



BODY MATTERS

**sia** spinal  
injuries  
association  
for life after spinal cord injury

# DIET AND EXERCISE

FACTSHEET



# Diet and exercise

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## Introduction

Fitness and health has had a fashionable makeover and been placed at the forefront of everyone's attention. Eating well and having good health is important for everyone. The type of food you eat has a major impact on not only how you look but also how you feel and how well your body systems work.

A well balanced diet is constantly mentioned but rarely defined. A well balanced diet means a diet that includes a combination of different food types including grains and pulses, fresh fruit and vegetables, meat and dairy products, fats and oils in the right proportion.

As with the rest of the population, people with spinal cord injury (SCI) need to practice healthy eating habits and a healthy, active lifestyle. But as a person living with SCI, you need to have a better understanding of the role that eating nutritious foods plays in keeping you healthy because your body faces unique challenges.

This factsheet is intended to be a general guide to healthy eating as a SCI person and on how you can still have an active lifestyle after your injury.

You are still advised to consult with a qualified nutritionist or dietician on all aspects of diet and nutrition.

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## Weight control

**"I was a thin person before my accident. I am now about three stone heavier - it has gradually crept up on me over the 23 years. I weigh about 10 stone now. I try to eat sensibly - lots of fruit and veg." SIA member, T6 complete**

After spinal cord injury, most people tend to experience dramatic weight changes and normally lose a lot of weight. This is because the body is under a lot of stress at the time of the initial trauma, and so your body's metabolism works quicker to provide energy and nutrients to heal the body and fight off infections. The body is burning off calories very quickly and so you lose a lot of weight.

Often during this time newly paralysed people are not really able to eat a regular diet and the paralysed muscles waste away because of inactivity, which leads to even more weight loss. Over time your body's metabolism slows down because you become inactive and your muscle tissue is replaced by fat tissue. So you will find that it is much easier to become overweight even by overeating just a little.

Being spinal cord injured there are some specific health concerns that you are more susceptible to through being overweight. Overweight SCI people face a much greater risk of secondary health problems including:

- Heart attacks and other circulatory complications from clogged arteries.
- Chest infections and other respiratory problems
- Bladder and Kidney problems including urinary tract infections
- Arthritis
- Some kinds of cancer
- Skin problems including pressure sores.
- Bowel problems including constipation and diarrhoea
- Type 2 Diabetes Mellitus
- Weak bones
- Wasted muscles

Other problems that are magnified by the excess weight for a SCI person include:

- Increased risk of injury to your shoulders which may lead to shoulder pain and joint degeneration. There is even some serious risk of rotator cuff tears as a result of shoulder injury. This type of injury, besides being very painful, seriously affects arm function and requires surgery.
- SCI people put a huge amount of stress on their shoulders during transfers and while manoeuvring their wheelchairs and, being an overweight person makes this even worse. Your arms have to not only compensate for the work your legs used to do but also take on the excess weight.
- Excess weight puts pressure on your skin and skin folds develop which trap moisture, increasing your risk of pressure sores. For more information on how to prevent pressure sores, SIA has a pressure care factsheet available free on request from the SIA Helpline.
- You might find it more difficult to hire a personal assistant or carer if assisting you with transfers may cause them to develop back problems.
- You might find it harder to self-catheterise.
- You might find it more difficult to fit in a standard wheelchair and may require a wider wheelchair, which can make access difficult and bring on additional expenses.

“Whilst on ‘bed rest’ immediately after my accident, I lost a vast amount of weight, about 4 stone. I was not fat before my accident, so you can imagine how I looked. By the time I left the unit I weighed about the same as when I went in, which was O.K.

Maybe it was depression or just boredom, I don’t know, but I soon ‘blossomed’ into a 20-stone ‘Mr.Blobby’! Being sick of people recognising me as a fat cripple, I decided to diet and to get a little fitter.

Six months later, which brings me to date, I have a completely different outlook on the way I lead my life. To start with, ‘the diet’ is so important. Less fat and more goodness is the answer. Some people are destined never to become over-weight, but I was always prone to be a little bit on the porky side, if I wasn’t careful. I started a ‘fat free’ diet which is working very well at the moment. I also started exercising regularly, going to the gym at least twice a week, if not three times. I go for a good push around the area several times a week.”

