seek permission from the student-athlete and parents or guardians to communicate to the team physician any ongoing problems that could affect safe participation.

After the initial clearance, the clearing physician should modify the athlete's level of participation as new or changing medical conditions arise. Following injury that requires medical intervention, a return to play evaluation and subsequent clearance to participate signed by a physician is required by high school governing bodies in some states and also in some sports programs before the athlete can return to practice or competition. Likewise, a new heart murmur or episode of syncope may require a change in the participation status until the athlete has had a complete evaluation and is deemed safe to return to activity. Finally, the primary care or team physician may find it necessary to rescind participation clearance based on changes in the athlete's health status that would affect the initial clearance decisions. This includes contacting school officials and/or the athletic trainer at an institution to inform them of the change in the athlete's clearance status. The specifics of the condition do not need to be shared unless the patient and family grant their permission.

TABLE 5-1. MEDICAL CONDITIONS AND SPORTS PARTICIPATIONa,b

Condition	May Participate
Atlantoaxial instability (instability of the joint between cervical vertebrae 1 and 2) Explanation: Athlete (particularly if he or she has Down syndrome or juvenile rheumatoid arthritis with cervical involvement) needs evaluation to assess risk of spinal cord injury during sports participation, especially when using a trampoline.	Qualified yes
Bleeding disorder Explanation: Athlete needs evaluation.	Qualified yes
Cardiovascular disease	No
Carditis (inflammation of the heart)	INO
Explanation: Carditis may result in sudden death with exertion. Hypertension (high blood pressure)	Qualified yes
Explanation: Those with severe hypertension (>99th percentile for age plus 5 mm Hg) should avoid heavy weight and power lifting, bodybuilding, strength training, and high-static component sports (Figure 5-1). Those with sustained hypertension (>95th percentile for age) need evaluation. The National High Blood Pressure Education Program working group	Qualifica you
report defined prehypertension and stage 1 and stage 2 hypertension.	The second second
Congenital heart disease (structural heart defects present at birth)	Qualified yes
Explanation: Consultation with a cardiologist is recommended. Those with mild forms may participate fully in most cases; those with moderate or severe forms or who have undergone surgery need evaluation. The 36th Bethesda Conference defined mild, moderate, and severe disease for common cardiac lesions.	y aonsoin Tuney aodiv
Dysrhythmia (irregular heart rhythm)	Qualified yes
Long QT syndrome	Qualified yes
Malignant ventricular arrhythmias	e no serosmay b
Symptomatic Wolff-Parkinson-White syndrome	Less Institution
Advanced heart block	100
Family history of sudden death or previous sudden cardiac event	AND MARKET BAR
Implantation of a cardioverter-defibrillator	est fambed 70
Explanation: Consultation with a cardiologist is advised. Those with symptoms (chest pain, syncope, near syncope, dizziness, shortness of breath, or other symptoms of possible dysrhythmia) or evidence of mitral regurgitation (leaking) on physical examination need evaluation. All others may participate fully.	Nab curling Fried song

