STATE HIGHER EDUCATION UNIVERSITY
"UZHHOROD NATIONAL UNIVERSITY"
MEDICAL FACULTY №2
INTERNAL DISEASES

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Guidelines to practical lessons

OK 42 PHYSICAL REHABILITATION, SPORTS MEDICINE

PHYSICAL EXAMINATION OF ATHLETES (2HOURS)

Topic 2

Module 1 “Sports Medicine”

Uzhhorod 2020

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The guideline is composed according to medical students' educational qualification characteristics and professional training programs.

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The preparticipation physical examination

Purpose: determine general health of the athlete.

1. Assess fitness level for specific sports.
2. Counsel on life-style issues and high-risk behaviors.
3. Answer health related questions.

Forma: Private office with primary care physician, group examination (Usually done as a station-based examination)

Frequency and timing of examinations

Most states require the examination to be done yearly. Optimal timing for the examination is 4–6 weeks before the season starts to allow sufficient time for further evaluation and treatment of any problems that are uncovered.

Medical history

The easiest method for obtaining an athlete's history is to make medical history forms available before the examination. These forms are probably best completed by the parents of adolescent athletes. Key questions include asking about any major preexisting medical problems or injuries, if they are taking any medicines or supplements, their current state of health, and family history of early death (before age 50).

Cardiovascular assessment

Critical history question "Have you ever felt dizzy, fainted, or actually passed out while exercising?" may be a sign of a structural heart problem. Benign systolic murmurs are common in athletes. If a murmur is grade III or louder and/or diastolic, further evaluation is recommended. Accentuation with Valsalva should alert to possible outflow tract obstruction such as hypertrophic cardiomyopathy.

Ectopic beats are also common. Those that disappear with exercise are usually benign, while those brought on with exercise are more worrisome.

Simultaneous palpation of the radial and femoral pulses for asymmetry is a simple screen for coarctation of the aorta.

Blood pressure

Should have three separate elevated blood pressure (BP) readings to diagnose hypertension. Mild to moderate hypertension without end organ damage need not be restricted from competitive sports. Severe to very severe hypertension should be restricted from high static sports until BP controlled. Systolic hypertension in young athletes is frequently related to anxiety or inappropriate cuff size in husky individuals.

Musculoskeletal assessment

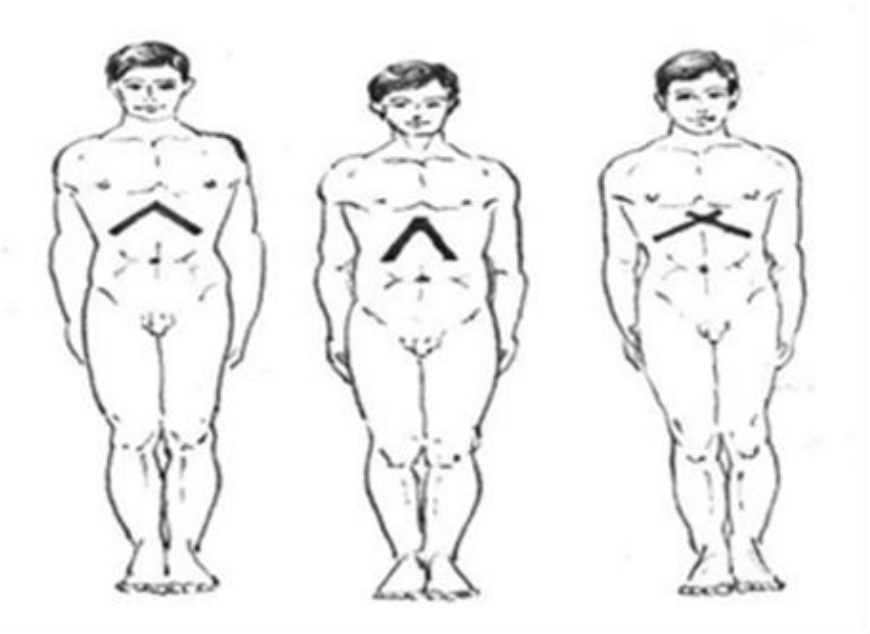
Look for preexisting injuries, as they are likely to recur. The knees, shoulders, and ankles are most at risk. Keep in mind the demands of the particular sport the athlete will be playing, and focus on areas of the body that will be under stress and prone to injury from that sport.

Musculoskeletal problems found during the preparticipation examination should be treated with appropriate rehabilitation and conditioning programs.

Visual examination of the chest and spine.

Visual examination should be performed following the order: from the front, sides and back. The examination is done when the patient is standing or sitting stripped to the waist at even light. First, the physician should pay attention to the shape of the chest.

