

FITNESS TESTING

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The success of the training program is largely dependent upon satisfying the performance aims associated with it. The intention of fitness testing is to evaluate specific aspects of a player's physical condition so that training programs and performance goals can be set.

This section will highlight the principal reasons for testing and outline protocols and procedures to follow. All tests described are tennis-specific and can be performed on the tennis court or in a well-equipped gym. None of the tests require significant technical competence on the part of the player.

Protocols and Procedures in Testing

The same testing protocol should be adhered to if the tests are to be administered in the most reliable and valid fashion so that the progress of a player's fitness can be monitored. In doing so, all tests should therefore be:

- Specific (designed to assess an athlete's fitness for playing tennis)
- Valid (test what it is supposed to test and nothing else)
- Reliable (capable of consistent repetition so that no factors other than those under examination can account for any improvement or deterioration in performance)
- Objective (produce a consistent result irrespective of the tester)

What are the purposes of testing?

Fitness testing is conducted for the following reasons:

- Results help to quantify a coach's own subjective appraisal. The subsequent identification of an athlete's strengths and weaknesses allows training regimes and techniques to be manipulated/maintained to accommodate the specific needs of each individual
- Conducting tests on a regular basis provides feedback on the effectiveness of the intervening program and enables coaches to monitor an athlete's progress. If required, modification to training can then be considered
- Testing, and more specifically test results, can represent a form of extrinsic or intrinsic motivation to the athlete. Irrespective of the source of the motivation, performance goals can be set to provide direction and incentives within a training programme
- Testing can help determine the physiological attributes of elite performers and consequently become a predictor of performance potential (DOES NOT predict future champions)
- Testing can facilitate a player's education progress by which the player learns to better understand their body and the demands of the sport of tennis
- Testing may highlight potential health problems that could occur during training that are not detected by standard physical examination

Tests additionally break up, and add variety to, the training program. They can be used to satisfy the athlete's competitive urge out of competition. In addition, they can be used during an injury rehabilitation program to assess recovery. Since they demand maximum effort of the athlete, they are useful at times as a training unit in their own right.

AEROBIC ENDURANCE TESTS

MULTISTAGE FITNESS TEST

Aim

To measure aerobic power. The test is particularly useful for tennis players because the movements used are similar to tennis with respect to the stop, start and change of direction movement patterns and can be easily administered with a squad or team simultaneously.

Equipment

- Multistage Fitness Test/20m Shuttle Run Test
- Compact disc (CD) and CD player
- Cones - to clearly mark a 20 m distance

Directions

1. Allow the players to warm-up by running and performing light stretching.
2. Ensure that the players listen carefully to the instructions on the CD.
3. The test begins at Level 1 following a brief explanation on the CD
4. The CD emits a single bleep at regular intervals. A player should try to be at the opposite end of the 20m track by the time the next bleep sounds. After each minute, the time interval between bleeps will decrease, so that the running speed will need to be increased. The first running speed is referred to as Level 1, the second speed as Level 2 etc. Each level lasts approximately one minute and the CD continues up to Level 21. The end of each shuttle is denoted by a single bleep, the end of each level is denoted by a triple bleep and by the commentator on the CD.

5. The player needs to place one foot on or behind the 20m mark at the sound of each bleep. Players who fail to reach the line at the sound of the bleep will receive a warning that they will be eliminated if they are not at the opposite end of the 20m track at the sound of the next bleep.

6. When near exhaustion, players falling short of the 20m line twice in succession have their test terminated and their score recorded. Their score is their level and number of shuttles immediately previous to the bleep on which they were eliminated.

Note

Current testing at the Australian Institute of Sport has found more applicable results for intermittent sports such as tennis, are able to be obtained doing the test over 10 metres and thus a player should turn twice within one bleep.

ANAEROBIC ENDURANCE TESTS

TENNIS-SPECIFIC AGILITY ENDURANCE TEST

Aim

The aim of this test is to measure the ability of a tennis player to be able to consistently repeat bursts of high intensity court movement throughout an entire match.