- SIA member, T9

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## Dietary needs when you are living with spinal cord injury

Being spinal cord injured, your body will require certain nutrients to help you cope better. No matter what your level of injury is, you will become healthier and may even prevent some health problems with a well-balanced diet.

The general rule is to have a low-fat, high fibre diet, for maintaining and achieving a healthy body.

You will have to take account of the following foods:

### Calcium

Calcium is the key nutrient in developing and maintaining strong bones and teeth. It also helps control blood cholesterol levels and helps your muscles contract properly including your heartbeat. It helps nerves to function properly and makes sure blood clots normally.

In the weeks after a spinal cord injury your body may excrete excess calcium in your urine as you lose some of your bone mass. This may cause calcium to settle out in your urine, forming stones in your kidneys or bladder, or little granules which tend to block a catheter.

After a while this should stop, especially once you become more active. Some people, however, are prone to stone formation and should follow a low calcium diet, limiting the intake of milk, cheese, and dairy products.



So you should not take excessive amounts of calcium in your diet but take the recommended daily amount which is currently 700 mg per day for men and women over 19 years. Children and young adults require more. People with osteoporosis as well as adults over 50, especially women should consult their doctors regarding their daily calcium intake.

Good sources of the mineral calcium include milk, cheese and other dairy foods, green leafy vegetables (such as broccoli, cabbage and okra) soya beans, tofu, soya drinks with added calcium, nuts, bread and anything made with fortified flour, and fish where you eat the bones, such as sardines and pilchards.

## Sodium

Sodium helps your body to regulate its fluid balance, contraction of muscles and conduction of nerve impulses. Our main source of sodium is from salt (sodium chloride) since many raw foods have a very small amount of sodium.

The recommended daily allowance is 6g per day but you should be aware of hidden salt content in processed and preserved foods. Too much salt will make your body retain a lot of water, putting you at risk of high blood pressure (hypertension), heart attacks and strokes.

## Fibre

Dietary fibre used to be known as 'roughage'. It passes through into your bowel where it absorbs and retains water, helping to form a soft stool, which can be passed easily, without damage to the bowel or anus.

If your diet is well-adjusted, you may find that you can do without laxatives and achieve greater regularity in bowel movements, and a bowel that responds easily and promptly to the stimulus given to empty it. Fibre helps to maintain a healthy digestive tract and keeps your bowels functioning properly.

You need about 25 to 35g of fibre each day.

Be careful when making changes to your fibre intake because sudden increases or decreases can cause irregularities in your bowel function and make you feel quite uncomfortable.

The best natural sources of fibre are vegetables, fruits and wholegrain cereals and bread, oats and pulses (beans, lentils, chickpeas) as well as whole-wheat pasta, brown rice and seeds such as pumpkin seeds, linseeds and sunflower seeds.

## Protein

Protein is very important for growth and repair of body tissues and as a source of energy. It is essential for healthy muscles and skin, as well as in helping your body to fight off infections.

Good sources of protein include meat, beans and dairy products and you should eat the healthier sources of protein which include eggs, fish, seafood, lean meats( 90% fat-free by weight) , low-fat milk (1%) and low fat cheese (2%).

You would normally need 70-90g of protein per day.

## Water

Water has a variety of important functions in your body including:

- Helping your body to get rid of wastes and maintaining healthy kidneys
- Keeping your body well hydrated
- Regulating your body temperature
- Aiding the digestion of food
- Cushioning your nervous system
- Being the medium in which many of the body's reactions take place

So it is important for you to ensure that you drink sufficient amount of water to keep your body working properly.

For individuals with spinal cord injury, water can help prevent urinary tract infections, kidney stones, and bladder stones.

You should drink at least 8 cups of water (2 litres) everyday. You may need to increase your fluid intake if you are on a high fibre diet, on very hot days, or if you sweat a lot.

You might be tempted to reduce your fluid intake if you are having problems with your bladder management. However, if you do you are more likely to develop kidney infections.

Remember, the sensation of thirst is triggered only when you are already dehydrated so it is important to drink before you get thirsty.

