## Trainer Modules

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## Trainer Module - Cardio-vascular (Aerobic) Training

### Definition

### Definition: Cardiovascular fitness is the ability of the heart, blood cells and lungs to supply oxygen-rich blood to the working muscle tissues and the ability of the muscles to use oxygen to produce energy for movement.

### Preparation

A warm up for cardio-vascular training should comprise at least 2 minutes of low intensity aerobic activity and be specific to the activity to be performed during the work period. The client should aim to reach 50-60% of their Training Heart Rate Zone (THRZ) before commencement of high intensity activity. Stretching should be performed if required for a specific purpose or if the client has a specific need.

*Note: The duration of the warm up will be dependent upon the intensity of the work to be performed, e.g. If the client is doing a sprint or plyometric session, the warm-up should be extended.*

### Training Phases

Cardio-vascular (CV) training may include:

* Long slow distance
* Fartlek
* Interval (aerobic)
* Interval (anaerobic)
* Sprints

CV training should be dependant on the client’s specific needs and goals. Heart rate monitors should be worn at all times during CV segments of personal training sessions to monitor intensity, progress and any health concerns. In prescribing a clients’ THRZ you need to consider the age, perceived rate of exertion (PRE), and the look and sound of the client at various intensities.

*Note: Your clients’ THRZ will vary between exercises, i.e. It will be higher during exercises where the client must support their own weight (eg. running, stepping) and lower when in water due to the cooling effect of the water.*

### Training Phases

### Long Slow Distance (LSD) Training

LSD training should be performed for a minimum of 20 minutes in your THRZ in order to gain maximum CV benefits., This therefore excludes the warm up period to reach your THRZ. The intensity will be dependent upon the clients’ level of fitness.

### Fartlek Training

Fartlek training involves training at varying intensities over a continuous period. This may involve changing elevation or resistance, or changing speed, e.g. alternating the elevation and speed on a treadmill. As with LSD, Fartlek training sessions should be for at least 20 minutes in the THRZ.

**Interval Training – 2 options: Aerobic & Anaerobic**

### Aerobic Interval Training

Interval training to develop the aerobic system should include periods of work of a minimum of 3 minutes at a maximum intensity (for that duration, i.e. at anaerobic threshold). The rest period between intervals should be similar to the duration of the work period.

### Anaerobic Interval Training

Interval training to develop the anaerobic system should include periods of work of 30 seconds - 2½ minutes at maximum intensity. The rest period between intervals will be dependant upon whether the purpose is to develop lactate tolerance (30 seconds rest) or the lactate threshold (3 minutes rest).

### Sprints

Sprint work may be performed to increase the efficiency of the anaerobic system (ATP-PC). Sprints should be for a maximum of 30 seconds with a work:rest ratio of 1:4. Sprint work is also an effective way of maintaining CV fitness without inhibiting the gains from strength training.

### Training Heart Rate Zones (THRZ)

### It is difficult to establish a client’s THRZ accurately without establishing their maximal heart rate. At Personal Best, we unfortunately do not have a suitable environment with which to conduct such a test. Therefore, the most effective means of establishing a client THRZ is to use Rate of Perceived Exertion (RPE) in conjunction with establishing how long a client can maintain a particular level of exertion, i.e. how long in each of the different training phases. Monitoring how a client sounds and looks (at a particular level of exertion) can also provide valuable information in assessing a client’s RPE. There is an element of trial and error in establishing THRZ and you should err on the conservative side during this process (especially with untrained clients.

### Note: It is generally inaccurate and unsafe to use the formula, ‘220 less age’ to establish a client’s Max HR as a client may have an actual Max HR up to 30 bpm greater or less than the average. This can obviously create large inaccuracies in prescribing a THRZ.

### Rate of Perceived Exertion Table (1 – 10)

0 – Nothing at all

1 – Very light

2 – Fairly light

3 – Light

4 – Light to Moderate

5 – Moderate

6 – Somewhat hard

7 – Hard

8 – Very Hard

9 – Extremely Hard

10 - Maximal

### Cool down

Decrease the intensity of the cardiovascular activity for a minimum of 2 minutes at the conclusion of the cardiovascular training to assist with venous return.

##

## Trainer Module – Fitness Assessments

Fitness assessments will help the client monitor their progress as well as help to establish which fitness parameters need to receive training emphasis.

*Fitness Assessments can include the measurement of:*

* Blood Pressure
* Resting Heart Rate
* Body Mass Index (BMI)
* Body Girths
* Waist to Hip Ratio (WHR)
* Skinfolds (Body Fat)
* Cardio-vascular Fitness
* Flexibility
* Strength

### Pre-Assessment Guidelines

The following should be adhered to when performing those parts of the fitness assessment that are physically active, i.e. cardio-vascular and strength fitness testing.

* The clients’ resting heart rate should be below 90 beats per minute.
* The clients’ resting blood pressure should be below 145/ 95 mmHg. ***Note: If this is not the case, a medical clearance is required.***
* The client should be in good health prior to the fitness assessment and not recovering from any illness, e.g. cold, influenza, etc.
* The client should have had adequate sleep prior to the fitness assessment and should not be suffering from stress or excessive alcohol consumption.
* Make the client aware of the conditions that warrant the tests being aborted, i.e. if nausea, undue pain or discomfort is experienced.

### Fitness Assessment Procedures Checklist

Some clients’ goals may make only parts of the fitness assessment relevant to their particular needs. You may need to educate the client on the importance of testing other components so that the program addresses more areas and ensures balance is achieved.

***Procedure***

1. A Pre-exercise questionnaire and an Acknowledgement Release should be completed, signed and dated before performing the fitness assessment.
2. Explain the exact areas of assessment that are to follow, and there purpose.
3. Blood pressure is taken and recorded.
4. Resting pulse is taken and recorded.
5. Weight and height are taken and recorded.
6. Girth measurements are taken and recorded.
7. Skinfold measurements are taken and recorded.
8. Strength tests are performed and results recorded.
9. A cardio-vascular fitness test is performed and results recorded.
10. Flexibility tests are performed and results recorded.
11. Discuss the results with your client and set goals (short and long term) considering the assessment results and the clients priorities.
12. Make the client aware that they will have access to the MyPersonalBest website in order to monitor their progress. Explain the results again at the following appointment if necessary.
13. Enter all assessment information on to the MyPersonalBest website.

### Fitness Assessment Parameters

### Pre-Exercise Questionnaire

A pre-exercise questionnaire and an Acknowledgement Release should be completed, fully signed and dated prior to commencing the fitness assessment (or undergoing any training session). The purpose of this questionnaire is to assist in assessing the clients’ suitability for specific fitness tests together with prescribing the most suitable exercise for the client.

Note: If there are any concerns with regard to your clients’ health or readiness for exercise it may be necessary to obtain a medical clearance from a doctor before proceeding.

### Blood Pressure

Blood pressure is the force of the blood pushing against the walls of the arteries under the pumping action of the heart. Blood vessels are living structures that can actively and passively alter their diameter to control and alter blood pressure and blood flow.

Systolic blood pressure represents the contractual phase of the heart and the maximum pressure on arterial walls as blood is forced into the circulatory system. The desired range is 90-140 mmHg.

Diastolic blood pressure represents the relaxation phase of the heart and the pressure on arterial walls as blood is returned from the circulatory system back to the heart. The desired range is 60-90 mmHg.

High blood pressure is one of the contributing factors to such disorders as coronary heart disease, stroke and kidney damage.

In measuring a clients’ blood pressure, ensure that the client is relaxed and comfortably seated and that long sleeved clothing is removed from the right arm. The cuff should be completely deflated. Do this by turning the valve on the sphygmomanometer anti-clockwise until loose.

With the clients’ arm resting on the table at the same level as the heart, wrap the cuff around the upper arm. The centre of the cuff should be in line with the middle anterior surface of the elbow crease and 3 - 4 cm above the elbow crease.

Place the diaphragm of the stethoscope over the brachial pulse site on the medial anterior surface of the arm, just above the elbow crease. Rapidly inflate the cuff to 160 – 180 mmHg. Gradually open the control valve and slowly deflate the cuff at a rate of 2 - 3 mmHg per second.

The point where you detect a sudden sharp tapping sound is when the blood again begins to flow into the forearm and this is noted as the systolic blood pressure. Record the reading on the mercury level at that point.

Continue to deflate the cuff at 2 – 3 mmHg per second. The point where the sound becomes muffled and disappears is noted as the diastolic blood pressure. Record the reading on the mercury level at this point. Rapidly deflate the cuff entirely.

***Any client with a hypertensive blood pressure must be cleared by a physician, obtaining written consent prior to the commencement of any exercise program.***

### Resting Pulse

Resting pulse is a measurement of the number of times the heart beats in one minute. This is used together with the clients’ age and perceived exertion at various training intensities to ascertain your clients Training Heart Rate Zone (THRZ).

The resting heart rate should be taken prior to any other activity and the client should be seated in a comfortable position. The heart rate ideally should be measured with a heart rate monitor. If a heart rate monitor is unavailable, locate the radial pulse on the lateral side of the wrist with the wrist in a supinated position. Gentle pressure should be applied with the index and middle fingers to find the pulse and the beats counted for a minimum of 15 seconds (ideally 60 seconds).

### Height

The client is measured with shoes on or off (make a note accordingly), standing with their back against a wall. The head should be level with the eyes looking directly ahead.

### Body Mass

Body weight refers to the mass of all components of the body, including skeletal mass, muscle mass, fat mass and all other connective tissues and fluids. Therefore measuring body weight is not a means of measuring over-fatness as it does not measure fat solely or its distribution. Body weight should be considered in conjunction with body fat and girth measurements to obtain a true picture. If looking at weight only, changes in muscle mass that occur with training can have a negative effect.

### Body Mass Index (BMI)

The BMI gives an indication of your ideal weight for your height.

The calculation for BMI is: weight (kg) / height ² (m). The ideal range for men is: 19 – 24; and for women: 20 – 25.

The client is weighed with shoes on and wearing minimal clothing, standing still, weight evenly distributed on both feet and positioned over the centre of the scales. The head should be up and the eyes looking directly forward.

