Mit Liebe zum Detail

gym80 International

circular

Training Handbook

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1. Introduction

The practice of sports and fitness has various positive effects on the human body. For participants these effects are a number of possible reasons to start practicing and to keep practicing sports. These effects will be discussed briefly in the first chapter. A section will follow this on basic anatomy and physiology and the science of sports training in chapters 2 and 3. We will then focus on the training of specific target groups and a number of common complaints and conditions in chapters 4 and 5. In the following chapters 6, 7 and 8. We will further examine: circular training; we will explain how the fitness equipment works; various exercises with separate materials that can be offered in addition to the circuit training.

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2. Reasons for practicing sports and fitness

It should be clear that the practice of sports and fitness has various positive effects on the human body. These possible effects contribute to participants reaching their set goals and will continue to take part in the movement or exercise programme they have started.

Which possible effects can you expect when you regularly participate in sports and movement programmes in general? Do you recognise one of the goals listed below?

- Do you want to have more stamina?
- Do you want to keep your bones strong?
- Do you want to become stronger?
- Do you want to have more energy?
- Do you want to maintain your weight or to lose weight?
- Do you want to decrease the risk of heart or vascular diseases?
- Do you want to relax?
- Do you want to look better?
- Do you want to feel younger?
- Do you want to feel fit?
- Do you want to stop feeling so tired?
- Do you want to sleep better?
- Do you want to be more limber?
- Do you want to improve your self-image?
- Do you want to stay healthy?

By practicing sports regularly these above-mentioned goals are attainable and it doesn't even have to take up much of your time!! Big steps can be made by just 30 minutes of exercise a day.

3. Anatomy and physiology

The human body is made up of a number of different tissues. The anatomy of movement is based on the collaboration of bones, ligaments and muscles. Likewise, the nervous system that controls the muscles, and the vascular system that supplies energy and drains away residual products, play an important part in the process of movement. In this chapter the various components will be briefly discussed.

The bones

The human body consists of approximately 206 bones, which form the skeleton. The bones have various functions. They give shape and support to the body; they protect the internal organs; they produces red blood cells. But their most important function within the anatomy of movement is the part they play in their position in relation to each other (they form the joints) and their function as the location where tendons (muscles) and ligaments attach.

The joints

Bones can be connected to each other in various ways: by means of cartilage, connective tissue or they can be grown together. When bones are grown together we refer to this connection as a continual connection, for there is no (or very little) motion possible. Within the framework of the movement apparatus we focus on those connections between bones, which allow movement: the discontinuous connections. The location where two or more bones come together in a discontinuous connection, we call articulations or joints. Most joints are composed of connecting bones, joint capsule, the ligaments, synovial fluid and cartilage.

The bones are held together by a sturdy joint capsule, which is coated on the inside with a mucous membrane. In the capsule there are many small blood vessels that nourish the mucous membrane. In addition, the capsule also consists of many nerves that use their sensors to measure the tension on the weight and the bones. The sensors pass information on to the muscles, which ensures that no abnormal movements can occur. The articulation cartilage protects the extremities of the bones. Furthermore it absorbs the impact in the joint and decreases the friction between the bones. There is a small space between the bones that is filled with synovial fluid, this aids the movement in the joint.
The cartilage works as a sponge: by an alternating suction and pressure tension the cartilage absorbs the synovial fluid, thus thickening the buffer layer and provides nutrients to the cartilage tissue. The joint movement is made possible by the operation of the muscles and tendons.

The muscles

Muscle tissue can be divided into three types: Smooth muscle tissue (for instance in the blood vessels, intestines and uterus), heart muscle tissue (in the heart), and skeletal muscle tissue (around the joints). Smooth muscle tissue and heart muscle tissue do not work by a conscious effort on our behalf, they work autonomously. Skeletal muscle tissue on the other hand does work by

a conscious effort, and by means of this muscle tissue we can move joints (but also for instance our eyes). The skeletal muscles (as of now referred to as muscles) are attached to the bones or other muscles at the origo (origin) and insertion. The origo is the point of attachment on which the muscle is anchored to the bone. The insertion is the point of attachment where the muscle is attached to the bone that is moved by the muscle. Although we often speak of muscles as a whole, it is the composition of a muscle that makes a movement possible. The smallest functional unit of a muscle is called a sarcomere, consisting of a composition of actin and myosin filaments. Long bands of sarcomeres together form a myofibril. And hundreds of myofibrils together form a muscle fibre. The number of muscle fibres that constitute a muscle depends upon the size of the muscle and its function. When the muscle fibres contract the entire muscle shortens, by which means a muscle can exert on the bones with which it is connected. By the force generated it is possible to move a joint. Various muscles work together in order to send joints into the direction required. Because of this you can, for instance, direct your arm to pick up a cup or you can lift weights. The muscle that performs the movement is called the agonist. We call the muscles that support the agonist the synergists. The muscles that work in the opposite direction of the agonists we call antagonists. When bending the elbow, for instance when lifting a weight, we need a calm movement in the elbow joint. The brachialis and the bicep brachii shorten; this is the movement of the agonists. The triceps brachii should partially relax while in motion: this is the antagonist. The bend in the elbow is supported by the brachioradialis: this is the synergist.

The muscle can supply force in various situations: we differentiate between concentric, eccentric and isometric contractions. With a concentric contraction a shortening of the muscle takes place during the contraction of the muscle fibres. The muscle exerts a greater force on the attached bone than on the environment. With an eccentric contraction the force exerted on the bone by the environment is greater than the force exerted by the muscle.
The muscle does not become shorter but longer during the exertion of force. When the muscle does not become shorter, or lengthened during the exertion of force, we speak of an isometric contraction.

Muscles can also be divided in another way. Some muscles make movements possible in one joint; we call these monoarticular muscles. Other muscles make movements possible in two joints; we call these biarticular muscles.

The nervous system

Skeletal muscles usually don't move spontaneously, they are activated by the information from the nerves. The nervous system can be divided into three systems: the autonomous nervous system, the central nervous system and the peripheral nervous system. The autonomous

nervous system is involved in the glands and the smooth muscle tissue. The central nervous system is made up of the brain and the nerves in the spine. The peripheral nervous system is made up of 12 pairs of brain nerves and 31 pairs of spinal nerves. The spinal nerves activate the muscles to make a movement. The nerve (or neuron) consists of a cell body and branched projectors (dendrites and axons).

In a motor nerve the dendrite receives information from the surrounding tissue and sends this nerve impulse to the nerve's cell body. The axon sends the nerve impulse from the cell body to the muscle fibres. The motor nerve and the associated muscle fibres are known as the motor unit.

The force that can be exerted by a muscle depends on a number of factors. The more motor units are activated simultaneously the more forceful a muscle contraction will be. Because of this, larger muscles are more powerful than smaller muscles. Furthermore, the type of motor unit that is activated determines the maximal force that can be exerted. Fast twitch motor units can supply more force than slow twitch motor units because a fast twitch motor unit consists of more muscle fibre than a slow twitch motor unit. Also the length of the muscle when it is activated determines the amount of force that can be exerted.

A muscle that is stretched only a little bit (20% of the original length) is more powerful than a relaxed muscle or a muscle that is stretched further than 20%. In addition, the angle of the joint affects the maximum exertion of force within the joint. This is connected with the position of the muscle with regard to the joint and the position of the muscle fibre in the muscle. This is therefore different for each muscle. The speed of the movement also affects the maximum force a muscle can generate. A difference should be made between concentric and eccentric contractions. In case of a concentric contraction

the muscle can exert the greatest force during a slow movement. In case of an eccentric contraction the muscle is stronger during a fast movement.

The blood vessels

Muscles need nutrients in order to be able to contract and during this muscle movement waste products are produced. The blood vessels transport these nutrients to the muscle tissue and then the resulting waste products away from the muscles. When the heart pumps it pushes the blood into the blood circulation system, which is made up of arteries, arterioles, capillaries, veins and venulas. The arteries and arterioles transport the blood to the tissues, where the capillaries take over and transport the blood directly into the tissue cells. The venulas and veins collect the blood from the capillaries and transport it back to the heart. The artery walls contain smooth muscle tissue that contracts in unison with the heart in order to pump the blood through the body. The veins contain small valves that make sure that the blood can only flow in the direction of the heart. The return of the blood from the body in the direction of the heart is supported by contractions in the muscles surrounding the veins. During the muscle contractions these muscles press against the veins by which process the blood is pushed back to the heart - this is called the muscle pump.

4. The science of sports training

This handbook gives a brief survey of the current knowledge with regard to the science of sports training. In this summary the basic knowledge necessary to be able to put together a well-considered training programme can be found.

