The Preparticipation Examination (PPE): The Primary Care Provider's Survival Guide

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Disclosure Information

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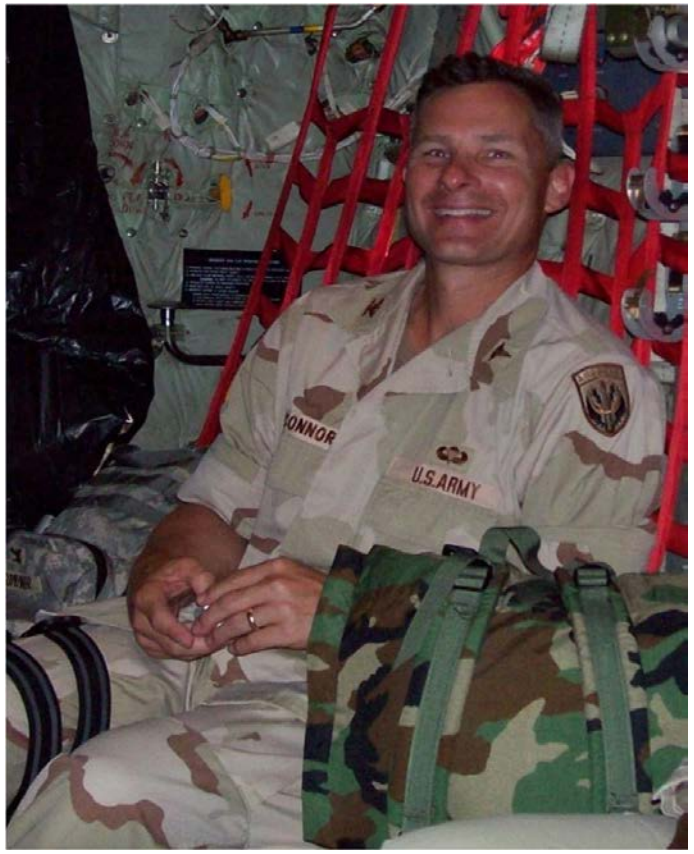
Francis G. O'Connor, MD, MPH, has no financial interests or relationships to disclose.



John is a Rising High School Senior

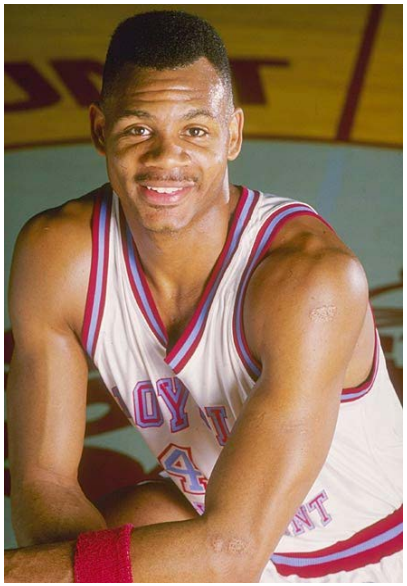
- John is a 17/o male being seen for his PPE.
- He is a multiple sport athlete and intends to play football, basketball and track.
- He has potential for a college scholarship as a wide receiver.
- **Practice starts tomorrow**.

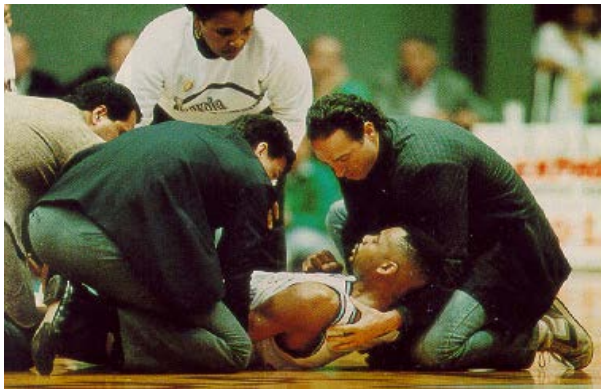
You have a Resident helping with Preparticipation Examinations

- Jason is a third year Resident in Family Medicine helping you with PPEs.
- **Jason has lots of questions!**

Objectives

- **Identify** Standard of Care **Resources** for performing preparticipation examination (PPE)
- **Discuss** the **Purpose**, **Timing**, **Frequency** and **Setting** of the PPE
- **Identify and Discuss** history questions on the PPE **not to miss**!
- **Identify and Discuss** physical examination findings on the PPE **not to miss**!
- **Discuss** the role of **Special Tests**
- **Discuss** common **Clearance** Issues





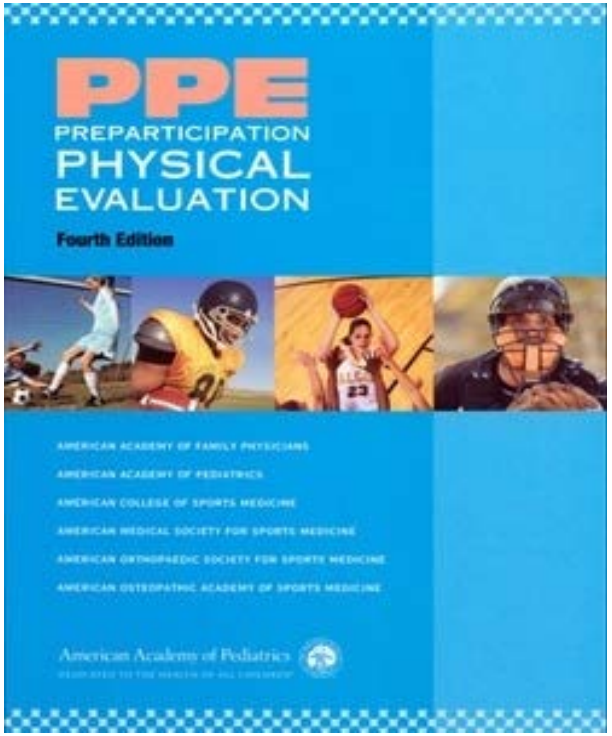
What Resources Address the PPE?

- **Jason inquires as to what references and resources he should be familiar with in assisting you with the PPEs?**

Preparticipation Examination Resources

Preparticipation Evaluation Physical Evaluation Fourth Edition

- American Academy of Family Physicians
- American Academy of Pediatrics
- American College of Sports Medicine
- American Medical Society for Sports Medicine
- American Orthopedic Society of Sports Medicine
- American Osteopathic Academy of sports Medicine



PREPARTICIPATION PHYSICAL EVALUATION
HISTORY FORM

(Note: This form is to be filled out by the patient and parent prior to seeing the physician. The physician should keep this form in the chart.)

Date of Exam _____

Name _____ Date of birth _____

Sex _____ Age _____ Grade _____ School _____ Sport(s) _____

Medicines and Allergies: Please list all of the prescription and over-the-counter medicines and supplements (herbal and nutritional) that you are currently taking

_____

_____

_____

Do you have any allergies? ☐ Yes ☐ No If yes, please identify specific allergy below.
☐ Medicines ☐ Pollens ☐ Food ☐ Stinging Insects

Explain "Yes" answers below. Circle questions you don't know the answers to.

GENERAL QUESTIONS	Yes	No
1. Has a doctor ever denied or restricted your participation in sports for any reason?		
2. Do you have any ongoing medical conditions? If so, please identify below: ☐ Asthma ☐ Anemia ☐ Diabetes ☐ Infections Other: _____		
3. Have you ever spent the night in the hospital?		
4. Have you ever had surgery?		
HEART HEALTH QUESTIONS ABOUT YOU	**Yes**	**No**
5. Have you ever passed out or nearly passed out DURING or AFTER exercise?		
6. Have you ever had discomfort, pain, tightness, or pressure in your chest during exercise?		
7. Does your heart ever race or skip beats (irregular beats) during exercise?		
8. Has a doctor ever told you that you have any heart problems? If so, check all that apply: ☐ High blood pressure ☐ A heart murmur ☐ High cholesterol ☐ A heart infection ☐ Kawasaki disease Other: _____		
9. Has a doctor ever ordered a test for your heart? (For example, ECG/EKG, echocardiogram)		
10. Do you get lightheaded or feel more short of breath than expected during exercise?		
11. Have you ever had an unexplained seizure?		
12. Do you get more tired or short of breath more quickly than your friends during exercise?		
HEART HEALTH QUESTIONS ABOUT YOUR FAMILY	**Yes**	**No**
13. Has any family member or relative died of heart problems or had an unexpected or unexplained sudden death before age 50 (including drowning, unexplained car accident, or sudden infant death syndrome)?		
14. Does anyone in your family have hypertrophic cardiomyopathy, Marfan syndrome, arrhythmogenic right ventricular cardiomyopathy, long QT syndrome, short QT syndrome, Brugada syndrome, or catecholaminergic polymorphic ventricular tachycardia?		
15. Does anyone in your family have a heart problem, pacemaker, or implanted defibrillator?		
16. Has anyone in your family had unexplained fainting, unexplained seizures, or near drowning?		
BONE AND JOINT QUESTIONS	**Yes**	**No**
17. Have you ever had an injury to a bone, muscle, ligament, or tendon that caused you to miss a practice or a game?		
18. Have you ever had any broken or fractured bones or dislocated joints?		
19. Have you ever had an injury that required x-rays, MRI, CT scan, injections, therapy, a brace, a cast, or crutches?		
20. Have you ever had a stress fracture?		
21. Have you ever been told that you have or have you had an x-ray for neck instability or atlantoaxial instability? (Down syndrome or dwarfism)		
22. Do you regularly use a brace, orthotics, or other assistive device?		
23. Do you have a bone, muscle, or joint injury that bothers you?		
24. Do any of your joints become painful, swollen, feel warm, or look red?		
25. Do you have any history of juvenile arthritis or connective tissue disease?		

MEDICAL QUESTIONS	Yes	No
26. Do you cough, wheeze, or have difficulty breathing during or after exercise?		
27. Have you ever used an inhaler or taken asthma medicine?		
28. Is there anyone in your family who has asthma?		
29. Were you born without or are you missing a kidney, an eye, a testicle (males), your spleen, or any other organ?		
30. Do you have groin pain or a painful bulge or hernia in the groin area?		
31. Have you had infectious mononucleosis (mono) within the last month?		
32. Do you have any rashes, pressure sores, or other skin problems?		
33. Have you had a herpes or MRSA skin infection?		
34. Have you ever had a head injury or concussion?		
35. Have you ever had a hit or blow to the head that caused confusion, prolonged headache, or memory problems?		
36. Do you have a history of seizure disorder?		
37. Do you have headaches with exercise?		
38. Have you ever had numbness, tingling, or weakness in your arms or legs after being hit or falling?		
39. Have you ever been unable to move your arms or legs after being hit or falling?		
40. Have you ever become ill while exercising in the heat?		
41. Do you get frequent muscle cramps when exercising?		
42. Do you or someone in your family have sickle cell trait or disease?		
43. Have you had any problems with your eyes or vision?		
44. Have you had any eye injuries?		
45. Do you wear glasses or contact lenses?		
46. Do you wear protective eyewear, such as goggles or a face shield?		
47. Do you worry about your weight?		
48. Are you trying to or has anyone recommended that you gain or lose weight?		
49. Are you on a special diet or do you avoid certain types of foods?		
50. Have you ever had an eating disorder?		
51. Do you have any concerns that you would like to discuss with a doctor?		
FEMALES ONLY		
52. Have you ever had a menstrual period?		
53. How old were you when you had your first menstrual period?		
54. How many periods have you had in the last 12 months?		

Explain "yes" answers here

_____

_____

_____

_____

_____

_____

_____

_____

I hereby state that, to the best of my knowledge, my answers to the above questions are complete and correct.

Signature of athlete _____ Signature of parent/guardian _____ Date _____

HE0503 9-2681.0410

PREPARTICIPATION PHYSICAL EVALUATION
PHYSICAL EXAMINATION FORM

Name _____ Date of birth _____

PHYSICIAN REMINDERS

1. Consider additional questions on more sensitive issues:
   - Do you feel stressed out or under a lot of pressure?
   - Do you ever feel sad, hopeless, depressed, or anxious?
   - Do you feel safe at your home or residence?
   - Have you ever tried cigarettes, chewing tobacco, snuff, or dip?
   - During the past 30 days, did you use chewing tobacco, snuff, or dip?
   - Do you drink alcohol or use any other drugs?
   - Have you ever taken anabolic steroids or used any other performance supplement?
   - Have you ever taken any supplements to help you gain or lose weight or improve your performance?
   - Do you wear a seat belt, use a helmet, and use condoms?
2. Consider reviewing questions on cardiovascular symptoms (questions 5–14).

EXAMINATION		
Height _____ Weight _____ ☐ Male ☐ Female		
BP ____/____ (____/____) Pulse _____ Vision R 20/_____ L 20/_____ Corrected: ☐ Y ☐ N		
MEDICAL	**NORMAL**	**ABNORMAL FINDINGS**
Appearance • Marfan stigmata (kyphoscoliosis, high-arched palate, pectus excavatum, arachnodactyly, arm span > height, hyperlaxity, myopia, MVP, aortic insufficiency)		
Eyes/ears/nose/throat • Pupils equal • Hearing		
Lymph Nodes		
Heart[a] • Murmurs (auscultation standing, supine, +/- Valsalva) • Location of point of maximal impulse (PMI)		
Pulses • Simultaneous femoral and radial pulses		
Lungs		
Abdomen		
Genitourinary (males only)[b]		
Skin • HSV, lesions suggestive of MRSA, tinea corporis		
Neurologic[c]		
MUSCULOSKELETAL		
Neck		
Back		
Shoulder/arm		
Elbow/forearm		
Wrist/hand/fingers		
Hip/thigh		
Knee		
Leg/ankle		
Foot/toes		
Functional • Duck-walk, single leg hop		

[a]Consider ECG, echocardiogram, and referral to cardiology for abnormal cardiac history or exam.
[b]Consider GU exam if in private setting. Having third party present is recommended.
[c]Consider cognitive evaluation or baseline neuropsychiatric testing if a history of significant concussion.

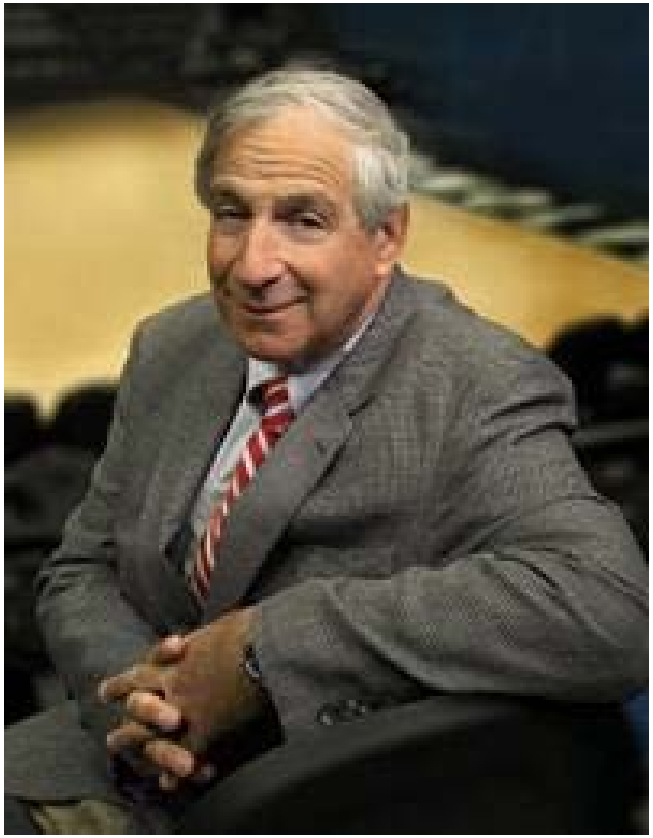
I certify that the above student has been medically evaluated for participation in athletics and deemed:

1. ☐ CLEARED WITHOUT RESTRICTIONS
2. ☐ Cleared for LIMITED PARTICIPATION
   - ☐ Not cleared for (specific sports) _____
   - ☐ Cleared only for (specific sports) _____ + _____
3. Requires further evaluation before a final recommendation
4. Not cleared for participation
   - ☐ Reasons: _____
5. Other recommendations: _____

Name of physician (printed/typed): _____ Date of Examination: _____

Signature of physician: _____

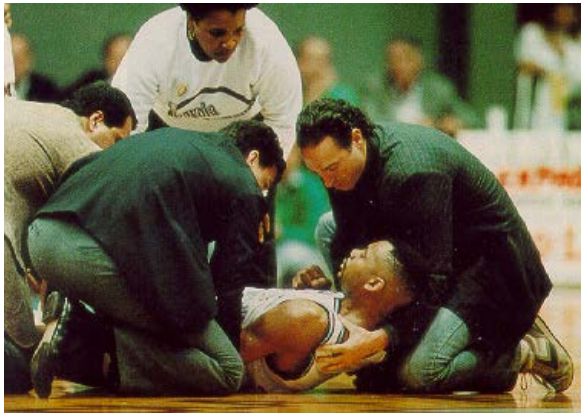
46th Bethesda Conference: Recommendations for Determining Eligibility for Competition in Athletes with Cardiovascular Abnormalities



Maron BJ, Zipes DP, Kovacs RJ; American Heart Association Electrocardiography and Arrhythmias Committee of Council on Clinical Cardiology, Council on Cardiovascular Disease in Young, Council on Cardiovascular and Stroke Nursing, Council on Functional Genomics and Translational Biology, and American College of Cardiology. ELIGIBILITY AND DISQUALIFICATION RECOMMENDATIONS FOR COMPETITIVE ATHLETES WITH CARDIOVASCULAR ABNORMALITIES: Preamble, Principles, and General Considerations: A Scientific Statement From the American Heart Association and American College of Cardiology. Circulation. 2015 Dec 1;132(22):e256-61.

