Unit -7

Physical Education

Unit – 7

Physiology & Injuries in Sports

Unit Contents

7.1 Physiological factor determining component of Physical Fitness

7.2 Effect of exercise on Cardio Respiratory System

7.3 Effect of exercise on Muscular System

7.4 Physiological changes due to aging

7.5 Sports injuries :

1. Soft Tissue Injuries :

Abrasion, Contusion, Laceration, Incision, Sprain & Strain)

2. Bone & Joint Injuries :

Dislocation,

Fractures: Stress Fracture, Green Stick, Commutated, Transverse Oblique & Impacted) Causes, Prevention& treatment

Sample Question Papers..!!

CBSE Sample Paper Questions

CBSE Sample Paper 2023

Q4. Slow twitch fibres are _____ in colour.

a) White
b) Red.
c) Transparent
d) Brown

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Q7.. The amount of oxygen which can be absorbed and consumed by the working muscles from the blood is called _____

a) Oxygen Uptake.
b) Oxygen Intake
c) Oxygen Transport
d) Vital capacity

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Q19. List down any four effects of exercise on the muscular system.

[2M]

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Q19. List down any four effects of exercise on the muscular system.

Q22. Explain any two types of soft tissue injuries with help of examples.

[2M]

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Q29. Explain any three physiological factors determining strength.

[3M]

Complete Chapter's Summary

7.1. Physiological factors determining Components of Physical Fitness.

Strength :

1. **Muscle size** : Bigger and larger muscles can produce more force. Males have larger muscles than females so the size muscles and strong can be improved with the help of weight training.

2. Muscle composition :

There are two types of fibers in muscles i.e. fast twitch fibers and slow twitch fibers.

The muscles which consist of more percentage of fast twitch fibers will produce more strength.

SPRINTER

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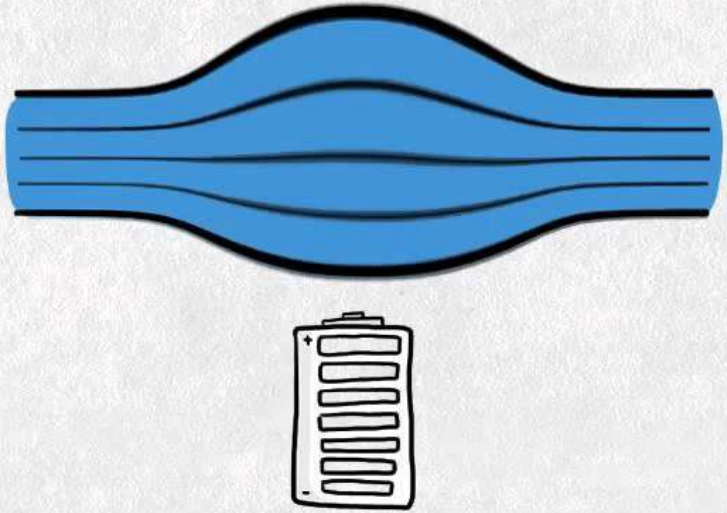
FAST TWITCH FIBERS



MARATHONER

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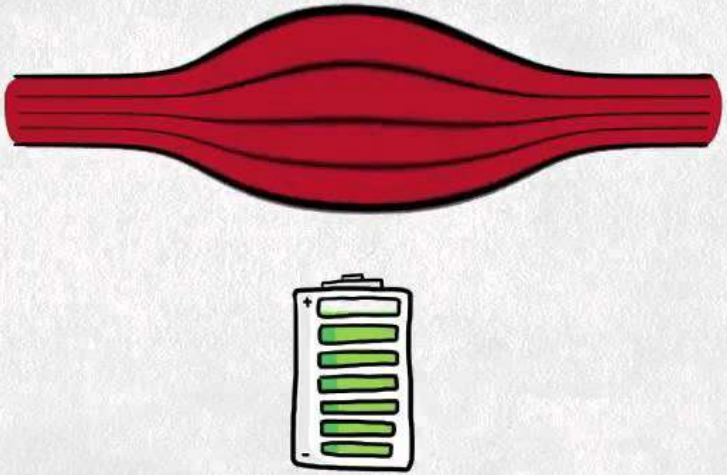
SLOW TWITCH FIBERS



3. Body weight :

There is a positive relation between body weight and strength.

The individuals who are heavier are stronger than the individuals who are lighter in weight.

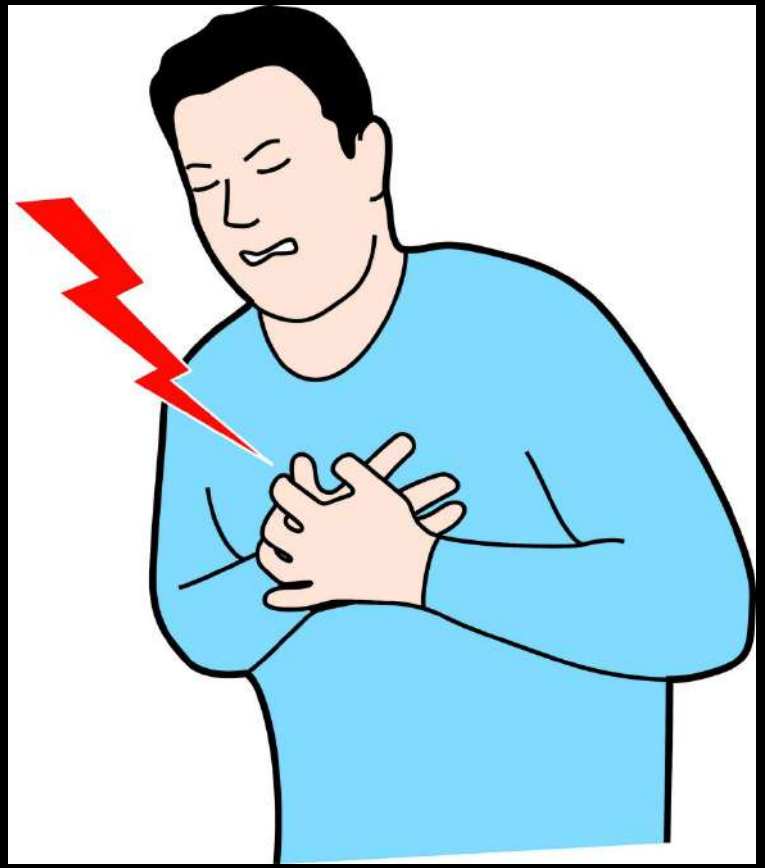
Physiological factors determining Flexibility :

1. Muscle strength :- The muscle should have minimum level of strength to make the movement, specially against the gravity or external force.

2. Joint structure :- There are different types ofjoint in human body, some of the joints intrinsically have greater range of motion than others. For example. The ball and socket joint of the shoulder has the greatest range of motion in comparison to the knee joint.

3. Internal environment :-

Internal environment of athlete influences the flexibility. For example- warm bath increases body temperature and flexibility whereas 10 minutes outside stay in 10°c temperature reduces the body temperature and flexibility.



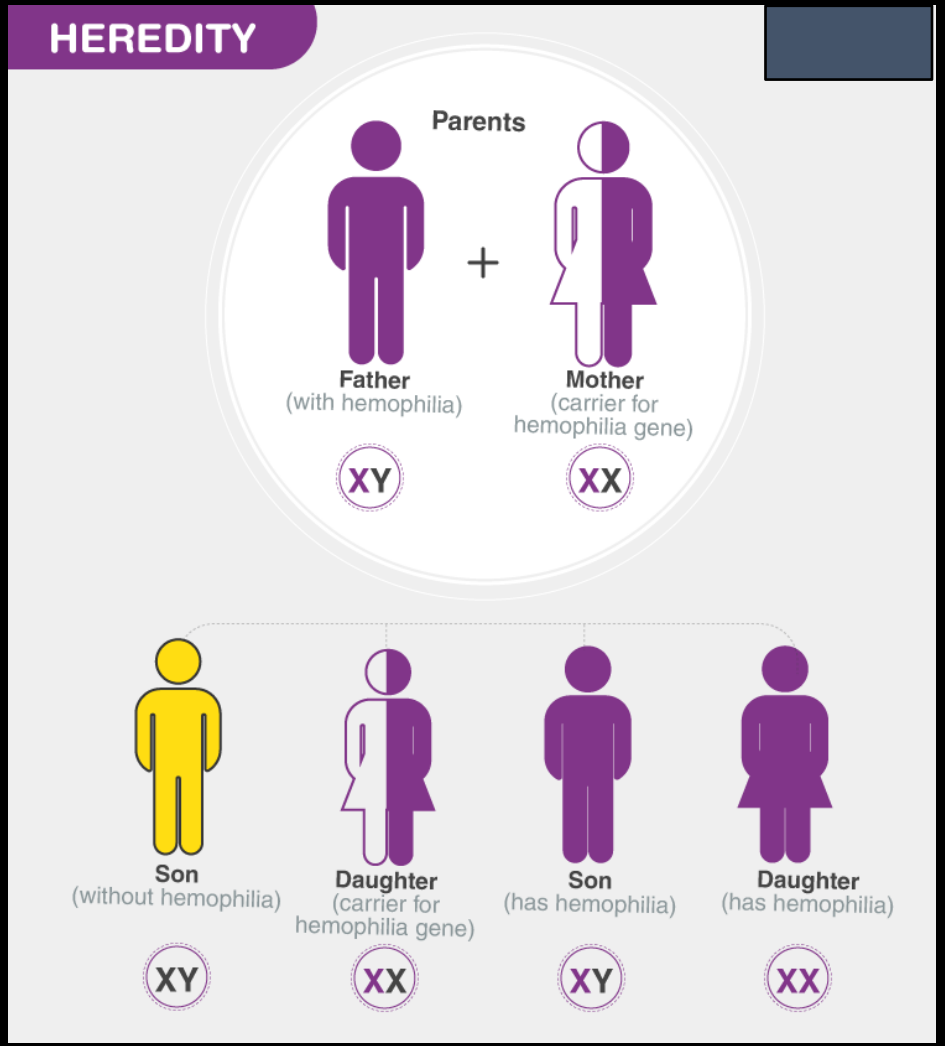
4. Injury :-

Injuries to connecting tissues and muscles can lead to thickening or fibroin on the effected area. Fibrous tissues are less elastic and can lead to limb shortening and lead to reduce flexibility.

