

Reflex 45

The Kieser Training Magazine

Ouch!

It's all too familiar. You stumble on a root whilst running or miss the kerb and before you know it, you've gone over on your ankle. If this is happening to you fairly regularly – either during sport or normal daily activities, don't just ignore it. This type of instability is a primary cause of ligament damage.

The process that triggers the injury normally starts at the moment your foot touches the ground: the outer part of the instep is flattened and the foot is naturally bent slightly forward. If the ground is uneven, if you lack concentration or if you have tired muscles, the movement of your foot may be disturbed as it touches the ground. The result is that you go over on your ankle, normally on the outside. When this happens, the damage is primarily to the ligaments on the outside of the ankle joint. Players of ball sports such as tennis, football, handball or volleyball, which involve sudden movements, are particularly prone to this type of injury.

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This type of injury often results in ankle instability. This in turn increases the risk of a recurring injury. Medical professionals reckon that 40% to 60% of those with chronic symptoms will develop arthritis of the ankle joint making it painful to put weight on the ankle. Mobility is then reduced.

If you don't want to risk this, you should pay attention to your foot as soon as possible. What is needed is a long-term programme to increase the strength of the muscles, ligaments and tendons in the feet. Kieser Training has developed two new machines specifically to do this. They target the muscles that stabilise the ankle and so reduce the risk of injury. Read more about them on pages 2 and 3.



Marcus Saegesser dreams of being the fastest man in the world on his un-faired "Naked Bullet".

© Photo: Horst Rösler

"For mental strength you also need excellent physical strength."

Markus Saegesser is a motorcyclist – not just any old motorcyclist but one with four world records under his belt, which he set at the "Speed Trials" on the Bonneville Salt Flats in the US state of Utah.

Markus, are you something of a speed freak?

Not really! (laughs) Motorcycling is something I have done for many years. I have probably covered almost one million miles – mostly on a Harley. I am more of a cruiser who enjoys the scenery.

So what made you want to set speed records?

In 2006, I was inspired by the film "The World's Fastest Indian" with Anthony Hopkins. He played a 67-year-old who dreamed of setting a motorcycle speed record on the salt flats. A year later I broke four world records and two US records.

But that was not enough?

In 2011, three of my records were smashed. I not only wanted to win them back but wanted one more as well. My aim was to ride my Naked Bullet – a custom-built un-faired machine – at more than 201 miles per hour (312.8 kph). This would have given me entry to the "201 mph Club". Unfortunately, I had various

equipment problems, including a jammed piston.

However, you did not give up your dream?

No, I licked the salt from my wounds and plan to try again next year. The Naked Bullet is being fitted with a new engine from Norway, a Harley-Davidson/Porsche combination. Depending upon the actual cubic capacity and class, I will need to ride at between 205 mph (330 kph) and 226 mph (365 kph) in order to smash the existing world record.

What is it that fascinates you?

Racing solo on a track is something special. At speeds faster than 125 mph (200 kph), you feel as though you are hovering over the machine. I can still remember vividly the precise moment I broke my first world record – it was an indescribable feeling of happiness.

So what is your greatest challenge?

The surface: Salt is rather like snow and is actually quite unsuitable. It

feels a bit like aquaplaning – there is constant rear wheel spin. You need total control over all your senses.

Extreme conditions for both body and mind ...

The salt flats are almost 1,300 metres above sea level. The temperature is approaching 50 degrees Celsius. You need to wear a leather suit and flame-resistant underwear. Often you have to wait for hours between individual runs. It is a physical but in particular an enormous mental challenge.

How do you prepare?

For mental strength you also need excellent physical strength. I train at Kieser Training and am a real fan of the concept and the instructors. No warm-up, no stretching and no endless repetitions. I enjoy concentrating on my muscles for 30 minutes. No energy is wasted. It's just so efficient. The intensity and programme content mean it's never boring – something that cannot be said of the myriad of other fitness studios.