### Girth Measurements

Girth measurements are a useful guide in evaluating body changes that occur as a result of exercise, and will demonstrate changes occurring throughout the body.

The general procedures for measuring girths with a tape are as follows.

1. Use a cross hand technique for measuring.
2. Reading and measurement is generally taken from a position to the side and slightly in front of the client.
3. The tape should be held at a right angle to the limb or body part.
4. The tape tension should be constant but not tight so that an indentation is made on the skin.
5. Ensure that the tape is at the designated landmark.
6. When reading the tape, ensure it is at eye level.

### Girth Sites

**Arm (relaxed):** The arm should be held by the side in a supinated position and in a relaxed state. Measure the circumference of the arm at the mid-point between the acromion process and the radial fossa.

**Arm (flexed):** The arm should be held at the side of the body with the arm horizontal and the forearm perpendicular to the arm with the bicep brachii fully flexed. Measure the maximum circumference of the bicep brachii.

**Chest:** The tape is held at nipple level with the arms slightly abducted allowing the tape to be passed under the arms and around the chest in a horizontal plane. The measurement should be taken at the end of normal expiration with the arms relaxed at sides. Check that the position of the tape is correct before measuring.

**Waist:** For women, the measurement is taken at the narrowest point between the lower costal border and the iliac crest. If not noticeable, measure at the level of the umbilicus. For men, locate the umbilicus and place the tape directly around the body at that point.

**Hip (Gluteal):** Measurement is taken at the maximum circumference with the clients’ feet together and the gluteals relaxed.

**Thigh (mid):** The point of measurement is mid-way between the inguinal fold and the superior aspect of the patella. Mark the position and take the measurement with the client standing erect, feet slightly apart and body weight equally distributed.

**Thigh (upper):** Measurement is taken 1 cm below the level of the gluteal fold. The client should stand erect with the feet slightly apart and the body weight equally distributed. Pass the tape around the lower portion of the thigh and then slide the tape up to the correct plane.

**Calf (max):** The measurement is taken at the site of the maximum circumference of the calf. The client should stand erect with the right foot forward and the body weight predominantly on the back (left) foot.

### Waist to Hip Ratio (WHR)

The WHR is a means of measuring body fat distribution. It provides an objective measurement of the distribution of body fat in regard to health issues.

WHR Calculation: Waist (cm) / Hips (cm)

Ideal WHR Score: Men < 0.9 Women < 0.8

### Skinfolds

Skinfold testing is a more direct measurement of body fat. As approximately 50% of body fat is stored just under the skin, we can gather a clearer picture of where the person carries their body fat by measuring the thickness of skinfolds at standardised sites. Remember it is the changes in measurement at each site that is most important, not the overall percentage.

General procedures for measurement using a set of skinfold callipers.

1. Measurements are taken on the right hand side of the body.
2. The skinfold is picked up approximately 1 cm above the marked site, grasped so that a double fold of skin plus the underlying subcutaneous adipose tissue is held between the thumb and index finger.
3. Avoid picking up muscle with the adipose tissue. If there is difficulty in picking up the subcutaneous tissue without the muscle, have the client tense the muscle until the tester is confident that only skin and subcutaneous tissue are in the grasp.
4. The contact faces of the callipers are applied at the base of the marked site.
5. The crest of the skinfold should follow the alignment specified for each site.
6. Continually hold skin whilst callipers are in contact with the skin and release spring handles completely.
7. Measurement is recorded in millimetres and reading taken once pointer on the dial has steadied and drift ceased. This should be no more than 3 seconds after application of calliper jaws as adipose tissue is compressible.
8. Two measurements should be taken at each site with the average value being used. Where the measurement between the 2 measurements varies by greater than 1 mm a third measurement should be taken and the median recorded as the result.

### Skinfold Sites

**Triceps:** The triceps skinfold is measured at the mid-point between the acromion process and the olecranon process on the posterior aspect of the arm. The crest of the skinfold is vertical and parallel to the long axis of the arm. The client stands with the arm relaxed by the side of the body.

**Biceps:** The bicep skinfold is measured at the mid-point between the acromion process and the radial fossa on the anterior aspect of the arm. The crest of the skinfold is vertical and parallel to the long axis of the arm. The client stands with the arm relaxed by the side of the body.

**Subscapular:** The subscapular skinfold is measured 1 cm diagonally below the inferior angle of the scapula. The crest of the skinfold is medially up and laterally down at a 45˚ angle.

**Suprailiac:**  The suprailiac skinfold is measured in line with the natural angle of the iliac crest and slightly anterior to the mid-axillary line immediately superior to the iliac crest. The crest of the skinfold is laterally up and medially down at a 45˚ angle. Palpate the superior edge of the ilium in order to ascertain the correct location.

**Abdominal:** The abdominal skinfold is measured 4 cm to the right of the umbilicus. The crest of the skinfold is vertical.

**Pectoral:** The chest skinfold is measured at the mid-point between the axillary crease and the nipple and is diagonal. The pectoral skinfold is only used for men.

**Thigh:** The thigh skinfold is measured at the mid-point between the inguinal fold and the superior border of the patella. The client stands and completely relaxes the muscles of the right leg to allow a skinfold to be taken. The crest of the skinfold is vertical and runs parallel to the long axis of the femur. If it is difficult to raise the fold, have the client lift the underside of the thigh to relieve the tension of the skin.

**Medial Calf:** The calf skinfold is measured at the most medial point of the calf (visually ascertained). The client stands with the right foot on a bench or step so that the knee is at 90˚ with the calf relaxed. The crest of the skinfold is vertical.

### Cardio –Vascular

Cardio-vascular (aerobic) exercise utilises the cardiovascular system, i.e. the heart, lungs and blood vessels to deliver oxygen to the working muscles in order to assist in the creation of energy. This is in contrast to anaerobic exercise which involves the creation of energy ***without*** the use of oxygen. The anaerobic energy system, therefore, can only be utilised over a short period of time.

When assessing cardio-vascular fitness, heart rate response to exercise is measured in order to estimate aerobic capacity. Generally, persons with a high aerobic capacity will attain relatively higher workloads before reaching a given sub-maximal heart rate than those less fit.

The maximal oxygen score is obtained using a sub-maximal test which means that it is necessary to estimate the clients’ maximum heart rate. This may affect the accuracy of the result. Most importantly however, this same estimation is made in future tests so that improvement can be monitored.

### 12 Minute Coopers Test

***Equipment Required:***

* A treadmill or running track
* A heart rate monitor
* A stop watch

***Procedure:***

1. The client walks/ runs for a period of 12 minutes.
2. The distance travelled in 12 minutes is recorded.
3. At the conclusion of the test, allow the client to recover for at least 2 minutes.
4. Compare the distance to norms.

### Beep Test

***Equipment Required:***

* CD player and Beep Test audio CD
* A flat, non-slippery 20 metre distance and line markers
* A measuring tape (to measure the 20 metre track)
* Stopwatch (to check accuracy of CD/ cassette)

***Procedure:***

1. Set up the 20 metre distance with line markers.
2. The client commences from one end on instruction from the tape.
3. The client must place either one foot on or beyond the 20 metre mark at the end of each shuttle and may not leave (to return) the line before the beep sounds.
4. If the client does not reach the line on two consecutive occasions, the test is finished and the level recorded.

### 3 Minute Step Test

***Equipment Required:***

* Step Bench (45cm high)
* Stop Watch
* Heart rate monitor
* Metronome

***Procedure:***

1. Step for 3 minutes at a rate of 30 steps/ minute. The clients’ legs should straighten on each step up with the entire foot on the bench.
2. Record the clients’ heart rate for 30 seconds at 1, 2 and 3 minutes post-exercise.
3. Total the 3 heart rate readings. This figure is the Recovery Index.

### Sub-MV0² Treadmill Walking Test

***Equipment Required:***

* A treadmill
* A heart rate monitor
* A stop watch
* A data sheet

***Procedure:***

1. Calibrate the treadmill (as required).
2. Calculate 50 – 70% of the clients’ predicted maximum heart rate.
3. Start the client walking on the treadmill at a comfortable pace at 0˚ gradient.
4. Record the clients’ heart rate each minute throughout the entire test.
5. Gradually increase the speed to a brisk but comfortable walking pace. The clients’ heart rate should be within 50 – 70% of the clients’ predicted maximum heart rate after 4 minutes.
6. Record the treadmill speed at the 4 minute mark.
7. Increase the gradient to 5˚ and maintain the speed reached at the 4 minute mark. The client continues walking for a further 4 minutes.
8. After the 4 minutes at a 5˚ gradient, reduce the speed to 3 kph and the gradient to 0˚ to allow the client to recover for 2 minutes.
9. Calculate result using the information obtained during the test. Use the data sheet provided.

### Flexibility

Flexibility is related to the general functional ability of the body and is the range of motion available at a joint or group of joints. The degree of flexibility at various joints may differ greatly as it is specific to the joint involved. The following tests are static measures of the range of movement at those joints.

**Hamstring Flexibility (Sit & Reach Test):** The client should be warm before performing this test. The client will be in a seated position on the floor with the soles of their feet in contact with the foot plate whilst maintaining straight legs. The client places one hand on top of the other with their hands even (palms down) and on the measuring device. The hands should maintain contact with the measuring device throughout the movement. Have the client bend forward at the hips and reach forward as far as possible along the measuring device in one smooth movement. Repeat the test twice and record the best result. Record as positive where the client reaches past the zero point and as a negative where the client does not reach the zero point.

**Shoulder Flexibility (Arm Over & Under Test):** The client extends the right arm directly upward and bends the elbow to reach hand (palm inward) down the spine toward the feet. The left arm reaches around the back (palm outward) and up the spine toward the head. The distance between the two middle fingers is measured. Where the fingertips do not meet the measurement is read as negative and where the fingers overlap the measurement is read as positive. Repeat on the opposite side.

### Strength

Strength is the ability of a group of muscles to move a particular resistance. A variety of tests will be performed to gain an overview of the clients’ strength.

### Push Ups

Push ups should be performed to the clients’ maximum. Where a client is unable to perform one (1) full push up, the test should be performed with the clients’ knees on the floor. The exercise should be performed so that the arms are fully extended at the start of each repetition and the nose is within five (5) centimetres of the floor at the end of each repetition. This position should be accomplished without the hips being unreasonably lifted in the air.

