RE FLEX

THE KIESER TRAINING MAGAZINE

58

I REGRET NOT STARTING

KIESER TRAINING 20 YEARS AGO

ROSS CLARKE-JONES, AN AUSTRALIAN, IS A PROFESSIONAL SURFER AND REGARDED AS ONE OF THE COUNTRY'S BEST BIG-WAVE SURFERS. AFTER INJURING HIS KNEE SURFING, HE DECIDED AGAINST THE SURGERY RECOMMENDED BY SPECIALISTS. INSTEAD, HE OPTED FOR A REHABILITATION PROGRAMME WITH KIESER TRAINING AND WAS BACK SURFING WITHIN THREE MONTHS.

Ross Clarke-Jones (49) is constantly on the move, searching for that special wave. However, about a year ago, an enormous wave almost cost him his career. "A big wave landed on my back and knees compressing me into the surfboard," he recalls. The consequences were disastrous: the anterior cruciate ligament was almost completely torn and the medial collateral ligament was a grade 2 tear.

The very next day, Clarke-Jones flew to Munich to consult a specialist. After MRI scans and a manual examination, the orthopaedic surgeon concluded that the knee would not recover without surgery. He also sent the MRI scans to a colleague in California for a second opinion; the latter shared his diagnosis.

Kieser Training has helped surfer Ross Clarke-Jones to get back on his feet after a knee injury.

"The doctor gave me an incredible leg brace to wear for the next six weeks until the operation," recalls Clarke-Jones. "To prevent the leg muscles wasting completely whilst the leg was immobilised, he recommended some physio exercises."

However, the surfer decided not to have the planned surgery. "Luckily, surf psychologist Richard Bennett insisted that I visit Kieser Training in Geelong." Richard Wallace, head physiotherapist at Kieser Geelong and Dr Drew Slimmon, a sport and exercise physician at a local medical center, advised the sportsman to try traditional physiotherapy combined with targeted muscle strengthening to stabilise the knee and improve his core strength.

Clarke-Jones was impressed by the rapid improvement: "After three months of Kieser Training I was able to surf small waves on the longboard. After four months I was snowboarding and tow-in surfing and could even surf 20 ft. waves with the brace on. After six months, my entire body was stronger – particularly my legs. I am so thankful that I decided against the surgery."

In the documentary "Storm Surfers" that Ross Clark-Jones made with his friend and surfing partner Thomas Victor "Tom" Carroll 2013, he says: "Big-wave surfing is not about abdominal muscles or even bench presses. It's all about your nerves." Today, the professional sportsman takes a different view: "I regret not starting Kieser Training 20 years ago." ■

TRAIN IN SEVEN COUNTRIES

Want to train on holiday or on your next business trip? No problem! Your membership is valid in more than 140 studios worldwide. With Kieser Training, you have the reassurance that the machines and the concept are the same wherever you are. ■

For a full list of locations see kieser-training.com

600 POWER PACKS

HOW MUSCLE BUILD-UP WORKS

OUR BODY HAS SOME 600 SKELETAL MUSCLES; THEY ARE UNDER OUR VOLUNTARY CONTROL AND WE CAN ALSO TRAIN THEM. TO UNDERSTAND THE PROCESS OF MUSCLE BUILD-UP, IT IS USEFUL TO EXAMINE THE STRUCTURE OF MUSCLES IN GREATER DETAIL.

A skeletal muscle is composed of bundles of muscle fibres. They, in turn, consist of muscle fibres and the muscle fibres are composed of myofibrils. The outermost layer enveloping a muscle is called the fascia, the inner surface of which consists of loose connective tissue called the epimysium. The fascia not only ensures that the muscle maintains its anatomical shape but also keeps it in the right place. The perimysium – also a sheath of connective tissue – surrounds bundles of muscle fibres; each individual fibre is surrounded by the endomysium and the role of the endomysium is partly to prevent muscle tears. At the ends of the muscles, the fascia, perimysium und endomysium connect to the tendons that secure the muscle to the bone.