Dear Readers,



you already know that targeted, isolated strength training on machines is extremely beneficial to your health. It maintains our muscles until well into old age, promotes healthy bones, boosts metabolic activity and gives us strength and energy – the latter being of increasing importance as without it we feel totally exhausted the whole time.

In contrast, few are aware that Kieser Training also benefits the cardiovascular system – something it achieves with just two 30-minute sessions per week. Yet despite the evidence in favour of strength training, doctors primarily recommend sports involving movement or endurance, e.g. running, swimming or cycling as a way of improving health.

Strength training, i.e. the production of muscles, should be a priority and a lifelong component of our health management programme. I am passionate about running but I realise that what we urgently need is a fundamental shift. Only by doing intensive strength training can we enjoy running, swimming and cycling without risk to health.

In this edition read how you can cleverly combine strength and endurance training, why your training should also include the feet, how strength training helps runners and how our new B3/B4 machines can improve ankle stability.

Patrik Meier
Chief Operating Officer
Kieser Training AG Zürich

KIESER TRAINING

STRENGTH FOR HEALTH

Three times round the world on foot ...

Statistically, we walk the equivalent of three times round the world during our lifetime. Although our feet play a significant role in this marathon achievement, the recognition they receive is only minor. It's time to bring them into the limelight.

Some 26 bones, 33 joints, 60 muscles and more than 100 ligaments ensure that we can use our feet to stand, walk, run, hop or jump. Our feet, which have transverse and longitudinal arches braced by muscles, tendons and ligaments, support our bodyweight, absorb shocks and transfer forces. Receptors on the soles of our feet send messages to the spinal cord and the brain about the external environment and body position in relation to its surroundings. This allows our central nervous system to control movements and prevent falls or injuries.

Children's feet only develop fully on reaching puberty. Although 98% of us are born with healthy feet some 80% of us will develop

foot problems later in life. This is primarily because we don't walk enough, rarely walk with bare feet and force our feet into inappropriate shoes.

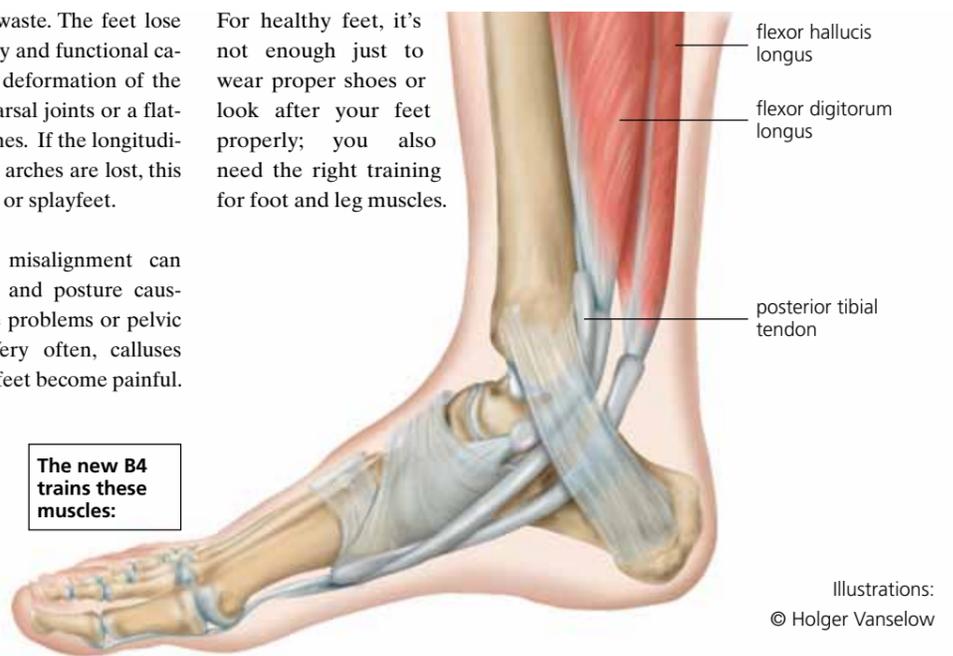
Our feet were designed for walking barefoot: If we were to walk barefoot over hill and dale, through woods with protruding tree roots or soft meadows, our feet would adjust continuously to uneven surfaces. Our muscles would work every step of the way strengthening our feet and legs. This is why children and adolescents should walk barefoot as often as possible.