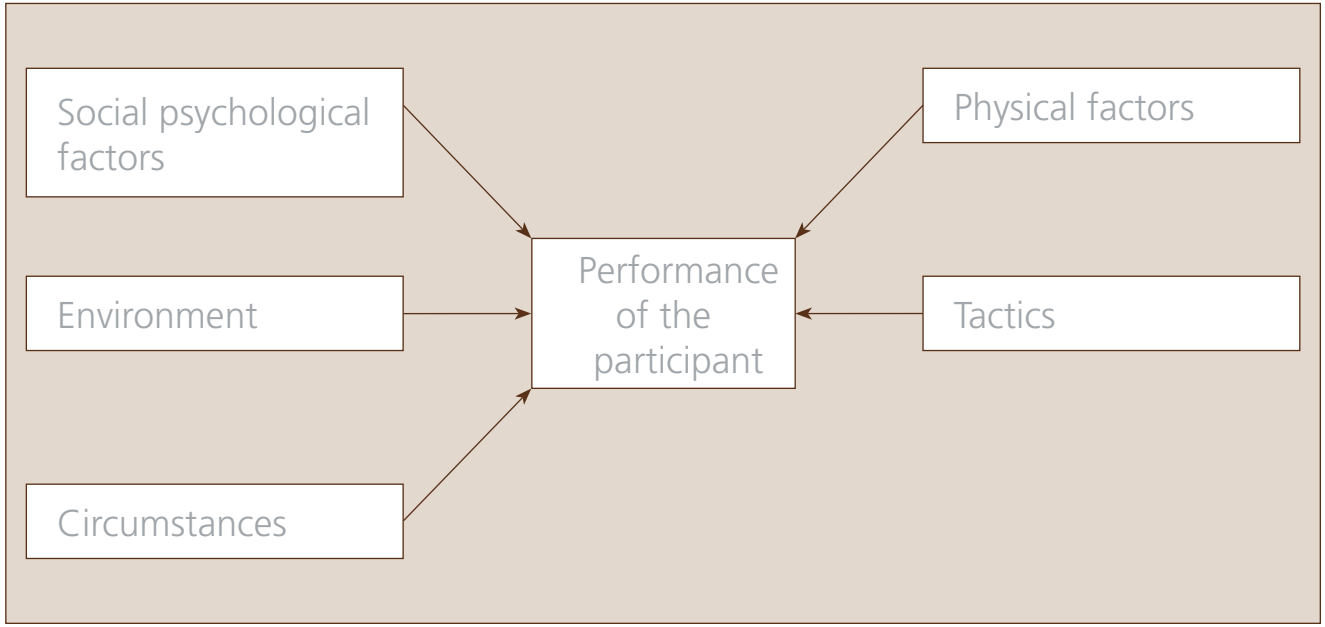
The definition of training is as follows:

"the systematic administration of functional stimuli aimed to achieve performance-enhancing changes of the form and functional organisation."

Performance is different to each individual: are you training a top athlete for an important event or are you working with participants that wish to lose some weight? "Performance" in the framework of this handbook can be described as „that which the participant wishes to achieve with the assistance of your training."

There are a number of different factors that affect the participant's capacity. Is his/her environment supporting the participant? Is the participant able to participate in the training planned? Is the participant physically capable to take part in a certain training? Are there any other matters that should be taken into account when putting together a training schedule? A number of factors that could affect the participant's performance are listed in the survey below.

An analysis of the factors before the start of the training programme will give insight into the training effects that can be expected. It is also wise to run through these factors in case a participant's performance does not meet the pre-set expectations.



4.1. Basic motor skills

Each participant is different, not only as an individual but also when it comes to stamina and skills. In starting by making an analysis of the participants' basic motor skills we will be able to put together an optimum training programme. The basic motor skills are:
a) Stamina
b) Strength
c) Limberness
d) Speed
e) Coordination

a) Stamina

Stamina is the capability to sustain a movement with large muscle groups at an average intensity for a prolonged period of time. It is therefore the duration with which the cardiovascular system and the muscles can perform.
This depends of course on the activity that you wish to train. We distinguish three trainable energy systems:
1. the anaerobic alactic system
2. the anaerobic lactic system
3. the aerobic system

Which energy systems should be trained and how, depends on the analysis of the participant's activities and the targets set in collaboration with the participant.

b) Strength

Muscular strength (in movement) is the capacity of a muscle group to generate maximum force in one loose contraction with a certain speed. Muscular stamina is the capacity of a muscle group to generate a submaximum force over a prolonged period of time.

Both types of strength can occur both in dynamic and static contractions. In case of static (=isometric) contractions no visible movement takes place within the joint. In case of dynamic contractions we differentiate between concentric (shortening of the muscle during the contraction), eccentric (lengthening of the muscle during contraction) and isokinetic (contraction during which the speed stays the same for the duration of the entire movement) contractions.

The method of strength training depends on the analysis of the participant's activities and the targets set in collaboration with the participant.

c) Limberness (or mobility)

Flexibility is the capacity to move a joint or a number of joints in its entire range of motion without injury. The limberness depends on the mobility or tautness of muscles, tendons and ligaments.

From the analysis of the participant's performance will appear which form of mobility is necessary for him to be able to function.

d) Speed

With speed we mean the speed with which movements can be performed. How speed should be trained, depends again on the before-mentioned analysis. For most of our target groups this won't be a specific target.

e) Coordination

Coordination we understand to be the cooperation between mutual muscles and the associated direction from the brain. Examples of coordination are eye-hand coordination and the efficiency of (complex) movements.

Which functional skills a participant needs for carrying out his activities can be trained as efficiently as possible.

Depending on the participant's activities (work, sports or other hobbies), the emphasis should lie on one or more basic motor skills. For a marathon runner the aerobic stamina is important, whereas for a weightlifter maximum strength is most important. For that matter, when trying to improve a performance, all basic motor skills should always be examined. They cannot be dealt with separately. When training the basic motor skills a number of training principles play a part. These will be examined in the next paragraph.

4.2. Training principles

In order to improve performances, the following training principles should be taken into account when deciding which training to apply:

The principle of the individual variability.

Each person is different, no person is the same. Because we are all different, we therefore do not all react similarly to training. Heredity plays an important part in the speed with which and the extent to which headway is made with training. The variations in cell growth, metabolism and neural and hormonal organisation lead to great variation in trainability between people. Because of this, one person will make immense headway after following a certain training programme, whereas another makes little or even no headway after participating in the same programme. That is why each training programme needs to be geared to the specific needs and possibilities for which it was put together.

The principle of specificity

Adjustment to training is very closely connected to the kind of activity and the volume and intensity of the training. A long-distance runner will not mainly focus on sprint training. A weightlifter will not just engage himself with slow low intensive resistance training. The training programme should aim at the physiological system that is most important for an optimum performance for an individual sports to realise a specific training adaptation.

The principle of the reversibility

A capacity level that has been built up is not just automatically maintainable. When you stop training the capacity level that you have built up will drop to the level that is necessary for daily use. Each acquired training effect will be lost.

The principle of overload

In order to increase the training capacity a body should each time be pushed a little further than it is used to. Overload can be realised by an increase in frequency, intensity and duration of the fitness training by an increase in the number of repetitions, sets or changes of exercise by strength or flexibility training. The body adapts itself in the recovery period to the strain it has been subjected to. If the body is subjected to too much, strain leads to overtraining and injuries and this should be avoided.

The principle of the reduced overrun

As the performance improves, the strength, stamina and/or flexibility increase and stronger training stimuli are needed in order to achieve the same changes. The higher the level, the more difficult it will become to make headway.

4.3. Training variables

During the discussion of the training principles in the previous section the overload principle was mentioned in connection to the overload principle that will eventually determine the training load. In this section we will discuss the various training variables. By means of these training variables a training programme can be put together.

Intensity

The intensity indicates the level of exertion experienced by the participant. For this you can differentiate between absolute intensity and relative intensity. An example: A running speed of 12 km/hour is high intensity for one participant, whereas it could be a low intensity for another participant. The absolute intensity is equal in both cases. In case of cardio exercises the intensity is usually expressed in a certain speed (km/hour, steps/min, strokes/minute, deepening/minute, etc.). In case of strength exercises the intensity is represented in the amount of weight that is moved per repetition. In addition, the training intensity depends on the number of sets per training and the number of repetitions per set.

Duration

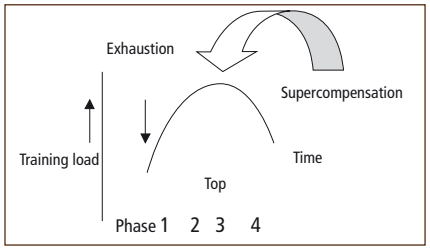
The duration indicates how long the intensity is maintained. When the training is extended over a longer period, more exertion is demanded of the body than during shorter periods of training with the same training duration. Together they form the frequency of the training volume.

Frequency

Training frequency means the number of training sessions a week. The number of training sessions that leads to the best result depends on a number of factors. More training does not always lead to a better performance; this is linked to the recovery period (see also supercompensation). The speed of recovery is not only different for different persons, but is also linked to the intensity and duration of a training session. In case of heavier or longer training sessions, the recovery period is longer.

