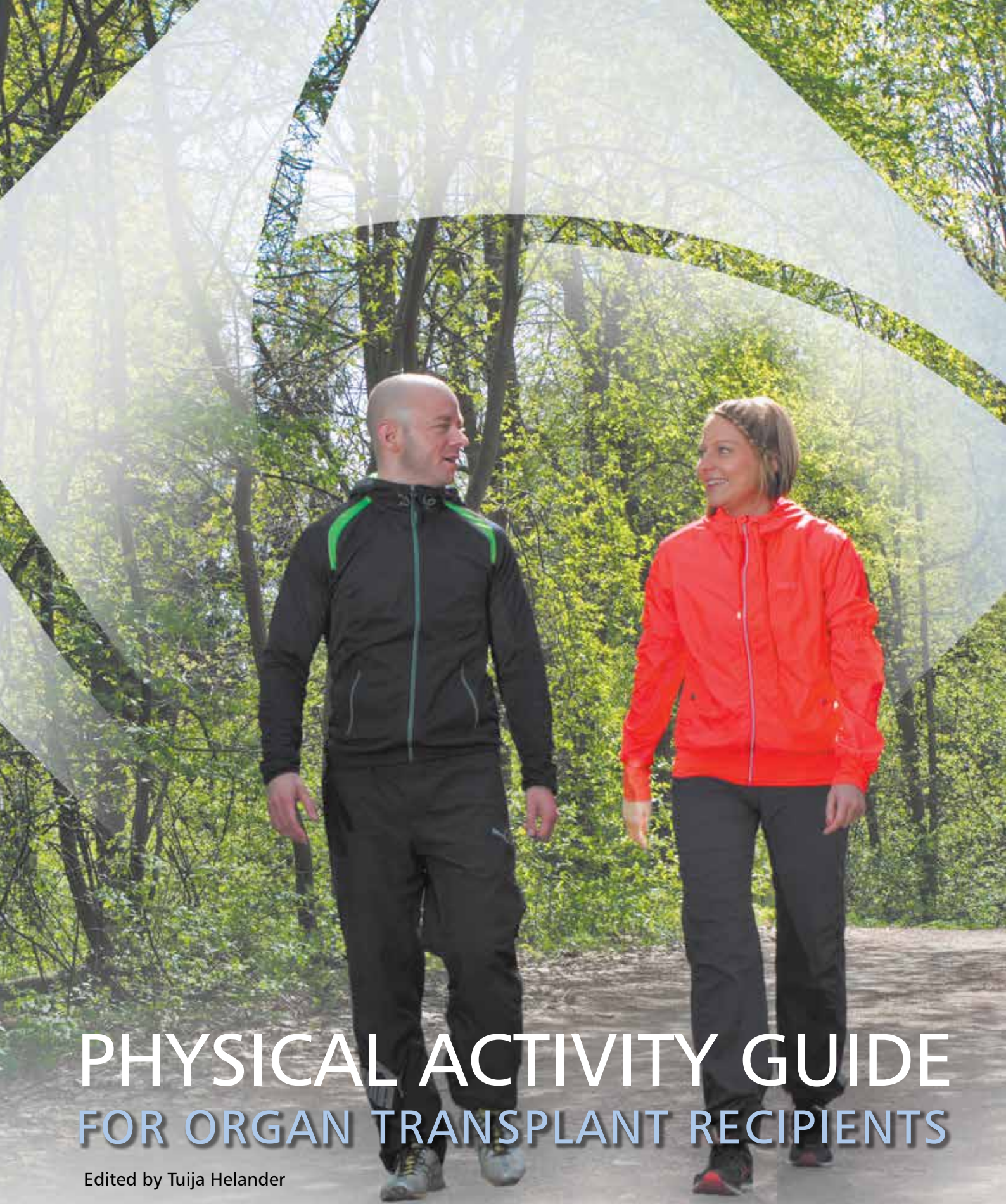

PHYSICAL ACTIVITY GUIDE
FOR ORGAN TRANSPLANT RECIPIENTS

Edited by Tuija Helander

VAU Finnish Sports Association of Persons with Disabilities

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I INTRODUCTION: FUN WITH DAILY PHYSICAL ACTIVITY

This guide is intended for patients who have had an organ transplant operation or are in the dialysis treatment. The guide includes instructions for leisure time physical activity. Leisure time physical activity makes it easier for you to return to normal everyday life and work.

You may be in a weakened condition after an organ transplant operation or dialysis treatment, and you may not have been able to do sports and physical activity for a long time, if ever. However, you can lead an active life after an organ transplant operation and in spite of dialysis. You are not only able to exercise, but physical activity is positively essential to your wellbeing. Physical activity relaxes and energises and offers a sense of satisfaction and accomplishment. Physical activity affects the body in many ways:

Physical activity
- prevents and alleviates the side effects of anti-rejection medications
- enhances the body's defence mechanism and prevents illness
- improves sugar metabolism
- improves fat metabolism
- helps with weight management
- increases muscle power and endurance
- maintains bone mineral density and prevents osteoporosis
- maintains respiratory and vascular system health
- improves maximum oxygen consumption
- improves neuromuscular coordination
- increases the release of endorphins, the brain's pleasure hormones
- controls mood and reduces depression, balances the brain's serotonin metabolism
- improves memory and cognitive brain functions
- relieves neuropathy symptoms in dialysis patients

The weaker your initial physical condition is, the harder it is to exercise at first. Then again, a low initial level of fitness means you can make major progress with little effort. After a couple of weeks of regular physical activity, you will notice that your fitness is gradually improving and you start to feel better.