## How diet affects your bowel and bladder function

A healthy diet that includes sufficient fibre and plenty of fluids with a moderate amount of dairy products, meat, fish or pulses, is the best way to regulate your bowel function. Fibre holds water and adds bulk to the stool, which aids the movement of the stool through the bowel. However you should avoid taking excess amounts of fibre and be aware that it is no longer recommended to use raw bran.

It is also important to eat your meals at regular times throughout the day to keep your digestive process working consistently and this will in turn prevent flatulence and bloating, and could help prevent bowel accidents.

To help your bladder function properly, you should keep your urine slightly acidic, with a pH between 5 and 6. This helps prevent the formation of kidney stones and also discourages the growth of bacteria along the urinary tract, which can cause bladder and kidney infections.

To test the acidity of your urine, you can buy test-strips from the chemist and simply dip a strip into your urine. If the urine has a pH higher than 6, it means that it is more alkaline and you may need to adjust your diet by cutting down on tomatoes and citrus fruits including lemon and orange barley water. You should drink apple, cranberry, or grapefruit juice or take a vitamin C capsule daily. If this does not make your urine acidic, see your doctor.

Also, try to ease off on the fizzy drinks as they tend to make your urine alkaline and increase the likelihood of that you will get bladder and kidney stones

It may be tempting to drink less fluid when you consider the difficulties that come with incontinence. This is not advisable especially if you have an indwelling catheter because you need a good fluid throughput to help your kidneys and bladder flush out waste.

If you are prone to urinary tract infections, then you should increase your fluid intake to preferably 3 litres daily, make sure your urine is acidic and if necessary, take a vitamin C supplement or drink cranberry juice to increase urine acidity.

## Getting fit



Most people exercise to improve their appearance and self-esteem, increase their physical endurance and strength, relieve stress or simply to become healthier. Although spinal cord injury can make it somewhat harder, it need not make it impossible. When you have SCI it is much harder for you to burn off calories as effectively as someone without paralysis. The major factor that makes it harder for your body to burn off calories is the loss of muscle mass. Muscle burns calories even when your body is at rest. So for a spinal cord injured person, your resting metabolism can be as low as half that of a person without a SCI.

So even though you may exercise regularly, you will burn significantly fewer calories than an able-bodied person performing the same exercise.

Your heart rate is not as responsive to increased exertion and your chest muscles may not be able to expand as efficiently which makes breathing difficult.

You may find that your blood pressure is reduced as blood tends to pool in the legs of SCI person, reducing blood flow back to the heart.

Nevertheless, there are numerous benefits of keeping fit including improved skin tone and blood circulation; bladder function; reduction in spasm, and pain relief; and weight control. Exercise would also help keep your joints flexible and loose, help you sleep better and may help you feel better about yourself



There are a variety of sports that a spinal cord injured person can do by simply adopting an exercise programme and finding one that suit them best. You can do this either alone or with the help of a gym or a sports club. There are some precautions that you need to take when planning to take up an exercise programme.

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## A) Before you start exercising

1. Discuss your exercise plans with your doctor or rehabilitation team, who will ensure that it is appropriate for you and will not cause you any harm. Be sure to inform them of any medication you are taking so that they can take into consideration the effects of the medication when assessing your exercise regime.
2. Make sure your body temperature is stable. While you exercise your body temperature may fluctuate for no apparent reason. But you can prevent your body from experiencing extreme temperature changes by:
  - Dressing in layers and adding on extra layers if in a colder environment;
  - Wearing comfortable and suitable clothing for exercising;
  - Drinking plenty of fluids preferably water;
  - Using a fan and/or water spray to keep your body cool; and
  - Exercising in the shade.
3. Don't exercise if you are feeling ill and that includes having a bladder infection, pressure sore or unusual spasticity.

In planning your exercise regime you need to be aware of other important physical differences as a result of your spinal cord injury. If you are exercising in a health club or gym with non-disabled instructors, it is very important that you make them aware of these differences:

## Autonomic Dysreflexia

While you are exercising, you might get a headache, chest and joint pain, cramping or high blood pressure. These may be signs of mild dehydration or poor nutrition or may be symptoms of something more severe like autonomic dysreflexia. So it is important that you do not ignore any of these symptoms. Other warning signs to watch for are profuse sweating, blotching of the face, neck, chest and arms, nasal congestion, and dilated pupils.