4.4. Supercompensation or overtraining

People often think that training makes you stronger or fitter, but contrary to what people think, rest makes you stronger and fitter. Training on the other hand makes you tired and leads to a decrease in energy levels. However, training is absolutely necessary, remember the principles of overload and reversibility. Let us recap: because sufficient rest is taken after a sufficiently strong training stimulus, the body adapts to the training load that was requested. In an optimum training programme training stimuli and rest alternate in an optimal way. During the training the performance level drops because of exhaustion (phase 1), after the training the recovery processes are set in motion (phase 2), the recovery processes increase the performance level up to the initial starting level (phase 3: supercompensation). When the training subsequently stops this effect will be lost (principle of reversibility), but if the body keeps receiving new training stimulus in phase 3 the principle of supercompensation increases and the participant will be able to take on bigger and bigger training loads. The reverse can also happen: when training stimuli keep succeeding each other in phase 1 the exhaustion keeps increasing and the physical capacity continually decreases. This can be referred to as overtraining.



The transition of phase 3 to phase 4 differs per basic motor skill and is co-dependent upon the volume and the intensity of the training stimulus that has been administered and the participant's individual recovery process. For healthy, trained participants this recovery period should be about 12 to 48 hours.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4.5. Improvement of physical fitness by training

With the aid of training the cardiovascular system can be improved. We can achieve this by doing exercises during training in order to maintain a heart beat rate between 55 and 90% of the maximum heartbeat or between 40 and 85% of the heartbeat reserve. This can of course be realised by means of a circular training. By quickly switching between fitness machines the heartbeat rate stays at the desired level and the stamina will be trained at the same time.

The training heartbeat can be calculated by means of the Karvonen formula, for this we depart from a training zone of 60% of the heartbeat rate reserve.

Karvonen formula:

Training heart beat rate = (Training intensity x (HFmax – HFrest)) + HFrest

This means:
- Training intensity = the percentage of the heart beat reserve that you wish to train
- HFmax is the estimated maximum heartbeat = 220 – age (attention, this is the estimated value!)
- HFrest is the heartbeat measured during rest

In the example below we determine the heartbeat zone of approximately 60% of the heartbeat reserve in a 50 year old participant who has a heartbeat of 70 beats per minute in rest.

Training intensity	= 60% = 0.6
HFmax	= 220 – 50 = 170
HFrest	= 70 beats per minute
Training heart beat	= (0.6 x (170 - 70)) + 70 = 60 + 70 = 130 beats per minute

Calculation of the training intensity by means of the Karvonen formula is based on an estimation of the maximum heartbeat. As a consequence of this the calculated training heartbeat can deviate from the real 60% level. That is why the heartbeat is monitored during training by means of the level of exertion experienced by the participant.

- During the warming-up the following instructions apply: „you feel that you are exerting yourself and you start to feel warm. However, you should not get out of breath and you must be able to continue talking". (talking test!)
- For the work-out the following instructions apply: "you can sweat profusely and it must be strenuous, but the exertion must feel in such a way that you know you can keep it up for another 10 minutes extra".
- For the cool-down the following instructions apply: "you must keep moving, but it should not cost you any effort". The heartbeat zone should be adapted immediately, should it turn out to be too light or too heavy during the training session.

4.6. Energy-burning and losing weight through training

In rest the body needs a certain amount of energy in order to keep all bodily functions going. This is the basic metabolism or rest metabolism, expressed in kcal (1 kcal = 4.2 kJoule) per twenty four hours per kg of body weight. On average women have a slower rest metabolism than men.

The total amount of energy needed per twenty four hours in a certain person in rest can be roughly estimated with the aid of the formulas listed below:

Women: 655.1+(9.563 x W)+(1.850 x H)-(4.676 x A)

Men: 66.5+(13.75 x W)+(5.003 x H)-(6.775 x A)

W = weight (kilograms)
H = height (centimetres)
A = age (years)

We can now calculate for the above-mentioned examples how much energy is approximately used in rest per twenty four hours:

- A 57 year old woman weighs 50 kg and is 165 cm tall; she has a BMI of 18.35 and her basic metabolism is 1172 kcal/twenty four hours.

- A 63 year old man weighs 60 kg and is 171 cm tall; he has a BMI of 20.50 and his basic metabolism is 1320 kcal/twenty four hours.

When participants wish to lose weight it is important that their metabolism is increased. Light to moderately heavy cardio training has a positive effect on the combustion of fat in the body. Weight training has a positive effect on the increase of the fat-free mass. Combinations of both forms of training are the most effective means to positively influencing the composition of the body. circular training gives you the opportunity to experience the benefits of both weight training and stamina training. circular circuit training sessions immediately raise the energy burning levels during the training sessions because the heartbeat remains increased during the exercises. This results in higher energy burning rates. In addition, with circular one directly experiences the advantages of weight training.

5. Target group training

5.1.1. Getting older and training

The 50+ age group grows as the proportional rise of the ageing population increases. This group forms a specific target group within the exercise programmes; they have their own needs but also their own reasons for participation. With the circular training we can perfectly attune to many of the needs of the 50+ age group.

First we shall pause a moment in order to examine the changes in the ageing body. What happens after a person turns 50?

1. The oxygen capacity diminishes 9% with each 10 years.
2. The muscle mass decreases by 12 to 30% after 55.
3. Because of this a person's strength diminishes by 20 to 30%
4. The nerve conductivity decreases by 10 to 15%
5. The flexibility decreases by 30%
6. The metabolism decreases by 8 to 12%
7. The cardiovascular capacity decreases by 30%
8. Male bonestructure decreases by 15 to 20%, female bonestructure by30%
9. The liver and kidney function decreases by 40-50%
10. The blood pressure rises (systolic pressure) by 10-15 mm, underpressure by 5-10 mm

By participating in training to increase the stamina or aimed at weight control we can make sure that this age group grows old healthily and that various bodily functions improve. By exercising regularly and, if necessary, by performing exercises aimed at improving the flexibility, the possibility that this group gets up stiff and crammed every morning can be avoided. Moreover, it will also allow this group to be able to function independently for longer when their stamina and muscular strength is maintained. In addition, the opening and training hours can be adapted to a meaningful spending of the day, something this group is looking for when they no longer work or work less. People will also have the opportunity to make contact with new people. In this way the gym cannot only become a place that is healthy for the body, but will also play an important role in the social network of 50+ age group.

Summary

Problems for 50+ people	circular training solution
Age is a heavy burden	Improved stamina, increased strength, weight check programmes, improvement of bodily functions (for instance kidney function)
People feel stiff when they get up in the morning	Improved blood flow and flexibility
Climbing stairs becomes more difficult	Improved stamina, increased strength
People search for companionship and social contacts	Group training and a cup of coffee
People look for a useful form of recreation	Day-time opening hours

5.1.2. Weight training after 50

Opt for weight exercises, which do not raise the blood pressure levels too much and monitor breathing during the exercise.

1. 1 – 2 sets
2. 8 – 12 repetitions
3. Execute the exercises slowly
4. large muscle groups first
5. maximum of 5 exercises
6. 3x a week maximum
7. start with compound exercises for multiple joints
8. Build up slowly: 1st month habituation, 2nd month build up muscles

Train daily activities (ADL) and explain the chosen exercises. Choose for exercises similar to walking stairs (for instance the stepper) or lifting shopping bags (for instance squat exercises)

If possible let participants train with a heartbeat meter at 60-85% of HRR. Employ the Karvonen formula for calculating the heartbeat zone. For this group you should be extra mindful of the use of medication, like beta-blockers (see medicine use and training).

Pain directly after training is not a good sign, ask participants how they felt after the first two hours after the previous training, adjust, if necessary, the resistance. A little muscular pain is harmless, but it should never be the training objective! Muscular pain should never last longer than a day. If is does last longer you have trained too hard.

Provide the participants drink sufficiently. Water is allowed, but isotonic and hypotonic drinks (thirst-quenchers) are absorbed quicker by the body. In case participants wish to lose weight, advise against the use of hypertonic drinks.

5.2.1 Fitness training for women

More and more people start practicing fitness because they want to look better, feel better and want to have a healthier lifestyle. Fitness is a perfect way to achieve these goals. It is an effective way to increase the stamina and strength, to build up muscle mass, loose body fat, to get in shape and to raise the general level of physical fitness. The possibility to personally determine how often and for how long you train and to keep a close eye on your progress, makes sure that you are personally in control of the level of progression.

Tight means firm

By training the muscles their muscle tension in rest increases, with the result that the body looks firmer. Muscles that look flaccid look fat, which doesn't necessarily mean that someone's fat percentage is too high. By practicing power training, like the circular training, women too can achieve spectacular results. By training the muscles that are indicated by the participant as a problem area, will make this area firmer. The fact that you offer these exercises to burn fat locally is of course an invention.

In addition, the circular training improves the body composition. Not only do the muscles become a bit bigger and stronger, the strength as well as the physical fitness component of the metabolism is stimulated which could result in a decrease of the body fat percentage. Naturally success in this area also depends on the training frequency and the entire energy balance.

