

# Reflex 43

The Kieser Training Magazine

## Not for those with weak hearts!

This was the dogma previously metered out to cardiac patients when it came to jogging, cycling or similar activities. It was considered much too strenuous to lift weights and strength training was regarded as far too dangerous because it increased blood pressure. However, even scientists can err and revise previous dogmas. In medical circles, the new mantra for cardiac patients is to lift weights. There is now evidence that strong muscles reduce the strain on the heart.

# 40

Let's take an example: two men climb the stairs. One does training and the other does not. The one who does not training has to use every available muscle fibre to climb the stairs. In contrast, the other man only uses 50% of available fibres because each fibre is stronger. In the untrained man, pulse rate and blood pressure increase by much more than in the trained man – the latter has something left in reserve. This pays dividends as the trained man's heart needs less oxygen – up to 40% less than his untrained colleague. In essence, strong muscles protect the heart in daily life, including that of cardiac patients.

However, patients with heart problems must train at the right intensity. For example, isometric exercises are "out"; exercises must be dynamic. Patients should "feel" the load; from the subjective perspective, training ought, if anything to feel slightly on the light side or only slightly difficult. In that case the training is right: That means low weights, gradual increases from week to week, a maximum of 8 to 10 exercises and a maximum of 12 repetitions per exercise. The way to a strong heart!



## The Yukon Myth

**Almost no other river is so synonymous with wilderness and adventure. The Yukon winds its way for more than 3,000 kilometres through the solitude of the North American tundra.**

**Dirk Rohrbach, doctor, journalist and Kieser Training customer wanted to embrace this myth – alone in a self-built canoe.**

"It's probably down to Jack London! For my 18th birthday I was given 'White Fang', 'Burning Daylight' and the 'Call of the Wild,'" explains Rohrbach. "I devoured his books with increasing fascination. Whenever I saw pictures of the North or heard stories my yearning grew." However, it was not until spring 2010 that Rohrbach quit his job as a radio presenter for Bavarian Radio. His first stop was Tom Byers in the Canadian forests of Ontario. Tom is one of the few who still has the skills needed to build a traditional canoe. "I really wanted to make the trip in a canoe made from birch bark – and not just because they look great," says Rohrbach. "The more than twenty settlements and villages along the Yukon, primarily in Alaska are the traditional home of the original inhabitants and are only accessible by bush plane or boat. The interior belongs to the Gwich'in Athabasken who previously made their boats from birch bark. In particular, I wanted to meet the local people and hoped that an authentic canoe would open doors or at least make contact easier."

When the boat was ready, Rohrbach first of all drove his 40-year old truck

"Loretta" to Skagway in Alaska, some 4,000 kilometres further north and the actual start point for the trip. Carrying 25 kg on his back and with a bad knee, he first had to cross the steep Chilkoot Pass to the mountain lakes that later become the Yukon. He started the actual canoe trip from Bennett, initially following the route of the Klondike gold prospectors. "The tension that had built up during the preparations gave way to a feeling of joy that I was finally starting. I carefully pushed the paddle into the crystal clear water of the lake and took a deep breath. I was on my way to the Bering Sea that – hopefully – I would reach in about 3,000 kilometres time." Within Alaska, the Yukon changes from a wild stream to a river several kilometres wide as it meanders through the Alaskan marshes. On route, Dirk Rohrbach met hunters, fishermen and others escaping from modern life. He spoke to chiefs and trappers and ate caribou, moose and freshly-caught salmon with the locals.

On his ten-week trip through the wilderness of North America he met some wonderful people and became familiar with a world of unforgiving rawness

but stunning majesty. "Confronting the power of nature but also myself was both a challenge and a fascination," says the 43-year old doctor. Of course, this required not just mental strength, "I realised that physical preparations were equally important and so my training focussed primarily on the shoulders and back as it was these areas that would be under particular strain. Admittedly, the one-sided paddling action did cause me a few problems but I was quickly able to remedy this on my return by doing Kieser Training." His wish now – to revisit the people of the Yukon who so impressed him.



## Dear Reader,



"What prompted you to make your own machines when there is already a glut on the market?" I was asked this by a visitor to FIBO 2011, the world's largest trade fair for the fitness industry. The answer is simple: The fitness industry seems to offer what is requested but not what is actually needed.

