

Section 7 :

Weight Training

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Section 7 : Weight Training

Weight Training - An Introduction

Almost every muscle group is used in rowing, some in a dynamic way whilst others are used to stabilise the body. Any weakness or muscle imbalance will lead to poor technique and possible injury. Weight, or resistance, training is a way to address this and gain improvements in strength. One advantage of weight training when used in conjunction with rowing training is that the muscles used simultaneously during the rowing action can be developed individually, removing any muscular inequality while developing structural strength. However, weight training for rowing is not just about the development of "Structural Strength". Like any complicated movement rowing requires the body to learn the movements in order that they can become automatic. When you first learn a skill, especially a complicated skill like rowing, riding a bicycle or driving a car, it takes your entire concentration. You make mistakes and are unable to concentrate on anything else at the same time but as you become more proficient at the skill it requires less of your brainpower to do it and in the end it becomes fully automatic.

The Skill Strength Connection

A common feature amongst people who are really good at their job, whether a top class athlete or a skilled craftsman, is that they make it look so easy. When we try to emulate these experts we realise that it is not as easy as it looks and it is from this experience of failure that we appreciate what they have achieved. Strength is the basis for all movement, but this does not necessarily mean that the more skilled people are stronger; it simply means that they use the strength that they do have more efficiently. They achieve this by creating a closed circuit where all their effort is directed to the task. All parts of the body that are not directly involved in achieving the aim remain loose and relaxed. Amongst those less skilled you can see all this energy escaping through contorted faces, gritted teeth and tight shoulders that consume huge amounts of effort but contribute nothing to achieving the task.

Although a certain amount of strength is required to overcome any task, in rowing there is no evidence that suggests that improving your absolute strength results in better performance over 2,000m. What is more important is the strength that you can maintain over the entire race, your functional strength. For this reason the alternative programme is designed with improving that area of performance in mind.

As we grow and develop, our structural strength increases naturally through the release of growth hormones, allowing us to carry out activities in a non-prescribed way. Increasing structural strength would be the first stage of strength development, however, when we embark on a programme of weight, or resistance, training to develop a specific skill or movement, there are two further stages of strength development that we need to address to gain any transferable benefit;

Functional strength training is the process by which the muscle begins to learn its role, familiarising it with the load, range and speed of the outcome task and to coordinate with other muscles in a more specific way. These types of exercises are analytical in that they reflect the movements of the outcome task.

Cognitive strength training begins when the muscle knows its role. Load, range of movement and speed of contraction are specific to the outcome task. Use of the words "learn" and "know" are deliberate because apart from the mechanical component there is also a neurological component in the muscle. Muscular contractions occur on receipt of an electrical stimulus from the brain. These small electrical impulses travel along pathways, which must be developed through practice. Until these pathways exist, movements are awkward and require deep concentration. Once strong neurological pathways are established the movement becomes autonomous.

Weight Training : Section 7

In this section of the Training Guide different methods of weight training are examined. Traditional weight training is compared to an alternative rowing programme developed by Terry O'Neill. Both of these methods use conventional free weights and require access to a gym. For developing core stability (the muscles that support your spine) there is a training programme developed by rowing coach Ade Roberts. The 12 core exercises for both the traditional and alternative weight training methods are set out below:

The Exercises

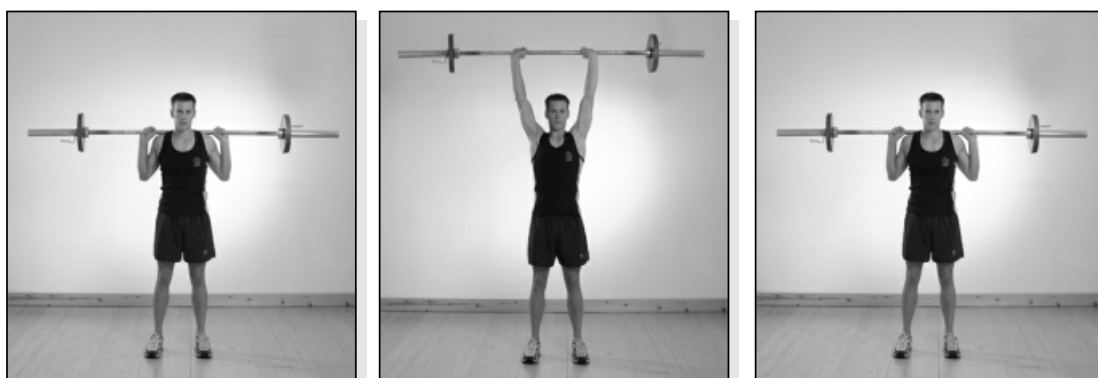
Exercise 1 - High Pulls



Compound exercise that works the back, shoulders, legs and arms.

Method: Stand with feet under the bar and shoulder width apart. Lean forward with your back flat and bend the knees. Grip the bar with hands outside of the knees and knuckles forward. Stand up bringing the bar up to your chin in a straight line close to the body. Lower the bar to the thighs then bend the legs and return to the start position. Avoid arching the back and always lower the bar in a controlled manner.

Exercise 2 - Press Behind Neck



Works the medial deltoids and triceps.

Method: Start with the bar behind your neck across the shoulders and the hands slightly wider than the shoulders. Extend the arms upwards and hold the bar overhead. Bring back to the start position and repeat. Can be either free weights or machine.

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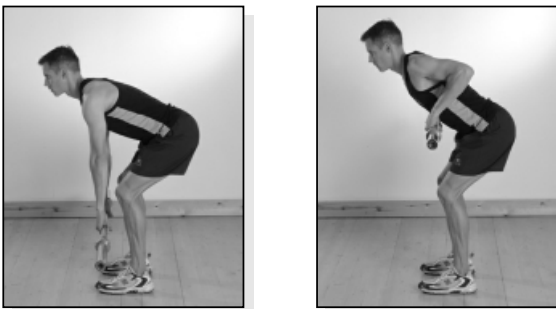
Exercise 3 - Front Curl



Develops the biceps and brachial muscles.

Method: Hold the bar in front on your thighs with the palms of the hand pointing upwards. Bend your arms upward bringing the bar to the chest as close to the body as possible. Lower in a controlled manner back to the start position.

Exercise 4 - Bent Over Rowing



Develops the latisimus dorsii as well as the back and arms.

Method: Stand feet apart, knees slightly bent and holding the bar knuckles forward. Bend forward with the back flat and let the bar hang. Holding this position bend the arms raising the bar to the chest then lower to the start position.

Exercise 5 - Lateral Dips (right hand)



Internal and external obliques.

Method: Standing feet well apart with the left hand on your hip and your right hand holding the dumbbell. Bend to the right then back to the start position.