Equipment

- Masking tape
- Measuring tape
- Stopwatch
- Tennis court

Directions

1. The player begins at the centre mark on the baseline. Upon the 'go' command of the coach, the player sprints forwards to the net to touch a cone with the hand. The player then returns back again to the starting position whilst keeping an eye on the opponent and ball at the other end.
2. The second sprint is to the right singles sideline. Again, a cone is placed at the intersection of the singles sideline and baseline for the players to touch. Players should simulate footwork positions when they touch each cone and always return to the starting position.
3. Thirdly, the player proceeds to the short diagonal to the right side, which is the service line and the singles sideline and again touches a cone before returning back to the starting position at the centre mark on the baseline.
4. This is repeated to the left side – short diagonal.
5. Finally, the player sprints past the left singles sideline and the coach stops the stopwatch and records the time.
6. Player can then rest for 20 seconds precisely.

7. The player then repeats the above exercise a total of five times with a recovery period of 20 seconds between each repetition.

Scoring

All five times are recorded and the difference between the best result and worst result is expressed as a percentage decrement (i.e. the difference/best x 100).

STRENGTH TESTS

UPPER BODY STRENGTH ENDURANCE TEST

Aim

To determine the muscular endurance of the triceps, pectoral and deltoid muscles.

Equipment

- Stopwatch

Directions

1. The player assumes the prone position on the floor with the hands directly underneath the shoulders, legs extended and together, and toes tucked under so they are in contact with the floor, (push up position).
2. The player then pushes with the arms until they are fully extended.
3. The player then lowers the body until the chin or chest touches the floor. At this point, the line from the head to the toes should be straight.
4. All this movement should be performed only by the arms and shoulders.

Scoring

The score is the number of push-ups, while maintaining correct form, completed in one minute.

WALL SQUAT TEST

Aim

To determine the muscular endurance of the quadriceps muscles.

Equipment

- Stopwatch
- Smooth wall

Directions

1. Player starts standing comfortably on both feet with the head back against a smooth wall.
2. The player then slides the back down the wall to assume a sitting position.
3. Measure the vertical distance the stick rises from the floor to the nearest centimetre.
4. The angle at the hip and the knee should be 90°.
5. The player then lifts one foot 5cm off the floor and balance is held for as long as possible.
6. The watch is stopped when the player puts the foot back on the ground.
7. The player then repeats the test lifting the other leg.

Scoring

The score is the time the player keeps the foot elevated from the ground.

GRIP STRENGTH TEST

Aim

To measure the strength of the flexor musculature of a player's forearm.

Equipment

- Grip Dynamometer

Directions

1. Ensure that the grip dynamometer is set to zero before starting the test.
2. Fit the size of the player's hand to the dynamometer by adjusting the base and the handle of the dynamometer. The handle should rest on the middle phalange, and the base should rest on the first metacarpal.
3. In the starting position, players stand with their heel, buttocks and back resting against a wall. The arm is raised vertically above the head with the palm facing inward.
4. The player grips the dynamometer as tightly as possible while moving the arm through a 180° arc for 3 seconds. The arm should remain fully extended throughout the movement.
5. Repeat with the other hand.

Scoring

Record the score to the nearest 0.5 kilogram. Three attempts are given with each hand and the best score for each is recorded.

UPPER BODY POWER TESTS

OVERHEAD MEDICINE BALL THROW TEST

Aim

To measure the ability of the upper body to exert force at high speed.

Equipment

- 1kg medicine ball
- Measuring tape or wheel

Directions

1. Player begins at the baseline in the service stance position.
2. Holding the medicine ball in two hands, the player elevates and flexes the arms so that the ball is held behind the head.
3. The player then propels the ball maximally from this position. The player is allowed to use leg flexion/extension, trunk/shoulder rotation, but is not permitted to step.
4. Encourage a release of approximately 45° to maximise distance achievable.