Forced permanently into inflexible shoes with rigid soles, our feet and lower leg muscles fail to work

sufficiently and waste. The feet lose strength, elasticity and functional capacity causing a deformation of the tarsal and metatarsal joints or a flattening of the arches. If the longitudinal or transverse arches are lost, this results in flatfeet or splayfeet.

Even a minor misalignment can disturb our gait and posture causing back or knee problems or pelvic misalignment. Very often, calluses develop and the feet become painful.

For healthy feet, it's not enough just to wear proper shoes or look after your feet properly; you also need the right training for foot and leg muscles.



What effect does Kieser Training actually have on...

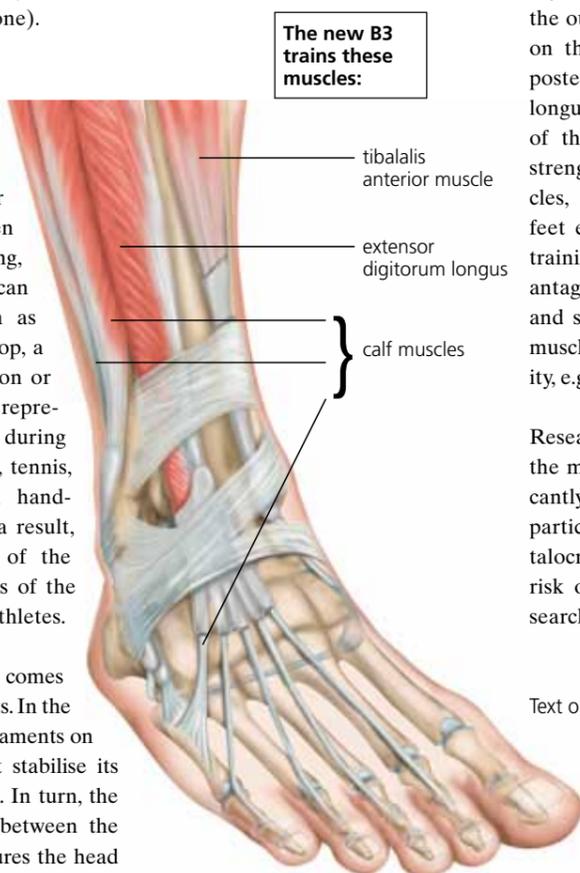
... the foot and ankle?

Foot movements take place at several joints: The true ankle joint (talocrural joint) is responsible for the up and down movement of the foot. It consists of the talus together with the fibula and the tibia. The subtalar joint moves the foot side to side and rotates it. It is formed by the talus and calcaneum (heel bone).

The joints in the ankle must be able to withstand a significant load – and not just because they support our entire body weight. Even during normal walking, the load on the ankle can be increased as much as sevenfold. A sudden stop, a rapid change in direction or jumping in the air all represent an increased load during sports such as football, tennis, badminton, volleyball, handball or basketball. As a result, ankle joints are one of the most injury-prone parts of the human body amongst athletes.

The stability of a joint comes partly from the ligaments. In the case of the ankle, the ligaments on either side of the joint stabilise its outer and inner aspects. In turn, the taut connective tissue between the fibula and the tibia secures the head

of the talus. However, additional stability comes from the muscles: the muscles in the lower leg – in particular the tibialis anterior and peroneus longus muscles – surround the arch of the foot acting like a clamp and so provide powerful support.



This means that it is essential to strengthen the lower leg muscles in order to improve foot stability. Training on the new B3 machine strengthens the calf and shin muscles (tendo-calcaneus, tibialis anterior muscle and the extensor digitorum longus). These muscles lift the outer edge of the foot. Training on the B4 strengthens the tibialis posterior and the flexor digitorum longus, which lift the inner edge of the foot. Training on the B8 strengthens the tibialis anterior muscles, i.e. the muscles that lift the feet every step of the way. Finally, training on the J1 strengthens the antagonists, i.e. the gastrocnemius and soleus muscles. We need these muscles to counter the effect of gravity, e.g. to stand on tiptoe.