### Bench Press

The Bench Press should be performed using either a barbell or a Smith machine depending upon the experience level of the client, i.e. an inexperienced participant should use the Smith machine to alleviate the need to use stabilising muscles which may be underdeveloped. The test should be performed to establish the 3-Repetition Maximum (3RM) of the client.

### Single Leg Squat

Single-leg Squats should be performed to the clients’ maximum. The exercise should be performed so that the leg is flexed to 90⁰ and then extended fully. Note: This test should only be performed by persons with good control in this exercise.

### Chin Ups

Chin ups should be performed to the clients’ maximum with the clients’ hands in a neutral grip (where this apparatus is available). A note should be made as to what grip is used. The exercise should be performed so that the arms are fully extended at the start of each repetition and the chin reaches a position above the level of the bar at the end of each repetition.

### Lat Pulldown

The Lat Pulldown should be performed using a Lat Pulldown machine with the hands in a neutral position (either wide or narrow). A note should be made as to which neutral grip bar or otherwise is used. The exercise should be performed so that the arms are fully extended at the start of each repetition and the bar reaches a position below the chin at the end of each repetition. The test should be performed to establish the 3-Repetition Maximum (3RM) of the client.

### Abdominal Strength Test

Level 0: Unable to sit up with knees bent at 90 ° and feet held.

Level 1: Able to sit up with knees bent at 90 ° and feet held.

Level 2: Able to sit up with arms out straight and knees bent at 90 ° (feet may lift).

Level 3: Able to sit up with arms out straight and knees bent at 90 ° without lifting the feet off the floor.

Level 4: Able to sit up with the arms across the abdomen, hands gripping the opposite elbows. Knees must remain bent at 90 ° with the feet remaining on the floor.

Level 5: Able to sit up with arms across the chest, hands gripping the opposite shoulders. Knees must remain bent at 90 ° with the feet remaining on the floor.

Level 6: Able to sit up with arms flexed behind head, hands gripping the opposite shoulders. Knees must remain bent at 90 ° with the feet remaining on the floor.

Level 7: Able to sit up with arms flexed behind head, hands gripping the opposite side of a 2.5 kg weight plate. Knees must remain bent at 90 ° with the feet remaining on the floor.

Level 8: Able to sit up with arms flexed behind head, with hands gripping the opposite side of a 5 kg weight. Knees must remain bent at 90 ° with the feet remaining on the floor.

**Abdominal Endurance Test (60 Second Maximal)**

The client lies supine with legs on a chair so that both the knees and hips are bent at a 90 ° angle.

The arms are held across the chest with the earlobes held between the thumb and the index finger. The elbows must touch the thighs and the shoulders return to the floor to count as one (1) crunch.

### Suggested Order of Strength Tests

The suggested order of performing the strength tests is:

1. Chin ups
2. Push ups
3. Single-leg Squat
4. 8 Stage Abdominal Test
5. Lat Pulldown
6. Bench Press
7. Abdominal Endurance Test

## Trainer Module - Flexibility

### Types of flexibility training

* PNF
* Dynamic
* Static

### Exercise Technique

Technique for PNF, dynamic and static stretching to be demonstrated for (but not limited to) stretching of the back, chest & legs with specific attention to pelvic and shoulder girdle positions.

### Stretching Exercise Equipment

### A variety of implements can be used to assist in stretching including:

* Balls
* Bands
* Foam rollers
* Sticks

### List of Exercises

At least 2 partner stretches should be performed at the conclusion of each personal training session. They can include:

* Hamstring stretch
* Gastrocnemius stretch
* Gluteal stretch
* Lower back stretch
* Upper back stretch
* Hip flexor stretch
* Quadriceps stretch
* Soleus stretch
* Chest stretch
* Back stretch - single/double hand
* Neck stretch – lateral/ diagonally forward

Clients should be encouraged to perform additional non-assisted static stretches at the conclusion of their training session.

**Trainer Module – Periodisation**

1. **What is periodisation?**

Periodisation is a method of structuring training through the variation of **volume**, **intensity** and **type of training** over a period of time. Each phase of training builds on the previous phase ensuring continued progress and avoidance of overtraining.

1. **Training Phases**

At PB, we are mostly concerned with periodisation for RT, CV & Flexibility

* + RT Phases: Strength; Power (Strength & Speed emphasis); Hypertrophy; Endurance
	+ CV Phases: LSD: Fartlek; Aerobic Intervals; Anaerobic Intervals; Sprinting
	+ Flexibility Phases: Static; Dynamic; PNF
		1. The following notes focus on resistance training although the same principles apply to cardio-vascular and flexibility training.
1. **Periodisation Cycles**

Periodisation cycles can be broken down into 3 periods. Those timeframes are:

* Micro cycle; usually 1 week
* Meso cycle; usually 2 - 6 weeks
* Macro cycle; entire training season/ year
1. **An example of a Periodisation Plan**
2. **Why periodisation?**

Besides continued long-term gains in muscle size, strength, and power, there are other reasons to use a periodised resistance training program.

* 1. Many people performing fitness training, whether they are fitness enthusiasts or professional athletes, have reached points in their training at which little or no increase in cardio-vascular endurance or power, muscle size, power, or strength occurs. Such a training plateau occurs even though they train intensely. Training adaptations take 2 – 10 weeks depending upon the training age of the client and frequency of training. Training adaptations are easier to maintain then to build.
	2. Planned variation in training for many individuals will also help keep the training program interesting. If a client simply goes through training sessions and does not attempt to perform the session at the needed intensity and volume because of boredom, fitness gains will stagnate.
	3. Another reason to use a periodised training program is the prevention of overuse injuries. Performing the same exercises at the same training intensity and volume for long periods can eventually result in an overuse injury.
1. Not only does strength and power periodisation result in greater strength and power increases than non-varied models, but the majority of studies also indicate that this type of training brings about greater increases in lean body mass and greater decreases in percentage of body fat than non-varied training models (Fleck, 1999; Fleck, 2002).
2. Treat clients like athletes with regard to exercise prescription
3. **Classic (Linear) periodisation**
	* Classic strength and power periodisation methods use a progressive increase in the intensity and decrease in volume with small variations in each 1 to 4 week micro cycle.
	* There is some variation within each micro-cycle because of the repetition range of each cycle. Still, the general trend for each meso-cycle is a steady linear increase in the training intensity with a decrease in the volume of exercise. Because of the straight-line increase in the intensity of the program, classic strength and power periodisation has also been termed *linear* periodisation training.
	* Two to five meso-cycles are normally combined to produce a macro-cycle with a definite peaking phase at the end of the macro-cycle. An active rest cycle is used after the peaking phase. This basic sequence has been the essence of the classic strength and power periodisation model of physical training.

**Classic Strength and Power Periodisation Model**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Training phase** | **Hypertrophy** | **Strength** | **Power** | **Peaking** | **Active recovery** |
| **Workout variables** | Sets | 2-5 | 2-5 | 2-5 | 1-3 | Light physical activity |
| Reps per set | 8-14 | 2-6 | 2-3 | 2-6 |
| Intensity | Low | Moderate | High | Very High |
| Volume | Very High | High | Moderate | Low |

1. **Undulating (Non-linear) periodisation**

Non-linear periodisation, also termed *undulating periodisation*, is a more recent development than the classic strength and power periodisation model.

Studies have shown that when more meso-cycles were used in a macro-cycle, better results were achieved. Essentially that meant that the different patterns of loading had a greater frequency of exposure.

Note that training zones are *not* necessarily performed sequentially such that training volume and intensity follow a consistent pattern of increasing or decreasing over time. With non-linear training, long periods (months) using the same training intensity and volume are not performed.

Once training zones have been decided however, it does not mean that over time different training zones cannot be incorporated into the training program. Therefore the choice of training zones to use at a particular point in the training program can be changed to meet the goals and needs of the client as training progresses. Similar to the classic periodisation training model, light training periods or rest periods can also be incorporated into non-linear training programs.

Non-linear periodisation offers advantages over classic strength and power periodisation in some training situations. A major goal of the Classic strength and power periodisation model is to reach a peak in strength and power at a particular time. For many sports with long seasons, such as basketball, tennis, and football, success is dependent on physical fitness and performance throughout the season. It is therefore important to have multiple peaks or consistent performance throughout the season. Training goals for many sports and for general fitness need in part to focus on development and maintenance of physical fitness throughout the season or throughout the year.

Non-linear periodisation is more flexible in how and when a peak in performance is created, depending on the goals of a particular meso-cycle. It also allows for more frequent exposure to different loading stimuli (e.g., moderate power) within a particular weekly or monthly workout profile. It does not progress in a planned linear increase in intensity with a reduction in volume as seen in the linear model, but it varies training volume and intensity in such a way that consistent fitness gains occur over long training periods. Studies indicate that a session-by-session non-linear program results in greater strength gains than a classic strength and power model.

In summary, the practicality and increasing popularity of the non-linear approach to periodised resistance training have been due to several factors:

1. Greater frequency of exposure to different loading patterns, e.g. monthly changes
2. More meso-cycles allowing multiple peaks → better results
3. Allows a client to more easily pick up a workout sequence after illness or injury
4. It allows more variety in a workout sequence
5. It causes less boredom in the day-to-day workout routines
6. It is adaptable to the diverse situations of a given training day and gives clients the most effective type of workout
7. It allows more frequent rest of some muscle tissue due to the use of various resistance loadings.

Although non-linear periodisation is a relatively new training model, it does result in significant gains in strength, power, body composition, and motor performance.

Data also indicate that non-linear periodisation results in significantly greater changes in fitness variables compared to non-varied strength and power training models. Current research indicates that when a non-linear program is used, the training zones should be alternated on a session-by-session basis. From the point of view of training a client on a less than regular basis, i.e. less than 3 times per week, it is ineffective to create this amount of change.

1. **Flexible Non-linear periodisation**

Note that only the motor units that are actively recruited during an exercise to produce force will subsequently adapt to the resistance training. Therefore, motor unit recruitment is of primary importance in the effectiveness and specificity of resistance exercise programs. In resistance exercises, it is the load or training intensity that determines how many motor units are recruited. Heavier loads (or higher intensities) recruit more motor units than lighter loads (or lower intensities). Motor units and their associated muscle fibres that are not activated during an exercise do not generate force and move only passively through the range of motion.

