The art of healthy living with physical impairments

Your comprehensive lifestyle guide to health and wellness

Anna-Carin Lagerström & Kerstin Wahman

Spinalis®

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Editor: Anna-Carin Lagerström
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Text adaptations: Kathryn Anne Sinnott Jerram
Proofreader: Dinah Geda

Instant Book, Box 49109, 100 28 Stockholm
info@instantbook.se
ISBN 978-91-86939-58-8

For information: anna-carin.lagerstrom@spinalis.se
www.spinalis.se

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Medical disclaimer

This book *The Art of Healthy Living with Physical Impairments* is a lifestyle guide. The information and tips provided are intended to inspire and motivate toward implementing healthy lifestyle habits. They are not intended to offer medical diagnosis or advice, or substitute medical or other professional health care treatment.

We subscribe to the idea that healthier food choices, increased and/or adapted physical activity, and mindfulness (all examples of the provided programs) can be used effectively to complement an already existing health care routine and are specifically important for people with chronic conditions/physical impairments.

Though we strongly advise you, the reader, to consult your medical or health care practitioner, physiotherapist, or another member from your rehab team whenever you feel uncertain. This being particularly so, before implementing any major change, such as excessive training or if you enrol in an excessive weight loss program (which we do not recommend). Do not disregard personal medical advice from a professional or delay in seeking it because of information given in this book.

The authors disclaim all responsibility for personal injury or other negative health conditions which are incurred as a direct or indirect consequence from the use or application of any of the contents in this book.

Foreword

Yet another book preaching the virtues of healthy eating and exercising the body? Yet another righteous publication repeating the horrors that will befall all of us gluttonous, lazy, and weak-willed couch potatoes? Please tell us something new! Furthermore, how can someone specifically direct such fire and brimstone toward persons with a disability? Isn´t it just plain humanitarian to let those off the hook who already have to cope with the 'slings and arrows of outrageous fortune'? Why not just endorse 'Live and let live'? Why problematize the sometimes only remaining pathways of pleasure? Why not just say 'Eat, drink, and be merry'?

Yes, why not indeed?

The mindset caricatured by me in the first paragraph was for many years, the tacit assumption of many health care professionals – not least us doctors. We felt somehow uneasy adding to the patient´s psychological burden by pointing out the perils of an unhealthy lifestyle. Some of us weren´t convinced that behavior was all that important for the well-being of our patients, and especially so for those who were living with the consequences of major trauma or disease. Perhaps we hesitated because we felt like kill-joys or callous moralizers. However, although such reasoning may not totally lack justification, research data showing the paramount importance of informed lifestyle choices are now so overwhelming that we are absolutely compelled to take lifestyle seriously. This is true for all persons and it is especially true for persons with a disability. The reason for the particular importance of lifestyle choices for persons with a disability is related to 'vulnerability'. A detailed explanation of the concept is beyond the scope of this foreword, but will be elucidated in the main text. Suffice to say here, that living with a significant disability will tax the body´s resilience against secondary and tertiary complications through several, mutually reinforcing stressors. One typical scenario illustrating this, is the following: After injury to the nervous system, the patient is paralyzed and thus immobilized which leads to cardiovascular deconditioning, decreased energy consumption, muscular wasting, risk for pressure wounds, osteoporosis, and blood clots. Decreased energy consumption easily leads to accumulated obesity and deranged blood lipids. Muscular wasting leads to insulin resistance, glucose intolerance, and possible development of diabetes mellitus. Obesity, immobilization, deranged blood lipids, and diabetes all promote development of hypertension and arteriosclerosis, and thus

cardiovascular disease… mutually reinforcing factors branch off and interact to create vicious circles of declining health. If we add to this picture: smoking, excessive alcohol intake, and other behaviors detrimental to health, we get a hint as to what 'vulnerability' means.

And this still isn´t quite the whole picture. Many persons with a disability have to use the functioning parts of their bodies excessively (for example, the arms in a person with paraplegia) in order to manage everyday living. Thus, increased and sustained 'wear and tear' will take its toll in the form of musculoskeletal disorders.

To complete the sketch of what 'vulnerability' means, and therefore how and why lifestyle management is of special importance in conjunction with disability, just imagine the added restrictions imposed by excess weight and cardiovascular deconditioning on independence in everyday life! It becomes crystal clear that lifestyle choices and consequences of behavior will make a substantial impact on health and well-being – both in the short and the long term perspective!

So there is no factual case whatsoever against us being thankful and appreciative for books such as this one. There are simply no valid arguments left for neglecting lifestyle – and especially so in the case of persons with a disability.

One more thing remains to be said. Lifestyle management is not merely a matter of laying facts on the table. We humans are no rational machines, often remaining blind to the most obvious things – and so here is the second big virtue of this book. Anna-Carin Lagerström and Kerstin Wahman are both very clinically experienced as physiotherapists and health coaches. They know that behavioral change must start from motivation. Their pedagogical approach, field tested over many years and distilled into this book, ensures that the persons they meet not only understand what to change but also why and most likely will want to do it. It´s only then, when the person himself has sufficient knowledge and motivation to make the necessary changes that our medical interventions come into their own.

I am convinced that whether you are a health professional, family member, assistant-helper, or want more knowledge for your own personal insight, you will benefit greatly from this book.

Umeå, April 2014
Richard Levi MD PhD
Professor & Chair
Rehabilitation Medicine
Umeå university
Co-founder Spinalis Foundation
Sweden

Introduction

Living a healthy lifestyle is fundamental for well-being; physically, emotionally, and mentally there are benefits to be gained for everyone. But scientific evidence tells us also that lifestyle habits become even more important when you live with physical impairments, such as a mobility disability. We know for certain from many years of clinical practice conducting lifestyle programs in rehabilitation settings, that through modified food choices, adapted regular physical activity, and the cultivation of a positive mindset, increased well-being is possible. Therefore, this guide to an active and healthy lifestyle is written primarily for you, those of you who live with a physical impairment and want more information, who are keen to get in better shape, and who have a desire for a healthy lifestyle and its positive effects. But it is also intended for family and friends, personal assistants, rehabilitation professionals, and primary health providers who want to advance their understanding.

Our intention with *The Art of Healthy Living with Physical Impairments* is to share our acquired knowledge and practical tips on this important topic and take the opportunity to address many of the lifestyle-related questions posed to us over the years. Infused in this is our commitment to compile, deliver, and spread evidence-based lifestyle programs on the subject and lastly but significantly, is our desire to honor the experiences shared with us by patients, program participants, friends, and colleagues who live with physical impairments and succeed every day with positive lifestyle changes.

Most of the information in this book is of a more general nature. It deals with health and lifestyle issues and the challenges that most people with physical impairments would acknowledge and recognize as having to address. But some information relates to specific issues for persons with spinal cord injuries (SCI). This is simply because we are most active within and most knowledgeable about rehabilitation following SCI. But whatever you are dealing with: paralysis, spasticity, limb amputation, multiple sclerosis, chronic pain, or similar challenges – we believe you will be able to make good use of the various health tools provided in this book.

It is our hope that this book will equip you with information, inspiration, and motivation to get started and that you will find the different programs and tools useful. We hope you will experience that new vitality is possible and not just for the things you have to do, but also for the things you want to do. In addition, you will be laying the best possible foundation for improved and sustained long-term health and well-being.

How to read this book

You can read each chapter without having to read the previous one. They stand for themselves. But, no matter what lifestyle changes you plan to make, our recommendation is that you take your time to read Chapter 2 *Motivation and Lifestyle Change.* To make a lifestyle change requires both commitment and time. In Chapter 2 we offer ways to plan, set goals, and gain insight into your feelings, values, and thoughts so they help, not hinder your progress. In a word, to ensure you succeed!

The story of this book

The Art of Healthy Living with Physical Impairments is the English version of the original Swedish book *Livsstilsboken – vägen till ett friskare och lättare liv för dig med rörelsehinder*, published in Stockholm in 2012. *Livsstilsboken* was part of the project *Life Competence – Aging with Physical Impairments* that was commissioned by the Spinalis Foundation with financial support from The Swedish Inheritance Fund Commission. Since 2012 the book has found its way to a wide readership and successfully been used as a textbook in several lifestyle programs within neuro-rehabilitation in Sweden.

This book, which has been further developed, came about at the suggestion of our New Zealand friend and colleague K.A. Sinnott Jerram from the Burwood Academy of Independent Living. It was Anne's interest and encouragement that provided the stimulus for this English adaptation. We are immensely grateful to Anne who gave us the necessary boost in confidence to take our Swedish notions to the English-speaking world where we hope the content is universally acceptable while retaining its Swedish origins.

We dedicate this book to all who are striving to improve their lifestyle day by day and thus become role models for others.

Stockholm, July 2014

Anna-Carin Lagerström
Kerstin Wahman

Anna-Carin Lagerström is a registered physiotherapist MSc, health educator, and nutrition counselor. She was responsible for the early introduction of health promotion in neuro-rehabilitation, specifically SCI rehabilitation in Sweden and has lead numerous R&D (research and development) projects in the field. With support from the Spinalis Foundation, she developed a concept referred to as the 'Spinalis Health Navigator®'. Anna-Carin's work is divided between conducting health dialogues with patients at The Spinalis Clinic/Rehab Station Stockholm and researching further development of the aforementioned concept. She is also frequently engaged as a lecturer and educator for health professionals both in Sweden and internationally.

'I would like to dedicate my part in this book to Carin Forsberg, my mother, who died in May 2011 at the age of 86. Mother lived with spinal cord impairment caused by an infection for more than half of her life. With her sunny disposition, positive attitude toward life, courage, and her inherent and uncomplicated approach to good health, she has been my inspiration and my personal role model.'

Kerstin Wahman is a registered physiotherapist, PhD. She is affiliated to the Karolinska Institute (Karolinska Institutet) and from June 2013 is head of the research and development unit at Rehab Station Stockholm. Among other projects, she is also involved in methods development and research in the area of health promotion within rehabilitation. Kerstin's PhD thesis focused on the need for a healthy lifestyle to reduce the risk for cardiovascular disease in persons with SCI. One of her latest projects aims to measure energy consumption in individuals with SCI and other neurological diagnoses, thus creating the basis for a future consumer-accessible database. Kerstin also has a keen interest in how mindfulness programs can complement the lifestyle panorama in rehabilitation.

'In the 1980s, I was given an opportunity to work with a non-profit patient organization RG Active Rehabilitation. That's where my interest in working with physical activity as a means to experiencing an active and independent life began to grow. Seeing firsthand how crucial lifestyle change can be, for an individual's health and quality of life, inspires me and gives me energy.'

Acknowledgments

In particular we thank Anne Sinnott Jerram, our friend and colleague from the Burwood Academy of Independent Living in New Zealand, who not only proposed the idea of a translation but also contributed hugely herself to the adaptations of the texts. Her personal engagement in this project, her knowledge and feeling for the English language, as well as insight relating to the topic and medical and academic notions have been indispensable.

Also in the background of this fruitful cooperation and significant support is the long standing relationship between the Spinalis Foundation, Rehab Station Stockholm and the Burwood Academy Trust in Christchurch, NZ.

Anne is a Research Fellow at the University of Otago Christchurch, New Zealand. She combines her research position with her role as the Research and Strategic Advisor, Burwood Academy of Independent Living, Christchurch, alongside her musculoskeletal clinical work in rural settings. The combination of these positions ensures that clinical relevance is maintained in her research and teaching, both in New Zealand and internationally. The geographical variation works well with living at Lake Waitaki where her retired GP husband toils on the family vineyards.

'My interest in Anna-Carin and Kerstin's work was ignited in Reykjavik, Iceland in 2007. It was a long way to travel for inspiration but it happened in a heartbeat. Their emphasis on Health and Wellness is essential and life changing. We hope the English translation retains sufficient Swedish flavor to influence lifestyle change with the passion that is the foundation of Spinalis & Rehab Station Stockholm.'

Without the advice, support, and contributions from colleagues and friends and especially from those people who shared their life experiences with us, it would have been impossible to write this book. So many of you have been involved and contributed with your specific knowledge in a myriad of ways. We apologize in advance if we have neglected to mention you. You have all been indispensable.

Thanks to those who contributed with facts, valuable comments, good advice, and encouragement: Anna Bjerkefors, Gerd Faxén Irving, Gunnar Krantz, Carl Mullally, Erika Nilsson, Helen Rönnegard, Anette Wilhelm, Madeleine Stenius, and Yvonne Svensson.

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Also, special thanks to Dinah Geda our proofreader, who with never ending enthusiasm tackled the texts and made them even better than the original version.

We thank Permobil, our top sponsor and Panthera AB, a valued contributor for their financial support in the production of this English version of our book.

We also want to thank all patients and participants that we have had the privilege of meeting and speaking to over the years. Your openness and generosity gives us the energy for this work.

Chapter 1

Our 10 Best Tips for Good Health

Good health is something we all strive for: an objective based on our personal requirements and abilities. For those living with physical impairments, there are special and specific circumstances to consider and with that acknowledgment in mind, these tips are provided to ensure you have the best chance of good health.

1. Try to maintain a healthy weight. Simply put, if you avoid excessive weight gain you will have an easier, more mobile life and minimize lifestyle complications. Whether you have a spinal cord injury, MS, or live with another cause determining your physical impairments, your *new* healthy weight is in fact lower due to loss of muscle mass. Of course this will vary according to the level of severity of your paralysis/impairments.

Naturally, lower levels of physical activity mean the body's requirement for energy is lower. This may mean that you need to reduce your energy intake to avoid weight gain. So keep an eye on the scales and adjust your calorie intake to your energy output, i.e. to what your body requires!

2. Eat fruit and vegetables several times per day. The equivalent of three handfuls of vegetables and 2–3 pieces of fruit (just over 1lb or 500 g) per day are recommended. Use the *Plate Method for Persons with Low Energy Expenditure* to be sure you are getting it right.

3. Exercise daily. Schedule strength training and cardiovascular exercise several times per week. A simple rule of thumb is to try to devote 30 minutes to practicing some type of physical activity every day. Besides reducing the risk for generally poor health, you will also be giving yourself the best possible

chance to manage daily chores and transfers. The bonus effects and health benefits of physical activity include decreased risk of depression, a reduction in stress levels, a likely reduction in pain, and a greater sense of well-being. It's a prescription for improved health!

4. Quit smoking. Smoking cessation lowers the risk associated with cardiovascular and pulmonary diseases. For persons with SCI there are additional reasons to quit. For example, your lung function may already be compromised and poorer blood circulation in the legs and feet increases the risk for pressure sores. Because nicotine has a powerful constricting effect on the blood vessels, circulation is further compromised. This increases the likelihood of skin breakdown while at the same time diminishing the capacity of the body to heal.

5. Drink alcohol in moderation. Pay attention to the amounts – how much and how often you drink. Watch out for 'those moments' where it is easy to have a glass or two of wine and then lose track of how much has been consumed.

In addition to the adverse consequences that can be linked to excessive alcohol intake and which apply to everyone (high blood pressure, cardiovascular disease, cirrhosis of the liver, etc.) there are particular reasons why persons with SCI should drink moderately. First, alcohol is a calorie trap and a lower metabolism is your incentive to be careful. Second, there is already an increase in the decalcification of the skeleton in those parts of the body directly affected by paralysis, so with the increased risk of fracture you cannot afford to take any chances. Just a little clumsiness during a transfer can lead to significant injury. Next, alcohol in combination with certain medications can also be a reason to be cautious. Finally, reduction in muscle mass means your body is less capable of processing alcohol – you simply cannot drink as much as before.

Recommendations for the general population:

- Women – Up to 9 standard drinks per week and no more than 4 on any one occasion
- Men – Up to 14 standard drinks per week and no more than 5 on any one occasion

6. Become involved with something meaningful and positive. Choose an activity outside your personal realm, aspiring to something that is 'bigger' than you. Become active in a pursuit that means something to you and where your life experience and knowledge are useful. Perhaps reconnect with friends from earlier in your life: those with whom you may have lost contact.

7. Work on your attitude toward life. It is not always obvious, but the important thing is not 'how things are' that governs whether you live a good life or not, rather 'what you make of it' (an old cliché, much more constructive in terms of mindset). Therefore, don't waste precious energy by getting stuck in negative thought patterns about the future or dwelling on the past or what might have been. You simply have no control beyond the present. Mindfulness and other awareness exercises are examples of how you can work on your attitude toward life in a concrete way. They will help you gain an awareness of the here and now, experienced with openness and interest.

By standard drink we mean: 12 fl oz (33 cl) of regular beer, 16 fl oz (50 cl) of light beer, 4–5 fl oz (1 glass) of red/white wine, 2.7 fl oz (8 cl) of dessert wine, or 1 ½ fl oz (4 cl) of liquor such as whiskey.

8. Reduce unnecessary negative stress. Positive stress in small doses is good – you feel challenged and get things done. More difficult and very important is trying to avoid protracted and debilitating negative stress. Take control in the here and now! Make 'to do' lists for the week/ month or tomorrow before going to sleep. Learn to say 'no' and try not to get stressed over things that are just not important. Identify and recognize which of the common 'thought traps' are yours – and maneuver your thinking around them!

Practice finding joy in everyday things and learn to relax. Easier said than done indeed! So find which method suits you best – and master the technique. Is it breathing, mindfulness, or meditation that helps you the most? Perhaps it is listening to your favorite music that brings you abundant joy and serenity.

9. Cultivate good sleep habits. It is during sleep that our body's cells are repaired and we recover from a hard day. Don't sit in front of the television or the computer until all hours of the night; it's important to get to bed at a decent hour. We all know that night time is worst for giving into temptation in the form of snacks, candy, alcohol, and cigarettes.

The best sleep potion besides a quiet, dark, cool bedroom is to go to bed without worries. So identify what makes you uneasy and what stresses you, then write an action list prior to attempting to sleep.

Most people need six to eight hours of sleep to feel good. If you are not getting your hours due to pain, spasticity, or because you must get up and go to the bathroom, a short nap during the day might help sustain you. Avoid drinking too many fluids during the evenings, especially coffee and tea as they have a diuretic effect. Remember that alcohol during the evening can cause wakefulness in the early hours of the morning and it can be difficult to fall back to sleep. And finally, if pain is an issue use appropriate medication or again, master a mindfulness or relaxation technique.

10. Do not be afraid to ask for help. There are many competent people out there, experts in a wide variety of fields who can help you establish and reach your health goals.

Some examples: dietitians/nutritionists, fitness trainers, physiotherapists, yoga and mindfulness instructors, occupational therapists, social workers, psychologists, and persons who work with different types of coaching or counseling.

When you seek help from experts within different health areas, it is not a given that they know that much about your particular disability. You need to be the expert on your health needs and inform them of your requirements.

Chapter 2

Motivation and Lifestyle Change

Regardless of what lifestyle change any of us want to pursue and what one's health goals are – whether it is to feel better, lose those extra pounds/kilos, start exercising, or finally make time for meditation – it will require determination, dedication, effort, and a lot of 'stickability'. Motivation is critical. It must be strong enough to turn desires into actions and strong enough to prevent us giving up halfway through.

Motivation is usually defined as the driving force behind a behavior or action. The driving force usually emerges when the gap between 'the way it is' and 'the way you want it to be' becomes apparent. Simultaneously one sees that a change is achievable. That is when the decision is made and motivation becomes real. Motivation is then nurtured through success.

Motivation is not something you either have or don't have. It is more of a process which changes depending on who you are with, the setting, and your particular situation or circumstance. The good news is – this is a process one can influence to a great extent.

This chapter deals with *how* to create the fundamentals for success; to create the motivation required for success with the lifestyle change. The examples are drawn primarily from the spheres of food and weight, exercise and training, and mindfulness and reprogramming of thought patterns because that is what this book is about. However, the principles and strategies described are universal.

'Motivation is everything! The most difficult task I face as a doctor is trying to get my patients motivated – as filled with sorrow as they are – to get them to go on, to see the light at the end of the tunnel, and to live life despite the hardships. I feel like half of my job is writing prescriptions and referrals; the other half is something I like to call the "magic drum" – an attempt to coax out of every patient that little something that can move them forward. If you fish long enough in the dark waters, you can usually find in each and every one of us some small embryo of something meaningful. Then you need to spend whatever time and energy it takes to support that little embryo, that little spark, so it gets enough oxygen for the flames to ignite and take shape.

Actually, you could say that I've built up an entire clinic around my own problems. This means of course that I understand what my patients are going through, how hard they have to struggle in all things great and small, their problems, etc. I've lived 27 years with my broken neck and I still feel that I have lived a good life even though it's a struggle every morning just to get my socks on – that in itself takes at least fifteen minutes. Sometimes I feel incredibly strong but often I try not to think too much about how my body is. If I did, I would probably never get out of bed. I've learned to live with my disability, even if deep in my heart I haven't accepted the situation. The thing that drives me, gives my life meaning, and motivates me is meeting others and doing something that feels important. Another driving force is to take on challenges and prove to myself that I can do them. Through being a role model, I try to give others a feeling of confidence in their own abilities and raise their self-esteem. The fact is, that confidence is contagious. Of course you have to organize your life so things work practically, otherwise it's just too hard. Sometimes that means you need to get help from others to make it work.

When it comes to seeing things through to completion and to help me reach my goals, my stubbornness and stamina help, as does my entrepreneurial bent. I tend not to see obstacles. Rather, I try to see opportunities and visualize outcomes. I invest a lot of time and energy in the things I want to achieve. If I decide something, if I'm passionate about it, then I give it 100 percent!

For me, a healthy lifestyle is not an end in and of itself, but I do have a sort of health compass. Most of all it's about keeping in shape, so that I have the strength to do what is required to maintain my quality of life. For example, if I were twenty pounds (ten kilograms) heavier, I wouldn't be able to do the things I want to do – it's that simple. Being out on the ocean is one such thing. The feeling of freedom when I am out on my sail boat is

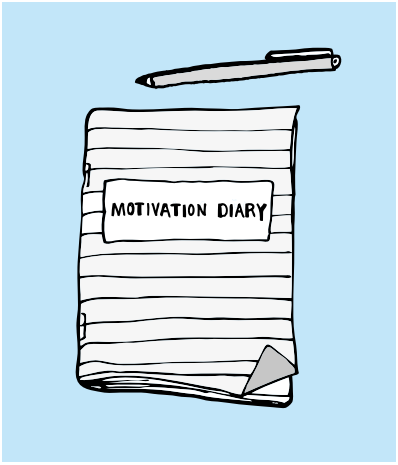
extremely important. Skiing is another – it gives me such joy. I just got back from one week of skiing (sit-ski, author's clarification) in the Alps with my 19 year-old son. Just incredible really, that this old man of 58 can be out and ski for a whole day!

I enjoy doing things together with others, like preparing delicious food for family and friends. But I am also good at being alone. I need to experience stillness and harmony in order to feel good.'

Claes 58, Tetraplegia for 27 years

Lifestyle changes – head work

To make lifestyle changes and succeed, primarily requires *head work*. It is essentially our thoughts, mental capabilities, and *values* that determine the outcome. That is why we must actively put time and energy into formulating strategies, setting goals, and putting our thoughts into words. Additionally, when such notions are written down it is easier to take them seriously and to respect them.



Motivation Diary

Under many of the headings in this chapter and for the various success strategies, there are exercises where you are asked to formulate your thoughts with words. These words become your guiding lights.

We encourage you to get a notebook which you can use as your personal motivation diary, where you do the exercises and write down your answers. You can also keep a motivation diary on your computer or in your mobile phone. Carefully prepared, well-formulated words and sentences that best describe your values, will help you to exploit your mental capacity for change and facilitate the necessary motivation.

Decision

One core requirement for success is that this is your decision for change – not because of others' expectations and wishes. It is also necessary that you perceive the desired change as important and that you have confidence in the process, i.e. you truly believe that you will succeed.

However as we all know, getting started is not easy even if you desire the change and think it is important. There are always advantages and disadvan-

tages to making a change. Otherwise let's face it, the change would have happened a long time ago.

In the following exercise, you will evaluate just how much you really want this change and whether you are prepared to make the necessary sacrifices. It is also a way to balance the demands you place on yourself relative to your ability and actual circumstances.

Take your time and do this simple exercise: 'Looking at the Pros vs. Cons.' Weigh up the pros and cons (benefits and sacrifices) against each other. You will be better prepared and better able to determine if this is the right decision at the right time

Looking at the Pros vs. Cons

Do this exercise on a big piece of paper or in your motivation diary.

1. Start by writing down all the advantages associated with your current lifestyle.
2. Write down any disadvantages that may arise if you make a lifestyle change.
3. Write down the disadvantages with maintaining your current lifestyle. Write down everything you can think of – big and small.
4. Write down all the advantages you can think of for making a lifestyle change. Try to avoid the types of arguments you find in magazines. Try to find arguments that come from within as to why you want to make this change.
5. Summarize

Pros vs. Cons

These examples are from various discussions about weight loss with patients in our clinics.

Lifestyle current situation		Changed lifestyle
1. Advantages with current situation Example: + like eating candy and fast food – they're good + immediate comfort	→	**2. Disadvantages with change** Example: – planning, organizing, and preparing proper food is time-consuming – healthy food is expensive
3. Disadvantages with current situation Example: – feel anxious and have a bad conscience – don't like and don't recognize my large body – heavy and difficult – afraid of developing diabetes	→	**4. Advantages with change** Example: + feel more satisfied with myself + feel more attractive + life will get easier + can change to a narrower wheelchair and we won't have to renovate the house + I can wear my old clothes again

Summarize your conclusions: .....
.....
.....
.....
.....
.....

Consider the advantages and disadvantages and see what conclusions you come to. If the advantages outweigh the disadvantages of making a lifestyle change, then it is time to make a decision and act on it. Remember that it is not the square with the highest number of arguments that wins, but rather how strong the arguments are, i.e. how important they are to you.

"You have to get to a place where you can see for yourself the point of exercising, more or less like I did. I reasoned that if I put some energy into this then my situation – which I thought was completely hopeless – would be just a little less hopeless."

Peter 36, Tetraplegia for 13 years

Planning and prioritizing

When it comes to changing habits in our daily lives, planning and prioritizing are necessary to create a more active and healthy lifestyle. After all there are only 24 hours in a day. Perceived lack of time is one of the most common excuses why we put off exercising or meditating, even though we may have decided to do so. What about you? Everything takes time when one has impairments and life is essentially more complicated. Basic tasks like getting dressed or personal hygiene can take up a large part of the day. It is therefore extra important that you plan, prioritize, and evaluate how you spend your time.

By planning, we mean that you make a concrete action plan that works practically in your daily life. For example, book a meeting with yourself in your calendar – say two or three times per week for 30–60 minutes of exercise or, if you are looking for time for meditation, create a routine where you sit by yourself every day for 10–20 minutes. Make these meetings just as important as your meetings with other people or work appointments. Create a meal plan for the week and stick to it. Don't go to the grocery store without a written shopping list. Stick to the list and avoid impulse purchases – they are bound to be convenience foods.

If it is difficult to find time for exercise, healthy food habits, or mindfulness exercises you may need to do an analysis of your week to allow you to prioritize.

Choose three days and write down exactly what you do and how much time you allocate for different activities. Then consider where you can cut down and ask yourself if there is anything that you can relinquish in order to free up time. Perhaps some of your tasks can be taken over by someone else. Try to identify your 'time thieves' – for example, watching TV or being constantly available on your mobile telephone.

Describe in your motivation diary how you will plan, prioritize, and free up time for your new habits.

One idea is to set goals according to the SMART principle

Within the sports world, where athletes often work toward concrete goals, the SMART concept can be used. There are various versions of SMART and we have chosen one for you to try. So set your goals according to the SMART approach and watch them become a powerful driving force to lift your motivation.

SMART goals are:

S	**Specific**
M	**Measureable**
A	**Ambitious**
R	**Realistic**
T	**Timely**

Specific – Goals should be clear and simple. Expressions such as 'I should' or 'I would like to' don't work. Concrete expressions which answer the classic questions *How? Where? When? What?* and *Why?* work, and will help you clarify your specific goals. Once you have a concrete plan, your brain re programs itself with new images of you and your new lifestyle. This makes it considerably easier to get started.

Measureable – By breaking your goals down into tasks, it is easier to make them measureable – for example, 'wheeling in my chair at least 30 minutes per day' or 'hand-cycling for 10 minutes x 2, three times per week.' Another example is 'eat breakfast' or 'meditate five times per week' or 'go to bed no later than 22:30 on week nights.' Use your imagination. Be creative and set measureable goals. Different types of tests are used to measure changes over time. Obviously, one of those is your weight. Use your training diary, food diary, sleep diary, weight log, or a fitness test test to keep track.

Ambitious – An ambitious and action-oriented goal means that you set the bar higher than usual and then decide that you will make it! Adopt a 'Yes I can!' attitude.

Realistic – The goal/s should be ambitious, but achievable with a reasonable investment of time, effort, or resources. Set your goal/s relative to your daily life and your priorities. Ask yourself if the goal/s is/are realistic.

Timely – It is important to establish a clear time frame for when the goal/s

"I always set goals that I know I can reach. I get such a kick out of it when I succeed, and I feel better along the way."

Bertil 46, Paraplegia for 22 years

should be achieved. Set a date for that achievement. It is also important to set deadlines for the tasks along the way so you can evaluate your efforts.

Formulate and write your goals and sub-goals in your motivation diary and check them against the SMART concept.

Feelings and stress

Most people who are overweight agree that their unhealthy eating habits and weight are not due to lack of knowledge but more related to feelings and stress. Stress can be the result of time pressure; that there are not enough hours in the day to eat regular, healthy meals and to plan for them. Food is not prioritized – the wrong food is eaten, too much food is eaten, and it is eaten too quickly.

The emotional side is much more complex. Many people eat to suppress feelings of anxiety, apprehension, and worry. Fatty foods and bad carbohydrates just like alcohol and nicotine stimulate feelings of pleasure and temporarily reduce anxiety and apprehension.

Identify situations which create stress or anxiety in your life and try to deal with them. Do not be afraid to seek professional help. Perhaps explore ways to alleviate uncomfortable feelings other than through food, candy, alcohol, or cigarettes. We do know that yoga and mindfulness routines reduce the experience of stress and anxiety. Another way is to repeat calming affirmations such as 'Everything is going to be okay.'

Write down in your motivation diary what you have decided and what you can do that is most likely to work for you.

Values and identity

Implementing long term change is very difficult if it conflicts with one's core values or identity – how one sees oneself. Identity is shaped through our daily choices – great and small. These choices are rooted in values, i.e. our basic belief of how things should be. Values develop in childhood and are influenced by the culture in which we live, how we are raised, and our own thought processes.

Our values and sense of identity can sometimes last beyond their 'use by' date. This means that we can make choices that are not well thought through. So in reality, our actions reflect old routines and habits. One example of a simple childhood habit is that you '*have* to eat up everything on your plate' regardless of how much is served.

Sometimes we have to consider whether our core values still apply and whether they should still rule our life choices – large or small. This can be especially important when life takes a new turn.

Consider whether you have any core values that can derail your ambitions for change. If you do, challenge and try to change them.

Word choice and inner dialogue

Our values and self-perceptions are frequently expressed through our language. Listen to your choice of words and inner dialogue. Do you often hear yourself saying/thinking 'I *am* the way I *am*' or 'I *am* sloppy/a smoker/lazy/an undisciplined person' or 'I *am not* the type who exercises.' If so, then it is as if your behavior were beyond your own control. You identify completely with your old (bad) habits and absolve yourself from being able to make any changes. Watch out for words like *always* and *never.* They are not conducive to change.

Critical factors for getting started with physical activity after a spinal cord injury

Strategies for thoughts, feelings, and behavior

- Find role models
- Set goals and get feedback
- Plan, prioritize, and create routines
- Recall earlier exercise episodes which were pleasurable
- Seek new knowledge
- Ask for help
- Get out and try different types of activities

Personal motivation

- Become and remain independent
- Be a role model
- Experience improved health and well-being
- Be willing to perform
- Look for identity within physical activity
- Seek to influence the body's outer appearance
- Create joy within a social network
- Desire to feel needed

New physical reference frameworks

- Learn to live within new physical limits
- Learning to listen to, understand, and adjust to your new body's limits and possibilities
- Learn new physical strategies

Approach to, and making the best of external factors

- Accessability
- Support persons, social network, and the attitudes of others
- Outdoor climate
- Economy and equipment

Source – Wahman 2006

Try to practice replacing words such as 'is', 'always', and 'never' to 'at the moment' or 'so far' when you talk about yourself and your habits.

21 days

Creating new habits takes time. If you succeed in establishing a new habit in your life and stick to it for 21 days, then you are well and truly on the right path. If you have managed to stick to your new habit for 100 days or approximately three months, then your chances of succeeding are excellent. When your new habit has been in place for six months or more, you will have succeeded in creating a new lifestyle pattern. So hang in there – the rewards are yours!

Challenge yourself with a new habit for 21 days. It can simply be something usual for you that needs freshening up. Make a plan and note in your motivation diary when you accomplish what you set out to do. Evaluate after three weeks – 21 days.

10 Strategies for Success

Here are 10 important strategies to maintain motivation and keep inspiration alive. These strategies have been gathered from the field of behavioral science. In our discussions about health with participants and patients and from our own personal experiences, we constantly receive confirmation that they work – that we can strengthen our motivation through working strategically on ourselves.

1. Look for information, develop knowledge, and gain insight
2. Be visionary
3. Examine your values and generate new ones if necessary
4. Explore your environment
5. Motivate yourself through planning and prioritizing
6. Believe in your ability to succeed
7. Find role models and seek support
8. Learn to avoid and deal with temptation
9. Don't allow yourself to lose your momentum due to a temporary setback. Get back on track!
10. Reward yourself

1 » Look for information, develop knowledge, and gain insight

Gather as many facts as possible about what you want to change and how they apply to your particular impairments. Examine the consequences of your current lifestyle and work out what you can achieve with change.

This book is a good start but there is also a wealth of information available on the internet, from various books and magazines, or through talking with health professionals. Explore this notion with your peers and find out what others experienced as they made lifestyle changes. Get tips on how the changes were implemented and especially seek to understand their challenges with busy schedules or such like. Think about how he/she overcame obstacles despite impairments.

Such acquisition of knowledge will develop your insight and the important reasons for change will become apparent.

Read through your arguments from the exercise you did on 'Pros vs. Cons' in your motivation diary and review whether you can expand them at all.

2 » Be visionary

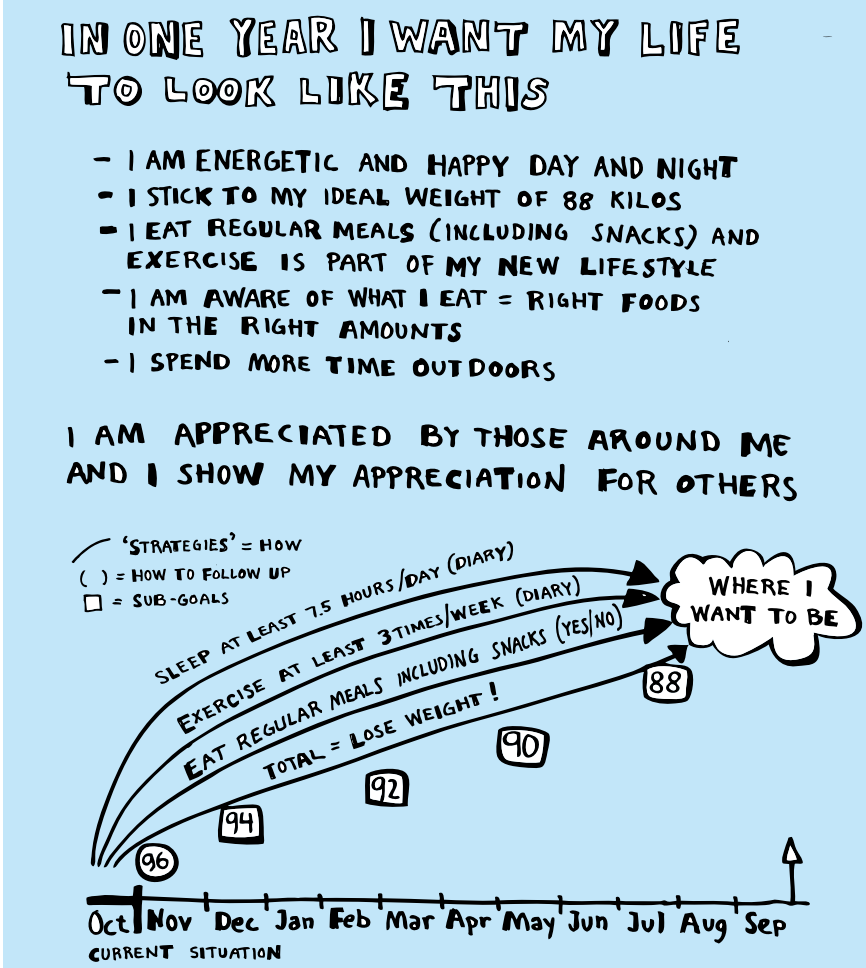
Thoughts and feelings pave the road to action. Create emotionally-charged and positive images of what you want to accomplish with your lifestyle change. If you do not have a clear and positive picture of what your new habits may give you, there is a risk that the change will be temporary. Use your cognitive reasoning and tell yourself 'I can do this!' And most importantly, look at your previous successes and learn from them.