## Pain

Most important (obvious to you, but very hard for a non-disabled person to take on board and remember) is that you don't have the pain feedback to tell you when exercise is imposing too much friction or pressure on your paralysed limbs. Carers and instructors need to bear this continually in mind. Failure to do so can lead to bruises, sprains, pressure sores, and fractures. You should also stop exercising if you feel any pain or discomfort.

## Spasticity

While you are exercising, spasticity may be made worse. You can prevent excessive spasticity by stretching spastic muscle groups and avoiding strenuous exercises.

## Pulse

Some exercise regimes monitor pulse rate. A non-disabled person's heartbeat may reach 200 per minute when taking strenuous exercise. A spinal cord injured person with a lesion at T7 and above will probably reach only 110–130 per minute, so pulse is not a reliable measure of activity.

## Orthostatic hypotension

This is a drop in blood pressure (greater than 20 mmHg for systolic blood pressure and greater than 10 mmHg for diastolic blood pressure) that occurs when you are sitting upright, standing upright, or tilting your head upwards. Symptoms include nausea, dizziness, and light-headedness. To prevent this:

1. Monitor blood pressure throughout your exercise routine
2. Avoid any quick movements
3. Perform orthostatic training if available from your rehabilitation centre
4. Make sure you are not dehydrated.

If orthostatic hypotension occurs lie on your back with your feet elevated to stabilise your blood pressure.

## Take breaks

If you are tetraplegic, you should exercise for short periods only, allowing long rest breaks.

## b) Other Safety Considerations

### Deep Vein Thrombosis (DVT)

Before your injury, walking used to encourage blood circulation. After spinal cord injury, your legs are immobilised and this increases your risk of having blood pooling and clotting in your legs. During the early phases of recovery and rehabilitation, DVT in the lower leg is quite common. But a blood clot in the thigh area is of greater concern because the blood clot can dislodge and travel through the blood stream to the lung. Once it arrives here, it can block the arteries that supply the lung with oxygen and this can be fatal.

There are ways to reduce the risk of getting DVT such as:

- Wrapping your legs in Ace wrap
- Using pneumatic compression or anti-embolism stockings which maintain constant pressure over legs. You can get these from your GP.

“One of the problems of being paralysed is putting on weight. Because my break was so high I was restricted to arm and head exercises. I kept as fit as I could swimming once a week and attending physiotherapy; I had a full time job as a teacher and so kept quite active (I thought). I found while exercising [on an electrical muscle stimulator] that I became breathless.

Tests were made and I was found to be grossly unfit and overweight. I was put on a diet and started a gradual programme to exercise the heart. Apparently the heart is such an efficient muscle that when one is forced to lead a sedentary life in a wheelchair it loses its efficiency and only works hard enough to keep the blood ticking over.

This was the reason for my shortage of breath; my body was not used to the sudden exertion. With the correct diet (I've lost two stones in weight) and controlled exertion, I'm starting to return to the fitness I enjoyed before my accident. I now have improved circulation (warm legs and feet), excellent skin quality, and the best part, I haven't been ill for over two years.”

SIA member, C6/7 (writing in SIA Newsletter, 1984)

## Exercise programme

There are a variety of exercises that as a spinal cord injured person you can do including aerobic exercise, strength training, and flexibility training.

Remember that if you have so far led a sedentary life then you should start with short intervals of physical activity (5-10 minutes) and gradually build it up to your optimum level of activity.

### a) Aerobic exercise

Aerobic exercise involves engaging large muscle groups in rhythmic, repeated movements. Aerobic exercise includes activities such as swimming, basketball, cycling, rowing, skiing and tennis. This type of exercise increases the body's need for oxygen and by doing so, challenges the heart and circulatory system to meet this increased need. You should aim for at least 30 minutes of aerobic sessions three times a week.

As difficult as exercising aerobically might be for some spinal cord injured people, it benefits your quality of life. Some of the important benefits of aerobic exercise include:

- Making your heart stronger and making it more efficient at pumping blood around the body
- Reduces risk of high blood pressure and high heart rate
- Helps to control your weight
- Increases endurance for physical activity by helping more blood and oxygen reach the muscles.



