

Table 1. Initial ACSM Risk Stratification

Low risk

Younger individuals * who are asymptomatic and meet no more than one risk factor threshold from Table 2

Moderate risk

Older individuals (men \geq 45 years of age; women \geq 55 years of age) or those who meet the threshold for two or more risk factors from Table 2

High risk

Individuals with one or more signs/symptoms listed in Table 2 or known cardiovascular,†pulmonary, ‡ or metabolic§ disease

* Men < 45 years of age; women < 55 years of age.

† Cardiac, peripheral vascular, or cerebrovascular disease.

‡ Chronic obstructive pulmonary disease, asthma, interstitial lung disease, or cystic fibrosis.

§ Diabetes mellitus (types 1 and 2), thyroid disorders, renal or liver disease.

Table 2. Coronary Artery Disease Risk Factor Thresholds for Use With ACSM Risk Stratification

Risk Factors	Defining Criteria
Positive	
Family history	Myocardial infarction, coronary revascularization, or sudden death before 55 years of age in father or other male first-degree relative (i.e., brother or son), or before 65 years of age in mother or other female first-degree relative (i.e., sister or daughter)
Cigarette smoking	Current cigarette smoker or those who quit within the previous 6 months
Hypertension	Systolic blood pressure of > 140 mm Hg or diastolic > 90 mm Hg, or on antihypertensive medication
Hypercholesterolemia	Total serum cholesterol of > 200 mg/dL or high-density lipoprotein cholesterol of <40 mg/dL, or on lipid-lowering medication. If low-density lipoprotein cholesterol is available, use >130 mg/dL rather than total cholesterol of > 200 mg/dL
Impaired fasting glucose	Fasting blood glucose of > 110 mg/dL
Obesity†	Body Mass Index of > 30 kg/m ² , or waist girth of > 40 inches (100 cm)
Sedentary lifestyle	Not participating in a regular exercise program or meeting the minimal physical activity recommendations‡ from the U.S. Surgeon General's report
Negative	
High serum HDL cholesterol§	>60 mg/dL

† Professional opinions vary regarding the most appropriate markers and thresholds for obesity; therefore, exercise professionals should use clinical judgment when evaluating this risk factor.

‡ Accumulating 30 minutes or more of moderate physical activity on most days of the week.

§ It is common to sum risk factors in making clinical judgments. If high-density lipoprotein (HDL) cholesterol is high, subtract one risk factor from the sum of positive risk factors because high HDL decreases CAD risk.

Table 3. Major Signs or Symptoms Suggestive of Cardiovascular and Pulmonary Disease

- Pain or discomfort (or other anginal equivalent) in the chest, neck, jaw, arms, or other areas that may be due to ischemia
- Shortness of breath at rest or with mild exertion
- Dizziness or syncope
- Orthopnea or paroxysmal nocturnal dyspnea
- Ankle edema
- Palpitations or tachycardia
- Intermittent claudication
- Known heart murmur
- Unusual fatigue or shortness of breath with usual activities
- These symptoms must be interpreted in the clinical context in which they appear because they are not all specific for cardiovascular, pulmonary, or metabolic disease.

Table 4. ACSM Recommendations for (A) Current Medical Examination and Fitness Testing Prior to Participation and (B) Physician Supervision of Fitness Tests

	Low Risk	Moderate Risk	High Risk
A.			
Moderate exercise †	Not necessary ‡	Not necessary	Recommended
Vigorous exercise §	Not necessary	Recommended	Recommended
B.			
Submaximal test	Not necessary	Not necessary	Recommended
Maximal test	Not necessary	Recommended †	Recommended

* Within the past year.

† Absolute moderate exercise is defined as activities that are approximately 3-6 METs or the equivalent of brisk walking at 3 to 4 mph for most healthy adults. Nevertheless, a pace of 3 to 4 mph might be considered to be "hard" to "very hard" by some sedentary, older persons. Moderate exercise may alternatively be defined as an intensity well within the individual's capacity, one which can be comfortably sustained for a prolonged period of time (~45 min), which has a gradual initiation and progression, and is generally noncompetitive. If an individual's exercise capacity is known, relative moderate exercise may be defined by the range 40-60% maximal oxygen uptake.

‡ The designation of "Not necessary" reflects the notion that a medical examination, fitness test, and physician supervision of fitness testing would not be essential in the preparticipation screening; however, they should not be viewed as inappropriate.