Through visualization and affirmation, you 'trick' the brain. You create a new, healthier self-image and are less likely to fall back into old patterns.

Create a positive vision of yourself where your change is future reality. Write down or draw a picture in your motivation diary.

Örjan 67 years old, a paraplegic for five years, and used to setting goals in his private and professional life writes down on a piece of paper his vision for how he wants his future to be.

96 kg = 212 lb
94 kg = 207 lb
92 kg = 202 lb
90 kg = 198 lb
88 kg = 194 lb



3 » Examine your values and generate new ones if necessary

Consider whether your values help you to make changes or whether there is something within your core value set that could hinder this process. This is a significant inner exercise, as it concerns the big questions in life. Sometimes it can be difficult to ask these questions of yourself, so perhaps discuss them with someone you trust.

Put the following questions to yourself and write down your responses: – What should a good life include? – What is important in my life? – Can I choose my lifestyle myself? – Can I choose how I relate to various things in my life? – What am I responsible for? – How do I use my time (24 hours per day)? – Do I prioritize the things that are most valuable to me?

4 » Explore your environment

Your environment, both outdoor and indoor, can help or hinder your efforts to put into place your new, healthier habits. When it comes to exercise, it might be that your outdoor environment is not appropriate. Or when it comes to finding a quiet and secluded place for meditation, your indoor environment is not conducive.

When it comes to food habits, it is important to take a look at where you buy your groceries, what selection of products is available there, and how you get to the store. Also significant is where you eat – in front of the television, at the fridge, or at your kitchen table. Do you sometimes eat at a fast food restaurant? When it comes to taking stock of your surroundings, it usually also means extensive purging – to physically get rid of all food and drink that does not support your vision and desire for change.

When we talk about environment, we don't simply mean your physical environment. We refer to the emotional environment contained within it. Think about whether there are people in your life with negative attitudes toward fitness training, meditation, or healthy eating. The negative attitudes of others can affect your ambitions and decrease your motivation. When you explore your environment with curiosity and awareness you will strengthen your motivation to achieve your goals.

Review the various settings where you spend time and reflect on which can support you and how to avoid the ones where there may be obstacles.

5 » Motivate yourself through planning and prioritizing

Preparation and commitment are perhaps the most important factors in facilitating a fundamental lifestyle change. Strong will power is not enough. Doing the necessary preparation to really plan your days based on the desired change, prioritizing what needs to be done to create new habits, and goal setting demand 100% commitment.

Write down your action plan, your goals, and sub-goals in your motivation diary if you have not already done so.

6 » Believe in your ability to succeed

Build your self-confidence through a series of easily achievable milestones and make sure that you reward yourself for each, no matter how small. By taking small steps initially, followed by success, you will feel encouraged and

get encouragement from others.

Other good tactics to build self-confidence:

- Make a list of your most important strengths, the ones that will help you achieve your goals – for example, 'I am good at asking for help' or 'I am good at following through on planned activities' or 'Once I've made up my mind I never quit.'
- Document your successes – preferably every day if you feel that you need to.
- Ensure you get encouragement from others.

7 » Find role models and get support

We all need role models, people we identify with and who lead us down a new pathway. Consider who could be your role model. Go through the persons closest to you – your family, friends, and work colleagues. If you cannot find anyone appropriate and cannot think of anyone, contact consumer groups or local sports associations or a rehabilitation center. They will be able to help you broaden your networks.

Interestingly, research has shown that it is just as important *to be a role model* once you are well on your way with your new habits. This strengthens your self-image. Consider the extent to which you can be a role model and how you affect those closest to you when you choose a healthy and sustainable lifestyle.

Consider where you may find support – individuals, groups, or organizations. Also consider those who may think of you as a role model. Note it in your motivation diary.

8 » Learn to avoid and deal with temptation

Many people know themselves so well that they can figure out their weaknesses in advance. They know which situations, persons, environments, time periods, or thought patterns can lead them astray. Others need practical experience. Just as important as *avoiding temptation,* are strategies to *handle situations* which cannot be avoided, in the best possible way.

Consider what tempts you and what prevents you from reaching your goals and note in your motivation diary how you can avoid and handle these situations. Use your imagination and above all, seek to break habits. Remember that you and you alone are responsible for yourself.

"I believe the most important thing is to not give up when things get tough and you're sitting there after having eaten all that stuff you weren't supposed to eat. You have to see setbacks as part and parcel of the training and just start fresh the next day! To put it simply – be patient with yourself!"

Örjan 67, Paraplegia for 5 years

9 » Don't allow yourself to lose your momentum due to a temporary setback. Get back on track!

For most people, the distance between thought and action is not linear. The fact is that most change processes are accompanied by relapses back to old habits and patterns. A pause in training can be necessary due to an inflamed tendon or muscle, a pressure sore, or a UTI. However, this does not mean that your earlier efforts have been wasted. It is important that you see attainment of your goals as a work in progress and that you are patient with yourself. Tell yourself that *practice leads to proficiency* and that *no one is perfect*. Avoid getting hung up on all-or-nothing thinking such as, 'Now that I've fallen off the wagon, there is no point in continuing' or 'I smoked and ate too much yesterday so I may as well just keep it up today.'

If you notice that you are not acting according to your plan, go back to your motivation diary. Read, reflect, and make new decisions. Perhaps you need to revise your earlier plans, goals, and activities so that they work more practically toward success on a daily basis.

10 » Reward yourself

Plan for rewards before you even begin your lifestyle change. Give yourself rewards when you exercise, eat right, or meditate as planned. It can be anything from complimentary thoughts to material things. Choose rewards that are good for you – both in the short and long term. Treat yourself to some little luxury that you would not otherwise have such as a massage, going to the cinema, or buying new training clothes. Do not reward yourself with the habits you are trying to change such as candy, fatty foods, alcohol, cigarettes, or time on the sofa!

One tip we received from several participants is to put away a certain amount of money for every exercise session that you follow through on. After five sessions, you have enough for a small reward and after 25 sessions, you have enough saved for something you have been longing for.

Note in your motivation diary how you plan to reward yourself and what you must achieve to get the reward.

The Change Process

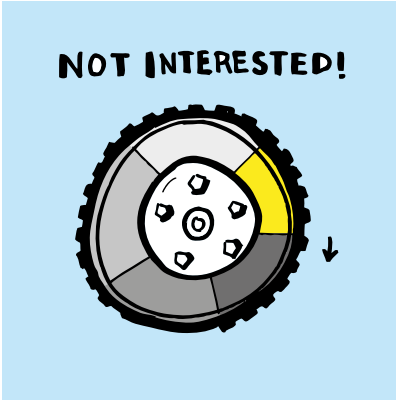
Behavioral change is often described in terms of a circle with five different phases. The first phase is *denial*, the second is *contemplation*, the third is *preparation*, the fourth is *action,* and the fifth and last phase is where you strive to stay on track, i.e. the *maintenance phase*.

It is not a given that you will travel in one straight line from phase to phase. Often, we get started just to fall back into old habits if motivation dwindles or the timing is wrong. But be assured that no one falls all the way back to the first phase of denial once the process has begun.

Behavioral science and practical work in the health care sector have shown that some motivational strategies are better than others when it comes to helping people move from one change phase to the next. The same applies for those who are managing the change process themselves without the help of others.

Consider where you are in the change process and use the success factors which suit you best right now.

Denial Phase

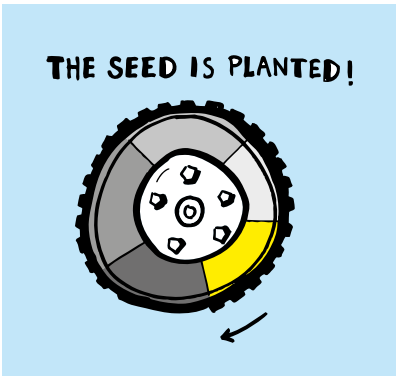


You are not interested in change. You think your lifestyle is fine as it is and you do not intend to make any changes.

Strategies for moving on to the next phase:
(This phase is about the strategies that concerned friends/family or health practitioners might use to introduce ideas when the person himself has not yet acknowledged the problem.)

- Look for information, develop knowledge, and gain insight
- Be visionary
- Examine your values and generate new ones if necessary
- Find role models and seek support

Contemplation Phase

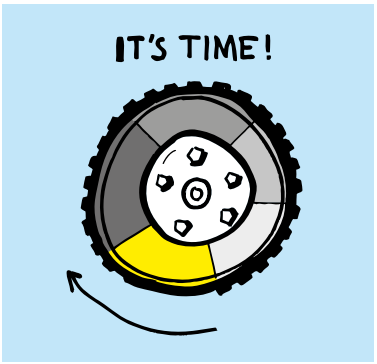


You begin to realize that aspects of your lifestyle are problematic and you feel concerned. You feel ambivalent and tell yourself that you have tried several times and nothing came of it. Still, you feel you should perhaps do something about your situation.

Strategies for moving on to the next phase:

- Look for information, develop knowledge, and gain insight
- Be visionary
- Examine your values and generate new ones if necessary
- Explore your environment

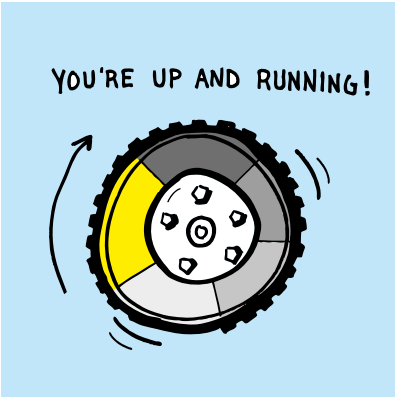
Preparation Phase



You are now certain that the advantages outweigh the disadvantages and you want to give change a serious try. You begin with concrete preparations. You make decisions, create a plan, and set a date when the change will occur. Perhaps you feel uneasy about how it will turn out. This is not unusual. What you can do is prepare yourself well. If you can, get help from someone with experience.

Strategies for moving on to the next phase:

- Explore your environment
- Motivate yourself through planning and prioritizing
- Find role models and seek support



Action Phase

You have shown yourself that you can do it. This is the outcome of the mental and practical preparation previously worked on. You are on your way and start to feel that you really want to get something out of this change. You have started to prioritize, plan, and write in your calendar in the same way you do for other important activities. You have changed your lifestyle but you are still pretty new at it.

Strategies for moving on to the next phase:

- Explore your environment
- Motivate yourself through planning and prioritizing
- Find role models and seek support
- Learn to avoid and deal with temptation
- Don't allow yourself to lose your momentum due to a temporary setback. Get back on track!
- Reward yourself

Maintenance Phase

You have arrived. Your new habits are now a natural part of life and are integrated with your identity. If you have been at it longer than six months then you know that no matter what happens around you, you will prioritize and create time for exercise, meditation, and/or healthier eating. Not because you have to, but because you enjoy it!

You think that you could lie back now and take it easy… but that is not the case. It will require ongoing effort to ensure that you do not fall off the wagon. Therefore, it is important to have strategies in place in the event you lose touch with your newly acquired healthy habits.

Strategies for maintaining your healthy habits:

- Motivate yourself through planning and prioritizing
- Find role models and seek support
- Learn to avoid and deal with temptation
- Don't allow yourself to lose your momentum due to a temporary setback. Get back on track!
- Reward yourself

Chapter 3

Food and Weight

Nutritious foods supply us with the strength and energy necessary to cope with our daily lives. They strengthen our immune defenses and help us stay healthy. This is true for all of us. The recommendations for people with physical impairments such as Spinal Cord Injury (SCI) are essentially the same as the recommendations for the general population, but they are just so much more important. Many persons with physical impairments experience secondary health complications. On top of psychological stress there might be problems such as pain, fatigue, bladder infections, chronic constipation, pressure sores, osteoporosis, obesity, and cardiovascular disease – all health situations that place additional demands on the provision of good nutrition. The recommendations primarily involve adapting eating habits to a more sedentary lifestyle and lower metabolic rate using nutrient-dense foods to nourish your body according to the concept 'less but better'.

In this chapter you will learn how to eat well, feel satisfied, and maintain or reduce your weight regardless of physical impairments.

It will help you:

- understand what happens to your metabolism after SCI or other physical impairments.
- learn what a good, healthy weight is and how to calculate and evaluate your Body Mass Index (BMI).
- discover the meaning of healthy eating and what to eat to maintain or decrease your weight if your energy consumption is low.
- learn about nutrition in relation to some common secondary health complications.
- put into practice different principles and tools for healthy eating/'less but better' : portion control based on the Plate Method for Persons with Low

Energy Expenditure, a method we simply call 'Amount of Food and Estimation of Calories', a Swedish diet known as Iso, and the use of a Food Diary. You will also find a short presentation of the American DASH diet.

Try this:

- Embrace the idea of being valuable and that your nutritional needs are specific. Simply put – be a bit more egoistic!
- Repeat to yourself, and learn by heart, some simple phrases explaining why 'less but better' applies to you and tell your friends, family, and any caregivers.
- Keep the principles and tools from 'less but better' in mind when you do your meal planning, when you go grocery shopping, or when eating out.
- Practice the principles when you do your own cooking: adapt your favorite recipes to your specific needs when creating dishes from the different food groups, carefully choose the amounts of the various foods, and of course be aware of portion sizes.
- Formulate realistic goals that you can reach.
- Conquer emotional eating.
- Seek advice and tips from peers and mentors.

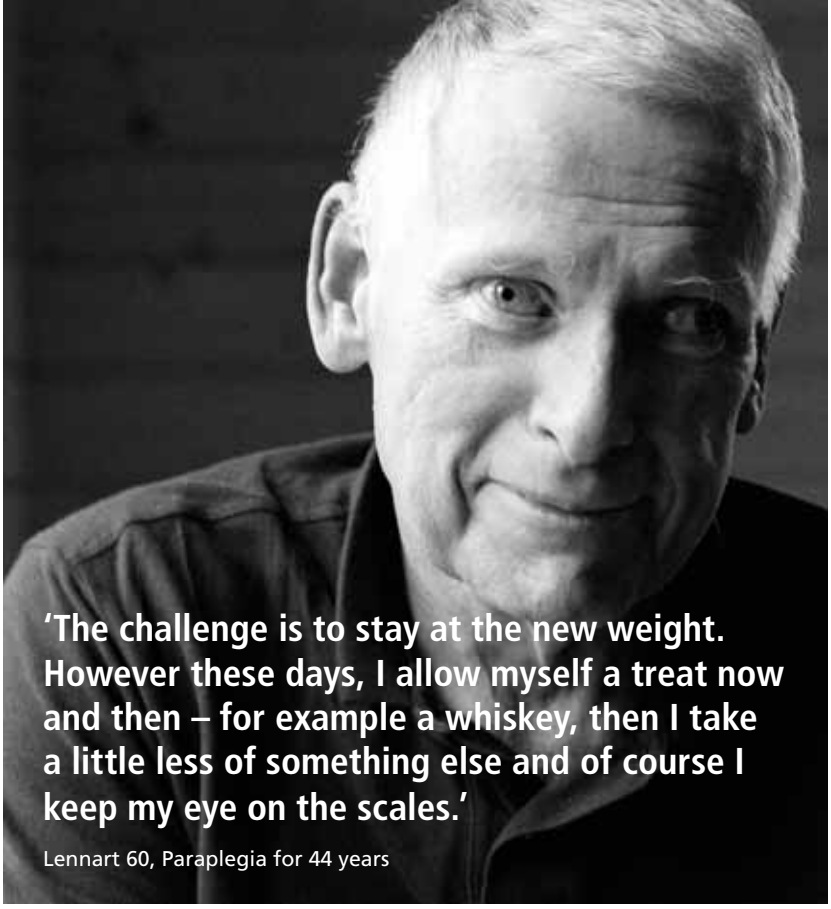
We specifically address those who have been living with physical impairments for some time but are otherwise healthy. *NB: If you are underweight or malnourished, or if you have an illness that requires a special diet, you should contact a dietitian/ your doctor/ a nurse who is knowledgeable about nutrition to find out what dietary recommendations apply to you before you implement any major changes.*

'I feel stronger and happier. I have never had as much energy as I have now!'

Lost 86 pounds (39 kg)!

Lennart Grånemo succeeded in doing what many believe is impossible. With self-reflection, insight, a firm decision to take responsibility, the acquisition of knowledge, and the support of inspiring role models along the way, he succeeded in losing 86 pounds (39 kg) in just a few years.

'I gradually realized that you cannot get rid of the extra pounds with just exercise. It requires a more comprehensive lifestyle change. I used to be a give-me-extra-of-everything kind of a guy – extra fries and extra Béarnaise sauce. I even used to have Béarnaise sauce on macaroni!



'The challenge is to stay at the new weight. However these days, I allow myself a treat now and then – for example a whiskey, then I take a little less of something else and of course I keep my eye on the scales.'

Lennart 60, Paraplegia for 44 years

Lennart at Tenerife in the late 1980s.

The most important factors were probably that I took the decision to become responsible – for example, by gathering information on how many calories there are in various things and starting a food diary. Support from people around me was also very important.

When I modified my diet, the pounds just started falling away. After one month, I had lost nine pounds (4 kg). After that it went a little slower.

I got really motivated when I was able to buy new pants and shirts and fitted into some of my old favorites that had been hanging in the closet for years. It also felt fantastic that my transfers got so much easier. Now I can get into cars, taxis, and airplanes without problems. I remember how difficult it used to be. Another bonus is my new wheelchair – it's smaller and lighter. When you add it all up, life is just so much easier.

I feel stronger and happier. I have never had as much energy as I have now. Plus, my doctor says I don't need medication for high blood pressure anymore. My blood pressure is perfect!'

Lennart got serious about his weight a few years ago. He has successfully maintained his new weight of approximately 134 pounds (61kg) and no longer needs to be quite as strict with himself.

LENNART'S RECIPE:

'This is what worked for me!'

- Count calories. (I tried to keep myself between 900–1,300 calories per day.)
- Keep a food diary.
- Take small portions.
- Eliminate most things that contain sugar.
- Drink water with your meals.
- Eat regular meals.
- Weigh yourself at least once per month.
- Try to find fun things to do instead of sitting at home feeling sorry for yourself and snacking on candy and chips/crisps while watching TV.

A reduced metabolic rate means fewer calories burned

Following SCI or other physical impairments, the metabolism slows drastically, specifically if there is significant loss of muscle mass. Research and our clinical experience have shown that persons with SCI may need to reduce the energy content in their food by 25–50 % from previous levels to avoid unwanted weight gain.

The rate at which calories are burned by the body governs the need for energy or fuel. Think of it in terms of an 'engine'. Factors which determine the size of the engine and its energy requirements:

- *age* – children and younger persons have higher energy requirements/faster metabolic rate than those who are older.
- *gender* – in general, men have higher energy requirements than women because of their greater lean muscle mass.
- *body composition* – a person with large muscle mass requires more fuel and has a faster metabolic rate than the same person with less muscle mass.
- *level of activity* – increased physical activity requires more energy than being sedentary.
- *a genetic component* that influences the metabolic rate.

Three factors that affect an individual's metabolism

The amount of fat-free body mass. This is the factor which governs the basal metabolic rate to the greatest extent (70–75%). Basal metabolic rate means the amount of energy required to sustain life, to ensure the proper function of all cells in all organs, and to maintain your heart beat. It is in the fat-free or lean body mass that metabolism takes place. A large body with a high proportion of lean muscle mass has a higher basal metabolic rate (a larger 'engine') than a small body or a body with less lean muscle mass.

Physical activity. To some extent, it is possible to influence and raise the metabolic rate by increased physical activity.

Thermal Effect of Food (TEF). Approximately 10% of energy use is through TEF. This is the energy required to digest food and produce heat in the body. This effect can only be influenced marginally.

Energy requirements relative to gender, age, and physical activity level – general population

Physical activity level	Age	Estimated calories required per day
High level of activity:		
Men	18–30	3,200 calories
	31–60	3,000 calories
	61–70	2,600 calories
Women	18–30	2,500 calories
	31–60	2,400 calories
	61–70	2,200 calories
Medium level of activity:		
Men	18–30	2,800 calories
	31–60	2,600 calories
	61–70	2,300 calories
Women	18–30	2,300 calories
	31–60	2,100 calories
	61–70	1,900 calories
Low level of activity:		
Men	18–30	2,500 calories
	31–60	2,300 calories
	61–70	2,000 calories
Women	18–30	2,000 calories
	31–60	1,800 calories
	61–70	1,700 calories
Very low level of activity/wheelchair users:		
Men		1,700 calories (detailed information is missing)
Women		1,500 calories (detailed information is missing)

Scientific studies regarding energy consumption after Spinal cord injury are conducted at Rehab Station Stockholm and will be published. – Wahman

The figures given should be taken as *very approximate* guidelines. There are those with a considerably faster metabolic rate but there are also those who have a significantly slower metabolic rate. For example, able bodied elite athletes can require up to 7,000 calories per day during intensive training periods, while persons with comprehensive paralysis can have an even considerably lower requirement (down to 1000 calories – or even less) than what is given under the heading *Very low level of activity.*

So how much fuel do you need?

Go through the activity levels and consider which square in the table best describes you as you were before your injury/illness and where you fit in now. Here, you will find the clues to the adjustments you need to make to your energy intake in order to maintain a healthy weight.

…while persons with comprehensive paralysis can have an even considerably lower requirement (down to 1000 calories – or even less)…

Conclusion:

Not only does the lower level of physical activity after an impairment resulting in muscular paralysis for example, affect the body's metabolism, but also the decrease in lean muscle mass.

'I have been injured for more than ten years and always actively exercised, both in the gym and outside rolling my chair, trying in this way to lose my extra pounds. I believed that if I just kept exercising I would be able to continue eating the same way I always did. Now I have started to realize that it is not through exercise that I will lose weight. Upper body training with strength and aerobic fitness segments simply does not burn the calories that I thought it would. I realized that I would also have to reduce my intake of calories.'

Statement from one of the participants in the Weight Group at Rehab Station Stockholm/ The Spinalis Clinic (a rehab center in Stockholm).

Concrete energy adaptation

Prior to an injury/illness, this can sometimes work (if one is an 18-year-old male and/or athlete).

Post injury/illness, it's not only the adjustment of calorie intake that is important but also being able to distinguish between daily food habits and special occasions, i.e. foods you rarely eat or 'treats'.

Information from www.mcdonalds.com

Weight and weight gain

Worldwide, excess weight and obesity issues have more than doubled since 1980. There are many and complex explanations for this development. But to put it simply – we consume more calories. Portion sizes have grown and much of what we eat and drink is far too energy dense. Soda, ice cream, candy, cookies, chips, which were earlier perceived as an occasional treat and only brought out on special occasions have become cheap, easily accessible, every day dietary items. The food industry all around the world supplies consumers with cheap, highly processed foods (often high-fat, high-calorie, and made with refined white flour instead of whole grain). We have also become more sedentary. This development, with the major negative impact it has on health, hits individuals with restricted mobility even harder.

SCI and weight

From the four corners of the world, we hear reports about weight gain and obesity in persons with SCI. For example, a study in the Stockholm area showed that approximately 75 percent of participants in the study were overweight or obese. The purpose of the study was to examine risk factors for cardiovascular disease in paraplegia. Similar weight issues have been reported from groups with other disabilities.

Besides the change in lifestyle and consumption patterns in society as a whole, an important factor associated with weight gain following SCI, is the slowdown in metabolism. Other factors may be of a psycho-social nature – for example, the changes in daily life occurring with the loss of structure provided by employment, the loss of a daily schedule, and thus the loss of obligation to get up early in the mornings. Other reasons may include depression, lack of motivation, and side effects from various pharmaceutical drugs.

Weight gain as a side effect of certain drugs or groups of drugs

Two examples of groups of drugs that can lead to weight gain are antidepressants or the SSRI preparations and certain morphine preparations used to treat long-term pain caused by for example, nerve damage. Both these groups of drugs increase appetite which contributes to weight gain. Another medication which can also contribute to weight gain is Baclofen, an antispasticity drug. A reduction in muscle activity means a reduction in energy use. If the energy intake is not similarly reduced, weight increases.

Facts

Undesirable low weight/underweight and malnutrition

For people living with SCI or other physical impairments, losing too much weight is uncommon, but does happen. Underlying causes can be illness, medication, addiction, depression, and/or eating disorders. The term 'underweight' describes a weight considered too low to be healthy; a situation which may be indicative of malnutrition and for example, will increase the risk for pressure areas. Because weight loss associated with nutritional deficiencies is a problem area which already receives attention from the health care system, we will not deal with it further in this book.

NB: Low body weight is not synonymous with malnutrition. Read more about healthy food, BMI, and weight classes for persons with SCI in the pages that follow.

Some tips though, if you want to gain weight:

When increasing calories, avoid foods with high sugar content (sugar feeds bacteria) and processed foods. Consume whole grain breads and whole grain pasta and foods with healthy fats such as avocados, nuts, olives, olive oil, flax seed oil, and salmon.

Try this:

If you have experienced sudden, unwanted weight gain and suspect that it may be a side effect of your medication, speak with your doctor. Ask if there are alternative medications without the undesirable side effects. Before you book this appointment, we suggest that you keep a food diary for one week in order to identify other possible reasons such as changes in your diet. You will find suggestions on how to keep a food diary later in this chapter. Compare your notes with the check lists in Amount of Food and Estimation of Calories in the Toolbox.

A common weight trend after spinal cord injury (SCI)

'I injured my neck in a diving accident and became totally paralyzed in my legs, torso, and to some extent even my arms. Before the accident, I had a normal weight for a 23- year-old male. I weighed 157 pounds (71 kg) and was completely happy with my weight relative to my height of 5 ft 8 in (177 cm). I had never really even thought about how much I weighed. Initially after the accident, I lost 22 pounds (10 kg). But I gained those pounds back relatively quickly during the first years after the accident. Ten years later, I had gained another 22 pounds (10 kg). Suddenly everything started to feel tougher. I weighed 179 pounds (81 kg) which was not all that visible, but I felt heavier and transfers were becoming difficult.

I didn't really notice the extra pounds, so the weight-gain problem just kind of snuck up on me. I had not weighed myself during those ten years, so I didn't really have any idea what had happened.

Now, I've lost 18 pounds (6 kg) through healthier eating without starving or suffering and by being a little more active. I feel stronger and lighter than I have in a long time and I am more aware of my weight.'

Peter 36, Tetraplegia for 13 years

The newly injured phase

Almost everyone with SCI loses weight in the acute phase immediately following the accident. Between 11–33 pounds (5–15 kg) is usual. This weight loss is the result of a decrease in the amount of muscle mass, fat, and water in the body. Just as with starvation, the body prioritizes using energy reserves in the muscles and stored fat to ensure survival of the vital organs. During

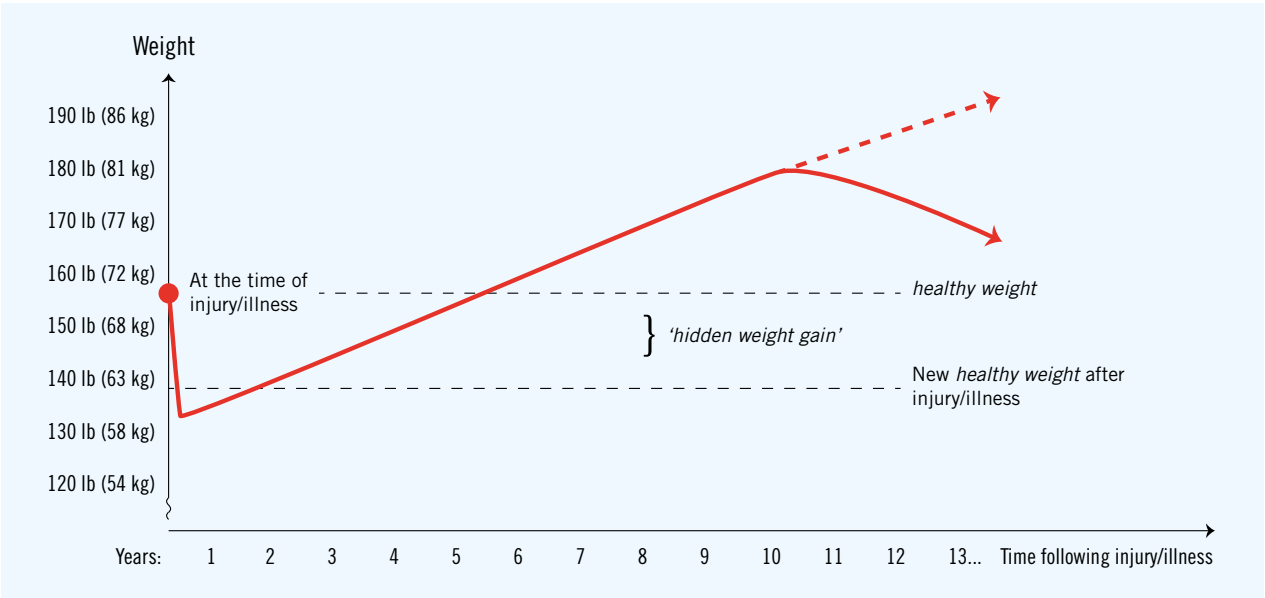
this stage, the entire health care system focuses on the patient recovering as quickly as possible. To this end, energy and nutritional supplements are given to reverse the weight-loss trend. The patient is weighed regularly and encouraged to eat energy-rich food.

The next phase

After the newly injured phase, there is a period of intensive rehabilitation where the person gradually improves after which he/she is able to go home. Weight often continues to increase. Because he/she is now considered medically stable, there is not necessarily a routine weight follow-up by the health care providers. Unnecessary weight gain can happen quickly and easily if information and encouragement are not given on how to adapt and decrease the calorie intake. In fact, many people will have already gained undesirable pounds by the time he/she returns to pre-injury weight. To weigh as much after the SCI as before, is a sign that former muscle mass pounds have been replaced by fatty tissues. We refer to this as 'hidden weight gain' because it is not always apparent on the scales or even to the eye.

Experience shows that if Peter had not reacted to gain control, his weight increase would have naturally continued. For example, on this same diet he would have gained at least another 22 lb (10 kg) every 10 years and so on…

Common weight trends after SCI, illustrated here using Peter's curve



The Weight Log is designed especially for wheelchair users who have access to wheelchair scales. The Weight Log and the concept of procuring a wheelchair scale for free patient access has been spread to many rehab centers in Sweden. It is an easy way of helping the wheelchair dependent person to 'keep an eye on weight fluctuations'.

Spinalis
Health Navigator©

Weight log

Weigh yourself regularly and use the Weight log to keep an eye on your weight trend (if you are able to use a regular bathroom scale, then by all means do so).

Weighing yourself with a wheelchair scale

- Weigh yourself while sitting in your wheelchair wearing your usual clothing and shoes – note the total weight.
- Find out how much your wheelchair plus seat cushion weigh = wheelchair weight.
- Subtract the weight of your clothing. As an example, subtract 4.4 lb (2 kg) for a larger person wearing jeans and a slightly heavier type of shoe or 2.2 lb–3.3 lb (1–1.5 kg) for a smaller person or if wearing light, summer clothing.
- Total weight minus the weight of your wheelchair and clothing = your body weight.

Measuring with a measuring tape

- Another way to keep an eye on your weight is to measure your waist – your waist circumference. This is where we usually store excess fat. Furthermore, research indicates that abdominal fat has a more negative impact on health than excess weight that is distributed throughout your entire body.
- Measure the circumference around your abdomen with a measuring tape at approximately the level of your belly button immediately after a normal exhalation.
- If possible, take the measurement while you are standing. Otherwise, measure while lying down. It is important that you do it the same way every time.
- According to the WHO, a man's waist circumference should be 37 in (94 cm) or somewhat less and preferably not exceed 40 in (102 cm). A woman's waist circumference should be 31.5 in (80 cm) or somewhat less and preferably not exceed 35 in (88 cm). Assessment of waist circumference is independent of height.

Wheelchair weight: _____ **lb (kg) + Clothing:** _____ **lb (kg) =** _____ **lb (kg)**

Date	Total weight	Body weight	Waist circumference

Spinalis®

'There is nothing more rewarding than when you start to notice that what you are doing is getting results. I like numbers and measureable results and that's why it's good for me to keep a diary. I use the Weight Log as a motivational tool.'

Örjan 67, Paraplegia for 5 years

Try this:

- Keep an eye on your weight; weigh yourself regularly. This applies for the rest of your life.
- Write down how much you weigh and draw a weight curve or keep a weight log. In this way you remain alert to fluctuations, mindful of which way things are moving, and more able to intercept undesirable trends.
- Be especially observant if your weight starts getting close to your pre-injury weight. That means it is high time to stop the trend!
- Estimate your new energy requirements and try to adapt your calorie intake.
- Use the adapted Plate Method and the checklists for Amount of Food and Estimation of Calories.

'Weight is definitely important! And that's probably why wheelchair manufacturers put so much effort into designing wheelchairs in light materials. Lightweight wheelchairs are popular because they are easy to lift, maneuver, and get around in.'

Statement from a participant at a health lecture.

Why watch your weight? Here's why!

There are many reasons why you should watch your weight. Excess weight and obesity negatively affect your health and well-being and in addition, they might reinforce the consequences of your injury/illness.

There is much to be gained from losing weight if you have a SCI or other physical impairments and are getting hefty!

» *All transfers become simpler* and it is easier to manage an active life. Your need for assistance may decrease, which results in an increase in personal freedom and independence. This means that the extent of your mobility disability diminishes.

» *The tendency to get pressure sores and skin complications* is reduced.

» *Shoulders and arms* are exposed to less wear and tear during transfers. This is true for wheelchair users and those who walk with crutches (for those who walk, there is less strain on weight bearing joints, i.e. ankles, knees, and hips). Essentially, extra stress on nerves, joints, and muscles with the risk for inflammation and accompanying pain is decreased.

» *Reduction in urinary incontinence.* Urine leakage worsens in individuals who are overweight or obese. A reduction in body fat reduces the pressure in the abdominal cavity and it is easier to hold back. A 'functional weight' also makes bowel and bladder routines easier.

How to find your BMI
– Metric measures

If you want to know your precise BMI and like doing a little math, use this formula:
BMI = weight (in kilograms) / height (meters) x height (meters). For example, a person whose height is 1.70m and who weighs 70kg will have a BMI of 24.2.

'Normal range/healthy weight' according to BMI 18.5–24.9 is as follows:
(Note that these weight categorizations apply to the general population, by which we here mean people without significant loss of muscle mass.)

Metric measures

Height Meters (m)	**Weight** Kilograms (kg)
1.52 m	43 kg – 58 kg
1.54 m	44 kg – 59 kg
1.56 m	45 kg – 60 kg
1.58 m	46 kg – 62 kg
1.60 m	48 kg – 64 kg
1.62 m	49 kg – 65 kg
1.64 m	50 kg – 67 kg
1.66 m	52 kg – 69 kg
1.68 m	53 kg – 71 kg
1.70 m	54 kg – 72 kg
1.72 m	55 kg – 74 kg
1.74 m	56 kg – 77 kg
1.78 m	59 kg – 78 kg
1.80 m	60 kg – 81 kg
1.82 m	61 kg – 82 kg
1.84 m	63 kg – 84 kg
1.86 m	64 kg – 86 kg
1.88 m	65 kg – 88 kg
1.90 m	67 kg – 90 kg
1.92 m	68 kg – 92 kg
1.94 m	70 kg – 94 kg
1.96 m	72 kg – 96 kg

- *Sleep improvement.* You feel more energetic. Overweight people sleep poorly and are more likely to snore. Additionally, this may contribute to involuntary gaps in respiration known as obstructive sleep apnea. This results in poor oxygen uptake and excessive daytime fatigue.
- *The overall quality of breathing improves when abdominal fat is reduced.* A big 'beer belly' creates upward pressure and prevents the diaphragm from contracting so that the lungs can expand. The diaphragm is the primary breathing muscle used when you 'breathe with your belly' concentrating on the lower portion of the lungs. This problem is particularly relevant for those with higher level tetraplegia where respiratory function is already compromised.
- *Decreased cardiovascular disease risk and other health risks.* Excessive weight gain or obesity, specifically when either are the result of unhealthy food consumption, increase the risk for certain lifestyle diseases. Abdominal obesity, resulting in an increase in waist size is considered especially dangerous. The risk of developing high blood pressure, fatty liver, insulin resistance, Type 2 diabetes, abnormally high levels of lipids in the blood, blood clotting, and cardiovascular disease correlates directly with increased abdominal girth. The fats from the abdomen's cells enter the bloodstream and negatively influence blood vessels, the liver, the release of insulin, and blood pressure. A number of other disease conditions correlate to excessive weight and obesity, including a number of cancers.
- *Lower risk of injury for those who assist you.* Obviously, those who assist you physically are more likely to develop problems with their backs and shoulders if you are overweight.