Exercise 6 - Lateral Dips (left hand)



Internal and external obliques.

Method: Standing feet well apart with the right hand on your hip and your left hand holding the dumbbell. Bend to the left then back to the start position.

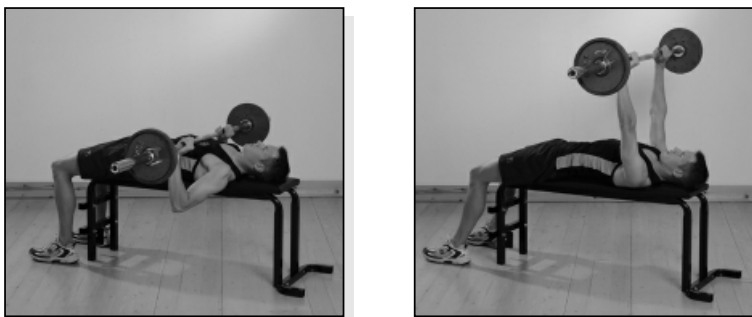
Exercise 7 - Squat



Development of the thighs and the calf muscles.

Method: Stand feet apart with the bar balanced behind your neck. Sink down keeping the back flat and head up until your thighs are horizontal. Rise up onto your toes then back to the start position. Do not let the knees turn inwards. A squat machine is better for beginners until they are familiar with the range of movement but use of free weights is ultimately better as it allows a wider range of muscles to be used.

Exercise 8 - Bench Press



Compound exercise to develop the upper body, arms, chest and shoulders.

Method: Lying flat on your back on a firm bench, knees bent and feet on the floor, letting the bar rest across your chest. Hold the bar with your palms forward and your arms bent then extend your arms upwards and hold the bar above your chest. The bar should be raised and lowered vertically. Lower the bar to the start position but do not let the bar rest on the chest between exercises.

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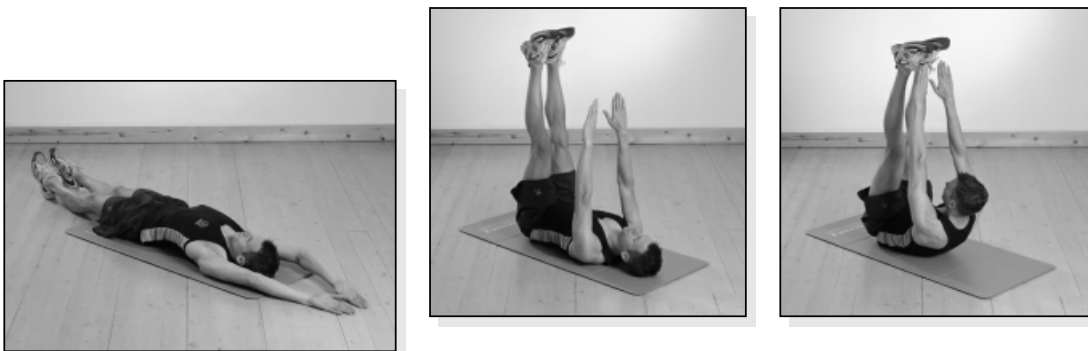
Exercise 9 - Clean and Press

Compound exercise working the legs, back, deltoids and biceps.



Method: Stand feet apart with your toes under the bar. Crouch down keeping the back flat and grasp the bar with the knuckles facing forward. Stand erect pulling the bar straight up close to the body until it is in line with the top of the chest. At this point bend the knees, and bring the elbows under the bar so it is resting on the chest. Press up with your arms and hold the bar at arms length above the head then bend the arms and bring the bar back across the chest. Lower the bar close to the body down to the thighs then bend the legs keeping the back flat lowering the bar to the floor.

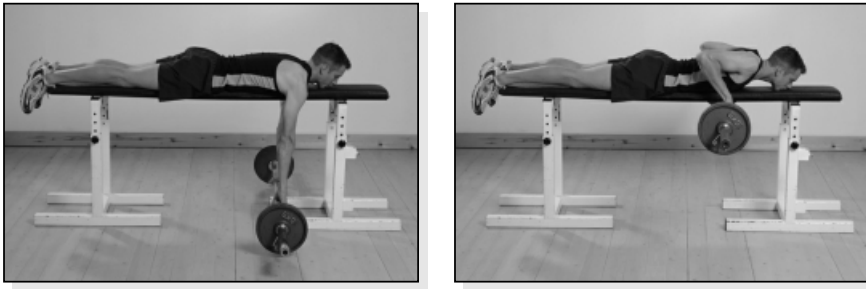
Exercise 10 - Jack-knife Crunch



Excellent abdominal exercise involving the inferior rectus abdominus.

Method: Lie flat on your back on a flat surface with your arms stretched overhead. Raise your legs, trunk and arms simultaneously to balance on your hips, bringing your arms forward as though attempting to grasp your ankles. Return in a controlled way to the start position to avoid injury.

Exercise 11 - Bench Pull



Upper back and lats.

Method: Lay face down on a bench with the arms hanging down holding the bar. Bend the arms bringing the bar straight up until it touches the underside of the bench. The chest should be kept in contact with the bench at all times. Lower the bar slowly to the start position.

Exercise 12 - Back Extensions



Works the lower back

Method: (With or without weight). Starting with your body straight lower your chest until your body and legs make a 90° angle. Straighten your body then repeat.

Traditional Weight Training for Rowing

Traditional weight training for rowing is based on the one repetition maximum (1RM) principle. The loading for the various exercises is based on a percentage of the maximum weight that can be lifted in one concerted effort. The percentage of the 1RM varies depending on the training aim of each training period.

The year is divided into training periods, as discussed in Periodisation in Training in Section 4 : Creating a Bespoke Training Programme, into transition, preparation, pre-competition and competition. The training aims of these periods are general conditioning, strength endurance, power and maximum strength. The number of exercises, repetitions and percentage of 1RM changes as you pass through each of the training periods.

The sessions are done in either circuit or station mode. A circuit is where the athletes move between the exercises, which remain in one place. This reduces the time between exercises. A station is when the athlete remains in one place and the weights and apparatus are changed for the different exercises. Which method you choose will depend on the size of the gym, equipment available and whether you use free weights or fixed multi-gym equipment. As a general rule the heavy weights maximum strength and power sessions would be done at stations but the general condition and strength endurance training would be done as a circuit.