Too muscular?

The advantages of power training for women are well known these days. However, there are still women who are afraid that power training will give them a masculine and broad figure. A small number if women are needed who have a genetical predisposition to develop very firm muscles. Given that only a very few women strive for extreme muscle development, it is important to emphasise that muscles in women take much longer to develop than in men. The majority of women need not be worried that she will develop a masculine-looking body.

We can moreover prevent this undesired effect when the desired result has been reached. When the participant is satisfied with the result, we freeze the training load. If the participants keep training on the same level with the same training load the body stays in the same shape and will not develop further. In this way the participant will stay in shape for the rest of her life.

5.2.2. Pregnancy and Training

From the reversibility principle we can deduce that to stop training leads to a drop in physical capacity. This also applies to pregnant women. We therefore advice also pregnant women to keep training for as long as possible. Various studies have moreover revealed that exercise during as well as after the pregnancy can have a number of advantages. There are, however, some things to consider when training pregnant women. In this paragraph we will discuss which advantages training can have to pregnant women and which things should need to be given special attention.

Pregnancy and Training The advantages

Research shows that women who continue training during their pregnancy feel more healthy and fit, have more energy and a better sleeping pattern. Moreover, training leads to an improved blood circulation, as a result of which complaints caused by stagnation of the blood circulation lessen, and the risk of gestational diabetes mellitus, high blood pressure, depression, anxiety and stress decreases, the posture improves, and the level of physical fitness is maintained or is even improved. A trained body also recovers faster after the delivery.

Pregnancy and Training: Areas for attention

First of all the doctor's advice should be followed up at all times and the pregnant participant should always carefully listen to her body's signals that it needs to slow down.

The fact that a pregnant woman's body changes needs no explanation; it's the first thing that gets noticed when a pregnant woman enters the training centre. But maybe you as the instructor will be notified with regard to possible adjustments to the training schedule. The noticeable or unnoticeable changes bring a number of areas of attention along with them. Always make sure that the training schedule has a gradual build up and a good cooling down. Being pregnant drains energy from the body. Pregnant women therefore tire more quickly. A pregnant participant should always listen to her body and you must make sure that she takes enough rest between exercises. Lower the heartbeat zone; 60-70% of the HRR is heavy enough. You should also regularly do a talking test. If the participant has trouble answering you, the training load should be adapted to a lower level.

In view of the fact that the weight increases during the pregnancy, the stress on the muscles increases. It should also be taken into account that the weight is situated in a different location than normal, this should be taken into account when putting together the training schedules. Choose exercises that can be linked to ADL activities so that practice will tell which position is best for lifting weight. Avoid jumping exercises and exercises that require deep squatting.

Opt for dynamic forms of exercise; pay attention to the breathing during the exercises, for it is important to not let the blood pressure rise too much. Because of their dynamic character, the circular training sessions are an excellent addition to the training. Adjust, if necessary, only the training load to a less strenuous level.

Because the levels of the relaxine hormone increases, the ligaments of the joints relax and room is made for the pregnancy and the delivery. A lot more is asked of the stabilising function of the muscle corset. During vertical exercises attention should be paid to the posture during the exercise, things should always be lifted with legs bent, with tightened pelvic floor muscles and the pelvis should be tilted backwards.

After the rectus abdominus has receded (=diastasis) exercises of the straight abdominal muscles should be avoided. The receded diastasis can be felt right above and below the navel, when the abdominal muscles are tightened. This will take place around the twentieth week, but can vary for each individual. Exercising the transverse abdominal muscles and a stabilising tightening of the abdominal muscles during exercises can be performed. The intake of fluids during pregnancy is even more important than normal. This to counteract overheating and dehydration. Training in hot and very moist environments should also be avoided.

There are also various contraindications for sport during pregnancy, like bleedings, dizziness, shortness of breath, nausea and contractions, but what is most important is that you should never ignore your gut instinct and address the pregnant participants when you feel something could be wrong.

5.3. Training while suffering from complaints and conditions

In this chapter we will discuss which possible effects can be reached by means of circular training when suffering from various complaints and conditions. This does not mean that everybody will be able to achieve these effects. All depends on the different training variables and training principles. That is why it is important that the exercises are performed in a technically correct way. You, as the instructor, are responsible for this. Keep a close eye on the participants and give them instructions on the correct way to perform an exercise.

Adapt exercises or training loads if you think it necessary. You should, however, be aware of your limitations and refer people's persistent complaints to their doctor. Attention: We do not advice you to start training activities against doctor's advice.

5.3.1. High blood pressure

What is high blood pressure?

The heart contracts about 60 to 80 times a minute. During these contractions the blood is pumped though the arteries and veins of the body. The blood presses against the walls of the veins and arteries: this pressure is called the blood pressure. Blood pressure is expressed in two figures, the systolic pressure and the diastolic pressure. The systolic pressure is the pressure measured in the blood vessels the moment the hearts pumps the blood from the left ventricle into the body. During this process the pressure of the blood against the vessel wall increases. After the heart has pumped the blood through the body it quietens down, during which the heart fills up again with blood from the body. At this moment the pressure of the blood against the vessel wall is lower; this pressure is called the diastolic pressure. The value of the blood pressure is measured in the number of millimetres of mercury (mm Hg). During a measuring first the systolic and then the diastolic is measured, this is also the manner in which it is represented. A systolic pressure of 135 mm Hg and a diastolic pressure of 85 mm Hg is represented as 135/85 mm Hg.

The blood pressure varies during the day: in the morning the blood pressure is often lower than in the evening. The bloodpressure also rises as a result of various activities (for instance talking, physical exercise) and as a result of emotions and tensions. One single blood pressure measurement is therefore no more than a random indication. A blood pressure that is too high over a prolonged period of time can have negative effects on someone's health. High blood pressure can cause kidney damage and it can play a part in the occurrence of heart and vascular diseases.

When is the blood pressure (too) high?

One single blood pressure measurement is a random indication, so in order to determine that a person's blood pressure is too high, multiple measurements are needed. When measuring blood pressure during three separate measurements over a period of several weeks, you gain a better insight into the actual average blood pressure value. When the blood pressure is too high, usually both systolic and diastolic pressure are raised. It is however also possible that only the systolic pressure or the diastolic pressure is raised. Blood pressure values of about 120/80 mm Hg are considered to be normal. Bloodpressure values over 160/95 mm Hg in adults is considered to be too high. Among other things illnesses, life style and eating habits, extra weight, stress and hereditary factors play a part in the occurrence of high blood pressure. When a participant's blood pressure is too high, you should advice the participant to visit his/her doctor before the start of the training.

What can be achieved with training?

When it has been diagnosed that a person's blood pressure is too high a number of interventions can be started by or on a doctor's recommendation. With the assistance of a dietician a balanced diet can be designed (this often includes the intake of less salt, liquorice and aimed at losing weight in case of excess weight) in order to lower the blood pressure. The following changes will also have a positive effect on the blood pressure: stop smoking, sufficient physical exercise and a more relaxed life style. If these adjustments to life style and eating habits have insufficient effect the doctor will possibly prescribe medication.

Research has shown that a training programme consisting of fitness training can lower the systolic and diastolic pressure with 11 and 8 mmHg respectively. It has been demonstrated that power training results in even greater decreases of the blood pressure. With its components of stamina training and power training the circular training sessions fit this goal perfectly. Moreover, the participation in circular training contributes to the decrease of excess weight and has a relaxing effect on body and mind.

5.3.2. Cholesterol

What is cholesterol?

Cholesterol is a fatty substance used in the body as a kind of building material for a number of different body cells and hormones. Without cholesterol a body cannot function properly. An excess of cholesterol however is harmful. A raised cholesterol level could eventually clog your arteries. As a result of this, organs, for instance the heart or the brain, receive too little or no blood at all, which could result in a heart attack, a stroke or other vascular diseases. The body produces the cholesterol in the liver and a small part is taken by from food. In a healthy situation the body produces precisely the right amount of cholesterol in order to function properly.

Because of the fact that cholesterol is a fatty substance, it is not absorbed by blood. Small globules of cholesterol are encapsulated by a protein layer, which allows them to be transported by the blood easily. The two most important protein-cholesterol particles are LDL and HDL. The LDL transports the cholesterol to various parts of the body. Along the way cholesterol can easily lodge itself in the artery walls and thus cause a blockage. On the other the HDL transports the excess of cholesterol back to the liver. The liver makes sure that the cholesterol is stored in the bowels and exits the body during the bowel movement. That is why LDL cholesterol is referred to as ‚bad' cholesterol and HDL as 'good' cholesterol. In addition to cholesterol, another fatty substance called triglycerides is also found in the blood. The lower the level of triglycerides the better.

When is the cholesterol level too high?