What is a good weight?

When we say good weight, we mean not just a weight that is healthy but also a weight that is functional. In other words, a weight that is manageable for you and which does not unnecessarily hinder transfers or an 'active life'.

'When I think about it, I managed myself much better ten years ago. I was 33 pounds (15 kg) lighter. For example, I had no problems taking care of my personal hygiene on my own.'

Spontaneous comment from a person in a wheelchair with a spinal cord injury attending a health lecture.

The general rule is that you ought to weigh less after your injury or illness than before. This is primarily due to the decrease in muscle mass but also a decrease in skeletal density. The parts of the skeleton which are not regularly subjected to body weight loading will decalcify.

Accordingly, if you have a spinal cord injury (SCI), optimum weight depends on the anatomical level of injury, the level of completion of injury, and pre-SCI body morphology (if you are a big or small person).

Body Mass Index – a way to evaluate weight from a health perspective

Body Mass Index (BMI) is used all over the world to evaluate weight relative to height from a broad health perspective. Its purpose is to provide a simple way to get an idea about whether an individual's body composition consists of an unhealthy proportion of fat, i.e. if the person's weight is healthy, too low, or too high. Since too little or too much body fat poses health risks, a simple evaluation tool is needed. Research shows that if a person's weight is acceptable according to the guidelines expressed for BMI, then the risk of weight-related health problems is low.

Weight classes

The World Health Organization (WHO) has set out four different weight classes for BMI in adults:

Underweight	BMI under 18.5
Normal range/healthy weight	BMI 18.5–24.9
Overweight	BMI 25–29.9
Obese	BMI 30.0 and over with three classes of obesity (I, II, and III)

BMI is a rough measurement and can be misleading

BMI is an assessment instrument which is most appropriate to study health-related issues in whole populations of people, but it is often used within healthcare. It is easy to use but also vague, which can be misleading. Body weight alone tells us nothing about body composition or percentage of fat relative to muscle. According to the WHO (World Health Organization), division into weight classes is accurate for 8 out of 10 persons in a general population. Our concern is that assessment using BMI is misleading for two specific groups of people: those with an unusually large amount of muscle

How to find your BMI
– Standard measures

If you want to know your precise BMI and like doing a little math, use this formula:
BMI= weight (in pounds) x 703/ height (inches) x height (inches). For example, a person who is 67 inches tall and who weighs 154 pounds will have a BMI of 24.1.

'Normal range/healthy weight' according to BMI 18.5–24.9 is as follows:
(Note that these weight categorizations apply to the general population, by which we here mean people without significant loss of muscle mass.)

Standard measures

Height Feet (ft) Inches (in)	**Weight** Pounds (lb)
5 (ft)	95–127 (lb)
5 (ft) 1 (in)	98–132 (lb)
5 (ft) 2 (in)	101–136 (lb)
5 (ft) 3 (in)	105–140 (lb)
5 (ft) 4 (in)	108–144 (lb)
5 (ft) 5 (in)	111–149 (lb)
5 (ft) 6 (in)	115–154 (lb)
5 (ft) 7 (in)	118–159 (lb)
5 (ft) 8 (in)	122–163 (lb)
5 (ft) 9 (in)	125–168 (lb)
5 (ft) 10 (in)	129–173 (lb)
5 (ft) 11 (in)	133–178 (lb)
6 (ft)	137–183 (lb)
6 (ft) 1 (in)	140–188 (lb)
6 (ft) 2 (in)	144–193 (lb)
6 (ft) 3 (in)	148–199 (lb)
6 (ft) 4 (in)	152–204 (lb)

Facts

The following values are usually given as guidelines for people with SCI:

- In cases of paraplegia: approximately 10–15 lb (4.5–7 kg) weight loss or approximately 7.5% of your pre-SCI 'healthy weight'.
- In cases of tetraplegia: approximately 15–20 lb (7–9 kg) weight loss or approximately 12.5% of your pre-SCI 'healthy weight'.
- In cases of partial paralysis where one can walk, there will not be such extensive weight loss because the mass of the body's largest muscles is maintained to some extent. The largest muscles are those of the thighs and buttocks.

mass (for example, body builders) and those with an unusually low amount of muscle mass.

Obviously, this applies to persons who have experienced loss of muscle mass due to SCI or other physical impairments. On one hand, people can be assessed as being underweight incorrectly (as having a percentage of fatty tissue which is too low) although their weight is actually fine. On the other hand, (and this is more common) you could be incorrectly assessed to be within 'Normal range/healthy weight' when you actually have a larger percentage of fatty tissue than what is considered healthy.

Adapted weight classes

In order to make assessments less misleading, a new tool has been developed with adapted weight classes. These new weight classes – Table II and III – take into account the estimated percentage of loss of muscle mass and bone mineral density in persons with spinal cord injuries.

Table I Weight classes according to the WHO (general population)

Persons with full muscle mass	
Underweight	< 18.5
Normal range/healthy weight	18.5–24.9
Overweight	25.0–29.9
Obese class I	30.0–34.9
Obese class II	35.0–39.9
Obese class III	≥ 40.0–

Tables II and III, with adapted weight classes for persons with comprehensive loss of muscle mass have been developed on the basis of others' research and own clinical experience. They should be interpreted very roughly. A-C Lagerström, Spinalis Foundation 2004

Table II

Persons with paraplegia (less 7.5% muscle mass)	
Underweight	< 17.1
Normal range/healthy weight	17.1–23.0
Overweight	23.1–27.7
Obese class I	27.8–32.3
Obese class II	32.4–36.9
Obese class III	≥ 37.0–

Table III

Persons with tetraplegia (less 12.5% muscle mass)	
Underweight	< 16.2
Normal range/healthy weight	16.2–21.8
Overweight	21.9–26.2
Obese class I	26.3–30.5
Obese class II	30.6–34.9
Obese class III	≥ 35.0–

Take Peter for example (a previous contributor in this chapter), before his injury he weighed 157 pounds (71 kg) and had a BMI of 22.5 which is a 'normal range/healthy weight' according to the WHO definition. Ten years after his SCI, Peter weighed 179 pounds (81 kg) with a BMI of 26. As Table III shows with tetraplegia, Peter was more overweight with a BMI of 26 than he would have been in the absence of the associated muscle loss. Accordingly, a new optimum weight for Peter would be approximately 137–141pounds (62–64 kg).

Try this:

Calculate your BMI and use the tables above to evaluate your weight in terms of the ranges provided. Be aware that the weight limits for each class should be taken as approximate. There are many factors at play when you consider your own weight. The most important thing is to feel comfortable.

NB: It is useful to calculate what your BMI was before your SCI. If you were previously overweight, it is even more important to find strategies to avoid weight gain given your new circumstances.

How to weigh yourself

Opportunities to weigh yourself are not always straightforward. Here are some suggestions when stepping onto regular bathroom scales is not possible:

- Chair scales may be available at your local health clinic.
- A scale attached to a hoist – for example, an industrial hanging scale that can be attached to a ceiling hoist or mobile hoist equipment.

A hanging scale attached between ceiling hoist and lifting strap/harness.

- An industrial scale with a platform works well if you want to weigh yourself in your wheelchair. Freight companies, laundries, or warehouses may have them. Vehicle inspection companies may have scales for weighing motorcycles. Veterinary clinics involved with large animal care may have suitable scales.
- A standard scales set can also be rebuilt to accommodate a wheelchair. Mount a firm platform onto the scales, perhaps a piece of plywood or aluminum.
- (NB: Check out one such solution at *www.spinalistips.se* under the heading *Take care of your health*.)
- A wheelchair scale – specifically designed to weigh a person in a wheelchair. Larger general hospitals (especially those with a dialysis unit), rehabilitation centers, or even some health care centers may have one. If not, try to convince them that they should!

Keep an eye on your weight by measuring your waist

An alternative and maybe simpler way to keep an eye on your weight other than using a scale is to measure your waist circumference. When your trousers are starting to get tight around the waist and difficult to do up, it´s a good idea to do a measurement!

Facts

Abdominal fat and the risk for cardiovascular disease

Research shows that excess fat deposited around the abdomen poses a greater health threat than fat distributed over the whole body. In particular, the risk increases in combination with other risk factors such as a sedentary lifestyle, high blood pressure, smoking, and unhealthy eating habits. Sleep deprivation and the effect of stress hormones during prolonged periods of stress have been linked to the development of abdominal fat. Additionally, reduced estrogen (oestrogen) contributes specifically to abdominal fat storage which is one of the reasons why it is easier for women to maintain a flat tummy before menopause. Take a look at the values listed on following page that apply to the general population but are considered applicable for persons with SCI or other physical impairments.

Waist measurement and risk for cardiovascular disease and diabetes

	Waist measurement	Risk
Men	Waist measurement of 37 in (94 cm) or less	Healthy
	Waist measurement over 37 in (94 cm)	Increased risk if other risk factors are present
	Waist measurement over 40 in (102 cm)	Significant increased risk
Women	Waist measurement of 31.5 in (80 cm) or less	Healthy
	Waist measurement over 31.5 in (80 cm)	Increased risk if other risk factors are present
	Waist measurement over 35 in (88 cm)	Significant increased risk

Try this:

Measure your waist with a measuring tape where you are narrowest and shortly after a normal exhalation. If you have a roundish belly, measure in the middle between the lower edge of your ribcage and your pelvic bone (iliac crest), at the approximate level of your navel. The reference values refer to measurements taken while standing. If possible, measure your waist while standing; otherwise you can measure while lying down. For accuracy, it is important that you always measure yourself the same way.

If your paralysis affects your abdominal muscles, the consequence is that the tummy tends to 'fall forward' when you sit. Essentially, this is the intestinal package which is no longer held in place by the abdominal muscles. This is not the same as abdominal fat. Check by measuring your waist while lying down.

If it bothers you that your tummy falls forward, try a soft corset to hold it in. This will also enable deeper breathing and help with postural support when sitting.

Healthy food and healthy eating habits when eating 'less but better'

Healthy eating is not just a question of *what* you eat, but also a question of *how much* and *how often*. We stated earlier in this chapter, that most persons with mobility disabilities are low energy consumers and need to reduce daily calorie intake to maintain a stable weight. Bluntly, this means that you ought to eat less than if you did not have a mobility disability. The margin for 'empty' calories is smaller, by which we mean ice cream, candy, cakes/muffins, soda, and chips/crisps. For optimal function and performance, it becomes more important to choose food that really contributes with all the important vitamins, minerals, antioxidants, and fiber. The requirements for improved 'food quality' increase and a 'less but better' rule applies from now on. By 'less' we mean less energy or fewer calories. Eating 'less but better' is not always obvious. In this section, we go through what constitutes healthy food choices and how diet can be adapted to suit persons with lower energy levels.

Some recommended diets

Dietary recommendations currently accepted within the scientific community, at least in Europe, are more or less identical to what has become known as the *Mediterranean diet*. A modern nutritional recommendation inspired by the traditional dietary patterns of Italy (particularly the south), Greece, and Spain. This is a diet rich in vegetables, fruit, nuts, fish, and fiber-rich grain products and legumes. It is characterized by low quantities of red meat (beef, pork, and lamb/mutton), refined sugary treats, baked goods, sweetened drinks, and industrially processed foods such as refined flour and ready-made meal items. The recommended source of fat is olive oil. Water is the main beverage at meals, but wine in moderation is an attractive characteristic!

Another dietary pattern known as the *Nordic diet* is considered a healthy option and is similar to the Mediterranean diet. Differences include rapeseed oil rather than olive oil and local fruit, with exotic fruits such as watermelon and figs being replaced by apples and pears. In Canada, Australia, and New Zealand, grape seed oil is a healthy and inexpensive oil alternative and there will be a greater variety of both local and exotic fruit.

The American *DASH diet* (Dietary Approaches to Stop Hypertension), an additional recommended healthy diet, was originally developed to lower blood pressure but has also been found to be good for weight loss. The DASH diet has many similarities to the *Mediterranean diet* as well as the

Facts

Dietary recommendations

NB: Where it says 'eat more of' in the recommendations means 'relative to everything else you eat'. It is still important not to exceed your individual energy budget.

Eat more food containing mono- and polyunsaturated fats

Foods containing monounsaturated fats:

- olives, olive oil, and grape seed oil
- eggs
- avocados
- almonds, peanuts, hazelnuts, and cashews

Foods containing polyunsaturated fats (especially Omega-3 and Omega-6):

Omega-3

- flax seed, grape seed, and rapeseed oils
- fatty fish e.g. salmon, herrings, sardines
- walnuts

Omega-6

- sesame seeds and sesame seed oil
- sunflower seeds and sunflower seed oil
- corn oil
- soybean oil
- walnuts, hazelnuts, and almonds

Eat less food containing saturated fats

- whole milk
- fatty cheeses
- cream and ice cream
- fatty meat products
- chocolate

Eat more food containing good sources of carbohydrates

- Legumes/lentils
- brown rice
- whole grain breads
- whole grain dinkel (spelt), wheat, quinoa
- vegetables, including root vegetables
- fruit

Eat less food containing bad sources of carbohydrates

- white sugar
- white bread
- soda and other sweetened drinks
- cakes/muffins
- candy
- white rice and white pasta

In brief:

Eat!

» Vegetables (e.g. carrots and broccoli)

» Protein-rich food (e.g. fish, eggs, chicken)

» Fruit (e.g. apples, oranges)

» Legumes (e.g. lentils, beans, and peas)

» Nuts (a variety of unsalted from the health food section of your food store)

» Good fats (e.g. olive oil, flax seed oil, coconut butter/oil, avocado, salmon and herrings)

» Whole grain products (e.g. brown rice and whole grain breads)

» Do not drink/eat, or avoid, everything 'white' – meaning sugar which includes sugary drinks and soda and white flour which includes bread and baked goods as well as restricting foods containing saturated fats!

Nordic diet as it is rich in fruit, vegetables, and whole grain products and limited in red meat, animal fats, and sugar.

The unhealthy alternative is often referred to as the *Western diet.* This is a diet which contains a lot of sugar and refined grain products (carbohydrates), highly processed factory-prepared and/or deep-fried food, and a low content of fruit and vegetables. Consequently, this is a diet which is associated with a variety of health problems including obesity, cardiovascular disease, and Type 2 diabetes.

Foods that protect

Amongst other ideas, a more recent point of interest is the role of inflammation in the development of some common diseases related to what we eat. Through healthy food choices we can to some extent, protect ourselves against inflammation and the problems it causes. This is where our choices

of fat and protein sources are important, as is choosing foods high in antioxidants.

- *Fat* which comes from fish (Omega-3 fats) has anti-inflammatory properties. The recommendation is to eat fish 2–3 times per week. For those who don't eat fish, the diet can be supplemented with fish oil.
- *Red meat* including beef, pork, and lamb/mutton in contrast, can increase the risk for inflammation in the body (according to supporters of the Mediterranean diet). For this reason, we recommend that you limit red meat to approximately twice per week.
- *Antioxidants* protect the body from harmful free radicals. This means that they protect against inflammation and damage at the cellular level. Antioxidants are found especially in fruit, vegetables, and berries. A good rule of thumb is the more colorful, the more antioxidants are present.

Specific recommendations

Here are some complementary recommendations which can be valuable for those with SCI and other mobility impairments. We do advise you to discuss with your doctor before initiating any major changes such as taking nutritional supplements or natural remedies on a regular basis. Then you can feel confident that there will be no problems due to overdosing or clashes with your usual medications.

Nutritional and vitamin supplements

As it seems difficult to avoid nutrient deficiencies when the caloric intake is low, you might be recommended supplements. This is especially true for someone who eats very little, who has difficulty consuming enough food, or who eats with little or no variation. These are the ones normally recommended: Calcium and Vitamin D (for bone health), Vitamin C (boosts your immune system and is good for your skin and muscles), Fish oils (contain Omega-3 which is good for your cardiovascular health and reduces inflammatory processes), Probiotics (help to maintain a healthy gut flora and regulate bowel function). For persons who do not eat meat or other animal protein, supplements of vitamin B12 are recommended. Multivitamins can be useful for overall health too as these contain the important nutrients: vitamin E, folic acid, selenium, and magnesium. NB: it is preferable that they do not contain iron or vitamin A (retinol) if you don't have deficiencies in either. They

Tip: One serving of salmon or other fatty fish, provides you with important Omega-3 fats and at the same time meets your vitamin D requirement for that day.

do more harm than good *unless of course* you have a particular need for them, and as many of you already know, iron supplements can contribute to constipation. Of course, all this in addition to our advice of wholesome food in general!

Good to know:
Omega-3 has blood thinning properties. Consult with your healthcare professional if you are on blood-thinning medication before taking Omega-3 supplements.

Water/ fluids

Drink 6–8 cups (1.5–2 l) of water/fluids per day (1 cup = 250 ml (approx.)/ 8 fluid oz). Water helps prevent constipation, supports kidney and bladder functions, and helps those with tetraplegia manage low blood pressure issues. Interestingly, drinking water makes it easier to maintain your weight as water reduces cravings for other more calorie-dense drinks and a good fluid balance will help you feel energetic throughout your day.

However, there is no reason to exaggerate your water intake. Moderation is best. To maintain your water balance, consider restricting drinks with a dehydrating effect such as coffee, tea, or alcohol. A sign of dehydration is urine that is dark with a strong smell.

Sweet, sour, and urinary tract infections

Preliminary research results suggest that a reduction in sugar consumption helps lower the incidence of urinary tract infections (UTIs) in persons with SCI. It appears that sugar inhibits the human immune system, which opens the door to infection. So specifically watch out for sugar, candy, soda, and juice if you have problems with UTI.

Here is a handy hint: Bacteria do not thrive in an acidic environment. Try pressing a little lemon juice into the water you drink to create a high acidic environment in your bladder. As a bonus, you will benefit from important antioxidants. Cranberries (and blueberries) are another proven means for prevention of UTI. They contain large amounts of compounds called tannins, which prevent E. coli bacteria attaching to the wall of the bladder. Besides fresh, dried, or frozen, cranberries are also available in tablet form and juice drinks. Choose real juice from a health food store as these do not contain as much added sugar.

Protein and healing of wounds

If you have pressure area problems, it is important to increase the amount of protein-rich food in your diet. Protein is needed to repair the body's cells. You may need to supplement in the form of a protein-rich nutritional drink.

Tip: Eggs are healthy and good choices of protein. You can have at least one per day – even with high cholesterol.

It is also important to increase calories for wound healing. When acting on that, choose healthy, energy-rich foods such as nuts, avocado, whole grain breads etcetera. If you decide to try or already use nutritional supplement drinks, make sure they are not too energy-rich as this might cause unwanted weight gain.

But beware if you have problems with your kidneys, you should be on a low protein diet. Check with your dietitian or doctor.

Is it necessary to consume extra protein to strengthen weak muscles?

If your diet includes a normal amount of protein, then it is not necessary for those who exercise normally to supplement. Research has shown that protein powder supplements do not result in increased muscle strength or endurance in a study conducted on persons with tetraplegia who had weak arm muscles.

However, those who train **very hard** may require increased protein. Interestingly, this need is most often met through responding to increased hunger feelings. Protein drinks can be a good supplement and snack for such individuals, but do refer to the warning above regarding kidney problems and protein. Another tip is to drink a glass of milk in conjunction with training. This provides you with protein and carbohydrates combining in a nice package that facilitates muscular recovery. You can find a protein drink recipe under the heading *ABCs of Weight Loss*.

Good to know:
Examples of foods which can cause hardening of feces/constipation:

- bananas (especially if unripe)
- pasta (well-cooked)
- rice (white)
- white bread (white flour)
- tea
- not drinking enough liquids

Examples of foods which can cause gas:

- onions, beans, lentils, cabbage
- whole grain breads and breads with a high percentage of fiber
- carbonated drinks

Tip: Cooked vegetables are considered to be less difficult for digestion than raw.

Food and the digestive tract

Many wheelchair users have problems with the digestive tract. Paralysis and extended periods of sitting lead to poorer action in the intestines and problems such as constipation or diarrhea, gas, and a bloated feeling are common. There used to be clear guidelines as to what was considered 'good food' for gastrointestinal health and what was best to avoid. These days, it is believed that recommendations should be individualized, as different people have different needs. For example, the recommended daily fiber intake for able-bodied persons is high but too much fiber can cause troubles for a person with SCI. Always get specific advice and start with small modifications so that your bowels have a chance to adapt to any changes in diet.

However, diet experts do agree that certain recommendations apply to the majority.

Do you have problems with constipation?

If so, you can try it like this:

- Take fiber supplements such as ground flax seeds and avoid processed foods such as white bread (contains very little fiber)
- Drink 8–10 cups of water/fluid per day
- Eat good fats (this helps lubricate your bowel and soften hardened stools)
- Eat dried fruit: prunes (also prune juice and purée) and apricots
- Eat fresh fruit: pears, plums, and kiwis
- Eat magnesium-rich foods (natural laxatives): bran, sunflower seeds, sesame seeds, and quinoa
- Orange juice and coffee are laxatives too

Tip: Drink 2–3 cups of juice on an empty stomach first thing in the morning if you are constipated.

Tip: Take the following healthy fiber supplements when you know you are not eating enough fiber-rich food and you are constipated. Don´t forget the water!

» Ground flax seeds

» Ground chia seeds

» Whole husk psyllium

Food intolerance

Food intolerance has become quite common. This happens when a food irritates the stomach and the stomach cannot properly digest it. You may have symptoms such as gas, cramps, and/or bloating. It usually comes on gradually and occurs when you eat certain foods in large quantities or often.
Among the most common foods that cause intolerance are lactose (a sugar found in milk/dairy), soy, and wheat.

Try this:

Keep a food diary and write down your symptoms. Try to figure out which food is causing you trouble and what you will need to cut back on. If you have a lactose intolerance you can buy lactose-free milk or take a lactase enzyme supplement.

NB: Food allergy is not the same as food intolerance. If you have a food allergy you need to stop eating the specific food altogether. Your doctor can help you find out if you have an allergy or an intolerance.

Tip: Increase the amount of fiber in your diet slowly to avoid excessive bloating.

Good to know:
Help the bacterial flora in your intestines to stay healthy – specifically important when using antibiotics.

Examples of fermented foods that are high in good bacteria:

- yogurt and kefir
- sauerkraut, miso, and pickled vegetables

'Someone tipped me to try eating a kiwifruit with my yogurt for breakfast. Not only does this up my daily dose of vitamin C and other antioxidants, which feels good, but I'm also very regular. No more constipation for me with hours sitting on the toilet waiting for something to happen! Talk about a bonus!'

Tommy 48, incomplete Tetraplegia for 4 years

What is your energy level?

If you want to eat well but have a low energy expenditure/consumption, there is simply no way to avoid considering just how many calories there are in various food products. It boils down to simple mathematics. If you eat more calories than your body uses, you will gain weight. If you eat fewer calories than what you burn, you will lose weight. If you eat as many calories as you burn, your weight will remain stable.

A sample calculation

If you eat and burn 2,000 calories a day, your weight will stay the same. If you reduce your energy intake by, for example 500 calories a day to 1,500 calories, your body will get the calories it needs by 'borrowing' it from stored body fat. If you eat 1,500 calories every day for one week (while still burning 2,000) you will loose one pound (0.45 kg) (minus 500 calories /day in 7 days = 3,500 calories = one pound (0.45 kg) of fat).

Good to know: 100 calories is the equivalent of one banana or a small serving of ice cream or ten potato chips/crisps.

If you consume 500 calories more per day in 7 days than what you burn, you will gain one pound (0.45 kg).

We are genetically programmed to store fat and the body's capacity to store fat knows no bounds; weight gain can continue throughout an entire lifetime.

For many, it is enough to abandon a *Western diet* and switch to a *Mediterranean* or *Nordic diet* in order to eat well and stop unwanted weight gain. For others, especially those with very low energy needs, more significant changes are needed. The guidelines developed for this book focus on those who fit the criteria for low or very low energy needs.

Which energy level best describes you?

For many persons with SCI or other physical impairments, 1,600 calories per day appears to be the right level for maintaining weight or keeping it stable (refer to the table under the heading *Energy requirements relative to gender, age, and activity level* at the beginning of this chapter). However, to lose weight you would need to reduce your daily intake of calories – for example to 1,400 or 1,200 calories per day.

As a comparison, 1,600 calories per day is the level recommended in many weight loss programs for the general population.

For many persons in our target group, 1,400 calories or 1,200 calories per day is reasonable for achieving weight loss.

For those with comprehensive neurological disabilities, 1,200–1,400 calories per day is reasonable for maintaining weight.
For a few individuals, 1,200–1,400 calories is too high. This may need to be reduced down to 1,000 calories per day to maintain or lose weight.

NB: However, if your energy turnover is this low and you want or need to lose weight, we strongly recommend that you seek professional help to ensure that your nutritional needs are met.

Tools for 'less but better'

Here are some methods to help adapt your diet to your energy level and ideas to 'eat less but better'. With the help of the Plate Method for Persons with Low Energy Expenditure, Amount of Food and Estimation of Calories, the Iso Diet, and the Food Diary, you will be able to make significant changes without feeling discouraged or abstaining from good food. Use one of the methods or let yourself be inspired by all four.

Some rules of thumb apply regardless of which method you choose:

- Reduce your fuel intake by eating less carbohydrates and fat relative to what is usual
- Increase the volume of vegetables/salads you eat to more than is usual

Plate Method – a simple strategy for daily living

As a way to make your daily life simpler, we dusted off the old Plate method and adapted it for low calorie levels. This method helps you to lose weight but also provides guidance on how you should eat for good health in the long run. The perfect strategy if you don´t like measuring food or counting calories!

Plate Method for Persons with Low Energy Expenditure
NB: This method has been developed especially for those with a small 'engine'. It is *not* the same as the method normally recommended for the able-bodied general population for whom other proportions and amounts apply.

Try this:

First, use a smaller plate. The part of the plate where the food is served should not be wider than 6 ½ – 7 ½ inches (17–19 cm) in diameter. Portions will appear generous even if the amount of food is less than what you are usually served.

Next, imagine that your plate consists of three parts: one large, which takes up half the plate and two smaller, almost equal parts for the rest of the surface. It looks a bit like this:

» The *vegetable part*. You fill at least half your plate with as many warm and/or cold vegetables (non-starchy from above the ground) as you like: tomatoes, spinach, broccoli, lettuce, etc. This becomes the largest volume-wise and helps ensure that you feel satisfied without adding unnecessary calories.

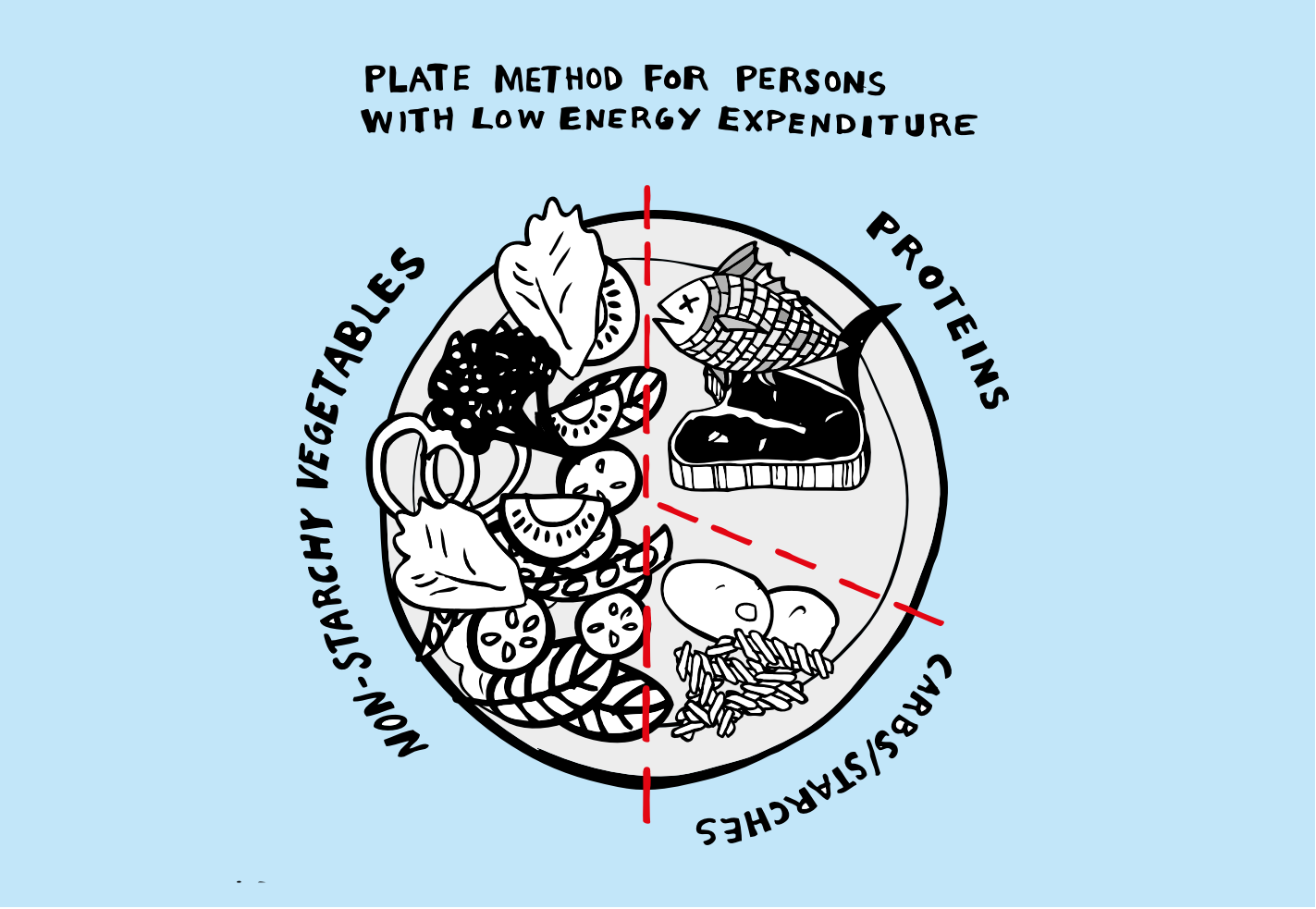
» The *protein part*. Your meat, fish, poultry, or egg/s serving takes up a little more than half of the surface that is left on your plate (the amount should be *slightly more than the size of the palm of your hand*).

» The *carbohydrate/starchy part*. Your pasta, rice, grains, potatoes, or other root vegetables serving or bread fills the rest of the surface of your plate (the amount should be *slightly less than the size of the palm of your hand*).

» *NB: Fat* intake occurs naturally in the various parts or can be added as required. This is the third important nutrient – the other two being protein and carbohydrate.

To help visualize the volume to eat of each nutrient, we use the concept of *the palm of your hand*. NB: In weight loss programs for the general population, the size of one's fist is often used to judge volume. However, for a person with very low energy expenditure this is frequently too much. The size of the palm of your hand (without your fingers) is slightly bigger than 1/3 cup = 3 oz (approx.) = 1 serving.

The picture with measurements gives you an approximate idea about proportions and what a portion size can look like for a person with low energy expenditure. Obviously, portion size is very individual. If you are not wrestling with weight gain, you may want to increase the volume of protein and carbohydrates a little. If you exercise a lot and use a lot of fuel, you will need to increase the volume of carbohydrates further. You will almost certainly feel hungrier and want to have a larger 'plate' (= portion).



'I was very active in sports until I got injured and I was used to eating larger portions. I found it very difficult to understand that my need for fuel dropped so much after the accident. The plate method has helped me to get my portion size straight.'

Peter 25, Paraplegia for 5 years

Try to maintain an image of the plate model with amounts and proportions in your mind's eye and use it every time you do or plan your grocery shopping and when you are about to eat.

Amount of Food and Estimation of Calories

In the Toolbox there are lists called *How Much You Can Eat in One Day.* There, you will find an approximate guide for various foods that can be consumed relative to calorie intake per day. Gradually, you will learn to estimate amounts without the need to check lists. There are two checklists: one for 1,300–1,500 calories per day and the other for 1,600–1,800 calories per day. Many of our patients and program participants like the lists and think they are easy to use and understand.

The Iso Diet – a low calorie diet

The Iso Diet is a low calorie, low carb diet designed for weight loss but which focuses on food for long term health. It is a Swedish concept that builds on a combination of weight loss diets from recent years. Iso is short for *iso caloric* – a diet where the calories come from equal parts of the three main types of nutrients: protein, fat, and carbohydrates.

It is our opinion that this diet can be a good alternative for persons with physical impairments and reduced energy expenditure. Essentially, you eat little, but as you get nutrients from all three different parts: protein, fat, and carbohydrates, the risk for nutrient deficiencies decreases.

The recipes and daily menus set out in this book are adapted to suit persons with very low energy expenditure who require a calorie intake of 1,200–1,400 per day. We present a framework for 1,200 calories per day with two snacks included for those who would like to stay at 1,400 calories per day. The idea is that our suggestions will lead to weight loss depending on which calorie level is chosen. However, they also serve as guidelines on how to think and plan for a healthier relationship with food for the rest of your life. This can be your new eating lifestyle!

If the servings in this book are too small for your needs related to how much you 'burn', then of course you will need to eat more. It´s the idea that's important!

The basic idea behind the Iso Diet is that a balanced meal should include all three macronutrients, together with a large share of something 'green' and preferably with some berries too. To plan meals that include all essential nutrients is especially important for those who eat very little. Fundamental to this diet is that food should give a maximum feeling of fullness per calorie, stabilize blood sugar, and that meals are spread out over the day.

Protein is the macronutrient which satisfies hunger the most (per calorie) and is a best friend to all who want to maintain or lose weight. Eating more protein-rich foods such as meat, fish, poultry, and eggs keeps you feeling full and helps you avoid temptation. Protein also helps stabilize blood sugar.

Fat is another macronutrient that keeps you feeling full. So don't *eliminate* fat from your diet, even though it contains a lot of energy. That said, do *reduce* the amount if your diet has been heavy in it.

Choose *carbohydrate-rich* food that contains *complex carbohydrates* with natural fiber – for example, eat whole grain breads. Complex carbohydrates raise blood sugar/glucose levels slowly (= low Glycemic Index (GI)) which is

advantageous in a weight loss context.

Simple carbohydrates raise blood sugar levels quickly (= high Glycemic Index (GI)) which is not helpful for losing weight. High blood sugar levels stimulate the body to produce insulin. Insulin has a variety of important functions, two of which are the storage of fat and to slow the rate of burning of stored fat when blood sugar levels are high.

You should therefore avoid foods that raise your blood sugar level in this quick way, especially foods that contain sugar and white flour – for example baked goods, such as cakes and cookies and also highly processed foods from the fast food industry. Neither one nor the other gives a feeling of fullness, so it becomes easy to eat too much. It is especially important to avoid sweetened drinks. Sugar from drinks enters the bloodstream quickly and raises the blood sugar level.

Regular meals spread over the day, prevent a drop in blood sugar and so help stave off hunger and cravings. This is especially important in a low calorie diet. If too much time elapses between meals, hunger and cravings take over and you will likely eat too much at the next meal. The more time that elapses since you last ate and the hungrier you are when you start your next meal, the longer it will take to experience a feeling of fullness. This increases the risk of overeating and/or eating the wrong things. When hunger and cravings take over, the body wants fast carbohydrates and fat. Both options are not especially filling and easy to overindulge in.

Most of the time, food items must be chosen separately to represent each macronutrient. However, some foods simultaneously contain two macronutrients and two examples are fatty fish like salmon that contains fat and protein, and beans that contain carbohydrates and protein.

Additionally, meals should include something *'green'* by which we particularly mean those vegetables that grow above ground: tomatoes, spinach, bell peppers, broccoli, lettuce, rocket, cucumbers, zucchini/courgettes, beans, peas, and leafy herbs like parsley, coriander/cilantro, and basil. Together with berries, all of these fabulous greens can be consumed in whatever quantity you wish as they contain few calories per serving.

To our American readers in particular, we would like to recommend you get acquainted with the DASH Diet. The DASH Diet has many similarities to the Iso Diet (as well as the Mediterranean and Nordic diets). It will also provide you with very low energy recipes for 1,200 and 1,400 calories, and you will find appropriate units of measurement for cooking as well as suggested specific local foods.

Tip: Some healthy snack alternatives (150–200 calories)

- 1 ½ cups sliced mango
- 1 small low fat granola bar and 1 apple (medium size)
- 2 tablespoons hummus, 1 oz honey whole-wheat pretzels
- 4 tablespoons hummus with 1 cup of raw vegetables such as sugar snap peas, cauliflower, or broccoli
- 1 ½ tablespoons peanut butter and celery sticks
- ½ cup low fat cottage cheese, 1 banana (medium size)
- Smoothies are also perfect snacks

Plan all meals to include foods that contribute:

- ***Protein*** – meat, fish, poultry, eggs, cottage cheese, or tofu (for those who prefer vegetarian).
- ***Fat*** – oil, nuts, avocados, or fatty sources of protein such as salmon, sardines, or herrings.
- ***Carbohydrates*** – pasta, rice, grains, potatoes, bread, fruit, root vegetables, or beans.

