

FUNCTIONAL TESTS FOR BIOLOGICAL AGE DETERMINATION

Body Composition Measures:

- Skinfold
- Circumference measures
- Body mass index (BMI)

Strength Measures:

- Hand Grip
- Push Up
- Curl Up
- Vertical Jump
- Bench Press
- Leg Press
- Anaerobic Fitness Test
- Standing Long Jump Test

Flexibility Measures:

- Shoulder / Wrist
- Trunk / Neck
- Sit-and-Reach
- Ankle

Aerobic Condition Measures:

- Post-50 400-Meter Walk Test
- Cooper 12-minute Run/Walk
- Post-50 Step Test
- 3-minute Step Test
- Rockport Fitness Walk Test (VO₂max)
- One-Mile Jog Test (VO₂max)

Body Composition Measure: Skinfold

Description

The measurement of skinfolds is used to predict percent body fat. It is assumed that subcutaneous fat correlates with total body fat. Fairly accurate estimates of body fat can be obtained by using skinfold calipers if the individual is trained to accurately identify the anatomical sites for measurements and to take the skinfold measures. Multiple body sites are used to ensure accuracy.

Protocol

1. Make all measurements on the right side of the body.
2. The skinfold is picked up between the thumb and index finger so as to include two thicknesses of skin, and subcutaneous fat without muscle tissue.
3. Apply the calipers about 1.0 cm from the fingers holding the skinfold and at a depth about equal to the thickness of the fold.
4. Obtain measurements from the following sites: triceps, subscapular, abdominal, chest, suprailium, axilla and thigh.
5. Measure each site three times, at least 15 seconds apart, and use an average value for the calculation.

References

1. Heyward, V.H. Practical body composition assessment for children, adults, and older adults. *Int. J. Sport Nutr.* 8(3):285-307. 1998.
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=9738136&query_hl=55
2. Wagner, D.R., and Heyward, V.H. Techniques of body composition assessment: a review of laboratory and field methods. *Res. Q. Exerc. Sport.* 70(2):135-49. 1999.
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=10380245&query_hl=55

BODY COMPOSITION

NAME: _____ DATE: _____

AGE: _____ WEIGHT: _____

CIRCUMFERENCE MEASURES (cm.):

NECK: _____ SHOULDERS: _____ CHEST: _____ r. ARM: _____

r. WRIST: _____ WAIST: _____ HIPS: _____ r. THIGH: _____ r. CALF: _____

SKINFOLD MEASURES (mm.):

TRICEPS _____, _____, _____ mean = _____ CHEST _____, _____, _____ mean = _____

SUBSCAPULAR _____, _____, _____ mean = _____ THIGH _____, _____, _____ mean = _____

ABDOMINAL _____, _____, _____ mean = _____ SUPRAILIUM _____, _____, _____ mean = _____

AXILA _____, _____, _____ mean = _____

Equations:

Male (sum of seven sites):

$$Bd = 1.1120 - 0.00043499 (\text{sum}) + 0.00000055 (\text{sum})^2 - 0.00028826 (\text{age}) = \underline{\hspace{2cm}}$$

(sum = all seven sites measured)

$$\%BF = (495/Bd) - 450 \qquad \%BF = \underline{\hspace{2cm}}$$

Male (sum of three sites):

$$Bd = 1.10938 - 0.0008267 (\text{sum}) + 0.0000016 (\text{sum})^2 - 0.0002574 (\text{age}) = \underline{\hspace{2cm}}$$

(sum = chest, abd, thigh)

$$\%BF = (495/Bd) - 450 \qquad \%BF = \underline{\hspace{2cm}}$$

Male (sum of two sites):

$$\%BF = 0.43 (\text{tri}) + 0.58 (\text{scap}) + 1.47 = \underline{\hspace{2cm}}$$

% BODY FAT AVERAGE = _____

BODY COMPOSITION

NAME: _____ DATE: _____

AGE: _____ WEIGHT: _____

CIRCUMFERENCE MEASURES (cm.):