The cholesterol levels can be determined by means of a blood test. The value of the cholesterol levels in the blood can fluctuate strongly, so in order to be able to determine whether the level of cholesterol is indeed too high, more measurements are required. During the cholesterol level tests usually the total cholesterol value of the blood is measured, this is represented in the number of millimol per litre (mmol/l) If a value is higher than 5.0 mmol/l the level of cholesterol is increased, in the case of values above 6.5 mmol/l the level of cholesterol is too high.

When the total cholesterol is too high, a second measurement is usually carried out, during which also the HDL and triglycerides levels are determined. The ratio between the total cholesterol value and the HDL cholesterol is a better indicator of whether the person tested is likely to develop heart and vascular diseases. The LDL cholesterol should, when measured on an empty stomach should not be higher than 3.0 mmol/l, the HDL cholesterol should be at least 0.9 mmol/l and the triglycerides level should be lower than 2.2 mmol/l.

Cholesterol levels that are too high can be caused by the following: intake of too much saturated fat, intake of food rich in cholesterol, being overweight, hereditary factors, a slow-working thyroid gland, diabetes and the use of certain medication.

What can be achieved through training?

By eating wholesome and varied food, the cholesterol level can be brought down by ten to fifteen percent. When your cholesterol level is above 6.5 it would be advisable to discuss your diet with a dietician. When the cholesterol level is measured at 6.5 or higher medication is sometimes prescribed. This usually concerns people with multiple risk factors, like high blood pressure, diabetes or who have suffered previously from a heart attack.

Being overweight has a negative effect on the cholesterol level. A cholesterol level that is also in combination with high blood pressure or too little exercise increases the risk of heart and vascular diseases even more. By participating in circular training it is possible to lose the excess weight and to lower the blood pressure so that the risk of heart and vascular diseases is considerably lowered.

5.3.3. Diabetes Mellitus

What is diabetes mellitus?

Diabetes mellitus is a metabolic disorder characterised by an increased blood sugar level and glycosuria. It develops when the pancreas does not produce enough of the insulin hormone or when the cells are unable to use insulin properly. Diabetes mellitus can be divided into two categories: Type I, or "insulin-dependent" diabetes mellitus and Type II, „non-insulin-dependent diabetes mellitus or adult-onset diabetes. Heredity can play a part in both types of diabetes mellitus, but excess weight also plays a major factor in the development of Type II diabetes.

Diabetes mellitus increases the risk of high blood pressure, heart and vascular diseases and eye disorders.

What can training mean for participants suffering from diabetes mellitus?

The three most common methods of treatment are: administration of insulin, diet and exercise. Not every diabetic needs to be administered insulin. For patients who are administered insulin the dosage is adapted in such a way that a normal carbohydrate, fat and protein metabolism can develop. For all patients the adherence to a well-balanced diet is very important. For diabetics who are overweight is important that they are put on a low calorie diet to decrease the level of body fat. For many Type II patients losing a considerable weight loss could return the blood sugar levelto normal values.

The patients suffering from Type I diabetes could improve the regulation of the blood sugar level by exercising regularly, but research results are not univocally positive. Given that the risk of heart and vascular diseases and strokes in diabetes patients are thrice as high as in non-diabetes patients physical exercise can certainly be recommended. There are however a some areas that deserve attention. There is certainly a risk that the blood sugar level becomes too low during and after performing physical exercise when the liver releases glucose more slowly than the glucose combustion of the body.

In patients with Type II diabetes training could contribute to the decrease of insulin resistance and the increase of cell insulin sensitivity. Because of this insulin-dependent patients can sometimes reduce the insulin intake. This means that sometimes they need to need to take less tablets or that they can postpone the administration of insulin.

The circular training can contribute to weightloss in diabetes patients, for weight loss can normalise the blood sugar level in Type II patients. At the same time circular

training can contribute to the decrease of insulin resistance and the increase of insulin sensitivity. Furthermore, training can contribute to the decrease of the heightened risk of heart and vascular diseases.

Areas of attention:

Diabetes patients who participate in sports should be well aware of a number of matters. You could come across these problems when you are training this target group. In order to prevent a hypoglycaemia in Type I patients they should be advised the following: they should take 15-30 gr of carbohydrates prior to the training for each 30 minutes of averagely intensive exertion; after the training they should take a small snack rich in slow-burning carbohydrates; they should adapt the insulin-intake; they should also avoid exertion in the late evening.

On the whole, diabetes patients know how to deal with their condition; however, it could happen that they are surprised by a hypoglycaemia.

You as the instructor will be able to recognise the onset of a hypoglycaemia (in diabetes patients) when the participant indicates he/she suffers from one or more of the following symptoms during training: headache, dizzy spells, hungry feeling, trembling, dry mouth, weak or faint feeling and when the participant is more grumpy or sulky than usual and seems restless. You should immediately approach the participant and offer him a number of dextro glucose tablets, soda or sugar lumps. You should immediately call the emergency service in case the participant becomes unconscious. Do not administer him/her anything. You should advice the participant to check his glucose level carefully.

5.3.4. Arthrosis and Arthritis

What is arthoris and arthritis

Arthrosis is the deterioration or wear of the joint cartilage. In the case of arthrosis also the synovial fluid in the joint necessary for a fluid movement of the joint diminishes. Because of this bones can more easily graze each other during the movement, which could also cause wear to the bones. The pain that accompanies arthrosis often results in a restriction of the movement of the joint and the use of the joint will be avoided because of the pain. Arthrosis is often part of the normal ageing process (20% of the 50+ age group and 90% of the 60+ age group are confronted with this complaint). Previous injuries and traumas to the joint, diseases of the joints, metabolic disorders and heredity can also play a part.

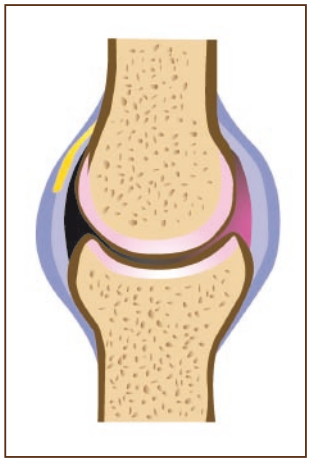
Inactivity of the joint often cause for stiffness and pain in the joint, resulting in a vicious cycle. This will result in atrophy, with diminished muscle strength as a consequence.

As a consequence of changes to the cartilage and the released cartilage particles inflammatory reactions occur often in the joint (particularly in the knees and fingers). These inflammations in the joint we call arthritis.

What does training have to offer to participants suffering from arthrosis and arthritis?

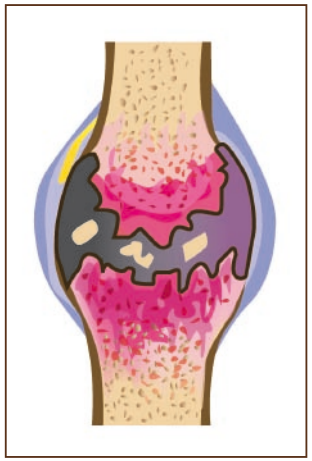
To sit still is not a good option. On the contrary, an exercise programme should be put together, which will allow these people to train both their range of motion and muscle strength, without overtaxing the affected joints. This will stimulate the cartilage so that it will keep functioning. Training will stimulate the muscles, tendons and ligaments that surround the joint to support the joint and help to absorb the impact caused by movement. This will positively influence the coordination, muscle strength and stamina; moreover, further cartilage changes will be counteracted. It is furthermore of the utmost importance to lose any excess weight, with regard to the additional pressure on the joints caused by this weight.
Peak training loads are not included in the circular training; exercises that cover the entire range of motion of the joints can be adapted to the participant's training capacity. The circular training offers excellent training options for participants suffering from arthrosis or arthritis.

Normal joint



Joint with arthrosis

Joint with arthritis



5.3.5. Osteoporosis

What is Osteoporosis?

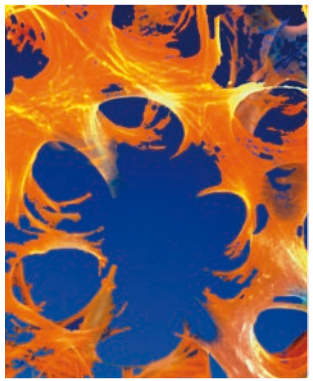
Bone is living tissue that is built up and broken down during the entire lifespan. Until the age of 30-35 the development of the bone is greater than the breakdown, after that the breakdown becomes gradually greater than the development. Osteoporosis is a condition that weakens bones to such an extent that the risk of fracture increases significantly. This condition affects both men and women, although it is more common in women. Osteoporosis is often discovered after a fracture has already occurred. Heredity predisposition, use of medication (particularly prednison and prednison-type substances), early menopause, immobility, certain diseases or conditions, age, hormonal abnormalities and diet play a part in the occurrence of osteoporosis.