5.Age and gender :- Flexibility decreases with the advancement of age. However it is trainable. It can be enhanced with the help of training, as strength and endurance are enhanced. Gender also determine the flexibility. Females tend to be more flexible than male.

6.Active and sedentary life style :- Regular activities enhance the flexibility, whereas inactive individual looses flexibility due to the soft tissues and joints shrinking and loosing extensibility.

7. Heredity :- Bony structures of joints length and flexibilities of the joint capsules and surrounding ligaments are genetical and can be altered by stretching programs.

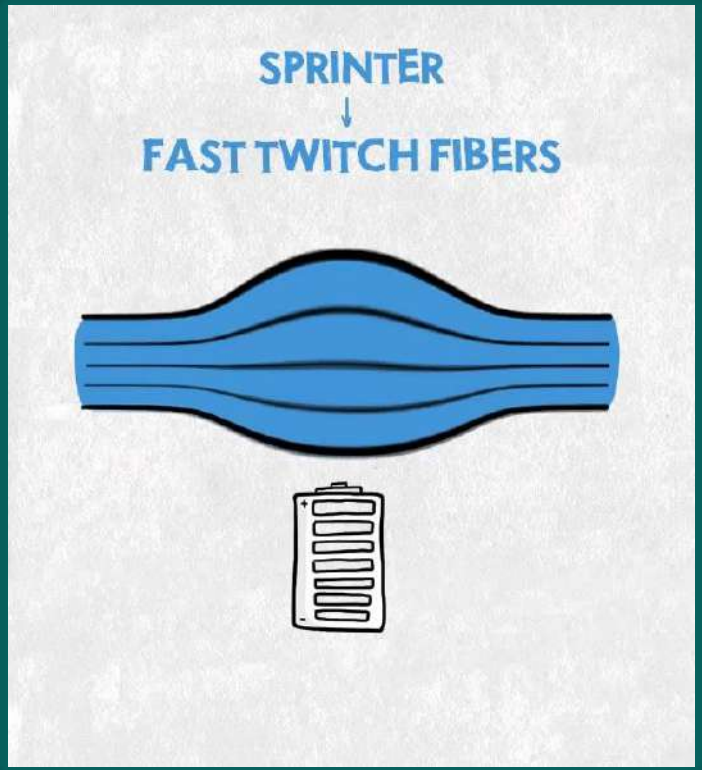


Physiological factors for determining speed.

1. Explosive strength – For every quick and explosive movement, explosive strength is indispensable. Like, a quick punch in boxing can not be delivered if the boxer lacks explosive strength. Explosive strength further depends on muscle composition, muscle size, and muscle coordination.

2.Muscle composition - The muscle which have more fast twitch fibers. They can do more speed. The muscle composition is genetically determined. We will improve it only by some training methods.

3.Mobility of nervous system - Motor and sensory nerves of nervous system can be determined by the mobility of nervous system. By training only we can limited extent in the mobility of nervous system because speed is determined to a great extent by genetic factors.



4. Elasticity and Relaxing capacity of muscle – Through the elasticity of muscle, muscle can move to a maximum range which reduces the inner hurdles and is instrumental in speeding up the activity. The muscles which get relaxed soon, they contract easily.

5. Bio-chemical Reserves and Metabolic Power -

For doing the exercises which are done quickly muscles need more energy. This energy in our muscles is obtained through the presence of ATP. The percentage of power and quantity in ATP can be increased through training.

Physiological factors determining endurance :

1.Aerobic capacity:-

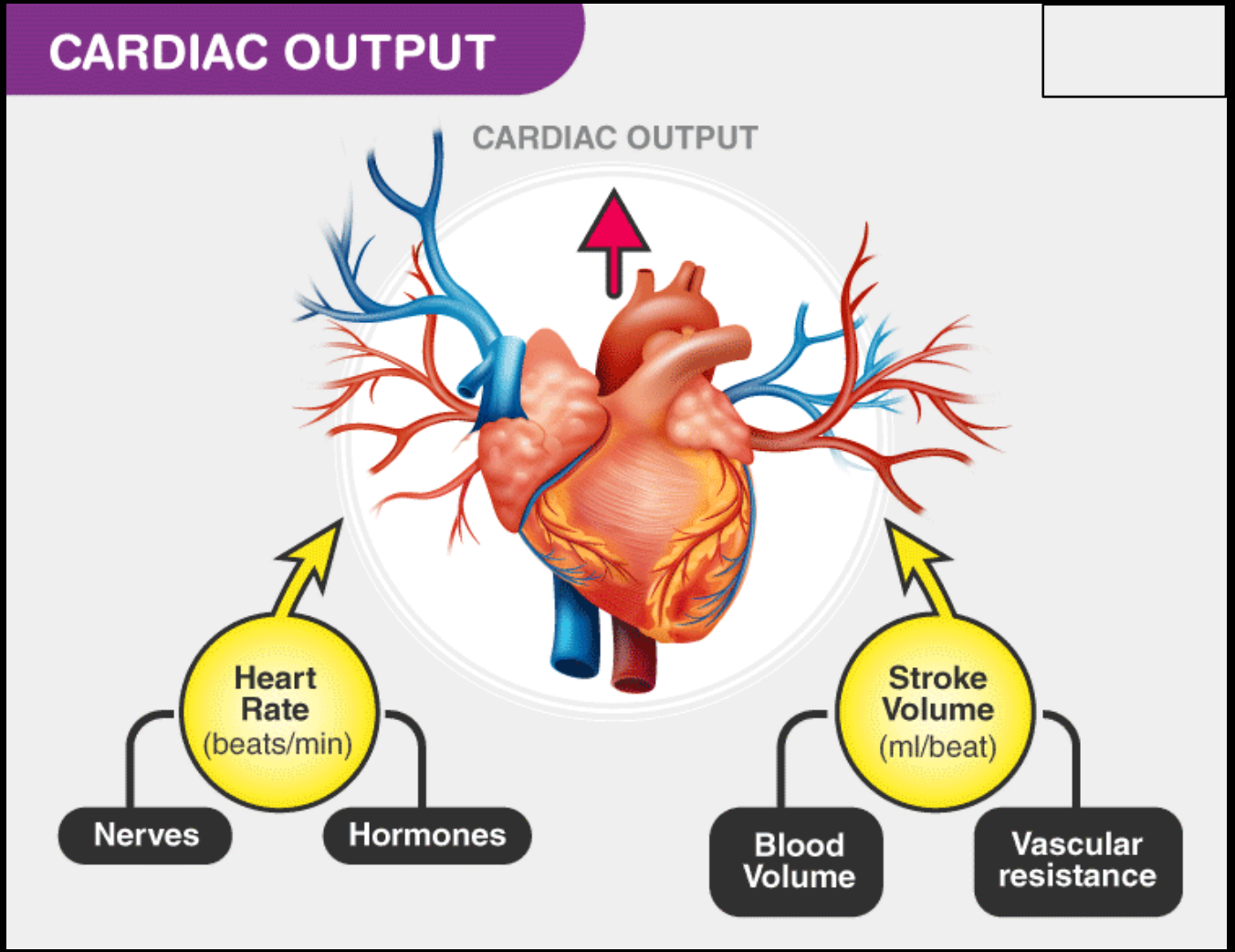
Aerobic capacity is the a measure of the **ability** of the heart and lungs to get oxygen to the muscles. An example of **aerobic capacity** is body's **ability** to take in and use oxygen to improve **aerobic** performance.

2. Oxygen Uptake :-

It is highest rate at which oxygen can be taken up and consumed by the heart per minute.

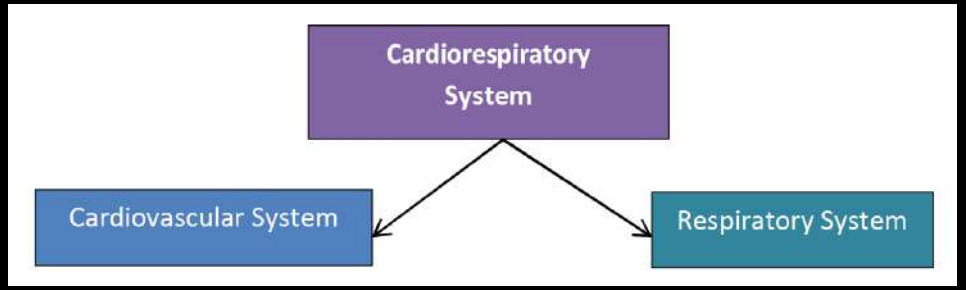
3.Cardiac Output :-

The cardiac output is simply the amount of blood pumped by the heart per minute.



7.2 Effect of exercise on the cardio-respiratory system.

Cardio system –

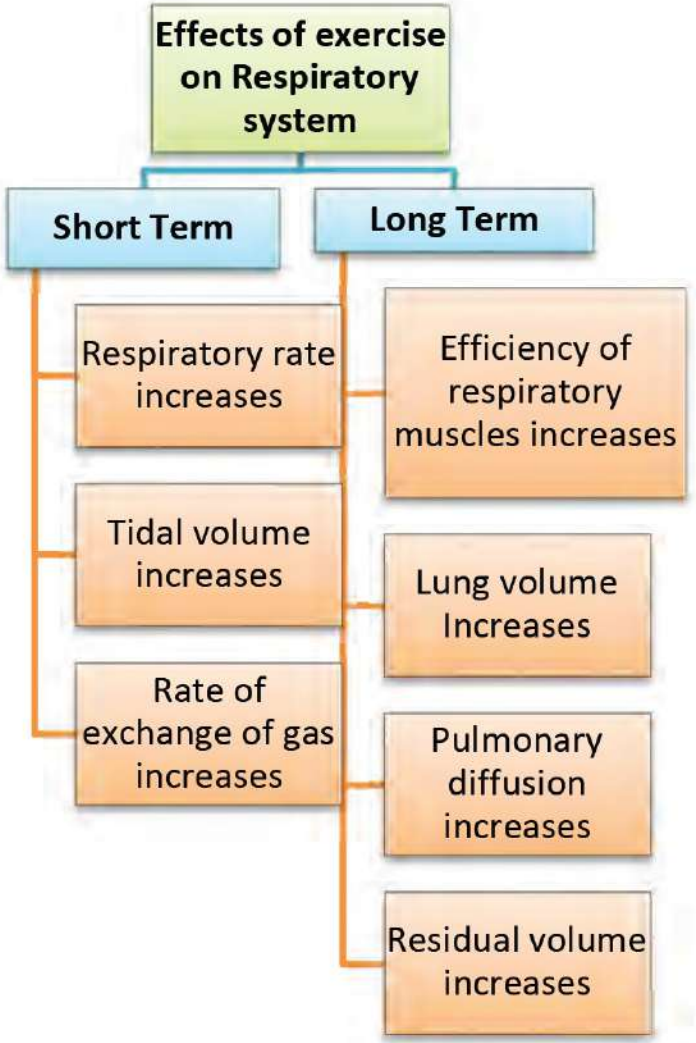


It consists of three parts :
the heart, blood vessels and blood.
Its major function is to deliver oxygen and nutrients, remove CO2 and other metabolic waste products, to transport hormones and other molecules, to support thermoregulation and control of body fluid balance and lastly to regulate immune function.