46th Bethesda Conference Guidelines

- **Recommendations for Determining Eligibility for Competition in Athletes with Cardiovascular Abnormalities 2015**
  - 15 Distinct Task Force Reports



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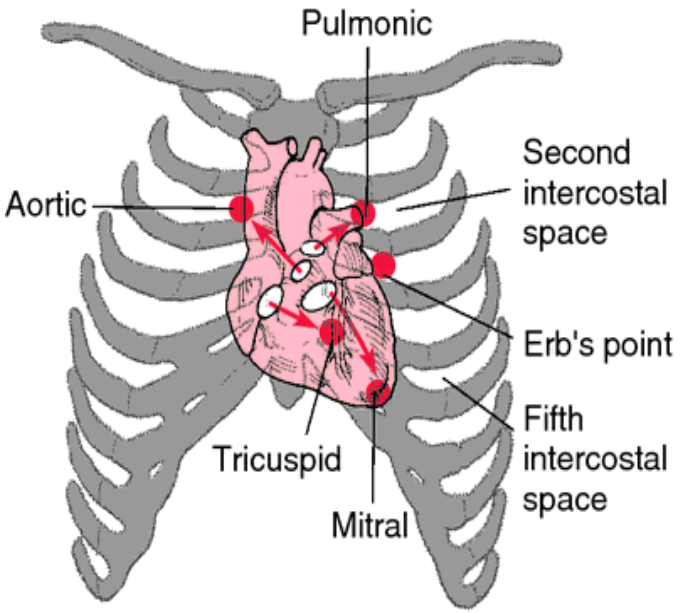

The Cardiovascular Preparticipation Evaluation (PPE) for the Primary Care and Sports Medicine Physician, Part I

Editors: Irfan M. Asif, MD; William O. Roberts, MD, MS, FACSM; Michael Fredericson, MD, FACSM; and Vic Froelicher, MD

Purpose: To provide a rational approach to positive responses to the American Heart Association (AHA) 12-Step Questionnaire and fourth-edition "Preparticipation Physical Evaluation" (PPE) monograph for assessing cardiovascular (CV) risk in athletes. This will assist primary care and sports medicine physicians in determining the need for the following:

1. Follow-up questions to a positive response that will enhance the history and help determine whether a condition that puts an athlete at increased CV risk exists
2. Any basic diagnostic tests to further assess the athlete and that will assist with making an informed decision
3. The need for a consultation or referral to an appropriate specialist

Our goal is to help the primary care and sports medicine physician with the critical decision making regarding positive responses to the AHA 12-Step Questionnaire and criteria for athlete clearance, as follows:

1. Could this be a potentially lethal problem?
2. Does this need additional workup or just an electrocardiogram?
3. Does this require consultation with a specialist (and which specialty)?

For example, to address a positive response to the question regarding "excessive shortness of breath or fatigue with exercise beyond what is expected for your level of fitness," it would be useful for physicians to know which elements in the history, physical, or diagnostic tests point to a potentially lethal CV diagnosis versus an easily treated pulmonary issue like exercise-induced asthma. If a lethal diagnosis can be excluded, the responsible physician may be able to determine that no restriction is warranted and clear the athlete for appropriate activity without a referral to a cardiologist or another specialist.

While there are some differences in the questions from the AHA 12 points and the CV questions in the PPE fourth-edition monograph, the underlying intent is the same and the

focus of this special communication. Cardiac events during sporting events, albeit rare, can be fatal, and these events are often very public (5,7,10). In the United States, most athlete PPE for ages 6 to 24 years are performed by family physicians and pediatricians (8), some with subspecialty training in sports medicine. Often, the PPE is the first encounter with the health care system for adolescents and serves as the sole opportunity for general screening, risk factor evaluation, and health education. This may be especially true for adolescents in lower income strata. The PPE is intended to reduce the risk of adverse outcomes without unduly restricting athlete participation. A thorough history examination can uncover a large portion of the athlete's risk for injury or illness, and the physical examination unveils other abnormalities. There are very few proven screening methods that assure an athlete's health, but the PPE provides a framework to assess and stratify sport participation risk. The intent of these evaluations is to deliver to health care providers pertinent information to educate athletes and parents and enable them to make an informed participation decision.

The first PPE monograph was published in 1992 by five organizations (American Academy of Family Physicians, American Academy of Pediatrics, American Medical Society for Sports Medicine, American Orthopedic Society for Sports Medicine, and American Osteopathic Academy of Sports Medicine). The American College of Sports Medicine joined for the third edition in 2005, and the fourth edition was published in 2010 (1). The American Heart Association (AHA) developed CV preparticipation screening recommendations for young athletes in 1996 and updated the statement in 2007 (8). The AHA and the American College of Cardiology have reaffirmed their position regarding the CV PPE and electrocardiography (ECG) screening in healthy 12- to 25-year-old young people with a comprehensive review that endorses the 12-element history and physical examination in the 2014 Scientific Statement (9). This recent document added two elements regarding palpitations and previous evaluations similar to those in the fourth PPE. The question sets from the two examination recommendations are similar, and the fourth PPE monograph uses the same general questions, with some differences in syntax and depth of question content. The question wording of the third PPE monograph

school athlete focus
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Current Sports Medicine Reports.
2015 May-Jun;14(3):254-6

American Family Physician Article

SORT: KEY RECOMMENDATIONS FOR PRACTICE

Clinical recommendation	*Evidence rating*	*References*
Preparticipation physical evaluations should occur approximately six weeks before activity to allow for further evaluation, treatment, or rehabilitation as needed.	C	4
All persons undergoing preparticipation physical evaluations should be questioned about exertional symptoms, the presence of a heart murmur, symptoms of Marfan syndrome, and family history of premature serious cardiac conditions or sudden death.	C	13, 16
Athletes with sustained systolic blood pressure of less than 160 mm Hg and diastolic blood pressure of less than 100 mm Hg should not be restricted from playing sports.	C	25
Athletes with well-controlled asthma who are asymptomatic at rest and with exertion can be safely cleared to play sports.	C	26
Screening blood and urine tests are not recommended for asymptomatic athletes.	C	37

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, go to http://www.aafp.org/afpsort.

Mirabelli MH, Devine MJ, Singh J, Mendoza M:The Preparticipation Sports Evaluation. Am Fam Physician. 2015 Sep 1;92(5):371-6.

Why are we doing these PPEs?

- **Jason inquires as to why are we doing these PPEs, in particular on a Friday night when he may have issues with work hour restrictions?**

Purpose of the PPE

- **Primary Objectives:**
  - Screen for conditions that may be **life threatening** or disabling.
  - Screen for conditions that may **predispose to illness** or injury.
- **Secondary Objectives:**
  - Determine **general health**.
  - Serve as an entry point to the health care system for adolescents.
  - Provide an opportunity to initiate discussion on **health related topics**.

American Academy of Family Physicians, American Academy of Pediatrics, American College of Sports Me. Preparticipation Physical Evaluation, 4th ed, Bernhardt D, Roberts W (Eds), American Academy of Pediatrics, Elk Grove Village, IL 2010.

Timing and Frequency of the PPE

- **Timing:**
  - Ideally, the preparticipation physical evaluation (PPE) should take place **four to six weeks before the season starts**, permitting time to evaluate and treat medical problems and/or rehabilitate musculoskeletal injuries before sports participation.
- **Frequency:**
  - Most sports medicine clinicians recommend that the PPE be conducted **before each new level of participation** (eg, middle school, junior high, high school, and college), with **yearly updates** of the history and targeted physical examinations.
  - Requirements for the frequency of PPE **vary by state**, but most state high school athletic associations require annual evaluations.
  - The AHA recommends that a PPE examination be **performed every two years** during sports participation, with an **interim history taken in the intervening years**.

Maron BJ, Thompson PD, Puffer JC, et al. Cardiovascular preparticipation screening of competitive athletes. A statement for health professionals from the Sudden Death Committee (clinical cardiology) and Congenital Cardiac Defects Committee (cardiovascular disease in the young), American Heart Association. Circulation 1996; 94:850.

Setting of the PPE

- **Office setting:**
  - Examination in the office setting by the athlete's primary care provider has the advantages of **privacy, continuity of care, and the provider's knowledge of past medical and family history**.
  - However, the complete examination is time consuming and may have **insufficient focus on the important sports-related components** of the PPE.

Setting of the PPE

- **Station approach:**
  - In the station approach, the athlete is examined by **multiple examiners** through a series of stations specific to individual components of the evaluation.
  - The station approach is time efficient, sports oriented, and inexpensive, and has a high yield for identifying abnormalities; however, it generally **does not afford confidentiality and may not provide for continuity of care**.

Exertional Sudden Death in Athletes

- **Jason inquires as to what are the more common causes of exertional illness we are screening for?**

Epidemiology of Sudden Death in Young Athletes

- Sudden cardiac death in athletes is an **uncommon** event.
- Risk in young athletes is approximately 1:50,000 - 100,000/yr.
- Risk ranges from 1:15,000 to 1:50,000/yr In older athletes.

THE NATION'S NEWSPAPER 50 CENTS

USA TODAY

NO. 1 IN THE USA . . . FIRST IN DAILY READERS

WHEN IS AN AVERAGE KID NOT GOOD ENOUGH?

WHEN YOU'RE A BOOMER PARENT WHO BUYS BOOKS LIKE 'TOILET TRAINING IN A DAY'; CHILLING OUT, 1D

MEL BROOKS PUTS THE MERRY MEN IN ★★ 'TIGHTS' 6D

WEDNESDAY

TRACEY ULLMAN: Crone Latrine, 8D

Boston star Lewis collapses, dies at 27

...y Jack Carey
...SA TODAY

Boston Celtics captain Reggie Lewis, 27, ...ho passed out during an NBA playoff ...ame in April, died Tuesday night after ...ollapsing while shooting baskets.

"It's a time of incredible grief," said Celt... executive Dave Gavitt late Tuesday.

After Lewis' April collapse, team doctor ...rnold Scheller said he had a life-threaten... ...g heart ailment like the one that killed ...ollege basketball star Hank Gathers in 1990, and probably would not play again.

"You can die from this," Scheller said he told Lewis, a 1987 first-round draft pick.

But Lewis, against team wishes, sought a second opinion and was told he had a nerve condition that could be controlled.

Lewis arrived at Brandeis University at about 4 p.m. ET Tuesday and was shooting baskets, said Brandeis' Jack Molloy.

Witnesses said Lewis fell to the court about 5 p.m., was limp and shaking, stopped breathing and had no pulse.

Lewis "wasn't doing anything too strenuous," said Amir Weiss, who was at the gym.

Local paramedics said they found Lewis in complete cardiac arrest; he was pronounced dead at 7:30 p.m. ET at Waltham-Weston Hospital.

Celtics' president Red Auerbach, who is recovering from heart bypass surgery, called Lewis "a warm, kind, gentle and generous man."

He is survived by his wife, Donna Harris, and a son, Reggie Jr.

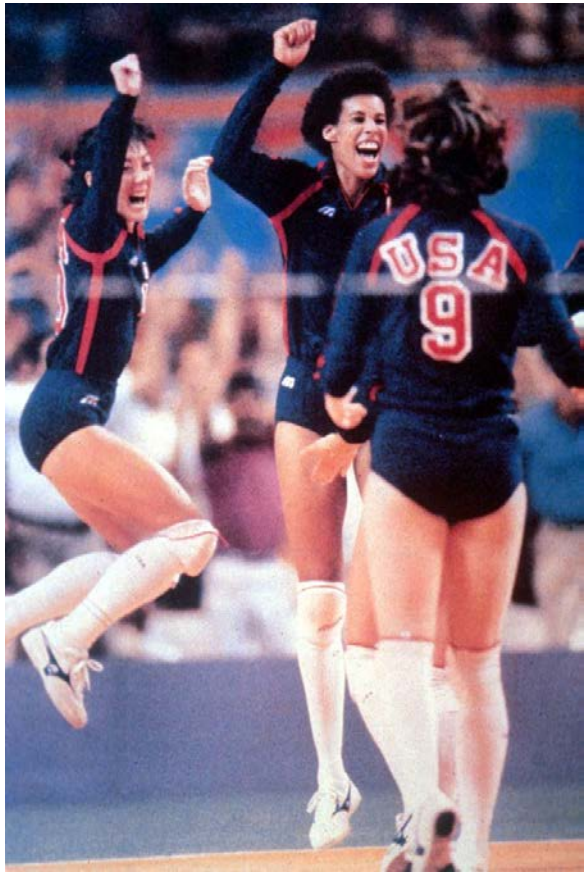
▶ 'Hearts are very heavy,' 1,9C

REGGIE LEWIS USA TODAY

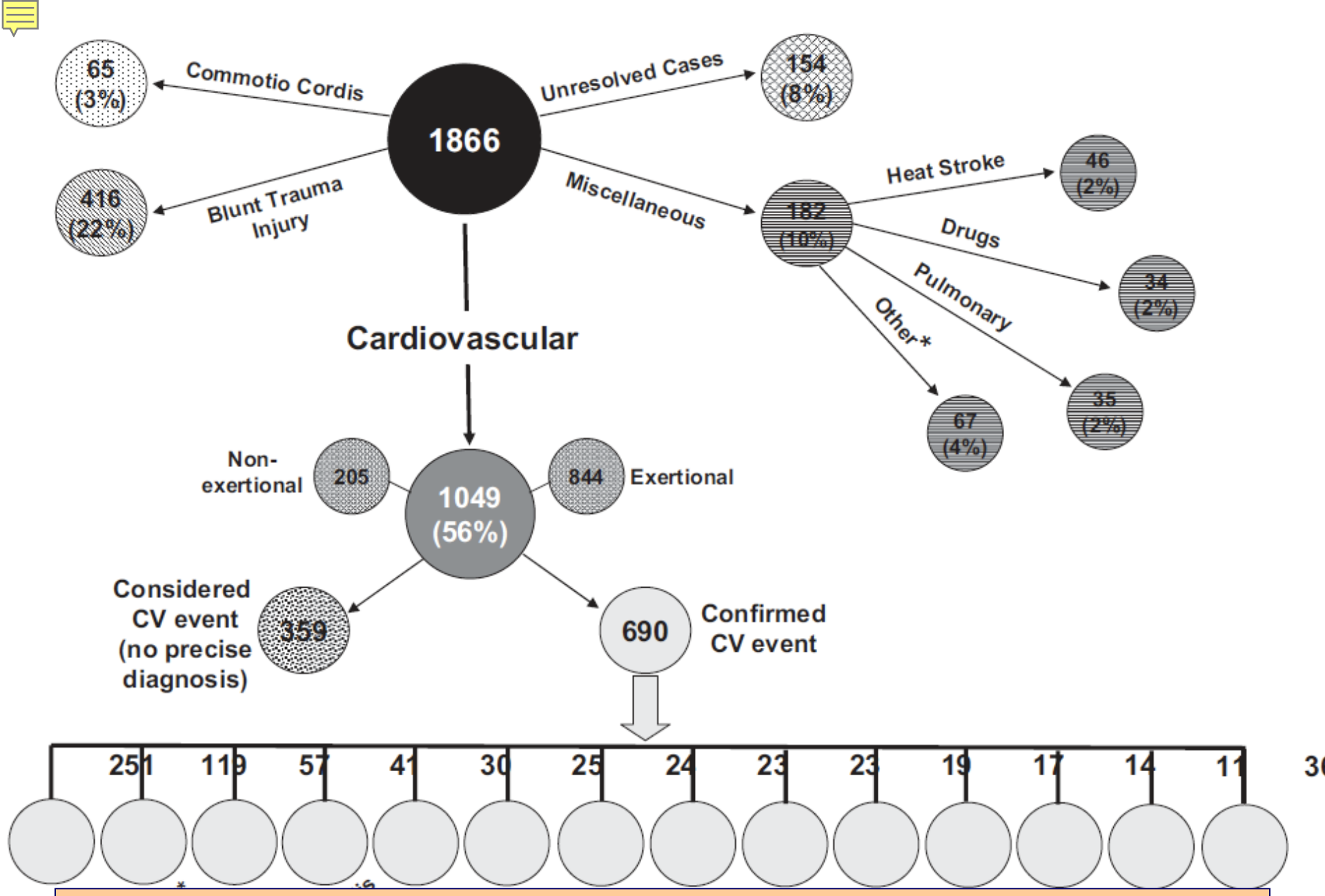
Sudden cardiac arrest is the leading cause of EXERTIONAL death in Young Athletes!

Epidemiology of Exertional Sudden Death

- Estimated death rates in **male athletes are 5X higher than in female** athletes.
- Estimated death rates in **college athletes are 2X higher than in high school** athletes.
- Non-cardiac deaths account for 22% of deaths.
- **Football and basketball** account for the majority of sudden deaths.
- **African Americans** appear to be at greater risk.



VanCamp SP et al: Nontraumatic sports deaths in high school and college athletes. MSSE 1992;24(3):279-80.



Maron BJ, et al: Sudden death in young athletes: Analysis of 1866 deaths in the United States, 1980 -2006. Circulation 2009;119:1085-1092.

Not so Fast!!