In the non-linear periodisation model, motor units that are not recruited (e.g. high threshold Type II motor units or fast-twitch muscle fibres) when using a light training intensity (e.g. 12 to 15RM) are essentially rested during the training session. This is the key to non-linear periodisation in that some lighter intensity workouts provide for recovery. Continued day-to-day use of high intensity loads without rest or recovery can lead to overtraining or plateaus in training adaptations, thus the genius of non-linear periodisation.

In the flexible non-linear periodisation model, you still have a plan for the client but the days on which specific sessions will take place are only tentative; each type of session is dependent on the ability of the client to do the workout that particular day. The flexible non-linear periodisation is more dynamic and may be more effective in getting the best out of the client during a given training session. Again, each meso-cycle will have a priority element that may dominate the particular phase of training (e.g. you may be working with your client in power phase but the power workouts will be dispersed with Hypertrophy or Endurance workouts).

### Non-Linear Periodisation Meso-cycle with an Emphasis on Power

|  |  |  |  |
| --- | --- | --- | --- |
| **Day** | **1** | **2** | **3** |
| Week 1 | Power | Hypertrophy | Strength |
| Week 2 | Power | Light Hypertrophy | Power |
| Week 3 | Strength | Power | Hypertrophy |
| Week 4 | Power | Light Hypertrophy | Power |

There are other possible ways to make the decision concerning which training zone to use, such as if there is lingering fatigue, which minimises the ability to develop maximum power. In that case if a power training zone is part of the training program, it might be advisable to use a different training zone for this training session.

A master plan functions as a guide for the goals of the training cycle. With the scheduled non-linear program, the type of session to be performed on a given training day is predetermined. However, with the flexible non-linear program, the type of workout to be performed is decided on the day of the training session. Therefore, the concept of flexible non-linear periodisation really refers to waiting until the day of the workout to make the decision about the type of training session to perform. Flexible non-linear periodisation does not mean there is no overall training plan or goals of the training cycle. It actually means having a training plan for a given micro-cycle in place but being flexible as required if a client is unable to meet the demands of the scheduled workout.

For some clients, their frequency of training may be as little as once per week. This will limit the flexibility and variety of the program

**Benefits of Flexible Non-Linear Periodisation**

In summary, the Benefits of Flexible Non-Linear Periodisation are:

* A non-linear plan provides flexibility of content for individual training days
* Rest for muscle fibre motor units, especially fast-twitch muscle fibres, therefore greater recovery
* More effective for avoiding training plateaus
* Even greater variety
1. **Base Program**

A base program is a beginning program using relatively light resistances (12 to 15RM) and lower training volumes. The client slowly increases the training intensity and volume. A client would need to follow a base program before initiating a non-linear program, because heavier loads will be used earlier in a non-linear program sequence.

This phase of a training program is typically used for beginners or after a long layoff from resistance training in order to introduce or reintroduce the body to resistance exercise. Those clients who have had extensive experience in resistance training may need a much shorter base program to get into the periodised array of workouts used in non-linear formats because their muscles are much more responsive to the exercise stimuli than the muscles of individuals just beginning to perform resistance exercise (Staron et al, 1991). A base program typically is at least 6 weeks in length with 3 training sessions a week and 48 hours between workouts. If too much soreness develops, an extra day or two of rest between sessions is required and the base program phase may be extended.

The two primary goals of a base program are:

1. Learning the exercise techniques and developing neural pathways
2. Developing initial physical tolerance to the stress of the workout. This is more important because heavier loads will be used more quickly in a program sequence

Note: 18 sessions suggested for preparation (2 sessions per week for 9 weeks; 3 sessions per week for 6 weeks). You could start periodising between Hypertrophy and Endurance prior to the 18 sessions due to the lower intensity of those two phases.

1. **Periodisation Overview**
	1. **The acute program variables provide the tools to design an infinite number of workouts**. Variation between days in a micro-cycle is the key to the non-linear periodisation approach to training.
	2. One of the goals is to create workouts that are very different in their force production demands, thereby training varying percentages of the motor unit pool of a muscle. Typically this means variations among workouts with very light to very heavy resistance loads. **The light resistance day essentially allows for recovery of the fast-twitch (Type II) motor units**.
	3. The choice of workout sequence is the determining factor in this type of periodisation model. **Learning how to choose the right workout for the client on a particular day is important in the flexible non-linear program approach.**
* **My recommendation – One emphasis in each of the CV, RT and Flexibility parameters per month allowing for flexibility & variety as required.**
1. **MyPB Website**

After creating a Periodisation Plan for a client, the Periodisation Plan together with the client’s Fitness Assessment results should be uploaded to the MyPB site ([www.MyPersonalBest.net.au](http://www.MyPersonalBest.net.au))

Your Username is your first name (with first letter capitalised) and last name initial capitalised, e.g. DavidB

Your password is your Trainer Key Tag Number preceded by your studio initial capitalised, e.g. T1234

Notes

* Fitness assessments should be done 2-monthly ideally
* Preparing a Periodisation Plan for a client will take some time (although you will become quicker) but it will save you an enormous amount of time during the 12 months of the plan
* You can also upload a Goal Planner and Weekly Exercise Plan for your clients onto the MyPB site
* You should create a Periodisation Plan for yourself and upload to the MyPB site in order to better understand the process. Note that you should use a different email address than the one you use as a trainer on the MyPB site.

# **Trainer Module - Resistance Training (Weight Training)**

### Phases of Resistance Training

Resistance Training may include training to develop:

* Strength
* Power – Strength or speed - emphasis
* Hypertrophy
* Endurance

### The phase will dictate the rep range, load, speed of movement & rest between sets

### Repetition Ranges for the various phases of training should be:

*Strength (very heavy) 1 - 2 reps 100 - 95% 1RM*

*Power (very heavy) 1 - 2 reps 100 - 95% 1RM*

*Note: The ‘very heavy’ rep range (1 - 2 reps) should only be used for clients who are very experienced with resistance training.*

Strength 3 - 6 reps 94 - 85% 1RM

Power (Strength emphasis) 3 - 6 reps 90 - 80% 1RM

Power (Speed emphasis) 6 + reps 80 - 30% 1RM

Strength/ Hypertrophy 6 - 8 reps 85 - 80% 1RM

Hypertrophy 8 - 14 reps 80 - 65% 1RM

Endurance 15 + reps < 65% 1RM

### Preparation

A warm up resistance training set using 50 - 60% of 1RM should be performed for each major body part (i.e. legs, back and chest) immediately prior to the first training set for the relative body part.

*Note: More than 1 warm-up set may be required if the client is performing a strength or heavy power workout.*

**Percentage of 1RM load for various rep ranges**

In order to help you establish suitable resistances, follow the resistance guide below.

100% = 1RM

95% of 1RM = 2 reps

90% of 1RM = 4 reps

85% of 1RM = 6 reps

80% of 1RM 8 reps

75% of 1RM = 10 reps

70% of 1RM = 12 reps

65% of 1RM = 14 reps

60% of 1RM = 16 reps

### Resistance Training Guidelines

### Specificity

Specificity in muscle action is important in planning resistance training programs for particular activities. As with all types of physical training, there is a high degree of task specificity with resistance training. Task specificity refers to the movement pattern and strength or power output necessary for successful completion of a specific task. Physiological adaptations brought about by a particular training program are specific to the training program performed. Therefore, the best training program to use to become better at a specific task, such as a certain sport or physical activity, mimics the characteristics of that task. That includes velocity of movement, angles used & concentric or eccentric contraction emphasis.

Ultimately, the amount of transfer from the resistance training program to the functional activity, everyday task, or athletic skill is an important part of the benefits of a resistance training program.

### Range of Motion

Normally, most resistance training exercises are performed through the greatest range of motion safely *allowed* by each individual’s body. Note that this will vary from one person to the next. This results in strength and power gains throughout the greatest range of motion possible.

Generally the goal of a resistance training program is to increase the strength and power throughout the range of motion at a joint. For some activities, e.g. volleyball, some sets for squat jump-type exercises may be performed in some training phases only through the range of motion used when performing a vertical jump in volleyball.

### Progressive Overload

Progressive overload refers to the gradual increase of training stress placed on the body during any physical training program, including resistance training.

Once a person adapts to the demands of a specific training program, if the person does not adjust some element of the program to make the training more difficult to perform, then continued adaptations, such as continued increases in strength, will not occur.

Progressive overload may be accomplished by:

* increasing the resistance used in performing a specific number of repetitions
* Increasing the number of repetitions performed using a specific resistance.
* Increasing the speed with which the concentric portion of a repetition is performed if a training goal is to increase maximal power.
* Shortening rest periods between sets so that more total work is performed in the same total training time; this may be especially important if a training goal is to increase muscular endurance.
* Lengthening rest periods between sets and exercises and increase the resistance used. Because of the longer rest periods, more recovery occurs, thus allowing the use of a heavier resistance. This may be important if a training goal is to increase maximal strength and power.
* Increasing training volume by increasing the number of sets or number of repetitions per set

Resistance increases should be manageable but challenging. Progressions of 5% or less are suitable but will largely depend upon the clients’ training age and phase of training.

### Frequency

Extensive studies conclude that for untrained individuals a frequency of 3 days per week per muscle group is optimal and trained individuals a frequency of 2 days per week per muscle group is optimal. You may hypothesize that the optimal training frequency may be lower in trained individuals than in untrained individuals because the studies of trained individuals used higher training volumes.

Frequency must always be considered as the frequency of working a particular muscle group. Whatever the frequency used in weight training, the total program, including all other types of training sessions, must be considered because training forms that do not involve weights will affect recovery between weight training sessions.

You should train at least every 5 days

### Cardio-vascular Benefits

Increases in endurance activity performance, such as 5 to 10 kilometre run times, have been improved by the addition of resistance training to a conditioning program in untrained individuals, moderately trained individuals, and highly trained endurance athletes. Interestingly, these increases in performance occur despite no increase in peak oxygen consumption. The increases in performance have been attributed to an increase in the lactic acid threshold. The lactic acid threshold is the pace that can be maintained with minimal increase in tissue lactic acid or increasing acidity. This suggests that resistance training should be a part of a total training program to bring about improved cardio-vascular economy and metabolic efficiency.