7.2 Effect of exercise on the cardio-respiratory system.

The important parts of the respiratory system are the nose, nasal cavity, pharynx, larynx, trachea, bronchi, and lungs. Air can also enter the respiratory system through the oral cavity.

Its major functions include, transporting air to the lungs, exchanging gases (O2 and CO2) between the air and blood and regulating blood pH.



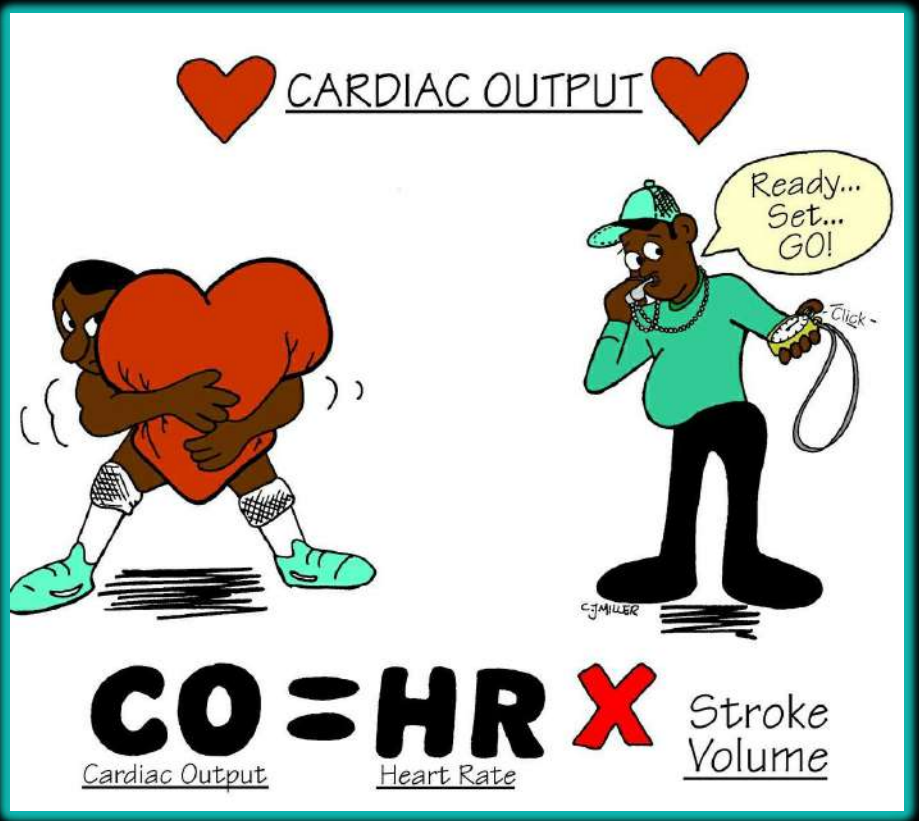
7.2 Effect of exercise on the cardio-respiratory system.

Increase in heart rate :- When an individual starts exercise, his heart rate increases as per the intensity and duration of exercise.

Increase in stroke volume :- Stroke volume increases proportionally with exercise intensity. It is measured in ml/ beat.

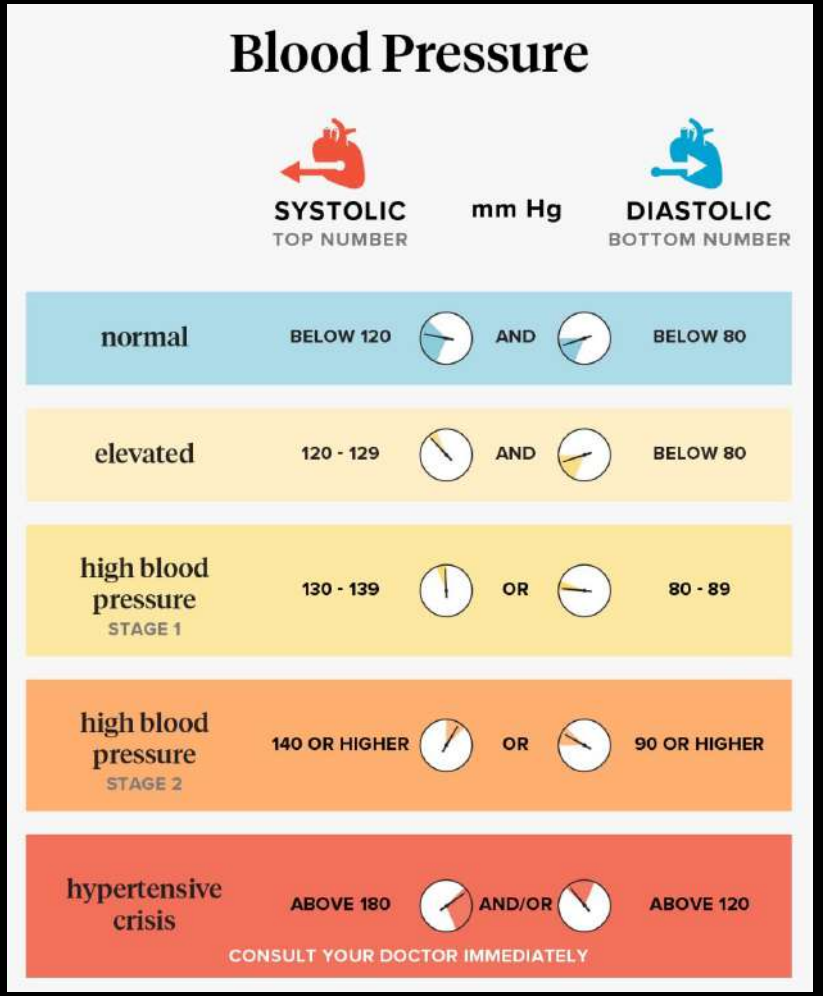
Increase in cardiac output :-
Cardiac output increases proportionally with the intensity of exercise's is measured in ltr/ minute.

Increases in blood flow :-
Cardio-vascular can be distribute more blood to those tissues which have more demand and less blood & those tissues which have less demand for oxygen.



Increase in blood pressure :- During the exercise, systolic blood pressure can increase while diastolic blood pressure usually remains unchanged even during the intensive exercise.

Increase in vital air capacity- It is the amount of air which an individual can inhale and exhale with maximum effect. Its capacity varies from 3500 cc. Due to exercise its capacity increases upto 5500 cc.