‘I have made some major changes when it comes to food – you might even say radical changes. I’ve received positive feedback from the scales. I’ve lost a little over 22 pounds (10 kg) but I have also had fewer urinary tract infections which means I take fewer antibiotics. I have had to learn a lot about food and it also required a lot of discipline.’

Sten 50, Paraplegia for 30 years and an active tennis player

Sten´s most important changes:

- Eat a breakfast of eggs and vegetables – for example, cucumber, tomato, and broccoli plus a little ham or tuna for the full feeling they give.
- Limit foods with a high carbohydrate content – for example, pasta, cereal, and bread.
- Limit alcohol and completely avoid refined sugar.

It is recommended that you spread your 1,200–1,400 calories over the day like this:

- Breakfast: approximately 300 calories
- Snack: approximately 150–200 calories (NB: Have two snacks per day, one in the morning and one in the afternoon, if you want to consume around 1,400 calories per day.)
- Lunch: approximately 400 calories
- Dinner: approximately 300 calories

Food from each Food Group: Protein, Fat, Carbohydrates

Here is a sample menu for one day at 1,200 calories with meals based on choices from each food group.

Breakfast: 1 slice of bread (preferably whole grain) or 2 slices of crisp bread/ crackers, scrambled eggs (2) + a 'smoothie' made from mixed berries, coffee, or tea.

Lunch: Pasta ½ cup (1.25dl = 0.12 l) (boiled) + meat sauce 3 ½ oz (100 g) + a large mixed leafy salad, water.

Snack: Low fat cottage cheese 3 ½ oz (100 g) + 5–10 nuts + as many berries or vegetables as you like.

Dinner: 3 ½ oz (100 g) salmon (steamed, boiled, or baked) + 1 ½ potatoes + steamed/boiled broccoli (as much as you like), berries for dessert, water.

Substitution lists for daily menus of 1,200–1,400 calories

Below you will find a description of how you can put together meals according to the idea of 'one food from each group' for a daily total of 1,200 calories. As mentioned previously, if your goal is 1,400 calories per day we suggest you have two snacks rather than one. This will bring you up to 1,400 calories with a maximum feeling of fullness.

BREAKFAST:

Sources of carbohydrates (choose from the following):

Crisp bread/flat bread	2 slices
Whole grain bread	1 slice
Oatmeal/porridge	½ cup (1.25 dl = 0.12 l) (when uncooked and can be eaten with ½ cup (1.25 dl = 0.12 l) skim milk)
Fruit	2 pieces

Sources of protein and fat (choose from the following):

Natural low fat yogurt	1 cup (2.5 dl = 0.25 l approx.)
Cottage cheese	3 ½ oz (100 g) (combine with 5–10 nuts)
Egg	2
Low fat (10%) hard cheese	1 ½ oz (40 g)
Ham/turkey/chicken	1 2/3 oz (50 g) (combine with 5–10 nuts)

Smoothies are easy to make. Mix all the ingredients in a blender and serve in a tall glass – delicious, nutritious, and filling!

PROTEIN DRINK/SMOOTHIE WITH A CHOCOLATE TASTE (180 CALORIES)

1 table spoon of dark cocoa powder

1 tablespoon of ground flax seeds

1 cup (2.5 dl = 0.25 l) of frozen or fresh strawberries

¼ cup/ 4 tablespoons of whey protein powder (can be chocolate flavored)

1 ½ (3.5 dl =0.35 l) cups of water

SMOOTHIE WITH BANANA AND HONEY (130 CALORIES)

½ banana

Dash of cinnamon

½ cup (1.25 dl = 0.12 l) of Greek yogurt

½ teaspoon of honey

½ cup (1.25 dl = 0.12 l) of almond milk

Sardines/tuna	3 ½ oz (100 g)
Berries	as many as you like

Examples of breakfast combinations

- 1 slice whole grain bread and scrambled eggs or cottage cheese + a small smoothie with mixed berries or just mixed berries
- Fruit salad with cottage cheese or cheese sticks + a small smoothie with mixed berries
- Cottage cheese and yogurt + berries and nuts
- Oatmeal/porridge with berries and an egg or cheese on the side

LUNCH AND DINNER:

Sources of carbohydrates (choose from the following):

Potatoes	1 ½ pieces/meal
Rice (boiled)	½ cup (1.25 dl = 0.12 l) /meal
Bulgur (boiled)	½ cup (1.25 dl = 0.12 l) /meal
Couscous	½ cup (1.25 dl = 0.12 l) /meal
Pasta (boiled)	½ cup (1.25 dl = 0.12 l) /meal
Beans (boiled or canned)	1 cup (2.5 dl = 0.25 l) /meal
Root vegetables	7 oz (200 g)
Fruit	2 pieces (medium sized)

Sources of Protein and fat (choose from the following):

Fatty fish (salmon, sardines, herrings)	3 ½ oz (100 g) /meal
Fattier meats (mince/ground beef/pork)	3½ oz (100 g) /meal
Egg	2 per meal
Tofu	5¼ oz (150 g) /meal
Lean white fish	3½ oz (100 g) /meal – combine with a fat source
Lean meat (sirloin/fillet)	3½ oz (100 g) /meal – combine with a fat source
Shellfish	3 ½ oz (100 g) /meal – combine with a fat source
Chicken	3½ oz (100 g) /meal – combine with a fat source
Soybeans	7 oz (200 g) /meal (half the carbohydrate quota if you choose these)

Sources of fat (use only if your source of protein is lean):

Olive oil	2 tsp/meal
Avocado	½ /meal
Nuts	approx. 20

Vegetables and berries

Vegetables that grow above ground	as much as you like
Berries	as many as you like

SNACKS (2 SNACKS FOR 1,400 CALORIES):

Sources of protein and fat (choose from the following):

Cottage cheese	3 ½ oz (100 g)/ (combine with 5 – 10 nuts)
Low fat (10 %) hard cheese	1 ½ oz (50 g)
Egg	2

Vegetables, fruit, and berries (choose from the following):

Berries	as many as you like
Vegetables	as much as you like
Fruit	½ (medium size)

DRINKS FOR ALL MEALS:

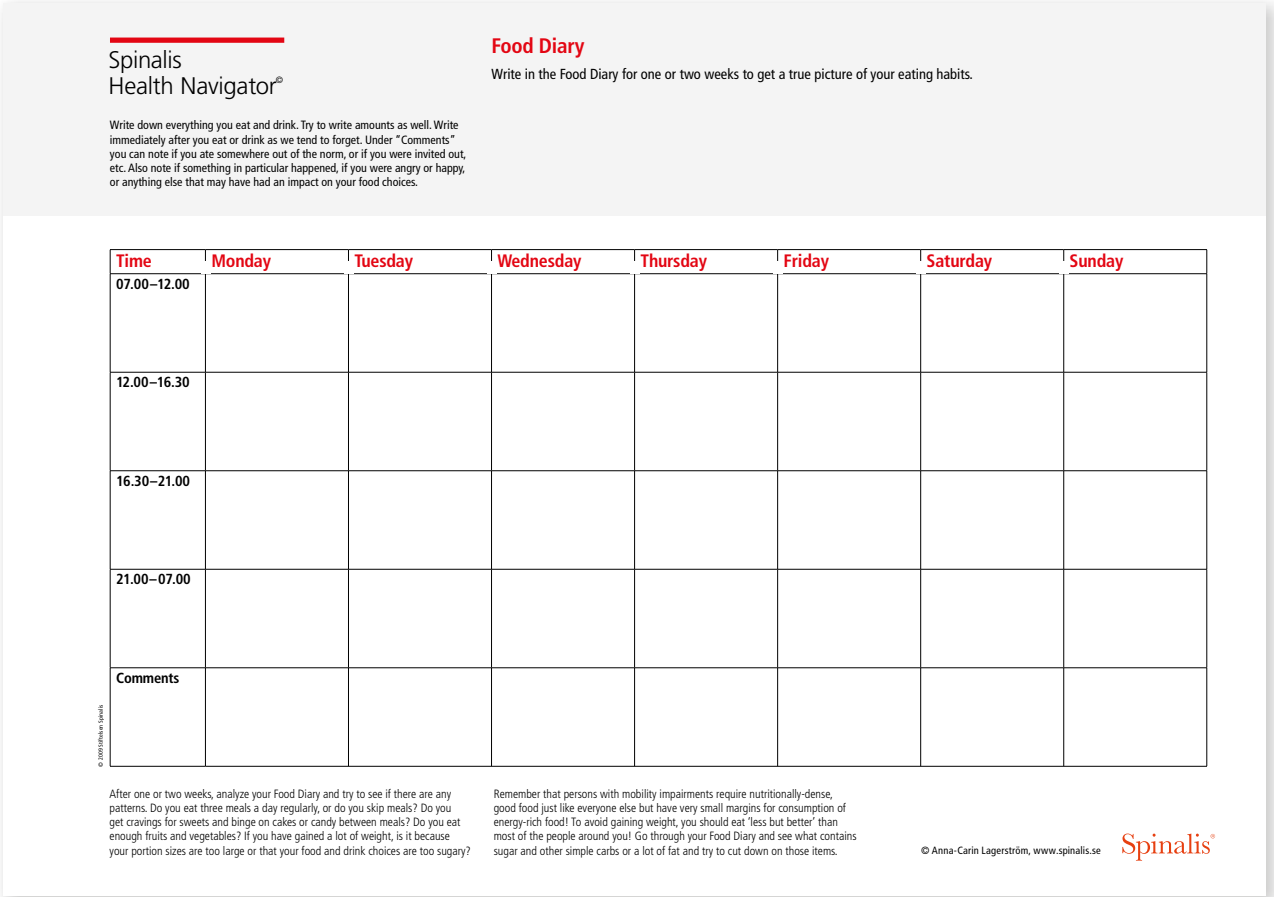
Water

Coffee

Tea

What you can do

The food guidelines described above have been developed to maximize your nutritional intake through healthy food choices despite the fact that you don't eat as much. We recommend that if you feel unsure about whether you are getting all the nutrients you need, you discuss this with a dietitian or a nurse who is knowledgeable about nutrition or speak with your doctor. It is important that you tell them you are a person with low energy expenditure, that they know not to recommend too much food (or foods that are energy-dense, thereby increasing the risk for unwanted weight gain).



Spinalis
Health Navigator©

Write down everything you eat and drink. Try to write amounts as well. Write immediately after you eat or drink as we tend to forget. Under "Comments" you can note if you ate somewhere out of the norm, or if you were invited out, etc. Also note if something in particular happened, if you were angry or happy, or anything else that may have had an impact on your food choices.

Food Diary

Write in the Food Diary for one or two weeks to get a true picture of your eating habits.

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
07.00–12.00							
12.00–16.30							
16.30–21.00							
21.00–07.00							
Comments							

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After one or two weeks, analyze your Food Diary and try to see if there are any patterns. Do you eat three meals a day regularly, or do you skip meals? Do you get cravings for sweets and binge on cakes or candy between meals? Do you eat enough fruits and vegetables? If you have gained a lot of weight, is it because your portion sizes are too large or that your food and drink choices are too sugary?

Remember that persons with mobility impairments require nutritionally-dense, good food just like everyone else but have very small margins for consumption of energy-rich food! To avoid gaining weight, you should eat 'less but better' than most of the people around you! Go through your Food Diary and see what contains sugar and other simple carbs or a lot of fat and try to cut down on those items.

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This is what the food diary, used by us in the weight loss programs at the Spinalis Clinic and Rehab Station Stockholm, looks like.

Food Diary

A food diary is a great tool to identify your usual food habits. Research shows that we often underestimate our food intake (and overestimate our physical activity too).

Try this:

Keep a food diary for one or two weeks. Depending on whether it is a regular weekday or the weekend, we tend to eat differently, so it is useful to include all days of the week. Write down everything you eat and drink and try to record how much as well. It is best to write down what you eat and/or drink more or less immediately because it is easy to forget. Under the *Comments* section, note for example if you eat somewhere other than where you usually eat – maybe in the car or perhaps you're out somewhere special. It is useful to note if there is anything in particular going on that day. Are you feeling

happy? cross? tired? or is there anything else that could be influencing your food choices?

After one or two weeks, analyze your food diary and see if there is a pattern. Do you have three regular meals per day or do you skip meals? Do you get cravings for candy or cookies/muffins between meals? Are you eating sufficient fruit and vegetables? If you have gained weight, is it because you eat too much or that you drink too many sweet drinks or alcohol? Go through your diary and identify what contains excessive sugar or fat and try to eat less of these. Compare with the lists under *Amount of Food and Estimation of Calories* in the *Toolbox*.

You can even use the camera in your mobile phone to document what you eat and make a pictorial food diary. Take pictures of everything you eat and drink for a week, download the pictures, and illustrate your diary with them on your computer. Write the date, time, and what you ate.
You can also download apps and other web tools such as food diaries and calorie calculators for food value checks.

Losing Weight

There is a widespread misconception out there in the universe, that it is impossible to lose weight if you have a physical impairment that prevents you from exercising or training. This is a question which arises often and which we would therefore like to answer. We meet people every day in our clinics who have successfully lost 12, 25, 50, 75, and as much as 100 pounds (5, 10, 20, 30, and 40 kilograms) and even more, despite extensive physical impairments. This has been achieved by modifications to diet and without any increase in physical activity.

Naturally, it is easier to lose weight if you burn more calories through an increase in activity and by building muscle mass. However, the physiological effect of training is not as great as you might believe if your intention is to burn fat. The well-intentioned advice that you may hear, such as 'if you just exercised more you would lose weight' is a myth.

Indeed, physical activity is important for many aspects of health, not least of which the increase in metabolism which helps regulate and stabilize blood pressure, blood fats, and blood sugar. However, if you want to lose weight, it is most important of all to eat less!

For those who can walk, an increase in energy use by 150 calories (the equivalent of the calories in 1 ½ glasses of wine or the butter on three

Facts

Theoretically, any one of us can lose 3 lb (1.4 kg) per year by not drinking 1pint (½l) of soda per week (10,500 calories in one year). Of course that is assuming one normally drinks that much per week. By refraining from drinking 1 pint of soda per day, a person could lose 18 lb (8.4 kg) per year (73,000 calories in one year).

sandwiches or 1 ½ bananas) requires about 30 minutes at a brisk pace. The tempo should be fast enough to increase body temperature and respiration somewhat. Obviously, to burn the same calories if the pace is slower, you need to walk for longer.

For wheelchair users to burn 150 calories takes considerably longer – probably somewhere between 50–60 minutes of self-propelling outdoors and at a good speed. However, self-propelling uses the relatively smaller muscles of the arms and shoulders. Even if this feels like strenuous exercise, it actually requires less energy than when working the legs. As mentioned before, the body's largest muscles are those of the buttocks and thighs.

The psychological benefits of physical activity

When it comes to weight loss, the psychological benefits of physical activity should not be underemphasized. Exercise enhances an awareness of what is going on in one's body. It becomes easier to distinguish between feelings of true hunger and cravings that stem from frustration. From a purely physiological perspective, the craving for sugar decreases because exercise leads to the release of stored glycogen which increases blood sugar levels. You become hungrier for 'real' food. It is also easier to take responsibility for your food intake when you have a sense of satisfaction due to exercise. If the exercise routine becomes regular, it also becomes easier to establish the ever so important regular eating habits.

However, this is not the entire truth. There are people who claim they gain weight from training because they feel hungrier and need to eat more.

Gentle weight loss

Weight loss typically involves not just a decrease in fat reserves in the body, but also a decrease in muscle protein and muscle mass. Because it is so important to retain muscle mass if you are a low energy user with slight muscle mass, it is extremely important to lose weight in an appropriate way. By which we mean gently. For example, the food and meal suggestions presented in the Iso Diet were designed to be safe for your health and to prevent loss of muscle mass. Weight loss should not take place too quickly. Contact a dietitian / a nurse with interest in nutrition / your doctor if you feel uncertain.

The ABCs of Weight Loss

Choose food which gives the maximum feeling of fullness per calorie. This is perhaps the most important advice to help you lose weight. If you eat too little, to seldom and too little protein, your blood sugar drops and activates that part of the brain which responds to survival threats. This will prompt you to obtain quick energy and you will feel in need of a snack.

Give your meals volume by filling your plate with large quantities of vegetables, remembering to choose more vegetables which grow above ground as they simply contain fewer calories than root vegetables.

Don't skip meals or forget snacks. Eat at least three meals per day and preferably one or two small snacks.

Choose light dairy products such as skim milk, low fat yogurt, and cottage cheese. Make other smart choices. Read the label and choose food that is not so energy-dense so that the amount you eat feels okay.

Drink water instead of sugary drinks with all meals and obviously when you are thirsty. Remember, soda is candy – just in a liquid form.

Reduce your alcohol intake. Alcohol contains many calories and also stimulates appetite.

Eat slowly so that you eat less. It takes approximately 20 minutes before you start to feel full. Research shows that people who eat fast often eat more and therefore consume more calories than those who eat slowly.

Practice mindfulness when eating. Take the opportunity to focus all your attention on what you are doing, each time you have a meal by yourself. Concentrate and enjoy! Avoid eating in front of the television.

Choose food that can be eaten warm. Warm food is more filling than cold. Another tip is to drink a cup of tea before meals or in the evening to prevent cravings.

Write in your food diary for a week or two every now and then.

Meal replacements? If you want to replace some meals with low calorie meal substitutes such as protein drinks or smoothies, we strongly recommend that you mix your own. Ensure you buy high quality products and choose natural varieties without added sweeteners.

Below is an example of a breakfast replacement which you mix yourself (either in a blender or with a hand blender) and dilute with water to the desired consistency.

RECIPE FOR A SMOOTHIE WITH BERRIES (300 CALORIES)

2/3 cup (1.5 dl = 0.15 l) low fat yogurt or lean quark

2/3 cup (1.5 dl = 0.15 l) skim milk

½ banana

½ cup (1.25 dl = 0.12 l) (or more) frozen berries (strawberries, blueberries, raspberries, or blackberries)

½ Tbsp cold pressed flax seed oil (for its healthy Omega-3 fat content)

10 tips from people who have been there and done that!

The following tips have been collected from our program participants who have either successfully lost weight, or succeeded in breaking a weight-gain trend and therefore maintained their weight.

'Make a menu for the week and do all your shopping in one go. Then there won't be so many poor quality quick fixes. Because of my MS, I am often very tired and so it is important I have a plan and healthy food at home. That's why I make shopping lists and plan my shopping for once a week on the day when I have the most energy and at the time of day when I am at my best. It's also a good way to save time and money.'

Elisabeth 48, with MS

'The Plate Method works well for me. It helps me to keep in mind amounts and proportions and how I should think when I plan my meals and shopping. If I go out to eat, I ask for lots of extra veggies and less potatoes, pasta, or rice. I managed to stop gaining weight and now I am slowly on my way to achieving my goal, which is to be 13 pounds (6 kg) lighter. I also use my own method: DTS or "Don't Take Seconds" but *rather stick to your original plan!'*

Marie 47, with Spina Bifida

'Keep a food diary! I really believe that writing down what I eat every day has helped me lose weight. Now I have a pretty good idea what it's all about, but I still keep a food diary. Then I really know what's going on!'

Lennart 60 (whom we wrote about in the beginning of this chapter),
Paraplegia for 44 years

'I count calories. That's one of my little tricks. I stay between 900–1300 calories per day. I've never been especially interested in food and nutrition and didn't really know much about it. That's why counting calories has helped me. I also use the National Food Agency's website, and have written up my own lists that I keep on the fridge door. It's scary when you see how many calories different things contain!'

Lennart 60 (same Lennart as above).

'Being in a weight loss club on the net has been a great help. I get lots of info on food and calories. It helped me change my attitude toward food and to understand that there are no shortcuts.'

Rikard 40, Tetraplegia for 22 years

'I make sure that we prepare proper food on the days when I have assistants that are good cooks. Then we make big batches and freeze in individual portions and I heat them up on the other days.'

Erik 45, Tetraplegia for 11 years

'Rewards are important – small and major. It doesn't have to be food, it can be something else too. But you can't live like a monk! Sometimes you have to plan for parties where you treat yourself to something you're really longing for!'

Gunnar 52, Tetraplegia for 35 years

'I have assistants in the mornings. I ask them to prepare fruit and vegetables that I can munch on at work if I get the urge. For example, they peel oranges or carrots for me or quarter apples.'

Gunnar 52 (same Gunnar as above).

'When I get the urge, I snack on small pieces of dark chocolate, unsalted nuts like almonds, or dried fruit. That's been my salvation!'

Karolina 47, Tetraplegia for 5 years

'I completely stopped drinking juice for breakfast and lost 10 pounds (4.5 kg) in three months. Juice is a real calorie trap because it seems so healthy!'

Jan 68, Paraplegia for 20 years

Tip: Three breakfast alternatives

Breakfast 1. (280 calories) from DASH

» 1 ½ oz shredded wheat squares
» 1 cup non fat milk
» ½ cup blueberries

Breakfast 2. (290 calories) from DASH

» 1 cup of asparagus, cut up
» ½ cup of onions, chopped
» ½ cup of broccoli, chopped
» 2 eggs
» (Sauté onions, asparagus, and broccoli in a pan and add the eggs)
» 1 small low fat granola bar

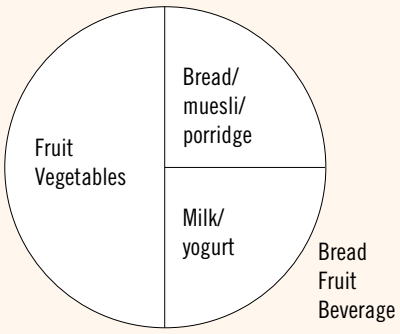
Breakfast 3. Smoothie (310 calories) From Eat Well, Live Well

» 1 kiwi (peeled)
» ½ cup of strawberries
» ½ cup of raw oatmeal
» 3 tablespoons of Greek yogurt
» Water (you decide on the amount to obtain preferred thickness)
» 1 tablespoon of ground flax seeds
» (Put all ingredients in a blender and mix)

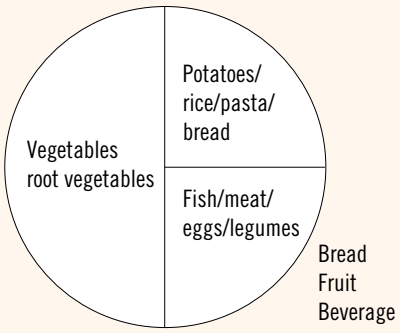
Toolbox: Amount of Food and Estimation of Calories

Recommended distribution of food in meals

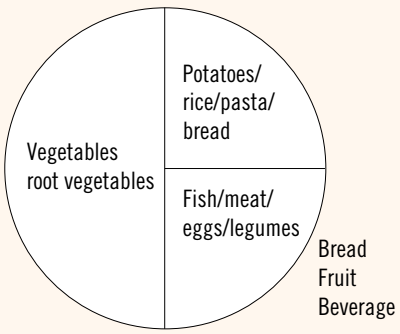
Breakfast



Lunch



Dinner



CHECKLIST: 1,300–1,500 calories (approx. 1,6 oz (45 g) fat and 0,6 oz (18 g) fiber)

This is how much you can eat in one day!

BREAKFAST/SNACK

Low-fat milk/yogurt	1 ¾ cup (4 dl)
Bread	2 slices
Crisp bread	1 piece
Light margarine	3 tsp
Cheese 17%	3 slices (with cheese slicer)

FRUIT AND VEGETABLES

Recommended total minimum quantity 17,5 oz (500g)/day (2 fruits and a minimum of 1 1/3 cup (3 dl) vegetables/day)

Fruit	2 per day
Fresh or frozen vegetables	unlimited

COOKING FATS

Margarine/oil	1 tbsp

MAIN MEALS – two per day

(The checklists for LUNCH and DINNER look the same)

Carbohydrate-rich food options, for example, one of the following:

- 2 potatoes (boiled, the size of a large egg)	
- rice (boiled)	2/3 cup (1.5 dl)
- pasta (boiled)	¾ cup (2 dl)

Protein-rich food options, for example, one of the following:

- meat/ground beef, pre-cooked weight	3 ½ oz (100 g)
- fish (fresh or frozen)	4 1/3 oz (125 g)
- low-fat sliced meats	2 ½ oz (70 g) (3 slices)
- legumes (beans/lentils)	approx. 1 cup (2.5 dl) (boiled)

Checklist content and concept from Obesitas: arbetsbok för dig som vill gå ned i vikt (*Obesity: A Workbook for those Who Want to Lose Weight*) by Ingela Melin

Toolbox: Amount of Food and Estimation of Calories

CHECKLIST: 1,600–1,800 calories (approx. 2.1 oz (60 g) fat and 0.8 oz (22 g) fiber)

This is how much you can eat in one day!

BREAKFAST/SNACK

Low-fat milk/yogurt	1 ¾ cup (4 dl)
Bread	3 slices
Crisp bread	2 pieces
Light margarine	4 tsp
Cheese 17%	4 slices (with cheese slicer)

FRUIT AND VEGETABLES

Recommended total minimum quantity 17,5 oz (500g)/day (3 fruits and a minimum of 1 1/3 cup (3 dl) vegetables/day)

Fruit	3 per day
Fresh or frozen vegetables	unlimited

COOKING FATS

Margarine/oil	1 tbsp

MAIN MEALS – two per day

(The checklists for LUNCH and DINNER look the same)

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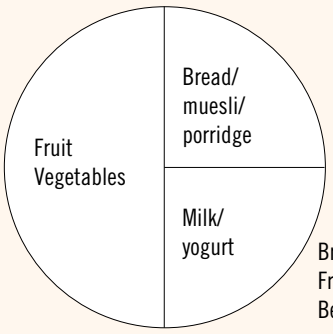
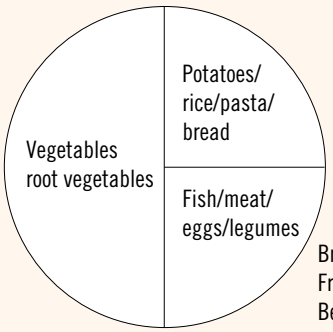
Checklist content and concept from Obesitas: arbetsbok för dig som vill gå ned i vikt (*Obesity: A Workbook for those Who Want to Lose Weight*) by Ingela Melin

Recommended distribution of food in meals

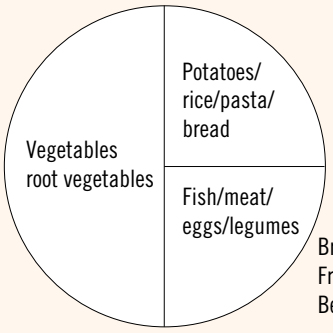
Breakfast



Lunch



Dinner



Chapter 4

Physical Activity and Exercise

Welcome to the more physically challenging part of this book. In this chapter, we describe how to get into shape and stay there. In addition to facts, programs, and a host of practical tips, you will learn how to get fit, measure your fitness, improve your motivation, and maintain your optimal level of physical activity.

All aspects of physical activity and exercise positively influence a number of proven health benefits. These include the prevention of the common lifestyle diseases of high blood pressure, Type 2 diabetes, osteoporosis, and certain types of cancer. Other proven benefits are improved sleep, a stronger immune system, and increased self-esteem.

Furthermore, for people with physical impairments, regular physical activity and exercise improve other aspects of overall well-being. For example, daily strength and flexibility training leads to functional improvements with less wear and tear on parts of the body that are particularly vulnerable to overuse. Provided that the exercises are done correctly, this is particularly so for shoulder muscles and tendons which require special attention for wheelchair users.

This section of the book is for those who want get on track with regular exercise and improve health and well-being. It is not intended for those who want to train at an elite level. The various instructions and programs have been chosen either because they can be done independently or with just a little help. All have been recommended by people with a great deal of personal experience, knowledge, and/or are scientifically proven.

The benefits of regular exercise for people with spinal cord injury (SCI) or other physical impairments are:

- increased cardiovascular fitness
- increased muscular endurance
- increased muscle strength
- reduced pain, stiffness, and spasticity
- improved balance, coordination, and posture
- increased lung capacity
- improved bowel function

'Improved quality of life is without doubt, the first thing I think about when asked what exercise has meant and means to me. Everything that has anything to do with physical activity has been so central for me. Besides the fact that sports have contributed to my ability to see the world, they have also been my passport to education and work, and introduced me to many friends and a vast network of contacts. Without that, I can't imagine that I would have the life I have now, or be able to do everything I do or want to do – a life I enjoy! Sports and training have taught me to focus, to concentrate, which benefits my daily life and work. For me, exercise is a necessary means to keep both my body and mind in shape.'

Lars 'Lövis' 55, Paraplegia for 51 years

The Programs

We have put together exercise and training programs, each one with a different emphasis. You will find them under the headings:

Strength Training: where we present a special program for strengthening shoulders and a program for the entire body.

Cardiovascular Fitness Training: you will find interval and distance training programs for hand cycles and wheelchairs, plus a simple fitness test.

Circuit Resistance Training: you will find a program designed to combine strength and cardiovascular exercise.

Flexibility: where we present tips on how to stretch tight muscles.

Mind and Body Exercise: where we introduce breathing exercises and both sitting and standing yoga programs.

NB: The exercise programs and instructions are intended for those living with SCI or other physical impairments who are otherwise healthy. If you have a progressive neurological diagnosis such as Multiple Sclerosis, we suggest you check with your physiotherapist or doctor before you start. The exercise program can be better adapted to your individual needs so you avoid overtraining and setbacks.

The best thing about exercise is that it is never too late to start. It is evident today that we benefit from regular physical exercise – even the old and grey!

Briefly on Exercise and Physical Fitness

If your primary goal is to increase your energy and endurance levels and/or to improve your metabolism, then choose cardiovascular training. If your primary goal is to become stronger, manage your transfers better, and increase muscle mass, then prioritize strength training. For the majority who consider themselves regular exercisers, an overall training program is preferable. For all-round training, alternate the different types of programs on different days or use a program that comprises both strength and cardiovascular exercises, such as circuit resistance training or join an aerobics or similar exercise class.

Warming Up and Cooling Down

Regardless of which type of exercise you choose, always start every exercise session with five to ten minutes of warm-up. A warm-up increases your circulation so you literally become warm. Your body is then fully prepared in that the muscles become more elastic and the joints are lubricated which helps avoid injury. Try to involve the larger muscle groups as much as possible to increase your heart rate. For example, you can warm up by air boxing, arm cycling with little or no resistance, or slowly wheeling in your chair. If you can use your legs, warm up by walking, cycling, or use a rowing machine or step machine. Go gently and slowly – this is just the warm-up.

When you have finished your program, do five to ten minutes of cool-down exercises. Again, work with the large muscle groups as much as possible, just as you did in the warm-up and at a slow pace. This will round out your workout and prepare you for stretching.

Increase your work out

When it is time to increase your work out there are several options. You can increase the number of training sessions per week, successively increase the duration of each exercise session, or increase the intensity of the exercises. If you exercise by wheeling: you can go further, faster, or over more varied surfaces. If your program includes walking: you can start walking faster, take longer strides, or use walking poles to involve your arms.

Exercise recommendations for people with SCI

For beneficial results from strength and cardiovascular training:

- Cardiovascular work: 2 times/week for at least 20 minutes (intermediate – high intensity)
- Strength training: 2 times/week (3 sets of 8 –10 repetitions) with exercises for all major muscle groups

This training approach is based on internationally recognized and scientifically conducted exercise studies with SCI participants.

The training programs described a little later in this chapter follow these recommendations with minor variations.

Variation is positive

There are advantages to variation. Introduce other elements to your cardiovascular training, perhaps alternate cardio work with strength training or some form of sport to make your training more complete. Variation of training gives the body more time to recover.

The effects of exercise and the necessity of rest

All the effects of exercise depend on a phenomenon known as *super compensation*. This refers to the body's attempt to adapt to new demands placed on it. After hard physical exercise – strength or cardiovascular – an adaptation occurs whereby the body is better able to cope the next time when subjected to similar stress. This takes place when the body is resting, which makes rest an important part of training. But rest can also be *active recovery*. You can recover *actively* through some other activity – for example, light cardiovascular exercise instead of strength training or if you can, by alternate programs for your upper and lower limbs.

Food and drink

Don't exercise on an empty stomach. Where possible, have a meal 1–2 hours prior or alternatively, have a light snack immediately before you exercise so your body has the energy to cope with the demand. A piece of fruit is a good idea. Don't forget to drink water before, during, and after exercise – especially if the session is long.

'The best exercise program is the one that gets done! Exercise that you decide for yourself is also best, simply because that's the program that you will do. So be realistic and keep your ambition levels moderate. Then your work out will be doable!'

Lars 'Lövis' 55, Paraplegia for 51 years

Strengthen your resolve

Dolly Parton reputedly said, *'Move your ass and your mind will follow!'*

Make a decision. Make up your mind and start with something fun and easy. You are more likely to get moving and feel satisfied, and that is where you derive your motivation from.

Do what works. If you don't know where to start, find out what is available locally in the way of accessible facilities and activities with adapted programs. Contact your local council, disabled sports organizations, interest groups, or rehabilitation facilities and ask questions.

Set goals. Formulate your goals so that they inspire and challenge you but at the same time are realistic. Read about SMART goals in Chapter 2 Motivation and Lifestyle Change. Build self-esteem through easily reached and functional milestones. For example, you may want to make it up a certain hill or staircase within a certain time without rest, or to get yourself up from the floor. The goals are then measureable, fun, and possible to follow up.

Make a plan. A good exercise plan might be to do a regular daily activity with a lower intensity, such as walking or wheeling. It is a good idea to add some sort of light daily maintenance training – with rubber resistance bands for shoulder strength. Then add more strenuous strength and/or cardiovascular work 1–3 times per week.

Formulate your plan so that it contains the details of specific activities. For example, when and where the activities will take place, their duration, and any variations.

Keep a training diary. A diary or log is a way to get an overview on the effects of the previous weeks/months of training; which activities you followed through with and which you skipped and why. This is an important motivational instrument that gives a sense of satisfaction as you realize what you have achieved. You can make notes about your training in your calendar, in a regular notebook, or create your own computer based system.

Use an odometer set up on your hand/arm cycle or wheelchair and for those who can walk, use a pedometer. Both are excellent motivational tools. Establish milestones for how far you will walk/pedal/wheel. Note them in your training diary and make sure that you reward yourself for each and every milestone reached.

Evaluate by asking yourself how it went. Adjust goals if necessary and *formulate a new plan*. Read Chapter 2 Motivation and Lifestyle Change and find continual inspiration.

Training Diary

Keep a training diary to track your workouts and increase your motivation. Write down your workout activity and how long you do it. Note the degree of intensity (high/medium/low) or the route and/or the number of times. Under the *Comments* section, you can write how you are feeling that day – how tired/energetic you are and whether something influenced the training, for example the weather, or if you were experiencing pain somewhere.

Date							
Activity							
Time/ intensity/ route etc.							
Comments							

'Grab every chance you get to exercise! Park your car as far away as possible when you are going to shop, ask the taxi/cab driver to drop you at the opposite end of the shopping center and view it as exercise. It is better to do something small every day than to do one big push once a week. Practice giving a friendly but firm "No, thanks" when the well-intentioned people in your life offer to drive/ push/lift you.'

Advice from Lars 'Lövis' 55, Paraplegia for 51 years

Top tips for wheeling

Wheeling in your chair is the everyday exercise that actually gets done, because it is simple to do and for many it is necessary. Wheeling efficiently requires a good technique to simultaneously protect your shoulders and arms. This is especially important if you use a wheelchair in conjunction with more demanding exercise.

'Make the push stroke longer. That is the first thing to think about and where many people go wrong. Avoid small/short strokes that start at the top of the push rim. This is unnecessarily strenuous for the arms and shoulders and very inefficient, and easily becomes a lighter sort of braking action with every stroke. To work in an energy-efficient way is especially important for persons whose muscles tire quickly.'

Staffan 30, born with Spina Bifida, got his first wheelchair at the age of two, teaches wheelchair technique.

Tips for making your wheelchair more exercise-friendly

- Remove unnecessary accessories so your chair is as light as possible for the best self-propulsion. For example, not everyone needs arm supports. Side protection may be enough.
- Back support should not be higher than necessary. High back support results in poor positioning of your shoulders and arms and gets in the way of effective self-propelling techniques. Lower back support also engages more muscles in the upper back when self-propelling, thereby relieving the shoulders and arms.
- Perhaps the most important thing is to make sure that you have the most appropriate wheelchair adjusted especially for your needs. Get help from an occupational therapist or physiotherapist with experience in wheelchair adjustments.

1. Begin by visualizing the push rim as a clock. Place your hands at 10 o'clock and push forward.

2. Release your hands at 2 o'clock.

3. Allow your arms to follow in the direction of momentum a little bit. Use the chair's kinetic energy to propel you forward – free propulsion.