Table 7.1

Training Intensities				
	General Condition	Maximum Strength	Power	Strength Endurance
Total Exercises	1-12	1, 8, 9, 11	1, 3, 4, 7, 8, 9, 11	1, 3, 4, 7, 8, 9, 10, 11, 12
% of 1RM	40-55	90-100	75-85	60-75
Repetitions	30-40	1-6	10-12	20-25
Sets	4-6	3-5	3-5	4-6
Method	Circuit/Station	Circuit/Station	Circuit/Station	Circuit/Station
Rest : Exercise	Continuous	3 : 1	3 : 1	2 : 1
Period	Transition and competition	Early preparation	Mid to late preparation	Pre- and early competition

This type of weight training brings about a significant improvement in strength relatively quickly as measured by increases in the one repetition maximum. Athletes find this very motivating, but unless a strength retention element is built into the programme these early gains cannot be reproduced later in the season. By increasing strength early in the preparation it enables the athlete to train at a higher intensity during the more specific pre-competition and competition phases.

An Alternative Weight Training Method

by Terry O'Neill

The drawback of traditional weight training for rowing is that the loading is based on the one repetition maximum and not the loading encountered in the rowing action. As the athlete's one repetition maximum (1RM) increases it is an indication of two things; increased strength and better technique. There is no guarantee that it indicates an increase in power. Power is the rate of doing work. For this reason an athlete may produce more power by lifting a sub-maximal weight faster than they would by lifting 1RM slowly. Because rowing is a test of power not strength the Alternative Weight Training Method is constructed specifically to maximise gains in power.

The basic principle of weight-training is that the muscles involved have to be exercised over the range and speed of the primary activity. The whole of the Drive phase of the rowing stroke takes in the region of 0.6 to 0.7 seconds. This means that the individual muscle groups involved are working even faster and weight training that does not reflect this fact and so may not produce any transferable benefits. Muscles develop as a result of the stimulus of the exercise and muscles trained with slow moving heavy loads could reduce their effectiveness for rowing.

This is not to say there is no role for the one repetition maximum system in rowing training. A case could be made to use this form of training for those muscles not used in the rowing action as a way to develop muscle balance. However, because a significant improvement in power can be gained from a small increase in strength, if you follow this type of training for rowers it should not exceed four weeks. Rowers with long levers are not built to handle heavy weights, this is the domain of the shorter, more compact athlete.

The twelve exercises are the same as those used in the traditional weight training programme, the difference is in the methodology and it is important that the changes to the weights and the speed of the circuit are closely followed in order to gain maximum benefit.

By varying the duration and rating of work when rowing we can alter the training effect. In the same way the training aims of each of the development phases can be met by subtle changes to the way the weight circuit is carried out.

Methodology

The biggest difference between traditional weight training and this programme is in the periodisation. The traditional periods are replaced by six week rotating blocks as described in Periodisation of Training in Section 4 : Creating a Bespoke Training Programme. The first block equates to the transition period and so only needs to be completed once at the start of the programme. After this, on completion of week 24, the programme continues on week 7. This is done so that the physiological benefits developed over the block are carried over into the next block. By returning to the beginning, a positive upward spiral is created. The changes between the blocks are less dramatic than those of traditional weight training further aiding the upward spiral. All the sessions are circuit format and involve all twelve exercises. Also, the difference in the loading through the periods is less than in traditional weight training, which promotes a gradual gain in power with less risk of injury. The programme is set out below:

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Weeks 1-6

This period addresses basic fitness as well as the development of the aerobic system. Load the weight bars sufficiently so that each exercise can be comfortably carried out continuously for one minute. At the end of one minute move onto the next exercise as swiftly as possible so the circuit flows. Total work time is from 24 up to 48 minutes non-stop at a pace of 75 to 80% maximum heart rate (MHR). Two complete circuits should be completed in the first two weeks with a third added for weeks three and four and finally four full circuits on weeks five and six. Special attention needs to be paid to the correct execution of the exercises.

Weeks 7-12

The focus changes to specific strength training. The weight on the bar is increased so that the athlete can complete repeated lifts at a given rate for a period of 20 seconds during which time the heart rate will rise to maximum. At the end of 20 seconds the athlete should not be able to complete another lift. Rest for 20 seconds and repeat before moving onto the next exercise. One minute is allowed for changes between the exercises. As the athlete improves, incremental increases in the loading are achieved by either increasing the weight up to the maximum as shown in Table 7.2 or increasing the rate of lifting. These increases should only be applied when the athlete can complete the 20 seconds without any loss of technique.

Weeks 13-18

This is the specific power phase where the weight is reduced. This is so that the athlete can complete 45 seconds of continuous rhythmic exercise at a given rate at each station. At the end of which the athlete moves onto the next exercise without stopping. This gives a total of eight minutes work during which time the heart rate will rise to 85-95% MHR so that total time and heart rate reflect the demands of a 2,000m race. Rest for two minutes at the end of each complete circuit.

Three complete circuits should be completed in the first three weeks with a fourth added for weeks 4, 5 and 6.

Weeks 19-24

The final phase deals with speed which, along with strength, are the components of power. Keeping the weight the same as the previous session, the time on each exercise is reduced to 15 seconds during which time the athlete tries to carry out as many repetitions as possible whilst maintaining good technique. At the end of 15 seconds, rest for 15 seconds and repeat. For the first three weeks a total of three sets are carried out on each exercise before moving onto the next until one complete circuit is completed. One minute is allowed for change over. For weeks 4, 5 and 6 the time on each exercise is reduced to ten seconds with ten seconds rest and the number of circuits is increased to two.

Table 7.2

Schedule					
Weeks	Exercises	Time	Reps	Rest	Circuits
1-2	1-12	1 minute	Continuous	None	2
3-4	1-12	1 minute	Continuous	None	3
5-6	1-12	1 minute	Continuous	None	4
7-12	1-12	20 seconds	15-35+	20 seconds	2
13-15	1-12	45 seconds	20-40+	None	3
16-18	1-12	45 seconds	20-40+	None	4
19-21	1-12	15 seconds	15-25+	15 secs/repeat	1
21-24	1-12	10 seconds	15-25+	10 secs/repeat	2

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Table 7.3

Loading Table						
Exercise Number	Children	Adolescents	Juniors & Women	Club Men	Elite	Notes
1	2-5kg	5-15kg	15-25kg	20-30kg	30-45kg	Improve technique before increasing weight
2	2-5kg	5-15kg	15-25kg	20-30kg	30-45kg	Weights machine is better for beginners
3	2-5kg	5-15kg	15-25kg	20-30kg	30-45kg	One foot forward for increased stability
4	2-5kg	5-15kg	15-25kg	20-30kg	30-45kg	Core stability exercise
5	2-5kg	5-15kg	15-25kg	20-30kg	30-45kg	Core stability exercise
6	2-5kg	5-15kg	15-25kg	20-30kg	30-45kg	Avoid leaning forward during the exercise
7	2-5kg	5-15kg	15-25kg	20-30kg	30-45kg	Beginners can place feet on the bench
8	2-5kg	5-15kg	15-25kg	20-30kg	30-45kg	Teach beginners sound technique
10	None	None	None	None	None	Beginners may be better with sit ups
11	2-5kg	5-15kg	15-25kg	20-30kg	30-45kg	Keep the chest in contact with the bench
12	Nil	Nil	Nil	5-10kg	10-15kg	Do not hyperextend by going too far past level

Weight Training for Children and Adolescents

Suggesting weight training for children is a contentious issue. It has been found that lifting heavy weights before and during puberty can stunt growth and lead to postural problems in later life. For this reason we suggest that although this circuit is safe for pre-pubescent children and adolescents it should be done with little or no weights and the focus should be on good technique and not the weights they are lifting.