NECK: _____ SHOULDERS: _____ CHEST: _____ r. ARM: _____

r. WRIST: _____ WAIST: _____ HIPS: _____ r. THIGH: _____ r. CALF: _____

SKINFOLD MEASURES (mm.):

TRICEPS _____, _____, _____ mean = _____ CHEST _____, _____, _____ mean = _____

SUBSCAPULAR _____, _____, _____ mean = _____ THIGH _____, _____, _____ mean = _____

ABDOMINAL _____, _____, _____ mean = _____ SUPRAILIUM _____, _____, _____ mean = _____

AXILA _____, _____, _____ mean = _____

Equations:

Female (sum of seven sites):

$$Bd = 1.0970 - 0.00046971 (\text{sum}) + 0.00000056 (\text{sum})^2 - 0.00012828 (\text{age}) = \underline{\hspace{2cm}}$$

(sum = all seven sites measured)

$$\%BF = (495/Bd) - 450 \qquad \%BF = \underline{\hspace{2cm}}$$

Female (sum of three sites):

$$Bd = 1.0994921 - 0.0009929 (\text{sum}) + 0.0000023 (\text{sum})^2 - 0.0001392 (\text{age}) = \underline{\hspace{2cm}}$$

(sum = triceps, iliac, thigh)

$$\%BF = (495/Bd) - 450 \qquad \%BF = \underline{\hspace{2cm}}$$

Female (sum of two sites):

$$\%BF = 0.55 (\text{tri}) + 0.31 (\text{scap}) + 6.13 = \underline{\hspace{2cm}}$$

% BODY FAT AVERAGE = _____

Body Composition Measure: Circumference measures

Description

The measurement of circumference (girth) of specific body parts can be used to predict percent body fat since it is assumed that these measures have a positive relationship to percent body fat. Thus, as the body girths increase, it is assumed that body fat levels also increase.

Protocol

1. Pull the measuring tape tightly but firmly around the areas to be measured.
2. Male circumference sites:
Wrist (WR): measure around the wrist just distal to the radial and ulnar styloid processes.
Abdomen (AC): measure around the abdomen at the level of the umbilicus.
3. Female circumference sites:
Abdomen (AC): measure around the abdomen at the level of the umbilicus.
Hip (HC): measure your hip or gluteal circumference at the largest circumference of the gluteals.
4. Repeat three times and record all values for measurements.

References

1. Heyward, V.H. Practical body composition assessment for children, adults, and older adults. *Int. J. Sport Nutr.* 8(3):285-307. 1998.
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=9738136&query_hl=55
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http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=10380245&query_hl=55

Body Composition Measure: Body Mass Index

Description

Body mass index (BMI) is a simple weight-to-height ratio. The theory behind this method is that weight-to-height ratios across the general population have a positive relationship with percent body fat. BMI is commonly used as an indicator of obesity and is correlated to an increased risk of cardiovascular disease.

Protocol

1. Measure the bodyweight of the subject and convert to pounds (2.2 lbs / 1 kg).
2. Measure the height of the subject and convert to meters (2.54 cm / 1 in).
3. To calculate the BMI of the subject using the equation: $BMI = \text{Body weight (kg)} / \text{Height}^2 \text{ (meters)}$.

Reference

1. Pongchaiyakul, C., Kosulwat, V., Rojroongwasinkul, N., Charoenkiatkul, S., Thepsuthammarat, K., Laopaiboon, M., Nguyen, T.V., and Rajatanavin, R. Prediction of percentage body fat in rural thai population using simple anthropometric measurements. *Obes. Res.* 13(4):729-38. 2005
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=15897482&query_hl=21

Strength Measure: Handgrip Test

Description

The purpose of the handgrip test is to measure the grip strength of the dominant hand using a handgrip dynamometer. The muscles tested are the extensors and flexors of the wrist.