4. Relax your shoulders and arms when they swing backward before gripping at 10 o'clock again. This reduces the risk of developing pain. Ideally, you should work with your shoulders lowered when propelling yourself. In order for this to be effective, seat height may need adjustment.

Top tips for those who can walk

Essentially, the advice is to use your available muscles optimally so that your training is sustainable long-term.

Wear stable shoes, preferably a pair you've tested.

For strength training, focus on the muscles around joints where you have loss of power. This applies to ankle, knee, and hip joints.

For cardiovascular workouts, exercise in such a way that you don't have to simultaneously concentrate on balance. When you have problems with standing/walking balance, activities like cycling, swimming, or sitting aerobics are great ways to get a cardio workout.

For balance training, practice your balance exercises securely, while standing close to a wall or chair.

Equipment can double for training gear. Think of wheelchairs, crutches, walkers, and walking poles as the best exercise gear you can buy. Incorporate the use of these into your program so you can vary the intensity and control how much you challenge the various muscle groups. You could practice wheelchair techniques even if you are not a full time wheelchair user. If you can maneuver a wheelchair, you have an excellent piece of training equipment.

Choose when you walk. If you experience pain when you walk, don't wear yourself out unnecessarily. Instead, choose to walk when it is important. We encourage you to use a wheelchair or such like occasionally, simply as training equipment, rather than to walk too much. You need your body for a long time to come.

Recovery is an important aspect of training. Without adequate recovery your body cannot rebuild itself. This is especially important if you are partially paralyzed or have a neurological illness. Make sure you rest and recover between exercise sessions and take breaks during the day.

Protect your joints from over-extending with various types of stabilizing bandages/braces/orthotic devices. When you over-extend a joint, it wears out with time and there is an increased risk for pain and the development of osteoarthritis. One example is in the knee, where breakdown of cartilage occurs with accompanying inflammation and pain in the soft tissues. That is also why it is important to strengthen the muscles surrounding such joints.

Train functionally. Taking the stairs is an example of functional training. Create your own step aerobics. Another example is to practice moving from sitting

to standing and back again. Other functional exercises are to get down to and up from the floor or walk sideways or backwards.

Keep an eye on your skin. If you have sensation loss, it is important to inspect your feet so that you see redness or blisters in time. Act immediately to relieve pressure/irritability and seek medical attention if the problem does not improve.

'I have to really think about my technique in order to walk as evenly as possible. Hips and chest forward, tummy tucked in, gaze forward, straight neck, making sure my heel makes contact with the ground properly, and keeping my shoulders down. When I get up from sitting positions I try to get up without support and to use both my legs equally.'

Yvonne 46, incomplete Paraplegia for 14 years

Safe Exercise

Here we describe various aspects of safety related to exercise and training and how injuries and problems can be avoided. Be informed about the risks you expose yourself to and again, remember that you need your body to thrive long-term.

To train or not to train?

Exercise delivers a powerful energy boost for most of us. Even if you have to more or less drag yourself along and feel tired and listless before you start, you will feel more alert and energetic afterwards. That said, it is sometimes wise to refrain. In addition to any specific advice from your doctor/physiotherapist/coach, here below are a few more reasons to skip training.

Skip training:

- when you have fever
- when you have a sore throat
- if you're feeling generally unwell, for example, if you have a UTI
- if you're feeling a little hung over
- if you have been training six days in a row

Pain is a warning signal

If you get pain during or after exercising, the cause may be inflammation in tendons or muscle attachments. This is particularly likely in and around the shoulders. Pain is a warning signal and you should consider this issue in the same way you would a wound or blister. The fact is, you can't make it go away by training harder. Either take a break from your program or try to perform the exercise an alternative pain-free way. Consult your coach or physiotherapist if you are uncertain. You should always be aware of what is going on in your body, and it should feel beneficial. No exercise should cause pain per se – of course usual muscle tightness is acceptable and of no concern. If pain persists, seek professional help. This can prevent more serious complex problems. There is a great deal that can be done to prevent pain/discomfort.

Upper extremity pain

Wheelchair users and crutch walkers often have problems with their arms and shoulders. This is not so strange when you consider the physical demands placed on them. Shoulder and arm joints and muscles are subjected to far greater stresses than that for which they were designed. Muscles and tendons are easily strained and react producing inflammation and pain. The negative consequences can be substantial, with impacts on your daily life. Furthermore, those reliant entirely on wheelchairs find it difficult to refrain from necessary daily activities and this complicates the process. Previously, the general attitude was that a person with a physical impairment should cope with as few aids as possible at any cost and that *the harder and more intensive the training, the better*. This attitude is long gone and not before time. Research findings emphasize the need to think long term and train smarter with wise use of assistive equipment to provide relief and prevent future problems due to overuse.

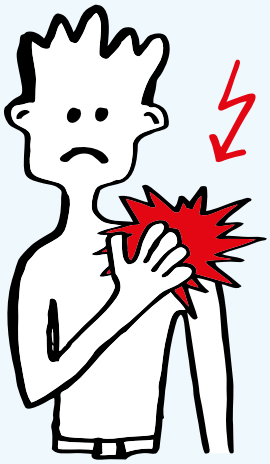
Shoulder problems

The shoulder is the body's most mobile joint system, a complex set-up of three bones, four joints, and 16 muscles which work in synchrony to provide movement, power, and stability.

The muscles that are especially important for the stability of the shoulder are known as the *rotator cuff*. These muscles hold the head of the humerus (upper arm bone) in place in the shoulder socket and prevent it from pushing upward where tendons and other joint structures can be squashed or impinged.

Common shoulder problems for active wheelchair users often involve the rotator cuff tendons. Injuries to tendons and joint structures cause inflammation and pain increasing the risk for further injury. For example, wear and tear in the joints at either end of the collar bone is common. Of course what we refer to as *pinched nerves,* either peripheral nerves or nerve roots in the neck are also common.

The most common symptoms of shoulder trouble are pain, weakness, difficulty lifting the arm higher than the shoulder plane, or difficulty when transferring or wheeling. With less severe injuries, the pain occurs only when the shoulder is loaded or during specific, more strenuous activities. When the injury is more extensive, the pain can be constant and sleep disturbance is likely.



Prevent shoulder problems:

- Increase shoulder muscle strength, especially the small muscles close to the joint (the rotator cuff), the muscles on the shoulder's posterior side, and those that hold the shoulder blades close to the body. For a shoulder training program, see the Toolbox.
- Maintain good mobility and posture. Stretching chest and neck muscles is especially important as these often become tight and pull your shoulders forward.

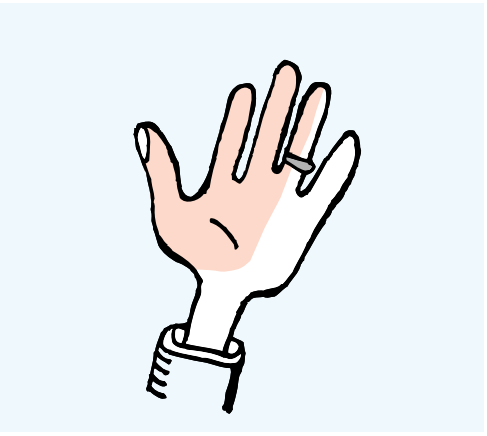
If you are a wheelchair user:

- Use a lightweight wheelchair that is easy to self-propel (easy to balance and with well pumped tires).
- Adopt a sitting position which is as upright as possible. Sitting with a stooped back and shoulders drawn forward places disadvantages on the shoulders anatomically and increases the risk for injury. Get help to adjust your sitting position in your wheelchair and/or wear an abdominal corset/binder to encourage good posture if you have poor core stability.
- Improve your wheeling technique. Use longer, more fluid arm movements. Avoid short, quick motions.
- Consider assistive devices as soon as you experience pain or if you have difficulty with some specific aspect of a task – for example, the use of a transfer board.
- Change your lifting techniques. The more you are required to reach forward with your arms when you lift, the greater the strain on the shoulders. Lifting with bent elbows (using your biceps) held close to your body, reduces strain on the shoulders. Try this technique when lifting your wheelchair into the car.

If you already experience pain in your shoulders:

- Avoid movements that cause pain. For example, it is usually easier to transfer from the wheelchair to the sofa in the direction of the painful side first. In other words, if you have pain in your right shoulder, initiate your transfer by loading the right arm first.
- See your doctor /physiotherapist to determine the cause of the pain and get the right treatment.
- Train in a way that allows your shoulders to recover and heal. This means very light, undemanding stretches that increase circulation to the inflamed structures. Do not begin endurance training until you are pain-free. See the Shoulder 1 and Shoulder 2 exercise programs in the Toolbox.
- Review your transfer and wheelchair techniques. Consider the need for assistive devices in the short term to relieve your shoulders. One way to get relief might be to use a power chair temporarily. Contact an occupational therapist to discuss options.

Carpal Tunnel Syndrome



Another common problem for wheelchair users is C*arpal Tunnel Syndrome*. This occurs when a nerve in the wrist (median nerve) gets compressed where it passes through the tunnel under a ligament situated there. The most common symptoms are pain and numbness in the lower arm, hand, thumb, index finger, middle finger, and half the ring finger. Some people experience almost constant pain, while others associate the symptoms with endurance activities such as wheeling for a longer distance.

Action:

» Consult your physiotherapist or doctor for advice and treatment. For those worst affected, there is a simple routine operation which remedies the symptoms effectively.

Incontinence

Both bowel or bladder leakage can cause great uncertainty while exercising. Here are some tips from men and women who deal with this problem. Planning seems to be crucial. Always take extra clothing in case of an accident.

Advice to avoid bowel leakage while exercising:

» Develop regular bowel habits and make sure you use the toilet before exercise.
» Use anal plugs. This is a plug which is inserted in the rectum to prevent leakage.
» Use continence protectors – for example, pads.

Advice to avoid bladder leakage while exercising:

» Empty the bladder before you start.
» Find out where the bathrooms are before you start.
» Avoid coffee and tea before exercise, both are diuretics.
» Consider using urinary incontinence pads even if it is not something you normally use. You will feel more secure, especially if the training session is long and you need to drink more than usual. Prescriptions for incontinence aids can be written out by a district /continence nurse.

There are pads designed especially for women which absorb a great deal of fluid and which eliminate odor. However, be careful not to sit too long when wet, as this increases the risk for skin breakdown and UTI.

A urodome is a good continence aid for men to use when exercising. For swimming, an alternative might be to attach a plug to the urodome, rather than the bag. Always apply a new urodome before exercise, as the risk of it loosening increases with time.

The following information is highlighted because it is particularly important for anyone with SCI who plans to undertake a new exercise program.

Fractures

Osteoporosis *increases the risk of fractures* and is common in women after menopause and for those who do not physically load the skeletal system. Therefore for persons with SCI, the risk is greatest below the level of injury. Obviously, with increased exercise your body is exposed to greater forces than usual and fractures can occur. In addition to pain, it is important to be aware of symptoms like swelling, local rises in temperature, redness, or an increase in spasticity as indicators of a fracture. This is particularly so in the absence of normal sensation.

Advice:

» If you suspect a fracture seek medical attention immediately!

Pressure sores

Increased risk for pressure areas, especially in those parts of the body with reduced sensation. The adoption of new positions and exercises with repetitive movements can cause chafing. Check your skin daily and watch out especially for redness. This can be an early sign that a pressure sore is developing.

Advice:

» Check your skin daily.
» If you notice redness: relieve pressure, change technique, avoid movement/ position.
» If you find you have a pressure area, contact your doctor/nurse.

Breathing Fatigue

For persons with high level SCI, the diaphragm functions not only as a breathing muscle, but also helps stabilize posture to help maintain an upright position. Problems arise because the diaphragm is easily fatigued as it performs these two important functions simultaneously. To optimize respiratory function during exercise, allow your diaphragm to work solely to help you breathe.

Action:

» Strap yourself into your wheelchair by fastening your trunk to its back support.

For persons with tetraplegia or high level paraplegia where the autonomic nervous system is affected, it is also important to watch for the following:

Low blood pressure

A drop in blood pressure is common with intensive exercise anyway, but is more likely to occur if you have tetraplegia or high level paraplegia. Discontinue if you start feeling off, get dizzy, or become pale. Fainting is a possibility.

Advice:

» A soft corset can help maintain blood pressure.
» Avoid eating a large meal immediately before exercise, as some of your blood volume will be directed to your digestive tract which causes blood pressure to fall.

Overheating

There is a risk of overheating if the body's automatic temperature regulation is affected. It is possible that you do not sweat and thus the body cannot cool

down. Again, this is more likely with tetraplegia or high level paraplegia but applies to MS where intolerance to heat is common.

Advice:

» Have a wet hand towel or a spray bottle with water readily available to cool your face, arms, and chest. This is especially important if the weather is warm.
» Ensure that you wear layered clothing to allow for easy removal.

Autonomic Dysreflexia

Autonomic Dysreflexia (AD) is a condition characterized by involuntary hyperactivity in the sympathetic nervous system (a part of the autonomic nervous system). Signs of AD are: a sharp rise in blood pressure with a pulsating headache, increased heart rate, and a feeling of nausea with facial blushing, goose bumps, and sweating. The most common causes are an overfilled bowel and/or bladder, catheter blockage, pressure areas, burns, or ingrown toenails. Menstruation can also trigger this response. When exercising, also be aware of: constrictive clothing or shoes, avoid bodily contact with hard or sharp objects, and look for blisters.

Even if AD has no direct association with physical exercise, it is important to know about. The greatest danger with AD is the elevated blood pressure which in rare cases can lead to stroke.

Advice:

» Discontinue your exercise immediately if there are signs of AD.
» Assume a sitting or half-sitting posture. Do not lie down.
» Check whether your bladder or bowel is full. If so, act on it immediately and if need be ask for help.
» Remove shoes and anything else which may be tight.
» Check if you have a pressure area developing or awkward folds in clothing, shoes etc.
» If you usually take hypertensive medication – take some!
» Seek immediate medical attention (your doctor/hospital) if the condition does not subside.

Strength Training

Strength training doesn't just build stronger muscles and improve coordination but strengthens your skeleton, joints, and ligaments and thickens articular cartilage which reduces the risk of injury. Additionally, strength training helps normalize blood cholesterol and improves metabolism. Greater muscle mass means your body has a larger *engine* and will burn more calories even at rest. Strength training makes muscles more insulin-sensitive which helps prevent diabetes and your posture will improve as well as your functional independence.

'Strength training is very important to me. It gives me that little extra bit of strength so that I don't have to exert myself to the max every time I transfer. Plus, I need my body to stay fit for a long time. But I also do strength training so I can cope better generally and just feel better. I think the 'just feel better' reason becomes more important the older I get. I play wheelchair tennis a lot, and the strength training is also necessary for preventing injuries.

My tips:

- Keep a training diary. That's what motivates me. I can go back and see which weights and which color of the resistance bands I used previously. Then I can really see my improvements and feel satisfied with my efforts.
- Set reasonable goals. I believe it's important to think about why you want to train so you set reasonable goals. When it comes to strength training, a little bit often is definitely better than a lot just now and then.
- Include resistance bands for training. They're gentle, even when the exercise itself is tough.
- Do a few easy exercises every day, with heavier workouts perhaps twice a week. It is important to rest between training sessions and not work out every day. If you do train more often, vary the exercises so that you do not work the same muscle groups.
- A good exercise for strengthening the back and arms is to get down onto the floor from your wheelchair and then get yourself up again. I try to do this regularly.'

Sten 50, Paraplegia for 30 years and a keen tennis player

Programs

Our programs for strength training can be done at home or at the gym. The programs are designed to optimize exercise for wheelchair users or for those who walk with crutches.

- A shoulder training program in two steps: Shoulder 1 is for pain and muscle weakness and Shoulder 2 is good as a start program if you do not have pain.
- Three upper body routines which can be done once, twice, or three times per week.
- A leg routine to do twice per week.
- A full body routine to be done twice per week. This program trains the legs, abdomen, and back and includes the most important exercises from the upper body program. The focus is on increased strength around the body's major joints.

You will find the programs and instructions with photos in the Toolbox.

A brief on Strength Training

Effects of training. Increased strength occurs after repeated muscle activity. Initially, the result is that the muscle structures start to break down. The nerve system reacts by telling muscle to respond by repairing and rebuilding so that it becomes stronger than it was before. The adaptation and repair take place when the muscles rest, which is why rest is important for the desired results.

Start strength training with light weights and high repetitions. It is always important to concentrate when you learn new techniques. However, it is especially important for beginners, so that the movements will be correctly impressed on your brain from the beginning. Muscles and tendons need several weeks of regular strength training to adjust. High repetitions with a light load increase endurance and the flow of blood to muscles/tendons. This increase in circulation decreases pain associated with overuse.

Training development. If the primary goal is to increase endurance, start with light weights and gradually increase the number of repetitions as you get stronger. Over time, the weight should be increased. If you want your muscle mass to increase, use heavier weights and do fewer repetitions. Since muscles

adjust constantly to the demands placed on them, the training needs to be changed regularly and should not be exactly the same each time. Otherwise, you will maintain your muscles but there will be no increase in strength.

Frequency of training. You will benefit from your strength work if you train regularly. Twice per week is sufficient but three times is better. That said, training once a week is definitely better than nothing. Even doing a daily mini program with weights or resistance bands will ultimately result in an increase in muscle endurance.

'It's always important to focus when you do strength training. Focus and the correct technique are the most important of all!'

Martin 31, Paraplegia since birth

The how-to of strength training

The starting position is to sit or stand with a good upright posture. Try to keep your neck straight and draw in your chin a little. Relax your shoulders and let them roll back and at the same time draw your shoulder blades together – down and in. If you are going to stand, separate your feet to the width of your shoulders, bend your knees slightly, and stabilize your lower back by drawing in your lower abdomen. If you are going to sit and you have poor core stability, wear a soft corset. It stabilizes your trunk, encourages good posture, and a good starting position for the shoulders.

Remember to *warm up* for 5–10 minutes before you start.

Do *12–15 repetitions* for each exercise. Rest briefly, approximately 45 seconds. Then repeat the exercise or do a different one. (If you have a neurological diagnosis that causes muscle fatigue, it is important that you rest for longer – preferably for three minutes.)

Plan your training so that you can maintain good posture for the whole session. Don't work specifically on your large postural muscles until the end. You don't want to get exhausted before you finish. By these we mean the muscles of the abdomen, back, hips, and buttocks.

Do the exercises slowly with good control – three seconds in each direction. Count to three as you contract the muscles and again as you allow the

muscles to lengthen. Some will find it easier to use a slightly shorter time, two seconds to perform the initial movement, then the return to the starting position.

Pause briefly before you change the direction of the movement to avoid a pendulum motion. If you notice that you start to shake and struggle with the resistance bands or machines, your muscles are probably too tired to continue. The risk is that your posture and technique deteriorate. Take a break, do another type of exercise, or end your session completely.

Try to use the *entire range of motion* – for example, from a completely bent elbow to a fully extended elbow and keep your wrists straight during the entire exercise.

Focus on the movement. Think about, feel, and experience every movement.

Prioritize training that increases *stability in the muscles nearest your joints*. Generally, the recommendation is to train larger muscle groups. To maximize function such as walking, wheeling, and transfers, it is very important for people with SCI or other physical impairments to train the muscles that are weak, as well as the stabilizing muscles for the larger joints such as the shoulders, back, hips, knees, and ankles.

For example, the shoulder program starts with the smaller muscles of the shoulder (rotator cuff) to increase stability and avoid wear and tear. You need to manage shoulder stabilizing exercises before you advance to heavier gym programs.

Strive for *balance between muscle groups to reduce the risk of injury and optimize function*. A good proportion of daily activities use the muscles in the front of the body. This means that the front, such as the chest muscles (pectorals), the muscles on the front of the shoulders, and the muscles that bend the arms (biceps) get strong while the muscles on the back of the upper body become weaker. Because all the muscle groups are required to work together, the weaker ones are more easily prone to repetitive strain injuries and the joints are not as protected. To enhance muscle balance, work on the weaker muscles on the back of the upper body. For some, it is more important to stretch rather than strengthen the pectoral muscles as these are often tight.

Training at the gym. It is important to consider that while gym instructors are

no doubt competent, they may have little or no experience of people with SCI or other physical impairments. We recommend that before you join a gym, establish likely training restrictions and determine which type of training is important for you. Ensure that you get an adapted program from a physiotherapist or someone who has specific knowledge of your needs. He/she needs to understand the risks of overtraining. It might be useful to discuss with the gym instructor how a program can be adapted to suit the equipment available – for example, exercise machines that you can transfer to, free weights, strength machines, and mats for floor exercise. You can always take your own resistance bands with you.

'I do n't think I enjoy every second I'm working out at the gym. Training is hard, but in the long run I feel the difference – I'm stronger, life is easier, and the simple truth is, I can manage more myself.'

Peter 35, Tetraplegia for 13 years

Choose the right level of intensity

One way to judge whether you are at the right resistance level is to choose enough resistance so that you manage 12–15 repetitions. If you cannot manage more than 8–10 repetitions, then the level of resistance is too high. If on the other hand, you can manage 20 or more, the resistance is too low.

Equipment and practical tips

With the exception of strength machines, most equipment can be purchased in regular sports stores. Some pharmacies also carry simpler equipment such as resistance bands.

Resistance bands – are thin, strong, elastic, portable strength training tools. They are cheap and simple to use at home and your training can be varied.

They are available in different resistances and can be purchased by the meter so they can be cut to an appropriate length. Resistance bands with handles are also available. Buy a variety of resistances. A shorter band or one that is folded double offers increased resistance.

You will need three wall attachments for your bands: one a little higher than your head, one at shoulder level, and one at elbow level for rotation exercises. Do make sure that the attachment is well anchored. You can also attach the resistance band to a door handle. For some, this is the approximate equivalent of your shoulder height when seated.

Free weights – you will need a light one and a slightly heavier one. They should not be heavier than one which allows you to do 12–15 repetitions of the same exercise in a row. *Wrist cuffs* can be used to attach the weights to your wrists if your hand function is poor.

Wall-mounted cable pulleys – versatile and easy to adjust the resistance.

Hand strengtheners – good for maintaining strong hands.

A training mat – a yoga mat or a big, thick bath towel for floor exercises.

Transfer from your wheelchair if possible for all exercises on gym machines. Most of the time, this will allow for a more stable and better starting position.

If you stay in your wheelchair, the brakes should be on. Good brakes and well pumped tires are important so that your wheelchair does not move during the exercises. Place something hard – for example, a weight under the anti-tip bar (if you have one) so that the chair does not tip backwards. Alternatively, place a free weight on the footrest (or have someone hold it).

Strap yourself in – fasten your upper body to the back support of your wheelchair if you have poor balance. Another tip to help you maintain stability when doing exercises with one arm, is to 'hook' the other arm's elbow around the chair's armrest. A good example is during biceps exercises. Another alternative to sitting is to do the exercises lying down or on an inclined bench.

Allow someone to help you hold your shoulders down when doing *lat pull-downs* or *rowing* by placing their hands on your shoulders. This will encourage a better starting position.

If you have impaired hand function, you can sometimes use the regular cable pulleys or lifting straps that most gyms have. You could use a couple of rounds of sports tape to improve your hand position. Be generous with anti-slip material where necessary. A good alternative may be to use a glove with a hook to stop you loosing your grip. (Picture) If you are using *weight cuffs*, wear a long-sleeved top to avoid chafing.

If you have poor trunk stability, use a *pillow to support your chest* when doing exercises that require you to lean forward.

Use a small rolled up towel wedged between your upper arm and your side when doing shoulder rotation exercises. This improves the starting position. Ideally, your upper arm should be 30 degrees out to the side and 30 degrees forward relative to your shoulder.

www.spinalistips.se – Check out *Spinalistips* for more practical solutions regarding physical activity and training under the heading *Looking After One's Health* and *Recreation, Leisure*.

Cardiovascular Fitness Training

Cardiovascular exercise, *cardio*, refers primarily to training for the heart and circulation of the blood, while endurance training is about overall physical capacity and the body's ability to perform physical activity for a prolonged period of time. Scientific evidence shows among other things, that increased cardiovascular fitness and endurance increases well-being and quality of life and decreases the risk of depression. The risk for cardiovascular disease is decreased due to increases in metabolism, which also makes it easier to maintain weight. Furthermore, the ability to perform daily activities increases, which enhances independence. Another plus, is the improvement in respiratory function. So you have every reason in the world to exercise to improve your overall condition.

'I'm out and about in my wheelchair a lot – it's so nice. I usually go three days a week for about one and a half hours – about 10 kilometers (6 miles). I alternate my regular wheelchair with my outdoor wheelchair which I can adapt for arm cycling. Sometimes I meet my wife when she is out walking. Then we keep each other company on the way home. I work out the right way. I have new instructions for using my wheelchair and for strength training so at the moment, I don't have any shoulder problems. But one thing I think is really important – consider as you get older, that you need rests.'

Hasse 72, Paraplegia for 36 years

Programs

The programs in this book are for those who are unfamiliar with training and/or those who exercise a little, but would like to increase their overall fitness. Others of you may want to get back on track after a break from training. There are also excellent maintenance programs. However, if you are competitive and possibly more performance-oriented or if you are preparing for some type of competition, the training loads, pace, and times in these programs are too low.

The programs we have included are designed for hand biking, wheeling, and arm cycling (ergometer). Some are evidence based with proven effects on cardiovascular health. The intervals and distances can be used in other activities such as swimming or using a punch bag. If you have the use of your legs, use the intervals and distances with stationary bikes, rowing machines, or walk briskly with or without walking poles.

We have developed four fitness programs

- Short interval training
- Long interval training
- Distance training
- A combination program with short and long intervals

Finally across the finish line! Kungsträdgården, Stockholm, 28 July 2010.

Some of the programs were developed by Lars 'Lövis' Löfström, who has vast experience in wheelchair training and who has won multiple Olympic gold medals. One of his more unusual pursuits with distance training, was when he and a friend, Mats Melin, wheeled their way from Casablanca, Morocco across Europe to Stockholm, Sweden as part of a project called 'Inclusion Tour 2010'. It took almost five months to do the 6,300 kilometers (3,900 miles) – a unique test of physical fitness. Another proof of physical strength, and willpower, was the wheelchair climb of Mt Kilimanjaro in 2013. An achievement that demanded years of preparation.

Benefits of cardiovascular exercise

It is possible to achieve the following:

- increased sense of well-being
- increased quality of life
- increased independence
- decreased risk for cardiovascular disease
- decreased risk for depression
- easier to maintain a healthy weight

A brief on Cardio Fitness Training

For your training to increase your cardiovascular fitness, you must exercise in such a way that you increase your pulse rate over a period of time. Your pulse rate increases when you exert greater effort than usual and choose activities that activate large muscle groups. The activation of the larger muscles places a higher demand on the heart to pump and distribute oxygenated blood to your muscles. Therefore, your heart beats faster and is forced to work more efficiently. That's why it is important to do all movements fully and use the entire range of motion to engage as many muscle groups as possible.

For the untrained individual, a brisk walk, cycle ride, or wheeling at a slightly higher pace on a slightly more difficult surface such as gravel or grass, can be sufficient to improve fitness. If you are already physically fit, you will require higher intensity activities to improve your cardiovascular fitness and endurance. Otherwise, the activity will be maintenance only.

Endurance is measured by oxygen uptake and is determined by the capacity of your heart, lungs, and small blood vessels to transport oxygen. The muscles' ability to use oxygen to produce energy is another requirement. Exercise improves the heart's capacity to pump, so it doesn't have to work as hard during physical exertion once fitness is improved. The effect is an increase in endurance, whereby you will be able to work at a higher intensity for a longer period of time, or at the same intensity with a lower pulse rate. For example, when wheeling up a hill or walking up stairs, you are not as short of breath.

Regardless of whether you have a physical impairment or not, the principles for cardiovascular exercise are essentially the same. However, cardio exercise performed in a wheelchair using the arms will not give the same result as exercises using the legs. The body's maximum oxygen uptake is lower with arm muscle activity as compared with leg muscle activity.

For people with SCI, the level and extent of neurological damage and whether the paralysis is complete or incomplete will affect the result of the training. When a SCI is located in the mid thoracic area (above the sixth thoracic vertebra) the *sympathetic nervous system* is damaged. The *sympathetic nervous system* is a part of the *autonomic* (involuntary) *nervous system*. When the autonomic system is disrupted, the regulation of heart rate, blood pressure, and body temperature are compromised during physical activity. The body cannot respond to training in the same way as for a lower level SCI. For persons with a higher level of injury, the greatest benefit of training is an increased *work capacity* (increased strength, endurance, and performance).

Fact Box

If you have a low level SCI you can improve your cardiovascular fitness almost to your pre-injury level.

Physiological effects of cardiovascular exercise with low level paraplegia

- Increased deep breathing
- Extra oxygenated blood is directed to the working muscles
- Heart rate can increase as needed
- Blood pressure and heart rate increase during physical activity and the heart pumps more blood per beat in the same way it does for persons without SCI

Physiological limitations

- The calf muscles normally help to transport de-oxygenated blood from the legs back to the heart. Because this muscle pump is absent in paralyzed legs, the return of blood to the heart is decreased. This means that extra heartbeats are needed to pump blood throughout the entire body resulting in a somewhat higher heart rate.
- The maximum heart rate with paraplegia is almost the same as for non-injured individuals.

Maximum heart rate is a person's heart rate during one minute of maximum exertion. Most people are satisfied with a rough estimate simply because measuring maximum heart rate is extremely strenuous and only elite athletes are usually tested. Approximately 80 % of the general population has a maximum heart rate of 220 beats per minute minus the individual age. This means that a 20-year old has an approximate maximum heart rate of 200 beats per minute, while a 40-year old has an approximate maximum heart rate of 180 beats per minute. The maximum heart rate while working the arms is around 90 % of the maximum heart rate of leg action.

Comment: The original formula was later found to have a fairly large standard deviation.

From now on we will replace *maximum heart rate* with *peak heart rate*. By peak heart rate we mean the highest heart rate measured. That can be the same as the maximum heart rate but not necessarily. Most individuals don't have a test for maximum heart rate.

Fact Box

If you have tetraplegia or high level paraplegia you can increase your strength, vigor, and endurance. However, the benefits are not primarily cardiovascular in nature but more at the local muscle level.

Physiological effects of cardiovascular exercise for tetraplegia or high level paraplegia

- The greatest benefit of training is improvement in oxygen uptake, metabolism, and transport of oxygen to the muscles at the local level – not a cardiovascular effect.

Physiological limitations

- The depth of breathing does not increase in the same way as it does with a lower SCI
- The body cannot redirect extra oxygenated blood to the working muscles
- Low blood pressure is common during training and reduces training benefits
- Because the calf muscle pump is absent when the legs are paralyzed, the return of de-oxygenated blood to the heart is poorer in the same way as for paraplegia. However, the heart cannot compensate for this with extra beats per minute as it does in lower paraplegia.
- The maximum heart rate for tetraplegia and high level paraplegia is usually between 110 and 130 beats per minute.

The how-to of Cardiovascular Training

Warming up, cooling down, and stretching

A cardiovascular exercise session should always include a proper warm-up of gentle mobility exercises before you start, and finish with a cool-down followed by stretching.

How often?

A good approach is to train two to three times per week, gradually increasing the intensity. Space the sessions over the week so your body can rest in-between them.

For those with tetraplegia who want to train after a longer break or who are beginners:

- Start with two sessions per week.
- After six weeks increase to three sessions per week.
- Then increase the training load by increasing the amount of time you exercise per session.

How long?

The recommended workout time for the able-bodied is a minimum of 30 minutes with a high intensity to improve cardiovascular fitness. However, it is not necessary to hold that tempo for 30 minutes straight. For example, in many exercise classes the aerobics component is split and woven in with strength, balance, and flexibility/mobility exercises. These recommendations are for those who are untrained or in fairly good shape. Those who are well-trained must train longer and at a higher intensity to improve their cardiovascular fitness. For untrained people with SCI or other physical impairments whose condition at the starting point is poor, it is likely that shorter times will be enough to improve cardiovascular fitness.

How hard?

A common misconception is that you should train as hard as you can. The result of this misunderstanding is frequently injury or one simply tires quickly and gives up before ever really getting started. Cardiovascular fitness can improve relatively quickly, but it takes longer for tendons and muscle attachments to increase their resilience. It is therefore important for someone who is untrained, to start at a low level of intensity – a low training load and/or low tempo and then increase gradually.

A moderate level of intensity is often best and means that it should not be too hard or too easy. The *Talk Test* is useful. If you´re so out of breath that you cannot put together simple sentences, you need to slow down.

Choose the right intensity

Here are two different methods you can use to find the right level of intensity – the Borg Scale and Heart Rate-Based training:

The Borg Scale named after Professor Gunnar Borg, is an assessment scale that measures perceived exertion and is used in sports and particularly exercise testing. The perceived exertion is how hard you think your body is working. The scale assumes that the feelings of fatigue, exertion, and heart rate (pulse) increase linearly with an increase in load/intensity. Even though this linear increase cannot be assumed to be the same for people with SCI (see previous fact box), it can be a useful tool to help find the right training level and to evaluate training results. Over time, the amount of effort it takes to do a certain activity should decrease.

The intensity level depends on your initial condition and your goals:

- For an untrained beginner whose goal is to improve general fitness, an appropriate exertion level is 10–13 on the Borg Scale (*light* to *somewhat hard*). You can exercise by wheeling, walking, light jogging, taking an exercise class, or strength training with a component of aerobic exercise.
- Scientific evidence suggests that for persons with tetraplegia, a lower training intensity with an exertion level of 10–12 also improves fitness.
- For those with fairly good cardiovascular fitness who want to improve further, exertion levels must increase to 14–16 or *somewhat hard* to *hard*. This can be achieved for example with tougher interval training.
- For well-trained persons who want to improve their fitness and possibly their competitive standing, the training should be 15–18 or *hard* to *very hard*.

Try this:

Use the Borg Scale to assess your level of exertion during the various stages of your training. Document the figures in your training diary. The exertion indicators can complement or even replace taking your pulse. Assess whether the level of exertion is correct relative to your personal goals for training. This is based on the whether you want to improve or maintain your cardiovascular fitness. Note down whether the exertion is greatest for your heart or the muscles of your arms/legs.

Heart rate-based training. In heart rate-based training, your heart rate is used to measure intensity during training relative to the peak heart rate. Heart rate-based training provides feedback on how your body is responding to exercise and gives information that prevents you from training too hard. Recommended intensity levels are given as a percentage of the estimated maximum heart rate or the 'actual peak heart rate'. Your starting level and your goals determine the recommended level:

The Borg Scale

6	
7	Very, very light (rest)
8	
9	Very light
10	
11	Fairly light
12	
13	Somewhat hard
14	
15	Hard
16	
17	Very hard
18	
19	Very, very hard
20	Exhaustion

Low intensity
45–70 % of peak heart rate
Borg Scale 10–13
Untrained/beginner

Intermediate intensity
70–80 % of peak heart rate
Borg Scale 14–16
Intermediate

High intensity
80–90 % of peak heart rate
Borg Scale 15–18
Well-trained

Try this:

In order to stay within your intended heart rate or pulse zone you must measure your pulse. Of course if you use a heart rate monitor you can keep a constant eye on your pulse. If you take your pulse manually, we suggest you do it immediately before your cool-down. Take a short pause from your activity, count your pulse for 30 seconds and multiply by two to get the number of beats per minute. Find your pulse by pressing lightly with the tips of your fingers over the inside of your wrist or over the carotid artery on the side of your neck. You will need a watch with a second hand.

'Even if you use heart rate zones when exercising, it is still your exertion experience that should ultimately control how hard you train!'

Lars 'Lövis' 55, Paraplegia for 51 years

Equipment and practical tips

Standard wheelchair. Make sure that you have the right/a good chair and also the right technique.

> **'Get out and wheel! Self-propelling is the best daily exercise because it's so easy to do.'**
>
> **John 55**, Tetraplegia for 36 years

An attachable hand cycle.

Tip: The FreeWheel makes outdoor wheeling easier and more enjoyable.

Hand cycles and tricycles have come a long way in recent years. There are models that you transfer to, but it is also possible to connect a front wheel with a drive function to your regular wheelchair. This option has become immensely popular for those who exercise in a wheelchair. Interestingly, research indicates those with symmetrical drive are easier on the shoulders than self-propelling your chair. The symmetrical drive provides better core stability than arm cycles with unsymmetrical drive thereby improving the foundation for training.

Tips:

Handles for those with poor grip

The recommended setting is that handles should be somewhat wider than shoulder width, allowing for a slightly bent elbow when your arms are straightest and a low shoulder position. Avoid working with the arms in an elevated position, as this causes more wear and tear on the shoulders. It should feel comfortable.

Trainer

For cycling indoors when weather conditions are poor, you can use a trainer. The front wheel is fastened to a frame and rolls against a moveable metal cylinder. The resistance can be varied through the cycle's gears. Trainers can be purchased in any good bike shop.

