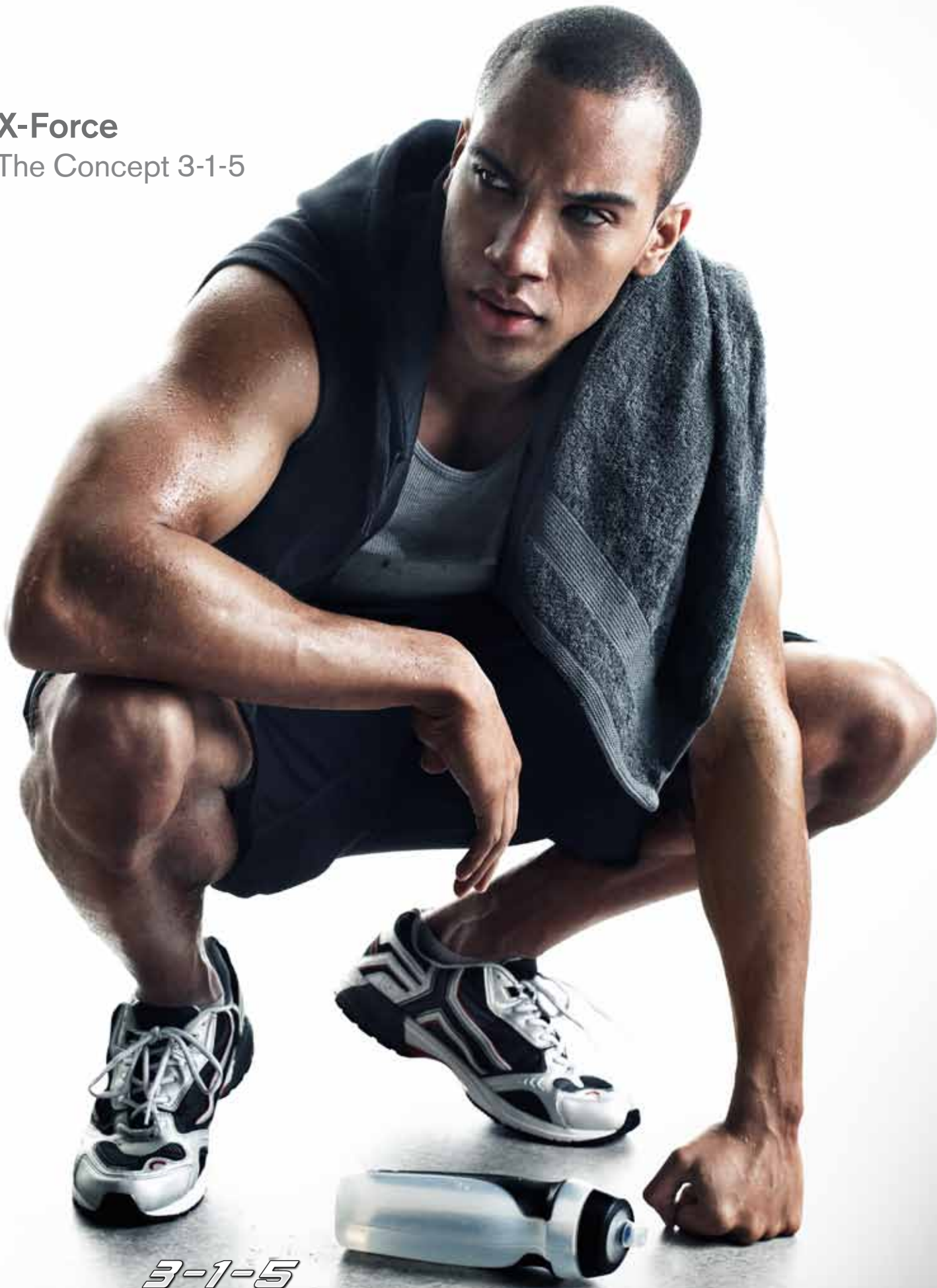


X-Force
The Concept 3-1-5



3-1-5



Negative training made easy

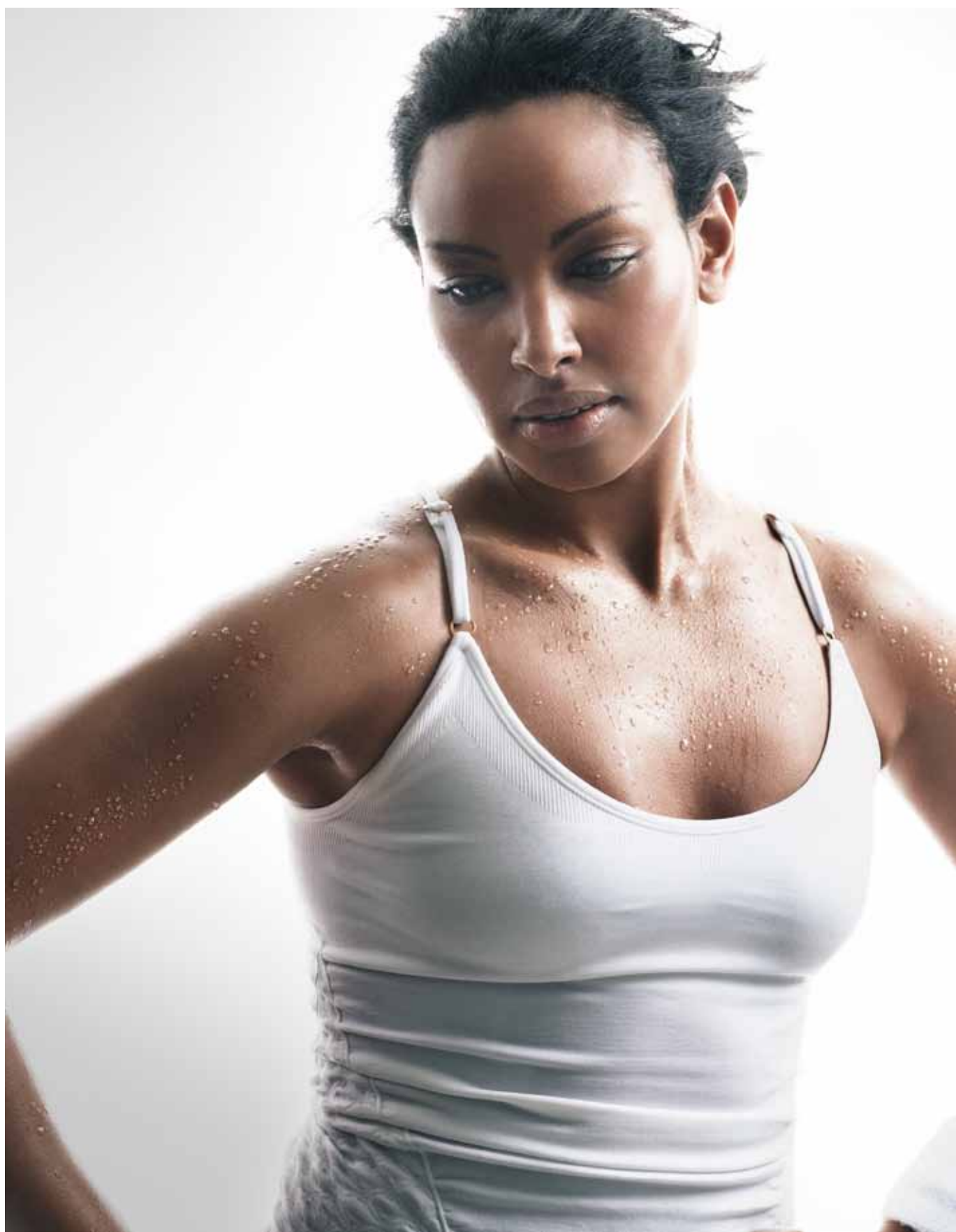


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Chapter I Introduction

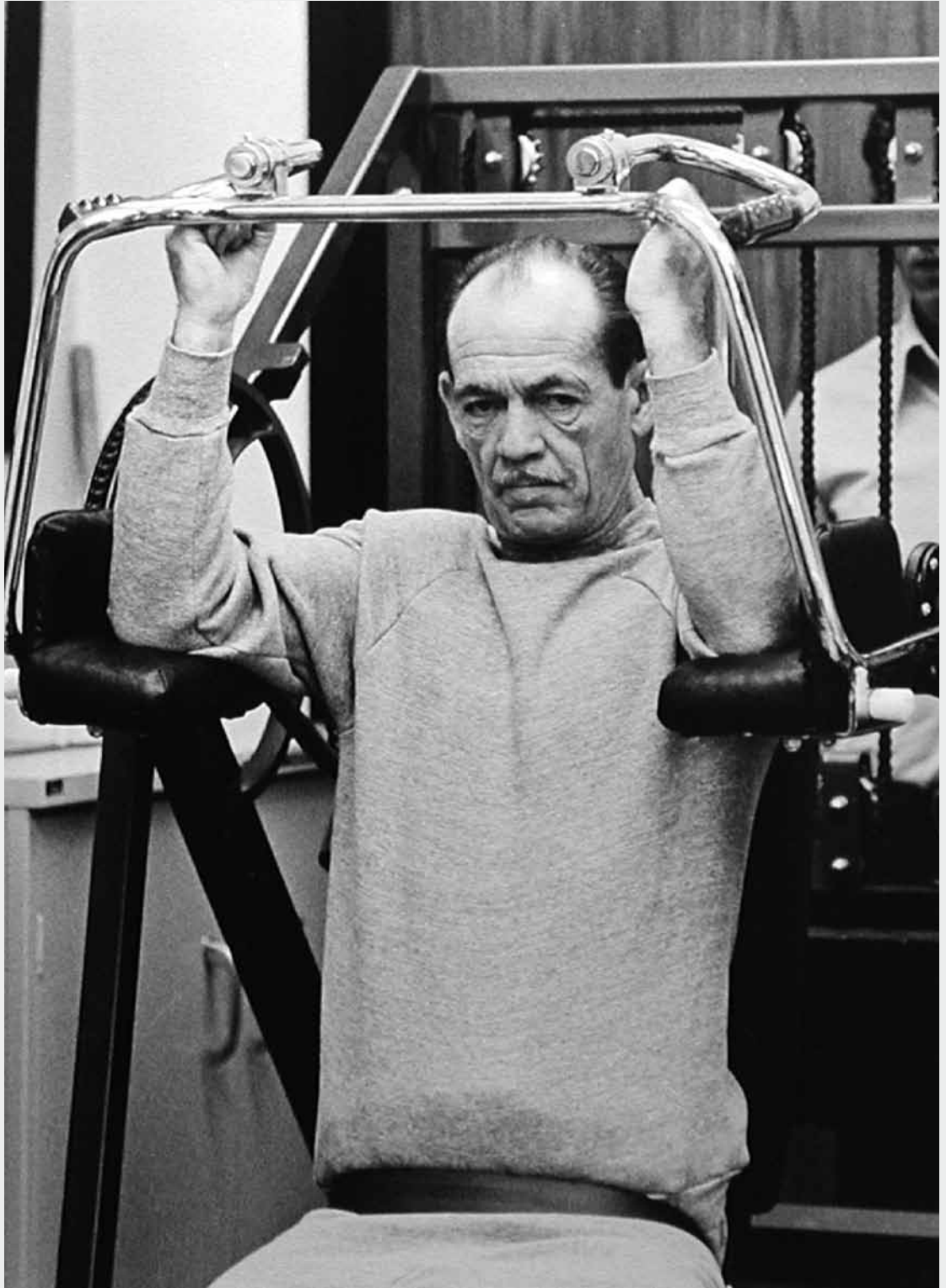
There is one problem with modern society, along with all its technological advantages, and this is that it has helped man evolve into a totally sedentary lifestyle. Ever since the beginning of the 20th century there has been a growing interest in man's need for physical activity. In the 1960s physiological research in this area focused on maintaining the function of the circulatory systems (aerobic conditioning). It was not until the beginning of the 1990s that the focus shifted towards exercising the locomotor systems (i.e. muscles, bones, joints and tendons). Today it is scientifically recognised that most of modern man's illnesses and increased rate of ageing is a direct result of a lack of locomotor exercise. The challenge for us now is to find a safe and efficient way to redress this imbalance. X-Force 3-1-5 is the answer to this challenge!