Most people exercise to improve their appearance and self-esteem, increase their physical endurance and strength, relieve stress or simply to become healthier. Although spinal cord injury can make it somewhat harder, it need not make it impossible. When you have SCI it is much harder for you to burn off calories as effectively as someone without paralysis. The major factor that makes it harder for your body to burn off calories is the loss of muscle mass. Muscle burns calories even when your body is at rest. So for a spinal cord injured person, your resting metabolism can be as low as half that of a person without a SCI.



“I started swimming five years ago and it has changed my life completely. I am now much fitter and have a lot more confidence in myself... I compete for Great Britain and I hold six world records at present. When I started swimming I had no confidence and never thought I would be able to swim unaided. People think I am joking when I say I can swim better now than I could when I had use of my legs, but it is true. I have a good coach, and I also train every day.

A lot of people with a spinal injury are put off swimming because of bladder and bowel problems. When I had an indwelling catheter I would attach a small leg bag with a short tube and place it across my stomach under my bathing costume. Now I have an ileal conduit and a colostomy, I just change my bags to a smaller size and lay them across my stomach. I must admit sometimes when I come out of the water after a training session, I look a little fatter than I did when I went in, but I keep a towel on my chair and just place it across and no-one really notices.” - SIA Member, T4 complete

## b) Strength training

As a spinal cord injured person, you need to make the most of the muscles you still have control over because you are relying on them to compensate for the muscles that are now paralysed. So you need to develop as much strength as possible in these muscles. Strength training will not only help you perform your daily living activities but will improve your stamina and overall good health.

You do not have to exercise a muscle by training to exhaustion. You can maintain your muscles by gentle and slow repetitions with little weight and gradually build up your strength.

You should refrain from exercising the same muscle groups on consecutive days. Aim to spread out your exercise program over the course of a week, taking day breaks in between exercise sessions to prevent overtraining your muscles and causing more harm than good to your body.

Some examples of strength building exercises include using free weights, weight machines, medicine ball, wall pulley, and the Thera-band.

## c) Flexibility training

Muscle strength is not simply all about bulk but also a matter of softness and elasticity. Flexibility training can also reduce spasticity and improve your range of motion. It is important in preventing permanently shortened muscles which are known as contractures.

You can keep your muscles flexible in a number of ways including passive resistance, using Thera-band exercisers and using a standing frame.

## Healthy shoulders

Shoulder problems have gained notoriety in recent years. Wheelchair users are 50%-75 % more prone to overuse shoulder injuries than the general population due to the unusually high and repetitive stress they put on their upper limbs, carrying out day to day activities such as:

- Wheeling about
- Transferring
- Even just breathing because a person with spinal cord injury may tend to use additional muscles rather than just the diaphragm, the predominant breathing muscles.

Because being spinal cord injured demands that you take on compensatory (usually awkward) postures to retain your balance and to position yourself more comfortably, you will find that you develop abnormal muscle control and muscle tone.

So what really causes the shoulder pain in spinal cord injured people? There are several related causes of shoulder pain that you need to be aware of:

### Muscle paralysis

Since your spinal injury, your muscle strength has been compromised by the onset of paralysis. This paralysis has also created muscle imbalances and by weakening your muscles, interrupted the synchronized fashion that they used to work in to move your joints. This means that your joints will move in an abnormal way and cause injury over time.

Spasms, a consequence of paralysis, also contribute to shoulder injury. Spasms overwhelm one side of your trunk or a particular limb over the other side and consequently cause further damage to the disadvantaged body part. Anatomically your shoulder is built similar to a door hinge, so like a door hinge, if it is not deformed, it rotates smoothly. If the hinge post is bent or out of alignment, it will be more difficult to operate and, if force is applied to it, might even be permanently destroyed.

### Increased stress on joints

The shoulder has great difficulty in supporting your body's weight. Through an activity like transferring, we put unusually high amounts of stress on our shoulders to do a task more suited to the hip, which is biomechanically fashioned to bear that amount of stress without being injured.

## Repetitive activities

By carrying out repetitive motions such as wheeling, weight shifting like push-ups, and transferring, you are putting repetitive stress on your shoulders which will cumulate in trauma.