For example, I spent a long time looking for a machine that could train the anterior tibial muscle. This muscle is particularly important for runners as it can prevent the muscle imbalances caused by the single-sided training of the calf muscles. As I couldn't find one, we developed our own machine. That is why our facilities have machines that you won't find anywhere else.

At this year's FIBO – from 19th to 22nd April in Essen (Germany) we are presenting three new machines, which are currently on test in our three Zurich facilities: one machine is for the outward rotation of the foot (supination) and the second is for inward rotation (pronation). Training on these two machines stabilises the ankles and reduces the risk of falling. The third innovation is the pelvic floor machine. For the first time, there is a machine that visualises the training of pelvic floor muscles and quantifies progress.

Werner Kieser

# KIESER TRAINING

STRENGTH FOR HEALTH

# Sciatica – it gets on my nerves

The “Nervus ischiadicus” – also known as the sciatic nerve – is the longest and thickest nerve in the body. It starts in the lower back and passes through the buttocks into the legs. It controls all the muscles and sends messages back to the spinal cord and brain in the event of problems. The term sciatica is used to refer to pain with varying causes that radiates from the lower back into the legs.



If a prolapsed disc presses on a nerve root, the patient experiences a tingling sensation, pins and needles or pain in the nerve supply area.

## Sciatica, lumbo-sciatica or lumbago?

Sciatica is the term used in everyday language. However, doctors make quite clear distinctions. They use the term sciatica to denote pain in the sciatic supply area. Lumbo-sciatica is used to denote pain radiating from the lower back or hip into the leg and “lumbago” is used if the pain does not radiate. However, even if we pinpoint the location of the pain, it does not tell us much about its cause. Often, the problem has nothing to do with the sciatic nerve.

## Discs – seldom the culprit

An intervertebral disc is only involved in a maximum 15% of cases. Here, a disc presses on a sciatic nerve root and triggers a tingling sensation, “pins and needles” or pain in the sciatic supply area. Depending upon the intensity, the pressure may also

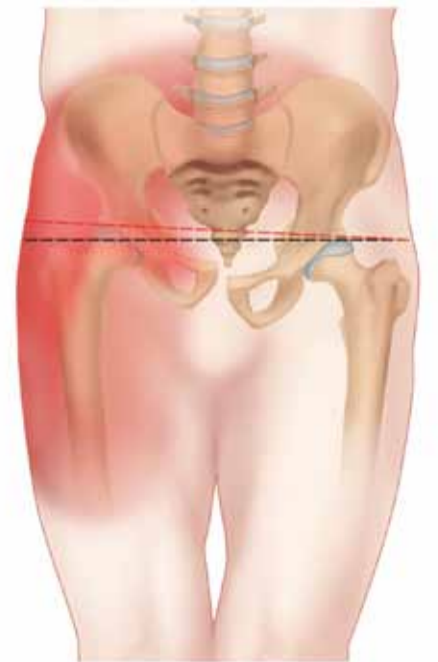
affect the nerve fibres that control the muscles and reduce strength or even cause paralysis.

## Facet joint syndrome – the most frequent cause of pain

The other 85% of patients are suffering from harmless but irritating problems. If the sacroiliac or facet joints lock or if the patient is suffering from muscle tension or irritated tendon insertions, this can produce a mixture of confusing symptoms. A very common cause is the locking of the sacroiliac joints. That’s not surprising because the entire weight of the upper body is transferred to the pelvis via the triangular sacrum. This high load makes it prone to locking.

In addition, the pelvis can become twisted, i.e. one half of the pelvis can glide forwards or backwards meaning that hip joints are at dif-

fering levels and so patients have a lopsided walking gait. Patients will experience diffuse pain in the lower back, hips and groin which often radiates into the legs. This makes sleeping difficult and first thing in the morning patients are stiff in the lower back. This stiffness eases when the problem joints are “warmed up”. Standing or sitting for long periods makes the pain worse whereas brisk movements almost always improve it. If symptoms subside, this is followed by a deceptive calm. The locked joint may be “silent” but if the problem is not remedied the calm will be of short duration. Where the pain is caused solely by chronic muscle tension, it is known as “myofascial back pain”.



If the sacroiliac joint locks, the hip joints are at different levels and the pelvis is lopsided.