Research has shown that training the muscles in the lower leg significantly improves ankle stability; particularly the stability of the talocrural joint and so reduces the risk of injury (see also "Latest research").

Text on this page: Dr. med. Martin Weiß

Doctor's Tip

What to do about ...

fallen foot arches or other skeletal anomalies such as pes planus, pes pro-natus, pes planovalgus and splayfeet.

A **flatfoot** is a condition where the longitudinal arch is partially or completely lost. A **splayfoot** is where the transverse arch starts to flatten, the metatarsal bones move apart and the front of the foot becomes broader. If the toes are constricted – as a result of a splayfoot – this additionally results in a **hallux valgus** where the large toe has deviated to one side.

These conditions are due primarily to muscle wasting in the lower leg and feet. The wearing of inflexible shoes means that feet are immobile and so are not subject to a training stimulus. Muscles atrophy, ligaments slacken and arches sink. High heels are a further problem as they increase five-fold the load on the front of the feet. Standing for long periods is another common cause, as the load remains static for a long time; muscles switch off putting undue strain on the ligaments and joints. This can lead to a dysfunction of the metatarsal joints, heel spurs and an uneven load on the knee and back resulting in foot, knee or back pain.

If the longitudinal or transverse arches

are flattened, shoe inserts are prescribed; they provide a passive correction of the deformity and may relieve symptoms temporarily. However, they encourage further muscle wasting.

If you value healthy feet, it's important to strengthen the muscles, bones, ligaments and tendons in the feet. The best way to do this is to go barefoot as often as possible, do intensive foot exercises and use specific foot machines at Kieser Training. In addition, whenever possible wear shoes that give the feet sufficient space and have flexible soles with good contact with the ground. Several shoe manufacturers simulate barefoot walking by producing minimal shoes with no shock absorption or support or shoes that encourage foot muscle activity such as those with an integrated balancing area in the soles that ensure the feet are subject to adequate training stimuli.

To sum up: your feet may be invisible for much of the time but they should receive more attention, as healthy and strong feet mean you have solid foundations upon which to build your training!



Dr. med. Martin Weiß

Reflex

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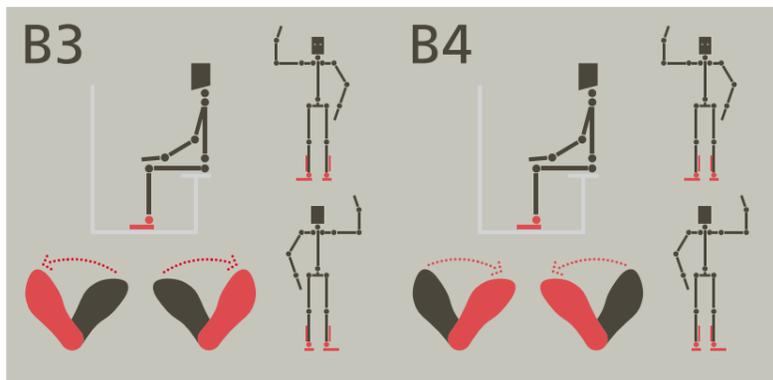
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B3/4 – lower ankle joint pronation/ supination

The B3 and B4 are the new Kieser Training machines: they train the deep outer (lateral) and deep inner (medial) lower leg muscles. The B3 trains the pronator muscles, i.e. the tibialis anterior muscle, the extensor digitorum longus and the calf muscles. The exercise is started with the toes pointing inwards and the heels outwards. The foot is then rotated outwards and upwards so that the inner edge of the foot is lowered. The B4 strengthens the supinator muscles, particularly the tibialis posterior muscles and the flexor digitorum longus and brevis muscles. This exercise is started with the foot in the V-position. The foot is then rotated inwards and upwards so that the outer edge of the foot is lowered.