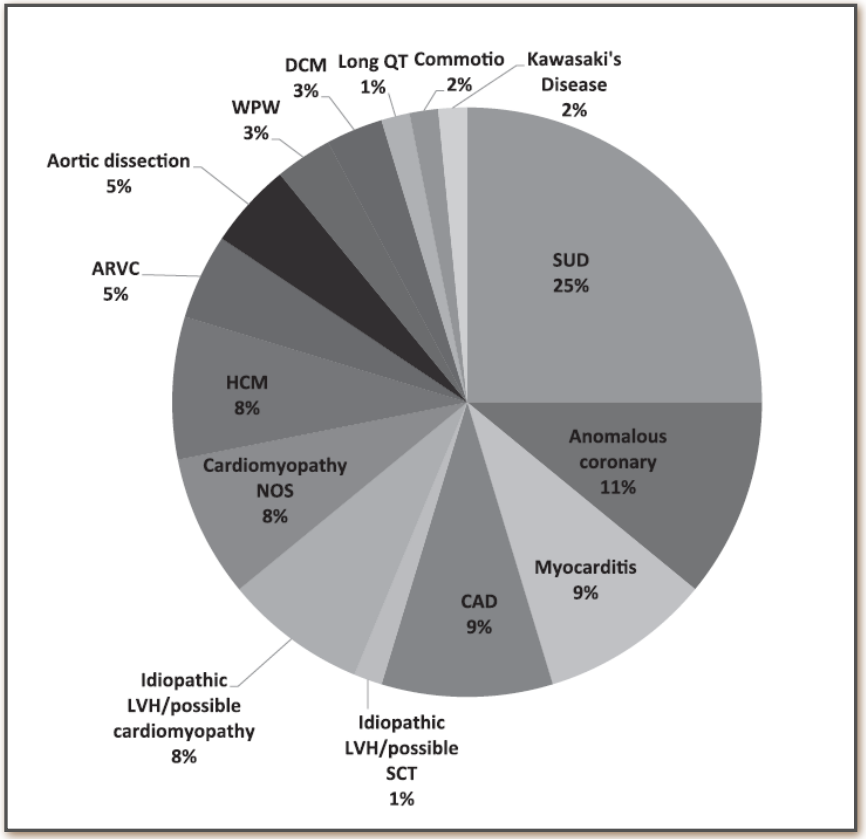
Table 3 Cause-Specific Findings in 902 Cases of Adjudicated Unanticipated Sudden Cardiac Death Stratified by Age <35 Years and ≥35 Years in a Cohort Undergoing Active Surveillance

Findings	<35 Yrs of Age (n = 298)	≥35 Yrs of Age (n = 604)	p Value
Sudden unexplained death	123 (41.3%)	64 (10.6%)	<0.001
Atherosclerotic disease	69 (23.2%)	442 (73.2%)	<0.001
Hypertrophic cardiomyopathy	38 (12.8%)	19 (3.1%)	<0.001
Myocarditis	17 (5.7%)	13 (2.2%)	0.009
Idiopathic dilated cardiomyopathy	14 (4.7%)	21 (3.5%)	0.478
Anomalous coronary artery	12 (4.0%)	1 (0.2%)	<0.001
Hypertensive cardiomyopathy	11 (3.7%)	15 (2.5%)	0.419
Arrhythmogenic RV dysplasia	4 (1.3%)	6 (1.0%)	0.737
Ischemic cardiomyopathy	2 (0.7%)	14 (2.3%)	0.135
Other*	8 (2.7%)	9 (1.5%)	—

Eckart RE et al, Department of Defense Cardiovascular Death Registry Group: Sudden death in young adults: an autopsy-based series of a population undergoing active surveillance. J Am Coll Cardiol. 2011 Sep 13;58(12):1254-61.

Sudden Unexplained Cardiac Death (SUD)

- The incidence of SCD in Division 1 male basketball athletes was 1:5200 AY.
- The most common findings at autopsy were a**utopsy-negative sudden unexplained death** in 16 (25%), and definitive evidence for hypertrophic cardiomyopathy was seen in 5 (8%).



Harmon KG et al: Incidence, Cause, and Comparative Frequency of Sudden Cardiac Death in National Collegiate Athletic Association Athletes: A Decade in Review. Circulation. 2015 Jul 7;132(1):10-9.

“Big Picture” Perspective

- **RESULTS:**
  - During the 5-year period, there were 273 deaths and a total of 1 969 663 athlete participation-years.
  - Of these 273 deaths, 145 (53%) were due to accidents or unintentional injury, 45 (16%) from cardiac arrest, 25 (9%) suicides, and 18 (6%) homicides.
  - Motor vehicle accidents accounted for 100 accidents (69%).
- **CONCLUSIONS**:
  - **Motor vehicle accidents** are the most common cause of sudden death in athletes across NCAA divisions, gender, race, and sport.

Asif IM, Harmon KG, Klossner D : Motor vehicle accidents: the leading cause of death in collegiate athletes. Clin J Sport Med. 2013 Nov;23(6):439-43.

An Appropriate History and Physical Examination

- **Jason inquires as to appropriate questions to ask athletes as you begin the preparticipation examinations.**

PREPARTICIPATION PHYSICAL EVALUATION
HISTORY FORM

(Note: This form is to be filled out by the patient and parent prior to seeing the physician. The physician should keep this form in the chart.)

Date of Exam _____

Name _____ Date of birth _____

Sex _____ Age _____ Grade _____ School _____ Sport(s) _____

Medicines and Allergies: Please list all of the prescription and over-the-counter medicines and supplements (herbal and nutritional) that you are currently taking

_____

_____

_____

Do you have any allergies? ☐ Yes ☐ No If yes, please identify specific allergy below.
☐ Medicines ☐ Pollens ☐ Food ☐ Stinging Insects

Explain "Yes" answers below. Circle questions you don't know the answers to.

GENERAL QUESTIONS	Yes	No
1. Has a doctor ever denied or restricted your participation in sports for any reason?		
2. Do you have any ongoing medical conditions? If so, please identify below: ☐ Asthma ☐ Anemia ☐ Diabetes ☐ Infections Other: _____		
3. Have you ever spent the night in the hospital?		
4. Have you ever had surgery?		
HEART HEALTH QUESTIONS ABOUT YOU	**Yes**	**No**
5. Have you ever passed out or nearly passed out DURING or AFTER exercise?		
6. Have you ever had discomfort, pain, tightness, or pressure in your chest during exercise?		
7. Does your heart ever race or skip beats (irregular beats) during exercise?		
8. Has a doctor ever told you that you have any heart problems? If so, check all that apply: ☐ High blood pressure ☐ A heart murmur ☐ High cholesterol ☐ A heart infection ☐ Kawasaki disease Other: _____		
9. Has a doctor ever ordered a test for your heart? (For example, ECG/EKG, echocardiogram)		
10. Do you get lightheaded or feel more short of breath than expected during exercise?		
11. Have you ever had an unexplained seizure?		
12. Do you get more tired or short of breath more quickly than your friends during exercise?		
HEART HEALTH QUESTIONS ABOUT YOUR FAMILY	**Yes**	**No**
13. Has any family member or relative died of heart problems or had an unexpected or unexplained sudden death before age 50 (including drowning, unexplained car accident, or sudden infant death syndrome)?		
14. Does anyone in your family have hypertrophic cardiomyopathy, Marfan syndrome, arrhythmogenic right ventricular cardiomyopathy, long QT syndrome, short QT syndrome, Brugada syndrome, or catecholaminergic polymorphic ventricular tachycardia?		
15. Does anyone in your family have a heart problem, pacemaker, or implanted defibrillator?		
16. Has anyone in your family had unexplained fainting, unexplained seizures, or near drowning?		
BONE AND JOINT QUESTIONS	**Yes**	**No**
17. Have you ever had an injury to a bone, muscle, ligament, or tendon that caused you to miss a practice or a game?		
18. Have you ever had any broken or fractured bones or dislocated joints?		
19. Have you ever had an injury that required x-rays, MRI, CT scan, injections, therapy, a brace, a cast, or crutches?		
20. Have you ever had a stress fracture?		
21. Have you ever been told that you have or have you had an x-ray for neck instability or atlantoaxial instability? (Down syndrome or dwarfism)		
22. Do you regularly use a brace, orthotics, or other assistive device?		
23. Do you have a bone, muscle, or joint injury that bothers you?		
24. Do any of your joints become painful, swollen, feel warm, or look red?		
25. Do you have any history of juvenile arthritis or connective tissue disease?		

MEDICAL QUESTIONS	Yes	No
26. Do you cough, wheeze, or have difficulty breathing during or after exercise?		
27. Have you ever used an inhaler or taken asthma medicine?		
28. Is there anyone in your family who has asthma?		
29. Were you born without or are you missing a kidney, an eye, a testicle (males), your spleen, or any other organ?		
30. Do you have groin pain or a painful bulge or hernia in the groin area?		
31. Have you had infectious mononucleosis (mono) within the last month?		
32. Do you have any rashes, pressure sores, or other skin problems?		
33. Have you had a herpes or MRSA skin infection?		
34. Have you ever had a head injury or concussion?		
35. Have you ever had a hit or blow to the head that caused confusion, prolonged headache, or memory problems?		
36. Do you have a history of seizure disorder?		
37. Do you have headaches with exercise?		
38. Have you ever had numbness, tingling, or weakness in your arms or legs after being hit or falling?		
39. Have you ever been unable to move your arms or legs after being hit or falling?		
40. Have you ever become ill while exercising in the heat?		
41. Do you get frequent muscle cramps when exercising?		
42. Do you or someone in your family have sickle cell trait or disease?		
43. Have you had any problems with your eyes or vision?		
44. Have you had any eye injuries?		
45. Do you wear glasses or contact lenses?		
46. Do you wear protective eyewear, such as goggles or a face shield?		
47. Do you worry about your weight?		
48. Are you trying to or has anyone recommended that you gain or lose weight?		
49. Are you on a special diet or do you avoid certain types of foods?		
50. Have you ever had an eating disorder?		
51. Do you have any concerns that you would like to discuss with a doctor?		
FEMALES ONLY		
52. Have you ever had a menstrual period?		
53. How old were you when you had your first menstrual period?		
54. How many periods have you had in the last 12 months?		

Explain "yes" answers here

_____

_____

_____

_____

_____

_____

_____

_____

I hereby state that, to the best of my knowledge, my answers to the above questions are complete and correct.

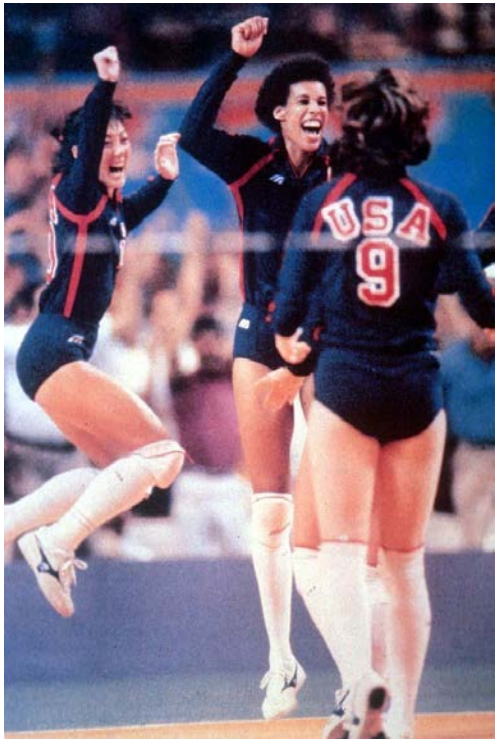
Signature of athlete _____ Signature of parent/guardian _____ Date _____

HE0503 9-2681/0410

History Questions on the PPE Not to Miss!

12 Element AHA Recommendations

- **Family History**
  - Premature death (sudden and unexpected, or otherwise) **before age 50** years due to heart disease in a close relative
  - **Disability** from heart disease in a close relative **<50 years of age**
  - Specific knowledge of certain cardiac conditions in **family members**: hypertrophic or dilated cardiomyopathy, long QT syndrome or other ion channelopathies, Marfan Syndrome, or clinically important arrhythmias.



Maron BJ, Thompson PD, Puffer JC, et al. Cardiovascular preparticipation screening of competitive athletes. A statement for health professionals from the Sudden Death Committee (clinical cardiology) and Congenital Cardiac Defects Committee (cardiovascular disease in the young), American Heart Association. Circulation 1996; 94:850.

12 Element AHA Recommendations

- **Personal History**
  - Exertional chest pain/discomfort
  - Unexplained syncope/**presyncope**
  - Excessive exertional and unexplained dyspnea/fatigue, associated with exercise
  - Prior recognition of a heart murmur
  - Elevated systemic blood pressure

Maron BJ, Thompson PD, Puffer JC, et al. Cardiovascular preparticipation screening of competitive athletes. A statement for health professionals from the Sudden Death Committee (clinical cardiology) and Congenital Cardiac Defects Committee (cardiovascular disease in the young), American Heart Association. Circulation 1996; 94:850.

14 Point AHA Update

TABLE. The 12-Element AHA Recommendations for Preparticipation Cardiovascular Screening of Competitive Athletes

Medical history*

Personal history

1. Exertional chest pain/discomfort
2. Unexplained syncope/near-syncope†
3. Excessive exertional and unexplained dyspnea/fatigue, associated with exercise
4. Prior recognition of a heart murmur
5. Elevated systemic blood pressure

Family history

6. Premature death (sudden and unexpected, or otherwise) before age 50 years due to heart disease, in ≥1 relative
7. Disability from heart disease in a close relative <50 years of age
8. Specific knowledge of certain cardiac conditions in family members: hypertrophic or dilated cardiomyopathy, long-QT syndrome or other ion channelopathies, Marfan syndrome, or clinically important arrhythmias

Physical examination

9. Heart murmur‡
10. Femoral pulses to exclude aortic coarctation
11. Physical stigmata of Marfan syndrome
12. Brachial artery blood pressure (sitting position)§

Table 1. The 14-Element AHA Recommendations for Preparticipation Cardiovascular Screening of Competitive Athletes

Medical history*

Personal history

1. Chest pain/discomfort/tightness/pressure related to exertion
2. Unexplained syncope/near-syncope†
3. Excessive and unexplained dyspnea/fatigue or palpitations, associated with exercise
4. Prior recognition of a heart murmur
5. Elevated systemic blood pressure
6. Prior restriction from participation in sports
7. Prior testing for the heart, ordered by a physician

Family history

8. Premature death (sudden and unexpected, or otherwise) before 50 y of age attributable to heart disease in ≥1 relative
9. Disability from heart disease in close relative <50 y of age
10. Hypertrophic or dilated cardiomyopathy, long-QT syndrome, or other ion channelopathies, Marfan syndrome, or clinically significant arrhythmias; specific knowledge of genetic cardiac conditions in family members

Physical examination

11. Heart murmur‡
12. Femoral pulses to exclude aortic coarctation
13. Physical stigmata of Marfan syndrome
14. Brachial artery blood pressure (sitting position)§

Maron BJ, Levine BD, Washington RL, et al. Eligibility and Disqualification Recommendations for Competitive Athletes With Cardiovascular Abnormalities: Task Force 2: Preparticipation Screening for Cardiovascular Disease in Competitive Athletes: A Scientific Statement From the American Heart Association and American College of Cardiology. Circulation 2015; 132:e267.

Is Exertional Syncope an Important Symptom?

Victims of Sudden Death

- **Seventy-two percent of SCA victims were reported by their parents to have at least one cardiovascular symptom before SCA, with fatigue (44%) and near-syncope/lightheadedness (30%) the two most common.**
- Twenty-four percent of SCA victims had one or more (average 2.6; range, 1 to 10) events of syncope or **unexplained seizure** that remained undiagnosed as a cardiac disorder before SCA.
- Parents reported that cardiovascular symptoms first occurred, on average, 30 months (range, 19 to 71 months) before SCA; a symptom was brought to the attention of the child's physician in 41% of cases.
- **Twenty-seven percent of families reported a family member had suffered sudden death** before age 50 because of a heart condition.

Drezner JA, Fudge J, Harmon K et al: Warning Symptoms and Family History in Children and Young Adults with Sudden Cardiac Arrest. J Am Board Fam Med. 2012 Jul;25(4):408-15.

Not to be Forgotten!

- **Musculoskeletal Symptoms**
  - Status of rehabilitation of prior injuries
- **Concussion Symptoms**
  - Baseline symptoms
- **Respiratory Symptoms**
  - Occult asthma
- **Eating Disorders**
- **Psychologic Stress**

An Appropriate History and Physical Examination

- **Jason inquires as to how detailed the physical examination needs to be?**

PREPARTICIPATION PHYSICAL EVALUATION
PHYSICAL EXAMINATION FORM

Name _____ Date of birth _____

PHYSICIAN REMINDERS

1. Consider additional questions on more sensitive issues:
   - Do you feel stressed out or under a lot of pressure?
   - Do you ever feel sad, hopeless, depressed, or anxious?
   - Do you feel safe at your home or residence?
   - Have you ever tried cigarettes, chewing tobacco, snuff, or dip?
   - During the past 30 days, did you use chewing tobacco, snuff, or dip?
   - Do you drink alcohol or use any other drugs?
   - Have you ever taken anabolic steroids or used any other performance supplement?
   - Have you ever taken any supplements to help you gain or lose weight or improve your performance?
   - Do you wear a seat belt, use a helmet, and use condoms?
2. Consider reviewing questions on cardiovascular symptoms (questions 5–14).