Recent research has been focused on the general effects of strength training on the musculoskeletal system. How and how often should we apply this type of training? What kind of muscle loading should we apply and how intense it should be? What kind of training would best strengthen and repair all tissue in the locomotor system (not only muscle tissue).

In any given exercise activated muscles can work in three ways;

- Concentric – the muscle contracts and shortens under tension.
- Static – the muscle is held in a fully or partially contracted position whilst maintaining high tension without movement.
- Eccentric (previously known as excentric or negative) – the muscle lengthens while it is kept under tension.

New research has focused on eccentric training, proving it to be the most effective way of building muscle as well as all other tissues in the locomotor system. The scientific evidence for this is visible in the higher than normal levels of delayed onset of muscular soreness (DOMS) that eccentric training generates. Eccentric training leads to faster depletion of muscle power compared with other forms of exercise. The reason for this is that muscles are better designed to work eccentrically as opposed to concentrically. A person performing an exercise with an elevated eccentric load can as a result be expected to complete fewer repetitions. The time it takes for a given exercise to exhaust the muscle is called the 'inroad'. It has also been proven that speeding up an exercise reduces muscle tissue growth rate (hypertrophia). Thus controlling the speed and load on muscles using all three forms of training (concentrically, statically and eccentrically) is the best way to optimise hypertrophic growth. Research has also proven eccentric training to be most effective in regard to the rehabilitation of damaged locomotor system tissue (i.e. it accelerates the repair process).



Arthur Jones

Chapter II The Importance of Strength Training

Historical Background

Strength Training History

From the beginning of the 20th Century man started using weights as a means to increasing strength and power. Dumbbells and barbells quickly replaced the early kettle bells, and by the mid-1960s, research had proven that heavy resistance and high intensity while training was necessary to ensure optimal muscle growth.

Around this time resistance training machines utilising pulleys were introduced. These allowed users to change the direction and amount of force more easily. However, these machines, as with barbells, would only allow muscles to work from a weak position, meaning that they could only work with a near maximum load over a short distance.

The first real breakthrough in resistance training was achieved by Arthur Jones, who designed and introduced the Nautilus Training System. These machines re-defined the future of resistance training. Combined with high intensity training and allowing no resting points throughout the movement cycle, they delivered result hitherto unheard of.

By the early 1970s scientists had concluded that strength training could be divided into three basic components; concentric, static and eccentric (also known as "negative"). Each of these was deemed to be vital to overall strength development. Eccentric (negative) strength was, interestingly, found to be at least 40% higher than concentric strength. But this fact failed to match the strength training programs at that time. The eccentric force when using barbells and dumbbells was never greater than the concentric, and in machines it was, in fact, often dramatically lower (due to friction).

Arthur Jones realised this and for many years tried to design functional training machines that incorporated the benefits of increased eccentric resistance. In two Athletic Journal articles Jones discussed "Negative work as a factor in exercise" and "Negative accentuated strength training". Jones saw clearly the benefits of eccentric training long before exercise physiologists and in doing so foresaw the benefits of combining concentric and eccentric muscular work. He also thoroughly discussed the problems surrounding constructing such a training machine.

Thanks to Jones's research, Dr. E. Darden, who ran the Nautilus Research Center and was a key figure in the famous 'WestPoint' studies, has since become a strong advocate of eccentric training. Darden has personally introduced eccentric training to many disciples and was consequently one of the first to be invited to participate on the X-Force Development Team.

Research during the 1980s and 1990s provide more evidence to show that increased eccentric resistance improved training intensity and efficiency. It was also proven that eccentric training was more beneficial in the rehabilitation of injuries, compared to concentric training. Most researchers agree, however, that a combination of concentric and eccentric work would be most beneficial. Many people have since tried to produce a machine that would combine these requirements and generate an eccentric force 40% greater than the concentric force.

The need for efficient strength training: do we really need muscles?

The causes of 80% of work related injuries are to be found within the musculoskeletal system:

- Muscular atrophy: muscle that is not used vigorously on a regular base is gradually broken down
- Pre-weakening of stabilising muscles: leading to overloading of the joints
- Cartilage growing thinner: leading to more frequent joint injury
- Overuse of remaining muscle fibres: leading to chronic pain

Strength training counteracts this – it gives us:

- The means to maintain or increase muscle mass
- Stronger bones – a stronger skeleton
- Thicker and firmer cartilage
- Increased metabolism
- Improved fat metabolism
- Lowered blood sugars
- Lowered blood fats
- Lowered blood pressure
- Improved back strength – by strengthening stomach muscles
- Reduced risk for joint wear that leads to joint pain
- Improved flexibility, strength and stamina
- Faster, more efficient healing

Why flexibility is important

Without agility, flexibility and normal range of motion in the joints, the body is more prone to injury. Low flexibility reduces the body's capacity for work and increases the risk for injury and illness. Reduced flexibility and range of motion is usually first experienced as fatigue and later on by injury or disease. To ensure full body stability and balance, the range of motion and flexibility in each joint should be normal. This is best accomplished using a structured



and well balanced strength training program performed on biomechanically well designed strength training machines (such as X-Force).