Until now, it was impossible to isolate these muscles and so train them intensively – the technology required was too complicated. However, these two exclusive machines have been developed by Kieser Training in cooperation with Dr. phil. Marco Hagen from the Institute of Sports

Science at the University of Duisburg-Essen. They increase the strength and reaction speed of the pronator and supinator muscles, stabilise the ankle joints and prevent injuries.

Expert's tip

With the increased use of technology and automation, most muscles are chronically underworked in everyday life. They then lose strength and mass – an underlying cause of many health problems. Metabolic disorders, cardiovascular disease and back pain are just a few of the so-called lifestyle diseases that threaten those with weak muscles. We all know that we should do some sport for health reasons but often don't know how much and at what intensity. "The more the better" is not the right mantra here. After sitting for hours in the office, car or at social events, we should not expect the body to be capable of sudden sporting excellence – whether it's running or weekend football training. If we do, we are likely to strain ourselves. The resultant symptoms should be treated as a warning message from the body. So what can we do to cope with this oscillation

between extremes of movement and rest? Strength training: It gives us strength and energy, stabilises the joints, strengthens bones, ligaments and tendons, boosts metabolic processes, reduces blood pressure, improves mobility, coordination and stamina and increases self-confidence. In short: Kieser Training for strength and health.



Anika Stephan
Research & Development Kieser Training

Latest research – an end to ankle instability

What can you actually do about ankle instability? Many basketball and volleyball players tape their feet when they play or even wear strong plastic bandages to prevent going over on their ankle. Runners whose feet roll unduly inwards often wear inserts. However, these aids do not solve the actual problem, i.e. the muscles are too weak to provide enough support to the ankles.

It's much better to strengthen pronator and supinator muscles – this is clear from our recent study at the University Duisburg-Essen. 22 sports students trained their

lower leg muscles for 10 weeks. To train the right leg, they used the B3 and B4 machines – machines jointly developed by the University and Kieser Training. To train the left leg, the students used a calf trainer and the B8 tibia dorsiflexion machine.

We tested the stability of the ankle joint before and after the study. This involved examining the actual movement of the right and left feet during running. We also simulated what happens when you go over on your ankle sideways. In addition, 9 participants were given an MRI scan to measure the increase in muscle mass.

The result: There was an increase in the size of the tibialis anterior and lateral calf muscles in both the right and left legs. The improvements in lateral muscle tension combined with faster response times reduced the likelihood that participants would go over on their ankle.

However, we were only able to identify a significant increase in the mass of the deep inner supinator muscles amongst those who trained the right leg on the B3/B4. The effect: during running, these muscles provided more support, which minimised the inward rotation and controlled the

roll. This significantly increased the stability of the ankle joint, something of particular benefit to runners. Excessive inward rotation (pronation) is the cause of many problems such as runner's knee, Achilles tendon problems, shin splints and inflammation of the plantar fascia.

Text: Dr. phil. Marco Hagen
Director of the study at the University of Duisburg Essen, Department of Biomechanics/Kinematics

B3/B4 training is recommended particularly for the following:

- Chronic ankle joint instability
- Chronic compartment syndrome
- Arthritis of the ankle joints
- Venous and lymphatic insufficiency in the lower leg
- Reducing the incidence of falls amongst osteoporosis sufferers
- Overpronation syndromes
- Preventing sport-related injury or strain

Training theory – the basics

The 5 Instruction Boards – remember them? When you first started Kieser Training we used them to explain the main principles of training theory. Training success is based on adherence to these principles and so reason enough, therefore to revise them.

What produces an actual movement? First of all, at least one muscle must contract. This moves the bone to which it is attached and the joint(s) that it spans. For example, if we tension the biceps, we bend the arm at the elbow. If we then want to straighten the arm, we need to contract the antagonist, i.e. the triceps. This principle of tension and counter-tension is the basis of all movements, the work in all cases being done by the relevant flexor and extensor muscles.