When coaching children the coach often has to protect them from themselves, as their perception of exertion is lower than that of an adult working at an equivalent level.

Weight Training

by Jurgen Grobler

If you asked ten top chefs to prepare a meal, although the recipe may be the same the results would be different. A good chef would rely on his feelings as to what is needed rather than what is written down. It is similar to a coach who, although he might have a training programme to follow, will have a feel as to whether the athletes have to back off or push on.

A successful athlete/coach partnership must be coach driven but the coach cannot function without good feedback from the athletes. So an important part of the coach's job is to listen, but first he has to establish this partnership with the athlete. Like all good partnerships, it has to be based on trust.

When I started coaching as a young man I was very lucky in the fact that I was surrounded by outstanding coaches. In particular I owe a lot to Theo Corner who was my mentor. I believe a good education in your sport, so that you know it inside out, is vital to be successful. This doesn't mean that you have to have rowed at a high level; many top coaches were not international oarsman. Although I never rowed at the highest level I learned enough at my level to know how tough it is and how hard you need to train to reach the top.

High performance coaching is not like working on a production line where the parts appear at one end and a car comes out at the other. A coach has to have a vision of what an athlete needs to look like to be a winner. Every athlete is unique and requires special attention and so a coach faces constantly changing challenges to progress from where the athlete is today to where he needs to be to match the coach's vision. This is both stimulating and exhausting but is worth it when your crews are successful.

Our training can be divided into three main areas; land training, water training and cross-training. Land training involves the rowing machine, weights and running. Once a week we have a 30 minute row on the machine at rate 20. This is to develop strength per stroke and the top rowers cover 9,000m. We also use the machine for anaerobic alactate work, which involves short bursts of up to 20 strokes at maximum intensity. Of course we use the rowing machine for all out testing but I am a big believer in the benefits of training on the rowing machine and it plays a big part in our preparation. We also use weights in our land training two to three times a week. We include both strength and strength endurance circuits.

We mainly use the water work for low intensity training where we can develop the necessary technique to row powerful strokes. From the 12 to 14 sessions a week that we carry out, I only do two to three sessions where we accumulate lactate. One of these is either on the water, or the Indoor Rower, where we row 3 x 2,000m at stepped rate from 24 to 28 strokes a minute.

The third area is cross-training. We mainly do this at training camps where we take part in different activities from cross-country skiing to cycling. The training camps play a vital role in two ways: it breaks up the tedium of the daily routine, and training in different surroundings in itself is stimulating. More important however, is the need to develop athletic qualities in the rowers. Many rowers come into the sport because they lack the skills and dexterity for ball games. They tend to be big and ungainly but with tremendous physiological characteristics. However, to be fully able to exploit these, rowers must be able to develop athleticism. Tables 7.4 and 7.5 show examples of the strength/core stability and strength/endurance weights circuits that we use.

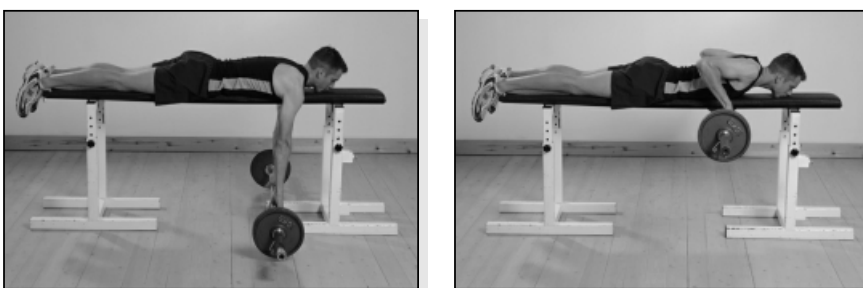
Table 7.4

Strength/Core Stability				
Exercise	Weight	Sets	Reps	Total
Bench Pull	80-90%	5	8	40
Leg Extension	80-90%	5	10	50
Bench Press	80-90%	5	8	40
Crunches and Twist	80-90%	5	10	50
Squats	80-90%	5	8	40
Leg Curls	80-90%	5	10	50
Dorsal Raise	25kg	5	8	40
Seated Twists	15kg	5	10	50
Expander	80-90%	5	30	150
Lunges	30kg	5	10	50
Total				560 reps

Notes:

Percentages are given of one repetition maximums.

Bench Pull



Method: Lay face down on a bench with your arms hanging down holding the bar. Bend your arms bringing the bar straight up until it touches the underside of the bench whilst keeping the chest in contact with the bench. Lower the bar slowly to the start position.

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Leg Extension



Method: Sitting with an upright, neutral, back position, raise your feet until your legs are straight, then lower the weight. If possible the machine should be adjusted so that the pads are just above the ankle joints.

Bench Press



Method: Lying flat on your back on a firm bench, knees bent and feet on the floor, letting the bar rest across your chest. Hold the bar with your palms forward and your arms bent then extend your arms upwards and hold the bar above your chest. The bar should be raised and lowered vertically. Lower the bar to the start position but do not let the bar rest on the chest between exercises.

Crunches with Twist



Method: Lying on your back with your feet flat on the floor, knees in the air. Draw your right elbow to your left knee, lifting your right shoulder clear off the floor. Lower, then repeat with the left elbow going to the right knee.

Squats



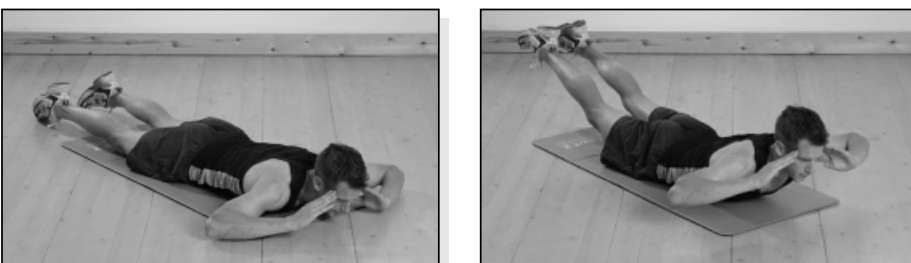
Method: Stand feet apart with the bar balanced behind your neck. Sink down keeping the back flat and head up until your thighs are horizontal. Rise up onto your toes then back to the start position. Do not let the knees turn inwards. A squat machine is better for beginners until they are familiar with the range of movement but use of free weights is ultimately better as it allows a wider range of muscles to be used.