TABLE 5-1. MEDICAL CONDITIONS AND SPORTS PARTICIPATION^{a,b}, CONTINUED

Condition	May Participate
Cardiovascular disease, continued Heart murmur Explanation: If the murmur is innocent (does not indicate heart disease), full participation is permitted. Otherwise, the athlete needs evaluation (see congenital heart disease, structural heart	Qualified yes
disease [especially hypertrophic cardiomyopathy and mitral valve prolapse]). Structural/acquired heart disease Hypertrophic cardiomyopathy Coronary artery anomalies Arrhythmogenic right ventricular cardiomyopathy Acute rheumatic fever with carditis Ehlers-Danlos syndrome, vascular form Marfan syndrome Mitral valve prolapse	Qualified no Qualified no Qualified no Qualified no Qualified yes Qualified yes Qualified yes Qualified yes
Anthracycline use Explanation: Consultation with a cardiologist is recommended. The 36th Bethesda Conference provided detailed recommendations. Most of these conditions carry a significant risk of sudden cardiac death associated with intense physical exercise. Hypertrophic cardiomyopathy requires a thorough workup and repeated evaluations, because disease may change manifestations during later adolescence. Marfan syndrome with an aortic aneurysm can also cause sudden death during intense physical exercise. An athlete who has ever received chemotherapy with anthracyclines may be at increased risk of cardiac problems because of the cardiotoxic effects of the medications, and resistance training in this population should be approached with caution; strength training that avoids isometric contractions may be permitted. Athlete needs evaluation. Vasculitis/vascular disease	Qualified yes
Kawasaki disease (coronary artery vasculitis) Pulmonary hypertension Explanation: Consultation with a cardiologist is recommended. Athlete needs individual evaluation to assess risk on the basis of activity of disease, pathologic changes, and medical regimen.	
Cerebral palsy Explanation: Athlete needs evaluation to assess functional capacity to perform sports specific activity.	Qualified yes
Diabetes mellitus Explanation: All sports can be played with proper attention to diet, blood glucose concentration, hydration, and insulin therapy. Blood glucose concentration should be monitored before exercise, every 30 minutes during continuous exercise, 15 minutes after completion of exercise, and at bedtime.	Yes
Diarrhea, infectious Explanation: Unless symptoms are mild and the athlete is fully hydrated, no participation is permitted, because diarrhea may increase the risk of dehydration and heat illness. See fever.	Qualified no
Eating disorders Explanation: Athlete with an eating disorder needs medical and psychiatric assessment before participation.	Qualified yes

TABLE 5-1. MEDICAL CONDITIONS AND SPORTS PARTICIPATION^{a,b}, CONTINUED

Condition	May Participate
Functionally one-eyed athlete Loss of an eye Detached retina or family history of retinal detachment at a young age High myopia Connective tissue disorder, such as Marfan or Stickler syndromes Previous intraocular eye surgery or serious eye injury Explanation: A functionally one-eyed athlete is defined as having a best-corrected visual acuity of less than 20/40 in the eye with worse acuity. Such an athlete would suffer significant disability if the better, eye were seriously injured, as would an athlete with loss of an eye. Specifically, boxing and full-contact martial arts are not recommended for functionally one-eyed athletes, because eye protection is impractical and/or not permitted. Some athletes who previously have undergone intraocular eye surgery or had a serious eye injury may have an increased risk of injury because of weakened eye tissue. Availability of eye guards approved by the American Society for Testing and Materials and other protective equipment may allow participation in most sports, but this must be judged on an individual basis. Conjunctivitis, infectious	Qualified yes
Explanation: An athlete with active infectious conjunctivitis should be excluded from swimming.	Qualified no
Fever Explanation: Fever can increase cardiopulmonary effort, reduce maximum exercise capacity, make heat illness more likely, and increase orthostatic hypertension during exercise. Fever may rarely accompany myocarditis or other conditions that may make exercise dangerous.	No
Malabsorption syndromes (celiac disease, cystic fibrosis)	Qualified yes
Heat illness, history of Explanation: Because of the likelihood of recurrence, the athlete needs individual assessment to determine the presence of predisposing conditions and to develop a prevention strategy, which includes sufficient acclimatization, conditioning, hydration, and salt intake as well as other effective measures to improve heat tolerance and reduce heat injury risk.	Qualified yes
Hepatitis, infectious (primarily hepatitis C) Explanation: All athletes should have received Hep B vaccination prior to participation. Because of the apparent minimal risk to others, all sports may be played that the athlete's state of health allows. In all athletes, skin lesions should be covered properly, and athletic personnel should use universal precautions when handling blood or body fluids with visible blood.	Yes
Human immunodeficiency virus infection Explanation: Because of the apparent minimal risk to others, all sports may be played that the athlete's state of health allows (especially if the viral load is undetectable or very low). In all athletes, skin lesions should be covered properly, and athletic personnel should use universal precautions when handling blood or body fluids with visible blood. However, certain sports (such as wrestling or boxing) may create a situation that may favor viral transmission (likely bleeding plus skin breaks). If a viral load is detectable, these athletes should be advised to avoid such high-contact sports.	Yes