What can training mean for participants suffering from osteoporosis

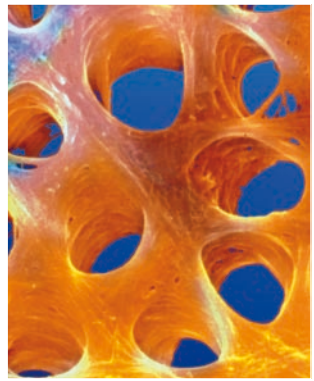
The maintenance of a normal mineral function in the bones depends among other things on the longitudinal pressure on the long bones. This pressure is caused for instance by gravity when we walk erect. In addition each form of stress on the bone activates bone growth.

By taking enough physical exercise in addition to a healthy diet the bone growth can be stimulated, causing the development of sturdier bones (up to the age of 30-35) and slower breakdown (after the age of 30-35). Training sessions that include body-carrying activities and strength exercises are most suitable to this purpose. It is unnecessary to start practicing sports at a high and intensive level. This effect can already be achieved by 3 times 30 minutes of exercise a week. It is even better to exercise for a few minutes a few times a day than an hour once a week.

Additional benefits of sufficient physical exercise is an improved stability, limberness and coordination, which reduces the risk of a fall and possible fractures that falling could cause. Participation in the circular training offer the participant the chance to place sufficient load on the bones in order to slow down the effects of osteoporosis and to increase the stability, limberness and coordination.



Osteoporose



Normal Tissue

5.3.6. Cellulite

What is cellulite

Cellulite, or orange peel syndrome, is caused by enlarged fat cells which give the skin an ‘orange peel’ roughness. Due to an excessive production of estrogens the fat cells swell up and increase in numbers. The blood circulation in the surrounding areas is blocked by oppression of the blood vessels. Because of this, waste products can no longer be removed and the underlying connective tissues become encapsulated as it were. The skin becomes less elastic and cellulite becomes visible. Cellulite is predominantly a female problem, approximately 90% of adult females are affected by it, whereas the problem hardly ever occurs in men. This is probably due to the influence of the female sex hormone estrogen. Insufficient physical exercise, excess weight, alcohol consumption, age and heredity also increase the risk of the development of cellulite.

What can training mean for participants affected by cellulite?

Insufficient physical exercise is an important factor in the occurrence of cellulite. Physical exercise stimulates the blood flow, which can counteract cellulite. In addition, training will help to reduce excess weight. Weight loss has a positive effect on the combat against cellulite. The circular training is an effective training method to decrease the risk of the development of cellulite. It is also of great importance that participants are stimulated to follow a healthy diet containing fibre, vegetables and fruit and a sufficient intake of fluids.

6. circular training

What is circular training?

In circular training a number of exercises are performed successively (individually or in a group). For this type of training we opt for a quick change between various exercises, as a result of which the exercises can be performed in a relatively short time and the heartbeat remains high. This means that both muscle strength and stamina are improved simultaneously. The exercises offered include strength exercises, exercises with cardio machines and exercises with separate training appliances. Because of this the variations are endless.

Why opt for circular training?

circular training has a number of advantages as opposed to regular fitness training. The choice of the type of training that is most suitable depends on the participant's goals. One of the advantages of circuit training is that quite a number of people can train in a relatively small space. Besides, the training load is well-balanced and quite a lot of training can be done in a small amount of time. As the exercises are performed quickly one after the other the heartbeat remains high; this adds a stamina component to the circular training.

By adding variation to the circular training form, very specific training can be accomplished. This form of training is especially suitable for various target groups like

senior citizens, women and young people. By carefully considering the position of the machines (for instance in a circle) more attention and coaching can be given to the individual participants, which will only increase safety. Besides, many people consider practicing sports in a group as a lot more fun and it turns out that people who participate in group lessons stick to sporting longer and stay on as gym members for longer.

The limitations of circular training

Due to its set-up, circular training has a number of limitations. The number of repetitions and the pace of the training is usually higher than in standard weight training. The effect of this is that both stamina and muscle development are stimulated simultaneously, but this combination has its price. In circular training the development of muscle is less pronounced than in standard weight training and the same goes for the stamina. This need not be a problem, as long as you realise that specialising in power or stamina training will always give better results in strength/muscle mass or stamina.

Conclusion

circular training is an attractive type of training with which the build up of strength and stamina can certainly be increased.

The various variations offered by circular training

In addition to the variety in exercises circuit training also offers the possibility to add variation to the intensity and the duration of the exercises. The choice of training intensity (which training load) can be linked to the choice of training duration (duration of the exercises).

The choice of training duration determines which energy system will be trained.

Anaerobic- alactic	Training load < 30 sec
Anaerobic- lactic	Training load 30-90 sec
Aerobic	Training load 90-180 sec

circular training;

The circular machines operate with hydraulic cylinders; features of these are:

1. The more energy (speed) is brought into the motion, the more strenuous it becomes
   - if you adapt your speed the resistance decreases!
2. circular training only features concentric training.
   - during each movement a muscle is contracted, this in contrast to the traditional machines.
   - during the reverse movement the antagonist is also trained concentrically.
3. The agonist and the synergist are trained concentrically at the same time.
   - Each movement generates resistance.
4. circular training means isokinetic training.
   - the combination of resistance and speed are equal across the entire range of motion.
   - exert maximum strength over almost the entire movement.
   - pain in muscles and joints is kept to a minimum.
5. Various levels of resistance.
   - you can chose between 6 different levels of resistance.

The table below indicates for which training purposes the various levels are generally used. Individual differences should however be taken into account.

Level	Speed	Training focus	Reps	Explanation
1 and 2	Fast 2 to 4 sec per repetition	Muscle stamina	15-20	The guideline of of number of sec. means the forward and reverse movement together. From start to finish!
3 and 4	Medium 4 to 6 sec per repetition	Strengthening of muscle	10-15	same
5 and 6	Slow 6 to 8 sec per repetition	Strength	8-12	same

Organisational aspects of a circular training

A circular training is quite easy to set up; you should however, take the following matters into account:

1. Make sure the exercises match the target group.
2. Adapt the training duration and intensity to the target group.
3. Direct the use of the training stations or employ numbers.
4. Maintain the circuit up to 4 to 6 weeks; then add variation.
5. Make sure the exchange moments are clear (count down or use a traffic light).
6. Make sure the exercises are varied; this will stimulate progress.
7. Make a separate appointment with a new participant to explain the training machines

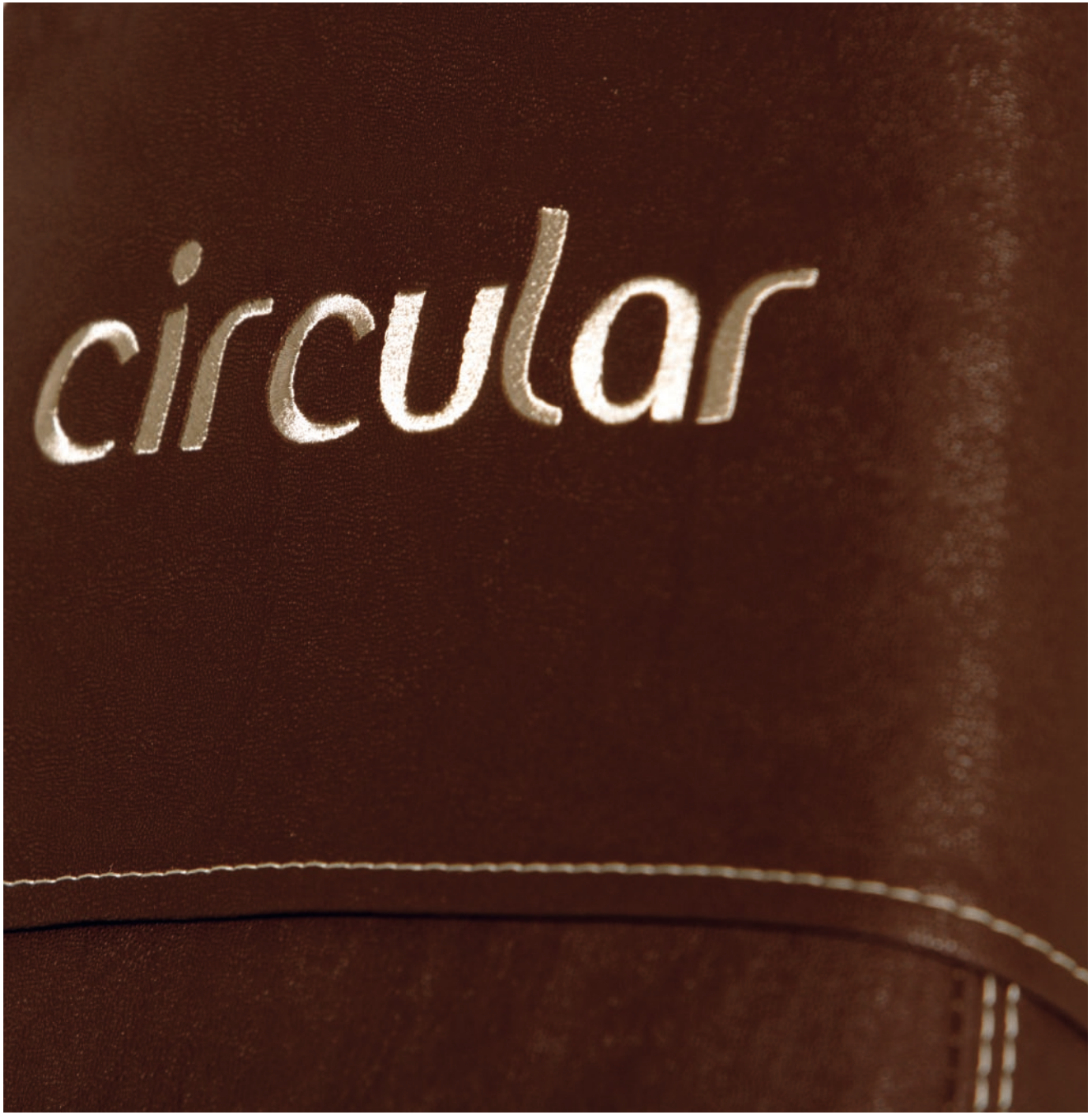
Areas of attention for the instructor

a. Pay close attention to the participants' breathing and prevent them from holding their breath when they are exerting themselves during the exercises. This could increase the blood pressure considerably.