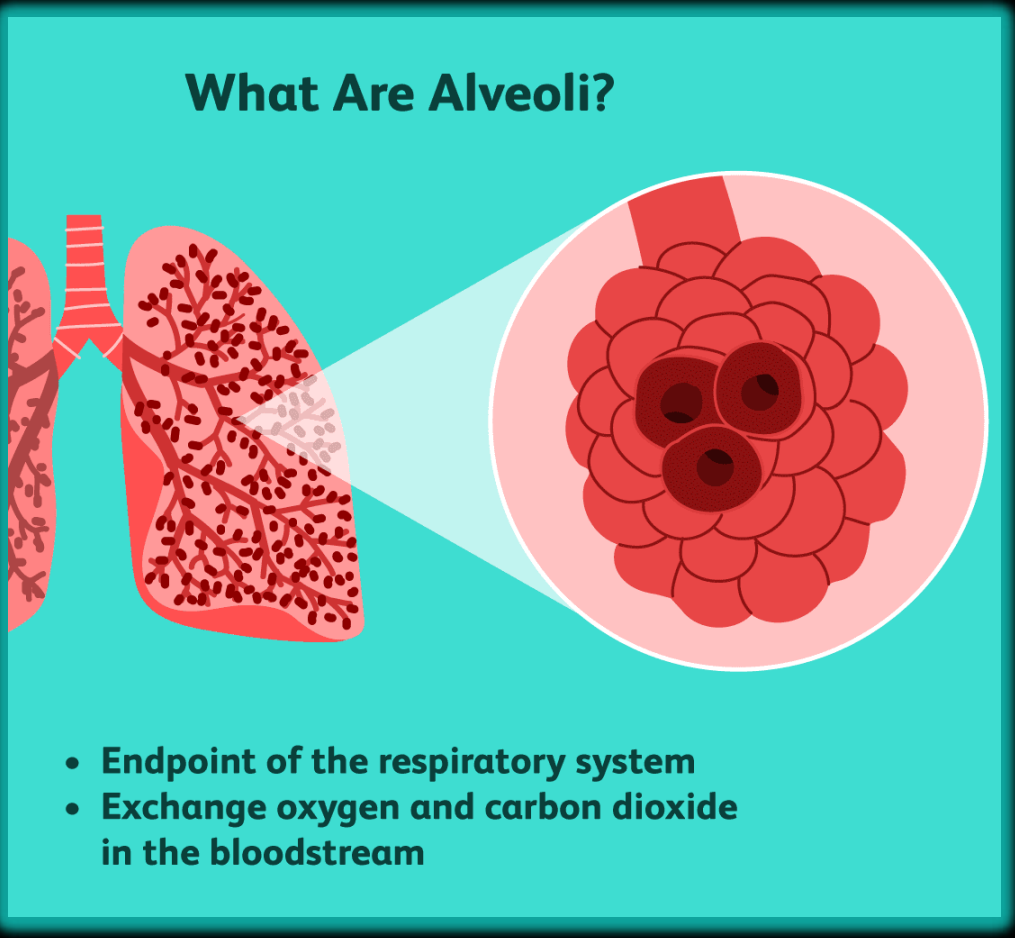


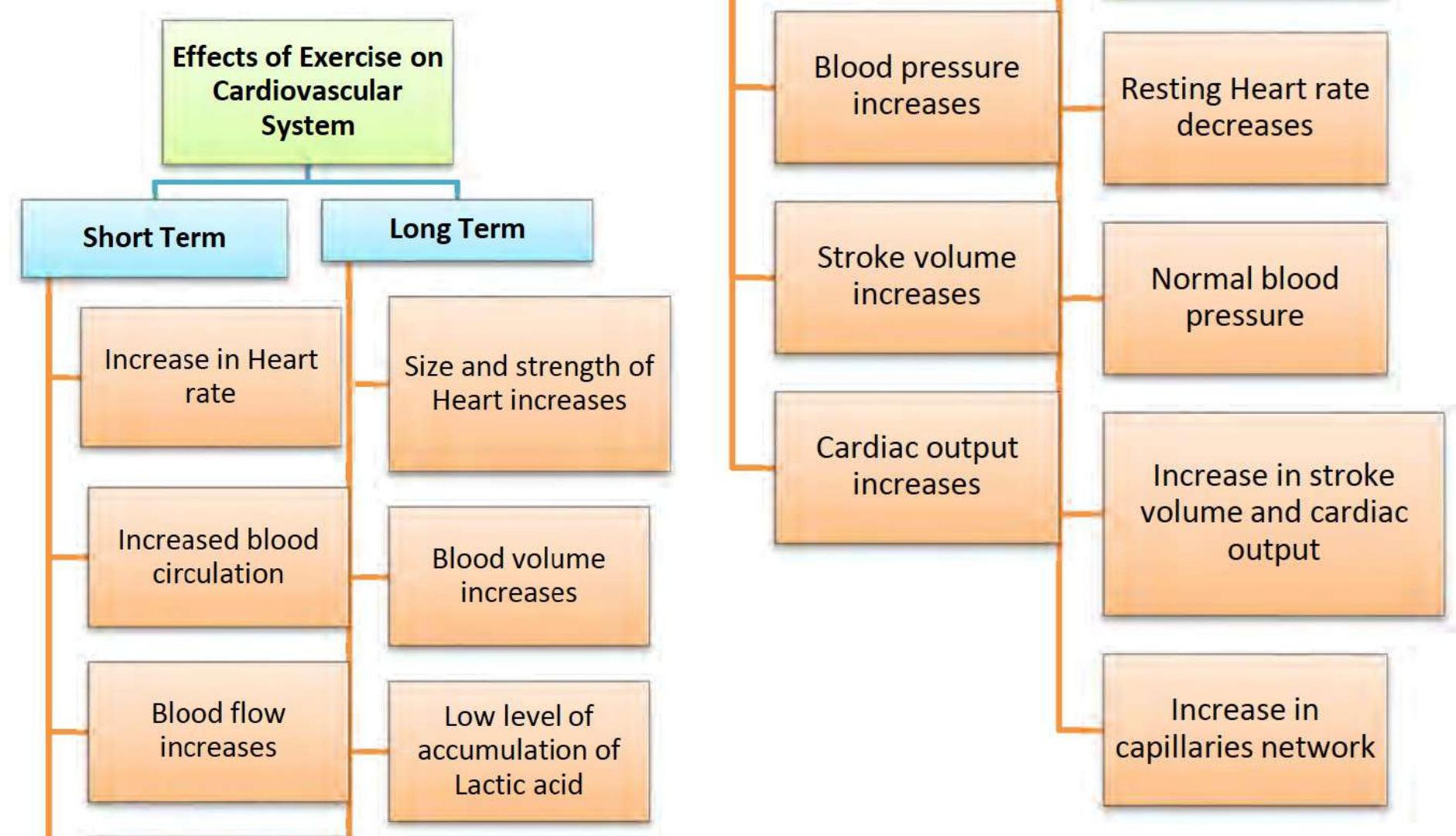
Increase in Residual air volume-

Due to regular exercise increases the capacity of residual volume from normal capacity.

Passive Alveolus become Active -

Regular exercise activates the unused alveoli because much amount of O2 is required in prolonged exercise of daily routine.

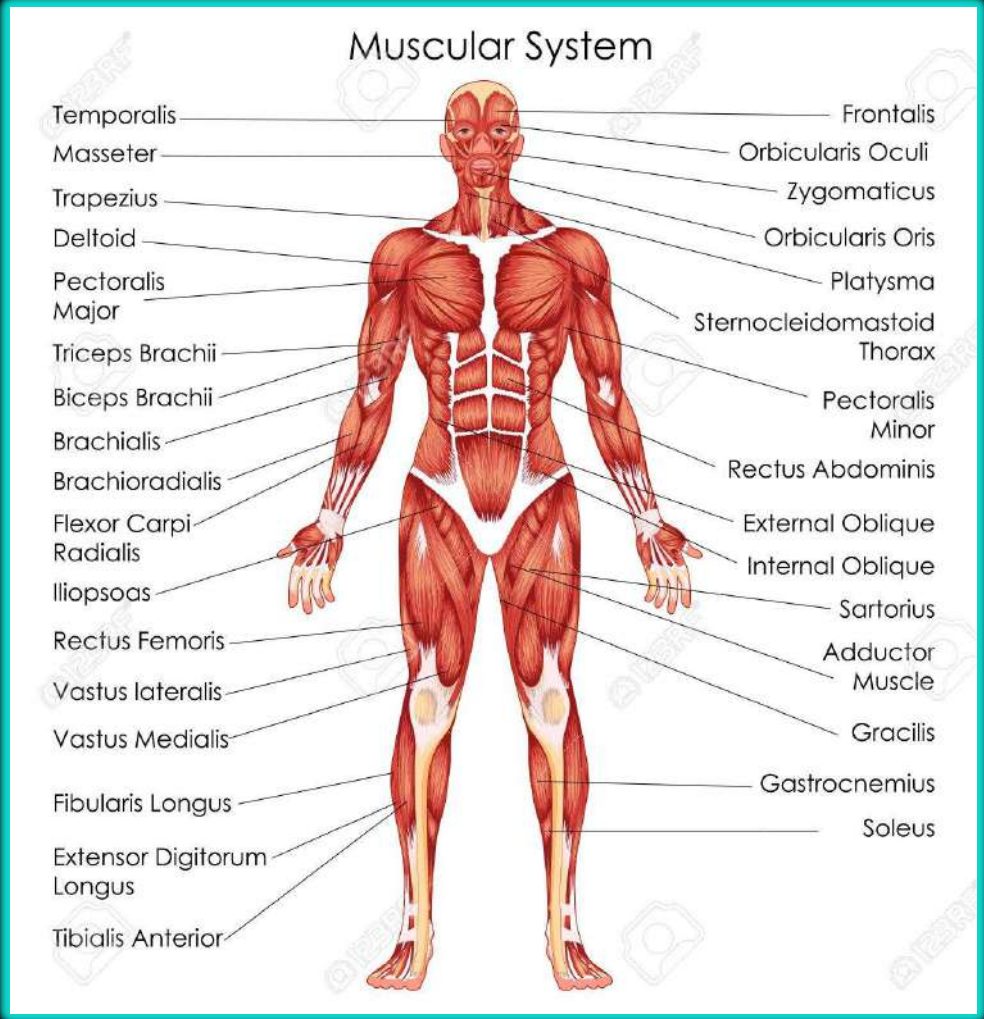



Effects of Exercise on Cardiovascular System
Short Term
Long Term
Increase in Heart rate
Increased blood circulation
Blood flow increases
Size and strength of Heart increases
Blood volume increases
Low level of accumulation of Lactic acid
Blood pressure increases
Stroke volume increases
Cardiac output increases
Resting Heart rate decreases
Normal blood pressure
Increase in stroke volume and cardiac output
Increase in capillaries network