## Muscle imbalances

This is caused by the overuse of one muscle and the underuse of the opposing muscle. The result of this will be the shortening of the overused muscle, making it overpower the underused muscle which has been not only overstretched but also weakened by lack of use. The damage does not simply stop there but continues by causing abnormal movements in joints and posture.

This type of muscle imbalance can be seen in the musculature of the shoulders of SCI people who have been using manual wheelchairs for years. What tends to happen is that the front of shoulder and the chest muscles are overused and so become stronger and tighten up, while the back of the shoulder and the scapular (shoulder blade) muscles are underused and so become weakened and underdeveloped. This will lead to changes in posture and trauma.

Another common example of muscle imbalances is hooking, which is when tetraplegics hook their arm behind the handle on back of the wheelchair. This helps to keep your balance and may help you do more activities by providing stability. So one dominant arm on one side is being used more often to carry out tasks than the other arm, which is occupied with hooking.

Other than the muscle imbalance, hooking will require a lot of twisting and leaning which will not only cause shoulder pain, but back pain, pressure ulcers on your buttocks and even skeletal deformation.

This type of damage can be found not only in manual wheelchair users but powered wheelchair users who also practice hooking.

## Posture

Many people prefer slouching in the wheelchair to sitting more erect because it improves balance. However, a bad posture while sitting in your wheelchair can have a negative effect on your health and may even limit your ability to carry out tasks because of back and shoulder pain. The structure of your wheelchair may force you to slouch if the seat depth of your wheelchair is too long or the back angle is too open.

## Exercise hints for your shoulders

Before you begin any exercise it is important that you consult your GP to ensure that nothing is broken, torn, and injured in any way.

Remember that if the exercise feels a bit strenuous, reduce the weight if you are using hand weights, move the exercise to the end of the workout when you are more warmed up or omit it for a week. If you are in pain, stop exercising immediately and maybe try again when your arm is not sore.

Remember to breathe properly throughout the exercise and do not hold your breathe.

Perform the following exercises at least 4 or 5 times per week:

### Wing Flaps

1. Sit upright in your wheelchair.
2. Place the back of your hands against your hips.
3. Slowly rotate your elbows forward as far as possible. If you feel any pain, you are pushing too hard
4. Then rotate your elbows backwards.
5. Repeat steps 3 and 4 15-20 times (repetitions).

### External Shoulder Rotation

1. Sit upright in your wheelchair with your elbows tucked in close to the body.
2. Place your forearms forward and horizontal and hold a resistance band tightly with both hands. Make sure your hands are about six inches apart.
3. Extend your arms straight out in front with palms facing down and stretch the band or tubing across your chest. Return the band/tubing to the start position and do 15-20 repetitions.

### Arm Circles

1. Sit upright in your wheelchair.
2. Extend your arms to your side and raise them up to your shoulder level.
3. Keeping them straight, move your arms in large circles forwards 10 times. Then take them back to shoulder level. Hold this position for 1 second.
4. Then move your arms in large circles backwards 10 times.
5. Then take them back to shoulder level. Hold this position for count of 2.
6. Do two sets of 5-8 repetitions.



## Curls

1. Sit up tall in your wheelchair and make sure your back is supported by back of the chair.
2. Take a hand weight in one hand and make sure you keep your elbow off the armrest of the wheelchair. Keep your elbow slightly bent. Let the other arm rest comfortably by your side.
3. Slowly to a count of three, curl your arm towards your shoulders until your elbow is bent.
4. Hold this position for count of 2.
5. Slowly lower your arm to the start position to a count of three.
6. Now do two sets of 8-15 repetitions.
7. Now carry out the same exercise with the alternate arm.



## Side shoulder extension



1. Sit upright in your wheelchair. Make sure there is enough room around you to carry out this exercise.
2. Hold hand weights in each hand and place your hands at your side.
3. Do not fully extend your elbows. Keep them slightly bent.
4. Slowly to a count of three, pull both your arms up and out to the side of your body.
5. Raise both arms until they reach near your shoulder level. Do not go past your shoulder level. Hold the position for count of 2.
6. Now counting to three, slowly lower your arms to start position.
7. Do two sets of 8-15 repetitions.

## Wheelchair Push Ups

1. Sitting upright on your wheelchair, place your hands at the top of the wheelchair tyres.
2. Raise your buttocks off the wheelchair until your arms are straight.
3. Hold for a count of three and then lower yourself slowly. Try to keep the elbows close to the body.
4. Do 10-20 repetitions.