Illustrations: © Holger Vanselow

## What effect does Medical Strengthening Therapy actually have on ... ... sciatica?

For patients with a disc problem, the treatment – whether cortisone injection, targeted physiotherapy or surgery – has one initial aim: to release the trapped nerve and with it the damaging pressure. If this is done early enough, the symptoms abate and strength returns. However, disc and facet joint degeneration (wear and tear) also reduces spinal stability. This is where Medical Strengthening Therapy (MST) is needed: MST replaces the lost intrinsic stability by creating a powerful muscle corset and

so maintains mobility. The special technology used in the machine makes it highly effective. The so-called “hip-lock system” secures the pelvis in a way that allows targeted and effective training of the deep back extensor muscles. In addition to training these “primary” spinal stabilisers, MST also strengthens the torso muscles that help to keep the spine in position. In about 80% of cases, pain will diminish and load capacity returns after 8 – 12 weeks.

For patients with facet joint problems, it is important, particularly at the start, to do targeted exercises that mobilise the locked spine. However, it is equally important to strengthen the muscles in order to prevent a recurrence.

Medical Strengthening Therapy often achieves both: it strengthens the muscles and simultaneously mobilises the joints and so joints are released spontaneously. If this does not happen, manual therapy is required to release the locked

joints. After that, patients can continue Medical Strengthening Therapy – in most cases without a problem.

In most cases, myofascial back problems also respond well to training. The principle is simple: The powerful contraction that occurs during training automatically releases the chronic muscle tension. If patients take a hot bath in the evening after training, this relaxes muscles further.

## Doctor’s tip

# What to do about sciatica?

Many people are driven to despair by chronic “sciatica”. They consult doctor after doctor and seek out numerous therapists. However, their hope of a cure is always in vain. Often this lack of success with doctors and therapists eventually results in a prescription for psychotherapeutic medication.

In most cases, this is the result of a sloppy diagnosis and undue emphasis on technical investigations. Technical equipment does not diagnose. It produces findings. To obtain an overall picture, you must also examine patients and listen to what they say. If an investigation fails to include the muscles, i.e. is there any atrophy, tension, shortening or insertion irrita-

tion and if it fails to include a functional test of the facet joints, the picture remains incomplete and so skewed. The crux of the argument: treatment cannot succeed unless there is a sound diagnosis.

In the past, back patients were prescribed back rest. This resulted in a loss of muscle and so a reduction in spinal stability. We now know better. If patients, including those whose spine is “com-



Dr. med. Martin Weiß

pletely shattered”, strengthen their muscles, this can improve their life dramatically.

In my experience, MST prescribed by a doctor often alleviates or cures pre-existing problems going back decades and frequently makes surgery unnecessary. The greater the wear and tear and the longer the duration of symptoms, the weaker the back muscles will be and therefore greater the improvement with MST. Many of my patients have found it to be their salvation. Pain diminishes, load capacity increases and quality of life improves.

So my tip is not to give up but to give it a try.

Text on this side: Dr. med. Martin Weiß

## Reflex

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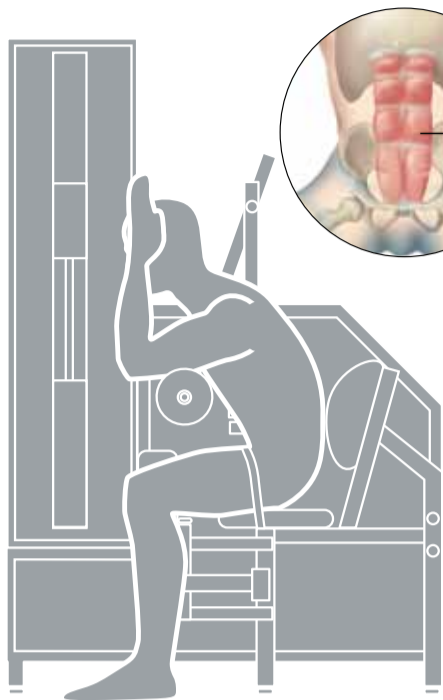
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## F2 – abdominal



Straight muscle of abdomen (M. rectus abdominis)

F2 (abdominal) – it’s a challenge in any Kieser Training programme. Very few exercises look so simple but are so difficult in practice.

Strenuous it may be but it is really beneficial to strengthen the straight muscle of the abdomen. It is the antagonist muscle for the back extensors and provides them with

considerable assistance. If the abdominal muscle is too weak, the pelvis tends to tilt forwards. This in turn pulls the lumbar spine forwards and can increase for example a lordosis (hollow back).