- **Normosthenic chest** (thorax normosthenicus). The transverse and anteroposterior sizes are proportional with the ratio of transverse to anteroposterior diameters measured at the same level 0,65-0,75. The angle between the both costal arches (epigastric angle) is about 90°. The ribs are directed slightly obliquely downward. The intercostal spaces can be noticed but not clearly marked. Supra- and subclavicular fossae are moderately developed, the collarbones do not jut out. The shoulder blades moderately fit the back with the hands down.
- **Asthenic chest** (thorax asthenicus). Anteroposterior to transverse chest size ratio is < 0,65 therefore the chest seems flat and narrow. The ribs are directed downward. The angle between the ribs is acute, intercostal spaces are wider than at norm and are clearly seen. Supra- and subclavicular fossae are distinct, the collarbones are well seen. The shoulders are let down (at an obtuse angle to the shoulders). The shoulder blades are stuck out (winged scapula, scapulae alatae). Sometimes the end of the tenth rib is free (costa decimafluctuans).
- **Hypersthenic chest** (thorax hypersthenicus). Anteroposterior to transverse ratio is > 0,75, therefore the transverse section of the chest is close to circle (in norm it is close to oval). The chest is wide. The ribs are horizontal. The epigastric angle is obtuse. The intercostal spaces are narrow and poorly marked, sometimes not seen. Supra- and subclavicular fossae are poorly seen. The hypersthenic chest is associated not only with the skeleton features but also good development of the chest muscles.



Pathological shape of the chest results from the changes in the skeleton (congenital anomalies), changes of the vertebral column due to pathological processes in it or various chronic diseases of the lungs and pleura.

- An **emphysemic or barrel chest** (thorax emphysemicus) resembles hypersthenic but its features are more pronounced. Unlike the latter it results from

emphysematous enlargement of the lungs. Due to sharp reduction of the lung tissue elasticity in lung emphysema, the lungs collapse insignificantly on expiration; therefore, the chest is constantly in an inspiratory state and resembles a hypersthenic chest. The ribs are horizontal, the intercostal spaces are narrow, supra- and subclavicular fossae are not seen, the epigastric angle is obtuse. The upper portion of the chest is especially wide. This shape of the chest is common for COPD, severe asthmatic and emphysema patients.

- A **paralytic chest** (thorax paralyticus) resembles an asthenic chest. This is caused by severe chronic diseases of the lungs (tuberculosis, pneumosclerosis, cystic fibrosis, bronchoectasis) resulting in shrinkage and reduction of the lung mass. Visual examination of the patients with a paralytic chest also reveals muscular dystrophy, asymmetry of collarbones, unequal supraclavicular fossae, different levels of scapulas moving synchronically during the act of respiration.
- **Pectus carinatum** (pigeon breast), characterized by the upper ribs bending inward and thrusting the sternum outwards like the keel of a ship. This shape of the chest is a result of abnormal skeleton formation in childhood in the patient with rachitis.
- The "**funnel breast**" of pectus excavatum (the reverse of carinatum) is characterized by a depression in the lower portion of the sternum near the xiphoid process. Severe deformation can diminish vital capacity; however, it is usually a mild, asymptomatic, congenital defect of cosmetic concern only.

Posture types

- **Forward head posture**- Often the position of the neck is a direct response to how the spine is positioned. If the lumbar spine is too flat or the chest is too rounded, it can contribute to the bump of the spine. The muscles in the lower part of the neck end up in a stretched position while the muscles in the upper part of the neck become short and tensed. The position makes the head feel heavier than normal and the muscles in the lower part of the neck and upper part of the spine have to work hard to keep the head upright.
- **Forward rotated shoulders** - means that the chest muscles are often short and tense. The muscles on the back of the shoulder and between the shoulders work hard to compensate for the short chest muscles, which can lead to tired muscles and pain between the shoulder blades.
- **Lordotic posture- Lordosis** is a type of posture deformity and is the result of a curve formed in the lumbar region. When this curve is exaggerated it is usually referred to as hyperlordosis. The pelvis is usually tilted anteriorly.
- **Sway Back Posture**- in this type of posture, there is forward head, hyper-extension of the cervical spine, flexion of the thoracic spine, lumbar spine extension, posterior tilt of the pelvis, hip and knee hyper-extension and ankle slightly plantarflexed.
- **Flat back posture**- In this type of posture, there is forward head, extension of the cervical spine, extension of the thoracic spine, loss of lumbar lordosis and posterior pelvic tilt.
- **Scoliosis** – type of posture deformity when spine has a lateral curvature. There are two types of scoliosis. One type comes from the pelvis being rotated which causes

a rotated spine. The rotation of the pelvis often depends on uneven muscle strength between the right and left sides of the hip, pelvis and lower back. The second type comes from the fact that the spine has grown into a rotated position which results in a rotated pelvis. In both cases the mobility of the spine is limited both to the side, in rotation and to the front / back.