Stationary arm cycles: *wall-mounted or placed on a table*. Arm cycling complements wheeling and is a good way to vary your training which is important for motivation and performance. In Sweden arm cycling indoors in the winter can be a savior. NB: Do not have the arm cycle mounted too high. You can find settings for arm cycles and mounting guidelines on www.spinalistips.se.

Walking poles. For those who can walk but have problems with balance, walking poles are an excellent training tool. The length of the poles should be adjusted so that the elbows are at a 90 degree angle when you set the tips of the poles on the ground. There are different types of tips, depending on whether you walk indoors, or outdoors on asphalt or gravel.

Cycles, stationary bicycles or tricycles. Bicycles are more appropriate for those who have some leg use. Ensure your feet stay on the pedals so they are not injured. There are accessories which can be attached – examples are, a harness which prevents the foot from sliding off backwards or rubber straps which prevent the foot from buckling to the side. You can also use Velcro bands.

Practical tips for fitness training sitting in a wheelchair or using an arm cycle:

- Be aware of your posture and sit as upright as possible. Strap yourself in if necessary. You will enjoy better results.
- Use gloves when you are wheeling for exercise to avoid blisters and small cuts. Use reinforced cycling gloves or work gloves in leather or with leather reinforcement (affordable ones can be found in any DIY store).
- Use tie-downs or bungee cords around your feet and ankles to fasten them to the footrest so they do not slide off and get injured. Straps and tie-downs can be purchased in sports stores and where motorcycles are sold.
- If you use an arm cycle, see above for setting recommendations.
- There are many benefits to wearing a corset, even a soft one when doing a cardio workout. It helps stabilize the torso, reduces the risk of diaphragm fatigue, improves shoulder positioning, reduces the risk for blood congesting in the legs, increases the availability of oxygenated blood to the arms, and allows for better breathing.
- Support stockings are useful. They help prevent blood from pooling in the legs and ensure that as much blood volume as possible is available for your heart.
- Push rims with a rubber surface allow for better grip when wheeling.

Establish your baseline – test your fitness level in the first place

To ensure you have a point of comparison over time, do this simple test.

The 6-minute test designed originally for walking, is simple to perform yourself. The test is suitable regardless of whether you walk with or without walking aids, or use a wheelchair. You simply compare yourself with yourself.

Prepare for the test by selecting a suitable route without traffic or pedestrian crossings. It is fun, but not necessary, to know exactly how many yards/meters your route is. Use the same route for every test. You will know that your physical capacity/endurance and cardiovascular fitness have improved if you get further or get just as far but feel a lower level of exertion and have a lower heart rate. It is also possible to use stationary arm/leg cycles to do the test.

Use common sense and do not take risks. If you do not feel good or your doctor has given you restrictions, then you should not exert yourself to the extent that the test demands. If you are going to walk the test, plan it so that you can sit down and rest if necessary. If your balance is poor, have someone walk with you.

Discontinue the test immediately if you experience chest pain, cold sweats, breathing problems, or severe responses.

How to do the 6-minute test

- Wheel your manual wheelchair or walk, with or without walking aids, as quickly as you can for 6 minutes. The test should feel strenuous but not too exhausting. Remember that you have to be able to hold an even pace for 6 minutes. NB: Before the test, warm up for 5–10 minutes through movements that engage the major muscle groups or by simply doing the chosen test activity but at a slower pace.
- Stop when you have walked or wheeled for exactly 6 minutes. Take note immediately how difficult it feels and document your level of exertion (according to the Borg Scale) in your training diary. Note where you started, how far you got, and your pulse (if applicable).
- If you know how to take your pulse, do so immediately after the test. If you have a heart rate monitor, you can use it to note your pulse. However, taking your pulse is not necessary to complete the test. It is the distance and level of exertion that is most interesting.

Your 6-minute fitness test results might look like this:

Date	Route	Exertion Level	Final heart	Comments
22/8	*Kiosk – the big oak tree*	*15 – hard*	*145*	*A little pain in my knee but feel satisfied*
6/10	*Kiosk – Traffic lights*	*15 – hard*	*140*	*Went about 150 meters further, somewhat lower pulse – great!*

Equipment

- A wrist watch with a second hand or a stopwatch
- The Borg Scale and a heart rate monitor (optional)
- Training diary
- Stationary arm/leg cycle where it is possible to set the load and measure distance – when indoor

Program for Cardiovascular Fitness

Interval training

The purpose of interval training is to increase your cardiovascular capacity. A distinction is made between *short interval training* with high intensity short intervals and *long interval training* with low intensity longer intervals. Utilizing the variation in load that a hilly terrain offers while wheeling, hand cycling, or walking briskly, is referred to as a *natural interval*.

The program with short and long intervals is systematically built up to combine periods of activity and rest. The period of activity, especially in the program for short interval training, should be intensive with quite a high pace and high training load so that your heart rate increases significantly. During the rest phase, the muscles recover and lactic acid is transported away. The rest period is *active rest* as you continue wheeling/walking but at a slower pace. The idea is that the pulse should remain relatively high even while resting, and not drop below 130 beats* per minute (and preferably higher). In this way, you gain the benefits of training even while resting.

The programs are built up to allow you to work with a high frequency and a load that you decide upon. Try to increase your heart rate. NB: You should keep the same pace during all intervals. Those unused to training often start at a level that is too difficult or choose a pace that is too fast in the first intervals and then do not have the endurance to finish the program.

* This doesn't apply to tetraplegia – read Factbox on page 112.

Every session should start with 5–10 minutes of warm-up to reduce the risk of muscle/tendon injury.

Equipment

- Stop watch (most mobile phones have one)
- Music appropriate for warming up and cooling down and fast music for the intervals
- A HR monitor if you have one – otherwise, get to know your body's exertion levels so you can judge whether the pace is too low or too high (use the Borg Scale)
- Read more about equipment and practical tips on previous pages

SHORT INTERVAL	**Structure: 2 times/week and 2 different weeks so you can alternate**	
Week 1	**Session 1**	1.5 min fast pace/1 min rest x 5 (or 6). Total training time 12.5 min
	Session 2	2 min fast pace/1 min rest x 4 (or 5). Total training time 12 min
Week 2	**Session 1**	70 seconds fast pace/20 secs rest x 5 (or 6). Total training time 7.5 min
	Session 2	5 min fast pace/2 min rest x 3. Total training time 21 min
		Total training times do not include warm-up and cool-down.

'This program with rather short sessions still gives a basic, light cardiovascular work out. It's a great way to exercise and get results without that much effort and it's pleasurable. It's appropriate for those who want to improve their cardio fitness, get stronger, more alert, and perform routine daily activities with more stamina. Exercise to feel better!' **Lars 'Lövis' 55**, Paraplegia for 51 years

Sessions 1 & 2 in Week 1 and Session 1 in Week 2 are gentle. If you want to increase the training load just add an extra repetition. Session 2 in Week 2 is tougher because you hold the intensive pace for longer. It is important to rest between the intensive intervals (2 mins). If you want to increase the level of difficulty, increase the total time by performing it twice. Between sets, increase the length of the rests – the recovery phase.

Try this:

Start with 2 sessions/week to see whether you develop pain in your shoulders/arms. Then increase to 3 sessions/week or make a change to distance training. This means longer stretches with a lower training load and lower HR. Keep a careful eye on your watch.

Long intervals

A progressive 12-week program

In long interval training, you exercise for a longer period of time but not at a high pace. This program has been scientifically tested on persons with tetraplegia using a hand bike. In the study, participants were encouraged to find a level of exertion from 11–13 on the Borg Scale. The program has shown good results for cardiovascular fitness and safety for shoulders/arms. The structure can be applied to other types of training.

LONG INTERVAL	**Structure: A progressive 12-week program 3 times/week with different intensities**
Week 1	3 min cycling/2 min rest x 6 – Total training time 30 min
Week 2	3 min cycling/2 min rest x 6 – Total training time 30 min
Week 3	3 min cycling/1.5 min rest x 7 – Total training time 31.5 min
Week 4 & 5	3 min cycling/1.5 min rest x 8 – Total training time 36 min
Week 6 & 7	3 min cycling/1 min rest x 8 – Total training time 32 min
Week 8 & 9	4 min cycling/1.5 min rest x 7 – Total training time 38.5 min
Week 10 & 11	4 min cycling/1 min rest x 7 – Total training time 35 min
Week 12	4 min cycling/1 min rest x 8 – Total training time 40 min
	Total training times do not include warm-up and cool-down. Valent -09

Distance training

Distance training refers to continuous activity for a longer period of time. Its purpose is to allow the body to adapt to prolonged periods of activity. This is accomplished primarily at a local level through an increase in the muscles' ability to extract oxygen and utilize stored fat as fuel. A more centralized adaptation takes place and influences heart and lung capacity. This type of training is sometimes called Long Slow Distance. The intensity remains the same throughout the entire session.

DISTANCE		**Structure: 3 times/week with varying intensities**
Week	**Time per session**	**Level of exertion**
	Session 1 35 min No warm-up or cool-down	Normal pace, light intensity Borg Scale 10–13
	Session 2 30 min + 5 min warm-up + cool-down	Slightly faster than normal but not your fastest pace, intermediate intensity Borg Scale 14–16
	Session 3 15–20 min + 5–10 min warm-up + cool-down	Fast pace, high intensity Borg Scale 16–18
	Total training times do not include warm-up and cool-down.	

'Don't go at it any harder than allows you to maintain your pre-defined level of exertion throughout the entire session!' Lars 'Lövis' 55, Paraplegia for 51 years

Program for arm cycles/hand biking/wheeling

Here is a summary from scientifically evaluated cardiovascular fitness programs for people with SCI, where participants either arm cycled and/or wheeled. The purpose of the various training programs was to evaluate the effects on cardiovascular health. The programs varied between 20 – 60 minutes per

training session. The table shows how long each session was, the number of sessions per week, the level of exertion, and the results.

The conclusion is that you can train in different ways and achieve the same results. Choose the style that suits you best – short and intensive or longer and slower.

Program

Number of sessions per week	Time per session	Level of exertion/intensity
At least 3/week	40–60 min per training session	Low intensity, 55–69% of max heart rate
	20–60 min per training session	Medium – high intensity, 70–90% of max heart rate

Results:

Increased capacity to take up oxygen, increased endurance, strength, and metabolism.
Reduced risk of cardiovascular disease, including improved insulin sensitivity and normalization of lipids.

Experience:

Programs with shorter training times require a higher level of exertion and vice versa to achieve the results

SCIRE, Spinal Cord Injury Rehabilitation Evidence

All sessions began with a warm-up and finished with a cool-down and stretching. The training structure can be applied to other activities such as swimming, cycling, or walking with or without walking poles. The principles are what matter – how hard, how long, and how often.

Try this:

- Exercise according to the longer and slower principle. Work out for 40–60 min at a low intensity (according to the study 55–69 percent of your max heart rate).
- Exercise according to the short and intensive principle. Work out for 20–40 min per session at an intermediate to high intensity level (70– 90 percent of your max heart rate).
- You can alternate between the two principles within the same week.

Circuit resistance training

Circuit resistance training is an effective way to build strength and cardiovascular fitness. This technique consists of a number of strength-building exercises interwoven with training that gets the heart pumping – for example, arm/leg cycling or *air boxing*. The trick is to maintain a high enough pace while you change stations, so that the heart rate does not have a chance to decrease. NB: The strength-building exercises themselves should be performed at a calm and controlled tempo.

We include three circuit programs that can be done at home or at the gym.

- Upper body circuit A (Nash -01)
- Upper body circuit B
- Total body circuit

Upper body circuit A has been developed for persons with SCI for both paraplegia and tetraplegia and was scientifically tested. Training three times per week for 16 weeks yielded good results for both strength and aerobic fitness. Blood fats also normalized.

We have modified the original program by replacing the biceps exercise with a rotation exercise to ensure shoulder safety. You can of course, choose to do both exercises.

Upper body circuit A

» Warm up with 5–10 minutes of light arm/leg cycling or air boxing.

» 6 stations with selected strength-building exercises for the upper body. See Toolbox.

» Do 10 repetitions of each exercise at a calm and controlled pace. Try to count 1–2–3 (3 seconds) for the lift and 1–2–3 (3 seconds) to return to the starting position – 1 minute per exercise.

» 1 minute of arm/leg cycling or air boxing after every other strength-building exercise at a rapid pace with/without very light resistance.

» Changing stations should be done as quickly as possible, preferably in 10–15 seconds so that the heart rate does not have a chance to decrease.

» Repeat the circuit up to three times.

» Upper body circuit A takes approximately 13–15 minutes. The entire three circuit program takes approximately 45 minutes if the changes are executed quickly.

» Beginners may start by completing one circuit. To ensure the program is practical, you may need to make some adjustments. For example, you may want to perform several sets of each exercise before you change, if each change takes a long time and/or you need special gloves. The training load should then be reduced.

Upper body circuit A, B, and Total body circuit with exercises and structure are presented in the Toolbox.

Equipment

- Gym machines or resistance bands and hand weights, and stationary arm/leg cycles
- Music (preferably fast music), so it is easier to maintain the pace
- For equipment and practical tips, see previous text

Flexibility/stretches

Muscles shorten when they contract so if they are not stretched regularly there is a risk that they will shorten with increased use. This leads to reduced mobility in surrounding joints. Reduced joint mobility makes daily activities more difficult such as getting dressed/undressed and transfers. The purpose is to retain flexibility and reduce the risk of injury to muscles and tendons.

Both wheelchair users and crutch walkers need to stretch the muscles of the neck and chest regularly. For those who can walk, it is important to stretch the muscles that bend the hips and knees, as well as the muscles for external rotation of the hip and inner thighs and don't overlook your toes, as those muscles often shorten.

Be aware that when you work the muscles of your back, you simultaneously stretch the chest muscles – which is often good. The same bonus effect applies when you do strength exercises that press the shoulders down, you simultaneously stretch the neck muscles.

Almost everyone is overly flexible somewhere in their body. Obviously such muscles should *not* be stretched. NB: If you have a SCI with tetraplegia tightness in certain muscles, this could be necessary for your function, so find out what muscles are necessarily tight for you.

'I lie on my belly for a little while every day, usually in the evening, in order to maintain mobility in my hips. It's important for everyone who sits in a wheelchair. From this prone position I also do an exercise to stretch out my back and stomach muscles. I support myself on my elbows and stretch my back holding for a short while. Then I rest prone again and then repeat.'

Ulla 57, Paraplegia for 38 years

Try this:

- Stretch the muscle to the point where you feel strain but not pain. Hold for a few seconds and then test if you can stretch just a little further.
- Hold still in the stretch position for 15–30 seconds. Relax.
- Concentrate on keeping your movements gentle but steady. Fast, jerky movements counter the effects of stretches.
- Stretches are usually done at the end of each training session. You can also do a few stretches after your warm-up, especially if you are aware of areas where you are particularly tight.
- Instructions for how to stretch the various muscle groups can be found in the Toolbox.

Fact box

Muscles and tendons become short and tight:

- If they don't get the chance to fully stretch out. For example, the muscles used to bend the hips and knees easily become shortened with wheelchair use because the sitting position requires bent hips and knees.
- If required to work repetitively. When you self-propel a wheelchair or walk with crutches, the chest and neck muscles shorten. This is not just because of the position of your body with raised and forward-drawn shoulders, but because these muscles are contracted constantly during transfers.
- If spasticity is present within a muscle.

Mind-body exercise

Mind-body exercise refers to the performance of slow controlled movements synchronized with your breathing. Great emphasis is placed on attention to each and every movement. Such exercise tends to combine awareness (mindfulness) with personal reflection on sensations, thoughts, and feelings. Relaxation and mind/body recovery are two of the achievable health benefits. Meditation and mindfulness practices often go hand in hand with mind-body exercises. Other forms include Tai-chi and Qi-gong.

We provide the following mind-body programs

- Breathing exercises
- A sitting yoga program
- A standing yoga program

The programs for sitting and standing yoga can be found in the Toolbox.

A Brief on Breathing

Our breathing mechanism oxygenates the blood that is then transported via the arteries to supply each and every body cell. The supply of oxygen along with various nutrients is a prerequisite for all bodily functions.

Breathing is a fundamental bodily function that we rarely think about because it essentially takes care of itself. But we can easily lose our healthy breathing and compromise our habit or ability to take long, deep breaths. Sometimes this can be due to stress, where we are so wound up that our breathing becomes shallow and ineffective. Those who have sedentary jobs may be inefficient breathers. This can of course also apply to those with SCI and others who are wheelchair dependent and/or have a sedentary lifestyle.

The breathing exercises that follow can either be done alone or in combination with other exercises – for example, as part of the yoga exercises in the Toolbox. Breathing exercises undertaken in a spirit of mindfulness or meditation principles, contribute to increased body awareness and are calming. Read more about meditation and mindfulness in Chapter 5 Mindfulness and Thought-Training.

Breathing exercises

We have borrowed two breathing exercises from yoga principles. One is called *Conscious breathing* and the other is called *Long deep breathing.* Among yoga practitioners, 10 minutes of focused breathing every day is recommended. Of course the exercises can also be used if you feel the need for a quick fix.

Starting position for breathing exercises

Sit with an upright posture, unsupported, if possible. Lift the chest upward, keep the chin in and a little down, and imagine that there is a cord attached to the crown of your head pulling you up to lengthen your neck. Keep the shoulders relaxed and drawn slightly back and the chest open. Your sitting position is important because an upright posture creates space in the chest cavity and allows the ribs to move with each breath. A slouched position decreases that space and deep breathing is compromised. Lie down if you feel dizzy.

Conscious breath

Adopt the starting position. Place one hand on your abdomen and the other on your chest. Direct your attention to your breathing. Follow your breath as it moves into your body and notice where it goes. Does your breath tend to stay high up in the chest or do you breathe into your abdomen? Observe your breathing for several breaths. Then take a deep breath that allows the air to fill your lungs and feel how your abdomen expands. Hold your breath for a moment, and then breathe out through pursed lips. If you can, use your abdominal muscles to help empty your lungs. Pause and once again follow your breathing – in and out. Repeat the exercise.

Pause a few times during the day to direct your attention to your breathing. Is your breathing shallow and high or deep into your abdomen? Take a deep breath, relax, and release your shoulders.

Long deep breath

The long deep breath is one of the fundamental principles of yoga. This is divided into three parts: abdominal breathing, chest breathing, and collar bone breathing. Both inhalation and exhalation are through the nose. You can practice the long deep breath either by focusing on one part at a time,

which can be preferable in the beginning. Later you can move your focus so that the three different parts merge into one, long, deep breath.

Try this:

1

Adopt the starting position. If you have difficulty with sitting balance especially when you raise your arms, you may want to lie down to start with. This allows you to concentrate entirely on your technique to determine what occurs with each breath.

Abdominal breathing

Place your hands on your abdomen at the level of your belly button. Breathe in through your nose and feel the abdominal wall expand. Ideally your chest and shoulders remain still. Breathe out through your nose and feel your abdomen sink as the air leaves your body. Press lightly to help with the exhalation.

2

Chest breathing

Move your hands to the lower part of your rib cage. Inhale through your nose and feel your chest expand (your shoulders remain still). Exhale through your nose and feel your rib cage sink. Press lightly to help with the exhalation.

Collar bone breathing

Place your hands high up on your chest, over your collar bones. Inhale through your nose and follow your breath so that you feel your collar bones and upper part of the chest rise. Your shoulders remain still. Exhale through your nose, feel the collar bones and upper chest sink during the exhalation. Press lightly to help with the exhalation.

3

Now put together the three different parts of the exercise for the *long deep breath*. Start by inhaling deeply through your nose. Fill your abdomen with air first, then continue up to and expand the rib cage, and finally, feel how the area rises around your collar bones. Exhale through your nose and empty all the air from your lungs. Begin at the top and work your way down. Feel the collar bones sink first, followed by the rib cage and finally your abdomen. Breathe with or without guidance – with or without light pressure from your hands.

A Brief on Yoga

Energy and its flow are important elements of yoga. The principles of yoga are based on the belief that the combination of physical movement, body positions/poses, breathing, meditation, and being 'in the moment' maximize energy flow throughout the body. It is via this mechanism that health and well-being are influenced. Originally from India, yoga is several thousand years old and has been described in sacred texts. Two examples are the Vedas, a collection of texts written during the period from 1500–1600 BC and the Bhagavad Gita, from approximately 500 BC. The belief is that yoga was a means to bridge the gap between the body or material world and the spirit or spiritual world. In some yoga traditions the purpose was to reach 'enlightenment'.

These days it is likely that yoga has no association with spirituality. During the last half of the 1900s, Western science became specifically interested in yoga's health benefits. This lead to the development of yoga programs with a medical focus for a variety of illnesses. For example, programs have been developed for treatment of cardiovascular disease, stress, and pain related illnesses. Within a rehabilitation framework, the practice of yoga is associated with improved well-being and quality of life. There are a variety of approaches available and we briefly present a few of the most well-known.

Hatha yoga is the earliest known form. Archaeological findings show yoga seated poses similar to those of Hatha yoga, suggestive of the practice as early as 3,000 BC. Within this form, there is a greater emphasis on the body's physical activity. This differed from the early and more meditation-oriented yoga culture. The belief was that by strengthening the body, one balanced the mind. It is possible that this physical focus is why Hatha yoga is popular in Western cultures. It is often easier to start with more concrete physical exercises before a move to more abstract practices.

Iyengar yoga is named after its founder B.K.S. Iyengar. The development of this yoga practice began in the 1930s. A special feature of Iyengar yoga is the use of props such as cushions, blocks, and belts. These are used to assist with the positions/poses. Poses are frequently held for long periods of time, some 5–10 minutes. This is considered necessary to create increased body awareness and ultimately over time, a sense of harmony. This yoga practice has been easily adapted for those with SCI and other physical impairments. However, the poses frequently require the assistance of a yoga instructor to

ensure the belts, cushions, and other props are adjusted correctly. In a rehabilitation context, this practice aims to improve strength, mobility, and balance.

Kundalini yoga is described in texts from 500 BC. It is likely that the oral tradition is considerably older. Yogi Bhajan introduced this yoga practice to the Western world in the 1960s. It was introduced to the USA first and from there it has spread around the globe. Kundalini yoga frequently combines a special type of breathing called *Breath of Fire* (a breathing technique using short, quick breaths through the nose where the abdomen moves quickly as one breathes) with a variety of physical movements and poses. Meditation mantras and chants are a feature of this practice. These are short repetitive verses sung or spoken in conjunction with the breathing.

Restorative yoga is particularly useful for relaxation and recovery. By resting in various positions/poses with a focus on breathing, conditions are created for a calm physiological state that facilitates a sense of well-being. Restorative yoga is especially beneficial for those who have problems with fatigue, low energy levels, or high stress levels. Of course it can be combined with other yoga practices to create a state of calm.

Toolbox: Strength training – Introduction

Here are six programs which can be done at home or at the gym. You can get help at the gym to integrate the resistance band and dumbbell exercises into the more traditional gym training with cable/pulley systems and machines. The purpose of the programs is to strengthen those muscles which are often weak yet are important in daily living. This is functional training.

The programs:

- Shoulder training programs in two steps – Shoulder 1 and Shoulder 2, developed for persons who experience pain or weakness in the shoulders and need a safe start.
- Upper body program to be done once, twice, or three times per week.
- Leg program to be done twice per week.
- A program for the entire body to be done twice per week.

General instructions

» Recommended training: 2 – 3 times per week or as prescribed by a physiotherapist or gym instructor.

» When training the upper body in a seated position, begin by adjusting the way you sit in the chair. Sit up with a straight back and try not to slump. Try to drop your shoulders.

» Keep your wrists as straight as possible.

» When training in a standing position, always begin by trying to find a stable starting position with good posture. If possible, check in a mirror.

» Warm up for 5 – 7 minutes (arm cycling, air boxing, or similar) to increase circulation in the arms, shoulders, and back if you are going to train in a seated position. For those who walk, warm up for 5 – 10 minutes (for example, on a stationary cycle/ergometer).

» Gradually increase the load and move from high repetitions with a light load to fewer repetitions with a heavier load.

» Remember to stretch when you have finished.

Training program – Shoulders

This training program is an excellent starting point if you are particularly weak in this region. This is also the program you should use if you have pain or tend to have pain in the shoulders. It is important to strengthen the small muscles near the shoulder joints, so that you have the necessary prerequisites to move on to other exercises without risking injury.

The program has been divided into two parts: Shoulder 1 and Shoulder 2. The exercises in Shoulder 1 teach you to stabilize the shoulders and ensure good posture as a starting point for further training. The exercises in Shoulder 2 continue the work with posture and stabilization of the shoulders, but include strengthening exercises for the small muscles near the shoulder joints.

The program has been designed so it can be done easily at home with a resistance band or dumbbells. We recommend that this training be done daily or as recommended by your health professionals. If you have strong shoulder muscles and you know your body, you may be ready to move on from Shoulder 1 and Shoulder 2 in a few weeks. If you are weak in this region, it may take considerably longer.

Before you move on to other programs and more mainstream strength training, you should be:

- able to maintain a strong starting position in all exercises, i.e. good posture with a straight back and with shoulders lowered and drawn backward.
- stronger in the muscles you have been training.
- pain-free before you increase the demands on your body!

Program Shoulder 1 – Training for shoulder stability and posture

Many people have weak muscles on the back of the upper body and are tight through the chest muscles. Together, these two factors lead to a somewhat rounded posture with shoulders pulled forward and upward. This is a starting position for arm exercises which does not promote shoulder health. A posture with a straight back and shoulders drawn back and lowered, on the other hand, will give you an optimal seated starting position for self-propelling a wheelchair as well as for all other physical activities. This is a starting position that prevents future shoulder problems. If possible, work in front of a mirror when you do these exercises.

Essentially, this is a program that most people who already have shoulder problems can do without any deterioration and in fact improving their situation. This initial program focuses on drawing the shoulder blades back and improving posture. **These exercises are the foundation of your training and should be a life-long habit!**

Program Shoulder 2 – Continued training for shoulder stability and posture with additional focus on the small muscles around the shoulder joints.

The exercises which supplement the stability and posture exercises are for the small muscles around the shoulder joints (the muscles of the rotator cuff) and the arms' abductors – exercises 5,6, and 7.

Shoulder program daily training or nearly every day:

Shoulder 1

- Posture training/Shoulders (exercise 1)
- Posture training/Shoulder blades (exercise 2)
- Seated rowing or Bent-over rowing/ Draw shoulders and shoulder blades backward (exercise 3A or B)
- Dumbbell or Chest press/Draw shoulders forward (exercise 4A or B)

Shoulder 2

- Posture training/Shoulders (exercise 1)
- Posture training/Shoulder blades (exercise 2)
- Seated rowing or Bent-over rowing/ Draw shoulders and shoulder blades backward (exercise 3A or B)
- Dumbbell or Chest press/Draw shoulders forward (exercise 4A or B)
- External shoulder rotation (exercise 5)
- Internal shoulder rotation (exercise 6)
- Lat pull-down (exercise 7)

Functional Training and Choice of Exercises

Important exercises for the upper body and optimum wheelchair performance:

- Exercises 3a and b Row and Exercise 6 Internal shoulder rotation – strengthen the shoulder joint, give you control, and reduce the risk of injury.
- Exercise 7 Lat pull-down – draws the arms downward to the sides of the body and helps keep the shoulder joint in place. The muscles that raise the arm are often strong while the muscles that lower the arm are often weak. This creates muscular imbalance.
- Exercises 8 High rowing, 9 Dips, and 10 Bent over lateral raise – press the shoulders downward and keep the shoulder blades together on the back; important muscles when transferring.
- Exercise 11 Triceps kickback – extends the elbow; important when self-propelling a wheelchair and when transferring.

Additionally, you need strong chest muscles for optimum wheelchair use. But since these muscles are often strong anyway, they do not usually need much extra training.

Important exercises for strengthening the legs and for walking:

- Exercise 14 Sit-ups – strengthens abdominal muscles.
- Exercises 15 Pelvic lift and 16 Back extension – strengthen the lower back, buttocks, and hips. Other good exercises for exercising the hips and the back of the thighs are backward steps or standing on one leg and lifting the other leg backward and upward.
- Exercise 18 Outer leg raise – trains the hip's abductor muscles and is important for keeping the pelvis in a horizontal plane when walking. This exercise can also be done standing. Another way to exercise these muscles is by walking sideways, i.e. taking steps to the side.
- Exercise 19 Leg kick – strengthens the front of the thighs and the muscles for straightening the knee. Other exercises to train the same muscles are walking up and down stairs or sitting down and getting up again from a chair.
- Exercise 20 Leg curl – strengthens the muscles on the back of the thigh that bend the knee. Exercises for bending the knees can also be done standing or while lying on your stomach.
- Exercise 21 Calf press – trains the muscles that stretch the ankle. You can also work these muscles by standing or walking on your toes, or by doing heel raises.

Another good exercise which is not included in this chapter, is to stand or walk on your heels.

Exercises – Strength Training

STRENGTHENING EXERCISES USING RESISTANCE BANDS, DUMBBELLS, OR YOUR BODY FOR RESISTANCE.

Exercise 1

Posture training/Shoulders (M. trapezius)
Sit up straight with good posture and back well supported. Take a deep breath and raise your shoulders. Exhale with a sigh, releasing your shoulders downward.

Do this exercise now and then throughout the day to remind yourself about your posture. If you have pain in your shoulders, it is especially important to do this exercise often.

Exercise 2

Posture training/Shoulder blades (M. trapezius, M. deltoid)
Sit with your arms at your sides. Bend your arms to a 90° angle. Keeping your elbows close to your body, move your hands and lower arms outward. Return to the starting position.

Feel how your shoulder blades move in toward your spine.

Exercise 3A

Seated rowing with resistance band (M. trapezius, M. rhomboids, M. triceps brachii)
Grasp the handles of the resistance band and pull backward until your hands reach your waist. At the same time hold your back straight and squeeze the shoulder blades toward the spine. Return to the starting position.

Strap yourself in if necessary. Avoid drawing your shoulders up toward your ears.

Exercise 3B

Bent-over rowing with or without dumbbells (M. latissimus dorsi, M. teres major, M. trapezius, M. rhomboids)
Sit with your body leaning forward to an approximate 45° angle or with your upper body resting against your thighs. Let your arms hang down toward the floor. Pull your elbows upward and backward toward the ceiling, dumbbells toward your armpits. Return to the starting position.

Place a cushion on your lap to support your upper chest.

Exercise 4A

Dumbbell press (M. pectoralis major, M. serratus anterior, M. trapezius)

Lie on your back with shoulders lowered. Raise your arms straight toward the ceiling. When your elbows are in line with your shoulders, lift/press the hands upward a little bit more toward the ceiling. Notice how the shoulder blades raise slightly from the floor or mat. Return to the starting position.

Avoid raising your shoulders toward your ears.
Adaptation: If you cannot straighten your arms at the elbow, raise your arms with the elbows bent. Use dumbbells to increase the load. If you are weak in one arm, work both arms at the same time. Hold a pole (with or without wrist cuffs) with both hands and lift both arms simultaneously. At the gym, you might choose to do a seated bench press to train the same muscles.

Exercise 4B

Chest press (M. pectoralis major, M. triceps brachii)

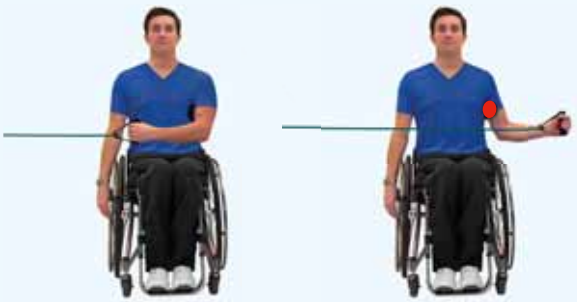
Grasp the resistance band with both hands, using an overhand grip. Keep the shoulders down and press the hands forward until the arms are outstretched. Press the hands forward a little more and notice how your shoulders and shoulder blades are pulled forward. Return to the starting position.

Exercise 5

External shoulder rotation (M. infraspinatus, M. teres minor)

Grasp the resistance band with the lower arm just above the waist and in front of the body, with the elbow at a right angle. Pull the resistance band outward from the body while keeping your upper arm in close to the body. Keep your wrist straight throughout the entire exercise. Return to the starting position.

Place a small rolled up towel or similar under your arm to improve your starting position for the shoulder. The arm should be approximately 30° out from and 30° forward from the shoulder.



Exercise 6

Internal shoulder rotation (M. subscapularis)

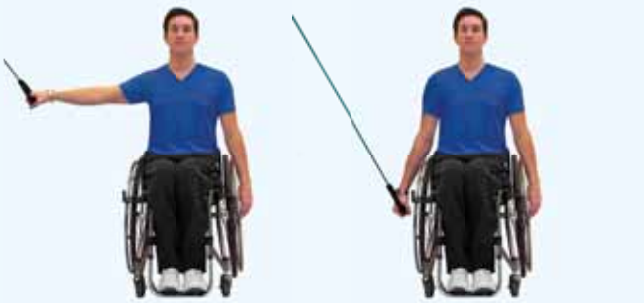
Keep the elbow at a right angle and your upper arm in close to your body. Position the lower arm and hand out to the side, away from your body. Pull the resistance band in toward your body at a height just above the waist, while keeping your upper arm close to the body. Keep your wrist straight throughout the entire exercise. Return to the starting position.

Place a small rolled up towel or similar under your arm to improve your starting position for the shoulder. The arm should be approximately 30° out from and 30° forward from the shoulder.

Exercise 7

Lat pull-down (M. latissimus dorsi, M. pectoralis major)
Make sure your seated position and posture are good, your shoulders lowered and shoulder blades drawn in toward each other in the back. Position your arm straight out from the side. Pull your arm downward in a straight line (not forward and not backward) and in toward your body. Use an overhand grip throughout the exercise.

Do not allow your shoulder to rise up toward your ear when returning to the starting position.



Exercise 8

High rowing (M. deltoid, M. rhomboids, M. trapezius)
Sit up straight with good posture and with your shoulders lowered. Stretch your arms forward so that your shoulders also move forward. Pull the resistance band in toward your body, while simultaneously bending your arms and pulling your shoulder blades in toward your spine. Return to the starting position.

Strap yourself in if necessary.

Exercise 9

Dips (M. triceps brachii, M. deltoid, M. pectoralis major)
Place your hands on your push rims (or on the arm supports of an armchair). Keep your arms as straight as possible with shoulders raised. Raise your buttocks up from the wheelchair by pressing down through the shoulders and straightening your arms. Return to the starting position.

Exercise 10

Bent-over lateral raise (M. deltoid, M. supraspinatus, M. trapezius, M. rhomboids)
Position your upper body against your thighs with your arms hanging straight down from your sides, your hands in front of your feet. Grasp the dumbbells and keeping the arms straight, pull the elbows upward toward the ceiling until they reach the height of your shoulders. At the same time pull your shoulder blades together and in toward the spine. Return to the starting position.

Place a cushion on your lap to support your upper body.
This exercise can also be done one arm at a time.
You can train the same muscles at the gym using cables/pulleys (Cable/pulley seated lateral raise).

Exercise 11

Triceps Kickback (M. triceps brachii)
Lean forward and allow your chest to rest against your thighs. Grasp the dumbbells with your elbows held in to your sides. From here, extend the arm through the elbow. Return to the starting position.

Place a cushion on your lap to support your chest.


Exercise 12

Chest Fly (M. pectoralis major)
Attach the resistance band at the approximate height of your chest. Sit with your back toward the wall and press your chest forward. Position your arms out to the side at chest level. Press your arms forward in a circular motion with the elbows lightly bent until they are outstretched in front of your body. Return to the starting position.


Exercise 13

Biceps curl (M. biceps brachii, M. brachialis)
Place the resistance band around your wheelchair's footrest. Position your arms so they are straight down by your sides but drawn slightly forward. Keep your palms facing upward throughout the entire exercise. Bend your elbows to an approximate 90° angle.

Return to the starting position.
Work with one arm at a time if this suits you better. You can also use dumbbells for this exercise.


Exercise 14A

Sit-ups lying down (M. rectus abdominis)
Lie on your back with bent knees. Cross your arms over your chest throughout the entire exercise. Contract your abdominal muscles and press the lower back into the mat/floor. Pull in your chin simultaneously as you lift your head and shoulders. Return to the starting position.

Place a cushion or bolster under your knees if you have difficulty lying with bent knees unsupported.


Exercise 14B

Seated sit-ups (M. rectus abdominis)
Lean back and slide your buttocks forward in the chair until you feel the lower part of the shoulder blades resting against the back support. Cross your arms over your chest and hold your neck in a neutral position. Bend forward with your upper back and try to lift your weight from the back support. Remember to activate and contract your abdominal muscles during the entire exercise. Return to the starting position.

Exercise 15

Pelvic lift (M. gluteus maximus, M. rectus abdominis, M. iliopsoas, M. tensor fasciae latae)
Lie on your back with bent knees. Contract your buttocks and raise your hips. Keep your hips horizontal throughout the exercise. This exercise strengthens the muscles of the back, thighs, and buttocks. Sink back into the starting position.