So what is the right way to do the F2? Sit in the machine and adopt a relaxed posture, i.e. keep the pelvis relaxed and forward. In this way, you cannot use the hips to do the exercise. In addition, when doing F2 don’t jerk forward like a flick knife. Rather curl the chest slowly towards the neutral and hips taking the most direct path. Your lower back should remain in contact with the back pad throughout the exercise. Many customers instinctively hold their breath. That is incorrect. Keep breathing normally.

## Expert’s Tip

As early as the 1940s, questions were being asked about the right number of sets per exercise if you wanted to maximise strength increases. Even today, opinions remain divided although the evidence is that the same benefit can be achieved from a range of set numbers per exercise.

Kieser Training is strength training with one set per exercise. The reason for that is quite simple: if you want to increase strength, you must train muscles to the point of complete fatigue. To achieve that, you need high resistance and motivation. If all active muscle fibres are exercised to total fatigue, this acts as a signal to the body to activate additional fibres and also to increase the size of existing fibres. One set is all you need to achieve this. If you train to complete local fatigue, you cannot do a second

set at the same intensity and so, additional sets would provide no additional benefit. Quite the reverse, it would impose an additional strain on the nervous system. Similarly, if you stop the exercise before local fatigue, the training is less effective and this applies, even if you do one, two or three sets.



Anika Stephan  
Research & Development Kieser Training

## Latest research – Muscle training, that’s using your brain

The final repetitions are the worst – we all know that from our (strength training) experience. Even though our muscles can manage a reasonable number of repetitions relatively easily, they certainly make their presence felt during those last few seconds – we experience a nasty burning sensation. Each movement takes progressively longer and the weight feels increasingly heavy; the training becomes really strenuous. Those cursed muscles – why do they feel so limp?

This was also a question asked by researchers from the University of Zurich

and the Swiss Federal Institute of Technology in Zurich. Until now, it was thought that muscles were to blame for the reduction in strength that occurs when you train. However, an interdisciplinary team consisting of neuro-psychologists and sports scientists has now shown that our muscles are pretty savvy when it comes to training – the muscle fatigue also occurs in the brain. The study found that neural processes reduce muscle activity during a tiring task. That makes sense: This built-in “brake” protects us from undue strain and allows us to keep some strength in reserve

for emergencies.

The researchers performed several tests in order to demonstrate this cooperation between muscle and brain. First of all, they tested the muscles themselves: Test subjects were asked to repeatedly contract the thigh muscles until strength faded. It was found that they could continue for significantly longer if the spinal cord was anaesthetised than if it were not. The reason: an anaesthetic interrupts the nerve impulses transmitted from muscle to brain – similar to the process by which pain information is transmitted

– and weakens the fatigue-related inhibitory processes emanating from the brain.

In a second study, the Zurich researchers, using magnetic resonance imaging, found that the brain regions that inhibit muscle activity are those that also draw attention to threats such as pain or hunger, i.e. the thalamus and the insular cortex.

In a third stage, researchers tested subjects on an exercise bike in order to substantiate their hypothesis that these messages from the insular cortex

played a role in the reduction in muscle activity.

Dr. Kai Lutz from the University of Zurich summed up the results as follows: “The findings are an important step in discovering the role the brain plays in muscle fatigue.” Both athletes and patients with limited muscle strength will benefit from these new findings. However, the final repetitions are still likely to be strenuous.

## 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 the implementation of these principles and so reason enough, therefore to revise them – hence our new column.

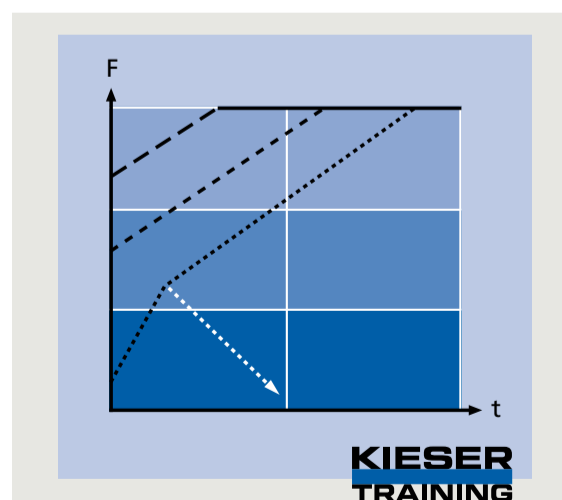
Any serious training plan must start by analysing the current situation. To do this, your first session included a detailed discussion on your health, any symptoms and of course your training aims. In addition, we made an initial assessment of your current strength using the “Positioning Board” (see diagram). We also used strength tests and back analyses to identify the actual strength of your main muscle groups. We then used your personal assessment and our objective data to design the right programme for you, i.e. one that succeeds. We also showed you how your training would develop based on current strength levels.