### Acute Program Variables

Acute program variables are factors that can be changed during any resistance training session or varied over time in a periodised program. The acute physiological responses and chronic adaptations to a resistance training program over time depend on the five acute program variables. They are:

* Exercise choice
* Exercise order
* Number of sets of an exercise
* Training intensity
* Length of rest periods between sets

### Exercise Choice

As with all resistance training programs, choices concerning workout variables, such as what exercises to perform, should be made based on the training goals of the program.

Multi-joint exercises, such as the squat, power snatch, clean, Lat Pulldown and Bench Press involve a large muscle mass and complex neural activation and co-ordination of the involved muscle mass.

Because of these factors, multi-joint exercises are the most effective exercises for increasing total-body strength and power. Additionally, power-oriented total-body exercises, such as the power clean and power snatch, have been regarded as the most effective exercises for increasing total-body power because of the fast velocity at which these exercises are performed and the necessity of developing force quickly to successfully complete a repetition. So if the goal of training is to increase total-body strength or power, multi-joint exercises should be included in the training program. Multi-joint exercises, because of the large muscle mass involved, have also shown the greatest metabolic responses and the greatest acute response of some hormones, such as increased growth hormone. The acute metabolic and hormonal responses of multi-joint exercises have direct implications for their use when the goals of a program target increased local muscular endurance, lean body mass, and reductions in body fat. If the goal of the program is body building, isolation exercises can be useful.

A general rule to remember is that every time you change the angle, you change the exercise. This therefore provides you with an even greater array of exercise options to utilise.

### Exercise Order

Minimising fatigue before performing multi-joint exercises (such as the squat and deadlift) and power-oriented exercises is an important consideration. Performing these exercises early in the training session allows the use of the heaviest resistance for the desired number of repetitions, which may be necessary for maximising total-body strength, power and hypertrophy. Multi-joint exercises also require greater neural co-ordination than single-joint exercises. Therefore, when training for strength and power, performing these exercises early in a training session, before fatigue sets in, may enhance exercise performance by optimising neural recruitment.

In general, the sequence of exercises for both multiple-and single-muscle group exercise sessions should be:

1. Large-muscle-group exercises before small-muscle-group exercises
2. Multi-joint before single-joint exercises
3. Explosive or power lifts (e.g., Olympic lifts) before basic strength and single-joint exercises.
4. Exercises for weak areas of the body before exercises for strong areas of the body
5. Most intense to least intense (particularly when performing several exercises consecutively for the same muscle group)

*Note: Resistance training should be dependant on the client’s specific needs and goals. The clients training age must be considered in prescribing the intensity and type of training.*

###  The Number of Sets

The number of sets performed is one of the factors affecting training volume. The number of sets does affect the nervous, metabolic, and muscular acute response to resistance training. For example, the acute growth hormone response is greater with multiple-set than with single-set training sessions. Gains in strength and muscle hypertrophy have been shown with both single-set and multiple-set training programs. However, the majority of studies demonstrate greater strength gains with multiple-set programs, and no study comparing single sets to multiple sets has shown single sets to result in greater maximal strength gains.

During the initial weeks of training (up to 15 weeks), untrained individuals show the same increases in strength, regardless of whether single-or multiple-set programs are performed. This indicates that initially untrained individuals can perform single-set programs and show the same strength gains as those achievable with multiple-set programs. However, after a short initial period, if maximal strength gains are to be achieved, multiple-set programs must be employed. The probable reason for no initial difference in strength gains in untrained individuals with multiple-or single-set programs is that both types of programs initially bring about relatively equivalent neural adaptations, and initially neural adaptations cause the majority of strength gains in untrained individuals. After this initial training period, multiple sets are necessary for bringing about further physiological adaptations resulting in maximal strength gains.

### Training Intensity

Training intensity is largely based on the resistance used for the exercise and the number of repetitions performed.

Other variables for resistance training intensity include:

* Speed of movement/ contraction
* Rest periods (hormonal v’s muscle recruitment)
* Eccentric emphasis (negatives)
* Supersets
* Drop sets
* Pre-exhaustion sets
* Pyramids
* High rep sets (metabolic stress emphasis)

### Rest Periods

The length of rest periods between sets and exercises influences the hormonal, metabolic, and cardio-respiratory responses to a resistance training session. The duration of rest periods also affects the amount of recovery that occurs between sets and exercises, thereby affecting the amount of fatigue experienced as the training session progresses.

Short rest periods of approximately 1 minute between sets result in several significant physiological changes including acute hormonal changes, such as increased growth hormone in the blood, are significantly greater than with 3-minute rest periods. Although acute hormonal changes are not a direct assessment of muscle hypertrophy, these acute hormonal changes have generally been regarded as significant for development of muscle hypertrophy and have shown significant correlations to the development of muscle hypertrophy in both fast-twitch and slow-twitch muscle fibres.

Local muscular endurance is typically defined as the maximal number of repetitions that can be performed using a specific resistance, such as number of repetitions at 65% of the 1RM. Nevertheless, use of shorter rest periods contributes to improved ability to tolerate the high acidic conditions of exercise that occur beyond a few repetitions.

Because of the previously mentioned factors, it is recommended that, when training to emphasise increases in maximal strength and power, rest periods of 2 to 3 minutes between sets should be used. When training to emphasise muscle hypertrophy, rest periods of up to 1 minute are recommended. When training to emphasise muscular endurance, rest periods of less than 30 seconds should be used.

Unless you have a client who has a goal to increase strength to high levels, it may not be practical to have 2-3 minutes rest between sets. As a guide you could consider the following rest periods which all allow 12 sets of exercises in 24 minutes, no matter what the phase of training.

* Strength - 20-30 seconds work 90-100 seconds rest
* Power - 20-30 seconds work 90-100 seconds rest
* Hypertrophy - 60 seconds work 60 seconds rest
* Endurance - 90 seconds work 30 seconds rest

### Exercise Prescription

Depending upon the frequency of training and goals of the client, a PT program may be a full body RT program or two or 3-way split (although 3 way splits are very uncommon for PB clients due to frequency of training & their goals generally)

If the program is a two-way split, it may be either:

* push/ pull exercises
* upper/ lower body exercises

You will find a list of exercises below. Your RT prescription should largely be based on the Group A exercises with exercises in Group B used sparingly. *Exercises in Group C should be avoided due to there lack of effectiveness or increased risk of injury.*

### Resistance Training Exercises

**Group A**

**Chest Back Legs**

***Flat Horizontal Quadriceps Dominant***

Bench Press Seated Cable Row Squat (any derivative, exc. FB or Smith)

Smith Press S/A Cable Row Lunge (any derivative)

Dumbbell Press Supported Row Leg Press

Cable Press Dumbbell Row

Push ups Horizontal Chin up

***Incline or Decline Vertical Hip Dominant***

Bench Press Chin ups (including assisted) Deadlift

Smith Press Lat Pulldown Power Clean

Dumbbell Press Cable Pulldown (single arm) Clean & Jerk

Push ups Power Snatch

 S/A Snatch

**Group B**

**Chest Back Legs**

***Flat Vertical Quadriceps Dominant***

Dumbbell Fly Shoulder extension Leg Extension

Dumbbell Pullover Dumbbell Pullover Hack Squat

Cable Fly

Chest Press (seated/ lying)

***Incline/ Vertical Horizontal* Other**

Incline Dumbbell Fly Prone (Reverse) Fly Cable Hip Extension

Push Press Cable Reverse Fly Cable Hip Adduction

Jerk Bent-over Row Cable Hip Abduction

Shoulder Press Cable Hip Flexion \*¹

Upright Row (DB/ Cable) Standing/ Lying Leg Curl

Lateral raise (DB/ Cable) Calf Raise

Shoulder Shrug

Dips

***Arm Extensors \*² Arm Flexors \*²***

Lying Tricep Extension Incline Arm Curl

Cable Tricep Extension Arm Curl

Tricep Pushdown Hammer Curl

French Press Reverse Curl

Wrist Curls (Rev)

\*¹ Ensure your client does not have tight hip flexors before performing this exercise.

\*² These exercises may be necessary in some rehabilitation programs

**Group C**

**Chest/ Arms Back/ Arms Legs**

Military Press Concentration Curls Smith Machine Squat

Front Raise Preacher Curls Cable Hip Flexion

Kickbacks Kettlebell Swings Stiff leg Deadlift

**Core Stabilisation**

Interaction of deep spinal muscles (quadratus lumborum, internal oblique deep fibres, transversus abdominus, multifidus) helps support the spine during normal daily activity. These deep muscles which partially wrap around the spine are also important for posture and back care. Your rectus abdominus contributes to your “six pack” but does not support the spine.

### Core / Spinal Stabilisation

### FB Lying (on floor with feet on the ball)

* Crunches (Option - use additional weight)
* Bridge
* Leg curl - S/L, D/L
* Feet on Ball – tap heel to the floor beside the ball, alternating side to side.
* Rolling the ball side to side (with hips up)

### FB Prone

* Plank (Option – S/L, S/A or alternate arm-leg raise)
* Rolling Plank (Kneeling on the floor)
* Alternate arm / leg raise (Hands & feet start on the floor)
* Back extension (The feet are held on the floor as close as possible to the ball)
* Tuck (Option - with lateral rotation)
* Mountain Climbers
* Push-ups (hands or legs on the ball)

### FB Supine

* Crunches (Option – oblique)/ Russian Twist
* Lateral slide Note: Head and shoulders start on the ball.
* Torso rotation (Option – perform with a dumbbell). Note: Head and shoulders on the ball.
* Bridge (Option – with Leg extension)

### FB Sitting/ Kneeling

* S/L lift
* Balance with feet off the floor
* Hip Movements - Side to side; Forward & back; 360⁰ Rotation.
* Medicine ball side to side
* Kneeling on the ball
* 2 ball balance - One (or both) feet on a medicine ball

### Floor

* Sit-ups/ Crunches:
* Bicycle
* Reverse Crunch (Options – incline bench, vertical)
* Medicine Ball (with a throw)
* Oblique crunches
* Plank (and variations thereof) Plank Variations include –
* arm wrestle
* One foot or forearm off the floor (or 1 foot and forearm off the floor)
* Side plank
* Jack-knife
* Floor Wipers (Holding Barbell up and bring legs back to either side, then to middle)
* Superman (alternate)
* Mountain Climber on floor/bench.