EXAMINATION		
Height Weight ☐ Male ☐ Female		
BP / (/) Pulse Vision R 20/ L 20/ Corrected: ☐ Y ☐ N		
MEDICAL	**NORMAL**	**ABNORMAL FINDINGS**
Appearance • Marfan stigmata (kyphoscoliosis, high-arched palate, pectus excavatum, arachnodactyly, arm span > height, hyperlaxity, myopia, MVP, aortic insufficiency)		
Eyes/ears/nose/throat • Pupils equal • Hearing		
Lymph Nodes		
Heart[a] • Murmurs (auscultation standing, supine, +/- Valsalva) • Location of point of maximal impulse (PMI)		
Pulses • Simultaneous femoral and radial pulses		
Lungs		
Abdomen		
Genitourinary (males only)[b]		
Skin • HSV, lesions suggestive of MRSA, tinea corporis		
Neurologic[c]		
MUSCULOSKELETAL		
Neck		
Back		
Shoulder/arm		
Elbow/forearm		
Wrist/hand/fingers		
Hip/thigh		
Knee		
Leg/ankle		
Foot/toes		
Functional • Duck-walk, single leg hop		

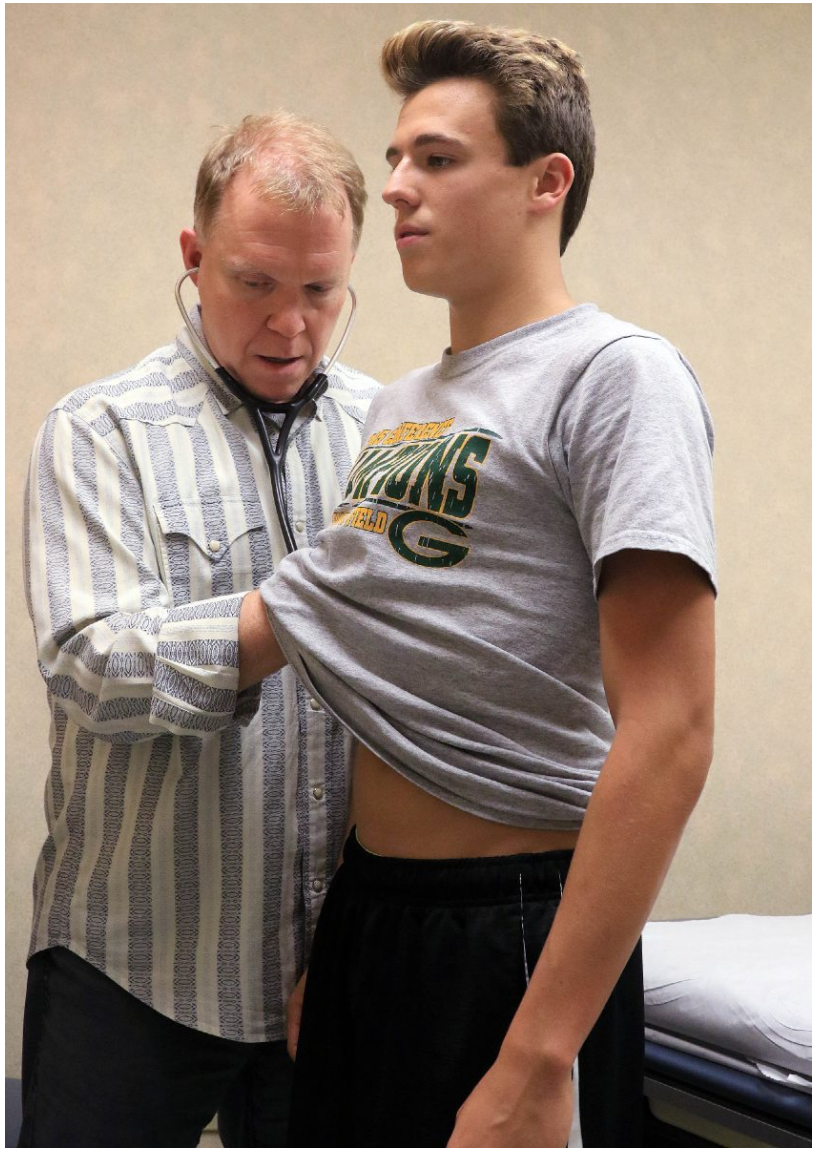
[a]Consider ECG, echocardiogram, and referral to cardiology for abnormal cardiac history or exam.
[b]Consider GU exam if in private setting. Having third party present is recommended.
[c]Consider cognitive evaluation or baseline neuropsychiatric testing if a history of significant concussion.

I certify that the above student has been medically evaluated for participation in athletics and deemed:

1. ☐ CLEARED WITHOUT RESTRICTIONS
2. ☐ Cleared for LIMITED PARTICIPATION
   - ☐ Not cleared for (specific sports) _____
   - ☐ Cleared only for (specific sports) _____ + _____
3. Requires further evaluation before a final recommendation
4. Not cleared for participation
   - ☐ Reasons: _____
5. Other recommendations: _____

Name of physician (printed/typed): _____ Date of Examination: _____

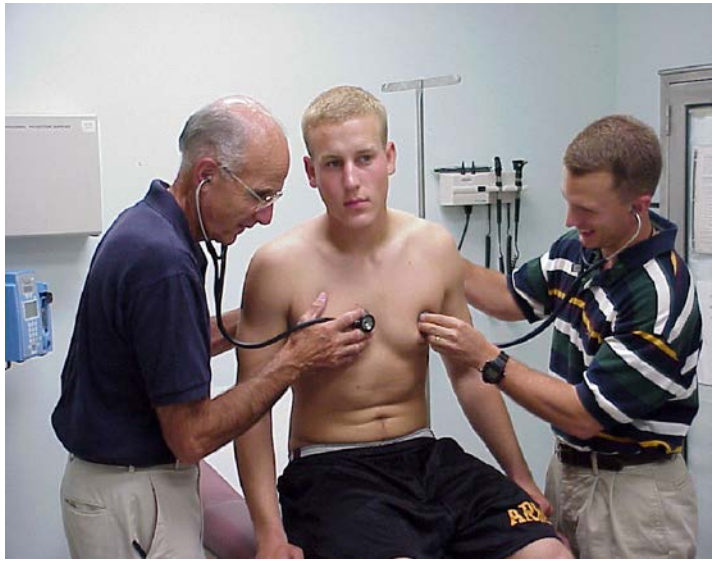
Signature of physician: _____



Performing the Cardiovascular Preparticipation Examination

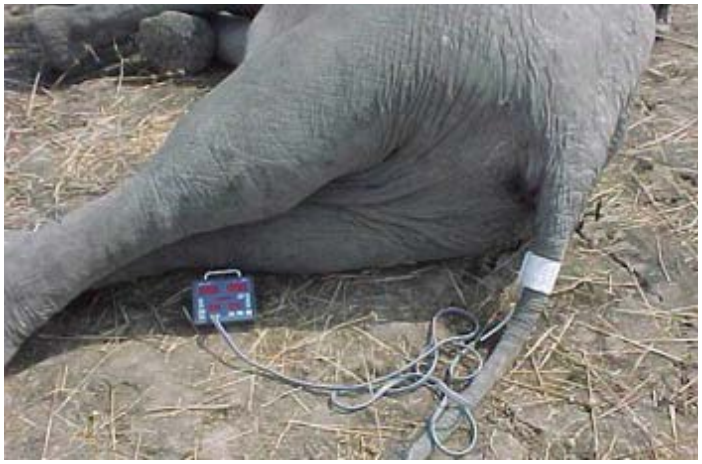
12 Element AHA Recommendations

- **Physical Examination**
  - Brachial Artery Blood Pressure
  - Femoral Pulses to Exclude Aortic Coarcation
  - Physical Stigmata of Marfan Syndrome
  - Heart Murmur (Supine and standing, or Valsalva to identify murmur of dynamic left ventricle outflow obstruction)



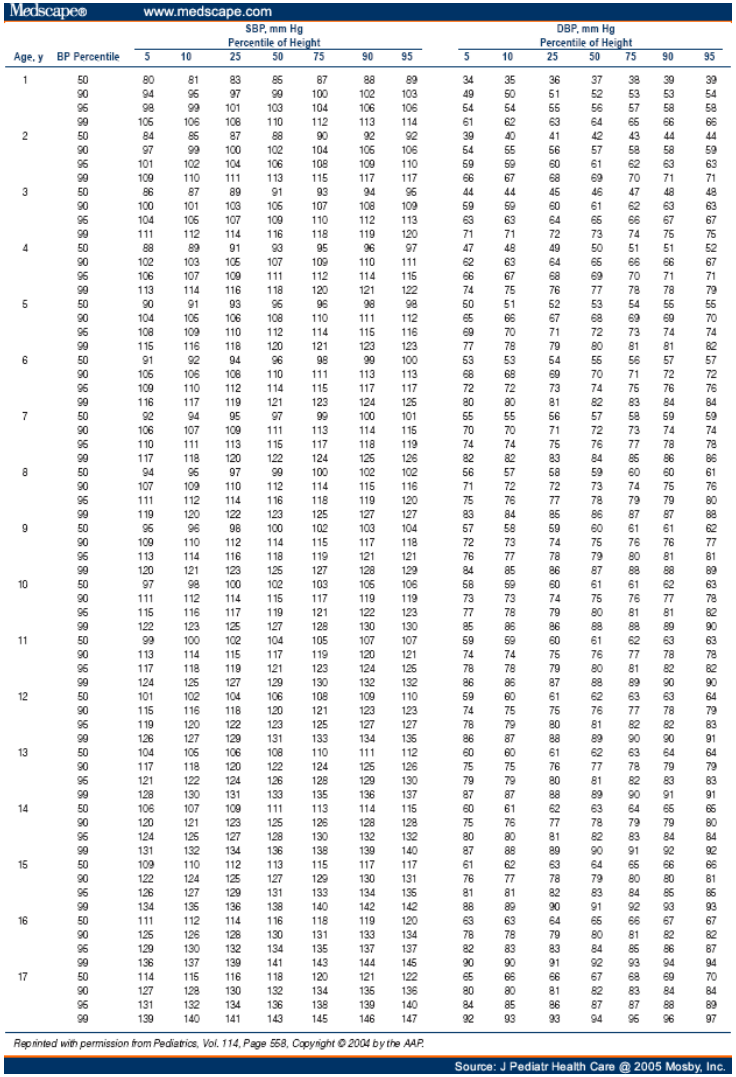
Blood Pressure Measurement

- You need:
  - the right sized cuff;
  - pediatric blood pressure tables that are gender, age and height dependent;
  - Trained personnel.



Blood Pressure Interpretation

- **Diagnosis**:
  - A diagnosis **requires at least three measurements**.
  - 90 to 95% was high-normal, now prehypertension;
  - 95% to 99% plus 5mmHg is Stage I; Greater than 99% plus 5 mmHg is Stage II.
    - The plus 5mmHg is new from 1996.
  - Ambulatory blood pressure monitoring recognized as useful in “white” coat hypertension.



Medscape® www.medscape.com

Age, y	BP Percentile	SBP, mm Hg Percentile of Height							DBP, mm Hg Percentile of Height						
		5	10	25	50	75	90	95	5	10	25	50	75	90	95
1	50	80	81	83	85	87	88	89	34	35	36	37	38	39	39
	90	94	95	97	99	100	102	103	49	50	51	52	53	53	54
	95	98	99	101	103	104	106	106	54	54	55	56	57	58	58
	99	105	106	108	110	112	113	114	61	62	63	64	65	66	66
2	50	84	85	87	88	90	92	92	39	40	41	42	43	44	44
	90	97	99	100	102	104	105	106	54	55	56	57	58	58	59
	95	101	102	104	106	108	109	110	59	59	60	61	62	63	63
	99	109	110	111	113	115	117	117	66	67	68	69	70	71	71
3	50	86	87	89	91	93	94	95	44	44	45	46	47	48	48
	90	100	101	103	105	107	108	109	59	59	60	61	62	63	63
	95	104	105	107	109	110	112	113	63	63	64	65	66	67	67
	99	111	112	114	116	118	119	120	71	71	72	73	74	75	75
4	50	88	89	91	93	95	96	97	47	48	49	50	51	51	52
	90	102	103	105	107	109	110	111	62	63	64	65	66	66	67
	95	106	107	109	111	112	114	115	66	67	68	69	70	71	71
	99	113	114	116	118	120	121	122	74	75	76	77	78	78	79
5	50	90	91	93	95	96	98	98	50	51	52	53	54	55	55
	90	104	105	106	108	110	111	112	65	66	67	68	69	69	70
	95	108	109	110	112	114	115	116	69	70	71	72	73	74	74
	99	115	116	118	120	121	123	123	77	78	79	80	81	81	82
6	50	91	92	94	96	98	99	100	53	53	54	55	56	57	57
	90	105	106	108	110	111	113	113	68	68	69	70	71	72	72
	95	109	110	112	114	115	117	117	72	72	73	74	75	76	76
	99	116	117	119	121	123	124	125	80	80	81	82	83	84	84
7	50	92	94	95	97	99	100	101	55	55	56	57	58	59	59
	90	106	107	109	111	113	114	115	70	70	71	72	73	74	74
	95	110	111	113	115	117	118	119	74	74	75	76	77	78	78
	99	117	118	120	122	124	125	126	82	82	83	84	85	86	86
8	50	94	95	97	99	100	102	102	56	57	58	59	60	60	61
	90	107	109	110	112	114	115	116	71	72	72	73	74	75	76
	95	111	112	114	116	118	119	120	75	76	77	78	79	79	80
	99	119	120	122	123	125	127	127	83	84	85	86	87	87	88
9	50	95	96	98	100	102	103	104	57	58	59	60	61	61	62
	90	109	110	112	114	115	117	118	72	73	74	75	76	76	77
	95	113	114	116	118	119	121	121	76	77	78	79	80	81	81
	99	120	121	123	125	127	128	129	84	85	86	87	88	88	89
10	50	97	98	100	102	103	105	106	58	59	60	61	61	62	63
	90	111	112	114	115	117	119	119	73	73	74	75	76	77	78
	95	115	116	117	119	121	122	123	77	78	79	80	81	81	82
	99	122	123	125	127	128	130	130	85	86	86	88	88	89	90
11	50	99	100	102	104	105	107	107	59	59	60	61	62	63	63
	90	113	114	115	117	119	120	121	74	74	75	76	77	78	78
	95	117	118	119	121	123	124	125	78	78	79	80	81	82	82
	99	124	125	127	129	130	132	132	86	86	87	88	89	90	90
12	50	101	102	104	106	108	109	110	59	60	61	62	63	63	64
	90	115	116	118	120	121	123	123	74	75	75	76	77	78	79
	95	119	120	122	123	125	127	127	78	79	80	81	82	82	83
	99	126	127	129	131	133	134	135	86	87	88	89	90	90	91
13	50	104	105	106	108	110	111	112	60	60	61	62	63	64	64
	90	117	118	120	122	124	125	126	75	75	76	77	78	79	79
	95	121	122	124	126	128	129	130	79	79	80	81	82	83	83
	99	128	130	131	133	135	136	137	87	87	88	89	90	91	91
14	50	106	107	109	111	113	114	115	60	61	62	63	64	65	65
	90	120	121	123	125	126	128	128	75	76	77	78	79	79	80
	95	124	125	127	128	130	132	132	80	80	81	82	83	84	84
	99	131	132	134	136	138	139	140	87	88	89	90	91	92	92
15	50	109	110	112	113	115	117	117	61	62	63	64	65	66	66
	90	122	124	125	127	129	130	131	76	77	78	79	80	80	81
	95	126	127	129	131	133	134	135	81	81	82	83	84	85	85
	99	134	135	136	138	140	142	142	88	89	90	91	92	93	93
16	50	111	112	114	116	118	119	120	63	63	64	65	66	67	67
	90	125	126	128	130	131	133	134	78	78	79	80	81	82	82
	95	129	130	132	134	135	137	137	82	83	83	84	85	86	87
	99	136	137	139	141	143	144	145	90	90	91	92	93	94	94
17	50	114	115	116	118	120	121	122	65	66	66	67	68	69	70
	90	127	128	130	132	134	135	136	80	80	81	82	83	84	84
	95	131	132	134	136	138	139	140	84	85	86	87	87	88	89
	99	139	140	141	143	145	146	147	92	93	93	94	95	96	97

Femoral Pulses

- Screening for Coarcation of the Aorta:
  - **Simultaneous palpation** of femoral and radial pulses
  - systolic blood pressure gradient between the arms and legs of greater than 10 mmHg

Marfan Syndrome Screening

- Screening recommended for men taller than 6 feet and women taller than 5’ 10”, who have two or more physical manifestations or a FH of Marfan’s Syndrome.
- Investigation should include an ECG, ECHO and slit-lamp eye examination.
- Diagnosis is clinical; made in conjunction with a regional referral center www.marfan.org

Marfan Syndrome Stigmata

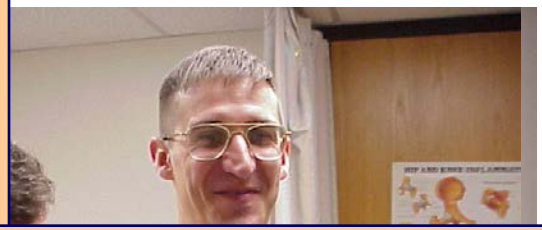
- www.marfan.org
  - **wrist sign** - thumb overlaps the distal phalanx of the fifth digit when grasping the contralateral wrist.
  - **thumb sign** - entire nail of the thumb projects beyond the ulnar border of the hand when the hand is clenched without assistance.
- www.MarfanDX.org

NMF National Marfan Foundation

mination - scultation

Normal:

- **systolic ejection murmur**
- **begins after first heart sound**
- **ends before the second heart sound**
- **crescendo-decrescendo profile**
- **normal inspiratory S2 split**
- **normal dyna**



- Splitting
- Dynamic exam
- Pathologic vs N

Suspicious:

- **diastolic, holosystolic, or continuous**
- **grade III or greater in intensity**
- **abnormal S2 splitting**
- **abnormal dynamic assessment**