- **Kyphosis** - type of posture deformities and can be detected by an exaggerated curve of the thoracic region, which makes the shoulders appear rounded. The neck becomes short or almost invisible.
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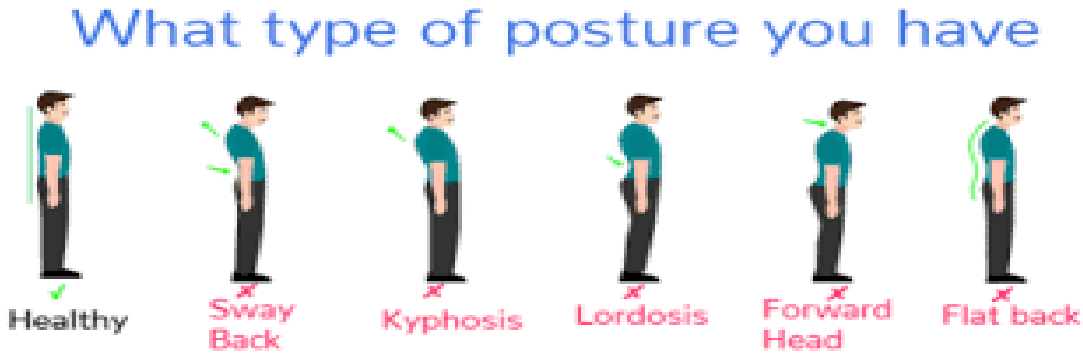
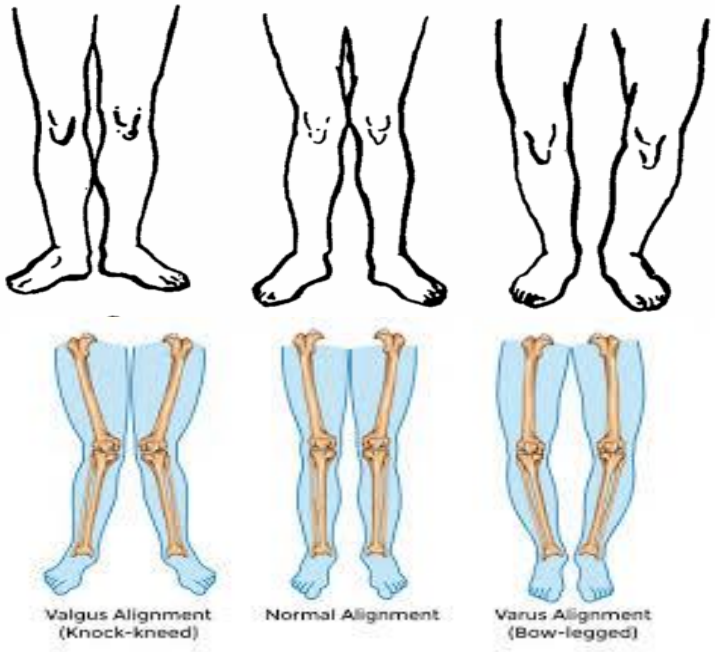


The shape of the legs:

- Normal (convergent of feet, knees, shins and ankles are with little clearance below the knees);
- X-shaped legs - knees come together, but ankles don't;
- O-shaped feet - with closed ankles knees do not come together;



The shape of the foot:

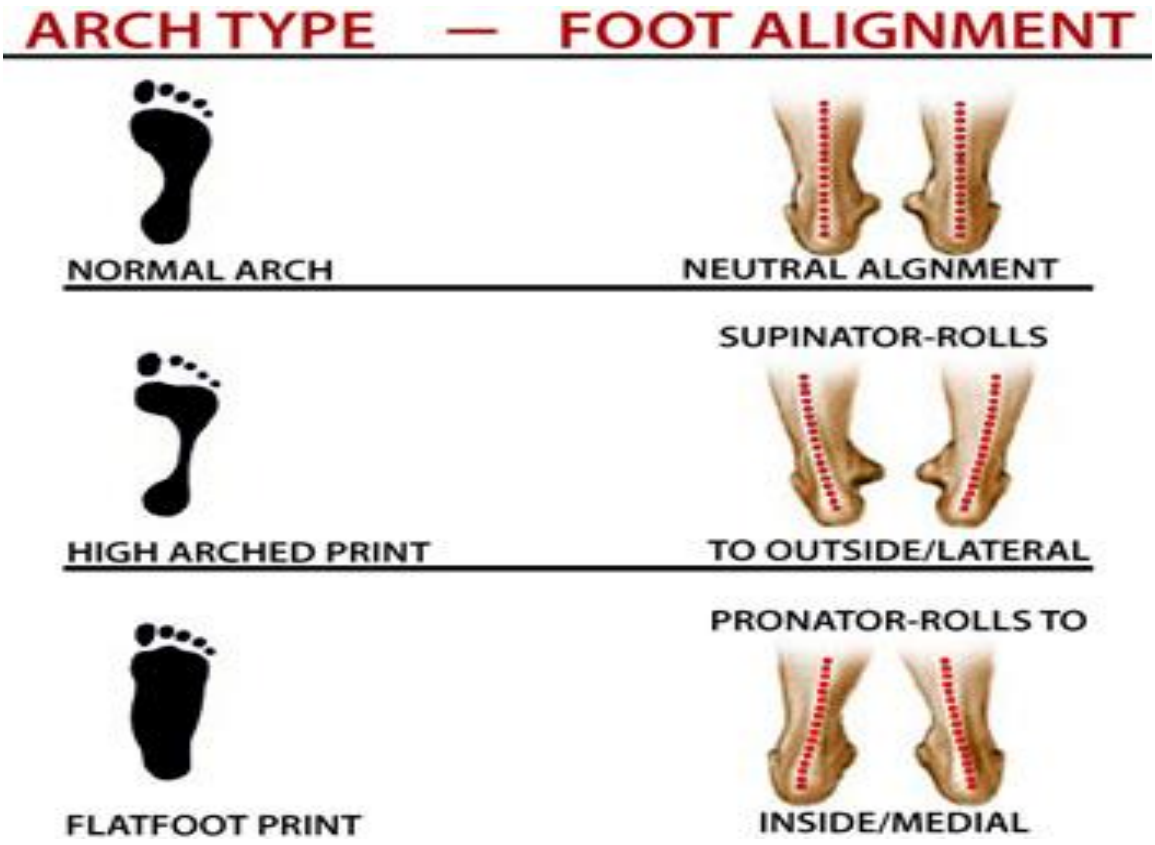
- **Normal foot shape** - where there is neither excessive pronation or supination during gait) is present in approximately 30% of population. The calcaneus and talus are at or near ideal structural alignment, enabling the foot to function optimally (pronate and supinate effectively) throughout the gait cycle.
- **Pronator foot shape** (most common) - shows up as a varus deformity in Sub-Talar Joint neutral causes the foot to roll inward and downward too much during the gait

cycle (hyperpronation) results in internal rotation of the lower leg (tibia) that twists and unlevels the hips which in turn can also cause the spine to twist and bend out of alignment (functional scoliosis).

- **Supinator foot shape** (very rare, 3%) - shows up as valgus deformity as in Sub-Talar Joint neutral high arches and a rigid structure throughout the gait cycle results in poor shock absorption (excessive supination) leads to outward rotation of the lower limbs. Wear and tear results from high impact rather than torsional twisting

Arch type:

- **Normal arch** - if the middle part of your arch is about half filled, this means you have a normal arch. Your arch naturally supports your body weight and pronates (rolls in) under a normal load.
- **Flat arch** - if your footprint looks like a complete foot, then you have a flat arch. Your foot probably rolls in (pronates) when you walk or run.
- **High arch** - if you see little of your footprint, you likely have high arches. High arches may contribute to excessive strain on joints and muscles. Your feet may not absorb shock well, especially if you perform a lot of impact or jumping activities.