### TRX/ Gym Swing

* Plank (with feet in TRX)
* Pike

### Other

* V-sit with Medicine Ball rotation. Note: May also be performed on the BOSU
* Superman with BOSU
* Wood Chop with barbell or cable
* Cork Screw (On cables, lift weight from ground, Twist body slightly, bring weight up past shoulder)
* Rolling Plank

## Trainer Module - Weightlifting

### Definitions

### Power = force x distance / time, i.e. Power is rate of force development (Speed = distance / time)

### Two types of power: Strength-Speed Power; Speed-Strength Power.

### Training Progression

**Work capacity/ Technique development** → **Strength** → **Power**

 (train the client to train)

### Start Positions

* Hang – ¼ Deadlift (bar above knees)
* Mid – ½ Deadlift (bar below knees)
* Full – Floor (full Deadlift)

Note: From a full or mid-starting position, the bar should be moved slowly until it passes the knee and then accelerate the movement.

 Teaching Points of Deadlift

* Natural spine, ie lower back lordotic curve
* Bar close to legs
* Hip flexion → Knee flexion (on the way down & vice versa up)
* Scapulae retracted/ Chest up

### End Positions

* Power – ¼ squat
* Squat – Full front squat

i.e. A Power Clean or Power Snatch will finish in a power position;

 A (Squat) Clean or (Squat) Snatch will finish in a full squat position.

### Stance Positions

* Hip width – starting position for Clean, Jerk and Snatch.
* (Front) Squat width – finishing position for Clean, Power Jerk and Snatch
* Split – finishing position for (Split) Jerk

### Grip

* Hook – allows the forearms to relax which in turn will allow the upper trapezius to relax
* Hand width - Clean, Jerk, Front Squat, Deadlift (narrow)

- Back Squat (outside shoulders)

- Snatch, Overhead Squat (wide)

### Teaching Drills – Power Clean

1. Jump and shrug
2. Hang pull (no jump)
3. Foot slide – Triple extension + shrug → Power position
4. Front squat (‘Catch’ position) - Feet wide and toes pointing out with knees in line with feet - Barbell on deltoids; elbows high & narrow - ‘Sit’ between heels – vertical back

### Teaching Progression – Clean

1. Power Clean (feet finish in power position)
2. Power Clean (from below knees)
3. Power Clean (from floor)
4. Squat Clean (feet finish in power position)
5. Squat Clean (from below knees)
6. Squat Clean (from floor)

### Notes on the Clean

* 2 step stance recovery
* Front squat - Feet wide and toes pointing out with knees in line with feet
* First pull – slow; second pull – accelerate. Do not jerk the barbell from the floor

### Additional Exercises for the Clean

* Deadlift
* Front Squat
* Back Squat
* Jump Squat (w/ Dumbbells)
* Upright Row

### Teaching Progression – Jerk

1. Push Press
2. Power Jerk (2 step stance recovery)
3. Split Jerk (3 step stance recovery)

### Notes on the Jerk

* Hands are outside shoulders to allow barbell to rest on the anterior deltoids
* Feet start at hip width
* Dip down to the power position before Jerk

###  Additional Exercises for the Jerk

* Dumbbell Push-Press (neutral grip)
* Dumbbell Power Jerk (neutral grip)
* Front Squat – Push Press

### Teaching Progression – Snatch

1. Power Snatch (feet finish in power position)
2. Power Snatch (from below knees)
3. Power Snatch (from floor)
4. Squat Snatch (feet finish in power position)
5. Squat Snatch (from below knees)
6. Squat Snatch (from floor)

### Notes on the Snatch

* First pull – slow; second pull – accelerate. Do not jerk the barbell from the floor
* The barbell should be 10-15 cm above the head on the ‘catch’
* The barbell will start higher (on the thigh) in the hang position because the grip is wider.

###  Additional Exercises for the Snatch

* Dumbbell Snatch (neutral grip)
* Overhead Squat
* Overhead Lunge
* Military Press position to Squat position without movement of barbell, then stand.

### General Notes

* For maximum power development, the following resistances are recommended:
* Olympic lifts – 60-80% RM
* Jump squat – 30% RM
* Squats – 60% RM
* Bench Press – 60% RM
* Develop speed before increasing weight.
* Use a rep range of 3 – 6 to allow maximum power.
* It is not so important to perform to failure as it is in other training phases.
* In the power equation (force x distance / time), the force component must be developed and maintained in order to optimise the changes in power. Therefore, missed sessions may require a return to the strength phase of training.
* Power sessions are most sensitive to even minor amounts of residual fatigue.
* If individuals are not accustomed to exercise in the morning or late in the night, their normal circadium patterns will affect the quality of the workout. The hormone melatonin is telling their bodies that they are not awake, and unless a tremendous amount of adrenaline is present to override this hormonal message, they will not see very impressive performances.

**Trainer Module - Weight Loss**

#### **Introduction**

* It’s important to provide a consistent message to clients:
* 3 aspects to effective weight loss; Nutrition, Exercise & Mindset (Mindset aspects only touched on briefly in this presentation)
* PB is about Optimal Performance & Health; Weight loss is a part of that.
* This is an overall solution. It differs from some programs that say you can’t eat CHO after 2pm or can’t eat bananas, or you have to do a particular type of exercise. – Crazy stuff!
* Suggestions to give to clients. Keep in mind that everyone is different. One plan may not work for another.
* Calories used in these notes (Conversion is 1 calorie = 4.2 kj)

### Basal Metabolic Rate (BMR)

You can assess how many calories your body requires by calculating your BMR. Your BMR is the amount of energy (calories) that your body needs to function and maintain itself. BMR is made up of:

* Basal component (influenced by weight, height, age & sex)
* Digestion
* Physical activity (A little subjective)

**Formula for Basal Metabolic Rate (BMR)**

BMR = {[9.99 x weight (kg)] + [6.25 x height (cm)] – [4.92 x age (years)] + S} x activity factor

(where S is +5 for males and -161 for females).

**Activity Factor**

1.2 Sedentary (little or no exercise, desk job)
1.375 Lightly active (light exercise/sports 1-3 days/week)
1.55 Moderately active (moderate exercise/sports 3-5 days/week)
1.725 Very active (hard exercise/sports 6-7 days/week)
1.9 Extremely active (hard daily exercise/sports or physical job, or 2 times per day training)

* Alternatively, you can base your diet on 1500/ 2000 (or 1200/ 1600 without exercise)
* Note that calorie restriction without exercise may lead to greater fat storage as exercise will help maintain your metabolism.

**How much do you really need to eat?**

* 7700 calories = 1 kg
* For weight loss ideally 500 – 1000 calorie deficit per day (Recommended - 550 calories = ½ kg per week). Greater weight loss appropriate for people 130+kg
* Minimum calorie intake should be 1200/ 1600

### Macronutrient Breakdown

* Once you have established your calorie target for weight loss, you should then consider your **macronutrient breakdown.**
* Providing you restrict your calorie intake to the amount calculated, you will lose weight. Our bodies however, require certain amounts of protein, carbohydrates and fats and the balance of these is very important. Our bodies convert food into energy and nutrients from these macronutrients in order to perform our daily functions.
* Ideal macronutrient breakdown for weight loss are:
* Protein - 1.05 grams per kilogram of body weight, e.g. 70Kg = 73.5g of Protein
* Fat - 20 – 30% of you overall calorie intake (Use 25% for your calculation); 375cal
* Carbohydrates - The remainder of your calorie intake will come from carbohydrates. This will generally be (but determined by your overall weight) 50 – 60% of total calories.

*Reducing calories achieved weight loss regardless of which of the three macronutrients was emphasized. – F Sacks & et al. Diets that reduce calories. Harvard School of Public Health (2009)*

**Dietary Facts for Australians**

* Calories from fat have increased from 32% to 43%
* Calories from carbohydrates have decreased from 57% to 46%
* Protein intake has remained the same at 11%

**Standard Portion Size Examples**

* 1 Serving of fruit = the size of a tennis ball or 125ml of fruit juice (½ glass).
* 1 Serving of meat = the size of the palm of your hand (including thickness)
* 1 Serving of salad = 1 cup
* 1 Serving of vegetables = ½ cup (cooked) or 1 medium potato
* 1 Serving of Dairy = 200g tub of yoghurt or 250ml of milk or 40g of cheese.
* 1 Serving of Bread = 2 slices or 1 medium roll
* 1 serving of cereal = 1 1/3 cup of packaged cereal or 1 cup of cooked porridge or ½ cup of muesli
* 1 serving of cooked rice, pasta, noodles or couscous = 1 cup

### How Often Do You Need To Eat?

* People say - Eat 6 Meals per Day? - It doesn’t matter when you eat
* Eating every 3 - 4 hours resets your body’s metabolism and turns off its ‘starvation mechanism’.
* Consuming frequent meals can also assist your appetite regulation. This will allow you to eat smaller meals at your main meals. For example, you could divide your lunch in half, eating half for lunch and the other half during the afternoon.
* As a general rule, listen to your body – it will tell you when to eat again. I mean really listen to your body; not your head. When it comes to food, many people confuse cravings with hunger. One is a want, the other is a need. If you eat a 600 calorie piece of chocolate cake at 11am, your body is not going to need a pre-set 12.30 lunch. Thirst does not = hunger.
* Adjust your calorie intake according to your activity levels: Women - 1500 with exercise and 1200 without exercise; Men - 2000 with exercise and 1600 without exercise.

**Hormones & Weight loss**

Insulin, glucagon, leptin and ghrelin are hormones that have a massive impact on your ability to lose weight and keep it off. By understanding the functions and actions of these four hormones in your body, you will have a much greater chance of controlling them and therefore accelerating the fat-burning process in your body.