Why "negative" training? Because it's the future of strength and fitness training!

Eccentric training is also known as 'negative' training simply because it is the opposite of traditional concentric training, which has always been labelled 'positive'. In the positive training phase the weight is raised which means that the muscle shortens as it works. In the negative phase the opposite happens: the weight is resisted as it is lowered, which means that the muscle lengthens as it works.

Negative training has many benefits (the summary below is a condensation of findings from a number of studies made over the two last decades. The most significant studies and review articles are referenced at the end of this publication):

- Muscles can work with much higher loads eccentrically than concentrically; a greater load means more efficient workout and faster results.
- More work can be done eccentrically in less time; to improve muscle strength you have to overload the muscle (progressive training) and because the eccentric loads are greater, the muscles fatigue (reach failure) sooner.
- Eccentric work forces the muscle to work in the fast twitch mode; this results in increased explosive performance.
- There is greater neural adaptation to eccentric training compared with concentric training, along with a corresponding higher level of neural activity in each motor unit; the motor unit is the nerve cell controlling the action of a part of a muscle.
- Strength gains obtained through eccentric work will carry over to concentric work (cross education); but not vice versa!
- Compared with concentric training, strength gains from eccentric training will be maintained longer while de-training; muscle built using eccentric training (as opposed to using concentric training) is better able to withstand the breakdown process that starts when muscles rest.
- Eccentric work requires less oxygen than concentric, thus taxing the heart less; the slow eccentric phase does, however, tend to increase blood pressure during the workout.
- Eccentric training works the entire joint structure; this results in increased strength, stability, and range of motion as well as improved healing ability.
- Most preventive and post surgical physiotherapy is now eccentrically-based; muscles are forced to work under greater loads and this makes them more stable which in turn benefits joint structures; eccentric training gives more stimulation to the so called passive structures – bones, ligaments, tendons and cartilage – making them stronger and healing them faster and better.



Chapter III The X-Force solution

The fundamental point of X-Force, compared to other forms of training, is to deliver a combination of static, concentric and increased eccentric resistance.

Early machines utilising pneumatic or electrodynamic resistance failed to provide this combination. The first machine to be constructed was the Eccentric Jo-Jo, developed by Swedish strength-training physiologist Per Tesch at the Karolinska Institute in Stockholm. This machine provided extra eccentric force in leg extensions. However, there was no static component and it was not possible to maintain a constant 40% increase in eccentric force.

Recent research has now proven that eccentric training improves muscular strength and muscle growth better than concentric training does. As such, eccentric training can be expected to deliver far better results in regard to the development of tendons, ligaments, joint surfaces and skeleton – and the way fat is metabolised.

Eccentric strength training is recognised as a principal cause of DOMS (delayed onset muscle soreness). Simply by increasing the intensity in the eccentric phase (instead of decreasing it) a person training eccentrically will be able to work out less frequently and in shorter bouts.

Attempts have been made to apply these facts in commercial gyms, but up until now no machine has been able to provide a precisely regulated eccentric force combined with concentric and static components in the correct proportions. The X-Force is the first machine that actually meets these requirements. X-Force provides modern man with excellent way to get fit and stay in shape, as it helps him achieve greater muscular mass and strength by spending less time at the gym.

Benefits

Applying the full potential of the X-Force operating principle reveals several benefits. For example, research shows that a properly trained muscle takes from 48 to 92 hours to recuperate and be ready for another bout. The stronger you are and the more intense your workout is, the greater the need for rest. Our predictions indicate that a highly motivated person will require a rest period of ten days in order to recover completely!

The case for X-Force is strengthened 1) by the fact that training with this system also helps regenerate passive tissues (bone, cartilage, ligaments and tendons) and 2) by the way it accelerates recovery from injuries.



Mats Thulin, CEO & President, X-Force AB



X-Force Pec Seated Press

Invented and developed by renowned Nautilus gym chain owner Mats Thulin, the X-Force machine has finally made Arthur Jones's and the muscle research physiologists' dream come true!

– The X-Force Training Concept 3-1-5 –

In order to achieve optimum results in terms of muscle growth, improved joint structure health and stability in the shortest possible time, training intensity must be kept high and within the correct metabolic range. This means that failure to repeat the movement (muscle exhaustion) must be reached within 60 seconds, or the muscle cell will be forced to change its method of energy deliverance to one that bypasses the uses of oxygen (anaerobic) so that it instead produces lactic acid, which lowers muscle power output. Avoiding this change requires a special mindset: the trainee must work at a minimum of 80% of maximum power for one set only.

In ordinary (concentric) dynamic strength training one is expected to complete eight to twelve repetitions before reaching failure. In X-Force training, thanks to a high inroad (the inroad of a given training system is its capacity to exhaust muscles); the trainee can expect to reach failure in five to eight repetitions. In order to ensure the involvement of all three phases of muscular action (concentric, static and eccentric) we recommend a 3-1-5 approach. That is, three seconds of concentric work followed by one second of static work, and then five seconds of eccentric work. This is only a guideline to help the trainee understand and appreciate the distinct phases.

When training like this the trainee will feel in control but will very quickly become totally exhausted. He will not, however, experience the usual pain associated with reaching the 'sticking point'. In conventional training trainees will normally warm up with a full body cardiovascular activity (running, biking, skipping, etc.) followed by some light resistance movement for each major muscle group. The X-Force approach differs in that trainees perform only one set to failure for each exercise.