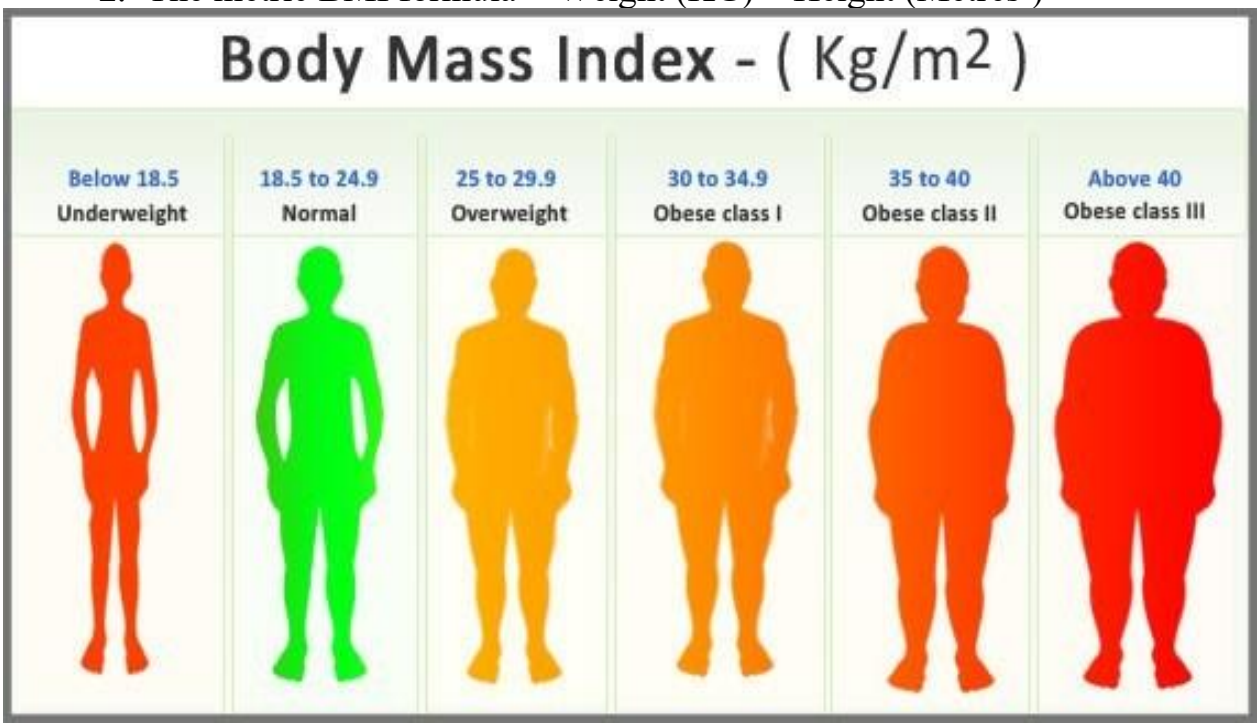
FOOT TYPE (Right Foot)	ASSESSMENT RESULTS	POSSIBLE SHOE TYPE
 Supinated	• High arch • Ankle has tendency to roll out during balance/dynamic activities • Old shoes are worn on the outside	Cushioned Shoe
 Neutral	• No exaggeration in foot print • Heel is able to maintain vertical position dynamically • Old shoes are worn between the 1st and 2nd toe	Neutral Shoe
 Pronated	• Flat arch • Ankle has tendency to roll in during balance/dynamic activities • Old shoes are worn on the inside	Support/Control Shoe

Other areas for assessment

1. Height/Weight (eating disorders, ideal body weight)

Body Mass Index:

1. The imperial BMI formula = Weight (LBS) x 703 ÷ Height (Inches²)
2. The metric BMI formula = Weight (KG) ÷ Height (Metres²)



Body Fat Percentage

Before you use the body fat percentage calculator, take tape measurements of your waist, hip, and neck. Use these measurements in tandem with your gender and height and the calculator will estimate your body fat percent, lean mass, fat mass, and your navy fitness category.

OR use formula with BMI:

Women: (1.20 x BMI) + (0.23 x Age) - 5.4 = Body Fat Percentage

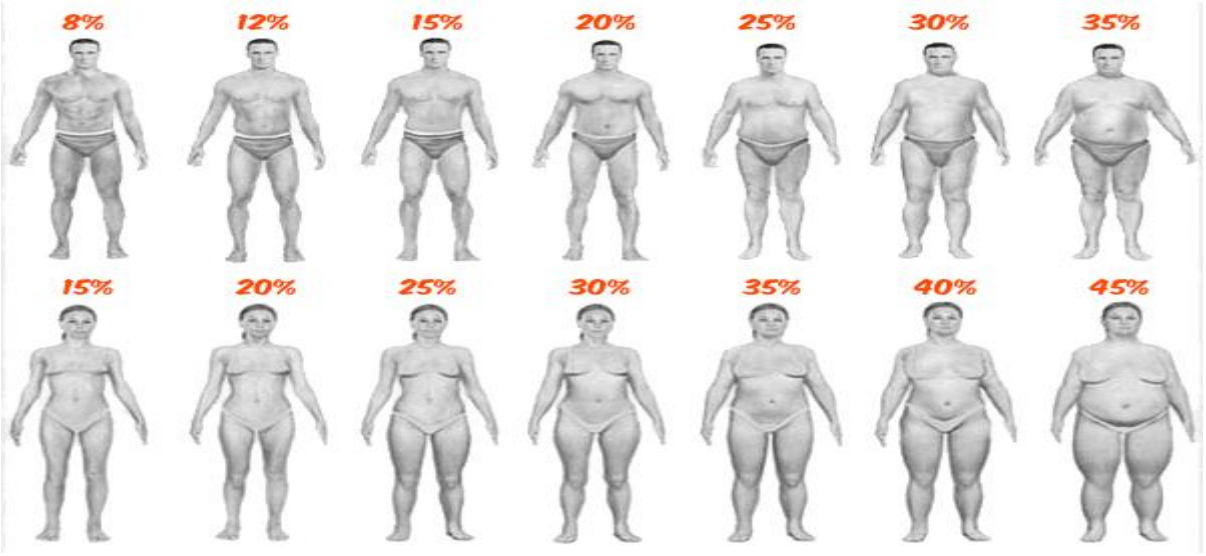
Men: (1.20 x BMI) + (0.23 x Age) - 16.2 = Body Fat Percentage