Physical activity has definite benefits. With so many different types of physical activity available today, almost everyone can find a sport they like. However, you can begin with home training. This guide will help you and the results will be worth the effort!

II DIVERSE AND SUFFICIENT PHYSICAL ACTIVITY

Various forms of physical activity is the best way to improve and maintain one's fitness and ability to function. **Endurance training** strengthens the heart, lungs and circulatory system, while **strength training** and **muscle toning** enhance the musculoskeletal system. **Speed and mobility training** are also required to improve coordination. Proper muscle conditioning and coordination help to maintain balance and agility, which are needed to prevent, for example, loss of balance and falling.

Sports suitable for improving endurance include
- walking, Nordic walking
- skiing
- swimming, water running and water walking
- cycling
- jogging

Using poles increases intensity and strengthens neck, shoulder, upper arm and back muscles.

Muscle strength is improved by all kinds of fitness classes and gym training. The muscles support the skeletal structure. Maintaining muscle fitness is important for organ transplant recipients, because some anti-rejection medications have side effects which increase osteoporosis and weaken the muscles.

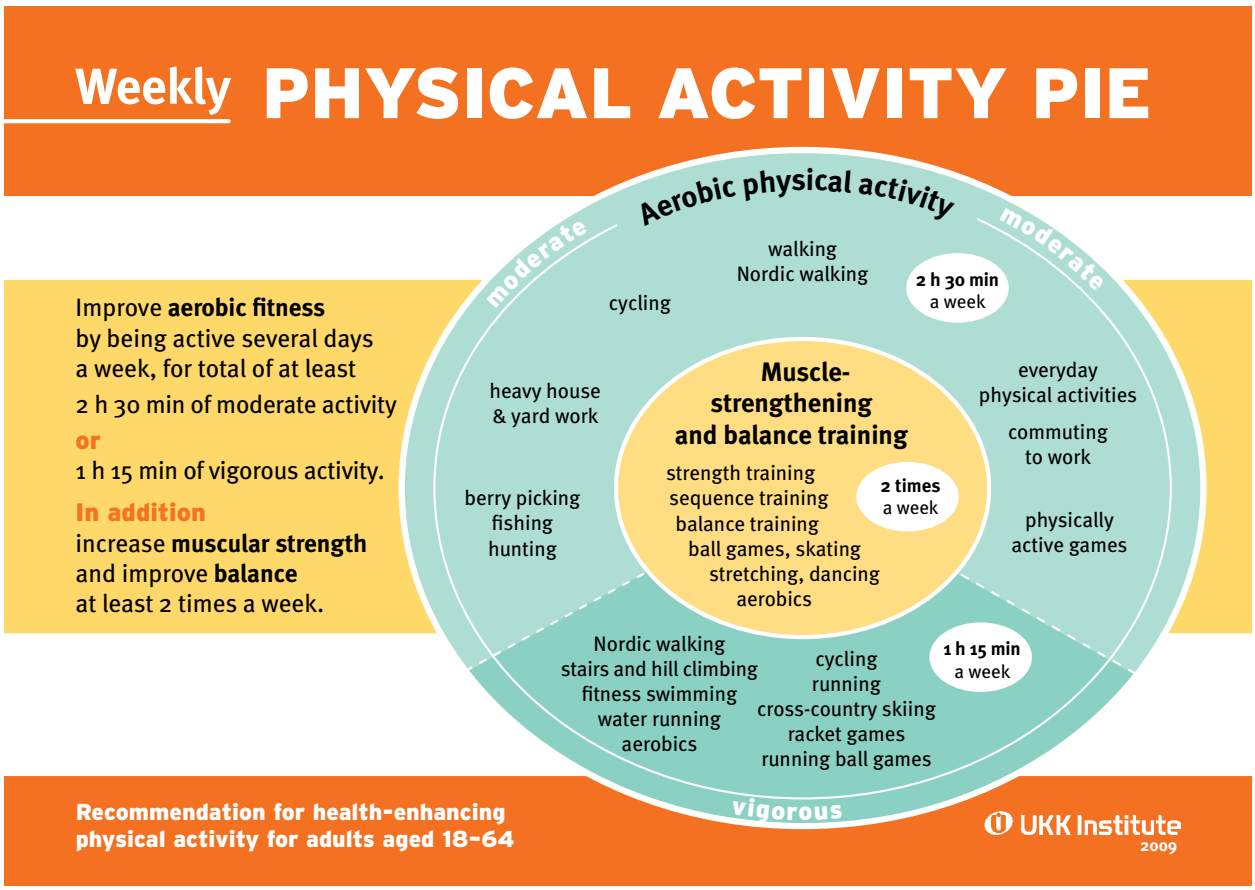
Physical activity can help to prevent osteoporosis. All kinds of physical activity where you have to carry your body's weight or that involves jolts and rotations strengthens the bones. Jogging, ball games and fitness training make good bone exercise.