Training should also always be progressive. It should be possible to perform, with good form, eight repetitions for any particular exercise. The resistance should then be increased by 2-5% in the next workout. The trainee should strive to increase the work load or number of repetitions in each workout. However each muscle group should be worked a maximum of two times every 10-15 days in order to avoid overtraining

Building a really strong body can be compared to erecting a building – you need at least three pillars to guarantee stability. Those already familiar with training philosophy will know that physical training must also be combined with rest and sound nutritional intake.

Chapter IIII

Modern man - why the need for efficient strength training is acute

Un-adapted modern man – creating a workforce that delivers!

Life in the west is a paradox. Living standards have improved and yet never before have we suffered so much from sickness and disease such as heart disease, cancer and joint problems (according to the World Health Organisation lower back pain has now reached epidemic proportions). More and more people are afflicted by diabetes and those affected are getting younger by the year. We now live longer – but ironically we also spend more time treating diseases that are directly related to the lifestyle that has helped promote longevity! Is this really progress? To live longer in a less healthy manner?

Employers face today a dilemma never before encountered. Their employees are physically less able to fulfil the demands made upon them by their work and as a result they are more prone to end up on sick leave. Many companies have found as a result that they have to struggle to survive on a reduced turnover compounded by substantially increased production costs.

This trend can in part be explained by the failure of the human body to adapt itself to a lifestyle that is completely opposite to the hunter-gatherer lifestyle that has dominated over the last couple of hundred thousand years. The last century alone has seen huge changes in lifestyle that have helped us to live longer. The same improvements have ironically helped us to attract disease earlier and more severely.

Looking back we can conclude that the hunter-gatherer lifestyle made us energy cautious. It gave us an efficient metabolism, forcing our bodies to adapt to a lot of physical, sometimes very strenuous, activity. It forced us to push our cardiac and muscular systems to their limits on a regular basis. Our new information society lifestyle isolates us from these physical demands leaving our bodies open to suffer the disadvantages of prolonged inactivity. As a result much of our day to day focus has shifted from living and surviving to identifying sickness and curing it.

If companies and organisations are to remain viable and sustainable then they will clearly have to re-think and start to work more preventively.

Around 75% of the disease that plagues modern society can be directly related to five basic lifestyle choices:

1. Level and type of Physical Activity
2. Food choice and quantity, leading specifically to obesity
3. Tobacco consumption
4. Over-consumption of alcohol or other drugs
5. Living continuously stressed



By far the most important of these factors is the absence of physical activity. However, the scientific community recently found that cardiovascular activity alone is not enough.

The need for strength training as a part of physical activity

There is a profound and scientifically well documented need for effective strength training. Examining scientific facts will actually show that high intensity strength training will produce gains in the cardiovascular system (aerobic conditioning) as well as in the locomotor system (muscles, bones and joints). No form of aerobic training will ever have such an effect on the locomotor system!

In the absence of physical activity modern man runs an increased risk of experiencing most of the traits outlined below, by the age of 30.

Case scenario: 22nd Century office workers

Middle aged man, office worker:

Low physical capacity combined with poor eating habits results in a swollen belly with associated love handles on the hips. Together with a lack of strength and flexibility training, this individual is very likely to experience recurring back pain, epicondylitis (e.g. tennis elbow), shoulder pain, stress intolerance, fatigue and recurrent infections. Why?

Lowered levels of physical activity lead to reduced aerobic capacity, reduced fat metabolism and a general weakening of the immune system.

Poor eating habits encourage obesity as well as the onset of illnesses associated with obesity. The extra weight around the belly and hips shifts the core balance of the body forwards, thus overloading the lumbar back. Add to this a gradual depletion of muscle mass and decreased hamstring flexibility and the risk of developing more severe spine disorders increases. Low muscle mass combined with a poorly functioning circulatory system increases the risk for recurring pain and chronic inflammatory disease. Poor eating habits combined with low physical capacity also helps lay the foundation for sleeping disorders and stress intolerance.

Middle aged woman, office worker:

Continuous pain in the neck and shoulder region, vulture's neck, epicondylitis, painful knees, sleeping disorders and recurring headaches with continuous colds. Why? Women are significantly weaker in the lower part of the upper body compared with men.

Because they are generally more flexible in most joints, many women tend to work in sitting positions with shoulders that are raised and displaced forwards. This results in disorders

that can be felt for example as a continuous burning pain between the shoulder blades. To compensate, the chin is raised and jutted forwards, resulting in a painfully bent neck (vulture's neck), which in turn increases the risk for headaches and other related disorders. Decreased muscle mass combined with an increased accumulation of fat around the thighs and buttocks causes a gradual increase in pressure in joints, resulting in gradual joint degeneration and disability.

As with men, low muscle mass combined with low aerobic capacity increases the risk for chronic pain and inflammatory disease when working in sedentary and static working positions. Women, who sleep badly, eat badly and exercise too little run the greatest risk of developing serious sleeping disorders and advanced stress disease.

In summary:

- Lack of regular vigorous physical activity is by far the most costly disease factor; inactivity increases the risk of developing other disorders and illness.
- The solution to the majority of health related issues in the workplace is to ensure that the human body can cope with the demands made upon it; trying to adapt the work environment to the un-adapted human body is not enough.
- Physical activity is probably the most powerful way to counteract lifestyle-related illnesses; physical activity includes:
 - cardiovascular activity
 - conditioning for the musculoskeletal system
- One important by-product of these two kinds of activity should be increased agility.
- Cardiovascular training gives the heart and lungs the opportunity to maintain and increase our capacity to do work (i.e. perform physical activity). This capacity is the foundation or motor for everyday activity and should include a margin large enough to prevent pulmonary and cardiovascular disease. All that is required is an activity that will activate the major muscle groups in the body in a way that keeps the heart rate at 120 bpm or more for at least 20 minutes, two to three times a week. Many activities fall into this category: running, brisk walking, cycling, dancing, rowing, cross country skiing, physical group activities, etc.
- Cardiovascular activity does not, however, address the needs of the rest of the physical body i.e. the bones, joints, cartilage, ligaments, etc. It will not for example cause an increase in metabolism except for during the period during which the activity is performed. Nor will it increase the level of rejuvenating growth hormone. These needs are addressed only through proper strength training.