Body Adiposity Index (BAI)

The Body Adiposity Index (BAI) is an alternative method of measuring human body fat without weight.

BAI = (100 x Hip(meters)) / (Height(meters) x (Height(meters)1/2) - 18

Or you may use BMI healthy weight and Body Fat Percentage or BAI online calculator.



IDEAL BODY FAT PERCENTAGE CHART (American Council on Exercise)		
Description	**Men**	**Women**
Essential fat	2-5%	10-13%
Athletes	6-13%	14-20%
Fitness	14-17%	21-24%
Average	18-24%	25-31%
Obese	25%+	32%+

The Brock and Bruhsh method

The height in standing position (cm) - 100 = the proper weight (kg)

The Quetle Index

Total body weight (g) / height (cm)

The norm:

350-400 g / cm - men

325-375 g / cm - women

Boys under 15 - 325 g / cm

Girl under 15 - 318 g / cm

The life indicator:

Vital capacity of lungs (ml) / body weight (kg)

The norm:

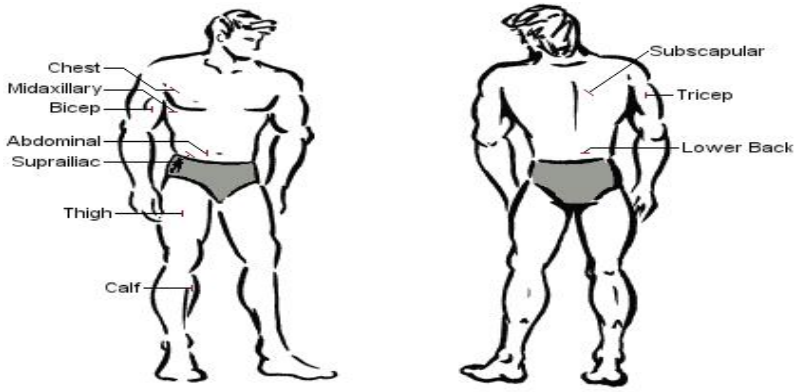
60 ml / kg - men
50 ml / kg - women
For male athletes - 65-70 ml / kg
For female athletes - 55-60 ml / kg

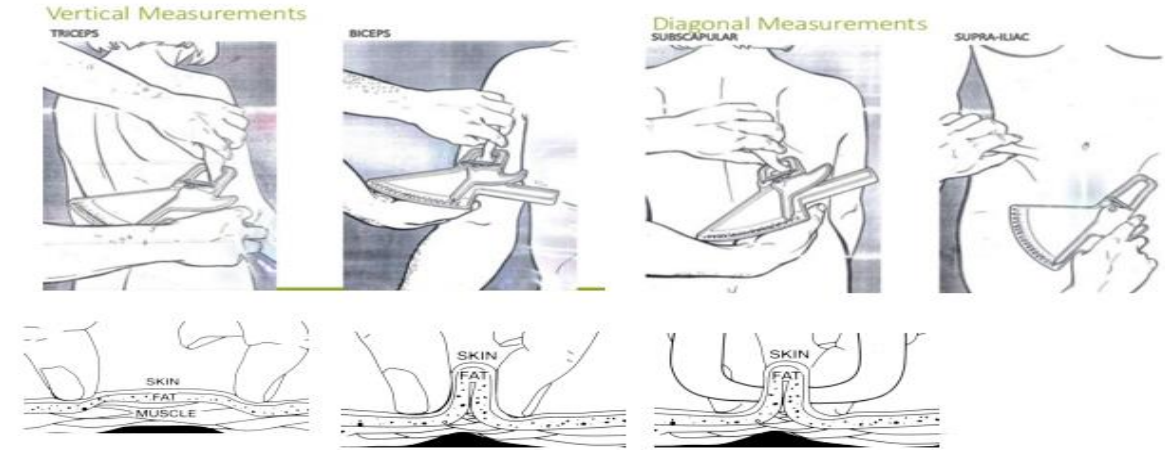
The index of the constitution strength (Piniye):

Height (cm) - (body weight (kg) + chest circumference (cm) in the state of exhalation)
The lower the index is the better it is.
The difference up to 10 indicates a strong constitution
From 11 to 20 – a good constitution
From 21 to 25 – an average constitution;
From 26 to 35 - a weak constitution;
> 36 – a very weak constitution.