b. Make sure that new participants start at a slow pace. Let body structures get used to the training load. Taking steps that are too big too fast increases the risk of injuries and can be de-motivating.

c. The right execution of exercises prevents injuries and produces the best results.

Therefore, pay enough attention to beginners during class (preferably one-on-one), and explain the above-mentioned areas of attention carefully.



7. The fitness machines explained

7. 1. Chest Press and Rowing Machine

Ajust position/device

1. Vertical handle for beginners and ladies.

- Move the elbow along the body.
- With the vertical handle more muscle groups are trained and exercise becomes more compact.

2. Horizontal handle for advanced learners and men.

- Elbow points outwards.
- With the horizontal handle the muscle groups are separated more strongly.

To be observed additionally:

Always hold wrists in line with the forearms.

Major muscles

- Vertical Chest Press (ducking phase):
  M. pectoralis major
  M. triceps brachii

  Auxiliary muscle: M. deltoideus

- M. deltoideus Seated Row (pulling phase):
  M. trapezius
  M. latissimus dorsi

  Auxiliary muscles:
  M. biceps brachii
  M. rhomboideus
  M. brachialis

7.2. Butterfly and Rear Delt Machine

Adjust position/device

1. Pectoral Fly

Pull together:

- Back against the backrest, feet flat on the ground.
- Hold back against the backrest during the entire exercise.
- During this phase the hands can be open.

2. Rear Deltiod

Push away:

- Back against the backrest, feet flat on the ground.
- Hold back against the backrest during the entire exercise.
- • The hands are closed during this phase.

To be observed additionally:

- Elbows remain below the wrists
- Hold the head in extension of the backbone

Major muscles

- Pectoral fly (pulling together):
  M. pectoralis major/minor
  M. deltoideus

  Auxiliary muscle: M. brachialis
- Rear Deltoid (pushing away) :
  M. deltoideus

  Auxiliary muscle: M. supraspinatus

7.3. Shoulder Press and Lat Pulley Machine

Adjust position/device

1. **Shoulder Press** (pressing phase):

- Elbows should not be stretched at the highest point.
- Press with heel of hand.

2. **Lat Pulldown** (Pulling phase)

To be observed additionally:

- The basic tension of the abdominal muscles and the back muscles should be observed during the entire exercise so that the position remains correct .
- Place feet flat on the ground.
- During the entire exercise the back should be held against the backrest.

Major muscles:

- Shoulder press (pressing phase):
  M. deltoideus, M. triceps brachii

  Auxiliary muscle: M. trapezius

- Lat pulldown (pulling phase):
  M. latissimus dorsi,
  M. trapezius,
  M. biceps brachii,
  M. teres major

  Auxiliary muscle: M. rhomboideus

7.4. Arm Curl and Triceps Extension Machine

Adjust position/device

- Hands on the lower handle (look at your hands).
- Assume active position (slight lordosis in the lumbar spinal column).
- Hold wrists always in line with the forearms.

1. Arm Curl (bending phase):

- Keep hands open and hold wrists straight.

2. Triceps Extension (extension phase):

- Make a fist and extend arms .

To be observed additionally

- The basic tension of the abdominal muscles and the back muscles should be observed during the entire exercise so that the position remains correct.

Major muscles:

- Arm curl (bending phase): M. biceps brachii

  Auxiliary muscle: M. brachialis

- Triceps Extension (extension phase): M. triceps brachii

7.5. Abdominal and Lower Back Machine

Adjust position/device

- Sit straight, with upper and lower back against the against backrest.
- The head is in extension of the body.
- A divided hyperextension provides sufficient space to move (ROM).
- Feet must be flat on the ground.
- Assume a straight and upright position while seated.

To be observed additionally:

- Lean far forward and exhale correctly while moving forward (abdominal muscle)!
- While moving backwards, extend arms backwards and assist with upper back while pressing.

Major muscles

- Low Back (backward movement):
  M. Erector spinae
- Abdominal (movement forwards):
  M. rectus abdominus

  Auxiliary muscles:
  M. obliquus internus, M. externus abdominalis

7.6. Seated Leg Curl and Leg Extension Machine

Adjust position/device

- Sit down with the hollow of the knee against the edge of the seat.
- Adjust the distance of the backrest, if required.
- Place lower leg between the two rollers.

To be observed additionally:

- Legs must be entirely extended during the leg extension!
- Legs should be bent as much as possible during the leg curl.
- Knees and ankles should be at the width of hip (in line).
- To protect the knee joints, it is better to press the toes in direction of the shinbone.

Major muscles

- Leg Extension :
  M. quadriceps femoris

  Auxiliary muscle: M. sartorius
- Leg Curl :
  M. biceps femoris
  M. semitendinosus
  M. semimembranosus
  (Achilles tendon muscle)

  Auxiliary muscle: M. gastrocnemius

7.7 Adduction and Abduction Machine

Adjust position/device

- Lower back and head against the backrest.
- Put legs in the V-supports.

To be observed additionally:

- Assume an active position while carrying out the movement (do not slouch).
- Participants with pain in the lower back should carry out the exercises in the positions 1 or 2 with at least 20 repetitions. Hold feet in a relaxed position.
- While tensing toes (dorsal bending) the weight is shifted to lower legs.

Major muscles

- Hip Abductor (pressing legs apart) :
  M. gluteus medius
  M. gluteus minimus
  M. tensor fasciae lata

  Auxiliary muscles: M. gluteus maximus,
  M. erector spinae
- Hip Adductor ((pressing legs together):
  M. adductor longus
  M. adductor brevis
  M. adductor magnus

  Auxiliary muscles: M. pectineus, M. gracilis

7.8. Leg press

Adjust position/device

- Place feet straight and at width of hips on the foot base (move lower leg slightly outwards, if required).
- Push knees slightly apart so that a distance of one hand's width is created.
- Move in such a fashion that an angle of 90° between thigh and lower leg is created during the exercise.

To be observed additionally

- On the leg press, the calf raise can also be exercised.
- In this case, place only ball of foot on the underside of the foot base and bring into the plantar bend.
- Getting on and off is a little easier when the device is more extended.

Major muscles

- Pressing the legs apart:
  M. quadriceps femoris
  M. gluteus maximus

  Auxiliary muscles : M. biceps femoris
- Calf Raise (extending the feet):
  M. gastrocnemius
  M. plantaris
  M. soleus

  Auxiliary muscles: M. quadriceps femoris

7.9 Twister

Adjust position/device

- Sit down, with your seat as far back as possible.
- During the rotating movement your back must be released from the backrest.
- During the rotation put the main emphasis on your abdomen.

To be observed additionally:

- Elbows remain below the wrists.
- Head turns with the shoulders.
- Exhale well during exertion.

Major muscles

- M. obliquus externus abdominus

Function:

- Rotation of the thorax (ribcage) to the opposite: M. obliquus internus abdominus
- Rotation of the thorax (ribcage) to the same side: Both muscles are responsible for the abdominal pressure and respiration (exhalation).

7.10 Stepper

Adjust position/device

- Stand straight.
- Lean with back against the cushion/the padding, if required.
- Do not press the foot supports into the rubber stoppers!

To be observed additionally:

- Make sure you always tense stomach muscles (no hollow back!).

Major muscles

- M. quadriceps (rectus femorus, vastus medialis, vastus intermedialus and vastus lateralus)
- M. soleus and M. gastrocnemius
- M. gluteus maximus
- M. biceps femoris (Achilles tendon)
- M. semimembranosis
- M. semitendinosus

7.11 Seated Safety Squat

Adjust position/device

- Place your feet on the ground at the width of the hips (if necessary turn the lower leg outwards).
- The knees point outwards.
- During the exercise an angle of 90° between thigh and lower leg should be created.

To be observed additionally:

- Always look straight forward and bring the back into a lordosis.
- Press your seat backwards.
- Stretch the abdominal and back muscles during the exercise.

