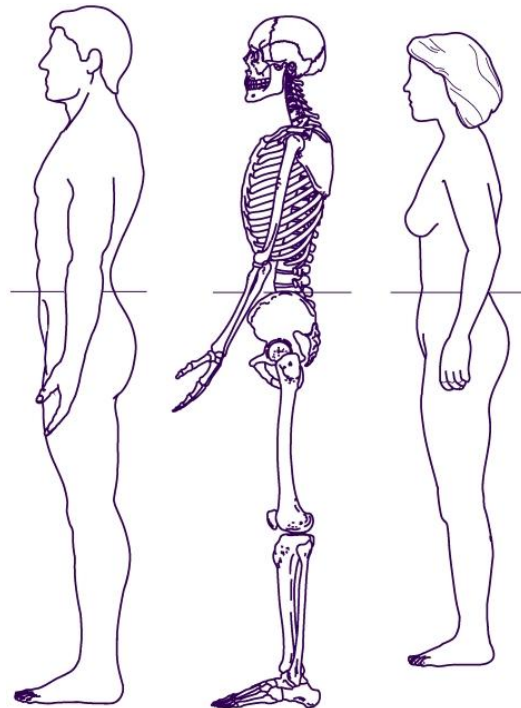


Office-based Anthropometric Measures

I. Measurement of Waist Circumference

To define the level at which waist circumference is measured, a bony landmark is first located and marked. The subject stands and the examiner, positioned at the right of the subject, palpates the upper hip bone to locate the right iliac crest. Just above the uppermost lateral border of the right iliac crest, a horizontal mark is drawn, then crossed with a vertical mark on the midaxillary line. The measuring tape is placed in a horizontal plane around the abdomen at the level of this marked point on the right side of the trunk. The plane of the tape is parallel to the floor and the tape is snug, but does not compress the skin. The measurement is made at a normal minimal respiration.

REF: U.S. Department of Health and Human Services, PHS. NHANES III Anthropometric Procedures Video. U.S. Government Printing Office Stock Number 017-022-01335-5. Washington, D.C.: U.S. GPO, Public Health Service; 1996.



II. Gulick Tape Measures

A Gulick is a tape measure with a tension sensing device to ensure reproducible measurements. Gulick tape measuring instruments have been used in sports medicine and anthropometric studies since the early 1980's. The Gulick tape measure makes it easy for anyone to accurately and reproducibly measure various body dimensions. It eliminates the guesswork by applying a known amount of tension (four ounces) to the measuring tape. When used properly, tape tension is always four ounces -- accurate measurements are possible no matter who is doing the measuring.

If an ordinary tape measure is used, the measurement will depend on how tightly the tape is pulled. If you pull harder and harder, tissue compression will be greater and greater, and the measured circumference will become smaller and smaller. Two consecutive measurements are usually quite different. If two or more people take the same measurement, the results rarely agree. It is clear that only by applying a constant tension (as the Gulick I does), can accurate and repeatable measurements be taken.

The Gulick tape measure uses a no-stretch, retractable tape with both Metric and English gradations (centimeters and inches). The tape is usually 5/16 inches wide and 72 inches long. The tape is not metallic to avoid the discomfort of a cold object touching the skin and to eliminate any possibility of scratches or cuts. The self-retracting tape is kept at the desired length until the retract button is pushed.

The most important part of the Gulick is its tensioning device, which provides a known amount of tension while a measurement is being taken. Each individual tensioning device is calibrated to indicate precisely a 4-ounce tension. The Gulick uses a stainless-steel *compression* spring -- this guarantees that the calibration will last a lifetime, since it is impossible to "over-compress" a spring of this type.

Gulick Instructions

Pull an appropriate amount of tape out of the housing. Wrap the tape once around the body part to be measured. Align the tape's "zero line" along side of the tape graduations. (Use the Metric or English units as desired by turning the tape over.) Now simply pull on the end of the tensioning mechanism until the calibration mark is just seen. Read the measurement next to the tape's "zero line". Gulick tape measures can be ordered from a variety of companies on the internet selling fitness and sports medicine equipment. It is important to use with the same Gulick tape measure instrument during serial waist circumference assessments for any given individual.



Original standard Gulick



Gulick II

III. Skinfold Measurements

The skinfold measurement is a method whereby a pinch of skin is precisely measured by calipers at several standardized points on the body to determine the subcutaneous fat layer thickness. Skinfold measurement when performed proficiently and skillfully is a valid means of establishing body composition. Skinfolds have been used for decades in sports medicine and clinical applications. Many of these applications include summing skinfolds from several body sites for conversion to a percent body fat by one of a variety of body density equations. The liability of these equations is that they nearly always do not reflect specific ethnic differences which among other variables determine body fat composition. For this and other reasons it is not recommended that cardiometabolic risk management programs use body fat percent conversion equations but instead use a more direct outcome measure: the skinfold measurement itself (in millimeters). These measures are not to be used for screening per se but as a serial measure of adiposity change between patient visits.