Protocol

1. Place the handgrip dynamometer in the subject's dominant hand.
2. With elbow held at 90-degrees against the body have the subject squeeze the handgrip dynamometer at 100% effort.
3. Subject must rest until no fatigue is felt in forearm
4. Repeat first three steps above twice more for trials 2 and 3.
5. Repeat steps 2 to 4 in opposite hand.

References

1. Mathiowetz, V., Kashman, N., Volland, G., Weber, K., Dove, M., and Rogers, S. Grip and Pinch Strength; Normative Data for Adults. *Archives of Physical Medicine and Rehabilitation*. 66: 69-74. 1985

Strength Measure: Push –up Test

Description

The purpose of the push-up test is to measure muscular endurance of the upper body specifically the flexors and adductors of the shoulder and the extensors of the elbow. Muscular endurance represents how well a muscle exerts sub-maximum force repeatedly within a given period of time. In this test the subject performs as many push-ups as possible until fatigue.

Protocol

1. The push-up test is administered with male subjects in the standard “up” position (hands shoulder width apart, back straight, head up, using the toes as the pivotal point) and female subjects in the modified “knee push –up” position (legs together, lower leg in contact with mat with ankles plantar-flexed, back straight, hands shoulder width apart, head up).
2. The subject must lower the body until the chin touches the mat. The stomach should not touch the mat.
3. For both men and women, the subject’s back must be straight at all times and the subject must push up to a straight arm position.
4. The maximal number of push-ups performed consecutively without rest is counted as the score.

References

1. Rutherford, W.J., and Corbin, C.B. Validation of criterion-referenced standards for tests of arm and shoulder girdle strength and endurance. *Res Q Exerc Sport*. 65(2):110-9. 1994.
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=8047702&query_hl=32
2. American College of Sports Medicine. *Guidelines for Exercise Testing and Prescription (6th Edition)*. Philadelphia, PA: Lippincott Williams & Wilkins, 2000. *Data provided by Canadian fitness survey (1981).

Strength Measure: Curl Up (Crunch) Test

Description

The purpose of the curl up test is to measure the muscular endurance of the abdominals. Muscular endurance represents how well a muscle exerts sub-maximum force repeatedly within a given period of time. In this test the subject does as many curl ups as possible until fatigue.

Protocol

1. Subject assumes a supine position on a mat with the knees bent at 90°. The arms are at the side, with the fingers touching a piece of masking tape. A second piece of masking tape is placed 8 cm (for those who are > 45y) or 12cm (for those who are <45y) beyond the first piece.
2. A metronome is set to 40 beats·min⁻¹ and the subject does slow, controlled curl-ups to lift the shoulder blades off the mat (trunk makes a 30° angle with the mat) in time with the metronome (20 curl-ups/min). The low back should be flattened before curling up.
3. Subject performs as many curl-ups as possible without pausing, up to a maximum of 75.

References

1. Payne, N., Gledhill, N., Katzmarzyk, P.T., Jamnik, V.K., and Keir P.J. Canadian musculoskeletal fitness norms. *Can J Appl Physiol.* 25(6):430-42. 2000.
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=11098155&query_hl=15
2. Faulkner, R.A., and et. al. A partial curl-up protocol for adults based on an analysis of two procedures. *Can. J. Sport Sci.* 14:135. 1989

Strength Measure: Vertical Jump Test

Description

The purpose of the vertical jump test is to measure the short anaerobic component of anaerobic fitness. Jumping ability is based on the presence fast twitch muscle fibers within the body and an individual's phosphagen stores. In this test the subject jumps as high as possible.