* Insulin – storage & transport hormone
* Glucagon – The major effect of glucagon is to stimulate an increase in blood concentration of glucose.
* Ghrelin – Increases after a meal until you eat again (very strong 4 – 5 hrs after last meal)
* Leptin – appetite suppressant – increases as you eat (turns off in fat people)

**Satiety Control**

**Satiety** is the feeling of fullness that stops appetite and hunger signals. Satiety signals that originate in the stomach are delayed from the start of eating, so for many, it's easy to overeat before satiety signals are received and acted upon. The length of time food stays in the stomach and intestine affects the duration of satiety and initiation of hunger signals.

**Foods and Satiety**

Protein-rich foods have a high satiety value. That's one of the reasons that high protein diets are popular.

Foods high in fibre also have a high satiety value because they stay in the stomach and intestine for longer periods of time than foods that contain concentrated sugars or highly processed foods that digest and absorb readily. People who consume quantities of whole grain products, vegetables and some fruits often feel no hunger because their satiety signals remain "on".

Although calorie dense, foods high in fat have a low satiety value. They fail to trigger the satiety signals so we often over-consume high fat foods. Unfortunately, many high fat foods trigger appetite, compounding problems for those who consume more calories than they need.

**Is fat good or not?**

* People eat too much fat however a certain amount of fat is crucial for good health as it provides fat-soluble vitamins (A, D, E & K) and essential fatty acids.
* 20 – 30% of daily nutritional requirements should come from fat. (Currently 43%)

The amount of fat consumed is not the only concern but also the type of fat consumed.

**The different types of fat are:**

**Saturated fat**

Saturated fats are found in dairy products, processed meats, skin on chicken, egg yolks, coconut and palm oil, hardened fats (lard, copha, dripping), biscuits, cakes and pastries (due to the butter used in cooking). These can all lead to an increase in blood cholesterol and therefore should be limited in your diet. In saying that, bad wrap.

***Note: If you read ‘vegetable fat’ on a food label, you can generally assume that it is palm oil and therefore not a good choice.***

**Monounsaturated Fats**

Monounsaturated fats can have a beneficial effect on your health when eaten in moderation and when used to replace *trans* fatty acids.  Monounsaturated fats can help reduce bad cholesterol levels in your blood and lower your risk of heart disease and stroke.

Monounsaturated fats are found in olive and canola oils, avocado, macadamia nuts, walnuts pistachios, and almonds.

**Polyunsaturated fats**

There are two types of polyunsaturated fats:

* Omega 3, which is found in foods such as oily fish such as mackerel, salmon, sardines, trout and tuna, and walnuts, almonds and linseeds.
* Omega 6, which is found in foods such as sunflower, safflower, soy bean.

The ratio of the amount of Omega 3 to Omega 6 is essential. Even though both Omega 3 and Omega 6 are vital for efficient function, if too much Omega 6 is consumed (in proportion to Omega 3), inflammation and illness can be promoted. On the other hand, Omega 3 fatty acids have been shown to reduce and even prevent illnesses and ailments. An ideal ratio is 1:1 (or at worst 1:4) of Omega 3 to Omega 6. For most Australians, the ratio is up to 1:35. (Grain fed & soy products)

The benefits of Omega 3 include:

* **Brain Health including memory and focus**
* **Protection against coronary heart disease**
* **Helping to positively regulate fat burning**
* **Reducing triglyceride levels**
* **Reducing LDL-cholesterol without lowering HDL-cholesterol**

Note: Omega 6 can also help reduce LDL-cholesterol, but a high intake of omega 6 polyunsaturated fats can also lower HDL-cholesterol at the same time.

**Sources of Omega 3**

* **EPA and DHA as opposed to ALA**. The most widely available source of EPA and DHA is cold water oily fish such as salmon, herring, mackerel, anchovies and sardines. Oils from these fish have a profile of around seven times as much *Omega* 3 as *Omega* 6.

**Trans Fatty Acids**

* Trans Fatty Acids (TFA) occur naturally in small amounts in animal fats, e.g. butter, meat & poultry.
* The large majority of TFA however, results from the processing of vegetable oils to increase their solidity at room temperature
* TFA do to the cells of your body exactly what they do to the food that it is found in: they thicken and harden the cells to reduce the normal entry of nutrients into the cell. This then leads to a build-up of fat deposits on the walls of the arteries which can then lead to atherosclerosis.
* TFA are often found in pies, pastries, biscuits and cakes as well as many commercially packaged foods, commercially fried food such as French Fries from most fast food chains, and other packaged snacks such as microwaved popcorn. TFA have an adverse effect on your health. TFA behave like saturated fat in the body by increasing LDL cholesterol levels in the blood and reducing HDL cholesterol but are harder for the body to deal with.
* Palm oil

**Cholesterol**

* Cholesterol is an essential structural component of cell membranes
* when we have too much in our system however, the excess will be deposited on the walls of the arteries. There are no symptoms of high cholesterol so regular checks every few years are advisable (especially if you are over 45 years of age). For many people, the first sign of high cholesterol is when they have a heart attack or stroke.
* two major types of these 'carrier' lipoproteins – low-density lipoprotein (LDL) and high-density lipoprotein (HDL). LDL is the major carrier of cholesterol from the liver to the rest of the body. When cholesterol levels are excessive, LDL deposits cholesterol onto the arteries causing the damage. HDL, on the other hand, mops up cholesterol from the bloodstream and takes it back to the liver.

**Carbohydrates are not the enemy!**

Carbohydrates are essential for efficient and healthy operation of the brain and body.

***Carbohydrates provide***:

* The brain with glucose to allow proper function.
* Note: 70% of the brains stored glycogen is depleted during sleep (8 hours)
* 2/3 of circulating glucose (at rest) used by the brain
* Muscle glycogen not available to the brain
* The body with energy which allows for an increased level of exercise
* Provides energy during the first few minutes of all activity
* Glycogen needed to help break down fat for energy use
	+ Vitamins and minerals
* Vitamins are necessary for growth & development
* Minerals are necessary to activate thousands of enzyme reactions (use vitamins)
* Supplementation
	+ Dietary fibre for bowel health
* Cannot be broken down by the digestive system
* Slows emptying of the stomach which helps satiety

**How Much Fibre is Enough?**

30 grams of fibre per day. You can reach this target by eating the following each day:

* 4 servings of bread, cereal, rice or pasta, all made from whole grains (each serving being two thin slices of bread or one cup of rice, pasta or cereal)
* 2 pieces of fruit
* 5 serves of vegetables (each serving being half a cup if cooked or one cup if raw)

### Glycaemic Index

* GI is the measure of the effect of CHO on blood glucose levels
* To use more fats for energy, the insulin response must be moderated
* Combine high GI with low or protein to lower the overall Glycaemic Load (GL)

High GI leads to Insulin release & storage as fat causing a crash leading to hunger once again within a short period of time.

**Why do we need Protein for Fat loss?**

**Protein is converted to amino acids which are used for cell growth and repair**, or they may be oxidized to produce energy. There are no storage sites in the body for excess protein. Once all of the primary needs have been met, the remaining amino acids are converted to either glucose or triglycerides (fats) and then used for energy requirements or stored as fat.

**Protein provides 3 important benefits in the weight loss process.**

**1. Protein helps boost energy expenditure**

**Dietary Induced Thermogenesis**, i.e. the increase in heat production by the body after eating due to both the metabolic energy cost of digestion and the energy cost of forming tissue reserves of fat, glycogen, and protein. It is generally 10-15% of the energy intake. Protein costs more to digest, absorb and store than carbohydrates & fat.

**2. Protein Helps Build Muscle**

**Diets often cause a loss in muscle mass**. Adequate protein from your diet can reduce the loss of muscle mass during calorie-restricted diets. Maintaining or increasing metabolically active muscle tissue increases the amount of energy requirements to maintain that muscle at rest in addition to the amount of extra energy required during exercise. 1kg of muscle burns 13 grams of fat per day (i.e. more than 600 grams of fat per year).

To maintain muscle mass for weight loss, protein intake should be **1.05 grams** / kg/ day.

**3. Protein helps Suppress Appetite (**Increase Satiety**) – like low GI**

Eating more protein can help you feel fuller for longer and therefore lower your energy consumption. Therefore, you will experience higher satiety and lower hunger levels on a higher protein diet.

This is a good example of why High Protein Diets are popular.

**Meal Timing Success Tips**

* Eat the majority of your food earlier in the day (breakfast and lunch) to avoid hunger and overeating later in the day
* As most people break their diet at around 4.30pm, ensure that you have a protein or low GI carbohydrate snack available for this time

More and more studies are showing that the faster you eat, the more you eat. The human brain requires about 20 minutes to registering of satiety (feelings of satisfaction and fullness). So, the slower you eat the less food you'll require to feel full. Fill up on low-fat and low-sugar, nutritious foods first in order to keep your level of fat and caloric consumption down and your energy levels high.

**Success Tips for Decreasing your Calorie Intake**

* Eat slowly – This allows time for the satiety signals to reach your brain from your stomach. This generally takes approximately 20 minutes
* Put your cutlery down and pause during your meals
* Use smaller plates
* Talk – Make eating a social experience
* Take small bites and chew more
* Plan your meals and snacks

Most of our dietary problems could be solved if we:

* Ate only when we were hungry
* Stopped when we were full
* Choose fresh foods in preference to concentrated processed foods and drinks.

**You Can’t Burn Fat when there is Alcohol in Your System!**

Alcohol contributes to daily calorie intake with no nutritional value (empty calories) and can lead to weight gain or negatively affect weight loss.

The liver which is responsible for metabolising both alcohol and fat cannot metabolise anything other than alcohol when alcohol is in your system, i.e. all excess fat, protein and carbohydrate will be stored as fat whilst there is alcohol in your system. The liver can metabolise only a certain amount of alcohol per hour, regardless of the amount that has been consumed. E.g. 1 unit of alcohol = 2 hours

**Water – Can you drink too much?**

The human body is made up of on average**, 57% water**. **When body water levels drop**, our body systems are **unable to function effectively**. Daily fluid losses for most adults are between 1 - 2 litres. High temperatures, humidity, exercise and air-conditioning will significantly increase these fluid losses.