Skinfold Measurement Instructions

Use only professional/clinical calipers, e.g, Lange skinfold calipers which have been the trademark of skinfold testing research for more than 30 years. Do not use plastic calipers or those with built-in body fat percent conversion microprocessors.

- Take skinfold measurements directly on skin – not through clothing
- Pick up and hold skinfold with thumb and forefinger of one hand. Apply the jaws of the caliper to the skinfold about 1/4 to 1/2 an inch from the fingers holding the fold.
- Do not release the fingers holding the fold. The caliper should only be used to measure the thickness of the fold, not to hold the skin folded. Any pressure placed on the caliper jaws as a result of their holding the skinfold in a folded state will result in an incorrect higher reading.
- Measure one or two sites, e.g., the triceps or subscapular upper extremity sites may be more appropriate for cardiometabolic risk management programs. The supriliac site can be an additional or alternate site. It is only necessary to take 1 measurement at each site for reasonable

accuracy. For slightly greater accuracy you can take 2 or 3 measurements at each site and use the average as your measurement.

Locating Skinfold Sites

Locate and measure each skinfold with care. Results may vary if measurements are not consistently taken at the exact locations. Skinfold sites are illustrated here.

TRICEPS



Between the tip of the olecranon process of the ulna (elbow) and the acromion process of the scapula (shoulder).

1. With a grease pencil, mark the point of the back of the arm midway between the tip of the elbow and the shoulder.
2. Pick up skinfold with thumb and forefinger of the left hand.
3. Apply jaws of the caliper to the skinfold so that the grease mark is midway between the jaws.
4. Release your thumb from the caliper handle, so that the tips of the caliper have full exertion on the skinfold. Take reading immediately after the first rapid fall.
5. One reading at each site will give reasonable accuracy but if you wish greater accuracy you can take 2 or 3 readings at each site and use the average of these readings.

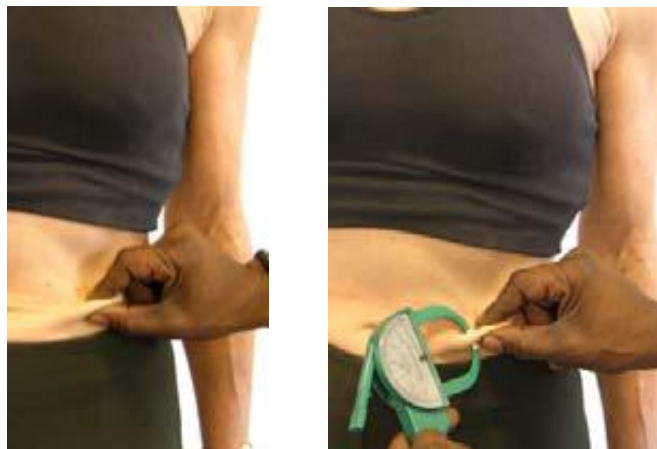
SUBSCAPULAR



Below tip inferior angle scapula 45 degrees to vertical (back – just under shoulder blade.)

1. Pick up skinfold just under the shoulder blade – following the natural fold of the skin.
2. With grease pencil, mark midway the fold. While holding the skinfold approximately 1 inch from the mark, proceed with steps 3, 4, and 5; in Triceps section.

SUPRAILIAC



Above iliac crest in mid-axillary line. (approximately 2.5 cm above hip bone.)

1. Pick up skinfold following the natural fold of the skin (approximately horizontal).
2. With grease pencil, mark midway the fold. While holding the skinfold approximately 1/4 to 1/2 inch from the mark, proceed with steps 3, 4, and 5; in Triceps section.

Caliper Calibration

Lange Skinfold Caliper is factory-calibrated to accuracy of +/- 1 mm. Calibration may be checked with a Gauge Block, P/N 010729. If the unit is not calibrated properly, return to Beta Technology for recalibration or the Service Center at 7621 E. Joy Road, Ann Arbor, MI 48105.

Purchasing Lange calipers.

There are many websites selling Lange calipers with a price range of \$200 – 300+). Creative Health Products(5148 Saddle Ridge Rd, Plymouth MI 48170 –phone 800-742-4478) is one of the more reputable companies selling Lange calipers and at an economical price range.

R. La Forge
2/2010