Leg Curls



Method: Ensuring that your knees are close to the pivot of the machine and, where possible, the pads are just above your ankles. Raise your feet until your shins are vertical. Then lower your feet back to the horizontal starting position.

Dorsal Raise



Method: Lying flat on your front raise the feet and shoulders from the ground. Ensure that the back is not so arched that it causes pain in the spine.

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Seated Twists



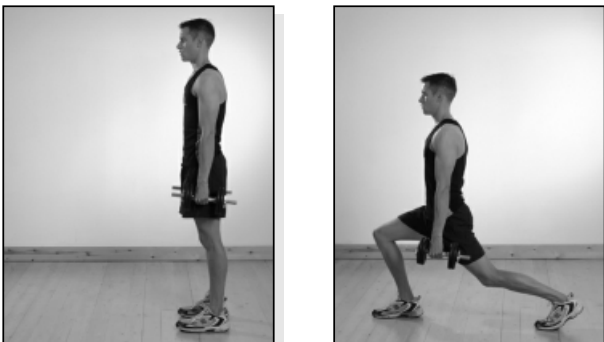
Method: Seated with your legs flat, feet pointing forward. Twist your torso one way as far as it will go, then return to the centre and repeat in the opposite direction.

Expander



Method: Sit on the machine with your legs slightly bent, arms straight and body rocked forwards from the hips. Draw your shoulders back, then pull your arms through as in the rowing stroke. Let your arms return to the straight position then rock from the hips, returning to the start position.

Lunges



Method: Start standing with your weight evenly on both feet. Step forward with one leg and bend the front knee, keeping your back vertical. Then straighten the front leg, returning to the standing position.

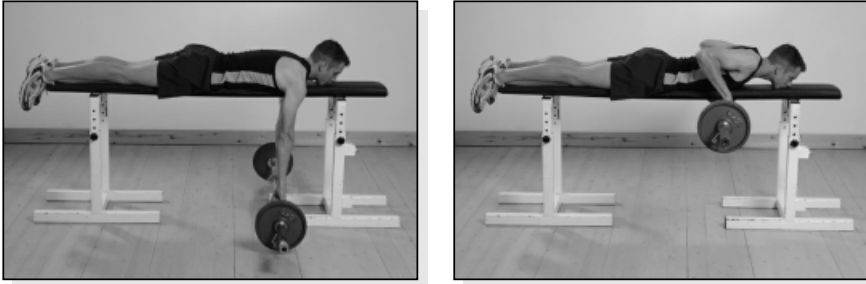
Note: when starting this exercise begin with small steps and no weights until you are familiar with the action.

Table 5.5

Strength/Endurance		
Exercise	Weight	Reps
Bench Pull, at rate 26	50 kg	35
Angels	2 x (2.5kg)	20
Squat Box Jumps		20
Bench Press	45kg	25
Crossed Leg Crunches		20
Expander	50kg	25
Leg Press	120kg	20
Dorsal Raise with Twist and Hold	15kg	10
Lateral Pulls to Neck	50kg	20
Windscreen Wiper	7.5kg	15
Bench Pull, at rate 30	40kg	30
Leg Extensions	50-60kg	15
Upper Body Rotations	15kg	20
Dyno Leg Drive		15
Deep Squats with Arm Pulls	2 x (12.5kg)	20
Four Complete Circuits Total Exercises		1,200

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Bench Pull, at rate 26



Method: Lay face down on a bench with the arms hanging down holding the bar. Bend the arms bringing the bar straight up until it touches the underside of the bench whilst keeping the chest in contact with the bench. Lower the bar slowly to the start position.

Angels



Method: Lie on your front (with or without weights) and raise the opposite arm and leg, trying to keep hips and lower back as still as possible. Return to lying flat then repeat using the other leg and arm.

Squat Box Jump



Method: Start standing, squat down until the thighs are horizontal and the hands can touch the floor. Jump up onto the bench, then squat down until the thighs are horizontal then stand up. Return to the starting position by jumping down and repeat the exercise immediately.

Bench Press



Method: Lying flat on your back on a firm bench, knees bent and feet on the floor, letting the bar rest across your chest. Hold the bar with your palms forward and your arms bent then extend your arms upwards and hold the bar above your chest. The bar should be raised and lowered vertically. Lower the bar to the start position but do not let the bar rest on the chest between exercises.

Crossed Leg Crunches



Method: Lying on your back with calves horizontal, raise the shoulder blades from the floor keeping the legs still. Return to the starting position and start again.

Expander



Method: Sit on the machine with your legs slightly bent, arms straight and body rocked forwards from the hips. Draw your shoulders back, then pull your arms through as in the rowing stroke. Let your arms return to the straight position then rock from the hips, returning to the start position.

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Leg Press



Method: There are many different leg press machines but the same principle applies to all. The range of movement used should be from straight legs to a 90° angle between the calves and thighs, then straighten.

Dorsal Raise with Twist and Hold



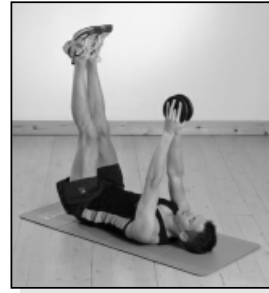
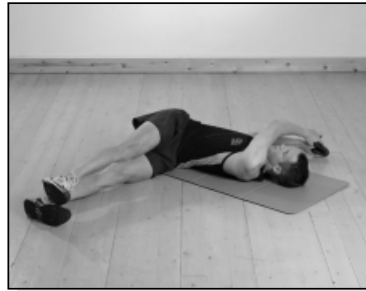
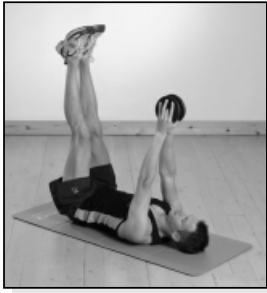
Method: Starting with your body straight lower your chest until your body and legs make a 90° angle. Straighten your body and twist to face the left, then repeat to the right side.

