

CIRCUMFERENCE MEASUREMENTS PROTOCOL

Circumference measurements are sometimes good predictors of health problems (e.g., waist circumference is correlated with the risk of developing heart disease). In addition, an overall body assessment may motivate some clients when they see changes in their body dimensions. In the case of excess body fat, clients may be inspired by a decline in circumference measurements, while individuals who are interested in muscular hypertrophy may be motivated by increases in circumference. However, some clients will be demotivated to begin an exercise program if they are self-conscious or may discontinue a program if measurement changes are smaller than they hoped.

When taking circumference measurements, accuracy is important. Therefore, the personal trainer must use precise anatomical landmarks for taking each measurement. In addition, procedures must be followed in accordance with established guidelines:

- ▶ When measuring body circumferences, it is important to measure precisely and consistently.
- ▶ All measurements should be made with a non-elastic, yet flexible tape.
- ▶ The tape should be snug against the skin's surface without pressing into the subcutaneous layers. Clients being assessed should wear thin, form-fitting materials that allow for accurate measurements.
- ▶ Personal trainers should rotate through the battery of sites, initially measuring each site only once.
- ▶ Duplicate measurements should be taken at each site. If recorded values are not within 5 mm, it is necessary to remeasure. Personal trainers should wait 20 to 30 seconds between measurements to allow the skin and subcutaneous tissue to return to their normal positions.

Many of the assessments measuring body size and proportions can be used in conjunction with body-composition assessment. Protocols are basically the same for all anthropometric assessments:

- ▶ These assessments should be performed prior to exercise.
- ▶ The personal trainer should explain the procedure for each assessment and ensure that the client is comfortable with the proposed measurement sites.
- ▶ Each measurement must be performed using the precise landmarks.

- ▶ The personal trainer should record values on the assessment form and then evaluate and classify the client's measurements using normative data.
- ▶ Personal trainers should discuss health and fitness concerns related to abnormal readings and educate clients on strategies to reduce personal risk and improve overall health.

When taking circumference measurements, it is important to be consistent in terms of both location and technique so that the baseline values can be used to track progress later in a client's training program:

- ▶ *Abdominal circumference:* With the client standing upright with arms at the sides, feet together, and abdomen relaxed, a horizontal measure is taken at the height of the iliac crest, typically level with the umbilicus.
- ▶ *Hip circumference:* With the client standing erect and the feet together, a horizontal measure is taken at the maximal circumference of the buttocks.
- ▶ *Waist circumference:* With the client standing upright with arms at the sides, feet together, and abdomen relaxed, a horizontal measure is taken at the narrowest part of the torso (above the umbilicus and below the xiphoid process).
- ▶ *Biceps circumference:* With the client standing upright with arms hanging freely at the sides and the hands facing the thighs, a horizontal measure is taken midway between the acromion and olecranon process.
- ▶ *Midthigh circumference:* With the client standing with one foot on a bench so the knee is flexed at 90 degrees, a measure is taken midway between the inguinal crease (i.e., the crease between the torso and the thigh) and the proximal border of the patella, perpendicular to the tibia.

WAIST CIRCUMFERENCE

For every 1-inch (2.5-cm) increase in waist circumference in men, the following associated health risks are found:

- ▶ BP increases by 10%
- ▶ Blood cholesterol level increases by 8%
- ▶ High-density lipoprotein (HDL) decreases by 15%
- ▶ Triglycerides increase by 18%
- ▶ Metabolic syndrome risk increases by 18%

The first table below presents the risk categories associated with various waist circumferences for men and women.

WAIST-TO-HIP RATIO

As mentioned previously, excess body fat poses significant disease risks. The location of the fat deposits may even be a better indicator of disease risk.

The waist-to-hip ratio (WHR) helps differentiate individuals with android body-fat patterns (masculine- or apple-shape) from those who have gynoid body-fat patterns (feminine- or pear-shape). Those who are apple-shaped carry excess fat in the abdominal area, while pear-shaped individuals carry excess fat in the hips and

thighs. Though any extra fat weight can be detrimental to a person's health, those who are android and have a high WHR are at a greater health risk. Visceral fat is located inside the body around the viscera and contributes to android fat distribution. Excess visceral fat is unhealthy because it has been associated with insulin resistance, many types of inflammation in the body, and the production of blood lipids. There is a strong correlation between excess visceral fat and a number of disease risks, including type 2 diabetes, hypercholesterolemia, and hypertension.

To determine a client's WHR, the waist measurement is divided by the hip measurement. The second table below illustrates the relative risk ratings for WHRs.

Criteria for Waist Circumference in Adults

Risk Category	Waist Circumference	
	Females	Males
Very low	<27.3 in (<70 cm)	<31.2 in (<80 cm)
Low	27.3–34.7 in (70–89 cm)	31.2–38.6 in (80–99 cm)
High	35.1–42.5 in (90–109 cm)	39.0–46.8 in (100–120 cm)
Very high	>42.9 in (>110 cm)	>46.8 in (>120 cm)

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Waist-to-Hip Circumference Ratio Norms for Men and Women

	Age	RISK			
		Low	Moderate	High	Very High
Men	20–29	<0.83	0.83–0.88	0.89–0.94	>0.94
	30–39	<0.84	0.84–0.91	0.92–0.96	>0.96
	40–49	<0.88	0.88–0.95	0.96–1.00	>1.00
	50–59	<0.90	0.90–0.96	0.97–1.02	>1.02
	60–69	<0.91	0.91–0.98	0.99–1.03	>1.03
Women	20–29	<0.71	0.71–0.77	0.78–0.82	>0.82
	30–39	<0.72	0.72–0.78	0.79–0.84	>0.84
	40–49	<0.73	0.73–0.79	0.80–0.87	>0.87
	50–59	<0.74	0.74–0.81	0.82–0.88	>0.88
	60–69	<0.76	0.76–0.83	0.84–0.90	>0.90

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