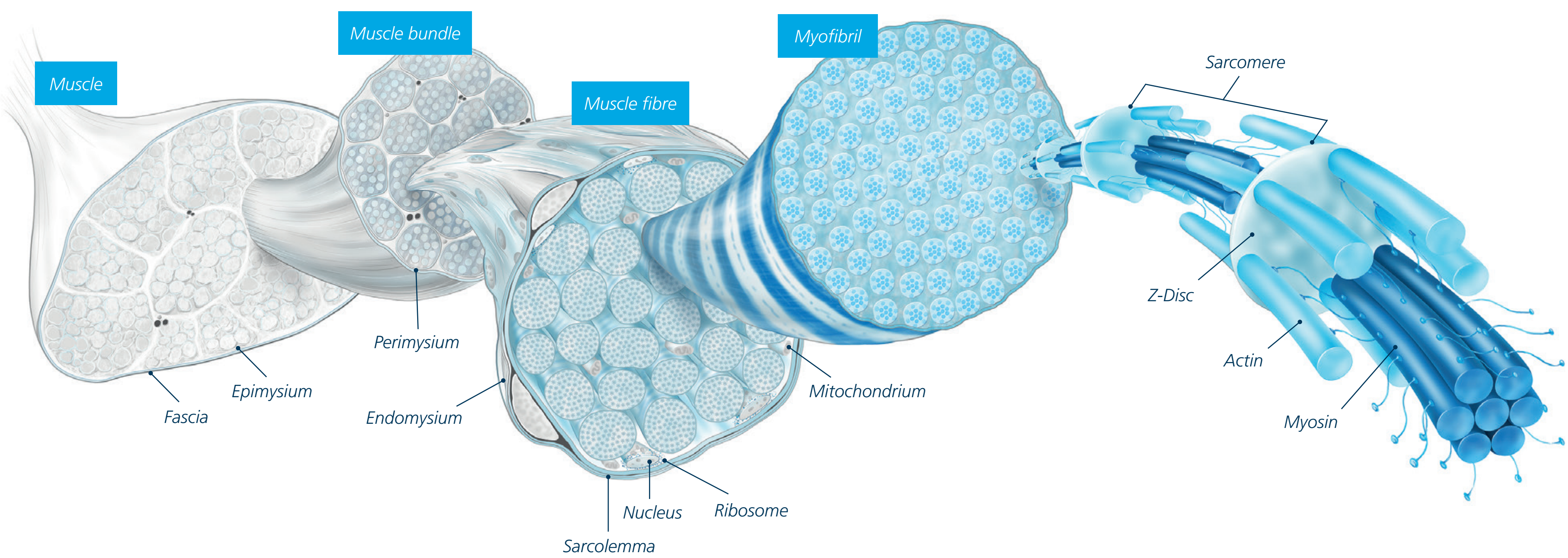
The interstices in the muscle are filled with a fluid called sarcoplasm. It contains myoglobin, a protein that gives muscles their red colour and plays an important role in the transport of oxygen. Sarcoplasm also contains mitochondria, the powerhouse of the muscle cell, and ribosomes, which is where protein is produced.

Muscle fibres
Turning now to an individual muscle fibre, we find it is surrounded by sarcolemma, a thin cell membrane. The muscle fibre is one of only few cell types to contain several nuclei; they are located directly beneath the sarcolemma and are distributed along the entire length of the fibre. They supply the genetic blue print together with the material required for the production of muscle protein. Each fibre contains hundreds of myofibrils.

Myofibrils and sarcomere
These are the very small functional units that allow us to flex our muscles. Myofibrils consist of repeating sections of sarcomere: rows of muscle protein separated by so-called Z-discs. It is this regular structure that gives a skeletal muscle its typical striation.