§ Vigorous exercise is defined as activities of >6 METs. Vigorous exercise may alternatively be defined as exercise intense enough to represent a substantial cardiorespiratory challenge. If an individual's exercise capacity is known, vigorous exercise may be defined as an intensity of >60% maximal oxygen uptake.

† When physician supervision of fitness testing is "Recommended," the physician should be in close proximity and readily available should there be an emergent need.

Table 5. Contraindications to Fitness Testing

Absolute

- A recent significant change in the resting ECG suggesting significant ischemia, recent myocardial infarction (within 2 days) or other acute cardiac event
- Unstable angina
- Uncontrolled cardiac arrhythmias causing symptoms or hemodynamic compromise
- Severe symptomatic aortic stenosis
- Uncontrolled symptomatic heart failure
- Acute pulmonary embolus or pulmonary infarction
- Acute myocarditis or pericarditis
- Suspected or known dissecting aneurysm
- Acute infections

Relative †

- Left main coronary stenosis
- Moderate stenotic valvular heart disease
- Electrolyte abnormalities (e.g., hypokalemia, hypomagnesemia)
- Severe arterial hypertension (i.e., systolic BP of > 200 mm Hg and/or a diastolic BP of > 110 mm Hg) at rest
- Tachyarrhythmias or bradyarrhythmias
- Hypertrophic cardiomyopathy and other forms of outflow tract obstruction
- Neuromuscular, musculoskeletal, or rheumatoid disorders that are exacerbated by exercise
- High-degree atrioventricular block
- Ventricular aneurysm
- Uncontrolled metabolic disease (e.g., diabetes, thyrotoxicosis, or myxedema)
- Chronic infectious disease (e.g., mononucleosis, hepatitis, AIDS)

† Relative contraindications can be superseded if benefits outweigh risks of exercise. In some instances, these individuals can be exercised with caution and/or using low-level end points, especially if they are asymptomatic at rest.

Table 6. General Indications for Stopping a Fitness Test in Low-Risk Adults*

- Onset of angina or angina-like symptoms.
- Significant drop (20 mm Hg) in systolic blood pressure or a failure of the systolic blood pressure to rise with an increase in exercise intensity.
- Excessive rise in blood pressure: systolic pressure > 260 mm Hg or diastolic pressure > 115 mm Hg.
- Signs of poor perfusion: light-headedness, confusion, ataxia, pallor, cyanosis, nausea, or cold and clammy skin.
- Failure of heart rate to increase with increased exercise intensity.
- Noticeable change in heart rhythm.
- Subject requests to stop.
- Physical or verbal manifestations of severe fatigue.
- Failure of the testing equipment.
- Assumes that testing is nondiagnostic and is being performed without direct physician involvement or electrocardiographic monitoring. For clinical testing, Table 7 provides more definitive and specific termination criteria.

Table 7. Indications for Terminating Fitness Testing

Absolute Indications

- Drop in systolic blood pressure of > 10 mm Hg from baseline blood pressure despite an increase in workload, when accompanied by other evidence of ischemia
- Moderate to severe angina
- Increasing nervous system symptoms (e.g., ataxia, dizziness, or near syncope)
- Signs of poor perfusion (cyanosis or pallor)
- Technical difficulties monitoring the ECG or systolic blood pressure
- Subject's desire to stop
- Sustained ventricular tachycardia
- ST elevation (> 1.0 mm) in leads without diagnostic Q-waves (other than V1 or aVR)

Relative Indications

- Drop in systolic blood pressure of > 10 mm Hg from baseline blood pressure despite an increase in workload, in the absence of other evidence of ischemia
- ST or QRS changes such as excessive ST depression (>2 mm horizontal or downsloping ST-segment depression) or marked axis shift
- Arrhythmias other than sustained ventricular tachycardia, including multifocal PVCs, triplets of PVCs, supraventricular tachycardia, heart block, or bradyarrhythmias
- Fatigue, shortness of breath, wheezing, leg cramps, or claudication
- Development of bundle-branch block or intraventricular conduction delay that cannot be distinguished from ventricular tachycardia
- Increasing chest pain
- Hypertensive response

† † Systolic blood pressure of more than 250 mm Hg and/or a diastolic blood pressure of more than 115 mmHg.