## Tricep Extension

This exercise strengthens the muscles in the back of your upper arm. Keep supporting your arm with your hand throughout the exercise.



1. Sit in chair with your back supported by back of wheelchair.
2. Hold a weight in one hand. Raise that arm straight toward ceiling, palm facing in.
3. Support this arm, below elbow, with other hand.
4. Slowly bend raised arm at elbow, bringing hand weight toward same shoulder.
5. Slowly straighten arm toward ceiling.
6. Hold position for count of 2.
7. Slowly bend arm toward shoulder again. Pause.
8. Repeat the bending and straightening until you have done 8-15 repetitions.
9. Repeat exercise with the other arm.
10. Rest; then do another set of 8 to 15 alternating repetitions.

## General information

### a) Functional Electrical Stimulation

Functional electrical stimulation (FES) uses electrical pulses through skin electrodes to make paralysed muscles contract. Following a spinal cord injury most paraplegics cannot voluntarily exercise enough muscle mass to gain the full benefits of a regular whole body workout.

So by either surgically inserting or placing electrodes on the skin, electrical impulses can make the paralysed muscles contract and relax creating a functional movement.

To help paraplegics get a full body work out rather than simply just working their upper bodies, FES exercise can be applied to the paralysed leg muscles to deliver an improved full body work out and corresponding cardiovascular fitness.

There are a number of systems that allow standing, walking, cycling, and even rowing following spinal cord injury. To really get the substantial benefits in terms of function and exercise, systems providing cycling and rowing are more effective compared to systems providing standing and walking.

In FES cycling, the electrodes are placed on the skin over the buttock, quadriceps (front of thigh), hamstrings (back of thigh) calf and shin. Then the muscles are stimulated in succession following a pattern that helps the legs to turn cycle pedals.

Similarly in FES rowing, the rower's thumb operates a switch that causes the quadriceps and the hamstrings to contract alternatively. Consequently the paralysed legs would flex and extend in a similar fashion as an able-bodied rower.



There are a number of health-related benefits for SCI people carrying out FES exercise including:

- Reducing risk of developing diabetes, obesity, and heart disease.
- Improving the mineral density of your bones decreasing the risk of fractures
- Improving blood circulation to your lower limbs which may help with wound healing and reduce susceptibility to pressure sores and deep vein thrombosis.
- Increases bulk of your lower limb muscles which tend to waste away after SCI.
- Improves your cardiovascular fitness
- Prevents joint contractures
- Reduces the stress on the upper body during exercise
- Helps you feel better about yourself and helps prevent depression

For more information on FES rowing:

**ASPIRE Association for Spinal Injury Research, Rehab & Re-integration**

The Aspire National Training Centre

Wood Lane

Stanmore

Middlesex HA7 4AP

T: 020 8954 5759

@: [info@aspire.org.uk](mailto:info@aspire.org.uk)

**FES Rowing Project**

W: [www.fesrowing.org](http://www.fesrowing.org)

@: [info@fesrowing.org](mailto:info@fesrowing.org)

The underlying aim of the FES Rowing project is to develop new technology that enables paraplegics to participate in a mainstream activity for health, leisure and sport.

**London Regatta Centre**

Dockside Road

London E16 2QD

T: 020 75112211

W: [www.london-regatta-centre.org.uk](http://www.london-regatta-centre.org.uk)

**National Clinical FES Centre**

Dept. Medical Physics and Biomedical Engineering

Salisbury District Hospital

Salisbury

Wiltshire SP2 8BJ

T: 01722 429063 / 01722 429334

W: [www.salisburyfes.com](http://www.salisburyfes.com)



## Where can I find out more?

### **British Dietetic Association**

5th Floor, Charles House  
148/9 Great Charles Street  
Queensway  
Birmingham  
West Midlands B3 3HT  
T: 0121 200 8080  
@: [info@bda.uk.com](mailto:info@bda.uk.com)  
W: [www.bda.uk.com](http://www.bda.uk.com)

Provides information on how to find a state registered dietitian, for general and dietary advice.

Professional association for dietitians. Covers UK.