We should also bear in mind the benefits of **household chores**. Raking, picking berries and mushrooms, gardening, shovelling snow and cleaning are diverse and effective forms of physical activity. After an organ transplant operation, many patient have such weak muscle tone that even washing up and lifting tableware up onto shelves makes good training. For this reason, organ transplant recipients should not accept the level of care they needed when they became ill, but try to participate in housework as much as possible depending on their fitness. Housework is the easiest and most natural way of beginning rehabilitation. Recovering patients should also go to the shops and run other errands on foot or by bicycle and use the stairs instead of the lift.

Physical activity generates beneficial health effects

- if it is **regular**,
- **sufficiently frequent**
- and the **intensity** is at least **moderate** (= any physical activity during which you experience shortness of breath but can still talk) depending on your fitness level.

Many organ transplant recipients have been ill and immobile for years. For this reason, shortness of breath and muscle stiffness may feel scary. However, you must learn to accept some level of discomfort in order to train effectively.



III EXERCISE RESTRICTIONS

Pain due to wounds, any nerves stretched during the operation and small injuries at the site of the operation is normal and will gradually fade away. Relaxing, light "pumping" motions that increase blood circulation and muscle stretching usually relieve pain.

After your organ transplant operation, you need to avoid heavy exertion for three (3) months.
You should avoid

- heavy lifting
- hanging by your arms
- push-ups
- sudden jerking motions
- driving a car (for 6–8 weeks, applies to heart and lung transplant patients)

You should not strain yourself with exercise during flu. If you experience any chest pain, abnormal shortness of breath or excessive fatigue, you must not exert yourself. If you have been diagnosed with coronary artery constriction, follow the instructions provided by your doctor concerning physical activity. If you feel you tire abnormally quickly, always contact your doctor.

After an organ transplant operation, you should avoid sports that involve powerful blows to the stomach and always protect your fistula when, for example, playing volleyball. If you are unaccustomed to training, too much muscle toning too quickly may lead to muscle tissue damage or even breakdown. Damaged muscle tissue releases protein. Removing the protein from the body strains the kidneys. It is particularly important to observe this if you have high creatine levels.

You should recover from training within a few hours. If you are still tired or feel weak after two hours, reduce your training intensity. You have found a good way to exercise when exercise makes you feel physically and mentally well. In addition to physical activity, please remember that varied nutrition, rest and sleep are important.

Physical activity increases the muscles' need for oxygen and nutrients considerably compared with rest. The more intense the physical activity is and the more muscle mass is trained (e.g. jogging, skiing, ball games, walking stairs), the greater the need for oxygen and nutrients. The heart therefore pumps more blood (volume per minute) to the trained muscles during intense exercise. A large share of the volume per minute is generated by increasing the heart rate.

After a heart transplant operation, your heart rate is relatively high, often over 80 beats per minutes while resting. Because the heart transplant does not have nerve connections to the rest of the body, your heart rate will not increase at the beginning of exertion. Due to the lack of nerve connections, the hormonal influence of the circulatory system regulates your heart rate, but more slowly than a nerve connection. Because the heart rate increases and decreases at a delayed pace, you need to increase (and decrease) exertion gradually.

Perform a sufficient warm-up to increase your heart rate so that your heart is able to respond to the increased need for oxygen and nutrients in your muscles during exertion. Otherwise, lactic acid will build up in your muscles and you will tire quickly. If you begin to exercise without warming up, you may experience more intense shortness of breath or even difficulty breathing.

Your maximum heart rate is lower after the heart transplant operation. However, you can increase it with regular exercise. Research has shown that in time, heat rate variability returns to near normal in many heart transplant patients.

When you exercise, it is important that you perform a proper warm-up, increase exertion gradually and cool down properly.

Exercise for dialysis patients

Physical activity does not cure kidney failure, but may slow down the progression of the condition. Physical activity helps to maintain the functional ability of the body. You should begin regular physical activity even before you begin dialysis treatment.

Hemodialysis patients typically suffer from rapid muscle wasting, which impairs their exercise tolerance. You must protect your fistula arm during exercise.

Any sports that compress or creates pressure on the fistula arm are unsuitable for a hemodialysis patient. Weight cuffs are not recommended on the fistula arm. If you have a central venous catheter for blood access, swimming is prohibited and you must avoid intense stretching on the side of the catheter.

Exercise during hemodialysis is intended to enhance the effects of dialysis by increasing urea removal.

Training during hemodialysis

- Training is most effective during the first two hours, when the patient usually feels most energetic and their blood pressure level is suitable for exercising.
- You should monitor your blood pressure, heart rate and wellbeing during exercise.
- You can exercise using a pedal restorator if you are lying in bed on your back, or using an exercise bike, mini stepping board or, for example, an elastic band, a dumbbell or a cuff weight.
- You can start by exercising for 2 minutes, for example, and then add 1 to 2 minutes to each training session. The goal is to exercise for 15–30 minutes without tiring.
- Remember to maintain proper posture and to breathe normally during exercise.
- During treatment and your blood pressure permitting, you should perform some movements sitting and/or standing up.