7.3 Effects of exercise on muscular system.

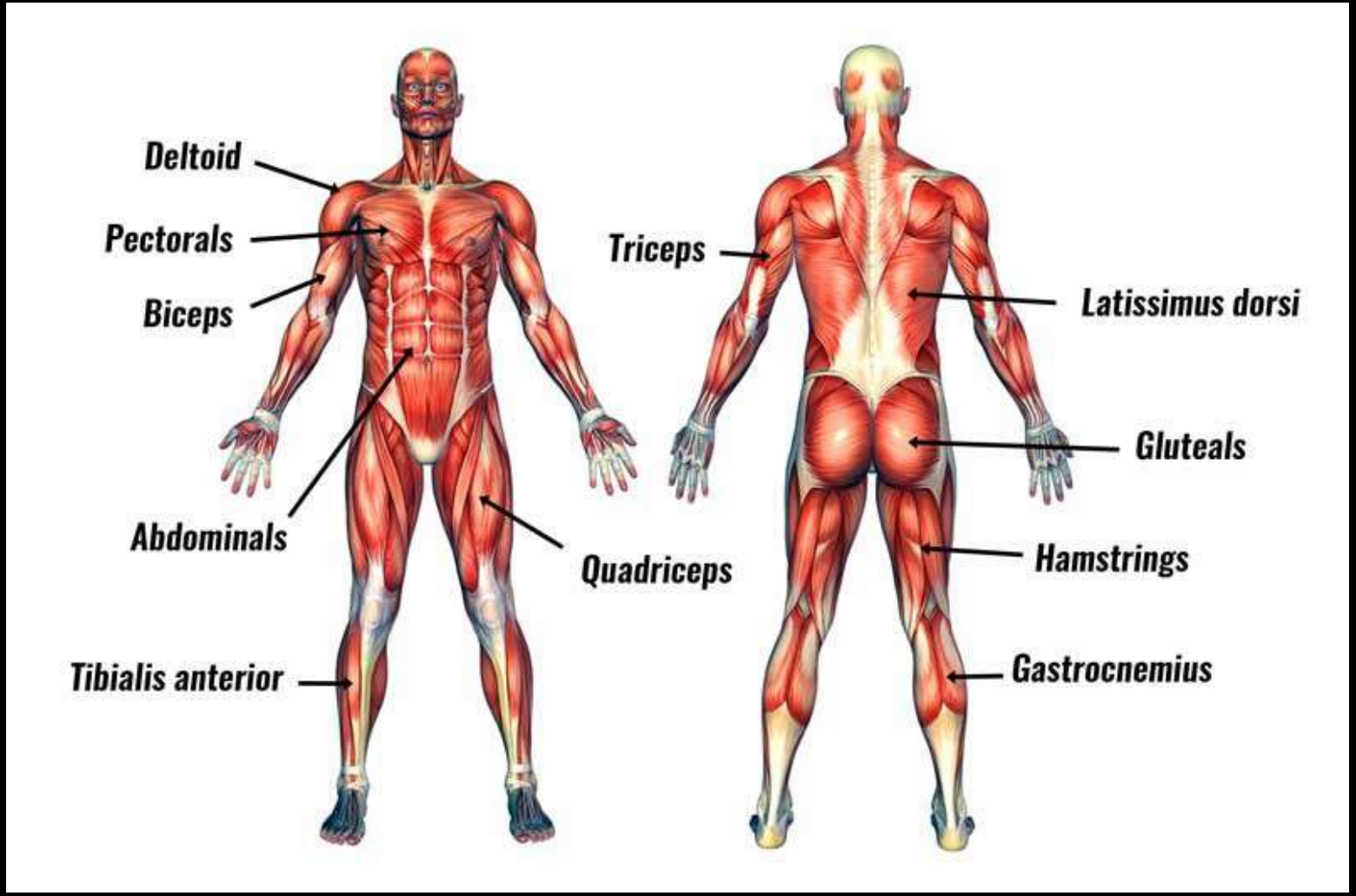
“Muscle is a specialized tissue, which enables
the body and its part to move and give shape to the body”

Effects of Exercise
- Change in shape and size of muscle
- More energy supply to muscle



- Improve in reaction time
- Capillarization
- Reduction fat
- Muscular endurance
- Posture
- Controls extra fat
- Delays fatigue
- Increase food storage
- Strength and speed

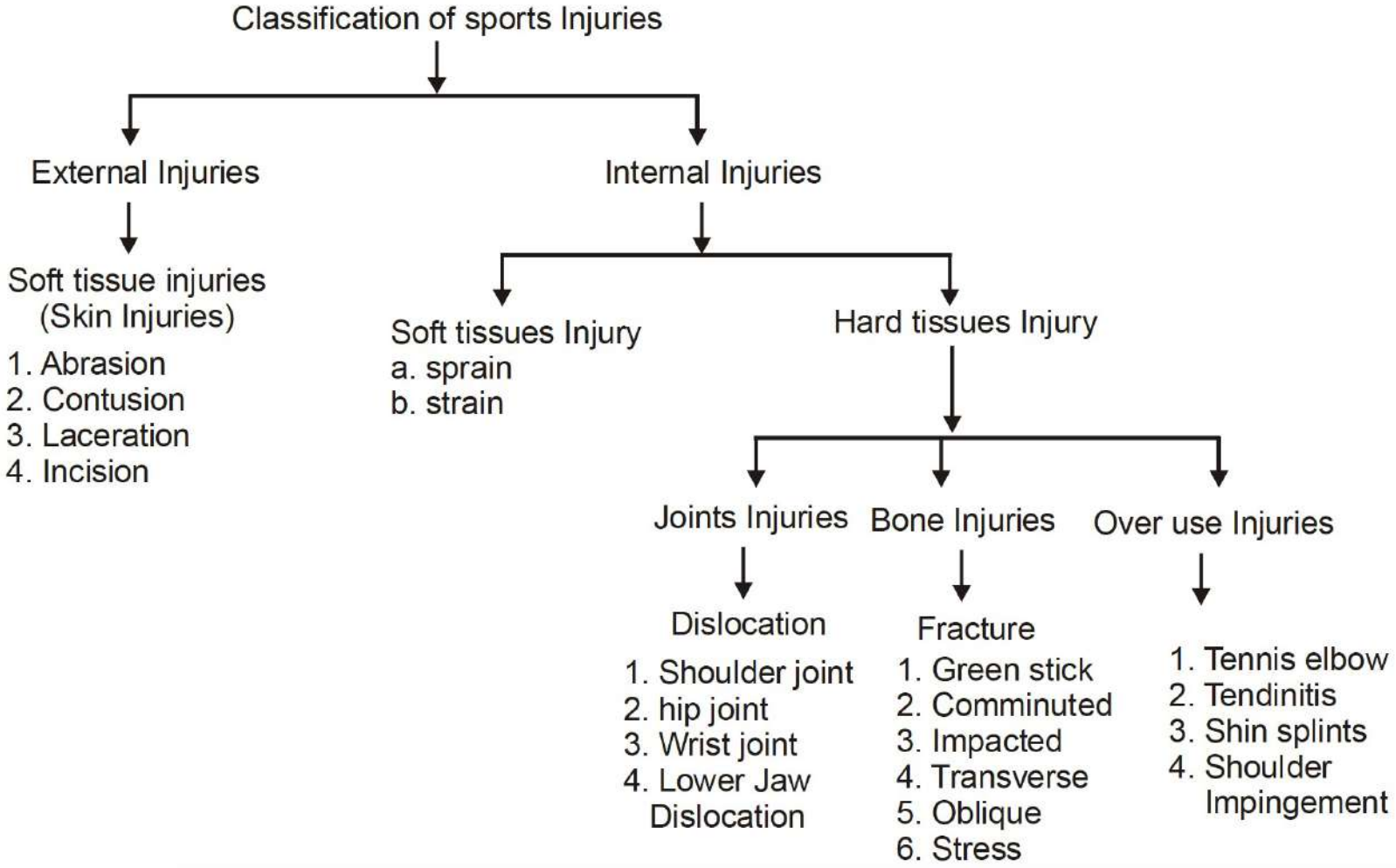
The formation and development of a network of capillaries to a part of the body; it is increased by aerobic exercise.


Deltoid
Pectorals
Biceps
Abdominals
Quadriceps
Tibialis anterior
Triceps
Latissimus dorsi
Gluteals
Hamstrings
Gastrocnemius

7.4 Physiological changes due to aging

1. Increased rigidity of the chest wall
2. Decreased respiratory muscle strength
3. Decreased cardiac output
4. Increased blood pressure
5. Impaired gas exchange in the lungs
6. Decreased vital capacity in the lungs
7. Slower expiratory flow rates in the lungs
8. Increased fat accumulation
9. Decreased lean body weight
10. Decreased calcium and phosphorous content of the bones

Classification of sports Injuries



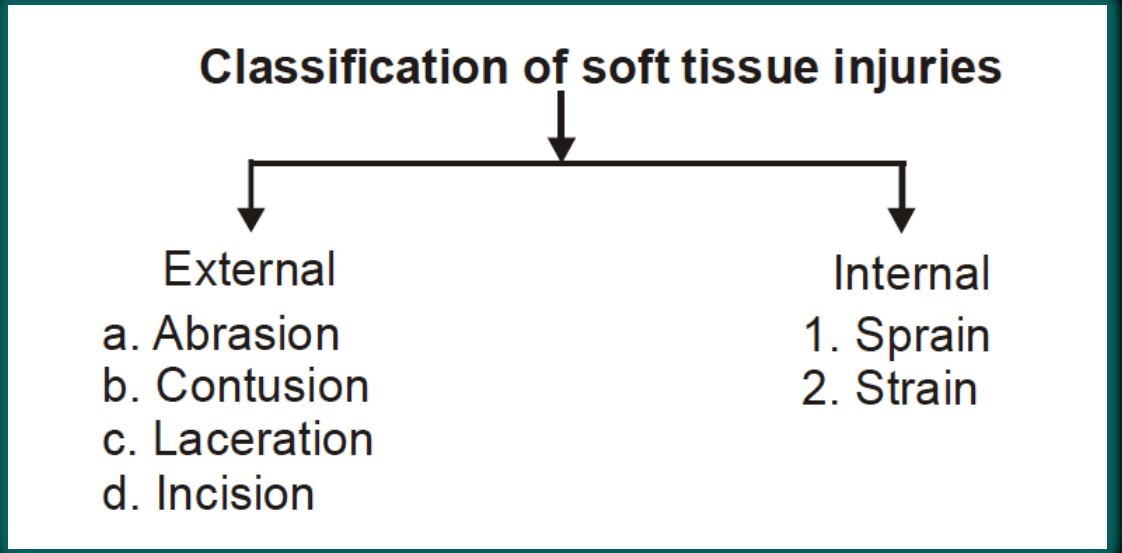
Soft tissue refers to tissues that connect, support or surround other structures and organs of the body the muscles, tendons, ligaments, fascial, nerves, fibrous tissue, blood vessels, etc. soft tissue injuries involve injuries to muscles, ligaments and tendons in the body.

1. Contusion (नील) :

Muscle injury occurs due to direct hit, with or without any sports equipment. Blood vessels in the muscles are broken, bleeding may occur in the muscles . Stiffness & swelling common sign. Muscle may not respond or may become totally inactive.