Sarcomeres consist, inter alia, of filamentary proteins: The actin filaments are thin and project from the Z-discs into the sarcomere whereas the myosin filaments are thick and are located in the middle. The actin and myosin filaments are responsible for muscle contraction.

Our skeletal muscles can be likened to bundles of cables: They are made up of bundles of muscle fibres or cells within which are located myofibrils. It is precisely here – in this tiniest of units – that muscle build-up occurs when we work out on the machines. ■



INCREASING MUSCLE MASS

MUSCLE FIBRE HYPERTROPHY

WHEN MUSCLES INCREASE IN SIZE, IT IS THE RESULT OF MUSCLE FIBRE HYPERTROPHY. WHAT EXACTLY IS THAT?

Even when we are adult, our muscles are highly adaptive. For example, if we subject a muscle to an adequate physical load and provided that it has enough protein, the muscle responds by growing; it does this by a process called muscle fibre hypertrophy. What it means is that, through the storage of muscle protein, the volume of muscle fibres increases, whereby the number of nuclei remains the same or increases.

Becomes thicker
If a muscle is subject to a regular load, the diameter of each muscle fibre increases, i.e. the muscles become thicker. The technical term for this is radial muscle fibre hypertrophy. In this case, new actin and myosin filaments are produced in the ribosome; new sarcomere is produced and added in parallel. The greater the number of sarcomere adjacent to one another, the thicker the fibrils and with it the fibres, i.e. the entire muscle. The result: The muscle contains more contractile material and can produce more strength.

Becomes longer
However, muscle filaments can become longer as well as thicker. With longitudinal fibre hypertrophy, sarcomere is also added but it is added not in parallel but in series. The result: The higher the number of sarcomere connected in series, the quicker a fibre can contract, the greater its range of movement and so strength increases.

In a nutshell: Muscles grow through a process called muscle fibre hypertrophy, whereby the body lays down muscle protein. If we train intensively and consume enough dietary protein, we can produce muscle protein and muscles thicken and/or lengthen. ■

When we train on the machines and eat high protein food, the muscles store protein during the recovery phase. The volume of each muscle fibre increases and so does the whole muscle.

INTENSIVE TRAINING

WHY IT IS SO IMPORTANT

INTENSIVE TRAINING AND SUFFICIENT RECOVERY TIME ARE CRUCIAL FOR SUCCESSFUL TRAINING. PROFESSOR DR DR GIESSING EXPLAINS WHY.

Professor Gießing, you have pointed out that a distinction must be made between training and practice. Why is that so important?

The terms practice and training are often considered synonyms, although they refer to completely different processes. Practice is defined as repeating something as often as possible in order to improve patterns of movement. For example, to learn an instrument, you would ideally practise several hours a day. Practice plays an important role in sport, for example in football or basketball. The more free throws you throw, the better you get. Here, the principles are “the more, the better” and “practice makes perfect”. When you practise, it is important to avoid exhaustion. If you are exhausted, you cannot coordinate your movements properly. In other words, you need to stop before you fatigue.

And what about training?

Training is something completely different. Its aim is to produce a stimulus in the muscles that triggers a process of adaptation. For this to happen, two things are crucial: An intense stimulus and enough time for the muscles to recover and adapt.

So, the right intensity is crucial for success?

Exactly. We know that there is a stimulus threshold which has to be surpassed. Otherwise the body has no reason to adapt. The stimulus must exceed this threshold to achieve positive effects. However, we do not know when the threshold is exceeded. After, for example, eight out of nine repetitions we cannot be sure if we have already exceeded the threshold. For this reason, it is important to train to local exhaustion, i.e. to the point where we can no longer continue. Only then can we be sure that we have actually exceeded the threshold. That is why we talk of high intensity training, where the intensity is sufficient to trigger the adaptation process.

"Two things are crucial: An intense stimulus and enough time for the muscles to recover and adapt."

What happens if training is not intense enough?