Note: **You can drink too much water**. Excessive amounts of water can cause a lack of salt in the blood which can lead to illness. In saying that, most people do not drink enough water. **Aim for 0.033 litres of non-caffeinated** fluids for each kilogram of body mass, e.g. 70 kg = 2.3 litres

**Water during Exercise**

Aim to drink 100 – 250ml for every 15 minutes

**Recommended Types of Fluid**

**Water is the preferred** drink to provide fluid required. Add a small amount of juice (e.g. lemon or lime) to water to aid absorption and digestion.

**Avoid energy drinks** as they often have high levels of caffeine or guarana (herbal form of caffeine). Caffeine is a diuretic and will increase dehydration.

**Sports drinks** are suitable during and *after longer (e.g. greater than 90 minutes), higher intensity exercise* sessions as they contain electrolytes to aid fluid absorption.

Thirst mistaken for hunger

**Resistance Training**

Resistance training will **maintain or increase your metabolic rate** which in turn helps you to maintain or decrease your body fat levels …… 24 hours a day!

1. **Improve glucose metabolism**. Researchers have reported a 23% increase in glucose uptake after 4 months of resistance training. Because poor glucose metabolism is associated with increasing body fat and adult onset diabetes, improved glucose metabolism is an important benefit of regular weight training.
2. **Helps neutralise age-related muscle loss**. Most adults that do not do weight training lose between 2.3 and 3.2 kg of muscle per decade. This equates to a decrease of 2 – 5% in metabolic rate every decade. At rest, 1kg of muscle requires 13 calories per day for tissue maintenance, and during exercise, muscle energy utilisation increases dramatically.
3. **Increase your strength** in order to more efficiently deal with daily activities. Increased strength can lead to greater efficiency in activities which can increase the use of body fat.

**Weight Training Exercise Prescription (FITT)**

**F**requency: Minimum twice per week per body part. This can be accomplished by training your entire body on each of your training days or training different parts of your body on different days, e.g. upper and lower body on 2 days each.

**I**ntensity: Your base weight training intensity should be such that you can perform between 8 – 14 repetitions in each set of each exercise that you do. Once you have become proficient at weight training, it is advantageous to vary your training intensity such that you use a variety of repetition ranges from workout to workout, or from month to month.

 It's the mix of repetition ranges and loads that will provide the best metabolic effect meaning that maximum muscle adaptation will occur, and of course, an increase in energy consumption. To gain optimal benefit, ensure that you use the maximum weight possible for the repetition range being used.

**T**ype: It is most important that you vary the type and intensity of your training in order to cause your body to adapt. Adaptation causes an increase in metabolism as well as an increase in EPOC.

**Aerobic Exercise**

To burn more calories you need to expend more oxygen. More energy is consumed during exercises involving greater muscle mass due to the increased demands of oxygen. Examples of large muscle mass exercises include running, cycling and walking. As you become fitter, you become more efficient and therefore use a greater proportion of fat.

**How does Aerobic Training help fat-burning?**

* **Increases the rate of lipolysis**. Lipolysis is the breakdown of fat stored in fat cells. During this process, free fatty acids are released into the bloodstream and circulate throughout the body.
* **Increases the number of capillaries** within the muscle. With an increase in the number of capillaries within a muscle, the muscle is able to utilise more energy during aerobic exercise.
* **Increases the size and number of mitochondria**. Mitochondria are the cell's power producers. They convert energy into forms that are usable by the cell.
* **Increases the number of enzymes involved in beta-oxidation** by 2-3 times. Beta oxidation is the process by which fatty acids are broken down in mitochondria for use as energy.
* **Increases insulin sensitivity** **positively** increasing the use of fats by muscle tissue. This is due to our body sensing an immediate need for energy. The body is great at distributing resources to the places where they are needed. So when we do aerobic exercise, all of a sudden the insulin starts to work better at getting the energy into our cells.

**Aerobic Exercise Prescription (FITT)**

**F**requency: Ideally daily but the more days the better (One day is better than none at all).

**I**ntensity: On a scale of 1 – 10 (10 being high), exercising at a level 6 – 7 is considered moderate and suitable for longer duration (20+ minutes) activities.

As you become fitter, you should vary the intensity of your training between low-intensity, longer duration workouts and high intensity, short duration workouts. This causes the body to have to continually adapt, therefore increasing the amount of energy required.

**T**ype: A variety of exercise is recommended for your aerobic activity. These exercises should involve large muscle groups and be rhythmical in nature. Examples include running, walking, cycling, boxing, dancing, etc.

Note: Exercise that requires you to carry your own body weight, e.g. running, stepping are better for weight loss than exercise that does not require you to carry your body weight, e.g. cycling, rowing. The least effective of all are those exercises that involve an element of floating (in water) such as swimming and aqua aerobics. In saying that, for most people, personal preference, variety and convenience are the keys so do what suits you best.

**T**ime: Ideally 270 minutes per week, i.e. 39 minutes per day (although any amount less than 270 minutes is better than none at all). If necessary, exercise can be performed in shorter periods, e.g. 10 minute intervals.

**Fat burning zone – Does not matter. – Work as hard as you can in the allotted time!**

E.g.

At 50% MVO² max At 70% MVO² max

50% of calories come from fat 40% of calories come from fat

8 calories per minute are expended 11 calories per minute are expended

60 minutes x 8 calories/ min = 480 calories 60 minutes x 11 calories/ min = 660 calories

50% x 480 = 240 calories of fat = 26.6g of fat 40% x 660 = 264 calories of fat = 29.3 g of fat

As you become fitter, your body will draw on fatty acids to provide energy sooner and therefore utilise a greater amount of fat stores throughout the workout. You will also utilise a greater proportion of fat (compared to glycogen) at higher intensities than an untrained person.

**Excess Post-exercise Oxygen Consumption (EPOC)**

EPOC is a measurably increased rate of oxygen intake following strenuous activity. The extra oxygen is used in the processes that restore the body to a resting state and adapt it to the exercise just performed.

EPOC is accompanied by an elevated consumption of fuel which leads to an elevated consumption of energy. The net effect is that the harder you work, the more fat you will burn after you finish the exercise session!

### Incidental Activity

* It helps & should be encouraged but it is not human nature.
* People are likely to take an escalator to the gym if they have the choice.

### What Will Help?

* Accountability/ Support
* Record Food intake & Exercise
* Measure (Assessment)
* Reward

### Sabotage

* Sabotage factors & Eating Triggers together with other Mindset factors can be very complex & not covered in this module. Be aware that people do sabotage themselves.

**Chill-out!**

When stressed, many people use food as a “tranquilizer”.

Stress is created when a perceived situation is considered to be threatening. This brings about a cascade of physiological reactions. Adrenaline and cortisol pump through our blood vessels, moving energy away from non-essential processes such as digestion, and directing it to the muscles. Our heart rate increases, our blood sugar and fat levels rise, our senses sharpen, and we are ready for action.

The only concern is often the stressor does not require a ‘flight or fight’ response and in current lifestyles it is often chronic and unrelenting, e.g. continual deadlines, limited finance, relationship challenges, etc. These hormones, if not used up, keep us in the cycle of stress leading to cravings, the deposition of fat and being consistently reactive.

In the moment of feeling overwhelmed, one of the best things that you can do is use up that adrenaline and cortisol; clear those fats and sugars from your bloodstream. If time is limited, perform a short burst of exercise such as some push-ups or squats, or maybe run up a flight of stairs. This will prevent you from experiencing the sugar and resultant insulin surges which lead to insatiable cravings and a drive for foods high in fat and sugar.

Means of keeping the effects of stress at manageable levels include:

**A low glycaemic diet** is important. Using sugar to handle stress further increases cortisol levels. Elevated cortisol, in turn, aggravates the sugar handling situation contributing to the development of high insulin levels and ultimately diabetes.

**Nutritional supplementation** is very valuable in restoring normal cortisol levels. It is important, however, to recognise if your cortisol levels are high or low. Low cortisol levels are the consequence of adrenal exhaustion or the exhaustion phase of the stress response. High cortisol levels are the result of the response to chronic stress and represent the adaptation phase of the stress response.

### Nutritional Supplements for basic adrenal support (to support low or high cortisol levels), include:

* a good Multi-Vitamin and Mineral supplement
* an adequate intake of omega-3 fat as they have the power to reduce our output of adrenaline
* Vitamin C, one capsule (500 to 1000 mg.) three times per day
* B5, (500 mg) one capsule per day
* B6, (50 mg) one capsule per day

Other supplementation may be required depending upon whether your cortisol levels are high or low. You should consult your Doctor or Dietician for further guidance.

**Eating regularly** (4-6 meals per day)

**Eat a variety of fruits and vegetables** as they provide protection from the effects of stress

**Rest and Relaxation** - It is also important to gain some quality rest daily. This may sound obvious but it must be managed and scheduled as a deliberate strategy, choice and course of action. Otherwise it gets forgotten in the busyness of life. Do some form of relaxation each day – sitting calmly, ten minutes of meditation, yoga or take a hot bath. Decrease Stress!

### Sleep

Sleep deprivation causes changes in metabolism and hormone functioning, which can affect how the body burns and stores fat.

There is also a particular link between sleep loss and obesity because a lack of sleep lowers leptin, an important hormone that tells the body when it has eaten enough food, and increases ghrelin, the opposite hormone that tells the body to eat more food. The two combined can set the stage for overeating, which in turn may lead to weight gain.

Ghrelin and leptin are both produced in the body. It has been found that thinner people have higher levels of ghrelin production during certain night-time hours which is lacking in people who suffer from obesity. People who fail to sleep properly over-stimulate their ghrelin production which increases the desire for food. Simultaneously, lack of sleep reduces the production of leptin which is the body’s appetite suppressant. So, if you don’t get enough sleep, the hormones in your body get all out of whack and you think that you’re hungry when you really don’t need the food.

Studies have shown that those who slept less than eight hours a night not only had lower levels of leptin and higher levels of ghrelin, but they also had a higher level of body fat. What's more, that level of body fat seemed to correlate with their sleep patterns. Specifically, those who slept the fewest hours per night weighed the most.

Food cravings increase as the body seeks an immediate source of energy to compensate for the sleep deprivation.

Also, people who are **well rested are more likely to engage in physical activity** or exercise and have a more positive attitude.