Exercise during peritoneal dialysis (PD)

Peritoneal dialysis has been shown to affect the regulation of the circulatory system, i.e. hemodynamics, less than hemodialysis. The body absorbs sugar from the dialysis liquid, which increases the risk of gaining weight and affects blood lipids. Exercise can help you manage your weight. Dialysis liquid stretches the abdominal cavity somewhat, which may create an unpleasant, full sensation. The stretching may also lead to back pain. This is why patients are advised to strengthen their back and abdominal muscles.

Exercise during PD treatment

- In some patients, the liquid in the abdominal cavity may increase the pressure in the abdominal and chest cavities, thus impairing venous return and the heart's pumping volume per minute.
- You can perform highly intensive exercise without dialysis liquid (e.g. running/jogging).
- You can safely perform moderately strenuous exercise with dialysis liquid in your abdominal cavity.
- Dialysis liquid may affect the duration of your training (dialysis liquid in the abdominal cavity increases a patient's weight by approximately 2 kilos).

What to remember during exercise

- Combat sports are prohibited because they involve punches and blows to the stomach.
- Avoid intensive rotations and gym training that creates pressure in the abdominal area.
- Avoid heavy lifting (items over 10 kg).
- You can protect the catheter site using film dressing or a colostomy bag when swimming. Consult your care unit before you take up swimming.

IV CHILDREN AND YOUNG PEOPLE WITH ORGAN TRANSPLANTS

Physical activity can also help children and young people recover physically after an organ transplant operation. The patient may be ill for a long period of time before the organ transplant operation and may therefore have poor physical fitness. Walking and standing upright, and even sitting, may feel strenuous. After an organ transplant operation, a child may have to spend long periods of time in a hospital. Maintaining physical fitness is important at this stage. Outdoor activities, cycling and playing are great forms of physical activity.

The sport or physical activity in question must correspond to the child's age and it is important that the child enjoys the activity for the sake of long-term results. A sense of accomplishment motivates the child to continue. The patient should begin moderate, regular exercise after discharge. The most important factors to consider when beginning physical activity are motivation, regular performance and a sufficiently low intensity.

A child being discharged from a hospital after an organ transplant operation may sometimes need a short period of physiotherapy. The goal of the physiotherapy may be to improve mobility to allow independent exercising.

When a child begins to move after an organ transplant operation, it is best to begin with easy and familiar forms of physical activity. The patient should exercise at least 3–4 times a week for 30–45 minutes. After regular physical activity has improved the patient's physical fitness, the child or young person may carry out a broader range of physical activities. However, it is always advisable to consult the patient's doctor or physiotherapist before taking up a sport.

Parents should remember that children and young people have no impediments to exercise after an organ transplant operation. On the contrary: physical activity in the form of play, games and hobbies is extremely important.

V RESTORING VIGOUR

Endurance training

Plenty of research data is available on the impact of endurance training on human health and functional ability. Endurance training is important after an organ transplant operation because it can help to prevent and treat high blood pressure, prevent coronary disease, improve fat and sugar metabolism and contribute to weight management. Endurance training is excellent for all these objectives.

Endurance means the body's long-term ability to tolerate stress. Sports that involve exerting large muscle groups continuously or at specific intervals for dozens of minutes increase endurance (energy metabolism and blood circulation). Such sports include walking, jogging, cycling, swimming and skiing.

Basic endurance training is a sufficient form of endurance training for maintaining normal fitness and health. It is intended to increase the number of blood vessels in the muscles and to improve the endurance of the exerted muscles as well as to improve the heart's stroke volume (pumping capacity). The majority of the energy required for basic endurance training comes from the body's fat storage, which is why basic endurance training also improves the body's fat metabolism, enhancing weight management. The training is completed at a steady pace, or at intervals with a short recovery period and a low intensity (heart rate). For a healthy person maintaining his or her fitness, this means 55–65% of the maximal heart rate.

Great endurance activities include calm, long trekking or hiking excursions (e.g. as a family activity), skiing, swimming, (Nordic) walking and cycling. Brisk raking or cleaning may also constitute endurance training. It is important that you exercise according to your personal fitness level. Slow walking is sufficiently strenuous exercise during recovery from an operation, while walking will not improve your endurance further at a good level of fitness.

As your fitness improves, you can introduce more intensive training, which, in terms of energy metabolism, means a transition from breaking up fat to breaking up carbohydrates. This also increases overall energy consumption. Your heart rate will slightly increase, up to 65–85% of your maximal heart rate. To do this, you can perform the exercises mentioned above more intensively or on varying terrain. Other great ways include various ball games, aerobics and circuit training.