The proportion index of the chest:

Chest circumference (cm) / height (cm) × 100
The norm ≈ 50 ± 5





1. Lungs (asthma)
2. Abdominal (hepatosplenomegaly, masses)
3. Skin (infectious diseases, acne)
4. Neuro (history of concussion)
5. Genitourinary (single testicle, hernia, testicular mass)

Diagnostic tests:

Lab tests

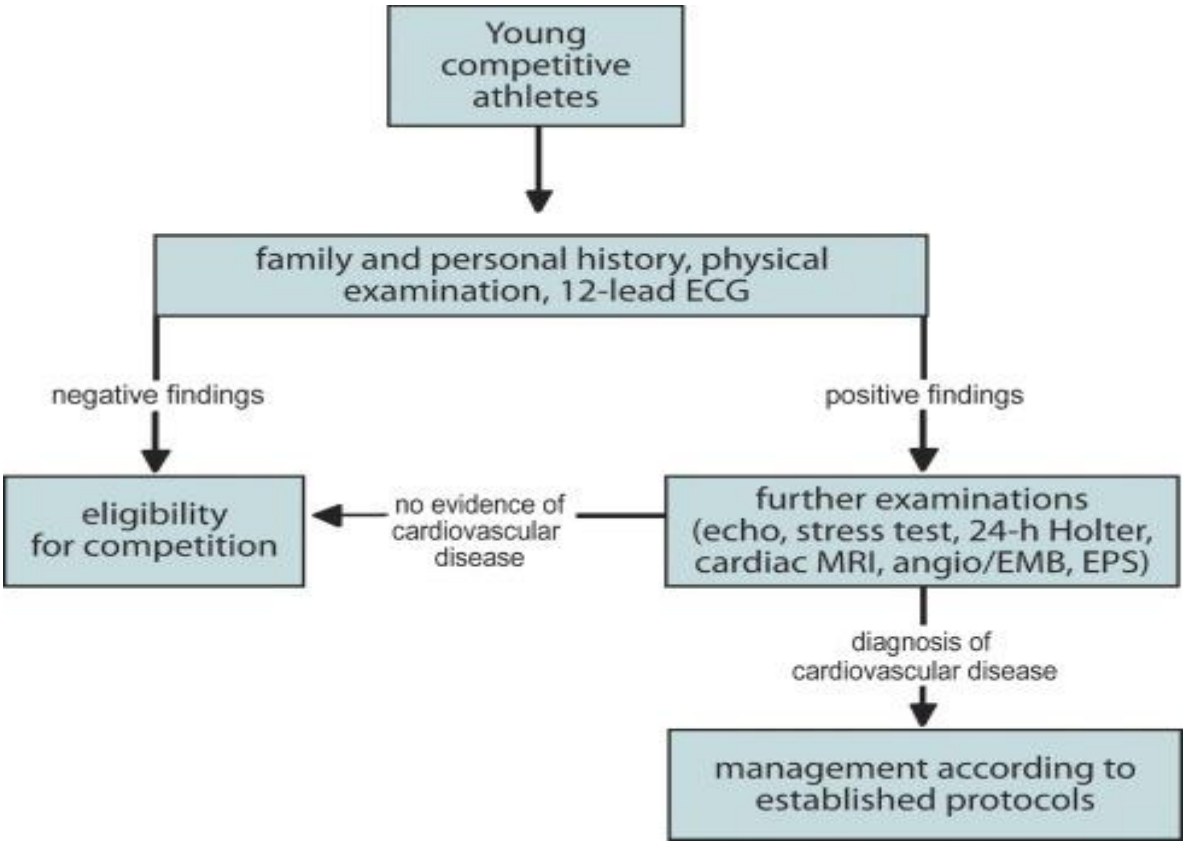
The most commonly used lab tests are the complete blood count (CBC) and urinalysis. Consensus is that they should not be done routinely during the preparticipation examination.

• Consider routine hematocrit in female athletes.
• Cholesterol testing if indicated by history.
• Consider testing for sickle cell trait in black athletes.

Cardiac testing

Routine electrocardiogram (EKG) and/or echocardiogram are not cost effective as screening test. Screening for sudden death:

• History: family history; syncope, exertional chest pain or dyspnea on exertion.
• Examination: Marfan's habitus; murmur.
• EKG and/or echocardiogram: reassuring if both normal
• Exercise stress test, Holter, and angiogram should be done as indicated by history and examination findings. Exercise stress testing may be indicated in the adult athlete with cardiac risk factors, prior to starting an exercise program.