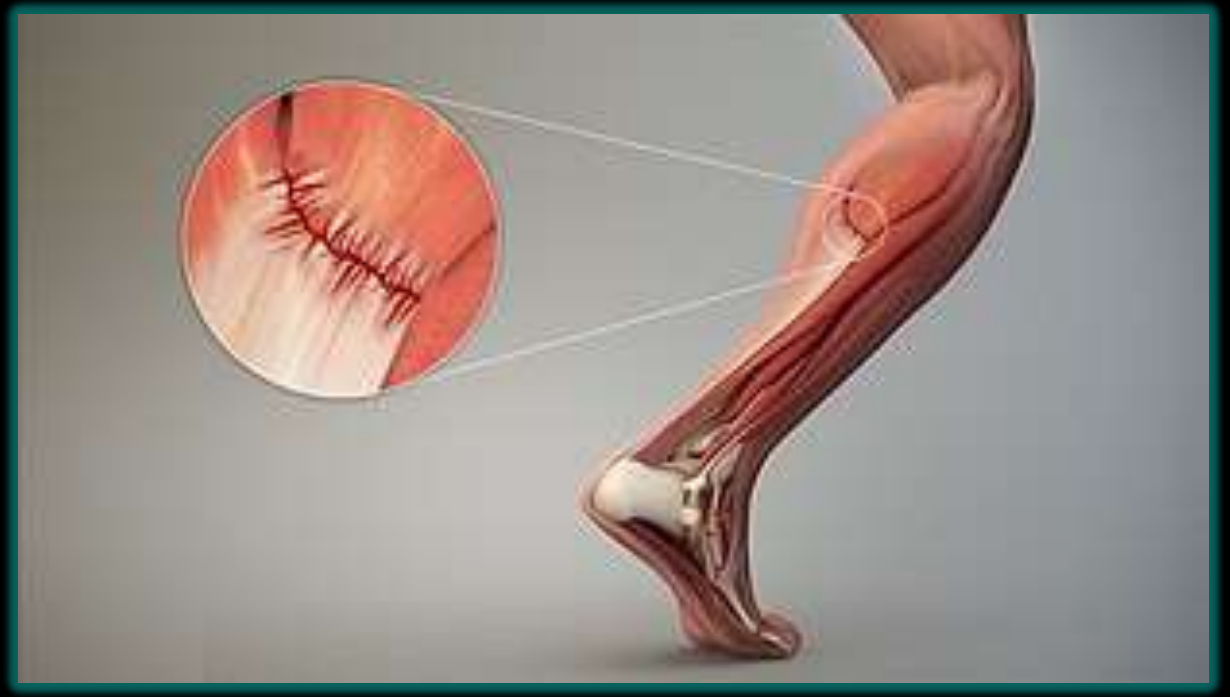
Common in :

Boxing, Wrestling, Kabaddi.



2. Strain :

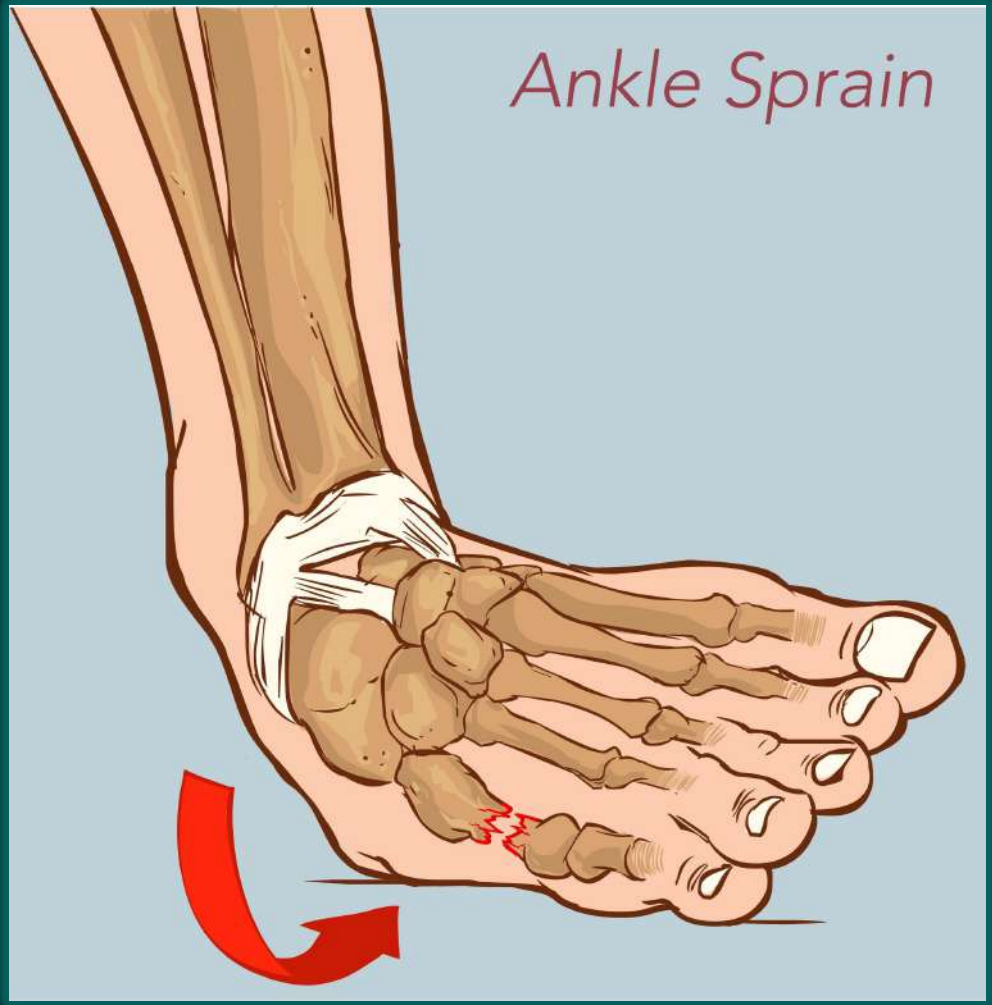
Mild or severe muscle injury. In severe case, muscle may rupture.
In case of complete rupture movement of limb is not possible due to severe pain.
May happen during practice or clash.



3. Sprain (मोच) :

May occur due to over stretching or tearing of ligament. Occurs at wrist joint and ankle joint. Some time fracture is possible along with sprain.

Swelling, inflammation, severe pain & tenderness are common symptoms.



4. Abrasion :

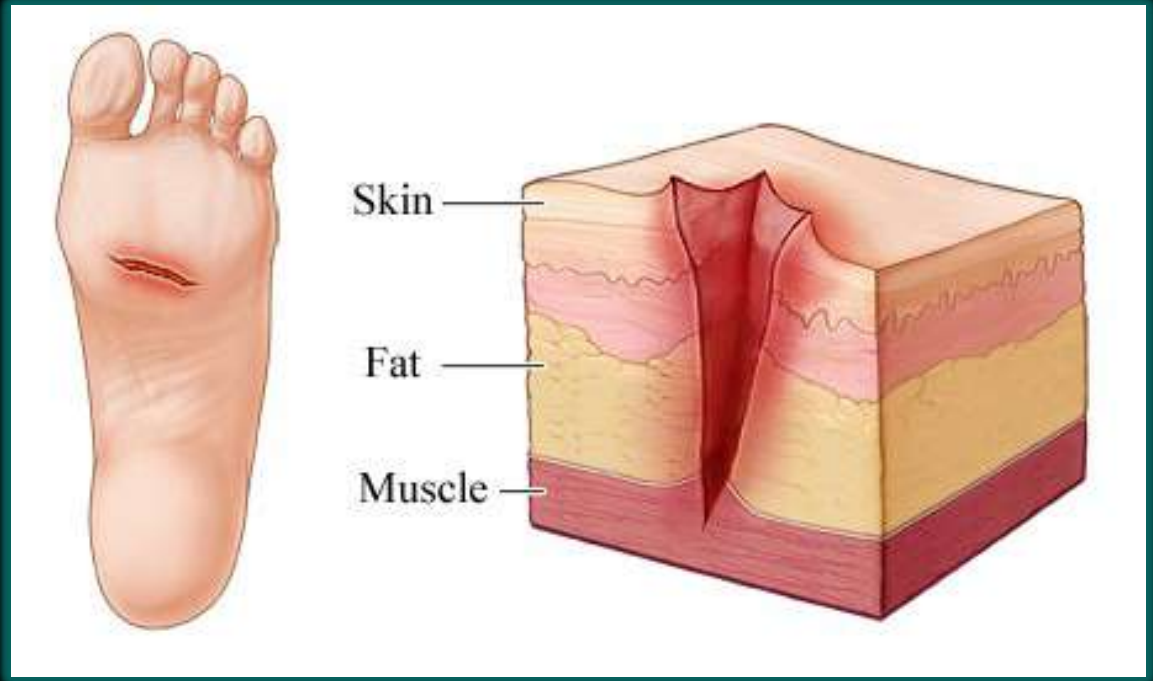
Skin Injury that Occurs due to friction with any equipment or a fall over the area where the bone is close to skin.

5. Bruises (चोट) :

An injury appearing as an area of discolored skin (red to blue or dark purple) on the body Caused by a blow or impact rupturing underlying blood vessels.

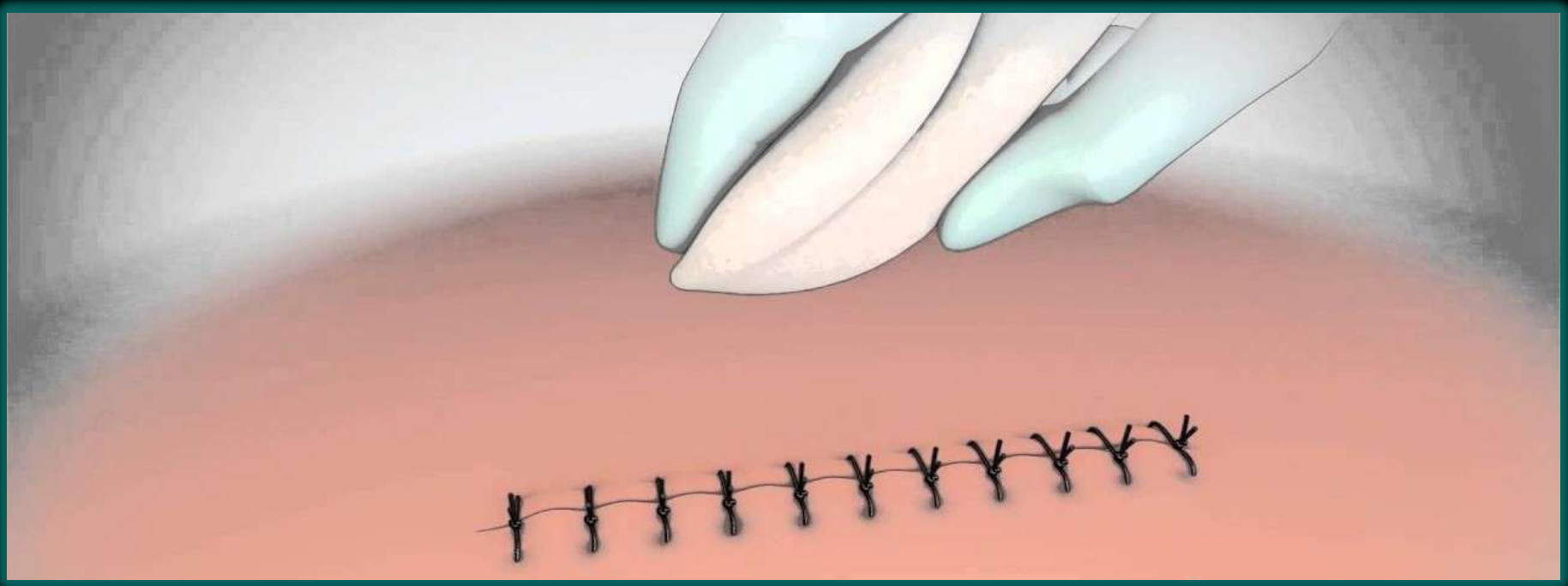
6. Laceration :

Lacerations are wounds that are torn, rather than cut. They have ragged, irregular edges and torn tissue underneath. These wounds are usually made by a blunt, rather than a sharp, object.