Improving Cardiac Auscultation

- **Normal versus Pathologic Heart Sounds**
  - http://www.cardiosource.com/

Cardiosource
American College of Cardiology

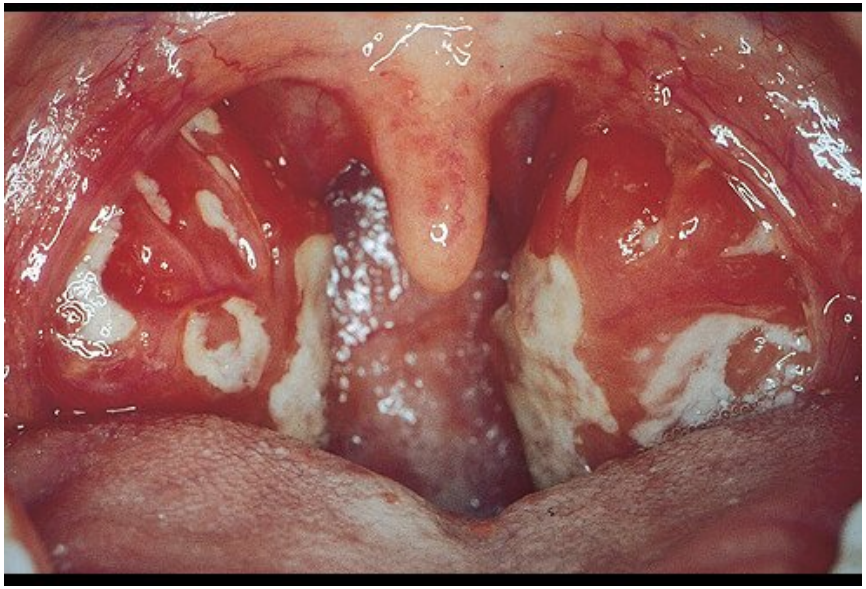
Heart
Songs

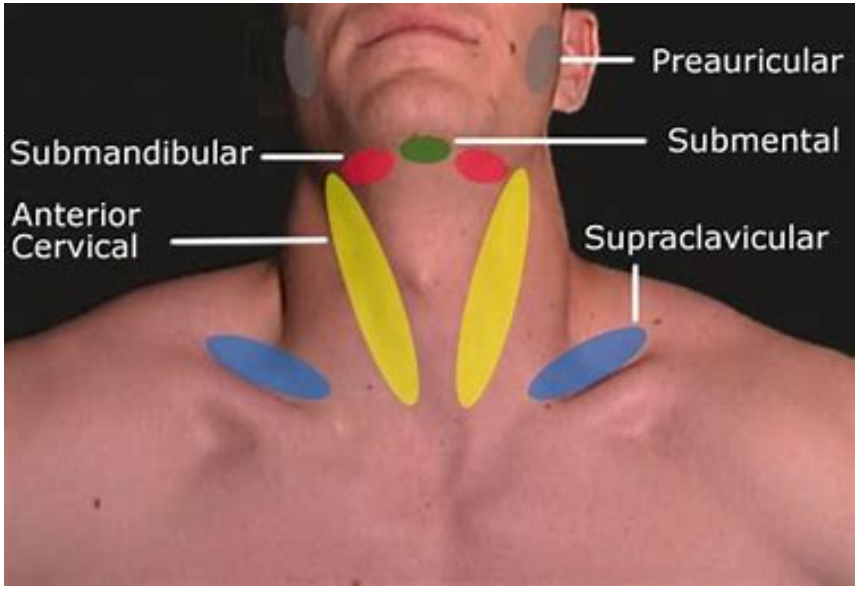
Not to be Forgotten!

- Musculoskeletal Screening Examination
- Pulmonary Examination
- HEENT/Skin
- Abdomen/Genital Examination
- Functional Testing

HEENT


E
F P
T O Z

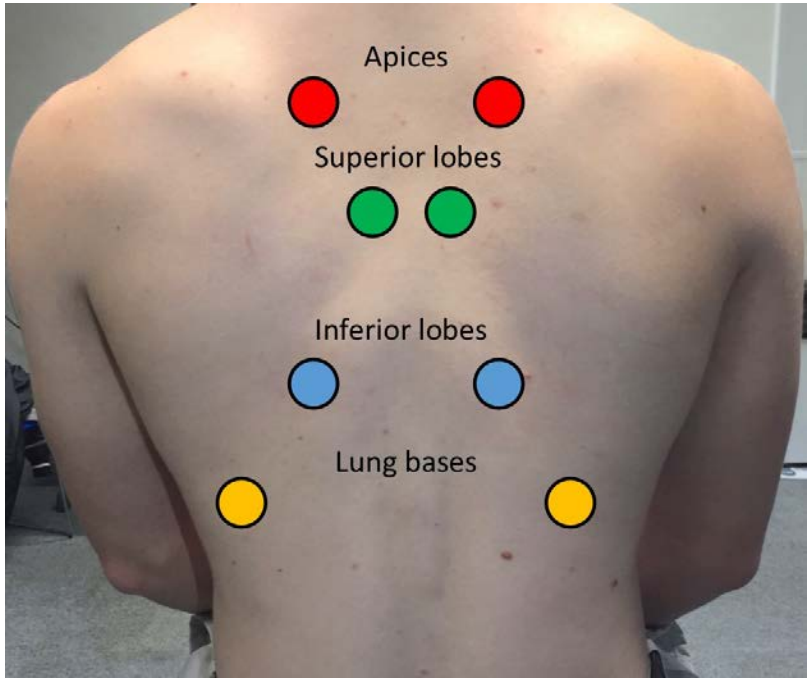


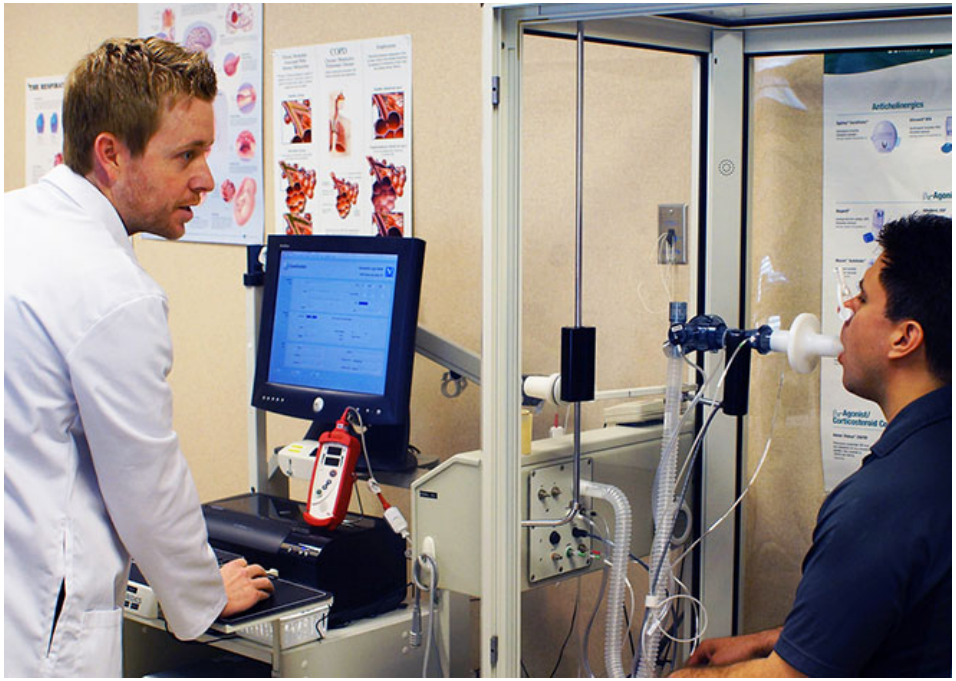

Preauricular
Submandibular
Submental
Anterior
Cervical
Supraclavicular

Skin

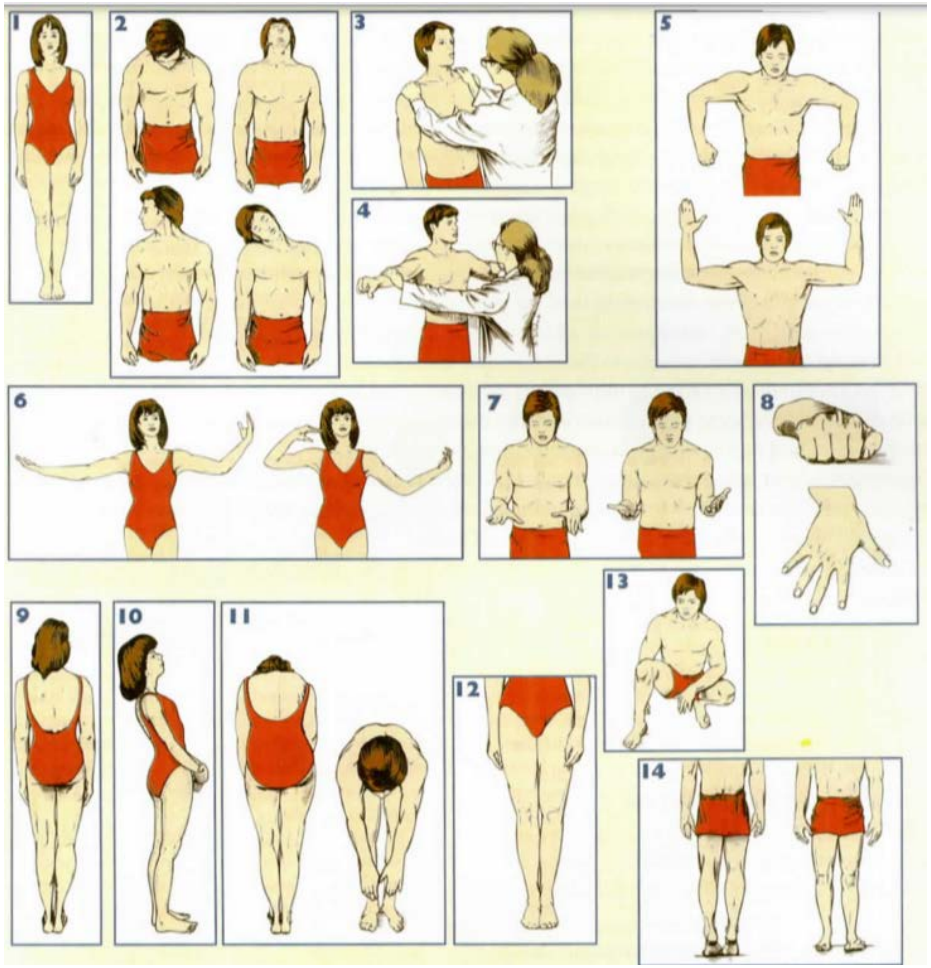
Abdominal/Genitourinary

Pulmonary Auscultation





Musculoskeletal Screening Examination



Functional Testing

The Functional Movement Screen

1. Squatting

2. Stepping

3. Lunging

4. Reaching

5. Leg Raising

6. Push-up

7. Rotary Stability

FUNCTIONAL MOVEMENT SYSTEMS FMS FUNCTIONALMOVEMENT.COM

The Role of Special Tests

- **Jason asks about a number of special tests that he has heard might be valuable in athletes:**
  - **CBC and UA**
  - **Electrocardiogram and Echocardiography**
  - **Sickle Cell Screening**
  - **Neurocognitive Testing**

Overriding Ethical Principles

- "**Beneficence**"
  - is the obligations to **confer benefits**, to prevent and remove harms, and to **weigh and balance the possible goods against the costs and possible harms** of an action.
- **"Non Maleficence"**
  - requires an **intention to avoid needless harm** or injury that can arise through acts of commission or omission.

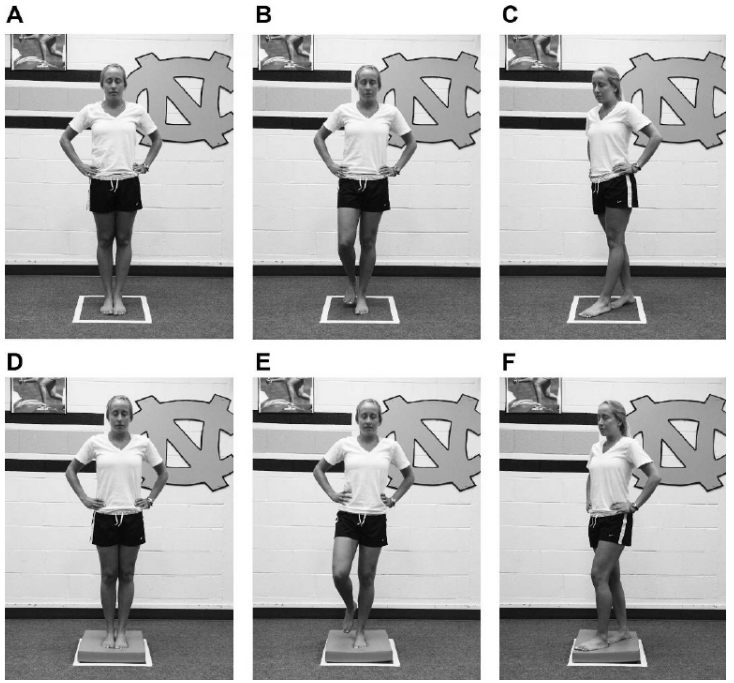
Routine Blood Tests and UA

- Routine laboratory testing is not recommended as part of the preparticipation physical evaluation (PPE) in the absence of symptoms.

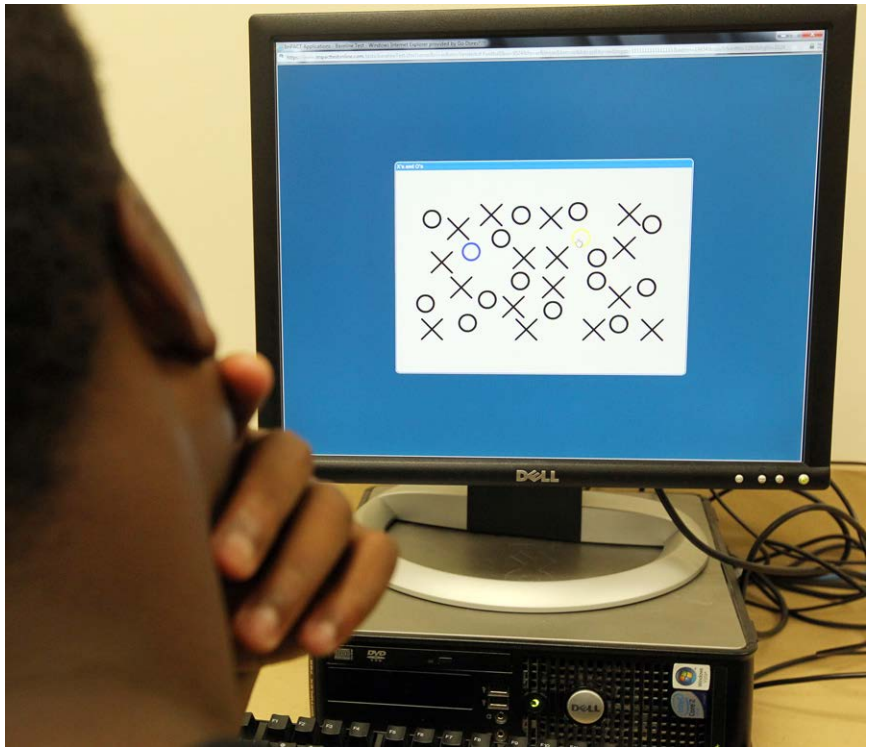
American Academy of Family Physicians, American Academy of Pediatrics, American College of Sports Me. Preparticipation Physical Evaluation, 4th ed, Bernhardt D, Roberts W (Eds), American Academy of Pediatrics, Elk Grove Village, IL 2010.

Baseline Concussion Testing

- Pre-participation assessment. A one-time, pre-participation baseline concussion assessment for all varsity student-athletes should include, but not necessarily be limited to:
  - A brain injury/concussion history.
  - Symptom evaluation.
  - Cognitive assessment.
  - Balance evaluation.
  - The team physician should determine pre-participation clearance and/or the need for additional consultation or testing.



Neurocognitive Testing



BJSM Online First, published on April 26, 2017 as 10.1136/bjsports-2017-097506SCAT5
To download a clean version of the SCAT tools please visit the journal online (http://dx.doi.org/10.1136/bjsports-2017-0975065CAT5)

SCAT5© SPORT CONCUSSION ASSESSMENT TOOL – 5TH EDITION
DEVELOPED BY THE CONCUSSION IN SPORT GROUP
FOR USE BY MEDICAL PROFESSIONALS ONLY

supported by

Patient details

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date of Injury: _____ Time: _____

WHAT IS THE SCAT5?

The SCAT5 is a standardized tool for evaluating concussions designed for use by physicians and licensed healthcare professionals[1]. The SCAT5 cannot be performed correctly in less than 10 minutes.

If you are not a physician or licensed healthcare professional, please use the Concussion Recognition Tool 5 (CRT5). The SCAT5 is to be used for evaluating athletes aged 13 years and older. For children aged 12 years or younger, please use the Child SCAT5.

Preseason SCAT5 baseline testing can be useful for interpreting post-injury test scores, but is not required for that purpose.Detailed instructions for use of the SCAT5 are provided on page 7. Please read through these instructions carefully before testing the athlete. Brief verbal instructions for each test are given in italics. The only equipment required for the tester is a watch or timer.