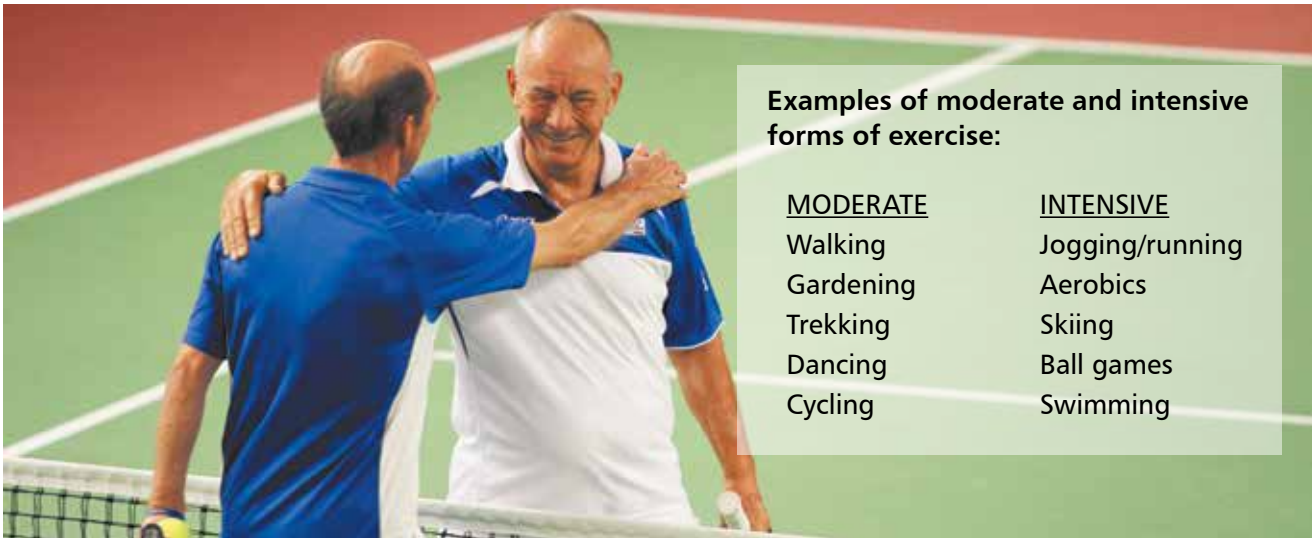
Interval training

Many heart or lung transplant recipients cannot consistently run or jog specific distances. Interval training is a good alternative: you can, for example, jog for 30 seconds and then walk for 30 seconds. As your fitness improves, you can gradually jog for longer and reduce your recovery period, e.g., jog for 45 seconds and then walk for 15 seconds. You can also increase the duration of the overall intervals. The recovery period should be shorter than or equal to the exertion. If you do not feel like checking your watch all the time, you can measure intervals according to, for example, electric poles: jog for 3 pole intervals and walk for 1, or jog for 4 pole intervals and walk for 1, etc. It is important that your jogging speed is slow enough, so that you have the energy to start running again after recovery and feel like you could do interval running "forever". Your interval training may vary from 2–6 kilometres depending on your fitness and daily condition.

If you cannot jog at all, you should include some uphill walking along your walking route. Walking uphill enhances breathing and requires more muscle work than walking on even ground. Poles also enhance walking. Shortness of breath is particularly important for mucous removal in lung transplant patients.

Intensity according to personal fitness level

Shortness of breath and sweating are good signs that you are training intensively enough. You should exercise regularly and increase training intensity and duration gradually. The longer you have been ill and the lower your initial level of fitness, the more carefully you want to begin. A 10-minute training session may be enough at first, but the goal is to complete 30–60-minute physical activity sessions 3–6 times a week. However, it is important that you find a form of exercise that you like and that you train according to your own fitness level.



Examples of moderate and intensive forms of exercise:

MODERATE	INTENSIVE
Walking	Jogging/running
Gardening	Aerobics
Trekking	Skiing
Dancing	Ball games
Cycling	Swimming

Exercise examples for a beginner

1) Walk slowly for 10 minutes and add 5 minutes up to 30–60 minutes as your fitness improves.
2) Walk slowly for 5–10 minutes + walk briskly for 5–10 minutes + walk slowly for 5–10 minutes
3) Walk slowly for 5–10 minutes + walk uphill 4–5 times + walk slowly for 5–10 minutes

More advanced exercises

1) Walk slowly for 10 minutes + walk briskly for 20–30 minutes + walk slowly for 5–10 minutes
2) Walk briskly for 45–60 minutes
3) Walk briskly for 10–20 minutes + walk uphill 5–6 times + walk slowly for 10–20 minutes
4) Alternate between jogging and walking (intervals), e.g. 1 min./1min., 2 min./1 min., 3 min./1 min., etc.

Exercise examples at a good level of fitness

1) Jog slowly for 30–45 minutes.
2) Jog slowly for 5–10 minutes + interval training: 5–10 x 45 seconds of running/15 seconds of walking + jog slowly for 5–10 minutes
3) Jog slowly for 10 minutes + interval training: 5–10 x run 3–6 pole intervals/walk 1 pole interval + jog slowly for 5 minutes
4) Alternate between jogging slowly for 5 minutes + jogging briskly for 5 minutes up to 25–35 minutes

(/ = recovery; for example 45 s/15 s = 45 s exertion + 15 s recovery)

These are different examples of training by walking and jogging. You can apply the same principles to skiing, cycling and swimming. It is important, both for improving your fitness and maintaining the sense in training, that you do not repeat the same exercises the same way every time, always completing the same route at the same pace. It is good to vary your training, including intensity (low-intensity vs. high-intensity training), duration (short vs. long) and style (choice of sport). Your three weekly endurance training sessions may comprise, for example, running at a steady pace, running intervals and running "sociably".