Scoring

Record score to the nearest centimetre. Three attempts are permitted. The best of the three throws is recorded

SIDEARM MEDICINE BALL THROW TEST

Aim

To measure the ability of the trunk rotators to exert force at a high speed.

Equipment

- 1kg medicine ball
- Measuring tape or wheel

Directions

1. Player begins standing side-on at the baseline or a designated start line.
2. The player holds the medicine ball in two hands, right hand at the back of the ball and left hand under the ball for a right-side throw (vice versa for the left side throw).
3. Player's arms are nearly straightened in front of the body and are held in a near-transverse (horizontal) plane.
4. The player then propels the ball maximally from this position. The player is permitted to use trunk/shoulder rotation (take a backswing) and attempt to sling the medicine ball. The player is not permitted to step or bend the arms significantly. The arms should move in a horizontal plane.
5. Encourage a release of approximately 45 to maximise distance achievable.

Scoring

Record the score to the nearest centimetre. Three throws are permitted and the best of the three throws is recorded. Repeat the test on the left-hand side.

LOWER BODY POWER TESTS

VERTICAL JUMP TEST

Aim

To measure the power of the legs in jumping vertically (and more specifically the power of the extensor muscles of the hips, knees and ankles).

Equipment

- Yardstick jumping device

Directions

1. The player should stand side on to the yard stick jumping device and with heels remaining flat on the floor, reach overhead as high as possible to displace the corresponding plastic vane.
2. The player then takes one step backwards and keeps side-on.
3. The player then takes one step forward and jumps as high as possible by executing a dip or counter movement immediately before upward propulsion.
4. As the player jumps, arms are permitted to swing, displacing the vane at the height of the jump. The take-off should be from two feet.

Scoring

Record the distance between the reach and jump heights to the nearest centimetre. The player should complete a minimum of three trials but may continue if still improving. The best trial is only recorded.

Notes

- If a yardstick jumping device is not available, players can repeat the above procedure against a wall that has a ruler/tape measure of sufficient length attached to it. To provide for the most accurate and reliable measurements, players should have their finger-tips marked with chalk/ink.
- A one-legged vertical jump can be recorded in the same way to assess if there is any discrepancy between right and left leg power.

STANDING LONG JUMP/HOP

Aim

In much the same way as the vertical jump/hop tests measure a player's leg power in jumping vertically, this series of tests provide for the assessment of explosive force application in a horizontal (and to a lesser extent, vertical) direction. The hop test similarly provides the evaluation of any discrepancy between the right and left leg operating independently in this fashion.

Equipment

- Tape measure

Directions

1. Players stand with toes of both feet touching the back of the baseline (or any line).
2. From this position players jump as far forward as possible.
3. Players may swing arms backwards and forward to provide momentum to assist with coordination and length of jump. The measurement is taken from the back of the baseline to the heel of the player's foot that is nearest to the baseline.
4. Players should endeavour to 'stick' their landing. The forward momentum is allowed to carry them forward so one (or both) hand/s touches the ground in front of them. Upon landing, if the player steps forward or for that matter steps backwards or touches the ground with his hand behind his feet, the jump should be deemed invalid.

Scoring

Players complete a minimum of three trials but may continue if still improving. The best of the trials is recorded. This procedure can also be repeated with right and left hops.

AGILITY TESTS

THE HEXAGON TEST

Aim

To assess the agility and coordination of a tennis player.

Equipment

- Masking tape, measuring tape and stopwatch.
- Using masking tape, mark a 0.6 m per side hexagon on the floor with angles of 120°.

Directions

1. The player stands in the middle of the hexagon facing forward, as they should for the duration of the test.
2. Begin by jumping forward over the tape with both feet and immediately back into the hexagon when the command “Ready-Steady-Go” is given.
3. Then, continuing to face forward, the player jumps over the next side and back into the hexagon. This pattern will be continued by jumping over all six sides and back to the middle for three full revolutions. The test begins at Level 1 following a brief explanation on the CD.