Protocol (using a commercial Vertec device)

1. The tester adjusts the height of the vertical column to be low enough for the subject to register a standing touch height on the colored movable horizontal vanes. The subject should stand so that, when the dominant hand reaches straight upward, it is directly below the cent of the vanes. The highest vane that can be reached and pushed forward while standing flat-footed determines the standing touch height.
2. The vertical column is then raised to a measured distance that accommodates the jumping ability of the subject.
3. The subject gets into the starting position under the vanes in the same location that was used to determine standing reach height.
4. The subject then lowers the right hand and, without a preparation or stutter step, flexes the knees and hips, brings the trunk forward and downward, and swings the arms backward. This downward countermovement prior to upward propulsion is the eccentric phase of the stretch-shortening cycle, which enables maximum jump height. The concentric portion of the jump movement follows immediately and is characterized by knee and hip extension and forward and upward swing.
5. At the highest point in the jump, the subject reaches up with the right hand and taps the highest possible vane. The score is the vertical distance between the height of the highest vane tapped during the standing vertical reach and the vane tapped at the highest point of the jump.
6. The best of three trials is recorded to the nearest 0.5in.

Protocol (using chalk at home)

1. The tester rubs chalks on the fingers of the subject's dominate hand.
2. The subject stands with the right shoulder about 6 inches from the wall and with both feet flat on the floor, reaches as high as possible with the right hand and makes a chalk mark on the wall.

3. The subject then lowers the right hand and, without a preparatory or stutter step, flexes the knees and the hips, brings the trunk forward and downward, and swings the arms backward, then jumps.
4. At the highest point in the jump, the subject reaches up with the right hand and places the second chalk mark on the wall. The score is the vertical distance between the two chalk marks. .
5. The best of three trials is recorded to the nearest 0.5in.

References

1. Payne, N., Gledhill, N., Katzmarzyk, P.T., Jamnik, V.K., and Keir, P.J. Canadian musculoskeletal fitness norms. *Can J Appl Physiol.* 2000 Dec;25(6):430-42.
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=11098155&query_hl=15
2. National Strength and Conditioning Association. *Essentials of Strength Training and Conditioning.* Hong Kong: Human Kinetics, 2000.

Strength Measure: Bench Press Test

Description

The purpose of the bench press is to measure a person's upper body strength specifically in the chest, shoulders and arms. The bench press is performed by lying supine on a bench with feet on the floor straddling the bench. Gripping the bar overhand about shoulder width apart. The downward movement includes lowering the bar until it touches the chest. The upward movement includes pushing the bar up to full elbow extension (never lock out the elbows completely) while maintaining body position without arching the back.

Protocol

1. The subject performs a light warm-up of 5 to 10 repetitions at 40 to 60% of perceived maximum.
2. Following a 1-minute rest with light stretching, the subject does 3 to 5 repetitions at 60% to 80% of perceived maximum.
3. The subject should be close to a perceived 1-RM in Step 2. A small amount of weight is added, and a 1-RM lift is attempted. If the lift is successful, a rest period of 3 to 5 minutes is provided. The goal is to find the 1-RM within 3 to 5 maximal efforts. The process of titrating the increase in weight up to a true 1-RM can be improved by prior familiarization sessions that allow approximation of the 1-RM. Clear communication with the subjects is needed to facilitate determination of the 1-RM. This process continues until a failed attempt occurs.
4. The 1-RM is reported as the weight of the last successfully completed lift.

References

1. Kim, P.S., Mayhew, J.L., and Peterson, D.F. A modified YMCA bench press test as a predictor of 1 repetition maximum bench press strength. *J Strength Cond Res.* 16(3):440-5. 2002.
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=12173960&query_hl=30
2. Rutherford, W.J., and Corbin, C.B. Validation of criterion-referenced standards for tests of arm and shoulder girdle strength and endurance. *Res Q Exerc Sport.* 65(2):110-9. 1994.
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=8047702&query_hl=32

Strength Measure: Leg Press Test

Description

The purpose of the leg press is to measure a person's lower body strength specifically the muscles that perform knee and hip extension. The subject begins by sitting with the legs parallel and the feet on the machine's footrest. The forward movement includes pushing the foot rests steadily forward until extension (never lock out the knees completely). The backward movement includes moving the footrests slowly back to starting position.