To ensure that the process functions properly, the strength in the flexors and extensors must be in balance. This is why programmes always include exercises for both muscle groups. At the same time, it is important that we do each exercise from flexion right through to the point

of maximum joint extension. This ensures that strength levels are high enough throughout the range of movement. This in turn gives joints the required stability and ensures that they work properly.

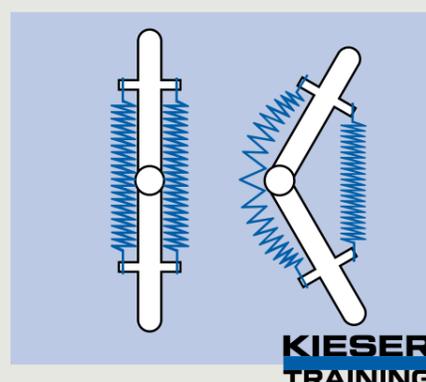
However, what happens if one of these two muscles is too weak? The result is an imbalance – a muscular imbalance. There is insufficient strength throughout the range of movement and sometimes the range of movement may actually be reduced. In this case, the muscles cannot absorb the exertion peaks and increasingly the strain is taken by the ligaments and joint surfaces. That increases the risk of injury and encourages joint wear.

Imbalances occur if we adopt a particular body position as a matter

of habit or if we do physical exercise without using the complete range of movements at our disposal. This happens to most of us. However, with the right strength training, we can

quickly eliminate these imbalances because weaker, untrained muscles respond more quickly to training than trained muscles.

To flex and extend a joint, we need at least two muscles: a flexor and an extensor – each shown on the diagram by a tension spring. However, many of our joints are more complex than the single flexor/extensor example. For example, we have other muscles, which work in other planes of motion and which provide the joint with strength and stability at various angles.



This Instruction Board illustrates the tension/counter-tension principle used by our musculoskeletal system

- **L:H: side:** Joint in neutral position. The flexor and the extensor both retain some tension at rest. This exerts a tension on the joint and so holds it together.
- **R:H: side:** If the flexor is contracted, the extensor has to extend in order to allow the movement. If the extensor is then contracted and the flexor released, the joint is returned to its original position.

KIESER TRAINING

Column

Men's Health

by Dr. med. Marco Caimi

In medical terms, men belong to a socially excluded group – after all, they don't even have their own medical speciality. In addition, their attitude to their own health could also be regarded as archaic: For example, on average men eat less fruit and vegetables than women. They are five times less likely to visit their doctor and on average die almost six years earlier than women of the same age. When men actually try and find out about health issues, there is much less published information available than there is for women.

Fortunately, things seem to be changing – the resistance of the average male to finding out about his body seems to be ending. Men are becoming more aware of their health – and vainer. Men now account for 25% of all cosmetic operations. Similarly, men are starting, albeit still somewhat hesitantly, to take an interest in their pelvic floor muscles. Word has got around that trained pelvic floor muscles make you even more of a man ... but more of that in our next edition.

“You can't maximise strength and endurance improvements simultaneously.”

First of all do some intensive cardiovascular training on the stepper, exercise bike or treadmill. Then fire up your muscles on the machines: that's the standard mantra at most of the fitness studios. Absolute rubbish – according to recent scientific findings.

“It's impossible to maximise strength and endurance improvements simultaneously”, says Professor Dr. med. Hans-Heinrich Hoppeler and he should know. Hoppeler is Head of the Department for Functional Anatomy at the Institute of Anatomy at the University of Bern and has researched the subject extensively.

For the past 15 years, new techniques

in molecular biology have allowed us to investigate and understand signal cascades and the mechanisms associated with muscle adaptation. This research has shown that strength training at high intensity and low repetition numbers triggers a quite different response in the muscle cell compared with endurance training at low intensity and high repetition numbers.

Hoppeler explains: “Strength training builds up the myofibrils in the muscle – myofibrils are the elements responsible for muscle contraction. This increases the cross-sectional area of the muscle and also its strength”. The response of the muscles to endurance training is quite different. “When you do endurance training, you need to conserve the energy reserves at your disposal and

so increasing muscle mass is not a priority. You need energy to support the delivery of the various processes, e.g. increases in blood supply and the number of mitochondria, i.e. the cellular power plant of the muscle.”