Exercise 16

Back extension (M. biceps femoris, M. gluteus maximus, M. erector spinae, M. rectus abdominis)
Lie on your abdomen with your forehead resting on the floor. Contract your buttocks and press your hips down against the floor as you lift one leg (leading with the heel) and the opposite arm toward the ceiling. Return to the starting position.

Increase the load by wearing weight cuffs around the ankles.

Exercise 17

Inner leg raise (M. adductor magnus, M. adductor longus, M. adductor brevis)
Lie on your side. Place the upper leg's foot in front of the lower leg's knee. Lift the lower leg up toward the ceiling. Return to the starting position.

If you find it difficult to place the upper leg's foot in front of the lower leg's knee, set the foot behind the lower leg. Most important is to work the adductor muscles and avoid forward bending the hip.

Exercise 18

Outer leg raise (M. gluteus medius, M. gluteus maximus, M. gluteus minimus)

Lay on your side with a slight forward lean. Lift the upper leg toward the ceiling with the foot tilted so that the heel points upward. Return to the starting position.

For the best support, bend your lower leg. Pay attention to how you lift the leg – that you lift it outward/upward so there is no forward bending of the hip.

Exercise 19

Leg kick (M. quadriceps femoris)

Sit up straight with good posture and the resistance band fastened around your ankle (secure the band by wrapping it around one or more times). Extend your leg until it is completely straight or as straight as possible. Watch your foot to make sure that it moves in a straight line and that the toes are pointing forward throughout the entire exercise. Return to the starting position.

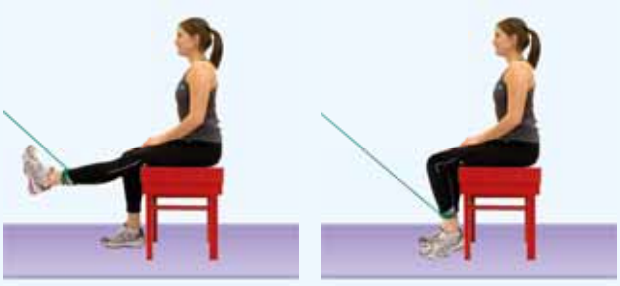
The resistance band should be stretched so that there is tension in the starting position and you experience resistance throughout the entire movement. Elevate the leg a little by laying a cushion, telephone book, or similar under your thigh. It is possible to perform the exercise using a weight cuff rather than a resistance band.

NB: Here is an additional exercise to strengthen and stabilize muscles and ligaments surrounding the knee and to prevent over-extension of the knee. Lie on your back with a rolled up hand towel or similar under your knee. Lift your heel to straighten the leg at the same time pressing your knee against the rolled up towel. Hold for five seconds and then allow the heel to sink slowly down again.

Exercise 20

Leg curl (M. biceps femoris, M. semitendinosus, M. semimembranosus)

Sit with outstretched legs and a resistance band fastened around one ankle. Pull the heel as far as possible in toward the chair, bending the knee. Watch your foot to make sure that it moves in a straight line and that the toes are pointing forward throughout the entire exercise. Return to the starting position. Raise the leg by placing a cushion, telephone book, or similar under your thigh so that your foot does not get 'stuck' or drag against the floor.



Exercise 21

Calf press/Ankle stretch (M. gastrocnemius, M. soleus)

Sit with a resistance band under the ball of your foot and your toes pulled back toward your shin. Press your toes toward the floor. Return to the starting position.

Secure the resistance band by wrapping it one or more times around your foot. Otherwise, it can easily slide off and snap you in the face! It is also possible to exercise the same muscles with standing calf raises.

Exercises – Stretching

Exercise 22

Neck muscles (M. trapezius)
Lower your right shoulder, bend your head to the left side with your ear toward your left shoulder. Turn your head slightly to the right and direct your gaze diagonally up toward the ceiling. You will feel a stretch sensation on the outer right side of your neck.

Keeping your right shoulder down and your left ear toward your left shoulder, turn your head slightly downward and direct your gaze diagonally toward your left knee. You should feel a stretch sensation on the rear of your neck.

Repeat on other side.

Exercise 23

Chest muscles (M. pectoralis major)
Sit with your side against a door jamb or a corner. Place your forearm at shoulder level against the wall with the elbow at a 90° angle. Lower your shoulders and press your chest forward as you turn your body away from the wall. You will feel a stretch sensation at the front of the shoulder.

Repeat on other side.

Exercise 24

Muscles at the back of shoulders and between shoulder blades (M. trapezius, M. rhomboids)
Stretch out both arms in front of you. Grasp your wrist with the other hand. Press your arms forward as far as possible at the same time as you round your upper back. You will feel a stretch sensation between the shoulder blades and on the outside of the shoulders. Alternate between holding your left and right wrists to target your left and right sides.

Exercise 25

Back of the arms (M. triceps brachii)
Lift your arm upward and backward. Grasp the elbow with the opposite arm. Pull your elbow toward the mid line of your head until you feel a stretch sensation on the outside of the upper arm.

Repeat on other side.

Exercise 26

Front of the hips (M. iliopsoas)
Stand on one knee as though you were proposing marriage. Contract the muscles of your buttocks as though you were pulling your tail in between your legs. At the same time, push forward the hip on the side of the supporting leg (the leg with the knee against the floor). You should feel a stretch sensation in the muscles on the front of your hip.
Use your hands for extra support if maintaining your balance is difficult.

Repeat on other side.

Exercise 27

Muscles of the buttocks (M. gluteus maximus, M. gluteus medius, M. biceps femoris)
Lie on your back with knees bent. Place your right ankle against your left knee. Grasp your left thigh and pull gently toward your chest. You should feel a stretch sensation in the muscles of your buttocks.

Repeat on other side.

Exercise 28

Back of the thighs (M. biceps femoris)
Stand on your knees and place your left foot in front of your body. Your heel should be on the floor and the knee lightly bent. Lean slightly forward with your upper body keeping your gaze directed straight ahead. You should feel a stretch sensation at the back of your thigh.

Use your hands for extra support if maintaining your balance is difficult.
Repeat on other side.

Exercise 29

Front of the thighs (M. quadriceps femoris)
Lie on your side with your arm under your head. Bend the knee of the upper leg and grasp your ankle. Stretch the upper leg's hip by pulling your foot toward your buttocks as you press the hip forward. You will feel a stretch sensation on the front of your thigh.

For better stability, lie with the lower leg slightly bent.

Exercise 30

Inner thighs (M. adductor longus)

Sit with the soles of your feet toward each other with your hands around your feet. Try to pull your feet in as close to your body as possible. Keep your back straight and your chest lifted. You will feel a stretch sensation in your inner thighs.

Exercise 31

Calf muscles (M. gastrocnemius, M. soleus)

Stand facing a wall. Take a large step backward with your left foot and bend your right knee. Lean forward against the wall and increase the bend in the right knee while keeping your left heel pressed down to the floor. You will feel a stretch sensation in your left calf.

Circuit resistance training program

- Exercises should be done at a tempo of 1–2–3 seconds in the active phase and 1–2–3 seconds in the negative phase.
- All circuits start with a warm-up to raise the pulse – arm/leg cycling or air boxing for 6–8 minutes.
- All circuits incorporate a cool-down near the end to lower the pulse – arm/leg cycling, rolling/walking at a calm tempo for 3–5 minutes.
- All circuits end with approximately 10 minutes of stretching.
- The switch between exercises should be done quickly so that the pulse remains high. The faster the switch, the higher the intensity of the training, at the same time reducing the total training time.
- For all programs, choose the tempo and the number of circuit rounds that you have the energy/strength to cope with and which allow you to complete the exercises in a controlled manner. As a suggestion for beginners, start with one round and increase thereafter.

Upper body circuit A

Circuit program of 6 strength exercises with cardio exercise interwoven.

Warm-up	Air boxing / easy arm cycling 5 – 10 min
Exercise 1.	Seated rowing (3A) (1min) Rest 10 – 15 sec
Exercise 2.	Chest press (4B) (1min) Rest 10 – 15 sec
Cardio	Air boxing/arm cycling (1min) Rest 10 – 15 sec
Exercise 3.	Internal shoulder rotation (6) (1min) Rest 10 – 15 sec
Exercise 4.	Lat pull-down (7) (1min) Rest 10 – 15 sec
Cardio	Air boxing/arm cycling (1min) Rest 10 – 15 sec
Exercise 5.	High rowing (8) (1min) Rest 10 – 15 sec
Exercise 6.	Dips (9) (1min) (Alternative exercise, Biceps curl (13) Rest 10 – 15 sec
Cardio	(1 min) or begin the final cool-down

Upper body circuit B

Circuit program with 8 different strength exercises.

Exercise 1.	Chest press (4B) (30-45sec) Rest 30sec – 1min
Exercise 2.	Seated rowing (3A) (30-45sec) Rest 30sec – 1min
Exercise 3.	Dips (9) (30-45sec) Rest 30sec – 1min

Exercise 4. Posture training, shoulders (1) (30-45sec) Rest 30sec – 1min

Exercise 5. Biceps curl (13) (30-45sec) Rest 30sec – 1min

Exercise 6. Lat pull-down (7) (30-45sec) Rest 30sec – 1min

Exercise 7. Chest fly (12) (30-45sec) Rest 30sec – 1min

Exercise 8. Seated sit-ups (14B) (30-45sec) Rest 30sec – 1min

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Whole body circuit

Circuit program with 11-14 different strength exercises.

Exercise 1. Chest Press (4B) (30-45sec) Rest 30sec – 1min

Exercise 2. Seated rowing (3A) (30-45sec) Rest 30sec – 1min

Exercise 3. Leg kick (19) (30-45sec) Rest 30sec – 1min

Exercise 4. Triceps Kickback (11) (30-45sec) Rest 30sec – 1min

Exercise 5. Posture training, shoulders (1) (30-45sec) Rest 30sec – 1min

Exercise 6. Leg curl (20) (30-45sec) Rest 30sec – 1min

Exercise 7. Biceps curl (13) (30-45sec) Rest 30sec – 1min

Exercise 8. Lat pull-down (7) (30-45sec) Rest 30sec – 1min

Exercise 9. Pelvic lift (15) (30-45sec) Rest 30sec – 1min

Exercise 10. Chest fly (12) (30-45sec) Rest 30sec – 1min

Exercise 11. Seated sit-ups (14B) (30-45sec) Rest 30sec – 1min

Leg exercises to add to the program/or do instead of leg exercises listed above:

Exercise 12. Outer leg raise (18)

Exercise 13. Inner leg raise (17)

Exercise 14. Calf press/Ankle stretch (21)

Yoga - Introduction

We present two yoga programs – one for sitting and one for standing. You will benefit from combining yoga exercises with meditation, mindfulness, or visualization. You can read more in Chapter 5 Mindfulness and Thought-Training.

Explanation of Terms

- *Centering* is a term used to describe how you prepare for yoga practice by tuning in to your body and connecting with your breath.
- There are two types of exercises: *static,* where a position is held without moving and *dynamic,* where the exercise is done while moving.
- *Activation of core muscles* is referred to within the yoga world as 'locks'. In our yoga programs we use two locks: *root lock,* where the muscles of the pelvic floor are lightly contracted by drawing them in and up, and *abdominal lock*, where the lower abdominal muscles are contracted by drawing them in toward the spine.

Tips

- Avoid eating a heavy meal just before practicing yoga. Neither should you be hungry.
- If possible, use a mirror to check your movements, position, and posture.

Instructions

- The basic *breathing principle* within yoga is that you should breathe normally while doing the exercises. Most importantly, do not hold your breath. Try to keep your mouth closed and *breathe in and out through the nose.*
- Keep the *tempo calm.* Give yourself 10 seconds to get into a position and just as long to come out.
- *Focus your attention* on the slow movements. By 'listening' to what your body tells you while doing the different exercises, your bodily awareness is strengthened.
- Do every exercise with *complete control and presence of mind.*
- Begin by *holding the static positions* for three breaths, gradually increasing until you can hold for several minutes.
- Do every *dynamic exercise/movement* 3 – 10 times.
- *Activate your core muscles.* Both locks are held during all exercises except relaxation.
- *Exit each position with control.* Stay focused and keep the locks activated during the whole exercise and especially when 'leaving' a pose, i.e. when

returning to the starting position.

- *Rest between each exercise.* This is especially important if your purpose with yoga is to relax and calm the mind. One way to rest is by returning to the starting position between exercises.
- *Take a moment to feel the aftereffects.* Notice how your body feels and what sensations you experience immediately after an exercise.

Practice yoga safely

- *Never go beyond your pain barrier!* The exercises may be physically challenging but should never be unpleasant or painful. If you experience more pain than muscle stiffness after practicing, or if you experience pain during or after a yoga practice (which can even occur the day after), you have probably exceeded your body's limits. The next time you practice yoga, do not go as deeply into the poses. Rather, visualize the whole movement. It can be difficult at first to physically refrain from doing the exercise deeply, while simultaneously imagining that you are doing it as deeply as possible. If it is difficult to imagine the exercise one way while doing it another, start by also imagining that you are holding back. This is an important step in understanding and respecting your body's physical pain barriers.
- If you have *loss of sensation* in the buttocks, be sure to include moments during the program where you relieve the pressure there. *Use a cushion* even when you sit on the floor.
- *Protect and relieve your shoulders* with exercise 6 in the seated program (Child's Pose) – a forward bend which serves as a resting pose between exercises, a counter or relief pose, as well as a position for final relaxation.
- If you are at *increased risk for osteoporosis,* it is especially important to do the exercises in a controlled manner.
- *If you have loss of sensation or are paralyzed* –for example in the muscles around the foot, knee, or hip, be careful not to go too far when you do the exercises. At worst, you risk a skeletal fracture.
- Create *inner images of your body through visualization* and in this way increase your ability to develop bodily awareness. This is especially important if you experience a loss of sensation.
- If you are stronger on one side, you can use a cane to 'help' the weaker side to keep up in the symmetrical exercises.
- If you have gone through *spinal fixation* surgery or if you are *excessively flexible*, be extra careful to listen to your body's signals for how far you should go in the various exercises.

Sitting Yoga Program

The exercises in our sitting yoga program have been selected for their focus on posture, balance, mobility, bodily awareness, strength, and tranquility. We have chosen the poses carefully to avoid unnecessary or inappropriate stresses to the shoulders. This is especially important if you use a wheelchair or walk with crutches or a walker, as your shoulders are subjected to so much stress in daily life. The program can be performed entirely while sitting in a wheelchair or a regular chair. We have included the Sanskrit names of the poses within parentheses as these are often used within the yoga world. The program is drawn from Hatha Yoga.

Exercises

1. Mountain Pose (Tadasana)

Starting pose

Getting into and maintaining Mountain Pose while sitting, is a yoga exercise in and of itself. Sit with your back straight, without support if possible. Lengthen the front of your body by lifting up through the sternum. Draw in your chin slightly and imagine that you are hanging from a thread attached to the crown of your head. Imagine that hanging from this thread is elongating your back and neck. Keep your shoulders relaxed, your chest open, and draw your shoulders and shoulder blades backward and downward so that they are straight. Allow your hands to rest on your thighs or let them hang relaxed alongside your body. Use inner visualization to create an image and a feeling for how you are sitting.

Preparing to practice yoga - centering

Begin by directing your attention to your breath. Rein in your thoughts and take a moment to focus solely on your posture. Perform a body scan, systematically directing your attention to the various parts. Notice and feel what is going on inside you in this moment, on this day.

Find your balance

Begin by exploring your body and its position in space.

Start with your feet. If you have no sensation there, visualize your feet and imagine feeling them, or look at them with the help of a mirror. Place them on the floor or on the footrest of your wheelchair in a stable position which provides support. If you can, press down one foot at a time and feel the contact with the floor/footrest. Finish with both feet parallel.

Continue up to your buttocks. Feel where you have your center of gravity and how you are sitting. Move your center of gravity forward and backward several times without losing your balance. Finish by sitting as straight as possible. Notice how it feels. Next, move your center of gravity from left to right several times without losing your balance. Come back to the center and notice how it feels. Feel that you are sitting with the same amount of weight on both of your sit bones.

Turn your focus to your pelvis and back. Tilt your pelvis forward (arch your back) and backward (round your back) several times. Notice what happens in the rest of your body as you perform this action. Finish by tipping your pelvis slightly forward so that your posture is as upright as possible. Sit firmly and notice how you are balanced.

Move your attention to your shoulders. Make light, circular motions with your shoulders. Then lift them and let them sink down again several times. Feel that your shoulders are relaxed and that they are at approximately the same level.

Then draw in your chin toward your throat so that your neck and back elongate a little more. Notice how you are sitting. *Feel your balance.* This is Mountain, your starting pose.

2. Bird Wing Breathing (preparation for Fish Pose/Matsyasana)

Sit in Mountain Pose with your hands in Salutation Seal (Anjali Mudra). Inhale deeply. During the exhalation, stretch your arms out in front of you as far as you can while maintaining your balance (palms of your hands still toward each other, fingers pointing forward). During your next inhalation, open your chest by slowly sweeping your arms outward until they are in a line with your shoulders and body. Lengthen out through your fingers. Pause for a moment. Notice how it feels. During your next exhalation and with control, move your arms back to the starting position, with the palms of your hands together in Salutation Seal.

An easier alternative

Sit in Mountain Pose with your hands in Salutation Seal. Hold your hands at chest height in front of your body with the tips of your fingers pointing toward each other and your palms facing downward. Inhale and 'open your chest' keeping the arms bent and at chest level while drawing your elbows backward. Feel how your shoulder blades move in toward each other on your back. Exhaling, return your hands and arms to the start position.

3. Cat-Cow Pose (Marjaryasana/Bitilasana)

Sit in Mountain Pose. If your balance is good, sit quite far forward in your chair and place your hands, palms down, on your knees. Otherwise sit in Mountain Pose with support from the back of your chair. While inhaling, draw your shoulders backward and allow your chest and sternum to move forward as you arch your back slightly. This is Cow Pose. Imagine you have a zipper between your shoulder blades and are drawing it up and 'closing' your shoulder blades. Next, as you exhale, allow your shoulders to move forward as you round your back. This is Cat Pose.

4. Twist Pose (Ardha Matsyendrasana)

Sit in Mountain Pose. Place your right hand on the outer side of your left knee. Place your left hand and arm so that you can grasp your push rim or back support. Be careful to maintain an upright posture during the entire exercise. Inhale deeply and as you exhale, press lightly against your knee and the push rim or back support maintaining the upright posture. Follow the rotation with your upper body, head, and eyes. Look over your left shoulder if you can and allow your head to follow your gaze. Hold the pose while breathing normally. Then, as you exhale with control, return to the starting position. Change hand positions and direction. Inhale deeply and as you exhale, repeat the entire exercise rotating gently in the other direction.

To ensure a safe rotation in the spine, it is important to hold your back as upright as possible and not collapse into a rounded 'banana' posture. Do your best!

5. Side Bends (Parighasana)

Sit in Mountain Pose. Place your hands on your shoulders with the fingers pointing forward and your thumbs on the back side. Raise your elbows (to a point somewhat lower than shoulder height) and pointing out from the sides. Inhale deeply. As you exhale, carefully raise your right elbow as you simultaneously allow the left elbow to move downward, stretching your right side. Allow your head to follow the movement. As you inhale (with full control and with the root and abdominal locks activated) return slowly to the starting position so your elbows are once again horizontal just below shoulder height. As you exhale, change direction and move the left elbow upward and the right downward. Inhale, and return to the starting position. Continue in a calm and controlled tempo.

NOTE! Be careful to test and find your point of balance and to see how far sideways you can bend, so that you do not tip or fall from your wheelchair or chair. Until you are familiar and secure with your limits, it can be a good idea to have a chair with the back support toward you on each side of your wheelchair or chair. In this way, you will have something to grab onto if necessary.

6. Child's Pose (Balasana)

Sit in Mountain Pose. Allow your upper body to move forward and rest upon your thighs. Rest in this position. Allow your arms to hang down beside your legs and focus on the experience of breathing deeply. Notice how your lower back rises as you inhale and sinks down again as you exhale.

If resting your upper body against your thighs is difficult for you, a *variation* is to do the exercise against a table. Sit so that you are a little less than an arm's length from the table. Lay your forearms on the table with your hands crossed over each other and rest with your forehead against your hands. You can also place something soft, such as a pillow or a towel under your forehead if it feels better. Rest in this position and focus on the experience of breathing deeply. Notice how your lower back rises as you inhale and sinks down again as you exhale.

7. Deep Relaxation (Savasana)

Sit in Mountain Pose or lie down on the floor. Release the root and abdominal locks and all other muscle tension. Close your eyes and take long, deep breaths. Release your shoulders and allow your hands to rest on your legs (or slightly out from the sides of your body, palms up, if you are lying on the floor). If you feel it is easier to relax in Child's Pose against a table (exercise 6), then choose to relax in this pose instead. Allow your body to sink into the surfaces supporting you and allow all tension to melt downward into the chair, table, or floor. Enjoy this relaxation for several minutes.

Turn your attention inward and feel the aftereffects of your yoga practice. Notice where and how you breathe and any sensations in your body and mind. Do not evaluate or judge your experience. Rather, accept your body's sensations, and any thoughts and feelings just as they are. If this is difficult – and it often is, especially in the beginning – repeat quietly or out loud to yourself, 'This is how it is right now and that's okay'. Prepare to leave this state of deep conscious relaxation. Thank yourself for taking the time to do your yoga exercises and return to your daily life.

Standing Yoga Program

The exercises in our standing yoga program have been selected for their focus on posture, balance, mobility, bodily awareness, strength, and tranquility. The program finishes with a few sitting exercises. We have included the Sanskrit names of the poses within parentheses as these are often used within the yoga world. The program is drawn from Hatha Yoga.

Exercises

1. Mountain Pose (Tadasana)

Starting pose

Getting into and maintaining Mountain Pose while standing, is a yoga exercise in and of itself. Stand with your feet shoulder distance apart and your back straight. Lengthen the front of your body by lifting up through the sternum. Draw in your chin slightly and imagine that you are hanging from a thread attached to the crown of your head. Imagine that hanging from this thread is lengthening your spine including your neck. Keep your shoulders relaxed and your chest open, and draw your shoulders and shoulder blades backward and downward so that the shoulders are straight. Allow your arms to hang relaxed alongside your body. Use inner visualization to create an image and a feeling for how you are standing.

Preparing to practice yoga – centering

Begin by directing your attention to your breath. Rein in your thoughts and take a moment to focus solely on your posture. Perform a body scan, systematically directing your attention to the various parts. Notice and feel what is going on inside you in this moment, on this day.

Find your balance

Begin by exploring your body and its position in space.

Start with your feet. Find/feel your center of gravity. Then shift your weight from your toes to your heels and vice versa, back and forth while keeping your entire foot firmly on the floor. Notice how it feels. Then shift your weight from your left foot to your right foot, noticing how it feels. As far as is possible, distribute your weight evenly over both feet. Also, try to ensure that you have as much weight on the front of the foot and the toes as on the heels. Stand firmly and notice how you are balancing.

Move your attention to your knees. Bend the knees slightly and then straighten your body so that your knees are aligned and straight. Be careful not to lock the knee joints.

Turn your focus to your pelvis. Tip the pelvis forward (arch your back) and backward (round your back) several times. Notice what happens in the rest of your body. Then stand with your pelvis in a neutral position.

Move your attention to your shoulders. Make light, circular motions with your shoulders. Then lift them and let them sink down again several times. Feel that your shoulders are relaxed and that they are at approximately the same level.

Then, draw in your chin toward your throat so that your neck and back lengthen a little more. Notice how you are standing. *Feel your balance.* This is Mountain, your starting pose.

Practice this variation and challenge your balance by raising your arms. Begin the exercise with your arms hanging alongside your body with the palms of your hands facing forward. As you inhale, raise your arms as high as your shoulders, (the thumbs guide the movement upward). Try to lengthen upward through your spine. As you exhale, allow your arms to return slowly to a relaxed position alongside your body.

2. Bird Wing Breathing - preparation for Fish Pose

(Matsyasana)

Stand in Mountain Pose, the starting position, with your hands in Salutation Seal (Anjali Mudra). Inhale deeply. During the exhalation, stretch your arms out in front of you as far as you can while maintaining your balance (palms of your hands still toward each other, fingers pointing forward). During your next inhalation, open your chest by slowly sweeping your arms outward at shoulder height until they are in a line with your body. Make sure that you engage your core muscles by activating the root and abdominal locks, and activate the muscles around the hips, buttocks, abdomen, and back. Visualize your body weight pressing down through the feet as though you were pressing them down into wet sand. Hold for a short moment and notice how it feels. As you exhale, reverse the movement (remember to keep the root and abdominal locks active) and slowly, with control, bring your hands back to the starting position with the palms of your hands together. Continue in a calm and controlled tempo.

An easier alternative

Hold your hands at chest height in front of your body with the tips of your fingers pointing toward each other and your palms facing downward. Inhale and open your chest keeping the arms bent and at chest level while drawing your elbows backward. Feel how your shoulder blades move in toward each other on your back. Exhaling, return your hands and arms to the start position.

3. Side Bends (Parighasana)

Come into Mountain Pose. Place your right hand on your right hip, against your thigh or support yourself using a wall, chair, or table. As you inhale, raise the left arm straight up, until the upper arm is as close as comfortably possible to the ear, with the left thumb pointing backward and the tips of the fingers pointing toward the ceiling. Feel that you are reaching and stretching out through the tips of your fingers. As you exhale, bend your body carefully to the right. The left hip will 'stick out'. Keep both feet in full contact with the floor and be mindful of your balance. Hold the position and take a couple of breaths. During an inhalation, return to an upright position slowly with complete control and locks engaged. Exhale and allow both arms to return to your sides. Repeat on the other side.

4. Tree Pose (Vrksasana)

Come into Mountain Pose with your hands in Salutation Seal. Lift the right foot and place the sole against the ankle of the left leg (right toes can remain on the floor if necessary to maintain balance) or calf or inner thigh (not against the knee). Move the right knee outward to open and stretch the hip. Use the muscles of the buttocks to help you maintain the pose. Find your balance. One way to strengthen the feeling of control over your balance is to imagine that you are drawing all your muscles in toward the body's mid-line.

A more challenging alternative

Come into Tree Pose, with the right foot in the position that works for you, arms by your sides and shoulders relaxed. As you breathe in, raise your arms (palms of the hands facing downward) until the arms are parallel with the floor. Attempt to lengthen your arms, stretching out through the fingers. As you balance here, breathe normally. During the next inhalation, turn the palms of your hands up toward the ceiling and continue raising them until the arms are approximately shoulder distance apart with the palms facing each other. Keep your shoulders relaxed and away from your ears. Remain in this position (where you are able to maintain your balance) breathing calmly. As you exhale, return your hands/arms and foot to the starting position slowly and with control (maintaining the muscle locks). Repeat on the other side.

An easier alternative

Stand with your back against a wall for support. Bring your foot into the position that suits you best (either with toes remaining on the floor or with the foot against your calf or thigh). Follow the instructions above.

5. Seated Forward Bend (Paschimottanasana)

Sit on the floor with your back straight and your legs extended in front of you as straight as you can, and feel the contact with the floor through your sit bones. Draw your shoulders down while lengthening through the entire spine including the neck. As you breathe in, flex your feet, drawing the toes toward your body so that you feel your legs lengthening out through your heels. As you exhale, lean forward from the hip joints, not the waist, keeping your back as straight as possible. Hold the pose breathing normally. Inhaling, return to an upright seated position slowly and with control.

Note. It is important that you do not go so deep into the pose that your back takes on a curved banana shape. Try to keep the back as straight as possible when you fold forward. The movement should be primarily felt on the back of the thighs, where the muscles receive a stretch. You do not have to go deep to experience a pleasant stretch sensation.

Tips

- You can make the starting position more accessible by sitting with your back against a wall.
- If you experience difficulties flexing the feet so the toes point more toward the body, you can place a belt, scarf, or towel around the feet and carefully draw them toward you, or you can sit so that the soles of your feet are against a wall.
- Creating a slight forward tilt of the pelvis and thus a slight arch in the back, will make it easier to sit. To achieve this, you can place a folded towel or a small cushion under your buttocks.
- If necessary, protect your knees by placing a pillow or a rolled up towel directly under them.

6. Wide-angle Seated Forward Bend (Upavistha Konasana)

Sit on the floor with your back and legs as straight as possible, and your legs spread out to form a letter V. Feel the contact with the floor through your sit bones. Release your shoulders downward. Breathe in, activate your feet so that you draw your toes toward your body and stretch out through your heels. As you exhale, walk your hands forward between your legs, maintaining the length of the front torso. The forward bend should occur in the hips and not the waist. Hold the pose, breathing deeply. With control, come slowly back to the upright starting position.

Note – It is important that you do not go so deep into the pose that your back takes on a curved banana shape. Try to keep your back as straight as possible when you fold forward. The movement should be primarily felt on the back of the thighs, where the muscles receive a stretch. You do not have to go deep to experience a pleasant stretch sensation.

7. Twist Pose (Ardha Matsyendrasana)

Sit on the floor with your back straight and your legs extended straight in front of you. Place the left foot on the outside of the right knee with the left knee pointing upward. Try to keep the entire sole of the foot on the floor. Support yourself by placing your left hand on the floor behind your buttocks, with the fingers pointing away from your body. Wrap the right hand and arm around the outer side of the left knee. As you inhale, lengthen upward through the spine. As you exhale, twist to the left gently following the rotation with your upper body, head, and gaze. Look over your left shoulder if you can, allowing the head and body to follow the gaze. Hold the position while breathing normally. As you exhale, return to the starting position slowly and with control. Repeat on the other side.

To keep the twist safe, it is important to keep the back as upright as possible and to resist allowing the spine to sink into a rounded banana shape. Do your best!

8. Cat-Cow Pose (Marjaryasana/Bitilasana)

Start on your hands and knees, making sure that your knees are directly under the hips and your wrists directly under the shoulders. Imagine you are stacking the joints directly over each other, i.e. wrist directly under elbow, and elbow directly under shoulder.

As you inhale, start the movement in your pelvis by tipping it somewhat forward (arching the back) and bringing the chest forward. This is Cow pose. Reverse the motion. As you exhale, start the movement in your pelvis by tipping it backward (rounding the back) and pushing your shoulders and upper back up toward the ceiling. This is Cat pose. Continue in a calm and controlled tempo.

9. Child Pose (Balasana)

Start on your hands and knees. Carefully allow your buttocks to sink toward your heels and lower the head, to the floor if possible. If you cannot reach the floor with your forehead, place one (or two) firm pillows under your forehead. Allow your arms to rest either alongside your body with your hands toward your feet, or in front of your head palms down. If you have shoulder problems, we recommend that you position your arms beside your body. Rest here, while breathing calmly and deeply. Feel how your back rises slightly as you breathe in and how it sinks, as you exhale.

10. Deep Relaxation (Savasana)

Lie on your back on the floor. Release the root and abdominal locks and all other muscle tension. If you need support to lie comfortably, place a pillow or rolled up blanket under your neck and/or knees. Place your arms slightly out from the sides of your body on the floor, palms up. Close your eyes and take long, deep breaths. Relax for a few minutes. Turn your attention inward and feel the aftereffects of your yoga practice. Notice where and how you breathe and any sensations in your body and mind. Do not evaluate or judge your experience. Rather, accept your body's sensations and any thoughts and feelings just as they are. If this is difficult – and it often is, especially in the beginning – repeat quietly or out loud to yourself, This is how it is right now and that's okay'. Before leaving this state of deep conscious relaxation, thank yourself for taking the time to do these yoga exercises and then return to your daily life.

Chapter 5

Mindfulness and Thought-training

That cardiovascular exercise and strength training improve our sense of well-being is well established. However, it may not be as obvious that our mindset and thought patterns need work if we are to truly feel good. Our mindset, thoughts, emotions, and actions are intertwined and affect how we feel. Fortunately, researchers discovered long ago that there is a great deal of room to maneuver to affect how we feel, by working on our approach to life and how we think. That is our focus here. The purpose of the exercises in this chapter is to improve health and well-being through mindfulness and strategies to change our thinking. Essentially, this is thought-training.

To change a well-established mindset and thought patterns takes more than a 'quick fix'. Rather, it requires continuous practice and learning. Some people are naturally predisposed to handle life's setbacks more easily. Others must patiently practice the skills necessary to acquire the attitudes, thought patterns, and values that support their desire to feel well. If you have impairments which make physical exercise difficult, then mindfulness and thought-training is the form of exercise that may contribute most toward improving your well-being.

Of all the strategies described in this book, the exercises in this chapter are perhaps the easiest to start with as they require no equipment and no special preparation. You can start right here, right now. But there are many invisible obstacles on this road. Many of us feel that we don't have the time, even the necessary ten minutes per day or perhaps just a second – to be still, take notice, and adjust one's mindset. It can be difficult to spend time on something so abstract. Best be said right now, the development of a routine for these exercises requires self-discipline and patience. You will need to work on both!

In this chapter we explore the following:

- Mindfulness meditation
- Visualization and affirmation
- Thoughts and thought patterns
- Gratitude training

Being consciously present here and now, has become a very meaningful part of my mental rehabilitation since my SCI. Thoughts about how things were and how the future will be, as well as different emotions, can just well up inside me. I cannot force them to go away. On the other hand, I try to learn how to relate to them. One way of doing this is to observe them and let them pass without seeing them as absolute truth or fact. Whether they are true or not doesn't matter that much; instead, I ask myself more and more often whether a thought or feeling helps me live my life the way I want to, and whether it helps me attain my goals.

Mindfulness helps me try to accept my comprehensive physical disabilities. Instead of spending my time and energy brooding and dwelling on the past, or struggling in vain to achieve things that are completely unrealistic, I can prioritize and strive to achieve what is possible based on my condition. This gives me the space and the power to reach a higher level of activity and participation, increased commitment, and hopefully greater satisfaction with my life. I try to accept in order to move on – not just passively!

After many months of regular practice and guided exercises (Internet and CD), I have found a technique which often gives me results and can reduce my psychological stress levels and even my nerve pain. I can concentrate better, I'm less sensitive to stress, and I experience less pain. The breathing anchor gives me a safe harbor when life is stormy outside or inside. Other positive effects are that I notice, experience, and appreciate the small things in life to a much greater extent and get a much needed break from my own and the world's demands on me.

In my work as a doctor in neurological rehabilitation, I meet many people who have suffered SCI. What they all have in common, is that the injury led to an acute crisis for the individual and the family. Their whole existence abruptly changed. Nothing could be taken for granted anymore: relations with partners, family members, and friends, work, home, hobbies... It's not so strange that feelings of grief, guilt, shame, worry, hopelessness, and regret arise. Existential reflection is normal and should not be suppressed. Processing the crisis and conversations about life are important, but some get

stuck in brooding and regret, anxiety, resignation, and passivity. Even nerve and other types of pain entail severe limitations for many of the affected.

In my meetings with these persons, I sometimes raise the subject of mindfulness and its potential positive effects. If there is interest, I even describe how it works practically, as well as sharing my own experiences with it. But the will and faith in these mental techniques must come from the individual him/herself for this to have any effect. It requires regular training, often for a very long time before the effects can be evaluated. Personally, I have now taken the first steps toward increased conscious presence. But I have so much left to learn, explore, and develop...

If you're interested – Good luck!
And remember: TPP - Time, Patience, and Practice.

Finally, I would like to share the Serenity Prayer with you.
"Grant me the serenity to accept the things I cannot change,
courage to change the things I can,
and the wisdom to know the difference."'

Mikael 31, Tetraplegia for 4 years

Mindfulness

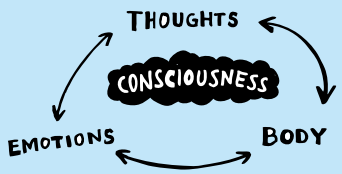
Mindfulness is not a method per se, it's an attitude to life. Mindfulness has its origins in Buddhist meditation. Based on Buddhist philosophy and principles for meditation, the American physician and scientist Dr. Jon Kabat-Zinn and his colleagues, developed and evaluated medical interventions for stress, pain, and depression, culminating in Mindfulness Based Stress Reduction, MBSR. Today, mindfulness-based programs have spread all over the world.

> **'Mindfulness means paying attention in a particular way: on purpose, in the present moment, and non-judgmentally.'**
>
> Jon Kabat-Zinn

Even without stress, chronic pain, or re-occurring depression, the practice of mindfulness provides added value through the cultivation of a more open approach to life. Living more consciously in a spirit of mindfulness can help us to deal with difficult feelings. The degree of freedom in our lives increases when we are able to observe what is happening on our inner landscape without

The benefits of practicing mindfulness:

- reduced stress and fewer stress-related disorders
- reduced risk for relapse into depression
- reduced pain
- improved sleep
- improved ability to take care of one's health
- stronger immune system



getting carried away or feeling pressure to immediately respond or react. Paying regular attention to the continuous stream of sensory input that rushes through us can enhance our compassion and understanding of ourselves and others. This is a good starting point to gather inner resources for improved health and well-being.