X-Force for general health and fitness

For functional strength, fitness and health we recommend one full body workout every 10 to 15 days. To those unfamiliar with negative training this might at first appear to be 'too little'. How this apparently low rate is interpreted and accepted among trainees depends upon how well they understand the X-Force concept.

Remember the key principles in successful strength training:

Movements should go with and not against the joint axis. They should be performed slowly and in a controlled manner (3-1-5) using heavy weights so that tension is maintained equally during the concentric, static and eccentric stages of the movement.

X-Force basic routine

- Horizontal leg curl
- Leg Quadriceps
- Leg press
- Lat back pull
- Lat back row
- Pec arm cross
- Pec seated press
- Deltoid lift
- Triceps press
- Biceps curl
- Abdominal crunch

Making progress using this routine usually involves removing some machines so as to avoid overloading the body. It is also recommended that the workout be completed within 20 minutes.

Subgroups

Men's fitness

For men, the general concept for X-Force will suffice, although slightly more emphasis on core stability and shoulder training would be reasonable from a preventive perspective. The emphasis should otherwise be on the form and rhythm (3-1-5) in each movement.

This should also take advantage of the individual's capacity to work the cardiovascular system together with the musculoskeletal system.

Those aiming to increase muscular mass significantly should start with a period of at least three months of conditioning based on the general training concept, followed by a series of routines with varying levels of intensity.

The X-Force base routine is recommended for the first three months, once every 10 days, alternating with intense cardiovascular training (running, cycling, rowing etc.). Other routines for developing agility and movement (body balance, step up, yoga) can be combined with this routine.

X-Force base routine

- Horizontal leg curl
- Leg Quadriceps
- Leg press
- Lat back pull
- Lat back row
- Pec arm cross
- Pec seated press
- Deltoid lift
- Triceps press
- Biceps curl
- Abdominal crunch

From the fourth month split routines can be followed. The number of workout sessions per 10 days can be increased to two. Intensity levels can be varied using a four 10 day segment workout cycle. For example, first 10 days – intense, the following 10 days – very intense, the next 10 day period – maximum intensity to failure on 7-8th repetition, and the last of the 10 day segments – low intensity.

After this a new cycle is begun starting at the level corresponding to the level used in the second segment (very intense) from the preceding cycle.

If training progress decreases or stops then it is recommended that trainees take a full break from strength training for two weeks before continuing. Trainees shouldn't be afraid to remove one or two machines from the suggested training sessions if they start to feel overworked or fail to progress as planned.

A routine

- Leg quadriceps
- Leg press
- Deltoid lift
- Deltoid press
- Lat back circular
- Biceps curl
- Triceps press
- Abdominal crunch

B routine

- Horizontal leg curl
- Leg Quadriceps
- Pec angle press
- Lat back pull
- Pec arm cross
- Pec seated press
- Lat back row
- Abdominal crunch

After two (four times 10 days) cycles, the routine can be adapted to deal with different parts of the body:

Example routines:

Legs

- Horizontal leg curl
- Leg Quadriceps
- Leg press
- Calf presses (performed in the leg press)



Chest & biceps (Abdominals)

- Pec arm cross
- Pec seated press
- Pec angle press
- Biceps curl
- Abdominal crunch

Back

- Lat back circular
- Lat back pull
- Lat back row
- Lat back row – one arm with twist

Shoulder & triceps (Abdominals)

- Deltoid lift
- Deltoid press
- Triceps press
- Abdominal crunch

Women's fitness

Women are genetically programmed to have a lower muscle mass in total, especially in the upper body. With oestrogen as the main anabolic hormone women can on average expect less muscle growth (hypertrophy) compared to men. Also, women can expect a more rapid decline in joint and muscular health, as oestrogen levels decrease with age.

One of the greatest misconceptions regarding female strength training concerns the female body's own built-in limitations to increasing muscular mass. While average female genetics does not allow for more than moderate hypertrophy, muscle to nerve response times (causing more than 30% of strength gain) are just as fast as in men.

Women are generally smaller than men and have a documented lower bone mineral mass and a higher susceptibility to degenerative arthrosis (breakdown of the joints). There is thus every reason for women regardless of age to engage in quality strength training. As western civilization in general and western women in particular struggle with obesity, the argument for effective eccentric strength training is overwhelming.

Strength training with X-Force can help women improve joint health and bone mineralisation, as well as develop a strong, lean body. Women should weigh their training regime slightly towards more upper body workouts and specifically work the core, shoulder and the back.

Trainees can begin with two workouts every 10 days. Once the trainee is content with her strength development she can then cut back to one workout a week. If more fat loss is desired then the number of workouts should be kept up (two to three per week). As discussed earlier, increasing muscle mass will automatically increase fat metabolism, even when the muscle is at rest. If training intensity is reduced too much, or the resting period becomes too short, then muscle growth will also be reduced.

Example routines

A routine

- Lat back pull
- Lat back row
- Lat back row – one arm with twist
- Deltoid lift
- Deltoid press
- Triceps press
- Abdominal crunch

B routine

- Leg Quadriceps
- Leg press
- Pec arm cross
- Pec seated press
- Pec angle press
- Biceps curl
- Abdominal crunch



Seniors

Increased longevity and the increasing numbers of seniors in society make this group very interesting. Studies have demonstrated that the musculoskeletal system benefits greatly from strength training regardless of age.


Seniors are however more prone to injury and will in general be less motivated to exert themselves, making eccentric training an ideal option for this group.