Lateral Pulls to Neck



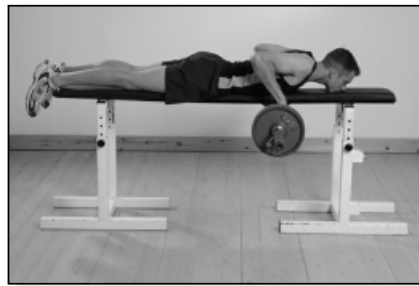
Method: Start with your arms extended, draw the bar behind the neck until level with the top of the shoulders. Return to the start and repeat, drawing the bar in front of your face until level with the front of the shoulders.

Windscreen Wiper



Method: Lying on your back with with your legs and arms vertical in air. Lower your legs to one side and your arms to the other. Return to the starting position and repeat on the other side.

Bench Pull, at rate 30



Method: Lay face down on a bench with your arms hanging down holding the bar. Bend your arms bringing the bar straight up until it touches the underside of the bench whilst keeping your chest in contact with the bench. Lower the bar slowly to the start position.

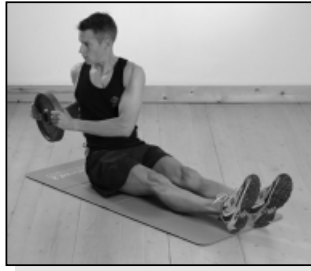
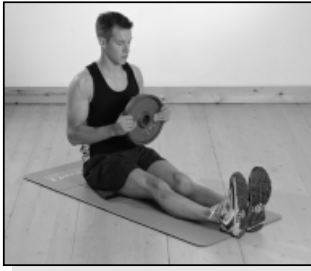
Leg Extension



Method: Sitting with an upright, neutral, back position, raise your feet until your legs are straight, then lower the weight. If possible the machine should be adjusted so that the pads are just above the ankle joints.

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Upper Body Rotations



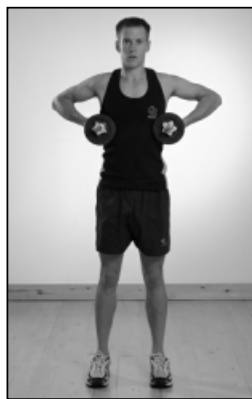
Method: Seated with your legs flat, your feet pointing forward. Twist your torso one way as far as it will go, then return to centre and repeat in opposite direction.

DYNO Leg Drive



Method: Sit with the back upright and pushing firmly against the padding. Place the feet in the foot stretcher and hold the hand grips under the seat.

Deep Squats with Arm Pulls



Method: Start standing then squat down until your hands are just off the ground. Stand up and continue to raise the weights until they are just below your arm pits. Repeat.

Core Stability Training

by Ade Roberts

What is it?

Core stability training is used to strengthen abdominal and spinal muscles with the aim of increasing spinal stability. Traditional abdominal training targets the prime movers in the trunk such as the rectus abdominis muscle. Core stability training works on the postural muscles (e.g. transversus abdominis) that help to stabilise the spine and maintain a desired position while performing an activity, that is to say they help to provide “dynamic stability”.

Why do it?

There are two main reasons for using core stability training in a programme:

- To facilitate good rowing technique via improved posture.
- To increase spinal stability during exercise.

An upright, forward leaning posture is a feature of good rowing technique. It is used to create a position where the weight of the athlete is on their feet rather than the back of the seat. Therefore it helps to produce a strong leg drive and helps to connect the leg drive to the handle via a strong trunk.

This position is achieved through flexibility (particularly in the hamstrings), postural awareness, and the ability to sustain a posture during the fatiguing demands of exercise.

Core stability training targets the postural muscles and is a means of training the recruitment and strength of those muscles, and in the advanced stages enables voluntary recruitment during dynamic exercise.

Spinal stability is relevant to most people because most sports, and everyday activities, load the spine. Both postural and prime mover muscles contribute to spinal stabilisation. The prime movers such as rectus abdominis assist in balancing large external forces. Local stabilisers such as transversus abdominis act on individual lumbar vertebrae to help maintain a neutral spinal position at times when the spine is under stress. Strength and balance in both systems could therefore help to reduce the risk of injury. Both systems are often trained in the rehabilitation from back injury.

How do I do it?

The concept of the trunk muscles protecting the neutral position of the spine during movement is key to the success and correct understanding of core stability training. This point is often forgotten and can result in exercises promoting static rigidity rather than dynamic stability.

Core stability training involves relaxation and the low-level recruitment of postural muscles. No muscle bulging, breath holding, teeth gritting is required!

The most difficult part of core stability training is getting started and recruiting the correct muscle. Achieving ‘Level 1’ is perhaps the hardest.

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Level 1

Exercise 1



Starting position:

Lie on your back with your knees bent to 90 degrees. Feet resting flat on the floor.

There should be a small arch under the lumbar spine (lower quarter of the back).

Place your right hand just inside of the pelvis at a level midway between your pubic bone and stomach button.

Rest your left hand flat on your stomach, positioned level with the bottom of your rib-cage.

Activity:

Suck your stomach towards your spine, while maintaining the neutral spine position. Your back should not flatten to the floor. This is called recruiting the core muscles.

Your hands should feel the stomach pull downwards under the right hand. No significant change should be felt with the left.

You should continue breathing and still be able to maintain the muscle contraction. Hold for 30 seconds. Repeat three times.

If you feel a tensing of the stomach with the left hand, the upper abdomen rises or falls significantly, or you are holding your breath, the exercise is being performed incorrectly and needs to be restarted.

Tip: It is harder to achieve Level 1 if sit-ups or other significant dynamic abdominal work has been performed immediately beforehand e.g. avoid doing sit-ups immediately before a core stability session.

Exercise 2

This is a variation on Exercise 1.



Starting position:

Kneel on the floor in the four point kneeling position.

Activity:

Recruit the core muscles. The aim is to lift the lower abdomen (not the upper) towards the spine without losing the neutral position of the lower back.

Level 2

Once the correct contraction has been identified, it needs to be used to assist the spine during dynamic activity. Level 2 introduces simple movement tasks. Level 3 uses more complex movement tasks.

Exercise 3



Starting position:

As for Exercise 1.

Activity:

Recruit the core muscle as in Exercise 1. Keep the muscles recruited and lower the right knee slowly towards the floor, pause then return to the starting position. Both feet remain static and maintain contact with the floor. There should be no movement at the pelvis. The lumbar spine should remain in the neutral position.

Repeat ten times on each side.

Exercise 4



Starting position:

As for Exercise 1.

Activity:

Recruit the core muscles as before and then slowly lift the right foot 1 to 2cm from the floor and then lower back to the floor. No pelvic or lumbar spine movement should occur.

Repeat ten times on each side.

Progression 1: Having lifted the foot 1 to 2cm above the floor, straighten your knee, still holding the foot 1 to 2cm above the floor and then return to the start position. No lumbar or pelvic movement.