One of the aims of training is to achieve a gradual increase in strength levels so that you have sufficient reserves for daily activities and sport.

In addition, it provides many other positive physical benefits: increased stability of ligaments, tendons and bones, increased metabolic activity and a reduction in the load on the cardiovascular system and in back pain.

An essential requirement for training success is an acceptance that strength training is a long-term process. We must train regularly and intensively. The body works efficiently: what it doesn’t need, it gets rid of. If we stop training, we soon lose the newly acquired strength.

Our tip: Use your next check session to revise the positioning process with your instructor. Instructors will be pleased to tell you about strength tests and back analyses.



The diagram shows the three different strength zones: Axis F represents your strength and Axis t the time.

Where were you when you started training and where are you now? A regular assessment of strength combined with our strength tests will help you remain focussed on your training objective and check your success.

- **Upper area = high level of strength**  
If your strength is at this level, you have a high level of strength and some reserves that will help you in daily life. It won’t take you long to familiarise yourself with independent strength training and you will soon be able to train at a high intensity.
- **Middle area = average strength level**  
If your strength is at this level, you can train independently and gradually increase your strength to the next higher level.
- **Bottom area = marked muscle weakness**  
If your strength is at this level and you have health constraints, you should train with caution and only under the supervision of a therapist in order to increase your strength to average levels.
- **Thick, black line = your maximum genetic strength**  
Genetic factors determine maximum strength; it varies from person to person. Once you reach your genetic maximum, you cannot increase strength further.
- **White broken line = loss of strength if you stop training**

# Column Windows of opportunity

**The responsibilities of ageing**  
by Dr. med. Marco Caimi

In our latitudes, life expectancy continues to increase by one year with every passing decade. However, ageing is not just a privilege. It brings with it responsibilities. How we age is not primarily a question of fate or genetics but self-respect and self-maintenance.

Most ageing processes are linked to an organ that until recently was completely underestimated: the skeletal muscles. Whether the parameter is our cholesterol or blood sugar level, bone density, temperature regulation, body-fat content or our propensity to fall, all are directly linked to our muscles. And yet, even in the 1980s I only attended seven hours of lectures on that subject during my entire medical studies.

We are now familiar with the ageing phenomena and with the baby boom generation at least we should have understood by now that we don't have to walk with a stick, push a Zimmer Frame or become a burden to our children. There is an obligation on each and every one of us to look after our muscle capital in the same way that we look after our personal pension capital. If society fails to recognise this soon, the Euro crisis will be followed by another economic crisis – the no less serious crisis of an ageing population.

**Why do some children enjoy physical exercise and others become couch potatoes? Prof. Dr. med. Urs Eiholzer, specialist in child and adolescent health, explains why it's more than just a matter of luck**

**Professor Eiholzer, you run the Centre for Paediatric Endocrinology in Zurich. In your research, you have described two “windows of opportunity” that we must exploit if we are to promote child development. What are they?**

The first window is the “coordination window”; it is open from birth to 10 years of age. The second is called the “windows of opportunity”; it opens somewhat later, closing probably at the onset of puberty. It is highly probable that if we can make the best possible use of these two windows of opportunity, we equip children with good coordination and strength for later life.

**Can you describe that in more detail?**

Whether we want to run, jump or climb, this requires coordination and movement skills that are not innate – they must be learned. The ideal time to learn them is during the coordination window. In the first few years of life, brain development is not yet complete. The nerve fibres that we use frequently can be developed into “data motorways” along which nerve signals can be transmitted at speed. To achieve this we establish new connections between nerve cells and strengthen the insulating layer of surrounding fibres. Children need this brain plasticity in order to learn complex movements. Vice versa, it's



Photo: Michael Ingenweyen

only when children are continuously able to try out and practice new and difficult movements that they will establish the new connections and strengthen the insulation layers.