7. Incision :

A surgical cut made in skin or flesh.



Preventive measures of soft tissue injuries :

1. Proper warming up

2. Proper conditioning of body

3.Scientific equipment & facilities

4.Clean & plain surface of play grounds

5. Knowledge rules & regulation of sports events.

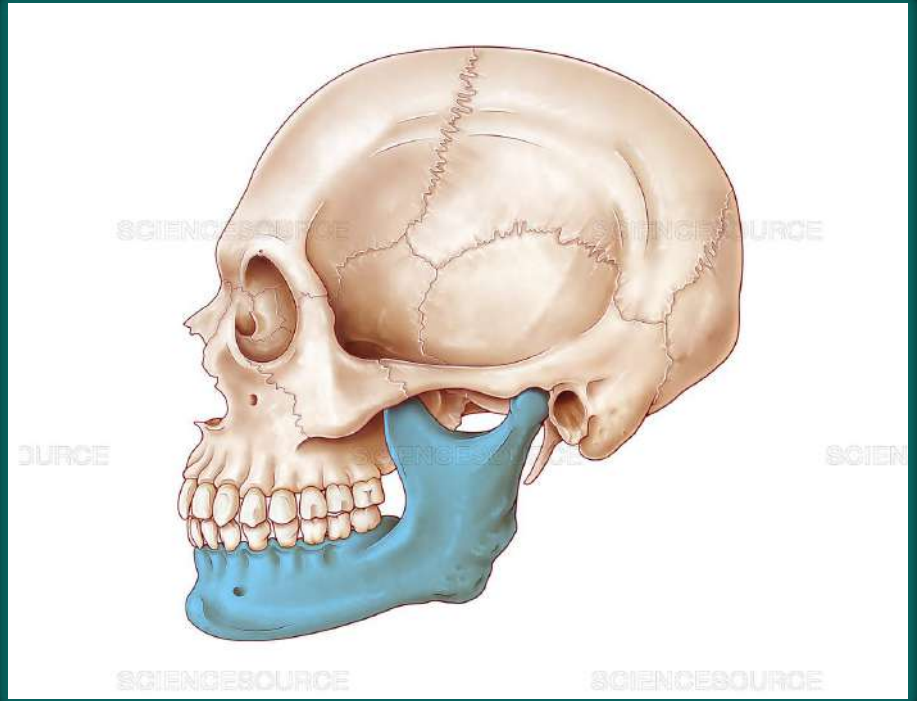
6. Actively & alertness participation during the sports training & competition.

7. Fatigue, sickness & injuries condition to avoid participation in the sports training.

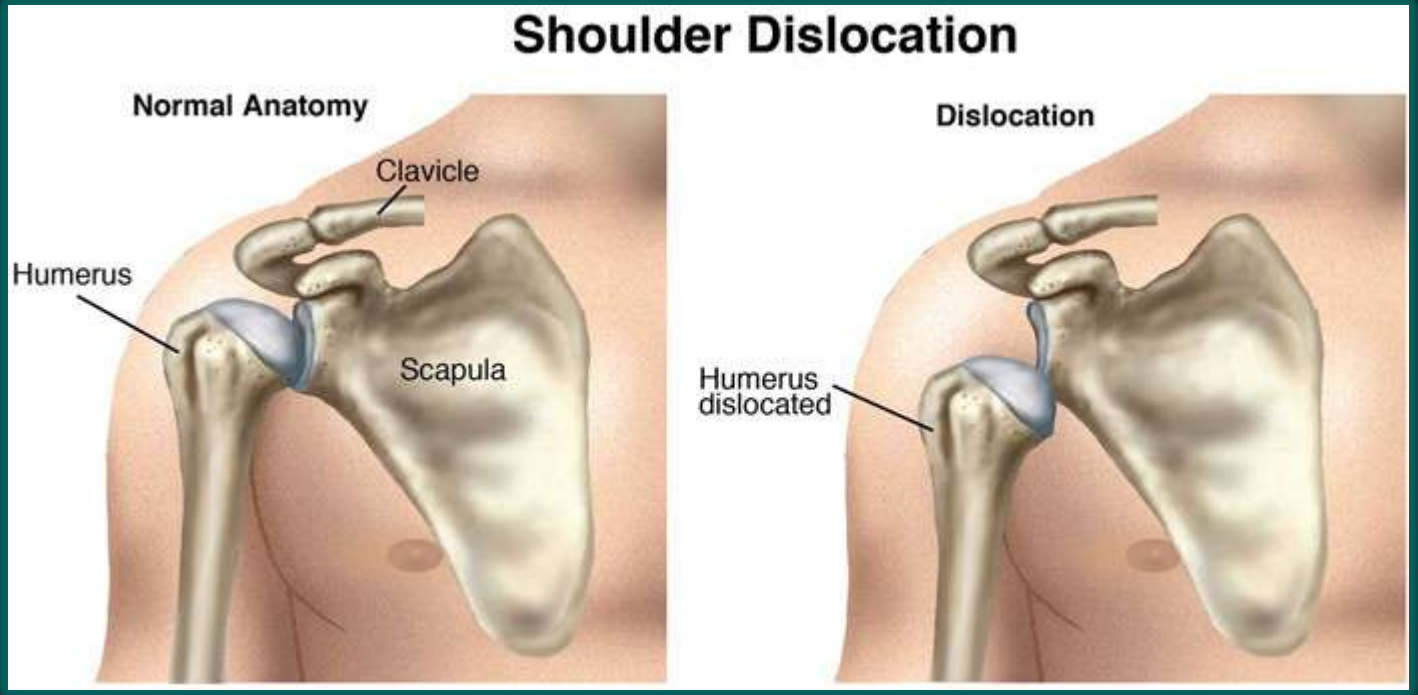
Dislocation :

A dislocation is a separation of two bones where they meet at a joint. Joints are areas where two bones come together.

1. Dislocation of Lower Jaw :
   Generally, it occurs when the chin strikes to any other object. It may also occur if mouth is opened excessively.



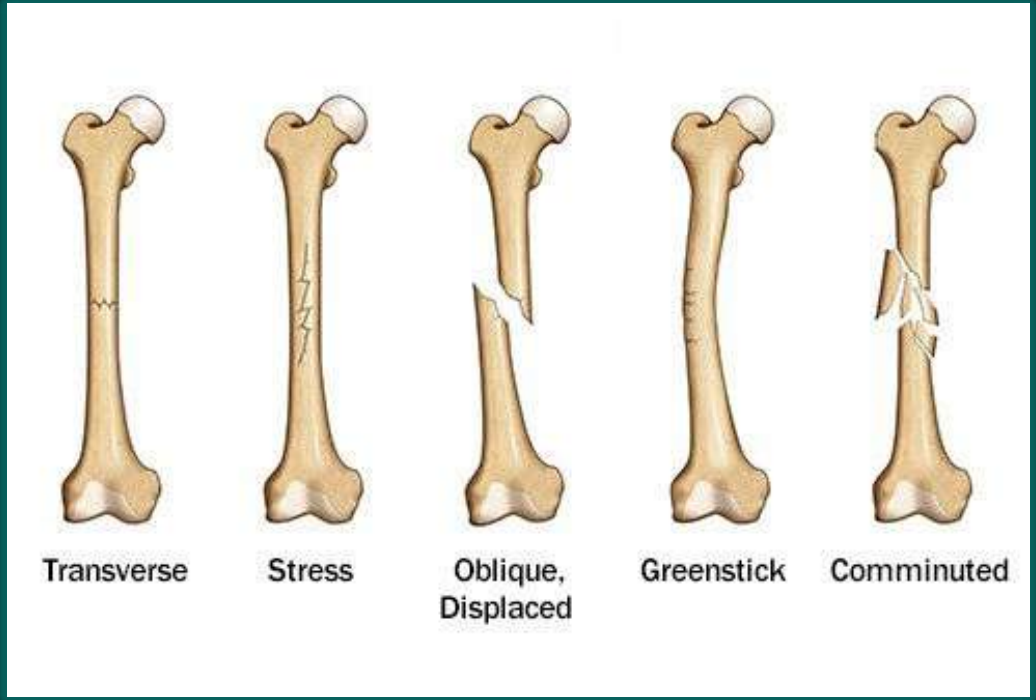
2. Dislocation of Shoulder Joint : Dislocation of shoulder joint may occur due to sudden jerk or a fall on hard surface. The end of the hummers comes out from the socket.



