CHAPTER 13

Knowledge Review

Q1: Why is fitness testing useful?

A1:

Fitness testing is useful for various reasons:

1. It can help to shape a basic fitness training programme
2. Periodic testing can help to monitor fitness improvements and appropriate modifications in training routines
3. Elite athletic performance can be closely analyzed, and the effectiveness of training strategies assessed
4. Post-rehabilitation and pre-match fitness testing helps to assess the functional ability of players
5. Testing fitness can be a strong competitive and motivational stimulus, and can heighten players' awareness of their responsibilities
6. Fitness tests can be used as part of team selection processes
7. Testing fitness can be a fun activity

Q2: What would be a logical sequence to a health-related fitness test?

A2:

A logical sequence to a health-related fitness test could be as follows:

1. Consultation and pre-test screening
2. Resting heart rate
3. Blood pressure testing
4. Height
5. Weight

6. BMI
7. Girth assessment
8. Postural assessment
9. Lung function testing
10. Body fat testing
11. Aerobic fitness testing
12. Flexibility testing
13. Strength testing
14. Power testing

Q3: In what ways can fitness test results be analyzed?

A3:

The results of the fitness tests can be analyzed in a variety of ways:

1. Against generally accepted norms
2. Against norms that take into consideration the age and sex of the individual
3. Against the same client's previous test results
4. Against training colleagues and team mates
5. By taking into consideration the general health, lifestyle and ability of the client
6. By simply looking at the positives and negatives of each of the results
7. By way of a computerized analysis programme

Q4: Describe the procedure for taking blood pressure.

A4:

The basic procedure for taking blood pressure using mercury sphygmomanometer:

1. The client should be seated and rested.
2. Their arm should be supported at the level of the heart on a table, with elbow slightly flexed and forearm supinated.
3. The sphygmomanometer should be released of air, and the valve closed.
4. The cuff should be applied evenly and snugly around the upper arm, about 2cm proximal to the elbow crease [making sure it is the correct size for the arm].
5. Position the bell of the stethoscope over the brachial artery [in the medial aspect of the cubital space].
6. Inflate the cuff to between 160-200 mmHg [observed on the mercury scale]. Do not keep the cuff inflated for any longer than is necessary.
7. Slowly deflate the cuff by slightly opening the valve.
8. Listen for the first sound of soft beating appearing [the systolic blood pressure returning after being shut off] whilst observing the mercury scale, and make a mental note of its reading.
9. As the cuff continues to deflate, listen for when the beating sound disappears [diastolic blood pressure], and make a mental note.
10. Inform the client of the results, and record the measurements on the test form.
11. If the measurement has not been effective [eg. failure to obtain a reading], or if the reading appears high or incorrect, then the procedure should be repeated, but a period of about 15 minutes

should be allowed between a consecutive measurement on the same arm.

12. Compare test results against accepted norms.
13. Try not to alarm the client if readings are a little high.
14. Never consider a test result as being absolute. There are many factors which can affect the result.

Q5: What is: i] PEFR ii] FEV_1 iii] FVC iv] FER

A5:

i] The peak expiratory flow rate [PEFR] test uses a basic peak flow meter to measure the peak rate of air coming out of the lungs in one blow [not the volume of air] [measured in litres per minute: l/min].

ii] The forced expiratory volume [FEV_1] test uses a digital micro-spirometer, to measure the proportion of vital capacity that can be forcibly expired in one second [measured in litres per second: l/sec].

iii] The forced vital capacity [FVC] test uses a digital micro-spirometer to measure the total amount of air that can be forcibly expired after one inhalation [measured in litres].

iv] The forced expired ratio [FER] test shows the ratio of air the individual can expire in one second [FEV_1], to their forced vital capacity [FVC]. It is expressed as a percentage. In healthy adults, the FEV_1 is usually at least 80% of the FVC.

Q6: Describe the procedure for measuring body fat using skin fold callipers.

A6:

The basic procedure for measuring body fat using skin fold callipers is as follows:

1. Position the client correctly according to the protocol [usually standing, relaxed]
2. Locate the specific skin fold sites
3. Pinch the superficial tissue away at the skin fold site with finger and thumb
4. Apply and close the callipers at the site, perpendicular to the fold
5. Measure the skin folds accurately
6. Record the measurement of each site
7. Repeat each measurement 3 times, and record the average
8. Add up the total number of skin fold measurements appropriate the protocol used
9. Convert mm of body fat into kg and/or % body fat.
10. Compare results against accepted norms relevant to the individuals age and gender.

Q7: List 5 different tests of aerobic fitness.

A7:

Commonly used tests of aerobic fitness include:

1. Cycle ergometer [eg. Astrand Ryhming, Fox, YMCA, ACSM protocols]
2. Treadmill run [eg. Bruce protocol]
3. Multi-stage “bleep” test
4. Pulse recovery rate test

5. Step tests [eg. Harvard, YMCA protocols]
6. 1 mile walk [eg. Rockport, Kline protocols]
7. 12 minute run [eg. Cooper protocol]

Q8: Describe the multi-stage "bleep" test.