Scoring

- When the feet enter the hexagon after three full revolutions, the stopwatch should be stopped and the time recorded.
- One practice trial is permitted and the test can be taken two times. The fastest time is recorded.
- A penalty of 0.5 seconds is to be given for each line touch or 1.0 seconds for failure to follow the proper sequence.

PLANNED AGILITY TEST

Aim

To measure the ability of a tennis player to be able to quickly and effectively move into a position of predetermined play (i.e. serve and run into the net).

Equipment

- Masking tape, measuring tape, stopwatch
- Tennis court

Directions

1. The player begins at the centre mark on the baseline. Upon the 'go' command of the coach, the player sprints to doubles sideline to touch a cone placed at the centre of the line. They then return back to the starting position on the centre mark. When players touch each cone they run to, they should simulate the correct foot positions that they use on court (i.e. for backhand: side on and right foot in front).
2. From the centre mark, they then run to the singles sideline and again touch the cone before returning to the starting position.
3. The next sprint is to the short diagonal at the intersection of the singles sideline and service line on the right-hand side, again returning back to the starting position.
4. Players then sprint forwards to touch the net and return back to the baseline keeping an eye on their opponent and the ball down the other end.
5. The long diagonal to the left is the next direction (intersection of the net and left singles sideline).

6. It is then along the baseline to the left singles sideline and back to the start. When near exhaustion, players falling short of the 20m line twice in succession have their test terminated and their score recorded. Their score is their level and number of shuttles immediately previous to the bleep on which they were eliminated.

7. Finally the last sprint is out to the doubles sideline as fast as possible. The stopwatch is stopped as the player crosses the doubles sideline.

Note

- Typically only one trial is performed.

SPEED TESTS

20 METRE SPRINT

Aim

To measure acceleration to the ball and speed in moving forward on the tennis court.

Equipment

- Stopwatch

Directions

1. Begin at baseline in the tennis ready position.
2. On the coach's command, sprint 20 metres without a racket as fast as possible.
3. Repeat three times.

Scoring

Only the best result is recorded.

FLEXIBILITY TESTS

LOWER BACK AND HAMSTRING FLEXIBILITY

Aim

To measure a player's lower back and hamstring flexibility.

Equipment

- A 'sit & reach table', or a bench with a ruler.

Directions

1. Allow the players to warm-up by running.
2. The starting position is sitting on the floor with shoes removed, feet flat against the table, and legs straight.
3. The player should reach forward and push their fingers along the table as far as possible without lifting their knees.
4. The distance from the finger tips to the edge of the table represents the score for that person.

Scoring

- As the 'sit and reach' table has an overhang of 15 cm, a person who reaches 10 cm past their toes scores 25 cm.
- Players complete a minimum of three trials but may continue if still improving. The best of the trials is recorded

SHOULDER AND WRIST FLEXIBILITY

Aim

To measure a player's shoulder and wrist flexibility.

Equipment

- 1 metre ruler
- Stick/pole (approximately 1 metre in length)

Directions

1. Player starts laying prone (face-down) with their arms fully extended holding a stick. The arms should be shoulder width apart.
2. The player raises the stick as high as possible, keeping their nose on the ground.
3. Measure the vertical distance the stick rises from the floor to the nearest centimetre.

Scoring

- Record the score to the nearest centimetre.
- Players complete a minimum of three trials but may continue if still improving. The best of the trials is recorded.
- Measure the arm length from the acromial extremity (Figure) to the tip of the longest finger
- Subtract the best score from the arm length to attain the score.

TRUNK AND NECK FLEXIBILITY

Aim

To measure a player's trunk and neck flexibility.

Equipment

- 1 metre ruler

Directions

1. Player starts laying prone (face-down) with their hands clasped at the side of the head.
2. The player raises the trunk as high as possible whilst keeping the hips in contact with the ground (note: an assistant may be required to hold the feet down).
3. Record the vertical distance, to the nearest centimetre, from the tip of the nose to the ground.

Scoring

Players complete a minimum of three trials but may continue if still improving. The best of the trials is recorded.