From a molecular perspective, these adaptation processes are quite different. However, it's more than that because each has a detrimental effect on the other. “Endurance training immediately before strength training inhibits protein synthesis, which means that there is no anabolic response. As a result, muscle growth is retarded,” stresses the Bern muscle researcher. “Vice versa, endurance training immediately after strength training causes muscle proteins to break down.

To sum up: If you want to increase muscle mass but also want to do some endurance training, you should allow a sufficient gap between the two. Otherwise your training will be in vain. For example, it's quite OK to do an easy run in the morning and strength training in the evening – with a protein-rich meal in between. However, if the run is more strenuous, it's better to do it on a different day.

Strength takes you forward – step by step



Simply start running? Better not. Do Kieser Training as it creates the basis for healthy endurance training and is the perfect supplement to running training.

- Avoid muscular imbalances by training both the running muscles and their antagonists, preventing undue strain and injuries.

- Stabilise the trunk, particularly the spine. This protects vertebral discs and prevents back problems. This improves the stability of your running gait.

- Strengthen muscles. This protects joints, particularly the knee, ankle and hip joints. You are better equipped to absorb the impact involved in running and can cope better with loads. You reduce the risk of chronic running injuries – most of which are caused by overload situations.

- Training the leg and hip muscles increases flexibility, allowing you to lengthen your stride and so run faster.

- Particularly when you first take it up, each session of strength training increases running performance. Performance is improved on a step-by-step basis so that even on longer runs you remain fit.

Step by step towards a personal best

She is young, fast and in top form: Jana Soethout is a 22-year-old from Cologne. In 2011 she was runner-up in the 5,000 metres at the German Junior Championships and this year came third in the 10,000 metres at the German Championships.



© Photo: Axel Kohring (Beautiful Sports)
Jana Soethout

Jana, when did you start running?

I ran my first race in my third year at school. My father took me to an open event where I ran 1,000 metres, which I found too short. In Year 4, I ran my first 5,000 metres and have stuck with the longer distance ever since. Admittedly, as a child, I was too lazy to train – it was all fairly easy. However, I eventually developed some ambition. I joined the local athletics club, ASV Köln, and started to train with them.

You now train with another club, LG Telis Finanz Regensburg?

Unfortunately, I was almost the only one in the Cologne club training at the

elite level. This limited my access to training camps and so I switched earlier this year to the Regensburg club. Although this means I am unable to train locally, the club has many good athletes and we often attend training camps.

How often do you train?

In summer, I train 7 to 10 times per week, including for example two hard speed sessions on the track. In addition, I do several longer runs of between 10 and 15 kilometres. In winter, I train up to 12 times per week. This includes one long run of up to 25 kilometres.

And you also train at one of our facilities in Cologne?

As a native of Cologne, I first competed in its open run called “Süd-stadtlauf” in Year 5 and recently I have always won it. Five years ago, the run was sponsored by Kieser Training and I won a voucher for a year's membership and have been training there ever since.

Running and strength training – is that a perfect combination?

Definitely! Strength training is essential for runners. I benefit a lot



from Kieser Training as I can isolate individual muscles and train them on the machines. For example, for a stable running gait, you need a strong back and trunk. This allows me to maintain a good speed even towards the end of the race. Of course I coordinate my strength training with my running training. In winter, I train twice a week at Kieser and three times if I have time. In summer, the running training is more intensive and so I reduce the strength

training. After all, it's no good starting a race with stiff muscles. By the way, sore abdominal muscles are the only ones that I like. My abdomen feels good after training on the F2.

Kieser Training has developed two new machines – for training pronator and supinator muscles – curious?

Yes, I have already looked at them. They look exactly the right machines

for me and I will definitely give them a try. For some time, I have had a tendency to go over on my ankle. I really need to do more for my ankles. They are much too flexible and I need to be more stable when I land.

What is your next goal?

I need to trim 60 seconds off my time to qualify for the European Championships. That's what I'm training for.