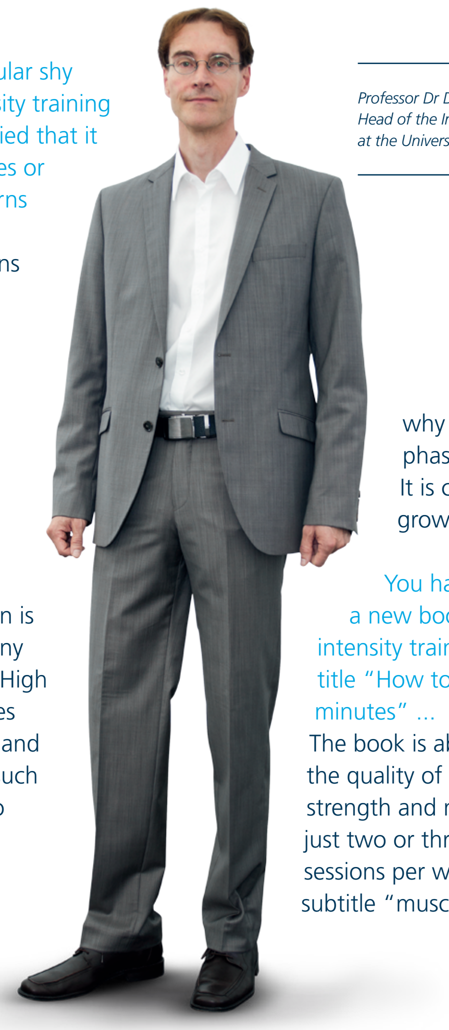
In the worst case scenario training is ineffective. Some people may not train with adequate intensity because they only want to gain “some” muscle mass but not too much of it. However, that is not how muscle building works. If you do not train intensely enough, you will not gain anything at all. Imagine you are in a dark room and want to turn on the light but fail to press the switch fully. The light does not come on because there is no electrical current. You have to press the switch firmly enough. This all-or-nothing principle applies to training as well.

Older people in particular shy away from high intensity training because they are worried that it might strain their bones or joints. Are their concerns justified?

As a rule, their concerns are unjustified. Terms like “high intensity”, “muscular failure” or “exhaustion” may be misleading and act as a deterrent to some. However, it is actually a positive if the intensity is high enough to exhaust the muscle. In fact, muscle adaptation is not only desirable at any age but also possible. High intensity training makes muscles larger, longer and stronger. In addition, such training is beneficial to health.

You also said that the recovery time was an important factor to be successful.

You can practise several times a day, but you should not train several times. After training, you need a recovery period. Usually this takes one to two days. If you train for hours every day, you are overtraining and will not recover. Training is actually catabolic but it triggers an anabolic adaptation process. If you train repeatedly during this phase, the catabolic effect, i.e. the process of breakdown, is greater than the build-up. That is why the recovery phase is so important. It is crucial for muscle growth.



Professor Dr Dr Jürgen Giessing
Head of the Institute for Sports Science at the University of Koblenz-Landau

You have just published a new book about high intensity training with the subtitle “How to build muscles in minutes” ...

The book is about optimising the quality of training to gain strength and muscle mass with just two or three short training sessions per week – hence the subtitle “muscles in minutes”. ■

RIBOSOMES

OUR PROTEIN FACTORIES

WHEN WE LIFT WEIGHTS ON THE MACHINES, ALL HELL BREAKS LOOSE IN OUR RIBOSOMES – THE BODY’S PROTEIN FACTORY. THIS IS WHERE THE BODY PRODUCES THE WIDE RANGE OF PROTEINS REQUIRED FOR MUSCLE BUILD-UP.

After a training session, the body starts to produce muscle protein. This occurs in the ribosome of a muscle cell where a total of 20 different amino acids provide the raw materials for what is known as muscle protein synthesis or translation.