Recognise and Remove

A head impact by either a direct blow or indirect transmission of force can be associated with a serious and potentially fatal brain injury. If there are significant concerns, including any of the red flags listed in Box 1, then activation of emergency procedures and urgent transport to the nearest hospital should be arranged.

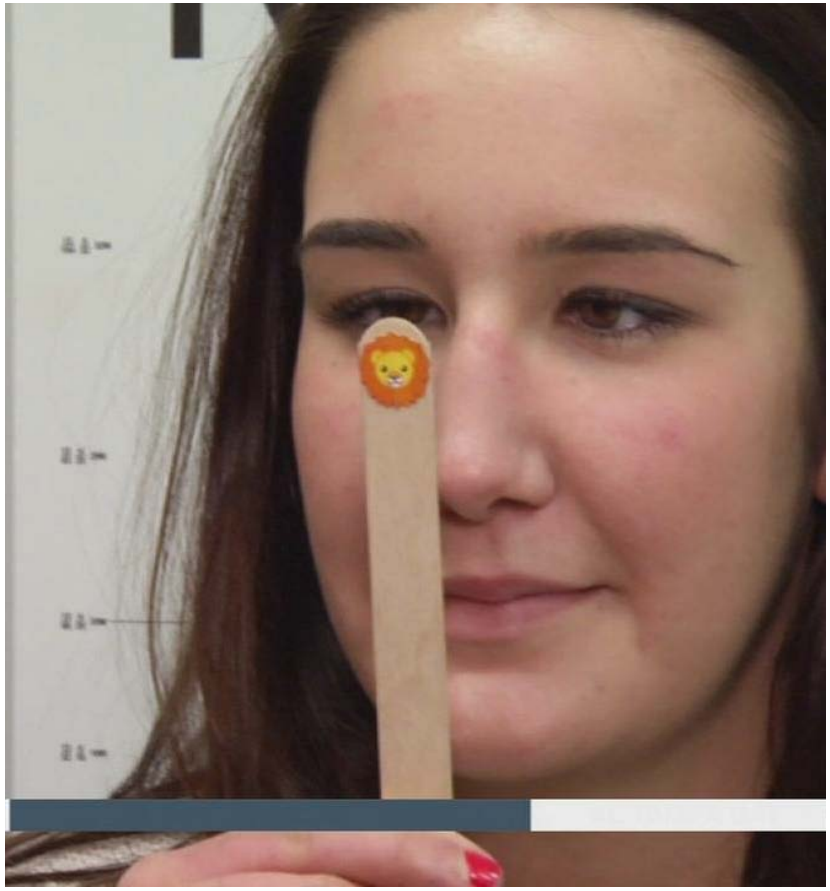
Key points

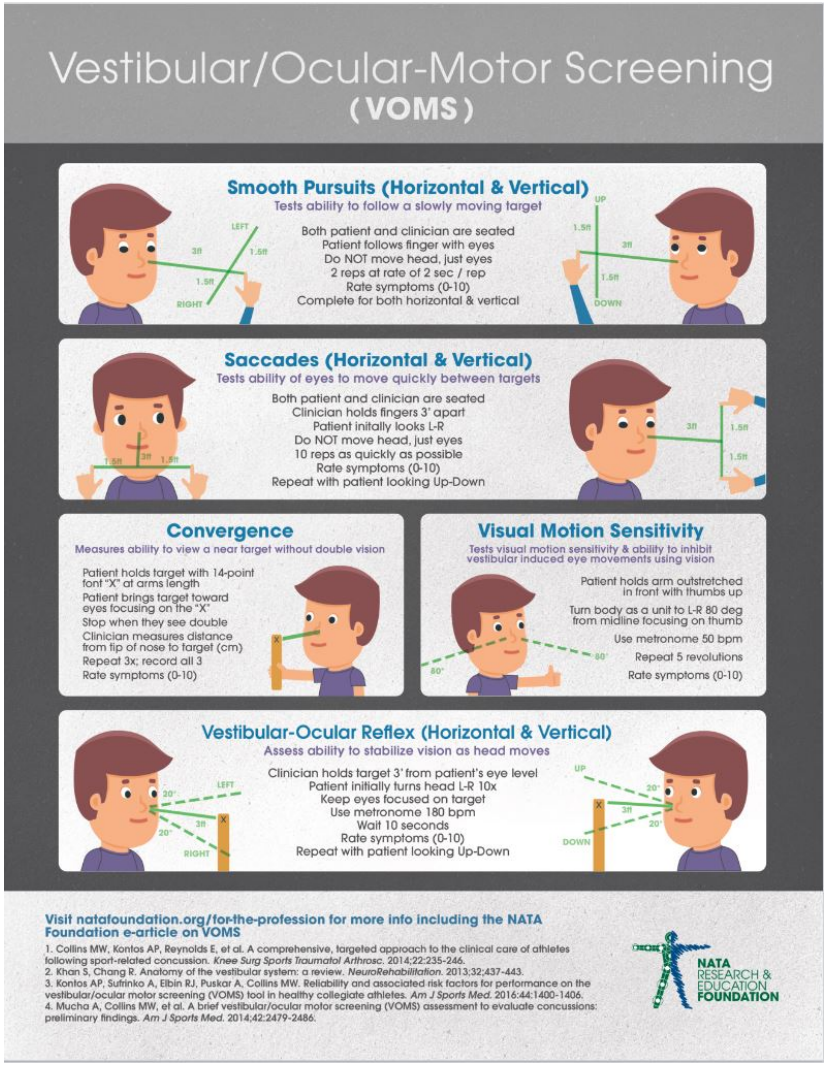
- Any athlete with suspected concussion should be REMOVED FROM PLAY, medically assessed and monitored for deterioration. No athlete diagnosed with concussion should be returned to play on the day of injury.
- If an athlete is suspected of having a concussion and medical personnel are not immediately available, the athlete should be referred to a medical facility for urgent assessment.
- Athletes with suspected concussion should not drink alcohol, use recreational drugs and should not drive a motor vehicle until cleared to do so by a medical professional.
- Concussion signs and symptoms evolve over time and it is important to consider repeat evaluation in the assessment of concussion.
- The diagnosis of a concussion is a clinical judgment, made by a medical professional. The SCAT5 should NOT be used by itself to make, or exclude, the diagnosis of concussion. An athlete may have a concussion even if their SCAT5 is "normal".

Remember:

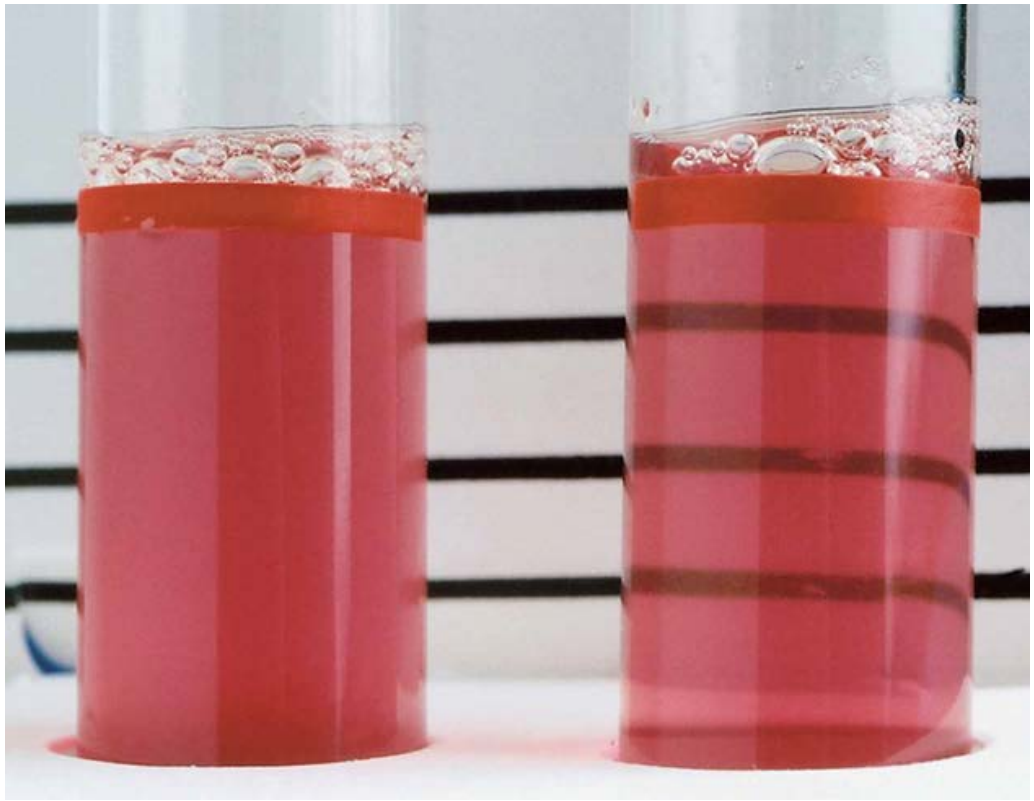
- The basic principles of first aid (danger, response, airway, breathing, circulation) should be followed.
- Do not attempt to move the athlete (other than that required for airway management) unless trained to do so.
- Assessment for a spinal cord injury is a critical part of the initial on-field assessment.
- Do not remove a helmet or any other equipment unless trained to do so safely.

Visual Ocular-Motor Testing (VOMS)



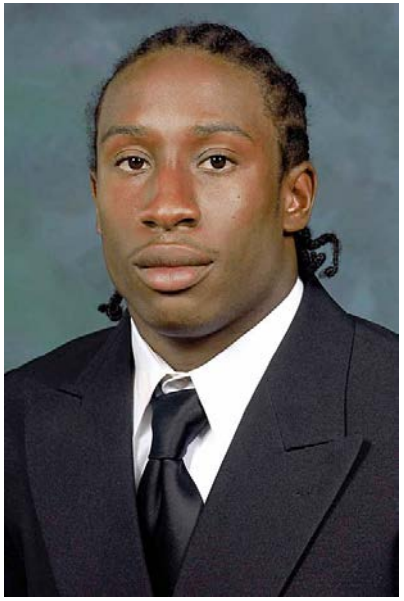


Sickle Cell Screening



Primary Prevention

- The National Collegiate Athletic Association (NCAA) adopted a policy requiring Division I institutions to perform sickle cell trait testing for all incoming student athletes.
- Policy was partly in response to legal settlement with Dale Lloyd Case.
- But then….



American Society of Hematology: ASH

- Policy **Opposes Mandatory SCT Screening** for Athletic Participation
  - Recommends universal training interventions and additional research
- Believes NCAA Division I policy, as currently written and implemented, **has potential to harm student athletes and larger community of individuals with SCT**.

Statement on Screening for Sickle Cell Trait and Athletic Participation. (2012). *ASH Policy* Retrieved January 2012, from http://www.hematology.org/advocacy/policy-statements/7704.aspx

Advanced Cardiac Screening

NCAA Guidance 2016

Consensus statement and guidelines: Interassociation consensus statement on cardiovascular care of college student-athletes

Brian Hainline,[1] Jonathan Drezner,[2] Aaron Baggish,[3] Kimberly G Harmon,[2] Michael S Emery,[4] Robert J Myerburg,[5] Eduardo Sanchez,[6] Silvana Molossi,[7] John T Parsons,[1] Paul D Thompson[8]

► Additional material is published online only. To view

ABSTRACT
Cardiovascular evaluation and care of college student-

F. to educate student-athletes regarding health risks, health-related behaviour, and pertin-

Pediatrics, Baylor College of Medicine, Houston, Texas, USA
[8]Division of Cardiology, Hartford Hospital, Hartford, Connecticut, USA

Correspondence to
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This paper is co-published with the *Journal of the American College of Cardiology*

Accepted 5 May 2016

To cite: Hainline B, Drezner J, Baggish A, *et al*. *Br J Sports Med* Published Online First: [*please include* Day Month Year] doi:10.1136/bjsports-2016-096323

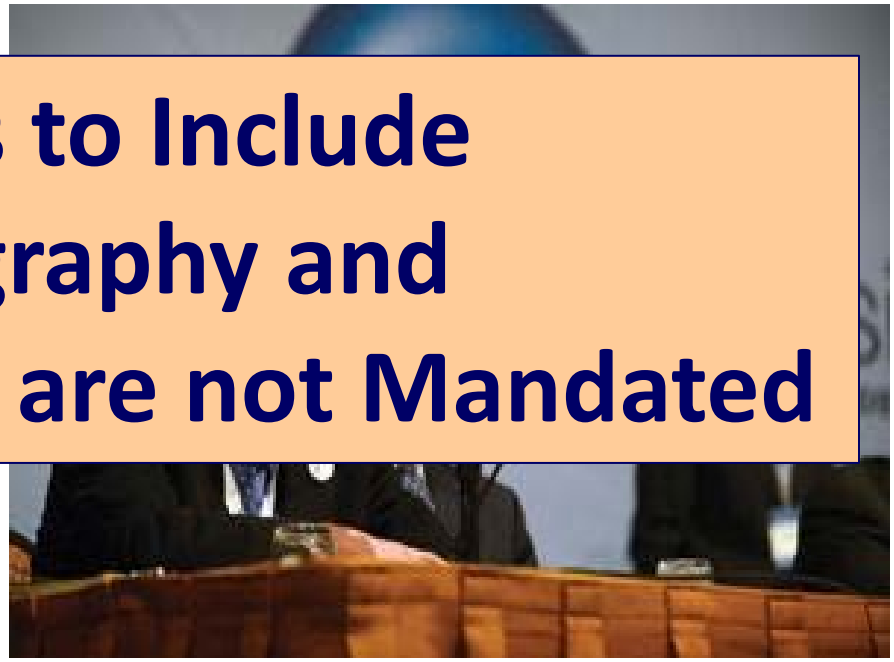
CARDIOVASCULAR CARE OF COLLEGE STUDENT-ATHLETES

The preparticipation evaluation

1. The purpose of the preparticipation evaluation is to identify conditions that may put the student-athlete at unreasonable risk of death or catastrophic injury, with the potential to modify and reduce risk through individualised management. In addition, the preparticipation evaluation provides the following opportunities:
   - A. to ensure that current health problems are managed appropriately;
   - B. to identify conditions that serve as barriers to performance;
   - C. to allow the student-athlete an opportunity to establish a relationship with the team physician, athletic trainer and other members of the medical team who may be involved in providing continuing medical care;
   - D. to assess for characteristics that may place the student-athlete at risk for future injury or disease;
   - E. to review medications and/or supplements, including addressing possible requests for therapeutic use exemption; and

cine level (most likely the head team physician) and one clinician provider at the athletic trainer level (most likely the head athletic trainer) who will be charged with the responsibility for ensuring that the preparticipation cardiac screening is conducted with the necessary components, as documented in the following text. Medical records of the examination should be kept in an accessible, secure file for at least the duration of the student-athlete's college career, and should accompany the athlete during any school transfers.

4. As afforded by local resources, cardiac screening on campus is encouraged in an effort to maintain a consistent and high-quality level of care.
   - A. For member institutions that choose to rely on external care providers to provide preparticipation evaluations, an on-campus mechanism should be established to confirm that the preparticipation evaluations are thoroughly reviewed. The goal of the review is to ensure follow-up and completion of any potential abnormal finding (either confirmed or dismissed) prior to organised athletic participation.



Special Tests to Include Echocardiography and Electrocardiography are not Mandated

However,
A Word About
the Role of the
Electrocardiogram?

AHA/ACC Scientific Statement

Assessment of the 12-Lead ECG as a Screening Test

**"… there is INSUFFICIENT information…
to support the view that universal screening ECGs in asymptomatic young people … is appropriate or possible on a national basis for the United States, in competitive athletes or in the general youthful population..."**

Paul Kligfield, MD, FAHA; Benjamin D. Levine, MD; Sami Viskin, MD;

**However
"…individual quality controlled local, community, or student-related initiatives were, however, supported by the AHA if conducted properly and with adequate resources..."**

Council on Epidemiology and Prevention, Council on Functional Genomics and Translational Biology, Council on Quality of Care and Outcomes Research, and American College of Cardiology

Maron BJ et al: Circulation.2014 Oct 7;130(15):1303-34

Not all Athletes Carry the Same Risk!

AMSSM Position Statement on Cardiovascular Preparticipation Screening in Athletes: current evidence, knowledge gaps, recommendations and future directions

Jonathan A Drezner,[1] Francis G O'Connor,[2] Kimberly G Harmon,[1] Karl B Fields,[3] Chad A Asplund,[4] Irfan M Asif,[5] David E Price,[6] Robert J Dimeff,[7] David T Bernhardt,[8] William O Roberts[9]

▸ Additional material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/bjsports-2016-096781).

For numbered affiliations see end of article.

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JAD and FGO cochairs.

Accepted 30 August 2016

ABSTRACT

Cardiovascular screening in young athletes is widely recommended and routinely performed prior to participation in competitive sports. While there is general agreement that early detection of cardiac conditions at risk for sudden cardiac arrest and death (SCA/D) is an important objective, the optimal strategy for cardiovascular screening in athletes remains an issue of considerable debate. At the centre of the controversy is the addition of a resting ECG to the standard preparticipation evaluation using history and physical examination. The American Medical Society for Sports Medicine (AMSSM) formed a task force to address the current evidence and knowledge gaps regarding preparticipation cardiovascular screening in athletes from the perspective of a primary care sports medicine physician. The absence of definitive outcome-based evidence at this time precludes AMSSM from endorsing any single or universal cardiovascular screening strategy for all athletes, including legislative mandates. This statement presents a new paradigm to assist the individual physician in assessing the most appropriate cardiovascular screening strategy unique to their athlete population, community needs and resources. The decision to implement a cardiovascular screening programme, with or without the addition of ECG, necessitates careful consideration of the risk of SCA/D in the targeted population and the availability of cardiology resources and infrastructure. Importantly, it is the individual physician's assessment in the context of an emerging evidence base that the chosen model for early detection of cardiac disorders in the specific population provides greater benefit than harm. AMSSM is committed to advancing evidenced-based research and educational initiatives that will validate and promote the most efficacious strategies to foster safe sport participation and reduce SCA/D in athletes.