One general principle for this group is to lower training intensity and focus more on the control of speed and movement. This group should also be encouraged to rest well between workouts as well as to eat enough of the essential nutrients required to ensure the body recovers fully. Core (abs and back), shoulders and leg extensors are muscle groups that typically require additional attention.

When injured, elderly trainees should adapt their routine so that the functional parts of the body are kept working as normal while injured part is rehabilitated according to its ability. This will often mean a slight reduction in range of motion and resistance while increasing the number of repetitions.

Example routine

- Leg press
- Leg Quadriceps
- Lat back row
- Pec seated press
- Deltoid lift
- Triceps press
- Biceps curl
- Abdominal crunch



Teenagers

A consensus among medical professionals, based on several studies, is that physical activity is a prerequisite not only for the normally functioning of the body but also for the normal, healthy development of the mind. Adolescents should therefore be encouraged to strength train, as this will impact positively on their overall health and development.

The risks associated with overloading developing tissues are reduced or even eliminated when using an eccentrically-based and carefully managed X-Force regime. The programs should always include the full body and the loading should always be set in relation to body weight.

Example Routine

- Leg press
- Leg Quadriceps
- Lat back row
- Pec seated press
- Deltoid lift
- Deltoid press
- Abdominal crunch

Fat Loss

It has long been recognised that strength training (increasing muscular volume) increases passive and active metabolism (energy expenditure). The elevation of metabolism following strength training lasts much longer than that following cardiovascular exercise such as running.

Several independent studies have recently demonstrated that eccentric strength training has an even greater effect on metabolism. For example, after a heavy eccentric strength training bout fat metabolism can be expected to remain elevated for up to 90 hours (four days and nights)!

Maximising fat metabolism requires long-term planning. In general, total calorie intake should not only be lowered but should also vary slightly from day to day. Days free from strength training should be used for cardiovascular activity, partly to increase metabolism but mainly to increase aerobic conditioning and thus the ability to metabolise fat. It is recommended that trainees use the X-Force base routine every third to fifth day. This will not maximise muscular growth but it will help maintain a high level of fat metabolism.

X-Force Base Routine

- Horizontal leg curl
- Leg Quadriceps
- Leg press
- Lat back pull
- Lat back row
- Pec arm cross
- Pec seated press
- Deltoid lift
- Triceps press
- Biceps curl
- Abdominal crunch

For cardiovascular exercise it is best to choose an activity that is appealing and that engages as much of the body's muscle mass as possible in a dynamic fashion (tension followed by relaxation). Such an activity should increase the pulse to 120 bpm or more, for between 20 to 40 minutes. This should tax the cardiovascular system at no more than 70% of maximum cardiac (heart capacity) output. A person's maximum pulse rate can be calculated using the formula 220 minus age.

Using this base routine will ensure slow but continuous loss of body fat while muscles are at the same time stabilised and toned.

Athletes

The modern athlete knows that strength training is the backbone of success. He/she will want to spend as little time as possible building the necessary strength and stability needed to succeed in his/her special sport so as to be able to concentrate on developing technique and timing.

Competitive athletes will tend focus on strength and plyometric training routines adapted to suit their specific needs. At the same time, all athletes still require a firm foundation for their general strength training. This foundation can easily be built and maintained using the X-Force system. Such training should be included ideally during low season training with not more than one session a week during this period.

The standard X-Force routine can be used initially, and then modified with special emphasis on specific muscular strength or power needed in each sport. For example, a wrestler might want to focus on strengthening the arms and torso, and a runner the legs and torso.

X-Force Base Routine

- Horizontal leg curl
- Leg Quadriceps
- Leg press
- Lat back pull
- Lat back row
- Pec arm cross
- Pec seated press
- Deltoid lift
- Triceps press
- Biceps curl
- Abdominal crunch



Extreme Muscle Building

Bodybuilders and power athletes are usually more knowledgeable and more focused on achieving optimal result compared with 'ordinary' members of the general public.

Often, by natural selection, these specialist trainees tend to have greater than normal regenerative, recuperative and healing abilities, meaning that they will more easily cope with a larger number of sets and/or repetitions as well as more frequent training bouts. These individuals will also have a clearer understanding about the parts of their strength/body development they want to alter, and will adapt their routines accordingly. Normally they will split their training into different body part sub-routines. These extreme trainees may in a few cases benefit from a higher number of sets.

For those not belonging to this category working out in this manner would be a mistake as it would more than likely invite injury and prevent progress in muscular development and strength.

The following is an example of a two-split routine. Recommended time frame is to complete the workout within 20 minutes.

A Routine

- Leg Quadriceps
- Leg press
- Deltoid lift
- Deltoid press
- Lat back circular
- Biceps curl
- Triceps press
- Abdominal crunch

B Routine

- Horizontal leg curl
- Leg Quadriceps
- Pec angle press
- Lat back pull
- Pec arm cross
- Pec seated press
- Lat back row
- Abdominal crunch

This routine works the whole body in two sessions. Those intending to increase the number of workouts without overstressing the system are advised to separate body parts completely.

Remember to rest sufficiently between workouts and to always train progressively.

Example Routines:

Legs

- Horizontal leg curl
- Leg Quadriceps
- Leg press
- Calf presses (performed in the leg press)

Chest & Biceps (Abdominals)

- Pec arm cross
- Pec seated press
- Pec angle press
- Biceps curl
- Abdominal crunch

Back

- Lat back circular
- Lat back pull
- Lat back row
- Lat back row – one arm with twist

Shoulder & Triceps (Abdominals)

- Deltoid lift
- Deltoid press
- Triceps press
- Abdominal crunch



Rehabilitation

The accepted basis for modern rehabilitation training is performing several sets of high repetition exercise with low resistance. So where does X-Force come in?