TABLE 5-1. MEDICAL CONDITIONS AND SPORTS PARTICIPATION^{a,b}, CONTINUED

Condition	May Participate
Kidney, absence of one Explanation: Athlete needs individual assessment for contact, collision, and limited-contact sports. Protective equipment may reduce risk of injury to the remaining kidney sufficiently to allow participation in most sports, providing such equipment remains in place during activity.	Qualified yes
Liver, enlarged Explanation: If the liver is acutely enlarged, participation should be avoided because of risk of rupture. If the liver is chronically enlarged, individual assessment is needed before collision, contact, or limited-contact sports are played. Patients with chronic liver disease may have changes in liver function that may affect stamina, mental status, coagulation, or nutritional status.	Qualified yes
Malignant neoplasm Explanation: Athlete needs individual assessment.	Qualified yes
Musculoskeletal disorders Explanation: Athlete needs individual assessment.	Qualified yes
Neurologic disorders History of serious head or spine trauma or abnormality, including craniotomy, epidural bleeding, subdural hematoma, intracerebral hemorrhage, second-impact syndrome, vascular malformation, and neck fracture. Explanation: Athlete needs individual assessment for collision, contact, or limited-contact sports.	Qualified yes
History of simple concussion (mild traumatic brain injury), multiple simple concussions, and/or complex concussion. Explanation: Athlete needs individual assessment. Research supports a conservative approach to concussion management, including no athletic participation while symptomatic or when deficits in judgment or cognition are detected, followed by a graduated, sequential return to full activity.	Qualified yes
Myopathies Explanation: Athlete needs individual assessment.	Qualified yes
Recurrent headaches Explanation: Athlete needs individual assessment. Recurrent plexopathy (burner or stinger) and cervical cord neuropraxia with persistent defects Explanation: Athlete needs individual assessment for collision, contact, or limited-contact sports;	Qualified yes
regaining normal strength is an important benchmark for return to play. Seizure disorder, well-controlled Explanation: Risk of seizure during participation is minimal.	Yes
Seizure disorder, poorly controlled Explanation: Athlete needs individual assessment for collision, contact, or limited-contact sports. The following noncontact sports should be avoided: archery, riflery, swimming, weight or power lifting, strength training, or sports involving heights. In these sports, occurrence of a seizure during the activity may pose a risk to self or others.	Qualified yes
Obesity Explanation: Because of the increased risk of heat illness, the obese athlete particularly needs careful acclimatization, sufficient hydration, and potential activity and recovery modifications during competition and training.	Yes
Organ transplant recipient (and those taking immunosuppressive medications) Explanation: Athlete needs individual assessment for contact, collision, and limited-contact sports. In addition to the potential risk of infections, some medications (eg, prednisone) may increase tendency for bruising.	Qualified yes
Ovary, absence of one Explanation: Risk of severe injury to the remaining ovary is minimal.	Yes

TABLE 5-1. MEDICAL CONDITIONS AND SPORTS PARTICIPATION^{a,b}, CONTINUED

Condition	May Participate
Pregnancy/postpartum Explanation: Athlete needs individual assessment. As pregnancy progresses, modifications to usual exercise routines will become necessary. Activities with a high risk of falling or abdominal trauma should be avoided. Scuba diving and activities posing a risk of altitude sickness should also be avoided during pregnancy. Postpartum, physiologic, and morphologic changes of pregnancy take 4 to 6 weeks to return to baseline.	Qualified yes
Respiratory conditions Pulmonary compromise, including cystic fibrosis Explanation: Athlete needs individual assessment, but generally, all sports may be played if oxygenation remains satisfactory during a graded exercise test. Athletes with cystic fibrosis need acclimatization and good hydration to reduce the risk of heat illness. Asthma Explanation: With proper medication and education, only athletes with the most severe asthma will need to modify their participation. For those using inhalers, recommend having a written action plan and using a peak flow meter daily. Athletes with asthma may encounter risks when scuba diving. Acute upper respiratory infection Explanation: Upper respiratory obstruction may affect pulmonary function. Athlete needs individual assessment for all but mild disease. See fever.	Qualified yes Yes Qualified yes
Athletes with systemic or polyarticular juvenile rheumatoid arthritis and history of cervical spine involvement need radiographs of vertebrae C1-C2 to assess risk of spinal cord injury. Athletes with systemic or HLA B27-associated arthritis require cardiovascular assessment for possible cardiac complications during exercise. For those with micrognathia (open bite and exposed teeth), mouth guards are helpful. If uveitis is present, the risk of eye damage from trauma is increased; ophthalmologic assessment is recommended, and if visually impaired, guidelines for functionally one-eyed athletes should be followed. Juvenile dermatomyositis (JDM), idiopathic myositis Systemic lupus erythematosis (SLE) Raynaud phenomenon Explanation: Athlete with JDM or SLE with cardiac involvement requires cardiology assessment before participation. Athletes on systemic corticosteroids are at higher risk of osteoporotic fractures and avascular necrosis, which should be assessed before clearance; those on immunosuppressive medication are at higher risk of serious infection. Sports activity should be avoided when myositis is active. Rhabdomyolysis during intensive exercise may cause renal injury in athletes with idiopathic myositis and other myopathies. Because of photosensitivity with JDM and SLE, sun protection is necessary during outdoor activity. With Raynaud phenomenon, exposure to the cold presents risk to hands and feet.	Qualified yes Qualified yes
Sickle cell disease Explanation: Athlete needs individual assessment. In general, if status of the illness permits, all sports may be played; however, any sport or activity that entails overexertion, overheating, dehydration, and chilling should be avoided. Participation at high altitude, especially when not acclimatized, also poses risk of sickle cell crisis.	Qualified yes