Protocol

1. The subject performs a light warm-up of 5 to 10 repetitions at 40 to 60% of perceived maximum.
2. Following a 1-minute rest with light stretching, the subject does 3 to 5 repetitions at 60% to 80% of perceived maximum.
3. The subject should be close to a perceived 1-RM in Step 2. A small amount of weight is added, and a 1-RM lift is attempted. If the lift is successful, a rest period of 3 to 5 minutes is provided. The goal is to find the 1-RM within 3 to 5 maximal efforts. The process of titrating the increase in weight up to a true 1-RM can be improved by prior familiarization sessions that allow approximation of the 1-RM. Clear communication with the subjects is needed to facilitate determination of the 1-RM. This process continues until a failed attempt occurs.
4. The 1-RM is reported as the weight of the last successfully completed lift.

References

1. American College of Sports Medicine. *Guidelines for Exercise Testing and Prescription (6th Edition)*. Philadelphia, PA: Lippincott Williams & Wilkins, 2000. *Data provided by the Institute for Aerobics Research, Dallas, TX (1994).
2. National Strength and Conditioning Association. *Essentials of Strength Training and Conditioning*. Hong Kong: Human Kinetics, 2000. *Data provided by the Cooper Institute for Aerobics Research (1997).

Strength Measure: Anaerobic Fitness Test

Description

The purpose of the anaerobic fitness test is to measure the amount of power (watts) a person can produce in 15 and 60 seconds. The watts produced at fifteen seconds represent the peak anaerobic power while the watts produced at 60 seconds represents the anaerobic capacity. In this test the subject must do as many step-ups on an 18-inch bench within one minute for each leg.

Protocol

1. The subject stands alongside a bench of 18 inches. The test leg rests on top of the bench; the free leg need not touch the bench when the test leg lifts the body.
2. Time begins with the first upward movement.
3. During the test, each step raises the body to the top of the step while the free leg dangles in a straight position during the ascent and decent, it supports and pushes off when the foot contacts the floor.
4. The test leg must be fully straightened with each step and the back must remain straight throughout the test.
5. The arms can be used for balance but cannot be pumped vigorously during the test.
6. The subject should be instructed to go all-out without pacing the duration of the test.
7. Measurements are made on four items: a) the weight of the subject, b) the number of steps by the subject, c) the timing of the test, and d) the bench height.
8. A step is counted for each time the subject's support leg is straightened and then returned to the starting position. Steps are not counted if the subject does not straighten the support leg or if the subject's back is not straight.
9. The number of steps should be recorded at the 15th and the 60th second.

Strength Measure: Standing Long Jump Test

Description

The purpose of this test is to monitor the development of the individual's elastic leg strength, specifically the strength of the muscles that perform knee and hip extension. The subject simply jumps as far as possible from a stand still.

Protocol

1. The start of the jump must be from a static position.
2. The subject places their feet over the edge of the sandpit (if there is no sandpit available make sure the subject lands on a soft surface).
3. The subject crouches, leans forward, swings their arms backwards, then jumps horizontally as far as possible, jumping with both feet into the sandpit.
4. The tester should measure from the edge of the sandpit to the nearest point of contact.
5. Perform three trials and record the values.

Flexibility Measure: Shoulder-Wrist Flexibility

Description

The purpose of this test is to measure the flexibility of the shoulders and wrist in a person. Flexibility is an important component of fitness and avoidance of injury.

Protocol

1. Lay prone on the floor with the arms fully extended overhead; grasp a yardstick with the hands shoulder width apart.
2. Raise the stick as high as possible.
3. Measure the vertical distance (nearest ½ in.) the yardstick rises from the floor.
4. Measure the arm length from the acromial process to the tip of the longest finger.
5. Subtract the best vertical score from the arm length.

Reference

1. Johnson, B.L., and Nelson, J.K. *Practical Measurements for Evaluation in Physical Education. 4th Edition*. New York, NY: Macmillan Publishing. 1986.