BACKGROUND

Cardiovascular screening in competitive athletes is recommended by most major medical organisations and sports governing bodies;[1–6] however, agreement on the most appropriate screening protocol remains a topic of considerable controversy. Within the primary care sports medicine and sports cardiology communities, this topic has created a highly charged debate specifically regarding the addition of a resting 12-lead ECG to the preparticipation history and physical examination. This polarised environment has limited a productive discussion of the current evidence, the identification of knowledge gaps and the development of research and educational priorities to improve the cardiovascular care of athletes.

AMSSM charge

The AMSSM Board of Directors appointed a task force to address the issues surrounding the cardiovascular screening of young competitive athletes (age 12–35) in the USA. The objective of the task force was to examine the current evidence and knowledge gaps relevant to cardiovascular screening in athletes and provide a framework for the AMSSM membership to assess screening recommendations and future research directions. This statement is unique in providing an assessment of cardiovascular screening from the perspective of a primary care sports medicine physician. While it may assist other healthcare professionals with cardiovascular screening in athletes, conclusions may not necessarily apply to physicians from other disciplines.

Writing group selection and process

The AMSSM President appointed cochairs (JAD and FGO) to assemble a task force to address the topic of cardiovascular preparticipation screening. The task force was carefully selected to include a balanced panel of primary care sports medicine physicians with demonstrated leadership and expertise in athlete cardiovascular screening to represent the different perspectives of cardiovascular preparticipation screening. This panel focused specifically on issues relevant to the potential addition of ECG to the preparticipation physical evaluation (PPE) and did not address the utility of other potential screening modalities, such as echocardiography.

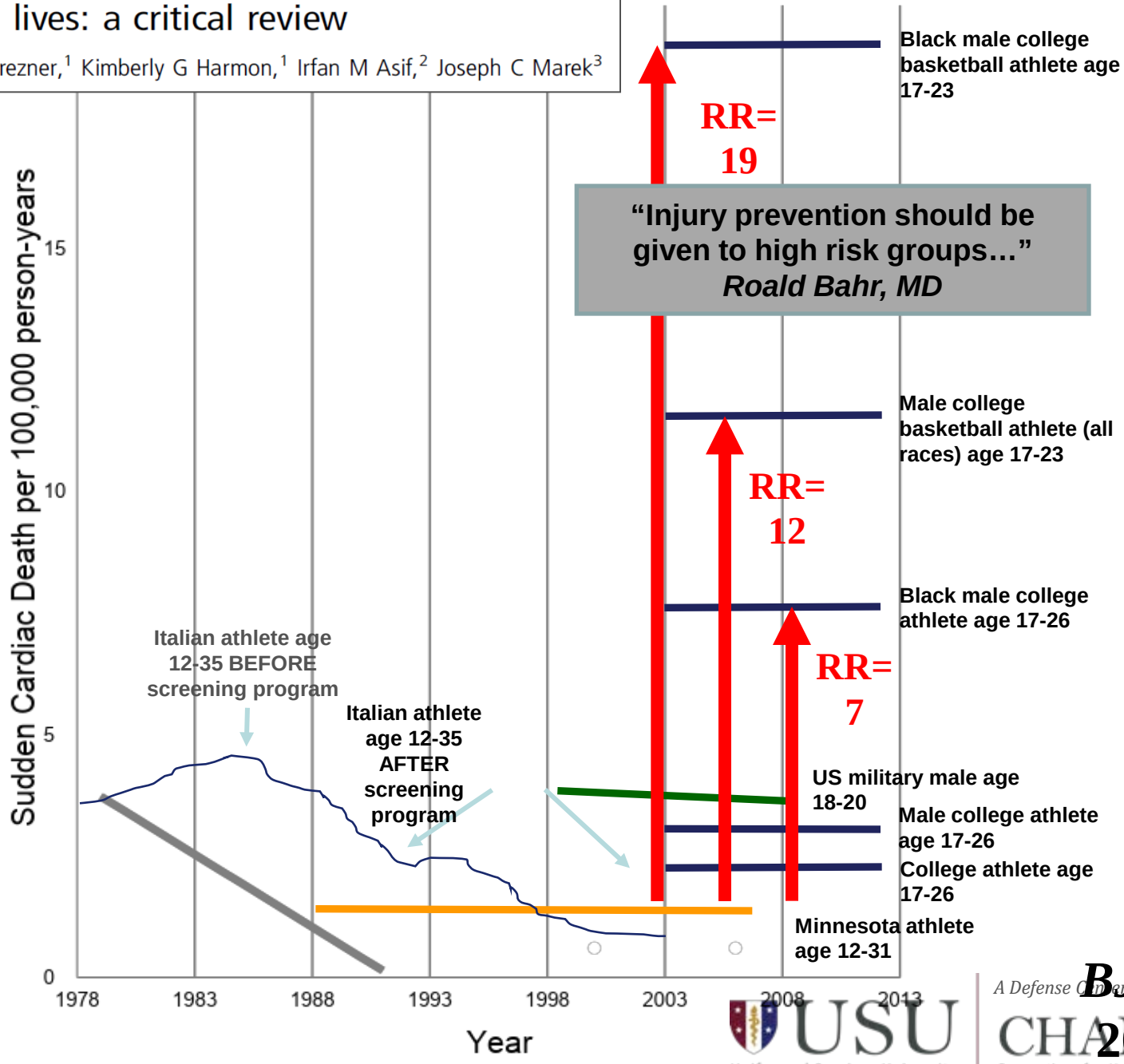
A survey of the task force members was used to identify key discussion areas and generate an initial outline. The panel subsequently engaged in a series of conference calls, literature review and written communications to discuss and analyse specific areas relevant to cardiovascular screening in athletes, followed by an inperson meeting in Atlanta, Georgia, USA, on 21–22 February 2016. An Executive Summary from this panel is presented in box 1.

To cite: Drezner JA, O'Connor FG, Harmon KG, *et al*. *Br J Sports Med* Published Online First: [please include Day Month Year] doi:10.1136/bjsports-2016-096781

- The **differential risk** of SCA/D between **athletes and non-athletes is not fully understood** based on current epidemiologic evidence.
- **Athletes display a differential risk** for SCA/D based on age, sex, race, and sport.

Why cardiovascular screening in young athletes can save lives: a critical review

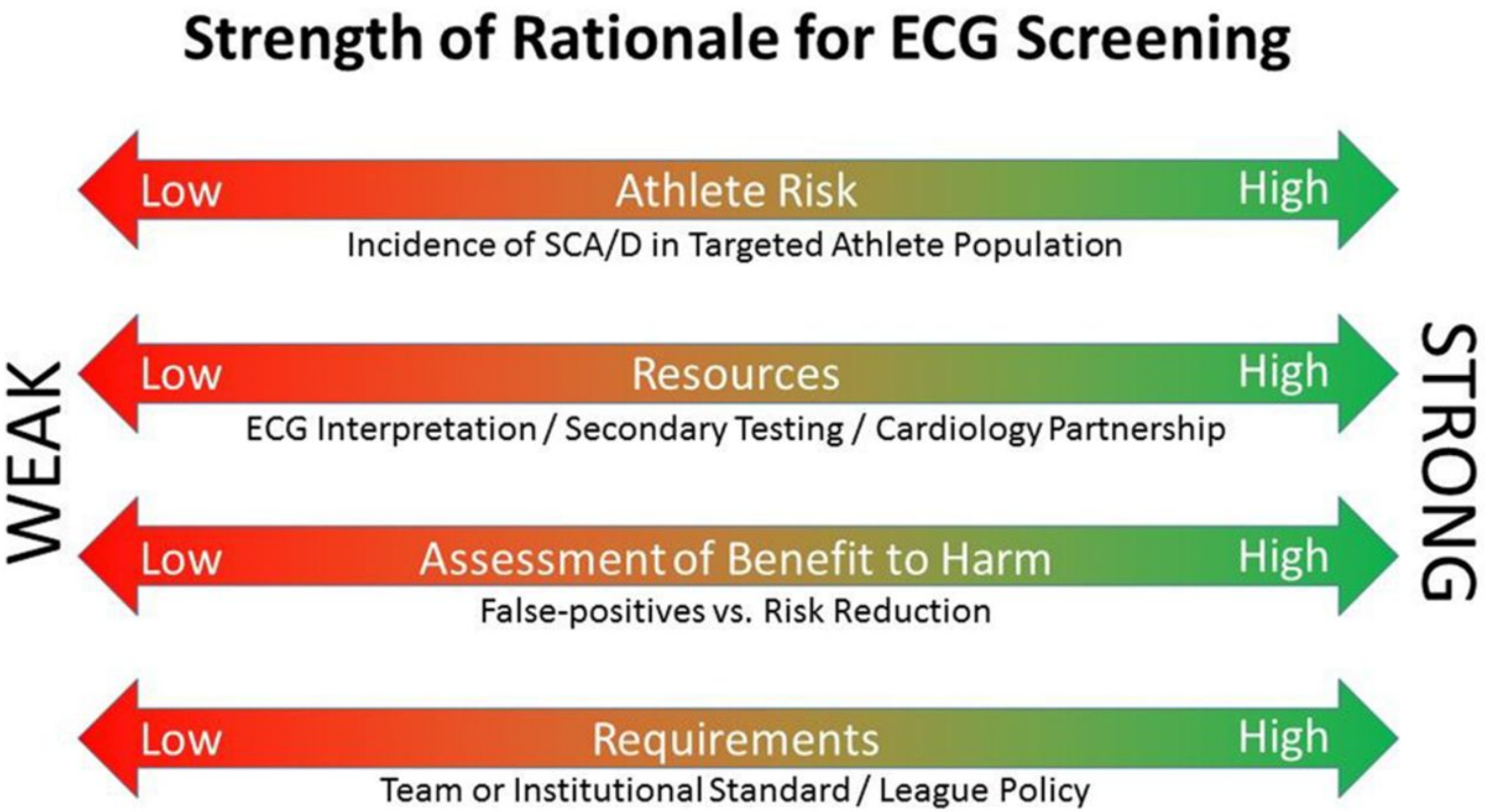
Jonathan A Drezner,[1] Kimberly G Harmon,[1] Irfan M Asif,[2] Joseph C Marek[3]



BJSM 2016

Strength of Rationale for ECG Screening

American Medical Society for Sports Medicine
Leading Sports Medicine into the Future



The Sad Reality: Screening is a Challenge

- **METHODS:** From 1996 through 2016, 11,168 adolescent athletes with a mean (±SD) age of 16.4±1.2 years (95% of whom were male) in the English Football cardiac screening program; health questionnaire, physical examination, electrocardiography, and echocardiography.
- **RESULTS:**
  - During screening, 42 athletes (0.38%) were found to have cardiac disorders that are associated with sudden cardiac death.
  - After screening, there were 23 deaths from any cause, of which 8 (35%) were sudden deaths attributed to cardiac disease. Cardiomyopathy accounted for 7 of 8 sudden cardiac deaths (88%).
  - **Six athletes (75%) with sudden cardiac death had had normal cardiac screening results.**
  - The mean time between screening and sudden cardiac death was 6.8 years.
  - On the basis of a total of 118,351 person-years, the incidence of sudden cardiac death among previously screened adolescent soccer players was 1 per 14,794 person-years (6.8 per 100,000 athletes).

Malhotra A, Dhutia H, et al: Outcomes of Cardiac Screening in Adolescent Soccer Players. N Engl J Med. 2018 Aug 9;379(6):524-534.

Final Assessment

- **You've completed the PPE on John, and it's time for the final assessment.**
- **Jason noted his BP was slightly high; how do you proceed with final clearance?**
- **He is also found to be SCT positive; can he play?**

Athletic Clearance Decision

PREPARTICIPATION PHYSICAL EVALUATION
PHYSICAL EXAMINATION FORM

159

Name _____ Date of birth _____

PHYSICIAN REMINDERS

1. Consider additional questions on more sensitive issues:
   - Do you feel stressed out or under a lot of pressure?
   - Do you ever feel sad, hopeless, depressed, or anxious?
   - Do you feel safe at your home or residence?
   - Have you ever tried cigarettes, chewing tobacco, snuff, or dip?
   - During the past 30 days, did you use chewing tobacco, snuff, or dip?
   - Do you drink alcohol or use any other drugs?

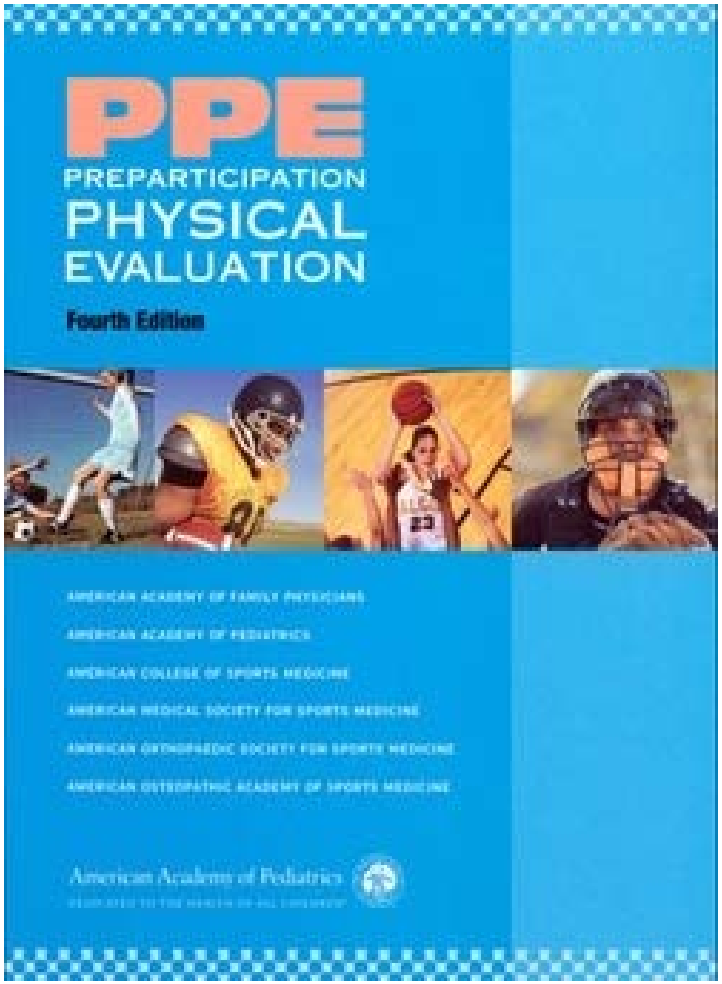
I certify that the above student has been medically evaluated for participation in athletics and deemed:

1. ☐ CLEARED WITHOUT RESTRICTIONS
2. ☐ Cleared for LIMITED PARTICIPATION
   - ☐ Not cleared for (specific sports) _____
   - ☐ Cleared only for (specific sports) _____ + _____
3. Requires further evaluation before a final recommendation
4. Not cleared for participation
   - ☐ Reasons: _____
5. Other recommendations: _____

Name of physician (printed/typed): _____ Date of Examination: _____

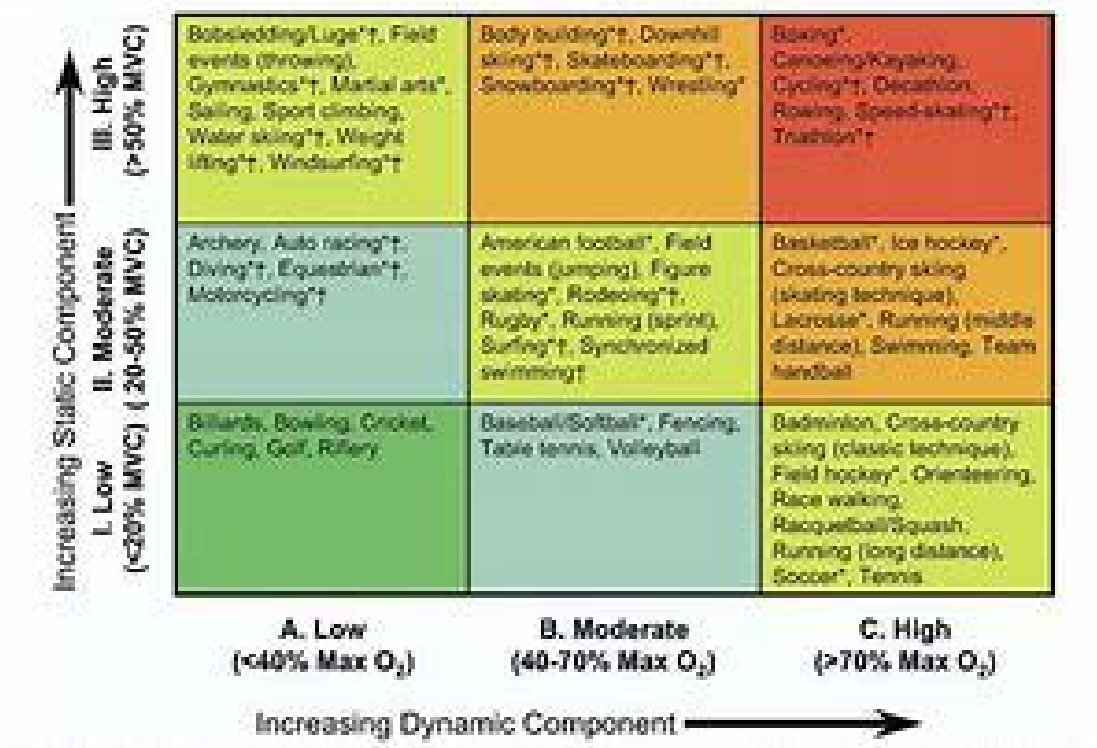
Signature of physician: _____

Resource Documents



2015
ACC/AHA Guidelines
-
Competitive Athletes with
Cardiovascular Abnormalities

Sports Classification



Zips DP, Link MS, Ackerman MJ, Kovacs RJ, Myerburg RJ, Estes NA 3rd. Eligibility and Disqualification Recommendations for Competitive Athletes With Cardiovascular Abnormalities: Task Force 9: Arrhythmias and Conduction Defects: A Scientific Statement From the American Heart Association and American College of Cardiology. J Am Coll Cardiol. 2015 Dec 1;66(21):2412-23.