Not only do those with well-developed coordination skills normally derive greater pleasure from sport and physical performance but such skills

are also important for the development of perception, emotion, social behaviour and intelligence. In other words, they have a positive effect on the development of the personality as a whole.

**And the “strength window”?**

“Normal life” is not enough for the normal development of movement skills and strength. In particular, for all intents and purposes the only exercise that older children take is on the way to school or when they play a sport. Several of my studies have shown that strength training by children prior to puberty not only increases strength but also increases the pleasure derived from exercise. This in turn further increases strength and so further increases the joy derived from exercise – a positive example of the feedback principle.



Photo: Prof. Dr. med. Urs Eiholzer

**And so you support “sport instead of Latin”?**

In an ideal educational world, sport would be a central activity. Strength training is simply the type of training that achieves the maximum benefit for muscles in return for a brief outlay of time. Admittedly, strength training for children and adolescents requires significantly more supervision than for adults. Child coordination is far less developed than that of adults. In addition, children are less able to recognise their limits and respect them. This is why we created “EOM”, development-oriented muscle training. It takes account of not just age and general development but also pays particular attention to the level of coordination development.

**How important is it to embed strength training in society?**

The muscular system is one of our most important organ systems. As long as we live in a world where it is not used automatically, we must ensure that even children train their muscles and with it their strength. Otherwise, the result will be a disaster for the individual.

You can read the full interview at: [www.kieser-training.com](http://www.kieser-training.com)

## Fundamentals: Exercise quality

**Why do we need to train our muscles? What is a sensible programme for strength training? We discussed these issues with Dr. Marco Toigo, an Exercise Scientist and Biologist from Zurich**



Photo: Michael Ingenweyen

**Dr. Toigo, why is it important to train muscles?**

Maximum strength declines by 40 – 60% between the ages of 20 and 80. Additionally, most people who do no training will lose muscle mass between the ages of 40 and 50. The average annual loss is about 0.6%. This loss of muscle mass and strength can cause functional problems in daily life and reduce mobility.

**Research has shown that the effect on general health is equally devastating ...**

Correct! Weak muscles result in weak bones. In addition, a lack or only minimal use of muscles definitely encourages the development of chronic metabolic disorders such as Type 2 Diabetes. Weak muscles can have a serious impact on health and quality of life. However, if you train

muscles properly, you will almost certainly experience a marked improvement in health.

**And yet, individuals react very differently to strength training. What role do our genes play?**

Our genetic makeup plays a major role. For example, if you give a group of unfit men biceps training for three months, the average increase in the muscle cross-section will be 20%. However, there are significant variations. For some, the increase may be 0% whereas for others it can be up to 50%. If individuals record a significant increase, it is not easy to determine how much is attributable to the training method. As a result, there is little sense in blindly copying the training programme of so-called “high-responders” and expecting to achieve the same results.

**What is the right way to train if you want to increase muscle mass?**

Ideally, training should increase not

only the speed at which muscle protein is produced but also the DNA content of muscle fibres - for the latter, you need help from muscle stem cells – the so-called satellite cells. To date, there has been little research into the effect on these two mechanisms of different types of muscle training. Nevertheless, it is already clear that muscle fatigue, e.g. that achieved by training to total exhaustion within one to two minutes, stimulates an increase in the synthesis of muscle protein and that eccentric contractions activate the satellite cells. To increase muscle protein synthesis, you need a training resistance that ensures that you cannot continue an exercise for longer than this period provided the exercise is done slowly and in a controlled and anatomically correct way. In addition, training must be progressive. If you can achieve one minute under load at your first training session, you should try and extend this period at the next session. If you can achieve that, you can then increase the training resistance, etc. However,

do not increase the period under load or the training resistance at the expense of exercise quality.

**You mentioned doing exercises slowly ...**

This gives you greater control over exercise quality and allows you to maintain constant muscle tension with an adequate training resistance. Muscles can then be trained to the point of local fatigue without the risk of injury. This is essential in order to recruit as many motor units as possible. Each motor unit comprises a motor neuron, whose cell body is located in the spinal cord, plus the muscle fibres activated by this motor neuron. If muscles are to grow, the recruitment of motor units must be maximised. Exercise quality is, therefore a basic tenet of successful training – a fact overlooked by many.