Flexibility Measure: Trunk and Neck Flexibility

Description

The purpose of the test is to measure the flexibility of the trunk and neck. Flexibility is an important component of fitness and avoidance of injury.

Protocol

1. Lay prone on the floor with the hands clasped together behind the head.
2. Raise the trunk as high as possible while keeping the hips in contact with the floor. An assistant can hold the legs down.
3. Measure vertical distance (nearest ¼ in.) from the tip of the nose to the floor.

Reference

1. Johnson, B.L., and Nelson, J.K. *Practical Measurements for Evaluation in Physical Education*. 4th Edition. New York, NY: Macmillan Publishing. 1986.

Flexibility Measure: Sit and Reach

Description

The purpose of the sit and reach test is to measure trunk and hamstring flexibility. Flexibility is an important component of fitness and avoidance of injury. The trunk and hamstrings play an important role in everyday activities such as walking, sitting and posture.

Protocol

1. Subject should perform a short warm-up prior to this test and include some stretches. The subject's shoes should be removed.
2. The subject's heels should be placed against the edge of the box.
3. The subject should slowly reach forward with both hands as far as possible, holding this position momentarily. Be sure that the subject keeps the hand parallel and does not lead with one hand. Fingertips can be overlapped and should be in contact with the measuring portion of the sit and reach box.
4. To assist the best attempt, the subject should exhale and drop the head between the arms when reaching. Tester should ensure that the knees of the subject stay extended; however, the subject's knees should not be pressed down.
5. The subject should breath normally during the test and should not hold his or her breath at any time.
6. The score is the most distant point (in inches or centimeters) reached with the fingertips. The best of three trials should be recorded.

References

1. Chung, P.K., and Yuen, C.K. Criterion-related validity of sit-and-reach tests in university men in Hong Kong. *Percept Mot Skills*. 1999 Feb;88(1):304-16.
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=10214658&query_hl=32
2. Payne, N., Gledhill, N., Katzmarzyk, P.T., Jamnik, V.K., and Keir, P.J. Canadian musculoskeletal fitness norms. *Can J Appl Physiol*. 2000 Dec;25(6):430-42.
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=11098155&query_hl=15

Flexibility Measure: Ankle Flexibility Test

Description

The purpose of this test is to measure the flexibility of the ankle. Flexibility is an important component of fitness and avoidance of injury. Ankle flexibility has an important role in walking, the most common activity in the world.

Protocol

1. Stand facing a wall.
2. Feet flat on the ground toes touching the wall.
3. Lean into the wall.
4. Slowly slide the feet back from the wall as far as possible.
5. Keep the feet flat on the ground, body and knees fully extended and the chest in contact with the wall.
6. Measure the distance between the toe line and the wall - to the nearest 1/4 of an inch.
7. Repeat the test 3 times and record the best distance.

Reference

1. Johnson, B.L., and Nelson, J.K. *Practical Measurements for Evaluation in Physical Education*. 4th Edition. New York, NY: Macmillan Publishing. 1986.

Aerobic Condition Measure: Post-50 400M Walk Test

Description

The purpose of the Post-50 Walk test is to determine the aerobic fitness category of a person by a simple walk test. The subject must walk 400m while being timed.

Protocol

1. Establish a 400-m distance on level terrain.
2. Start timing the walk on the first movement of the subject.
3. Proceed walking at a pace within the personal comfort zone.
4. Record the time (min:sec) taken to cover the 400-m distance.

References

1. Hoshizaki, T.B., Bell, R.D., and Collis, M.L. The Development of a Self-Administered Home Fitness Test for the Senior Population. *Canadian Gerontological Collection IV*. Winnipeg, Canada: Kellat Copy Centres Ltd. 1985.
2. Bell, R.D., Collis, M.L., and Hoshizaki, T.B. *The Post 50 "3-S" Physical Performance Test*. Victoria, BC: Durkin and Assoc., Ltd. 1984.