Contraindicated Sports

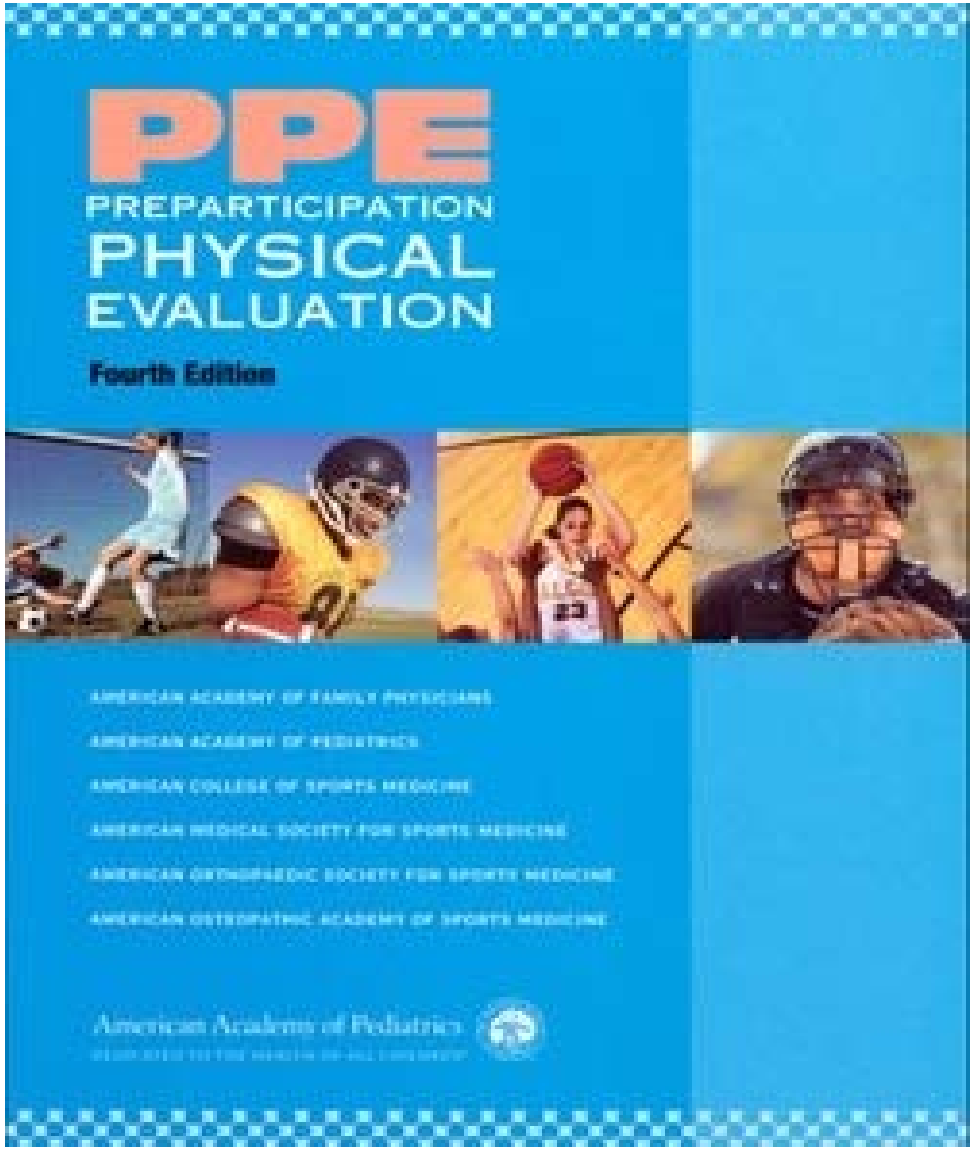


Table 1. Contraindications for Sports Participation

Active myocarditis or pericarditis
Acute enlargement of spleen or liver
Eating disorder in which athlete is not compliant with therapy and follow-up, or when there is evidence of diminished performance or potential injury because of the eating disorder
History of recent concussion and symptoms of postconcussion syndrome (no contact or collision sports)
Hypertrophic cardiomyopathy
Long QT syndrome
Poorly controlled convulsive disorder (no archery, riflery, swimming, weight lifting or powerlifting, strength training, or sports involving heights)
Recurrent episodes of burning upper-extremity pain or weakness, or episodes of transient quadriplegia until stability of cervical spine can be assured (no contact or collision sports)
Severe hypertension until controlled by therapy (static resistance activities, such as weight lifting, are particularly contraindicated)
Sickle cell disease (no high-exertion, contact, or collision sports)
Suspected coronary artery disease until fully evaluated (patients with impaired resting left ventricular systolic function less than 50%, exercise-induced ventricular dysrhythmias, or exercise-induced ischemia on exercise stress testing are at greatest risk of sudden death)

Adapted with permission from Kurowski K, Chandran S. The preparticipation athletic evaluation. Am Fam Physician. *2000;61(9):2688.*

Prudent Recommendations

- **Task Force 9 Arrhythmias**

Recommendations

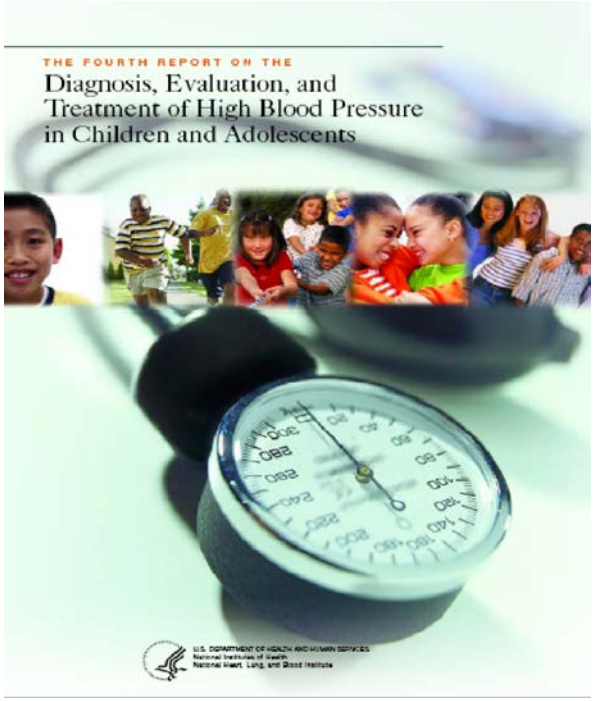
1. Athletes with exercise-induced syncope should be restricted from all competitive athletics until evaluated by a qualified medical professional *(Class I; Level of Evidence B)*.
2. Athletes with syncope should be evaluated with a history, physical examination, ECG, and selective use of other diagnostic tests when there is suspicion of structural heart disease or primary electrical abnormalities that may predispose to recurrent syncope or sudden death *(Class I; Level of Evidence C)*.
3. Athletes with syncope caused by structural heart disease or primary electrical disorders should be restricted from athletic activities according to the recommendations for their specific underlying cardiovascular condition *(Class I; Level of Evidence C)*.
4. Athletes with neurally mediated syncope can resume all athletic activities once measures are demonstrated to prevent recurrent syncope *(Class I; Level of Evidence C)*.

Zips DP, Link MS, Ackerman MJ, Kovacs RJ, Myerburg RJ, Estes NA 3rd.
Eligibility and Disqualification Recommendations for Competitive Athletes With Cardiovascular Abnormalities: Task Force 9: Arrhythmias and Conduction Defects: A Scientific Statement From the American Heart Association and American College of Cardiology. J Am Coll Cardiol. 2015 Dec 1;66(21):2412-23.

Hypertension in the Athlete

- Hypertension is the **most common** cardiovascular disorder detected during PPE screening.
- BP readings are altered by various factors that influence the patient, the techniques used and the accuracy of the sphygmomanometer.
- Clinical Observations:
  - Blood pressure during the PPE process is often completed by someone who does not regularly perform BPs.
  - False positive blood pressure readings are not uncommon.

The Fourth Report on the Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents



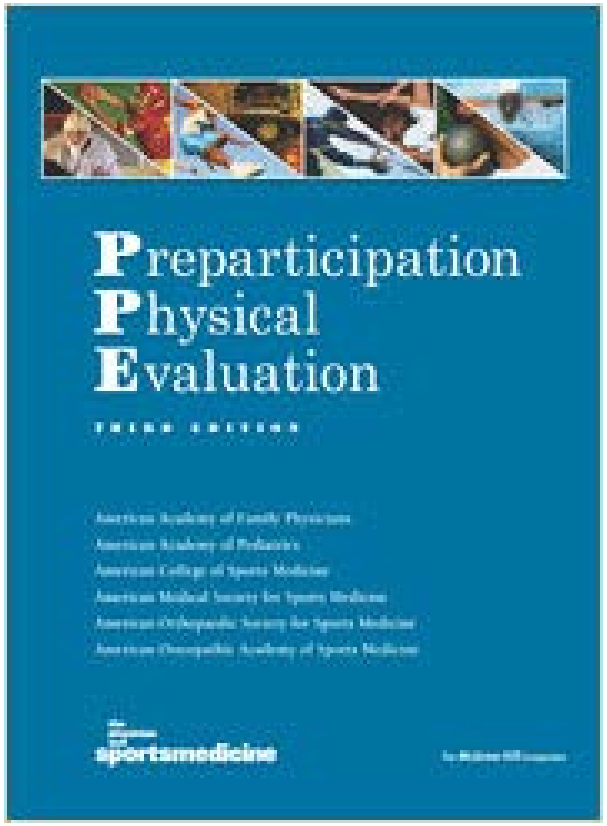
National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents. Pediatrics 2004; 114 Suppl: 555-76.

Implications for the Family Physician

- **Evaluation**:
  - All children and adolescents diagnosed with hypertension require a careful history and physical examination as well as further evaluation for a **secondary etiology** as clinically indicated.
    - **Renal US** for all children with sustained BP $\geq$ 95%
  - To evaluate for **target organ disease**:
    - **Echocardiogram**, as well as a **retinal examination,** is currently recommended for all patients with a BP $\geq$ 95th percentile.

Implications for the Family Physician

- **Treatment/Clearance**:
  - Similar to adults, any child athlete with **Stage 2 hypertension** should be restricted from participation until adequate control is obtained.
  - Children with identified **target organ disease** should have participation recommendations based upon the nature of their target organ disease.



SCT Guidance from the NCAA

In general, student-athletes with sickle cell trait should:

• Set their own pace.

• Engage in a slow and gradual preseason conditioning regimen to be prepared for sports-specific performance testing and the rigors of competitive intercollegiate athletics.

• Build up slowly while training (e.g., paced progressions).

• Use adequate rest and recovery between repetitions, especially during “gassers” and intense station or “mat” drills.

• Not be urged to perform all-out exertion of any kind beyond two to three minutes without a breather.

• **Be excused from performance tests such as serial sprints or timed mile runs, especially if these are not normal sport activities.**

• Stop activity immediately upon struggling or experiencing symptoms such as muscle pain, abnormal weakness, undue fatigue or breathlessness.

• Stay well hydrated at all times, especially in hot and humid conditions.

• Maintain proper asthma management.

• Refrain from extreme exercise during acute illness, if feeling ill, or while experiencing a fever.

• Access supplemental oxygen at altitude as needed.

• Seek prompt medical care when experiencing unusual distress.

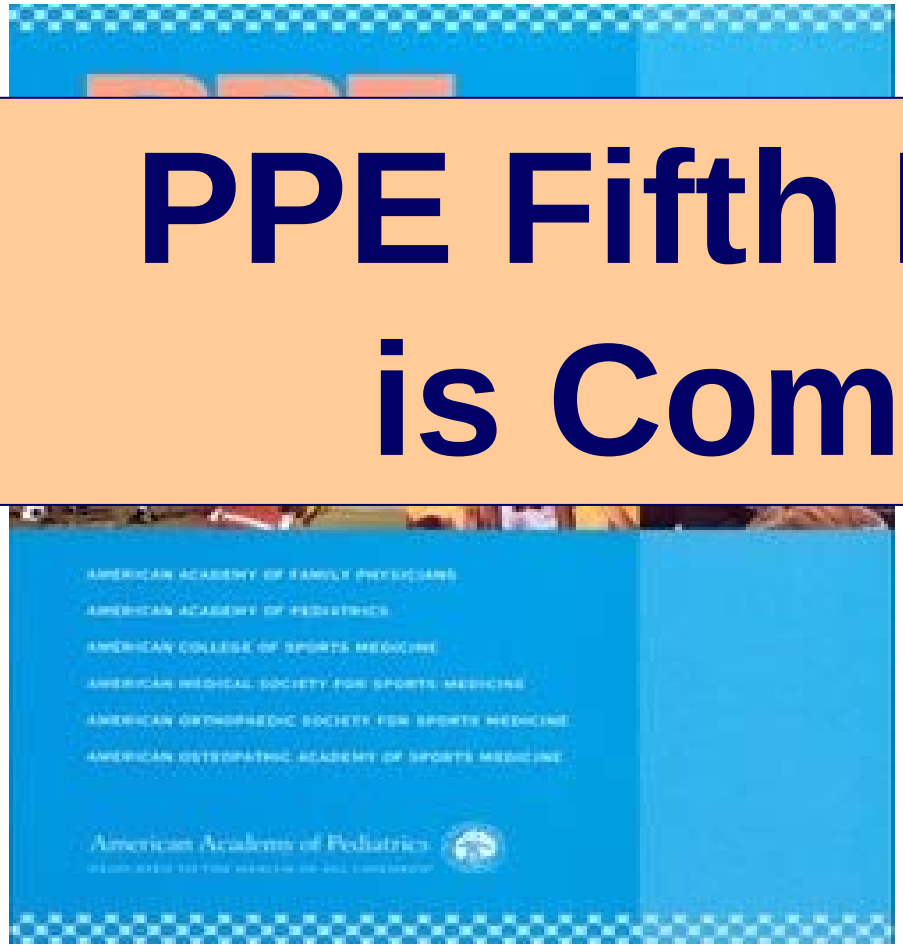
Guidance from ASH

- **Q: Can an individual with sickle cell trait participate in athletics/exercise?**
  - **A:** *Sickle cell trait should not be an impediment for participation in athletics or physical exercise. Maintaining good hydration and understanding how to avoid injuries can make exercise safer for ALL individuals, including those with sickle cell trait.*

Guidance from ASH

- **What precautions should an individual with sickle cell trait take when participating in sports or exercise?**
  - **A:** *Individuals with sickle cell trait should consider the same precautions that can prevent injuries and exercise-related illnesses as people who do not have sickle cell trait. These include being mindful of heat and humidity, drinking adequate fluids, taking rest breaks as needed, and not exceeding their current level of fitness.*

Final Thoughts



PPE Fifth Edition is Coming!

PPE 5th Edition

Chapter 9

Transgender Athletes

A transgender person has a gender identity that is different than their sex designation assigned at birth. Transgender athletes can be assessed for medical eligibility to participate in sports by using the standard preparticipation physical evaluation, or PPE, process. The conundrum arises with the designation of sex and gender and the determination of competition status that is based on either sex or gender. The terms *gender* and *sex* have been defined by the World Health Organization (WHO)[1] to standardize terms that are often used interchangeably in many settings. The WHO definitions confine the words to specific meanings for which *sex* refers to the biological and physiological characteristics that define male and female and *gender* refers to the socially constructed roles, behaviors, activities, and attributes that society considers culturally appropriate for men, women, and people of other gender categories. The fundamental concepts of sex and gender extend beyond the traditional male and female biological designations assigned at birth. Although not universally accepted, there are likely several categories along a continuum of biological sex in humans that include internal and external genitalia, chromosomes, hormone levels, and secondary sex characteristics, in addition to a broad range of gender identity categories. Determining when an individual is male, female, or another sex designation involves integrating all the elements of biological sex as well as self-described gender identity.[2] Sports competitions have traditionally been divided by sex, but as transgender athletes move into the sports arena, participation across sex divisions can create controversy. Questions surrounding transgender athletes in competition are just beginning to be clarified.

Conclusion

- The Preparticipation Examination (PPE) has yet to be validated as decreasing morbidity and mortality.
- At present, however, the standard of care in the United States is a carefully performed history and physical examination (PPE).
- The conscientious examination requires a trained provider, an appropriate setting, and sincere communication.

Giese EA, O'Connor FG, Brennan FH, Depenbrock PJ, Oriscello RG. The athletic preparticipation evaluation: cardiovascular assessment. Am Fam Physician 2007;75:1008-14.

Lammlein KP, Stoddard JM, O'Connor FG: Preparticipation Screening of Young Athletes: Identifying Cardiovascular Disease. Prim Care. 2018 Mar;45(1):95-107.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