Obviously, mindfulness is not the answer to all of life's challenges. However, practicing 'being in the here and now' can create a more perceptive and reflective approach to life's issues, both big and small.

Thoughts, feelings, and bodily sensations constantly influence each other. Bodily experiences affect our feelings. Thoughts leave their mark on our bodies. Our responses to our feelings create more feelings, which can in turn affect our thinking and manifest on our bodies. A constant stream of impulses, sensations, and impressions run through us. Obviously for the most part, we are unaware of them. Through mindfulness, we can improve our awareness so that we experience firsthand and clearly, the impressions from our senses and also better understand how they interact.

Formal and informal mindfulness practice

To practice mindfulness is to develop the ability to intentionally direct, shift, and hold our attention to various sensory inputs without judgment. Formal practices include various types of meditation techniques used to cultivate our ability to increase awareness, presence, and attention. These include: meditation with breathing, body scan where sensory input is consciously observed, and moving meditation using simple yoga exercises, walking, or wheeling your chair. However, there are less formal practices, more or less spin-offs, where we can apply the experiences from your formal meditation practice into your daily life. An example is to be totally in the moment in the midst of a conversation with a friend.

The art of being

Because mindfulness belongs to the art of being, an initial resistance in many of us is likely simply because we are accustomed to 'doing and fixing'. We are programmed to think critically, adjust, and control ourselves and what occurs around us. To simply let go and let things be, can constitute a real challenge. This requires the self-discipline to practice every day and the patience to direct one's awareness all the time, over and over again, toward what is happe-

ning in the moment. This requires courage to challenge ingrained beliefs and values about what true success really is – to be or to do.

To be mindful requires no goal other than to be aware of what is happening here and now. It is not the sort of goal-oriented activity that any of us are used to. It is not striving to get anywhere other than where we already are, in thought, feeling, or bodily sensation. Unlike 'doing' – where we try to bridge the gap between 'how it is' and 'how you want it to be', by just 'being' – one is already there.

Essential qualities of internal work

It is unhelpful to immediately evaluate and judge one's experience in relation to a given goal. In the moment where we do not judge or strive to be somewhere else, we have an opportunity to accept reality as it is. In this case, acceptance in no way means defeat or resignation. Rather, it means that we are consciously and with presence of mind able to consider and be free to make active choices – to either let go of what is experienced or to act.

For us impatient 'doers', the challenge to develop a non-judgmental attitude of acceptance can be daunting. This is precisely when it becomes necessary to cultivate the important qualities of mindfulness. Adopt the attitude of a 'beginner's mind' and practice awareness with curiosity, kindness, and compassion without any preconceived ideas or judgments about the thoughts and behaviors that arise from your automatic pilot. By automatic pilot, we refer to those habits and reoccurring choices that we make every day without thought or reflection. Another important attitude is trust. Trust has many dimensions. It is easier as you practice mindfulness, if you trust the process itself. However, it is also important to learn to trust yourself. Results do not always come quickly; neither are they visible to the naked eye. Therefore, internal work challenges one's trust on many levels.

Important qualities in mindfulness practice:

- a beginner's mind
- non-judgment
- non-striving
- patience
- trust
- acceptance
- letting go

Meditation

Among other things, mindfulness meditation strengthens our capacity for concentration and calm. Through breathing, we practice the ability to get in touch with ourselves over and over again. The basis of mindfulness meditation is to direct and redirect your chosen focus which may be your thoughts, feelings, and bodily sensations. With practice you allow distractions to come and go. Part of mindfulness meditation is the observation of what is experienced with an open mind and without judgment or reaction. This is what distinguishes it from other techniques where you concentrate solely on one phenomenon without directing any interest toward what distracts you.

In the Toolbox you will find exercises for the following types of meditation:

- Breath as an anchor
- Body scanning
- Sitting meditation
- Moving meditation
- Wheeling/walking
- Yoga

Breath as an anchor

In mindfulness meditation, breathing is used actively and referred to as an 'anchor'. Breathing is one of our most basic functions and is often described as a bridge between the mind and body. To focus on breathing, one breath at a time, is a concrete way to anchor our awareness and bring it back to the here and now, over and over again. Breathing is central and is used in meditation to get in touch with what is happening in the present.

Body scan

Body scan is a special exercise in awareness and meditation directed at 'listening through your body'. It is a sort of a guided tour while you progressively direct attention to the various body parts and sensations present. The purpose is to practice intentionally directing your awareness to what is happening in your body, moment by moment, body part by body part. As you change focus from one body part to another, you 'let go' of the awareness of where you have just been and move onward.

Sitting meditation

Sitting meditation is an important component in the formal practice of mindfulness. With a physical posture that mirrors dignity, clarity, and presence, attention is directed toward your inner landscape.

Always start sitting meditation with 'breath as an anchor'. After that, choose between meditating with one or more foci (see below). When you have practiced for a while, a short meditation for a few minutes can be a good way to take a break from your daily routine. But practicing for longer periods of time will give yourself a chance to experience both the simplicity and the difficulty, as you direct, maintain, and redirect your sense of awareness. This will involve 10–20 minutes or even longer sessions.

Sitting meditation with awareness on:

- breathing
- body as a whole
- sound
- thoughts and feelings
- choiceless awareness

Meditation in motion

The purpose of meditation in motion is the same as for all mindfulness meditation. However, body awareness and being 'at home in your own body' may be particularly distinctive with this style. Such practices can be especially appropriate for those who find it difficult to sit still or concentrate. The same qualities of mindfulness apply: to observe and be non-judgmental of what is experienced and to accept your body as it is in the here and now. Obviously, this approach may sometimes be challenging for people with physical impairments, nevertheless, there are major health benefits to be gained with meditation in motion such as increased energy and relaxation.

Here are two meditation practices with motion:

Wheeling/walking

Meditation while self-propelling your wheelchair or walking, is yet another way to be 'still'. The secret is not to be on your way anywhere. Rather, learn to direct your full attention to what is happening each time you take hold of your wheelchair rims or take a step. You can wheel or walk in a circle or simply back and forth to emphasize that you are not on your way anywhere. The important thing is that your attention is directed to calm movements and

that you are aware of every detail in every moment. This can be a demanding challenge; to wheel or take a step one movement at a time.

Yoga

Yoga allows you to gently and carefully, regardless of your physical condition, improve your flexibility, strength, and sometimes cardiovascular fitness. By paying close attention to what happens in the body and being sensitive to your limitations, you learn to challenge but at the same time not exceed these physical limitations. What you discover is that physical limitations of movement are not always static.

Under the heading 'Mind-body exercise' in Chapter 4, you can read more about yoga and in the Toolbox there are programs for sitting and standing yoga. Combine these exercises with mindfulness.

Daily mindfulness

The experience of calm and inner balance gained from formal mindfulness can be woven into your daily life. All daily chores can be transformed from merely doing, to a moment where you direct your complete attention to whatever it is you are doing. This allows an opportunity to keep an open attitude toward the moment. The practice of mindfulness can include any daily activity at all. For example, eat a meal with your full attention. If you allow your mind *to take in* the meal, you will discover whole new dimensions to food and the process of eating. It is definitely worth exploring. An accomplished mindfulness practitioner sees every moment as an opportunity to practice and weave mindfulness qualities as a non-judgmental attitude into his/her daily life.

One simple tool you can use to develop an attitude of mindfulness is SOAL: *Stop – Observe – Accept – Let Go*. This is a concrete way to include formal mindfulness in your daily life.

Stop – Turn your attention to what is happening in the here and now and simply take notice.

Observe without judgment or striving to be somewhere else – To avoid judgment is a difficult art. We often don't even notice that we judge.

Accept – This means to see reality as it is, which can provide a realistic basis for decision making. This doesn't mean that you must tolerate anything and everything.

Let go – After careful deliberation you may decide to take action. However, if you choose to 'let go' then you allow the thoughts, sensory experiences, or feelings to pass.

How to get started with your mindfulness practice

- In the first instance, define your intention; why you want to practice mindfulness.
- Decide before you begin how much time you will set aside and which type of mindfulness you would like to practice: breath as an anchor, sitting meditation, body scan, or meditation in motion for example, yoga. A fixed time makes it easier to maintain focus when thoughts enter your mind.
- In the beginning, it is good to have a specific place where you know you will not be interrupted. Turn off your mobile phone and tell those around you that you don't wish to be disturbed.
- Weave formal meditation sessions into your daily life, get in touch with your breathing, and 'listen' to the sensations you experience.
- Pre-recorded guided mindfulness exercises can be a great support to begin with. When the instructions start to take your attention inward, concentration can feel easier to maintain. Download exercises to your mobile phone, IPod, or use a CD. Once mastered, you may decide to move on to a method where you control the process.
- Attend a MBSR program or another mindfulness-based program/group.

Visualization and affirmation

Visualization and affirmation are two methods which on their own or in combination can strengthen your resolve to achieve your goals. Originally used within elite sport, these methods help enhance self-confidence. Such techniques are utilized in a variety of fields in health and education, including smoking cessation and weight loss programs.

Visualization can be divided into two styles:

External visualization refers to techniques where you imagine you have succeeded in what you set out to do. It is like playing a film or movie in your head, where you see yourself as you would like to be, the completed activity a success. You essentially create moving pictures of yourself – perhaps strong, resilient, or happy. This inner film cannot contain even the slightest hint of failure or negativity. If negative thoughts creep in, stop the imagery straight away and write a new script. Visualization can be used several times a day and preferably in connection with a particular activity.

Internal visualization involves seeing your body from the inside. Within the yoga world, it is described as 'seeing with the inner eye'. This may involve internal awareness, much the same as in the body scan exercise. It can also involve the creation of images of your body – for example, visualizing the body's external borders and shape in thought images or creating images of the body's interior. Sometimes this is easier with your eyes closed, as it reduces the background of sensory input that we constantly receive. These exercises work even if you have physical impairments including loss of sensation and/or function in various body parts.

Affirmations refers to the use of words and sentences which optimistically and positively describe who you want to be or what you want to do. You can use affirmations to strengthen your goal-setting. For example, 'I love my new food habits,' or 'Training makes me strong and happy,' or 'Meditation gives me peace of mind.' Affirmation can be usefully employed prior to situations where you know you will be nervous, such as before a meeting with a special person or a doctor's visit. Useful affirmations might then be: 'I am calm and collected,' or 'My breathing is calm and I feel peaceful.' Affirmation could be a poem or quote that strengthens and guides your work toward specific goals. An example is the well-known Serenity Prayer used by people all over the world.

‘The experience of sensory loss in my legs and abdomen was a source of great sorrow when I was newly injured. It felt as though I was sitting on a ball when I sat in a chair. I had completely lost contact with the earth and a sense of gravity in the paralyzed part of my body. My first contact with meditation, visualization, and affirmation was through pain rehabilitation. During a relaxation exercise which included visualization, I closed my eyes and tried to remember how it felt to stand on both feet on a lawn and feel how the grass was tickling my feet. It was rather easy to retrieve images and experiences and I got a fantastic feeling of support under my feet. The next step was the feeling of sitting in a chair and after some practice, I got a whole other sensation of gravity and it became more pleasant to sit in my chair.

The worst part was perhaps the lack of sensation when being touched, and the sorrow over not being able to feel my husband embrace me. But the more I train with visualization and affirmation, the easier it is to retrieve memories from my memory bank. A poignant example for me, is when my husband embraces me and I visualize images of his hands touching me. Then I can find my way back to a strong experience of joy and I practically feel his hands on my skin. Now, I practice meditation and visualization three to four times per week, and it really helps me to feel better and deal with my situation.

I use affirmation with positive feelings that I put words to and then practice every day. When life feels heavy, I can use the sentences to find my way back to the good feelings. I say that I attach anchors to the words. It really works.’

Karolina 48, Tetraplegia for 6 years

How to practice visualization and affirmation

Choose something that is important to you and that you wish to focus on. It could be exercise, food, mindfulness, or some other area that you want to develop in order to feel good.

Create your mental images and formulate one or several sentences that strengthen your resolve. Naturally, you can combine visualization and affirmation techniques to heighten the result.

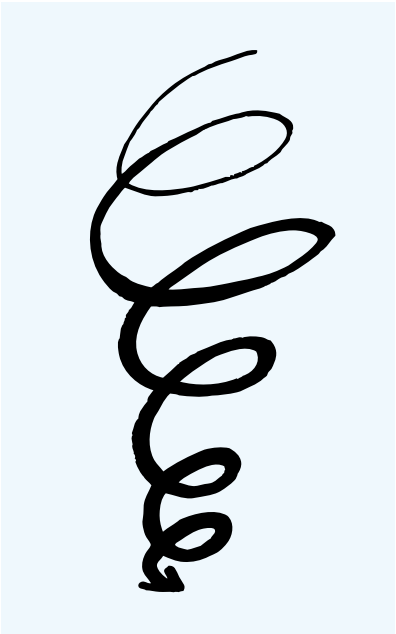
Write down your affirmation/s. You can have the sentence/s written on a piece of paper that you keep handy: in your pocket, on your writing desk, the refrigerator door, or on your bedside table next to the alarm clock. You could make the sentence/s your computer or phone screen saver.

Example: 'I feel good/calm/great from exercising/meditating.' A useful affirmation if you are prone to catastrophic imagining is, 'Everything is going to work out. Everything will be fine.' Repeat the sentences to yourself out loud or silently, or play that movie several times a day until you begin to experience it as truth. You can then switch to other positive affirmations or images that you wish to practice.

Thoughts and thought patterns

In reality, many of our thoughts are neither true nor false. Rather, they are constructions of an imagined future or past. An example is: 'I'll never feel good again because of what's happened to me,' or 'I don't have time to exercise,' or 'I eat nothing but I still gain weight.' It is important to pay attention to this inner dialogue, because thoughts can pave the road for positive change, but they can just as easily derail us. Do your thoughts help or hinder your intentions?

The possibilities to influence our thinking are endless so that it supports us and our intentions. Below are two thought patterns that illustrate what we mean; one where the risk of failure is high and another where the chances of success are vastly better. To make it easy to recognize the patterns, we have exaggerated them a little.



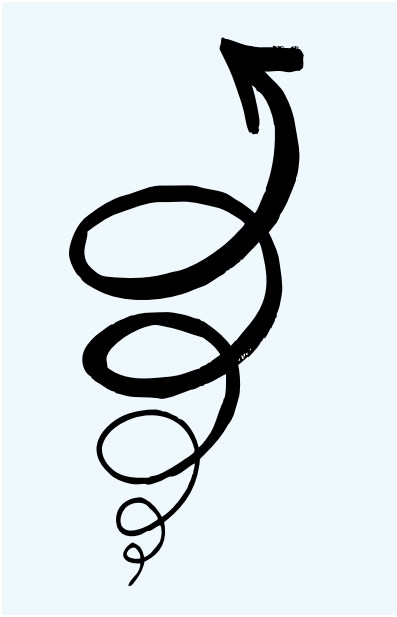
Thoughts and thought patterns that create a loop of feelings, actions, and events that can easily turn into a negative spiral:

What you think:	I will never succeed with this change.
What you do:	I do not prepare because it won't work anyway.
What you think:	I see how others in my situation act and think, 'That doesn't apply to me anyway.'
What you think/feel:	I imagine (visualize) that I do not succeed with the change and I feel uncomfortable.
What you do:	Perhaps I make a few attempts without preparation and so fail.
What you think/feel:	I focus on my failures and feel like an even bigger disappointment.
What you think:	I see other 'beginners' succeed with their lifestyle changes and think, 'Of course they succeed – yes, their situa-

tion is completely different but still they have it easier than me.'

What you think: I think, 'There's no point in trying again because I always fail anyway.' (negative affirmation).

Thoughts and thought patterns that create a loop of feelings, actions, and events that will turn into a positive spiral:



What you think: I will succeed with this change.

What you do: I prepare myself as much as possible to cope with my resolutions.

What you think/do/feel: I see how others in my situation are coping and it helps me cope with my change. I feel strong from seeing what others in my situation do and I think, 'If she/he can do it, then so can I!'

What you do/think: I imagine and see my success (visualize) with the plan.

What you think/feel: I believe in myself and feel motivated.

What you do: I prepare and plan for the change and set reasonable goals.

What you do/feel: I try and I practice the planned activities and feel satisfied because I've taken that first step.

What you do/feel: I adjust my goals and adapt to the new habits and I'm pleased with my success.

What you feel/think: I enjoy my success and focus on the changes needed for things to get even better.

What you think: After a while I notice other 'beginners' in my situation and see that I can help them get started with the activity. And I think, 'What progress I've made since I was completely new and in the exact same boat.'

What you think: I have proven to myself that I can succeed with my resolutions and this strengthens my resolve to instigate new changes.

Thought traps

In the negative spiral described previously, we can identify a number of 'thought traps'. By this we mean a way of thinking where we lower our capacity to logically and objectively look at events and interpret information. We create a distorted picture of reality with negative expectations. Self-esteem is undermined and we set ourselves up to fail.

Common thought traps

All-or-nothing thinking: People and events are either: black or white, good or bad, right or wrong. Often the negative dominates. *You feel like a total failure if you don't do something perfectly.*

Over-generalizing: A single negative event is interpreted as part and parcel of a pattern. You think, '*It's always going to be like this,'* or '*That will never work,'* or *'What's the point?!*'

Negative mental filter: A single negative event takes on a life of its own and we allow it to darken our mood for a long time.

Discounting the positive: Positive events or personal characteristics which are positive are diminished. *They 'don't count'*. Ninety-nine people may think we have done something well but one person has something negative to say, yet it is this negative criticism we remember.

Mind reading: We create negative interpretations based on what we believe others think about us, without exploring the truth.

Looking into the future and catastrophic thinking: An expectation things will end badly. '*I just feel it.'* The worst case scenario is always likely.

Magnifying or Minimizing: We blow things out of proportion, or exaggerate the importance of our mistakes, and/or belittle our own positive qualities.

Emotional reasoning: Emotional reasoning is a mixture of feelings and facts. *'If I "feel" like a failure, I must be a failure.'*

Unrealistic goals: We set the bar too high and fail as a result. In this way, the negative self-image is reinforced.

Labeling: We place negative labels on what we do/accomplish and place positive labels on what others do/accomplish. *'I'm a loser! Everyone else is smart and successful.'*

How to listen to your inner dialogue and choose new thought patterns

Do your thought patterns support you and your ambitions or are you stuck in a rut of negative thoughts that will not take you where you want to go? Here are some exercises you can do to get some idea of your inner dialogue and thoughts. Based on what you discover, you can start to cultivate and choose thoughts that support you. Several of the exercises use techniques which are common within a number of different therapies. Use any at your will.

Listen to your inner dialogue. Thoughts can be fleeting and difficult to grasp. That is why it is good to 'catch sight of' and formulate your thoughts either by saying them out loud or by writing them down.

Next, *reflect* upon which thought patterns and pitfalls are common for you, and whether they support your goals for improved well-being. Are they uplifting or do they bring you down?

Choose your thoughts! If you catch yourself in thought patterns which are negative and which do not support your intentions, the next step is to consciously choose words which do support you. You may be able to distinguish between those things which are part of who you are and which cannot be changed, and those which are just bad habits.

Distance yourself from your unhelpful thoughts, feelings, and ideas by telling yourself, 'I have thoughts, but they are not me,' or 'I have these feelings, they are not me,' or 'I have ideas about the world, but I am not these ideas.' This exercise works well when combined with meditation.

Gratitude training

As you work toward optimal well-being, another technique is to practice gratitude. Field research has shown that it is possible to increase quality of life and well-being through gratitude training. We are acutely aware that it may seem patronizing to suggest gratitude training following a severe injury or illness. However, positive results from studies which included persons with neurological disabilities, and our own clinical experiences, have convinced us that there are strong reasons why we should do just that.

> **'I kept a gratitude diary during a period when I was really feeling down. I ended every day by writing five things that happened during the day that I felt grateful for. As the weeks passed, my ability to focus on the good things in life grew sharper. It got easier to take one day at a time. I felt calmer and in some way I developed a sense of what was good in my life. I also became motivated to take action in a way that I hadn't done for a very long time. I simply felt much better. Now, I write in my gratitude diary periodically when I feel the need to sharpen my focus on what's good in life.'**
>
> **Erik 37**, Tetraplegia for 19 years

Gratitude is defined in a variety of ways. One common description is that it is 'an attitude, an adaptation strategy, or an approach which can give rise to positive emotions.' Gratitude training may be diverting your attention toward something of great value, or a gift that you appreciate which is not necessarily material. It can be anything you appreciate and value. Perhaps a simple everyday phenomenon, like a ray of sunshine on the kitchen floor in the early spring, the enjoyment of a cup of coffee, or an awareness that the cashier

Fact box

Benefits of gratitude training:

- a greater sense of enjoyment
- a reduction in illness symptoms
- an increased sense of well-being, happiness, and self-esteem
- enhanced stress managment
- a reduction in anxiety and depression
- enhanced ability to focus on the good things in life
- greater optimism for the future
- enhanced energy

is smiling at you. As the positive effects from gratitude training emerge, we consciously direct our attention toward the good things in life, with appreciation.

Critics may argue there is a risk that we may become too content and fail to take on new challenges. On the contrary, research shows that persons who practice gratitude are more likely to see opportunities and achieve their goals than those who focus on problems.

Positive results from gratitude training may seem a little too simple. The truth is that this technique is simultaneously easy and difficult. The simplicity lies in the absence of cost and equipment. You can undertake this technique alone and at any time during the day or night. But it is difficult because we are all so problem oriented. Obviously, as a survival strategy, such orientation has kept us alive for many thousands of years, but this instinct doesn't always work to our advantage. Initially, it can be difficult to set aside the time to do something as abstract as practicing gratitude. It can even be difficult to find something in your daily life to be grateful for. Assembly of positive thoughts can be difficult if you are in a situation where the consequences of an illness or injury overwhelm you. Don't despair – try it and you will develop confidence in this technique. Try to direct your attention toward something small that seems worthy of your gratitude, even if it is just for a few seconds.

How to practice gratitude

Of course you can simply reflect on your thoughts and develop gratitude. However, putting your thoughts into words and developing language skills will set those thoughts in concrete. So try to write your thoughts into a 'gratitude diary' and enhance the feeling. Obviously, writing down your thoughts makes it possible to go back and relive your moments of gratitude. This in itself provides added value and strengthens the positive emotions. The results of gratitude training may be observed after just a few weeks. It is possible that gratitude training is like cardiovascular exercise – it must be practiced, worked on, and mastered repeatedly.

» Find a notebook or a calendar where you can keep your notes.
» Create a routine where you make notes once per day or once per week.
» Write down three to five circumstances/events/gifts that you are grateful for. Experience has shown that it is good to vary what you write in your gratitude diary. This can also be a way to improve your capacity for gratitude.
» Install a gratitude app on your mobile phone.

Toolbox: Mindfulness – meditation

Breath as an Anchor

You can use your breath as an anchor during longer meditations, but also as a quick way to get in touch with yourself in the present moment.

Instructions

1. Lie comfortably on your back, or sit or stand with your posture as upright as possible. Close your eyes.
2. Begin by directing your attention solely to your breathing. Follow the path of your breath in and out of your body allowing your thoughts to come and go.
3. Feel how your breath reaches all the way down into your belly – so-called abdominal breathing. If you have loss of sensation in your abdomen, lay your hands on your belly to feel how it expands when you breathe in and sinks down again as you breathe out.
4. Continue to focus on the breath's pathway in and out of your body. Every time you notice your mind wandering, notice also where it goes – note the thoughts, feelings, or various sensations in your body that pull you away from your focus. Then, patiently and without becoming irritated, bring your focus back to your breathing.
5. Continue in this way for the duration of the time you have set for your meditation.
6. Finish by thanking yourself for dedicating this time to being present in conscious awareness.

Body scanning

Body scanning can be done for a shorter period of time – around ten minutes, or it can be done for a longer period of 45 minutes or more. If you have loss of sensation in some area of your body, it can be helpful to visualize that part of your body.

Instructions

1. Lie on your back or sit comfortably. This exercise can be done with eyes open or closed, depending on what feels best for you.
2. Begin by directing your attention to your breathing and follow the path of the breath in and out of your body for several minutes.

3. Notice how your body feels against the surface that is supporting it.
4. Next, direct your attention to one part of the body at a time. In the beginning, it may be easier to follow a particular order and do it the same way every time. If you like, you can use your breathing as a guide by visualizing the breath reaching all the way to the part of the body you are focusing on. For example, breathe in and direct all your attention to your right foot and notice how it feels there. Continue to breathe in and out with conscious awareness for several minutes as you continue to acknowledge sensory impressions from your right foot.
5. During an exhalation, shift your focus to the next part of your body. In this way, you leave behind what you were experiencing at just that moment. This is a concrete way to practice *letting go of* what you are experiencing. Continue in this way until you have explored your entire body.
6. Integrate your experience by feeling your body as a whole for several breaths.
7. Finish by thanking yourself for dedicating this time to being present in conscious awareness.

Sitting meditation

Decide whether you want to meditate with one focus at a time or include several, one after another.

Instructions

1. Sit with your posture as upright as possible. You can sit in a wheelchair, a regular chair, or on the floor without back support if possible. Allow your shoulders to relax and your hands to rest on your knees or lap.
2. **Breathing**. Begin by directing your attention to your breathing and follow the path of the breath in and out of the body. Allow your attention to rest in whatever is happening here and now. When your mind wanders, as it will again and again, notice where it goes and then lead it gently back to your breathing.
3. **Bodily sensations**. Allow your attention to expand to include bodily sensations. Breathe and listen to your body. During sitting meditation, you may receive strong signals from your body such as discomfort or pain. If you can, remain sitting and direct your full attention to the area where the discomfort is greatest. Notice what happens if the signals from your body change, become stronger or weaker, or move around, and whether there is a pattern. Continue breathing as deeply and calmly as possible, directing your focus to that which is demanding your attention. If or when you can no longer cope with the bodily discomfort, make a conscious decision to shift your body's position, but with the greatest possible awareness. Then bring your awareness back to your breathing.

4. **Sound**. The third focus in sitting meditation is mindful listening – to background hums and noises, sound patterns, and tones. One of the purposes of paying attention to sounds is for the direct experience of hearing without judging or evaluating. Sometimes it can be easier to place our awareness in sounds rather than thoughts or feelings, which makes for a good training opportunity.
5. **Thoughts and feelings**. Next, move on to listening to thoughts and feelings – paying attention to their content. It is recommended that you do this for a shorter period of time, perhaps for two or three minutes in the beginning.
6. **The entire body**. Round off your sitting meditation by bringing your awareness to your entire body. Open up to and welcome everything that is there to experience in this one moment. Allow yourself to really be with, whatever is there, and apply all the qualities that mindfulness encompasses.
7. Finish by thanking yourself for dedicating this time to being present in conscious awareness.

Wheeling and walking meditation

Set aside approximately ten minutes. Choose a place where you will preferably not be disturbed and where no one can see you.

Instructions

1. Sit or stand with your posture as upright as possible.
2. Bring your awareness to your breathing and your body. Bring awareness to your posture and notice how your body feels where it meets the surface that is supporting it. Place your hands on your wheelchair rims. How do your arms and shoulders feel? Become aware of your feet against your footrest or the floor or ground. How does it feel?
3. Start rolling or walking quietly and with dignity, and with your full awareness and presence in every movement/step. In the beginning it may be easier to bring your awareness to one place on the body at a time.
4. After a while, you will be able to experience every moment, from first contact with your hands on the wheel or pushrim, the actual stroke for forward movement, release of the pushrim, and return of the hands, arms, and shoulders in preparation for a new stroke. If walking, you can experience every step by consciously noting the placement of the heel, how the foot rolls forward onto the ball of the foot, pushes away, then how the heel of the other foot makes first contact. Notice any sensory impressions that distract you and patiently bring your concentration back to the moment and your movement.
5. Finish by thanking yourself for dedicating this time to being present in conscious awareness.

Glossary

Abdominal Breath – a breathing technique where the diaphragm is consciously activated. *(SpHB et.al.)*

Antioxidants – substances which have the ability to counteract oxidation (the damaging effects from certain forms of oxygen and nitrogen associated with the metabolism of energy in the body). A number of substances in food, the so-called bioactive substances, can function as antioxidants and a diet which includes large quantities of fruit, berries, and vegetables is thus recommended by the U.S. Department of Health and Human Services, the U.S. Department of Agriculture, and the World Health Organization (WHO). *(Wikip.)*

Autonomic nervous system – that part of the nervous system that regulates involuntary functions of the body. It consists of two parts: (1) the sympathetic nervous system which is the body's fight or flight response (increases pulse, blood pressure, breathing, degree of alertness, etc.) and (2) the parasympathetic nervous system which is the body's 'rest and digest' system (activates the internal organs, e.g. bladder and bowel movement, erection, etc.). *(SpHB et.al.)*

Blood lipids – an umbrella term which includes cholesterol and triglycerides present in our blood. Not all blood lipids (or fats) are bad but elevated levels of certain blood lipids increase the risk of cardiovascular diseases. *(SpHB)*

Calorie (cal) – a unit of energy defined as the energy required to raise the temperature of one gram of water by one degree Celsius. Although these units are part of the *metric system*, they have been superseded in the *International System of Units* by the *joule*. A calorie is thus equal to 4.184 joules. The energy content of food is measured in kilojoules or kilocalories (kcal) as a calorie is so small. This is however commonly shortened to just 'calorie', especially in American English. *(Wikip.)*

Cauda equina – the bundle of spinal nerve roots descending from the spinal cord at approximately the level of the first lumbar vertebra. *Cauda equina* is Latin for 'horse's tail' (it resembles a horse's tail) and these nerves control movement and sensation in the legs. *(Wikip.)*

Central nervous system – the part of the *nervous system* consisting of the *brain* and *spinal cord. (Wikip.)*

Diabetes – See Type 1 diabetes and Type 2 diabetes.

Diaphragm – or thoracic diaphragm, is the body's main breathing muscle. It is a dome-shaped sheet of thin muscle that extends across the bottom of the ribcage just under the lungs and functions as a bellows. When it contracts, the volume in the chest cavity increases, the lungs expand and air is drawn down into them. *(SpHB et.al.)*

Glycemic index (GI) – is a measure of the effect of various types of food on blood sugar values and is the basis for dietary recommendations in some diets. GI values are mainly affected by the amount and type of carbohydrates in our food. Carbohydrate-rich foods with high GI values are often called simple carbohydrates (or 'fast carbs') e.g. sugar and white flour, while those with a low GI value are called complex carbohydrates (or 'slow carbs'). *(Wikip.)*

Glycogen – sugar and carbohydrates stored in the liver and muscles. When the body needs energy, glycogen is converted to glucose (blood sugar). *(Wikip.)*

Incontinence – the inability to control the natural evacuation of urine and/or feces from the body. This can in some cases be prevented by strict, regular routines for emptying the bladder and bowel. *(SpHB)*

Insulin – a hormone secreted by the body in response to increased levels of sugar/glucose (see *glycogen*) in the blood after a meal. Insulin decreases/regulates the blood sugar by signaling the body's muscle and fat tissue to take up and store sugar from the blood. A decrease in the production of insulin or insensitivity to it is called *diabetes*. When there is a considerable decrease in muscle mass, such as in SCI, insulin's ability to lower blood sugar is impaired. *(Wikip., SpHB)*

Lactic acid – forms as a by-product in the muscles during intense exercise when the muscles are not getting enough oxygen to convert carbohydrates and fat into energy. The muscles must then break down *glycogen* anaerobically (without the presence of oxygen). The body cannot dispose of the lactic acid quickly enough and lactic acid accumulates leading to pain in the muscle. *(Wikip.)*

Menopause – is the cessation of a woman's reproductive ability. Medically speaking, it is the day after the last menstrual flow followed by postmenopause/change of life. *(Wikip.)*

Mobility disability – in this book we use the term to refer to permanent paralysis or disorders of motor skills, amputation, deformities, and advanced joint stiffness. *(HaKL)*

Multiple sclerosis (MS) – an autoimmune disease that is most common in the highest northern and southern latitudes, usually debuting in the 20-40

year agegroup. MS is at least twice as common in women as in men. Both disease progression and prognosis vary considerably. Some MS variants cause mainly spinal cord injury-like symptoms, such as paralysis of both legs, while others more notably affect intellect/thinking or balance. *(SpHB et.al.)*

Paralysis – a loss or impairment of voluntary movement in the muscles. Paralysis can be caused by injury to the *central nervous system* (brain or spinal cord), the *peripheral nervous system,* or the muscle itself. *(HaKL)*

Paraplegia – paralysis which involves the legs but not the arms. *(SpHB)*

Peripheral nervous system – the peripheral nervous system (PNS) is the part of the *nervous system* consisting of the nerves outside of the *brain* and *spinal cord*. Its main function is to connect the *central nervous system* to limbs and organs, serving as a communication cable sending messages back and forth between the brain and the extremities. *(Wikip.)*

Pressure relief – a technique for prevention of harmful pressure against various bony prominences. In a sitting position, the risk for damage in the form of pressure sores is greatest over the sacrum, ischial bones, and hips. The term 'pressure relief ' refers to moving or lifting oneself to take the pressure off areas that have been compressed, usually from sitting or lying in one position, so blood can circulate. *(SpHB et.al.)*

Spasticity – a condition of gradually increasing, involuntary muscle tightness or rigidity in paralyzed muscles which accompanies damage to the motor nerve circuits in the brain and spinal cord. *(SpHB et.al.)*

Spina bifida – (Latin for 'split spine') is a developmental congenital disorder where some vertebrae overlying the spinal cord, usually in the lower part of the spine, are not fully formed, remaining unfused and leaving a part of the spinal cord unprotected. The most common and significant form of Spina bifida is called Myelomeningocele which leads to disability in most affected individuals. These terms are usually used interchangeably. *(Wikip.)*

Spinal cord injury (SCI) – the spinal cord consists of an approximately ½ inch thick bundle of nerves and is that part of the central nervous system (brain and spinal cord) located within the vertebral column. An injury to the spinal cord means that nerve connection between the brain and the rest of the body is disrupted or broken. This leads to loss of movement and sensation below the injury, *spasticity*, loss of control over or impairment of the bladder, bowel, and sexual functioning. The consequences of a spinal cord injury (*paraplegia* or *tetraplegia)* depend on where along the spinal cord the injury is located and how comprehensive the injury is, i.e. partial or total paralysis. When the injury results in partial paralysis, the spinal cord

is not completely severed and some degree of sensation and/or the ability to move remains below the injury. Walking may be possible with crutches or a walker. The spinal cord ends at the first lumbar vertebra, but some nerves continue down through the spinal column exiting through holes between the vertebrae here. These nerves form the *cauda equina*, and are part of the *peripheral nervous system*. When these nerves are injured, the result is a condition known as 'flaccidity' which means limp muscles, i.e. there is no *spasticity*. *(SpHB et.al.)*

Tetraplegia – also referred to as quadriplegia, is total or partial paralysis of the arms, legs, and torso. It occurs most often in connection with injury to the cervical spinal cord (the top seven vertebrae of the neck). *(SpHB et.al.)*

Type 1 diabetes – formerly called juvenile diabetes or insulin dependent diabetes, it is a form of *diabetes* resulting from the *autoimmune* destruction of the *insulin*-producing *beta cells* in the *pancreas*. The subsequent lack of insulin leads to increased blood and urine glucose. The classical symptoms are frequent urination, increased thirst, increased hunger, and weight loss. *Insulin therapy* is essential, must be continued indefinitely, and does not usually interfere with normal daily activities. People are generally trained to manage their disease independently, however for some this can be challenging. *(Wikip.)*

Type 2 diabetes – formerly called adult-onset diabetes or non-insulin dependent diabetes, is the most common form of the disease and accounts for approximately 90 percent of all diabetes. This form of the disease occurs when the *insulin* in the body cannot operate at full force and the individual becomes desensitized to insulin. Some people are genetically predisposed to developing Type 2 diabetes but lifestyle factors can have a major impact, e.g. smoking, physical inactivity, *obesity* and abdominal obesity, high alcohol intake, and *high blood pressure*. *(Wikip.)*

Urinary tract infection (UTI) – a bacterial infection of the urinary tract. It is necessary to distinguish between an upper urinary tract infection (kidney infection), which affects the kidneys and ureters, and a lower urinary tract infection (acute cystitis/bladder infection) affecting the bladder and urethra. Lower urinary tract infections are very common, even in the general population, especially in women. The incidence is much higher in people with spinal cord injury. *(SpHB et.al.)*

Urodome – a condom-like device, to the tip of which is connected a tube and a urine collection bag. The urodome is secured with special double-sided tape around the base of the penis.This device is frequently used as an incontinence aid among spinal cord injured men. *(SpHB et.al.)*

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References and Literature for Knowledge and Inspiration

Here we have listed a selection of the hundreds of references that we studied in order to ensure the accuracy of the scientific evidence while writing this book. You will also find tips for reading: books and websites that have inspired us and we think could be useful.

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