TABLE 5-1. MEDICAL CONDITIONS AND SPORTS PARTICIPATIONa, CONTINUED

Condition	May Participate
Sickle cell trait Explanation: Athletes with sickle cell trait generally do not have an increased risk of sudden death or other medical problems during athletic participation under normal environmental conditions. However, when high exertional activity is performed under extreme conditions of heat and humidity or increased altitude, such catastrophic complications have occurred rarely. Athletes with sickle cell trait, like all athletes, should be progressively acclimatized to the environment and to the intensity and duration of activities and should be sufficiently hydrated to reduce the risk of exertional heat illness and/or rhabdomyolysis. According to NIH management guidelines, sickle cell trait is not a contraindication to participation in competitive athletics and there is no requirement for screening prior to participation. More research is needed to fully assess potential risks and benefits of screening athletes for sickle cell trait.	Yes
Skin infections Herpes simplex, molluscum contagiosum, verrucae (warts), staphylococcal and streptococcal infection (furuncle [boils], carbuncle, impetigo, methicillin-resistant <i>Staphylococcus aureus</i> [cellulitis, abscess, necrotizing fasciitis]), scabies, tinea Explanation: During contagious period, participation in gymnastics with mats; martial arts; wrestling; or other collision, contact, or limited-contact sports is not allowed.	Qualified yes
Spleen, enlarged Explanation: If the spleen is acutely enlarged, participation should be avoided because of risk of rupture. If the spleen is chronically enlarged, individual assessment is needed before collision, contact, or limited-contact sports are played.	Qualified yes
Testicle, undescended or absence of one Explanation: Certain sports may require a protective cup.	Yes

Adapted with permission from: Rice SG, American Academy of Pediatrics Council on Sports Medicine and Fitness, Medical conditions affecting sports participation. Pediatrics. 2008;121(4):841-848.

REFERENCES

- 1. Platt R. Two essays of the practice of medicine. Manchester Univ Med Sch Gazette. 1947;27:139-145
- 2. Hampton JR, Harrison MJ, Mitchell JR, Prichard JS, Seymour C. Relative contributions of medical history-taking, physical examination, and laboratory investigation to diagnosis and management of medical outpatients. BMJ. 1975;2(5969):486-489
- 3. Gruppen LD, Wooliscroft JO, Wolf FM. The contribution of different components of the clinical encounter in generating and eliminating diagnostic hypotheses. Res Med Educ. 1988;27:242-247
- 4. Peterson MC, Holbrook JH, Von Hales D, Smith NL, Staker LV. Contributions of the history, physical examination, and laboratory investigation in making medical diagnoses. West J Med. 1992;156(2):163-165
- 5. Roshan M, Rao AP. A study on relative contributions of the history, physical examination and investigations in making medical diagnosis. J Assoc Physicians India. 2000;48(8):771-775
- 6. Goldberg B, Saraniti A, Witman P, Gavin M, Nicholas JA. Preparticipation sports assessment: an objective evaluation. Pediatrics. 1980;66(5):736-745
- 7. Risser WL, Hoffman HM, Bellah GG Jr. Frequency of preparticipation sports examinations in secondary school athletes: are the University Interscholastic League guidelines appropriate? Tex Med. 1985;81(7):35-39
- 8. Lively MW. Preparticipation physical examinations: a collegiate experience. Clin J Sport Med. 1999;9(1):3-8
- 9. Chun J, Haney S, DiFiori J. The relative contributions of the history and physical examination in the preparticipation evaluation of collegiate student-athletes. Clin J Sport Med. 2006;16(5):437-438