Aerobic Condition Measure: Cooper's 12-minute Run-Walk Test

Description

The purpose of the Cooper's test is to measure aerobic capacity by testing the cardiovascular endurance of a person. The subject must run/walk for 12 minutes in order to see how much distance they can cover.

Protocol

1. A quarter mile track should be marked off in tenths of miles.
2. Subjects should be aware that they are allowed to walk if they get tired, but they are scored on how far they go in the 12-minute period.
3. The time starts as soon as the subject moves.
4. The distance is recorded at the end of 12 minutes.

Reference

1. Cooper. *The aerobic program for total well being*. New York, NY: Evans & Co. 1982.

Aerobic Condition Measure: Post-50 Step Test

Description

The purpose of the Post-50 Step test is to estimate the aerobic fitness category of a person by having them step in place. This test is less strenuous than most step tests because it does not require a stepping apparatus; the subject simply steps in place while someone counts their steps.

Protocol

1. The starting position is a standing position.
2. The time begins as soon as the subject lifts the right foot.
3. Each step should raise the knee parallel to hip level (as close as 90° as possible).
4. The stepping intensity should be within a personal comfort zone.
5. The number of left-foot floor contacts is counted within a 2-minute period.

References

1. Hoshizaki, T.B., Bell, R.D., and Collis, M.L. The Development of a Self-Administered Home Fitness Test for the Senior Population. *Canadian Gerontological Collection IV*. Winnipeg, Canada: Kellet Copy Centres Ltd. 1985.
2. Bell, R.D., Collis, M.L., and Hoshizaki, T.B. *The Post 50 "3-S" Physical Performance Test*. Victoria, BC: Durkin and Assoc., Ltd. 1984.

Aerobic Condition Measure: 3-Minute Step Test

Description

The purpose of the three-minute step test is to measure the aerobic fitness category of a person with a low-intensity exercise test. This test is distinctive because instead of counting the number of steps, it requires the subject to keep a specific space for three minutes and the pulse is measured immediately after.

Protocol

1. The subject is expected to step up and down on the 12-inch bench at a rate of 24 stepping cycles per minute throughout the 3-minute test.
2. Subject faces the bench; begin the metronome, set at 96 bpm.
3. Begin the clock when the subject begins stepping.
4. Ensure that each 4 beat cycle (up, up, down, down) is performed to cadence.
5. Announce when 1 minute and 2 minutes have passed.
6. When 20 seconds remain, remind the subject to be seated immediately after stepping.
7. Obtain the radial or carotid pulse of the subject within 5 seconds after sitting and count for 60 seconds.

References

1. Cotton, R.T., and Goldstein, R.L. *Aerobics Instructor Manual: the resource for fitness professionals*. San Diego, CA: American Council on Exercise. 1993. *Data provide by Golding et. al. (1989).

Aerobic Condition Measure: Rockport Fitness Walking Test

Description

The objective of this test is to monitor the development of an individual's VO₂ max. This test requires the subject to walk, therefore is a simple and safe manner to measure VO₂ max.

Protocol

1. Choose a windless day to conduct the test.
2. Record subject's weight (lbs).
3. Time begins at first movement of the subject.
4. Subject walks one mile as fast as possible within comfort.
5. Timer records the time to complete the one-mile walk.
6. Immediately on finishing the walk record the subject's heart rate (beats per minute).
7. Calculate VO₂ max.

Aerobic Condition Measure: One-Mile Jog Test

Description

The purpose of the one-mile jog test is to monitor the development of the subject's VO₂max. The one-mile jog can be performed on a track or flat level surface that is measure to be a mile with a car.

Protocol

1. Record the subject's weight (kg).
2. Subject warms up by jogging for a couple of minutes.
3. Timer starts stopwatch at first movement of the subject.
4. Jog one mile at an easy, steady pace, making sure that you take longer (yes longer) than eight minutes (males), or more than nine minutes (females).
5. Record the time it takes the subject to jog one mile.
6. Record the heart rate of the subject immediately on completing the mile.
7. Calculate VO₂ max.