VI TONING YOUR CORE

Muscle toning

The muscles supports the joints and skeletal structure and maintain posture. Walking up the stairs, carrying your groceries and beating carpets are examples of everyday activities that require muscle strength. In addition to your arms and legs, you need a strong core (back and abdominal muscles) to support your spine and improve posture. Core support is necessary for nearly all exercise. A good level of fitness also improves your balance, which is important for avoiding loss of balance and falling. Strength training and muscle toning also strengthen the bones.

Muscle toning and strength training exercises

Perform the following muscle toning exercises 10–15 (–20) times each for 3–4 sets (series). You can do the workout by performing one set of each exercise after another (circuit) or all sets of one exercise consecutively, which will increase the strain on one muscle group, improving the group's endurance. Small dumbbells and/or wrist weights (1–3 kg) enhance exercise. They are available in sports stores or shop sports departments. You can start by using a 0.5-water bottle that weighs 0.5 kg. When performing muscle toning exercises, you should pay attention to your core support and posture; maintain a straight back, tense your abdominal muscles, lower your shoulders and keep your head up. Then put on some music and tilt the corners of your mouth upwards. You are now ready to exercise.

Torso

1. Shoulder press (shoulder and elbow joint extensors)
Starting position: Stand with your elbows down and your palms in front of your shoulders. Straighten one arm towards the ceiling. You can alternate arms, train one arm at a time or train both arms simultaneously. Perform 10–15 repetitions per arm.

2. Biceps curl (elbow joint flexors)
Starting position: Stand with your arms straight along the sides of your body, palms facing out. Bend your elbow but keep your upper arm still. Remember not to tense your shoulders. Perform the exercise one arm at a time or with both arms simultaneously. Repeat 10–15 times per arm. Remember to stall the movement when you are extending your elbow joint, especially if you are using a dumbbell.

3. Front raise
Starting position: Stand with your legs apart. Hold your dumbbells with your knuckles up and position your hands on your front thighs. Inhale as you raise your arms level with your eyes, one arm at a time. Exhale as you lower the dumbbell. Keep your arms straight in front of you. Repeat 10–20 times per arm, switching arms. Remember to relax you knees. Do not lock your knees. Look up diagonally to help maintain posture. The exercise is easier standing up and becomes more intense if performed while sitting.

Legs

4. Step ups (front thighs)
Starting position: Place one foot on a step that is 10–20 cm high. Makes sure that the entire sole of your foot rests on the step while your other foot is positioned next to the step (not behind it). You can place a hand on a wall or a door handle, etc., for light support. Extend the knee of the leg positioned on the step. As you do this, your supporting leg will slightly lift from the ground. Repeat 10–20 times and then switch legs. Remember to keep your back straight and maintain your posture. If you can keep your balance, you can also perform this exercise using dumbbells. Please note! Using stairs also makes an excellent front thigh workout!

5. Standing knee flexion (backs of thighs)
Starting position: Standing up, place your hands against a wall and lean slightly forward. Flex one knee by pulling your heel towards your gluteal muscles. Please note! The thigh of the flexing leg must be parallel to the thigh of the supporting leg. Tense your abdominal muscles lightly. You can use an ankle weight to enhance the exercise. You can change legs after each flex or work one side at a time. Repeat 10–15 times per leg.

6. Hip extension (buttocks)
Starting position: Stand up and support yourself against a wall or a friend. Tense your abdominal muscles lightly. Hold your leg straight as you bring it back. Repeat 10–20 per leg. Be sure to keep you torso still.

7. Pelvic lift (backs of thighs + gluteal muscles)
Starting position: Lie on your back with your knees bent and the soles of your feet firmly on the floor. The closer together you position your legs, the more demanding the lift is. Lift your pelvis, lower back and thoracic spine from the floor one vertebra at a time and hold them up for a few seconds. Then slowly lower you thoracic spine, lower back and pelvis. Repeat 10–15 times.

8. Toe stand (calves)
Stand up on your toes. Support yourself against the wall or a friend. Repeat 10–20 times. The exercise is more effective if you do it standing on one leg.

9. Lunge (a relatively demanding general exercise that tones the fronts and backs of the thighs, the small muscles of your instep and your core)
Starting position: Stand with your hands on your waist, or, if you are using dumbbells, along the sides of your body. Step forward so that the lunging knee flexes. Stand promptly back up by returning your lunging leg next to the other. Perform repetitions on one side or switch legs. Repeat 10–15 times per leg. Please note! Keep your back straight and maintain your posture. The further you step, the more intensive the lunge.

Core

10. Abdominal muscles

a) Crunch

Starting position: Lie on your back with your knees bent and the soles of your feet on the ground. Press your lower back to the ground and hold for 3–5 seconds. Repeat 10–15 times. Please note! Try to "find" your deep abdominal muscles: press your back to the floor but keep your superficial abdominal muscles ("six-pack") relaxed. You have found the right muscles when you are able to relax your lateral abdominal muscles while pressing your back to the floor.

b) Torso reach

Starting position: Lie on your back with your legs straight and stretch your arms towards the ceiling. Try to stretch your arms 5–10 cm closer to the ceiling without lifting your shoulder blades off the floor. Repeat 10–15 times.

c) Oblique abdominal muscles

Starting position: Lie on your back with your knees bent. Reach your arm towards the opposite knee. Alternate reaching each arm towards the opposite knee, but do not lift your shoulder blades off the ground. Repeat 10–15 times.