Clearance

After a problem is found, the following factors should be considered in deciding whether to clear an athlete to participate:

1. Does the problem place the athlete at increased risk of injury?

2. Is any other participant at risk of injury because of the problem?
3. Can the athlete safely participate with treatment (medication, rehabilitation, bracing, or padding)?
4. Can limited participation be allowed while treatment is being initiated?
5. If clearance is denied only for certain activities, in what activities can the athlete safely participate?

Contraindications to exercise

Absolute

1. Recent acute myocardial infarction
2. Unstable angina
3. Ventricular tachycardia or other dangerous arrhythmias
4. Severe aortic stenosis
5. Acute infection and/or fever
6. Recent systemic or pulmonary embolus
7. Thrombophlebitis or intracardiac thrombi
8. Active or suspected myocarditis or pericarditis
9. Acute congestive heart failure
10. Dissecting aortic

Relative

1. Severe hypertension (uncontrolled or untreated)
2. Complicated pregnancy
3. Moderate aortic stenosis
4. Severe subaortic stenosis
5. Supraventricular dysrhythmias
6. Ventricular aneurysm
7. Frequent or complex ventricular ectopy
8. Cardiomyopathy
9. Uncontrolled metabolic disease (thyroid or diabetes) or electrolyte abnormality
10. Chronic or recurrent infectious disease (malaria, hepatitis, and the like)
11. Neuromuscular, musculoskeletal, or rheumatoid diseases exacerbated by exercise.

Medical records.

Student-athletes have a responsibility to truthfully and fully disclose their medical history and to report any changes in their health to the team's health care provider. Medical records should be maintained during the student-athletes collegiate career and should include:

1. A record of injuries, illnesses, new medications or allergies, pregnancies and operations, whether sustained during the competitive season or the offseason;

2. Referrals for and feedback from consultation, treatment or rehabilitation;

3. Subsequent care and clearances;

4. A comprehensive entry-year health-status questionnaire and an updated health-status questionnaire each year thereafter.

5. Immunizations. It is recommended that student-athletes be immunized and up to date for the following: Measles, mumps, rubella (MMR); Hepatitis B;

Diphtheria, tetanus (and boosters when appropriate); Meningitis; Seasonal influenza (flu).

6. Written permission, signed annually by the student-athlete, which authorizes the release of medical information to others. Such permission should specify all people to whom the student-athlete authorizes the information to be released. The consent form also should specify which information may be released and to whom.

Follow-up examinations. Those who have sustained a significant injury or illness during the sport season should be given a follow-up examination to re-establish medical clearance before resuming participation in a particular sport. This policy also should apply to pregnant student-athletes after delivery or pregnancy termination.

PHYSICAL EXAMINATION FOR ATHLETES

Student's name _____ M/F____
Date of Birth____/ ___ /___ Grade_____
Address_____
Fall sport_____ Winter sport_____ Spring sport_____
Height_____ Weight _____ BMI _____ BFP _____
BAI_____ Blood pressure _____/_____ Pulse _____bpm
Vision: R_____/L_____ Corrected: yes__ / no___ Pupils: equal / unequal
Asthma _____(medication used)
Diabetes_____(medication used)
Allergies _____(medication used)

Medical	Normal	Comments	Initials
Appearance			
Eyes/ears/nose/throat			
Hearing			
Lymph nodes			
Heart/Murmurs			
Pulse			
Lungs			
Abdomen			
Skin			
Genitalia			
Musculoskeletal			
Neck			
Back/ Spine			
Shoulder / Arm			
Elbow / Forearm			
Wrist / hand / fingers			
Hip / Thigh			
Knee			
Calf / ankle			
Foot / toes			
Other			

Clearance:

A. Cleared for all sports_____
B. Cleared after completing evaluation / rehabilitation for_____
C. Not cleared for:
    - Collision
    - Contact
    - Non-contact
    - Strenuous
    - Moderately – Strenuous
    - Non – Strenuous

Due to _____
Physician's Recommendation
Date of Physical Exam_____

List of questions:

1. The preparticipation physical examination.
2. Medical history
3. Cardiovascular assessment
4. Musculoskeletal assessment
5. Visual examination of the chest
6. Visual examination of the spine and legs
7. Other areas for assessment: Height/Weight (eating disorders, ideal body weight)
8. Lab tests used in physical examination of athletes
9. Cardiac testing in athletes
10. Clearance
11. Absolute contraindications to exercise
12. Relative contraindications to exercise
13. Medical records

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