Progression 2: Perform with the pelvis on an unstable surface such as a cushion or "Sit fit".

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Exercise 5



Starting position:

Sitting on a chair with knees and hips bent to 90 degrees, feet resting flat on the floor. Maintain an upright body posture with the neutral lumbar spine.

Activity:

Slowly lift your right foot from the floor and then straighten your leg out in front of you. Maintain your upright starting position with the neutral lumbar spine.

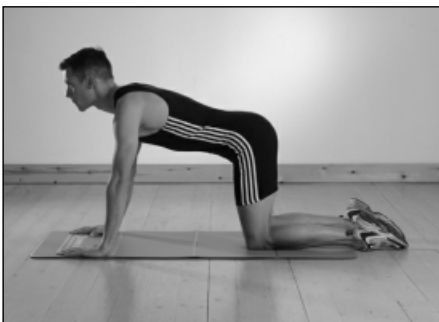
Repeat ten times.

Progression 1: Perform while sat on a 'Swiss Ball'. Neither the ball, your pelvis or lumbar spine should move during the activity.

Progression 2: As progression 1 but the supporting leg is also on an unstable surface such as a cushion or "Sit fit".

Level 3

Exercise 6 - Superman



Starting position:

Four Point kneeling.

Activity:

Slowly raise and straighten your right arm and left leg so that they are horizontal, hold for ten seconds then return to the starting position. Maintain the neutral spinal position. No pelvic rotation should occur.

Repeat ten times on both sides.

Exercise 7



Starting position:

In the press-up position, with knees straight, but with both feet resting on a 'Swiss ball' such that your body is parallel to the floor.

If possible look sideways to a mirror to ensure the correct starting position has been achieved.

Activity:

Recruit the core muscles. Bend your hips and knees until your thighs reach an angle of 90 degrees to your trunk. Return to the start position. Maintain a neutral spine position while this occurs.

Repeat ten times.

How Do I Apply my Training?

The conscious recruitment, as learned at Level 1, of the core muscles and an awareness of neutral spinal posture during rowing or weight lifting and other activities will maximise your gain from the training by ensuring that you are training the correct muscle groups and not relying only on the prime movers.

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Terry O'Neill's Hour of Pain

The cause of pain during exercise is the build up of lactic acid in the working muscles. Lactic acid is the end product of glycolysis, which is the process by which high intensity work can be carried out in the absence of oxygen. A small amount of lactic acid can be resynthesised to glycogen in the absence of oxygen by the reversal of glycolysis. For the remainder to be oxidised requires an abundance of oxygen but if the exercise intensity is high then there is an oxygen debt and the lactate starts to accumulate in the working muscles.

The build up of lactic acid reduces the efficiency of the muscle and eventually contractions will cease completely. The build up of lactic acid in the muscles and carbon dioxide in the blood makes this session quite unpleasant.

There are two good reasons why you need to go through this process. Firstly, working at this intensity increases enzyme activity in the muscles, which acts as a buffer and slows down the accumulation process. Secondly, you develop a tolerance to lactic acid accumulation so you are able to perform at a higher level of efficiency.

The Exercises

The following circuit is designed to fulfil two purposes. It develops muscular endurance and lactate tolerance within the muscle whilst working the cardiovascular system. If you have an hour to fill with a non-rowing workout then this is the one for you. All you need is a 20kg weights bar, a bench and an area where you can run 30m.

The hour is broken into three 20 minute blocks that run consecutively with no breaks between them.

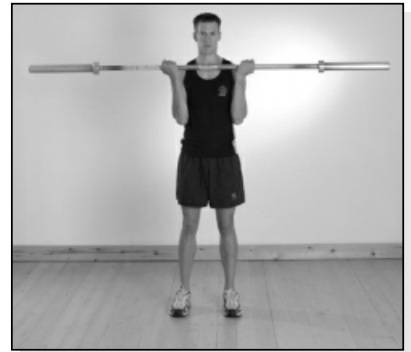
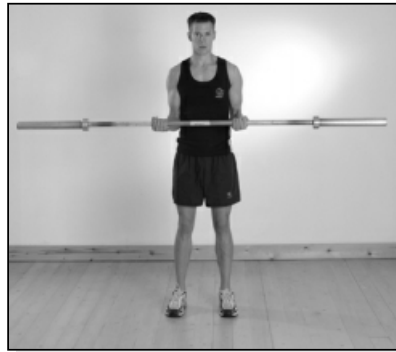
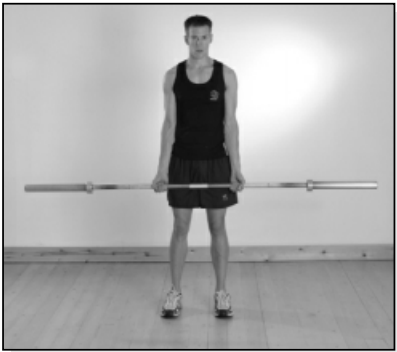
Circuit 1

This circuit is six exercises completed with a 20kg weights bar and a bench. Each exercise is done continuously for one minute and the circuit is repeated three times. This gives 18 minutes of activity followed by two minutes of rest before starting Circuit 2.

Table 7.6

Hour of Pain Circuit 1		
Exercise	Position	Exercise
1	Standing	Bicep Curls
2	Sitting	Press Behind the Neck
3	Lying	Bench Press
4	Lying	Triceps Press
5	Standing	Bent Over Rows
6	Standing	Straight Arm Canoeing

Bicep Curls



Method: Hold the bar in front on your thighs with the palms of the hand pointing upwards. Bend your arms upward bringing the bar to the chest as close to the body as possible. Lower in a controlled manner back to the start position.

Press Behind the Neck



Method: Sitting with your back upright start with the bar resting on your shoulders. Straighten your arms, lifting the bar to above your head. Lower slowly to the start position.

Bench Press



Method: Lying flat on your back on a firm bench, knees bent and feet on the floor, letting the bar rest across your chest. Hold the bar with your palms forward and your arms bent then extend your arms upwards and hold the bar above your chest. The bar should be raised and lowered vertically. Lower the bar to the start position but do not let the bar rest on the chest between exercises.

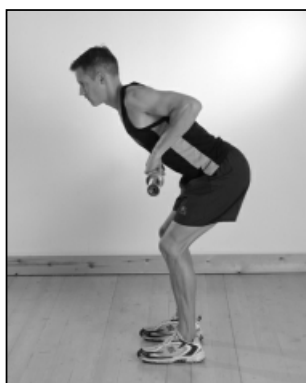
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Triceps Press



Method: Start with the bar held above your chest, with your arms straight. Bend at the elbows lowering the bar until the forearms are horizontal. Then lift the weight back to the start position.