### **Aspire**

The Aspire National Training Centre  
Wood Lane  
Stanmore  
Middlesex HA7 4AP  
T: 020 8954 5759  
@: [info@aspire.org.uk](mailto:info@aspire.org.uk)  
W: [www.aspire.org.uk](http://www.aspire.org.uk)

Aims to reintegrate spinally injured people back into society after their injury and to encourage, facilitate and enable them to reach their full potential. Has developed a national programme of work to this end.

Purchases essential specialist equipment for individuals who are paralysed; offers short-term housing and independent living courses for spinally injured people newly discharged from hospital and a research programme looking into ways of improving quality of life for wheelchair users. Raises funds for research projects and rehabilitation.

Runs a rehabilitation sports centre, facilities include 25m ramped access swimming pool, integrated gym, dance studio and training suite. IT department, which includes an internet cafe.





### **Back-Up**

Jessica House  
Red Lion Square  
191 Wandsworth High Street  
London SW14 4LS  
T: 020 8875 1805  
@: [admin@backuptrust.org.uk](mailto:admin@backuptrust.org.uk)  
W: [www.backuptrust.org.uk](http://www.backuptrust.org.uk)

Back-Up is a national charity enabling people with spinal cord injury to surpass their aspirations in every day life.

Services offered include outdoor activities (in UK and overseas), as well as a mentoring programme, and wheelchair skills training taught by experienced chair users.

### **British Wheelchair Sports Foundation (BSWF)**

Stoke Mandeville Stadium  
Guttmann Road  
Stoke Mandeville  
Buckinghamshire HP21 9PP  
T: 01296 395995  
@: [info@wheelpower.org.uk](mailto:info@wheelpower.org.uk)  
W: [www.wheelpower.org.uk](http://www.wheelpower.org.uk)

BWSF is the national organisation for Wheelchair Sport in the United Kingdom.

It provides, promotes and develops opportunities for men, women and children with disabilities to participate in recreational and competitive wheelchair sport.

BWSF annually organises a range of opportunities including training, events and camps at novice, junior, national and international level.

The Foundation provides information and produces a range of publications including a quarterly newsletter. It owns the Stoke Mandeville Stadium.



**Disability Sport England**

Belle Vue Centre  
Pink Bank Lane  
Manchester M12 5GL  
T: 0161 953 2499  
@: [info@dse.org.uk](mailto:info@dse.org.uk)  
W: [www.disabilitysport.org.uk](http://www.disabilitysport.org.uk)

Provides, promotes, co-ordinates and develops a range of sporting and recreational opportunities for people with disabilities.

The organisation has a broad grass roots base in approximately 550 clubs and schools, serviced by 10 regional offices.

It organises classification training courses, come-and- try days and 12 national championships in a variety of sports.

**English Federation Of Disability Sport**

Manchester Metropolitan University  
Alsager Campus  
Hassall Road  
Stoke-on-Trent ST7 2HL  
T: 0161 247 5294  
@: [federation@efds.co.uk](mailto:federation@efds.co.uk)  
W: [www.efds.co.uk](http://www.efds.co.uk)

National umbrella body responsible for the co-ordination and development of sport for disabled people in England. A network of nine local regions. It runs Inclusive Fitness Initiative Project, which aims to work with local authority fitness suites towards inclusive provision.

**For more information, contact us at:**

Spinal Injuries Association, SIA House,  
2 Trueman Place, Milton Keynes, MK19 6HY

0800 980 0501 (freephone support line open Mon-Fri 10.00am-4.30pm)

sia@spinal.co.uk



## About SIA

Spinal Injuries Association (SIA) is the leading national charity for anyone affected by spinal cord injury. We have specialist support available, for free, to support you through the mental and physical challenges you may face, both now and for the rest of your life.

Our support network is coordinated by a team of people, across the UK, who can put you in touch with our network of experts and trusted partners, covering all aspects of mind, body and life, to help you move forward with life. Our partners specialise in services such as legal, care, housing, finance, mental health and much more.

We are the voice of spinal cord injured people, through our expertise and we can connect you to the services and organisations you need through our network for all.

You can join the SIA community by signing up for free online at [www.spinal.co.uk](http://www.spinal.co.uk).

## Disclaimer

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