Raw material for muscle protein

Both body and nutrient proteins consist of chains of amino acids of varying lengths. Our body can produce some amino acids itself and it can also recycle acids released when other protein is broken down. Other amino acids, we have to obtain from our diet: These are the essential amino acids.

When we consume dietary protein, our digestive system breaks down the protein into its constituent parts. These are then transported via the bloodstream to the muscle cell where they pass through the cell membrane into the cell interior. Finally, the amino acids recombine into chains in the ribosome on the basis of a detailed genetic blueprint.

Blueprint for muscle protein

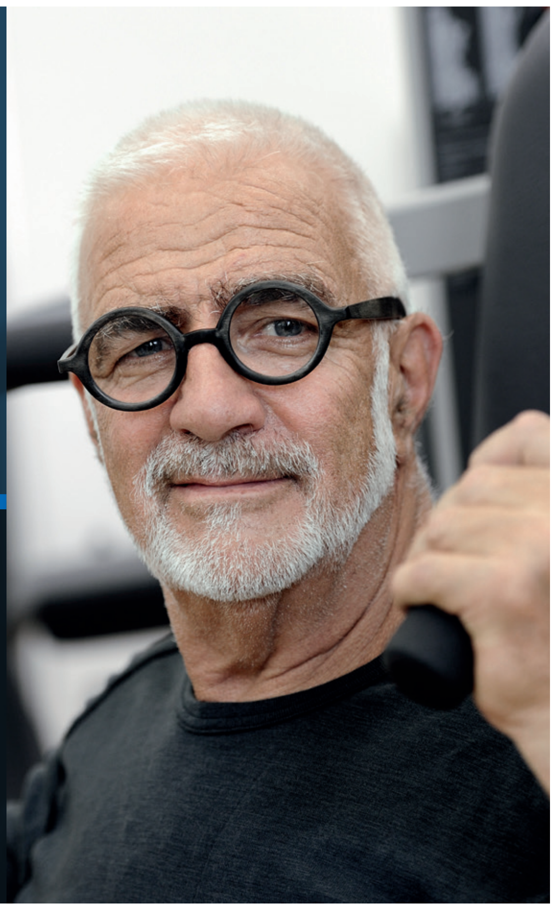
The nucleus of each cell contains our genetic blueprint: deoxyribonucleic acid, DNA for short. It consists – among other things – of four different bases, the sequencing of which determines the order in which amino acids are combined to form a specific protein.

First of all, a partial copy of the DNA is produced in the cell nucleus: the messenger ribonucleic acid (mRNA). This migrates to the ribosomes in the cells and is synthesised or translated into a sequencing of amino acids. This process is known as translation.

In fact, for muscle protein synthesis to occur, all 20 amino acids must be available at all times. If just one is missing, the production process stalls. ■

1) Nucleus
2) Nuclear pores
3) DNS
4) mRNS
5) Ribosome
6) Polypeptide (protein)

WERNER KIESER'S CORNER



DOES STRENGTH TRAINING MAKE US INFLEXIBLE?

Mirko Wolf, professional boxer and German lightweight champion, wrote his dissertation on "Strength Training for Boxers". When I mentioned to him that boxing trainers had previously told me that strength training reduced flexibility, he merely laughed and added: "Most people still believe that." In principle, however, the answer is no. Strength training does not make us inflexible. In fact, it is often the reverse.

Our flexibility depends upon two things: Firstly the flexibility of our joints and secondly the elasticity of our muscles. Joint flexibility depends upon bone structure and by the end of puberty it is more or less fixed and cannot be changed.