Bent Over Rows



Method: With your knees slightly bent, body at 45°, raise the bar from straight arms to the chest. Keep the body as still as possible.

Straight Arm Canoeing



Method: Standing upright, hold the bar in front of you with straight arms. Rotate the bar in a canoeing action so that each end creates large circles.

Circuit 2

This circuit is five exercises; squat jumps, press ups, burpees, sit ups and running. Start with ten squat jumps, then run 30m, do ten press ups, run back and do 11 squat jumps, followed by a 30m run, then 11 press ups. Continue until you have completed 25 reps on both squat jumps and press ups. Replace squat jumps with burpees and press ups with sit ups. Starting at ten reps work up to 25 reps again. This is designed so that the faster you go the more rest you have. If you do not complete all of the reps in the 20 minutes, remember where you are and finish them at the end of the hour.

Table 7.7

Hour of Pain Circuit 2		
Exercise	Position	Exercise
1	Standing	Squat Jump
2	Lying	Press Ups
3	Standing/Lying	Burpees
4	Lying	Sit Ups
5	Standing	Running

Squat Jumps



Method: Start in a standing position, squat down until your thighs are horizontal and you can place your hands on the floor. Jump into the air. Then repeat. Look forwards at all times.

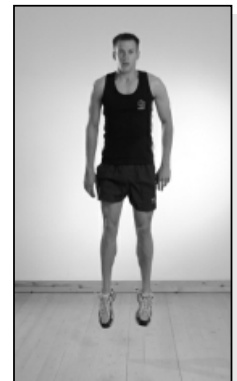
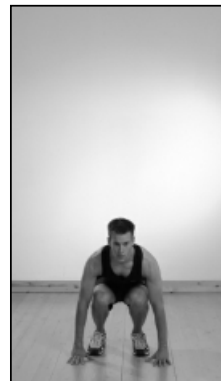
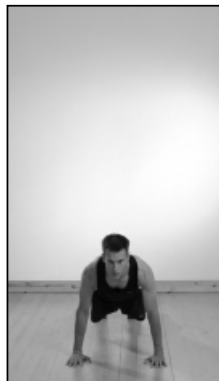
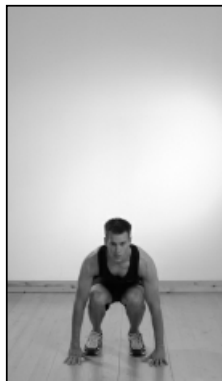
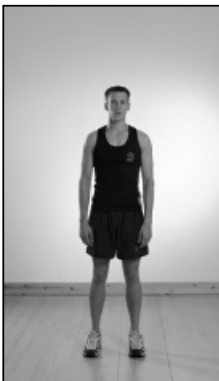
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Press Ups



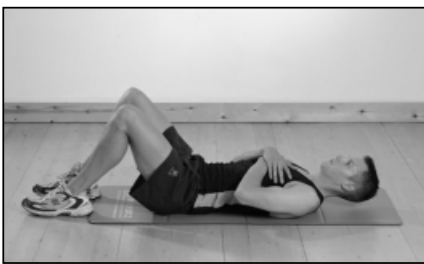
Method: Start lying on your front with your palms below your shoulders, fingers pointing forwards and on the balls of your feet. Straighten your arms keeping your trunk in a straight line. Return to starting position.

Burpees



Method: Start standing, squat down and place your palms on the floor with your fingers pointing forward. Straighten your legs, taking your weight on your hands until you are in a press up position. Bring your legs back so your feet are between your hands, then jump as high as you can into the air.

Sit Ups

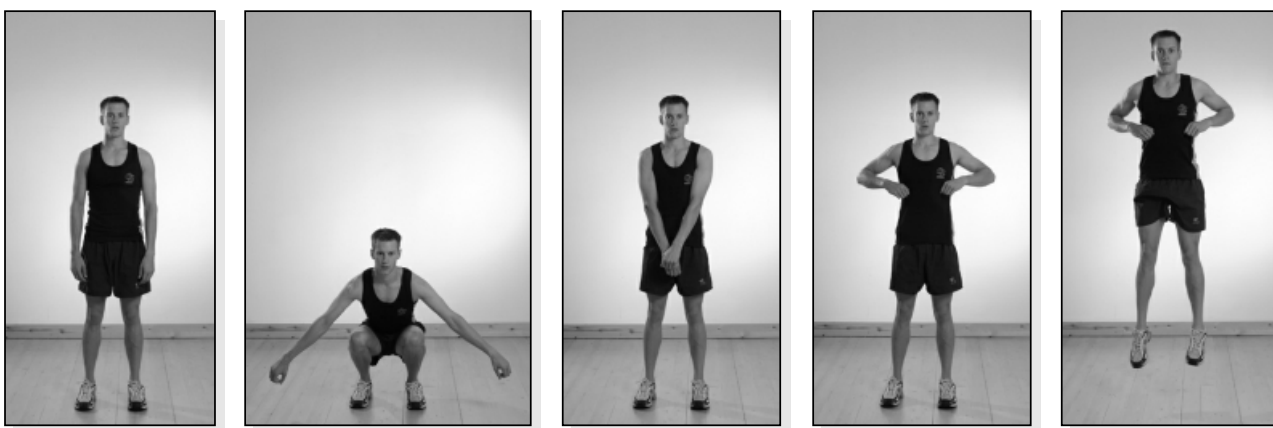


Method: Lie on your back with your feet flat on the floor and your arms crossed on your chest. Lift up your shoulders and back until your body is off the floor. Return slowly to the starting position.

Circuit 3

This circuit consists of three six minute sessions of upright sculling, with one minute of rest between each. The rate should reflect what time of the training season you are in (see Periodisation of Training in Section 4 : Creating a Bespoke Training Programme), if you are in the preparation period you should do approximately 18 to 22 repetitions per minute, if you are in the pre-competition period then you should gradually build from 22 to 32 repetitions per minute. Once you are in the competition period you should try and complete a race profile, with the rate as it would be in your race. Note that if you are training for a marathon you should maintain your marathon rate throughout but decrease the rest between each six minutes until you are doing one 18 minute session.

Upright Sculling



Method: Start in a standing position, squat down opening your arms so that your hands do not touch the floor. Your thighs should be just below the horizontal. From this position stand up drawing your arms through. To make the exercise more explosive jump up from the squat position whilst drawing the hands through.

Recommended Reading

- **Anita Beau, *The Complete Guide to Strength Training***
A & C Black, 2002
ISBN: 0713660406
- **Tudor O Bumpa, *Periodisation Training for Sports: Programmes for Peak Strength in 35 minutes***
Human Kinetics Europe Ltd, 1999
ISBN: 0880118407

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