11. Back

a) Opposite arm and leg lift in prone position

Starting position: Lie prone with your arms extended to the front. Lift your opposite am and leg slightly off the ground simultaneously. Keep your neck straight and eyes on the ground. Imagine your arms and legs are getting longer. Stretch your fingers to the front and your ankle to the back. Then bring your limbs down and repeat the exercise with the other arm and leg. Repeat 20–30 times in total. You can also use ankle and wrist weights to add intensity.

b) Rowing stroke

Starting position: Sit on the floor with your knees bent, your back straight and your arms extended forward. Bring your elbows back and squeeze your shoulder blades together (palms at chest level). Please note! Do not pull your shoulders up! You can use a light dumbbell or a an elastic band for added resistance. Repeat 10–15 times.

c) Shoulder blade adduction

Starting position: Stand with your arms along the sides of your body, palms facing inward. Simultaneously rotate your palms outward and press your shoulder blades together. You are adducting your shoulders blades and expanding your chest. Keep your arms straight along the sides of your body throughout the exercise and relax your shoulders. Enhance the exercise by breathing: inhale as you rotate outwards and exhale as you rotate back inwards. Repeat 10–15 times.

Planning circuit training

Perform muscle toning in an order that allows you to alternate between leg, core and torso exercises. For example,

1) toe stand (legs)
2) abdominal crunch or sit-up (core)
3) shoulder press (torso)
4) thigh flexors, pelvic lifts or hip extension (legs)
5) back exercise or rowing stroke (core)
6) biceps curl (torso)
7) step ups (legs)
8) abdominal rollout (core)
9) shoulder blade adduction (torso)
10) lunge (general exercise)

Choose the exercises that feel right for you when you plan your circuit. If you are just beginning training, choose only 5–6 exercises. However, make sure you train your whole body evenly. You can choose another five exercises for your second workout. However, you need to perform the same exercise (or train the same muscle group) sufficiently often to increase strength and improve endurance. Perform 2–4 set of each exercise. Repeat each exercise 10–20 times per set. If you want to improve muscle endurance, you can perform "station" circuit training, i.e. repeat the same exercise for 2–4 rounds in a row using 1–2-minute recovery periods. If you wish to improve general endurance, complete 2–4 sets where you perform every exercise using 20–30-second recovery periods.

Do not be alarmed if your muscles feel stiff or even sore at first. You are probably experiencing "healthy" muscle pain because you are unaccustomed to training. However, if you feel any sudden sharp pain, stop training and soothe the muscle by resting and possibly applying a cold compress. If necessary, consult an expert (doctor/physiotherapist). A beginner should first go through any muscle toning programmes with, for example, a hospital physiotherapist.

VII FLEXIBLE JOINTS

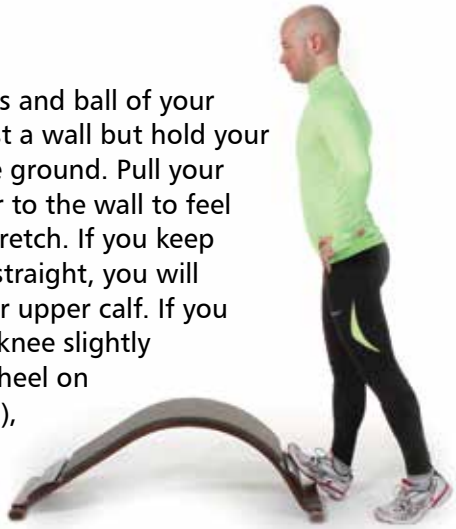
Mobility training

Regular stretching helps you maintain flexible joints and muscles and good posture. If you want to stretch your muscles to prepare for exercise, light stretching is enough. If you want to improve your mobility, perform longer stretches of at least 30 seconds but no more than a minute. You can repeat the stretches 4–5 times. Remember to breathe slowly while you stretch. Relaxed exhales enhances stretching. Long stretches relax the muscles, improve blood circulation in the muscles and prevent the muscles from getting sore. Some light exercise is recommended to warm up your muscles before stretching. Stretching is perfect after, for example, a walk or a run.

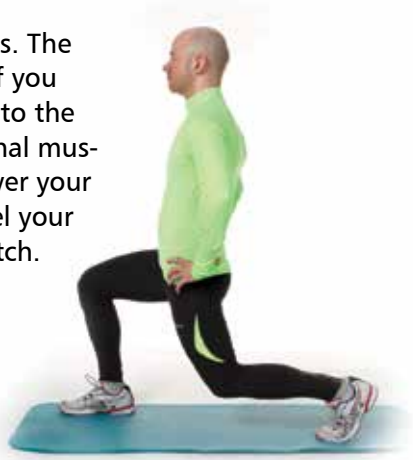
1. Front thighs
Stand close to a wall and place one hand on the wall for support. Bend your knee and grab your ankle with the hand on the same side. Use your hand to pull your heel towards your gluteal muscles. Keep your abdominal muscles tensed. Please note! Keep your thighs aligned. If you cannot reach your ankle, lift your leg on a chair behind you and keep your abdominal muscles tensed.