However, what we can influence is the elasticity of our muscles. Kieser Training is very good at doing that – provided that you train regularly on the machines and do each exercise properly throughout the entire range of anatomical movement. When sarcomere is added longitudinally in the myofibrils, muscle fibres become longer – and you more mobile. You will already know that if you have been training for some time.
Many years ago, I came across an excellent example of the fact that strength training had nothing to do with a lack of flexibility. Njue Jackson, a bodybuilder from Kenya was working in my studio. He had extremely well-developed muscles and in competitions regularly amazed his audience by ending his freestyle programme by doing the splits very elegantly. Not only were his hips very flexible but his muscles were also very elastic; despite strength training – or perhaps I ought to say – thanks to strength training.

If strength training is done correctly, there is no need to do additional stretching exercises. However, during any rehabilitation period, stretching may be appropriate. This is because joints are immobilised for short periods after surgery and this can reduce muscle elasticity; sarcomere breaks down in series and so the muscle becomes shorter and less mobile. In this case, physiotherapy combined with strength training may help you regain full mobility.

Werner Kieser

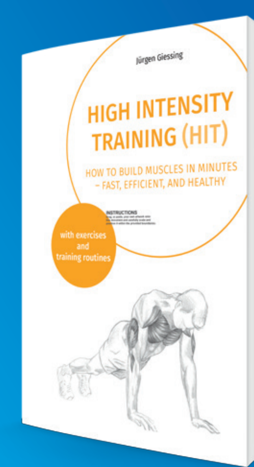
MUSCLE PLAY

Answer the following question and win one of three books:

What leads to an increase in muscle mass?
a) Strength training and chocolate
b) Strength training and proteins

Gießing, Jürgen:
High Intensity Training: How to build muscles in minutes – fast, efficient, and healthy. 2016. Books on Demand.

ISBN: 978-3739215570



Just email your answer (subject "muscle play") to: reflex@kieser-training.com

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RESISTANCE EXERCISE
INCREASES THE PRODUCTION OF MUSCLE PROTEIN

OUR BODY IS CONSTANTLY PRODUCING AND BREAKING DOWN MUSCLE PROTEIN. RESISTANCE EXERCISE INCREASES THE RATE AT WHICH THE MUSCLES PRODUCE NEW MUSCLE PROTEIN AND CREATES THE CONDITIONS REQUIRED FOR MUSCLE GROWTH, I.E. A POSITIVE NET MUSCLE PROTEIN BALANCE. DR MARCO TOIGO EXPLAINS.

"In order to build up muscle mass, we need a positive net muscle protein balance," says Marco Toigo, PhD. Toigo is a senior scientist at the Laboratory for Muscle Plasticity at Balgrist University Hospital, Zurich, where he investigates the molecular, cellular and systemic mechanisms of muscle adaptation.

The size of human muscle mass is determined by diurnal changes in rates of muscle protein synthesis and muscle protein breakdown. Toigo explains: "If the muscle protein synthesis rate exceeds the muscle protein breakdown rate, the net protein balance is positive, meaning that a small amount of protein is incorporated into the muscle. If, over time, periods and magnitudes of positive net protein balance outweigh those with negative net protein balance, which also do occur naturally, then muscle fibre hypertrophy will occur."

Two main anabolic stimuli are responsible for rendering the muscle in a state of positive net protein balance: "Resistance exercise and protein feeding," says Toigo. Resistance exercise effectively increases the muscle protein synthesis rate. According to Toigo, research has shown that a single bout of resistance exercise can increase the muscle protein synthesis rate for up to 72 hours by two to five times the starting rate. "Resistance exercise serves to potentiate myofibrillar muscle protein synthesis in response to amino acid feeding. That is the deeper purpose of resistance exercise," stresses Toigo.

However, the rise in the muscle protein synthesis rate after resistance exercise in the rested, fasted state is not enough to promote a positive net protein balance. "On the contrary, under these circumstances a single bout of resistance exercise without protein feeding in the subsequent hours and days results in a negative net protein balance. In the longer term, a negative net protein balance will lead to the loss of muscle protein," explains Toigo.

In short: It is best to combine the two anabolic stimuli, i.e. resistance exercise and protein feeding. ■

KIESER TRAINING