Types of Bone Fractures :

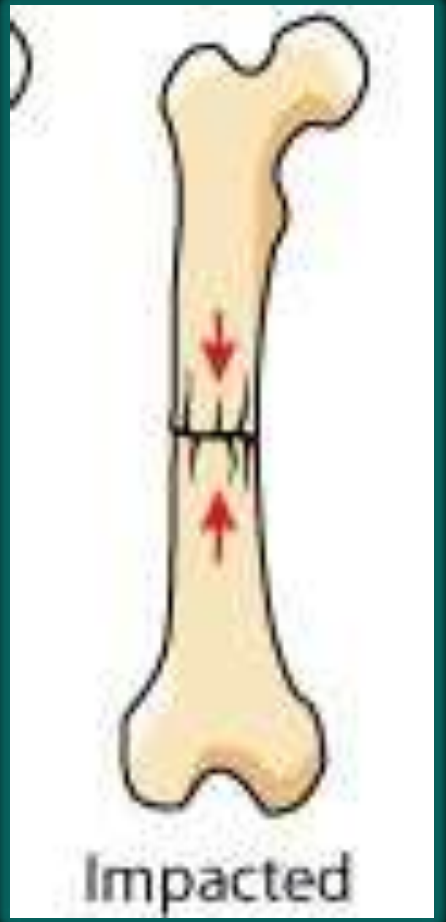
1.Greenstick fracture : An incomplete fracture in which a bone bends and cracks. This type of fracture usually occurs in children because their bone are soft and flexible.

2.Transverse fracture : A fracture at a right angle to the bones axis or a straight break right across a bone.



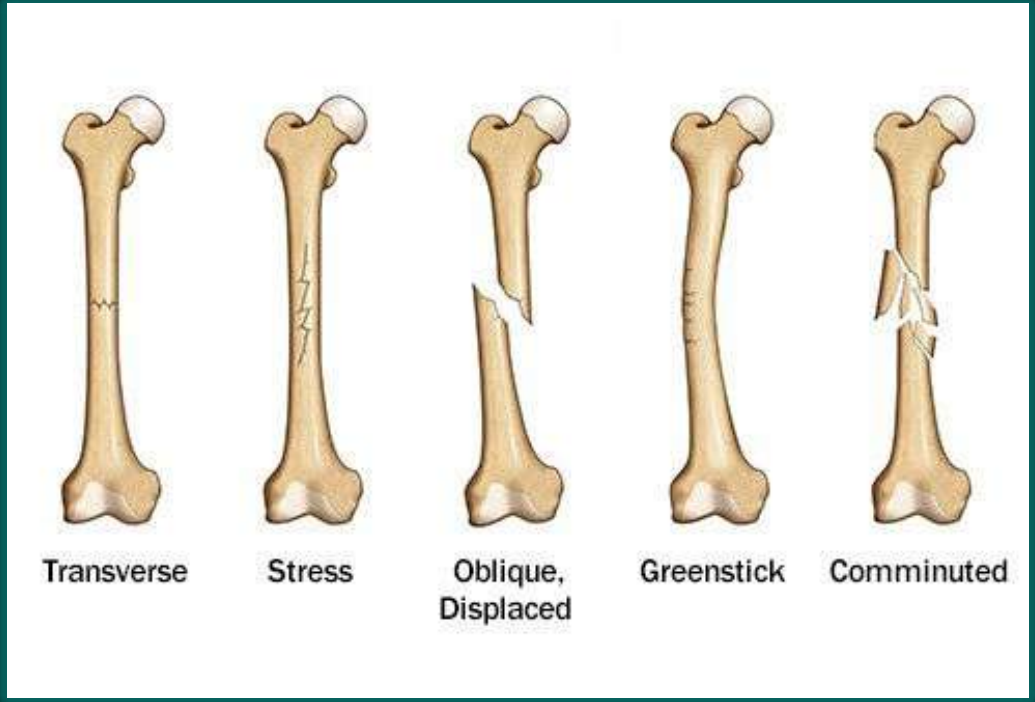
3.Oblique fracture : A fracture is a slanted fracture that occurs when a force is applied diagonally an angle to a bone's long axis.

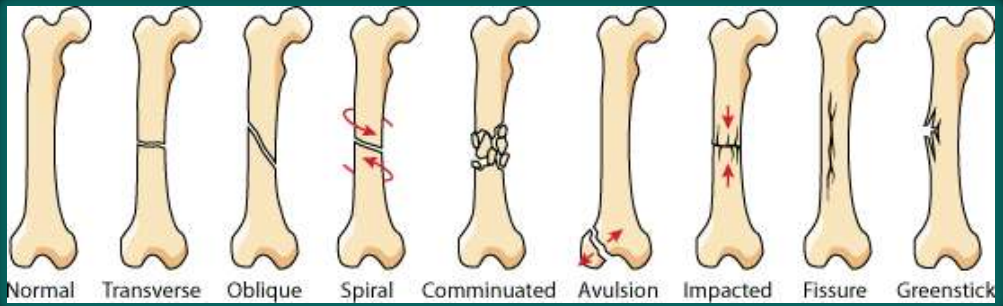
4.Impacted fracture: It is loss of continuity in the structure of bones.



5.Stress fractures : It is a crack in bone due to high impact physical activity.

6.Comminuted Fracture : A fracture in which the bone fragments.





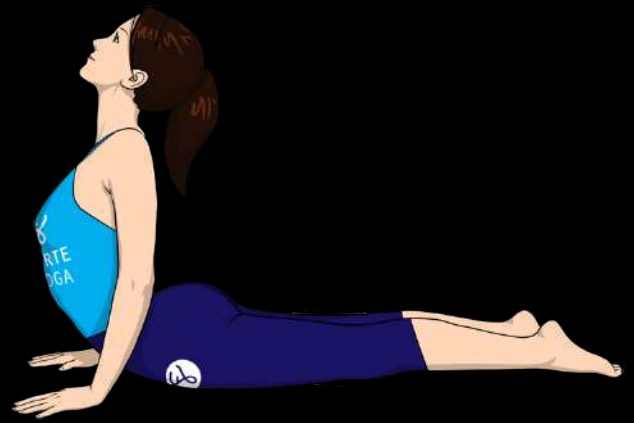
7.5 Prevention from Sports Injuries :

1.Warming up, stretching and cooling down.

2.Undertaking training prior to competition to ensure readiness to play.

3.Including appropriate speed work in training program so muscles are capable of sustaining high acceleration forces.

4.Including appropriate stretching and strengthening exercises in weekly training programs.



5.Gradually increasing the intensity and duration of training.

6.Maintaining high levels of cardiovascular fitness and muscle endurance to prevent fatigue.

7.Allowing adequate recovery time between workouts or training sessions.

8.Wearing protective equipment, such as shin guards. Mouth guards and helmets.

9. Pre participation-medical check up.

CBSE Sample Paper Questions

CBSE Sample Paper 2023

Q4. Slow twitch fibres are _____ in colour.

a) White
b) Red.
c) Transparent
d) Brown

CBSE Sample Paper 2023

Q7.. The amount of oxygen which can be absorbed and consumed by the working muscles from the blood is called _____

a) Oxygen Uptake.
b) Oxygen Intake
c) Oxygen Transport
d) Vital capacity

CBSE Sample Paper 2023

Q19. List down any four effects of exercise on the muscular system.

[2M]

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Q22. Explain any two types of soft tissue injuries with help of examples.

[2M]

CBSE Sample Paper 2023

Q29. Explain any three physiological factors determining strength.

[3M]

Q7. Dislocation is related to

a. Bone injury
b. Skin Injury
c. Muscular Injury
d. Joint injury.

Q 20. Create a flow chart for common Sports Injuries while enlisting the sub parts.

[3 Marks]

20.	**Common sports injuries** **Soft tissue injuries** a) Contusion b) Bruises c) Sprain d) Strain e) Abrasion	**Bone injuries** a)simple fracture b) complicated fracture c) impacted fracture d) green stick fracture e) compound fracture f) comminuted fracture	**Joint injuries** a) shoulder dislocation b)hip dislocation c) lower jaw dislocation (ANY TWO from each)

Previous Year Questions

SECTION–B

(Attempt any 5 questions)

19. Briefly explain any two factors determining endurance. **[1+1]**

Ans. Endurance is the ability to sustain an activity for extended periods of time and usually refers to aerobic ability.

Two factors which determine endurance are:

(i) **Aerobic capacity:** The muscles require energy to perform an activity continuously which can be supplied in the presence of oxygen. The aerobic capacity depends on the following factors:

(a) Oxygen intake

(b) Oxygen transport

(c) Oxygen uptake

(d) Energy reserves

(ii) **Lactic acid tolerance:** Muscles produce lactic acid during intense exercise. It is a metabolic byproduct that makes no contribution to exercise performance. It causes muscle fatigue and post-exercise muscle soreness. The ability to tolerate higher concentration of lactic acid can help in improving endurance performance.

(iii) **Movement economy:** For significant endurance performance, the movements performed should be economical. With less energy expenditure a runner can run at a set speed for longer duration. In endurance sports a good technique can save energy. For example, if the movements are correct, 20-30% of the energy can be saved in swimming. For economical movement, the good runners raise their center of gravity less high; as a result, their unnecessary movements are less.

(iv) **Muscle composition:** For endurance or aerobic activities the slow twitch fibers are best utilized. They generate small level of force for extensive periods of time, this makes them suited for endurance activities.

7. **The ability to tolerate higher concentration of _____ can help in improving endurance performance.** **[1]**

(a) Lactic acid

(b) Hydrochloric acid

(c) Acetic acid

(d) Sulphuric acid

Ans. (a) Lactic acid

4. Which of the following factors, does NOT determine flexibility? [1]

(a) Joint Structure

(b) Previous Injury

(c) Efficiency of Lungs

(d) Age and Gender

1. Discuss preventive measures of sports injuries? (3 Mark)

[2020]

MCQs

Q.1. Flexibility is not determined by which physiological factors?

(a) Muscle strength
(b) Age, gender
(c) Injury
(d) Aerobic capacity.

Q.2. Endurance is determined by which physiological factor?

(a) Aerobic capacity.
(b) Flexibility
(c) Age, gender
(d) Injuries

Q.3. Match the following

1. Speed	A. Age/gender
2. Strength	B.Aerobic capacity
3. Endurance	C Muscle size
4. Flexibility	D Explosive strength

A. 1D, 2C, 3B, 4A.
B. 1C, 2B, 3A, 4D
C. 1B, 2D, 3A, 4C
D. 1A, 2B, 3D, 4C

Practice Question

Q. Explain Types of Sports Injuries?

Expected Questions of Unit - 7

Q. What is Cardio Respiratory System?
What are the Effects of exercise on it?