Major muscles

- Squat (active rising):
  M. quadriceps femoris
  M. gluteus maximus

  Auxiliary muscles : M. biceps femoris

8. Examples of individual exercises

8.1 Exercises with the core ball

No.	Exercise explanation	Muscle group
1	Press lower back into the core ball while looking upwards.	M. rectus abdominus
2	Shinbones on ball, stretch legs and bring ball back to you.	M. rectus abdominus
3	Shoulder press: can also be carried out with dumbbells, if necessary.	M. deltiodeus
4	Balance exercise for pelvic floor muscles and leg lift.	M. quadrieps femoris

8.2 Exercises with fitness belts

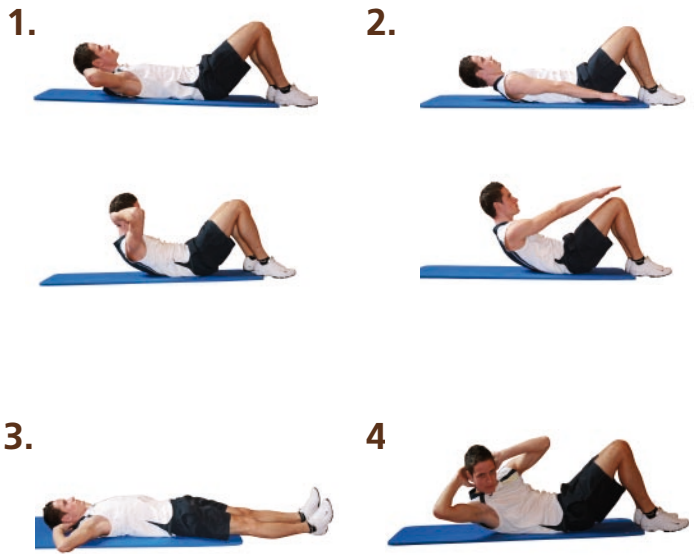
No.	Exercise explanation	Muscle group
1	Place the fitness belt around foot and stretch leg.	M. quadriceps femoris
2	Place arms along sides, elbows remain below hands.	M. deltoideus
3	Take the fitness belt in your hand, with the little finger outwards. (Do not wrap the fitness belt around your hand, it stops blood circulation!). Extend the arm.	M. triceps brachii
4	Hold the arm to be trained at your side and move the little finger in direction of the shoulder.	M. biceps brachii
5	Bring arms horizontally to shoulder height and stretch one arm.	M. deltoideus
6	Bring arms horizontally to shoulder height and then move both arms outward.	M. trapezius

8.3 Exercises with the step

No.	Exercise explanation	Muscle group
1	Lowering from the straddle position.	adductors
2	Side step.	M. quadriceps (Achilles tendons)
3	Step up, step down using arms and legs.	M. quadriceps (Achilles tendons)
4	Stretch the calf muscles.	M. gastrocnemius

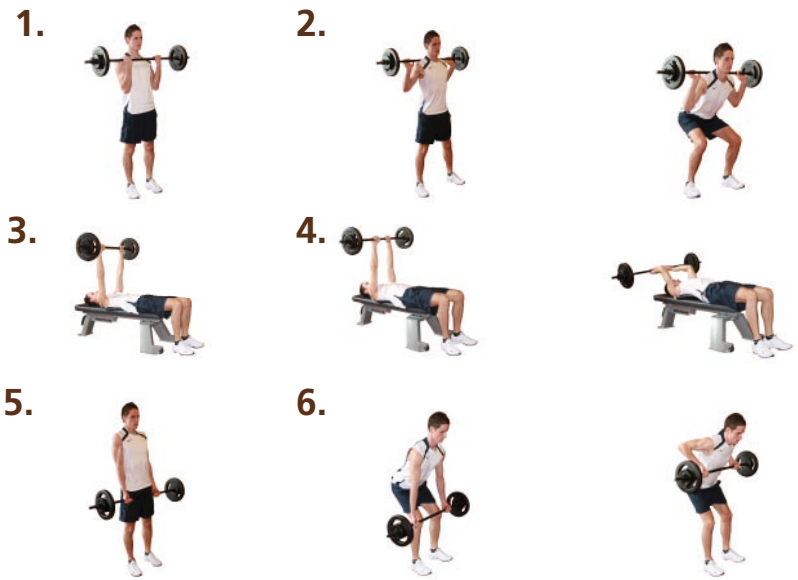
8.4 Exercises for the abdominal muscles

No.	Exercise explanation	Muscle group
1	During the crunch: keep a „fist- wide“ distance between chin and ribcage.	M. rectus abdominus
2	During the crunch: hands over knees.	M. rectus abdominus
3	Hold legs 5 cm above the floor.	M. rectus abdominus
4	During the lateral crunch: hands on back of neck.	M. obliquus externus abdominus M. obliquus externus abdominus M. obliquus internus abdominus



8.5 Exercises with the barbell

No.	Exercise explanation	Muscle group
1	During the barbell curl, arms bend and thumbs point outwards.	M. biceps brachii
2	Squat, place heels on floor and look straight ahead.	M. quadriceps Achillessehnen
3	Bench press, press dumbbell upwards at chest height.	M. pectoralis major M. triceps brachii
4	Triceps extension, hold elbows still and extend arms, barbell must not reach above head during the stretch.	M. triceps brachii
5	Shrugs, arms stretched and „shrug“ shoulders.	M. trapezius
6	Barbell rowing, move the barbell from thighs to navel with a rowing movement. Look straight ahead.	M. latissimus dorsi M. trapezius



8.6 Floor Exercises

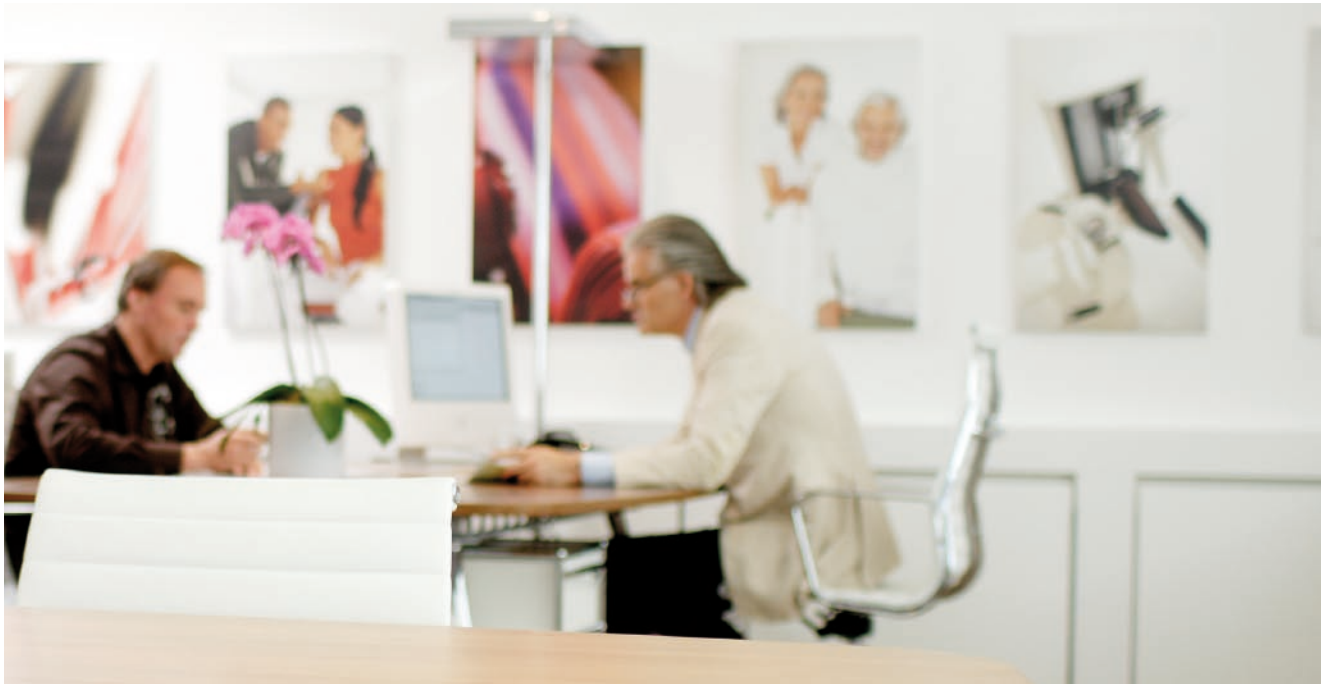
No.	Exercise explanation	Muscle group
1	While lying on your stomach, lift arms and legs.	M. erector spinae
2	Side step.	M. quadriceps fermoris Achilles tendon
3	„Cat back“, leg, starting position: While lying on your stomach, press leg upwards.	Achilles tendon group M. gluteus maximus
4	Balance-seat, all torso muscles must be tensed.	M.quadriceps femoris

1.

2.

3.

4.



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