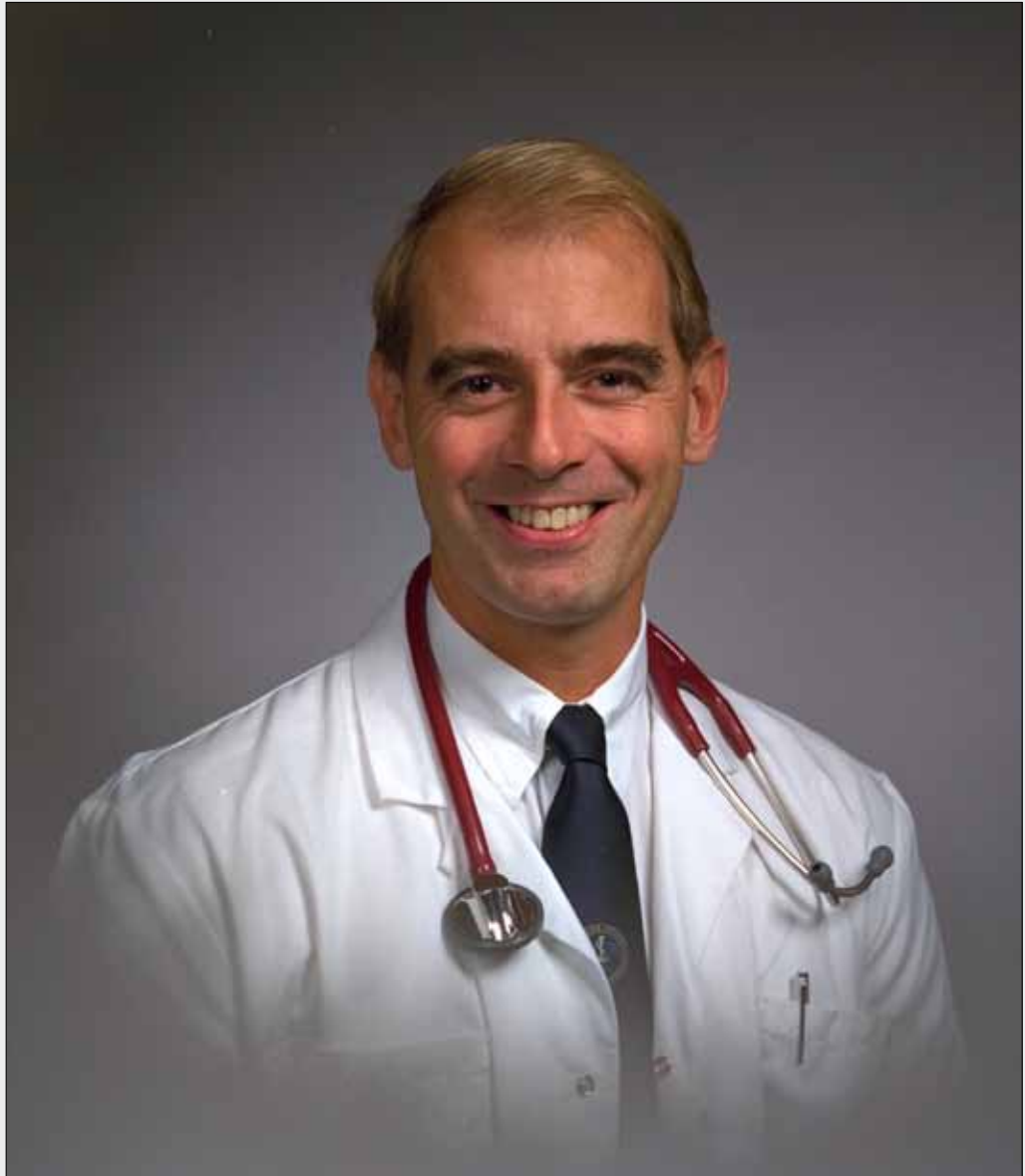
The answer to this is: the single most crucial factor to the effectiveness of rehabilitation lies in the ability to apply and control eccentric resistance.

Using X-Force, a physiotherapist would typically guide the patient through the exercise, controlling range of motion, aiding in the concentric phase but allowing the patient to handle the eccentric phase. Uninjured parts of the body would be trained in a conventional fashion in order to prevent deterioration of uninjured structures due to inactivity. X-Force plans to market an exclusive rehab series in the not too distant future.

During rehabilitation one would, for example, choose movements that engage the injured part and then perform 15-25 repetitions in the X-Force manner for three sets, with two to three minutes rest in between each set. Remember, the strength and function of uninjured parts of the body should be maintained by strength training in a normal manner.

Example: postoperative rehabilitation of injured ligamentous structures in the knee.

1. The Horizontal Leg Curl and the Leg Press should be excluded from the normal routine.
2. Perform leg extensions on the Leg quadriceps machine. 15-25 repetitions with eccentric emphasis and a total of three sets.
3. Following this, training on a stabilising board.
4. When this is completed, follow up with the rest of the full body routine.



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Chapter V Conclusions

Summary

Observing modern man's continuously decreasing level of physical stimulation from work, it is not hard to predict an increased need for daily physical stimulation to minimise health risks and maximise quality of life. Recent research has proven strength training on regular basis to be a key element in this activity. The application of negative accentuated resistance training makes this requirement fast and easy to satisfy. X-Force is the only existing exercise system today that meets these demands.

Recommendations

Incorporate a high intensity X-Force training routine once every 10 days into your lifestyle and you will be sure to experience most of the above cited benefits.

Future Research and Development.

- The X-Force team is already developing core specific machines and specific rehabilitation machines.
- X-Force is the first to offer an easy-to-manage negative accentuated training device.
- The X-Force team have a three staged research agenda. We will conduct studies to verify the effectiveness of this training, Studies that will quantify the elevation of fat burning and studies that will quantify the arresting effect on muscular breakdown in seniors.
- A further field of study is rehabilitation research where eccentric training has already proven to be highly effective.

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