A8:

The multi-stage "bleep" [or "shuttle-run"] test is a maximal test of aerobic fitness. It is often used in group situations because it is easy to organize, requires little in the way of equipment, and a number of participants can take the test at the same time. It is a functionally relevant test for sports that involve short distance but continual running activity. The basic protocol requires that individuals are asked to run back and forth between two lines, 20m apart in time to pre-recorded "bleep" sounds from an audio tape or CD. The time between the "bleep" sounds decreases with each minute, with three "bleeps" indicating a move onto the next level. The participants must reach the marker line before hearing the "bleep", but if the "bleep" has not been heard, they should wait until it is heard before continuing. Participants should continue until they can no longer keep up with the increasing speed. There are usually 23 levels [each level consisting of a series of 20m shuttle-runs], and it is likely that only highly trained athletes will reach the upper levels. At the end of the test, a record is made of the participants' number of shuttles and the level they reached. The results of the test can be compared against previous tests and also norms which predict VO_2 max, usually supplied by the manufacturer of the tape or CD.

Q9: Describe 3 different tests of muscular strength and endurance.

A9:

Commonly utilized tests of muscular strength and endurance include:

1. 1 repetition max
2. 10 repetition max
3. Press-ups in a minute / to exhaustion
4. Abdominal curls in a minute / to exhaustion
5. Isometric grip strength
6. Isometric back strength
7. Isometric abdominal hold
8. Isometric press-up hold
9. Isometric quadriceps hold
10. 30 second Wingate test

1. The 1 repetition maximum [1RM] test is a test of maximum strength ability, and involves the subject lifting or pushing the most weight they can possibly manage in one single effort, typically in such exercises as the bench press, shoulder press or leg press. Not recommended for most people.

2. 10 RM test is preferred to the 1 RM test because of the latter's greater potential to cause injury. This version allows maximal strength to be assessed in conjunction with a small endurance component. The maximal weight lifted will be lower than for the 1RM test, and therefore the risk of injury is less. The testing station's set up position and level of resistance, and the subjects test score should all be recorded.

3. Upper body muscular strength and endurance can be evaluated by performing as many press-ups in a minute as possible. This is a functional

test because body weight is being lifted. The press-up position can be adapted to suit different ability levels [ie. box position, long box position or full press-up position], and technique must be correct. Another adaptation to this test is to perform as many press-ups as is possible [to exhaustion, with no time limit], again the technique must be correct. The chosen exercise position and number of repetitions should be recorded.

4. Abdominal curls in a minute [or to exhaustion] assesses abdominal strength and endurance. Positions for this test can also be adapted to suit different levels of ability.

5. The handgrip dynamometer assesses isometric handgrip strength. The basic protocol involves: setting handle grip; standing up and holding the dynamometer at the side of the body with forearm in neutral; squeezing handle as strongly as possible; recording score; repeating procedure two more times, allowing 1 minute's rest between each effort; repeating on contra-lateral limb. The average score for each arm is recorded and compared against recognized norms for age and gender.

6. The isometric back strength dynamometer measures isometric back strength. The basic protocol is similar to that of the grip test, but great care must be taken to assume the correct testing position as stated by the manufacturer. Back strength should not be tested in the presence of acute or chronic back problems.

7. The isometric abdominal hold is a test of muscular endurance. The exercise/test position should be correctly assumed [curl-up mid-position, whilst looking up and forward, and with bent knees] and held for as long as

possible, and the duration of the test should be accurately timed in seconds, and the result recorded.

8. The isometric press-up hold is also a test of muscular endurance. The subject should assume the selected position [beginner/intermediate/advanced press-up], and lower their elbows until they are at 90 degrees.

9. The isometric quadriceps squat test assesses the muscular endurance of the knee extensors. The subject sits against a wall and lowers their body until their hips and knees are at 90 degrees, with feet directly under the knees and arms hanging down by their sides. [Although these particular isometric tests can be useful in assessing muscular strength and endurance, and can provide some variety to the testing routine, they are not as functionally relevant as their isotonic counterparts. Smooth rhythmic breathing must be encouraged throughout the tests, and it is important to remember that isometric tests should not be attempted by those suffering with hypertension.]

10. The Wingate test is a test of anaerobic endurance. The subject cycles on a stationary cycle ergometer, pedalling as fast as they can against a pre-set resistance [relating to their body weight] for 30 seconds. This test is best performed with the aid of an on-board cycle computer which can analyze the subject's performance, including average and peak power, and also the decline in power output [fatigue]. Because the resistance and speed of performance is relatively high, it is a maximal test, and therefore highly strenuous and exhausting.