^bThis table is designed for use by medical and nonmedical personnel. "Needs evaluation" means that a physician with appropriate knowledge and experience should assess the safety of a given sport for an athlete with the listed medical condition. Unless otherwise noted, this need for special consideration is because of variability of the severity of the disease, the risk of injury for the specific sports listed in Box 5-1, or both.

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- 10. National Federation of State High School Associations. 2006–2007 high school athletics participation survey. http://www.nfhs.org/web/2007/09/high_school_sports_participation.aspx. Accessed June 8, 2008
- 11. Maron BJ, Poliac LC, Roberts WO. Risk for sudden cardiac death associated with marathon running. *J Am Coll Cardiol*. 1996;28(2):428–431
- 12. Carek PJ, Futrell M, Hueston WJ. The preparticipation physical examination history: who has the correct answers? Clin J Sport Med. 1999;9(3):124-128
- 13. Grunbaum JA, Kann L, Kinchen SA. Youth risk behavior surveillance—United States, 2001. MMWR Surveil Summ. 2002;51(4):1-62
- 14. Linder CW, DuRant RH, Seklecki RM, Strong WB. Preparticipation health screening of young athletes. Results of 1268 examinations. *Am J Sports Med.* 1981;9(3):187–193
- 15. Tennant FS Jr, Sorenson K, Day CM. Benefits of preparticipation sports examinations. J Fam Pract. 1981;13(2):287-288
- 16. Thompson TR, Andrish JT, Bergfeld JA. A prospective study of preparticipation sports examinations of 2670 young athletes: method and results. *Cleve Clin Q*. 1982;49(4):225–233
- DuRant RH, Seymore C, Linder CW, Jay S. The preparticipation examination of athletes. Comparison of single and multiple examiners. Am J Dis Child. 1985:139(7):657-661
- 18. Magnes SA, Henderson JM, Hunter SC. What conditions limit sports participation: experience with 10,540 athletes. *Phys Sportsmed.* 1992;20(5):143–158
- 19. Fuller CM, McNulty CM, Spring DA, et al. Prospective screening of 5,615 high school athletes for risk of sudden cardiac death. *Med Sci Sports Exerc.* 1997;29(9):1131–1138
- 20. Dixit S, DiFiori J. Prevalence of hypertension and prehypertension in collegiate student athletes. *Clin J Sport Med*. 2006;16(5):440
- 21. Gomez JE, Landry GL, Bernhardt DT. Critical evaluation of the 2-minute orthopedic screening examination. *Am J Dis Child*. 1993;147(10):1109–1113
- 22. Maron BJ, Thompson PD, Ackerman MJ, et al. Recommendations and considerations related to preparticipation screening for cardiovascular abnormalities in competitive athletes: 2007 update: a scientific statement from the American Heart Association Council on Nutrition, Physical Activity, and Metabolism. *Circulation*. 2007;115(12):1643–1655
- 23. Rifat SF, Ruffin MT IV, Gorenflo DW. Disqualifying criteria in a preparticipation sports evaluation. *J Fam Pract*. 1995;41(1):42–50
- 24. Smith J, Laskowski ER. The preparticipation physical examination: Mayo Clinic experience with 2,739 examinations. *Mayo Clin Proc.* 1998;73(5):419–429
- 25. Coddington RD. The significance of life events as etiologic factors in the disease of children. II. A study of a normal population. J. Psychosom Res. 1972;16:205–213
- 26. Rice SG, American Academy of Pediatrics Council on Sports Medicine and Fitness. Medical conditions affecting sports participation. *Pediatrics*. 2008;121(4):841–848
- 27. Maron BJ, Zipes DP. 36th Bethesda Conference: eligibility recommendations for competitive athletes with cardiovascular abnormalities. J Am Coll Cardiol. 2005;45(8):1317–1375
- 28. Mitchell JH, Haskell WL, Raven PB. Classification of sports. Med Sci Sports Exerc. 1994;26(10 suppl):S242-S245