2. Back thighs
Stand on one leg with your knee slightly bent. Extend your other leg forward with your ankle bent and heel on the ground. Support you hands against the supporting leg. Slightly arch your back down. Slowly press your torso down to feel the stretch at the back of your thigh. Please note! Do not arch your back. Only bend your as far as you can keep your back straight.

3. Calves
Lift the toes and ball of your foot against a wall but hold your heel on the ground. Pull your body closer to the wall to feel your calf stretch. If you keep your knee straight, you will stretch your upper calf. If you bend your knee slightly (with your heel on the ground), you will feel your lower calf stretch.



4. Hip flexors
Take a long step forwards. The shin of the leg in front of you should be perpendicular to the floor. Keep your abdominal muscles tense and slowly lower your pelvis down until you feel your hip and upper thigh stretch.



5. Gluteal muscles
In a seated position, lift one leg over the other and bring your knee towards the opposite shoulder until you feel your gluteal muscles stretch. Lift your knee higher to enhance the stretch.

6. Pectoral muscles and biceps
Stand with your chest close to a wall. Raise one arm to horizontal, holding your palm against the wall or the back of a friend. Rotate your body away from the hand by rotating one shoulder away from the wall until you feel your pectoral muscles and bicep stretch. Keep your shoulders down.

7. Neck and shoulder area
Perform the following stretches in a sitting position for a maximum of 30 seconds. Perform the stretches on both sides. Remember to maintain good posture, breathe slowly and relax your neck and shoulders.
a) Bend your head directly to the side. Keep your eyes forward and shoulders still. You will feel the side of your neck stretch.

b) Perform the same exercise as above, but tilt your chin down towards your collar bone to stretch your neck.

c) Place one hand on the opposite collar bone. Bend your head away from the collar bone and slightly back. Tilt your chin up and keep your teeth together until you feel your neck stretch on the side of the hand you placed on your collar bone.

8. Abdominal muscles
Lie in a prone position. Prop yourself up on your elbows and breathe slowly in this position. If you want to enhance the stretch, extend your elbows and push back with your arms.

VIII AGILITY IS TRANSIENT

Speed training

While a regular health or fitness enthusiast does not require separate speed training, it is advisable to maintain your fast muscle cells. Speed is the ability to engage the muscles required to perform an activity as quickly as possible.

Speed, like agility and balance, tends to decline rapidly after the age of 35. However, both the young and old need these qualities in everyday life. In order to avoid falling, you need the ability to quickly engage the muscle fibre that allows you to perform a corrective movement when you lose your balance. This also takes good muscle tone. Balance therefore requires both speed and muscle strength.

Great forms of exercise to improve speed and balance include dancing and various ball games. Badminton, for example, is usually effortless to take up. It does not require a high level of fitness or a perfect stroke technique, just a friend who plays at the same level. Playing badminton requires rapid

movements, changes in posture and reaching, which make for excellent speed training as well as muscle toning and bone exercise. Moreover, the strokes also tone the arms and neck and shoulder area.

If you can run, you can sometimes do short sprints at the end of your run to stimulate the fast muscle cells. While running, lifting your knees up and front sharply or lifting your heels towards your gluteal muscles expands your range of movement. You can add these exercises to your run in small, 10–20-metre doses.

IX PLENTY OF SMALL DOSES IN A WEEK

Planning a weekly routine

After you are discharged from the hospital, household chores are enough to improve your physical fitness. You should gradually increase training intensity to strengthen your joints, bones and muscles. Ensuring plenty of small doses in a week is a good rule of thumb when exercising. It has been shown that four 30-minute exercise sessions distributed over four days in one week have better health effects than one two-hour session once a week. Exercising out in the fresh air is also important. You should spend at least 30 minutes outside daily. Carrying the household chores is the best way to fill your quota.

Be sure to plan a sufficiently varied weekly training programme. Nevertheless, endurance training and muscle toning are the most important forms of training. Below are example programmes comprising three and five exercises. When the three-exercise programme begins to feel easy, we recommend adding one exercise at a time.

A three-exercise weekly programme

1. day: Brisk endurance training + stretching
2. day: Rest
3. day: Instructed exercise class or a ball game or muscle toning at home
4. day: Rest
5. day: Long, low-intensity endurance training (e.g. “gossip run” or a hike)
6. day: Rest
7. day: Rest

A five-exercise weekly programme

8. day: Brisk endurance training + stretching
9. day: Light endurance training (including fast running 3–4 x 30–40 m, running with knee lifts 2–3 x 20 m and glute running 2–3 x 20 m) + muscle toning at home
10. day: Rest
11. day: Interval-type endurance training + stretching
12. day: Instructed exercise class or a ball game or muscle toning at home
13. day: Long, low-intensity endurance training (e.g. “gossip run” or a hike)
14. day: Rest

It also advisable to schedule recovery weeks during which you train less and at a lower intensity. A good rhythm is 2–3 weeks of regular training/1 week of recovery. During recovery, reduce your training by half.

Be sure to get some incidental exercise daily. Exercising is like putting money in the bank. It accumulates interest and will be the best investment you ever make!

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