

# Introduction to Anatomy



# As a Coach

You do **not** need the detailed knowledge of a doctor

You do need to know the basic structures of the body

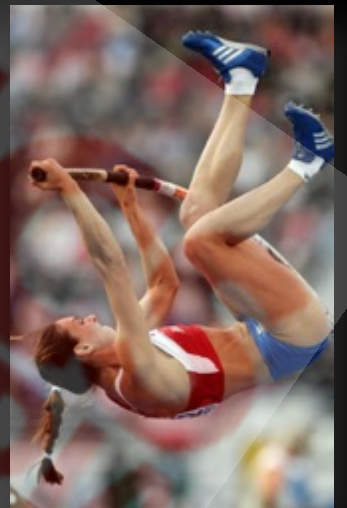
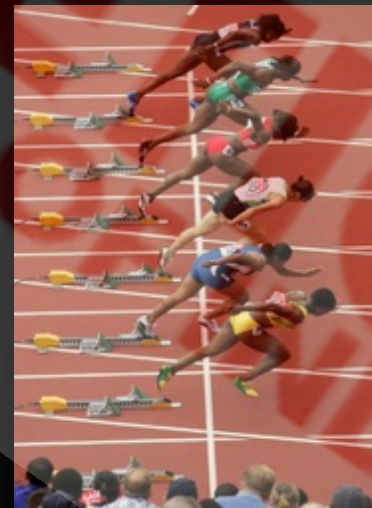
You do need to know how these structures work together.



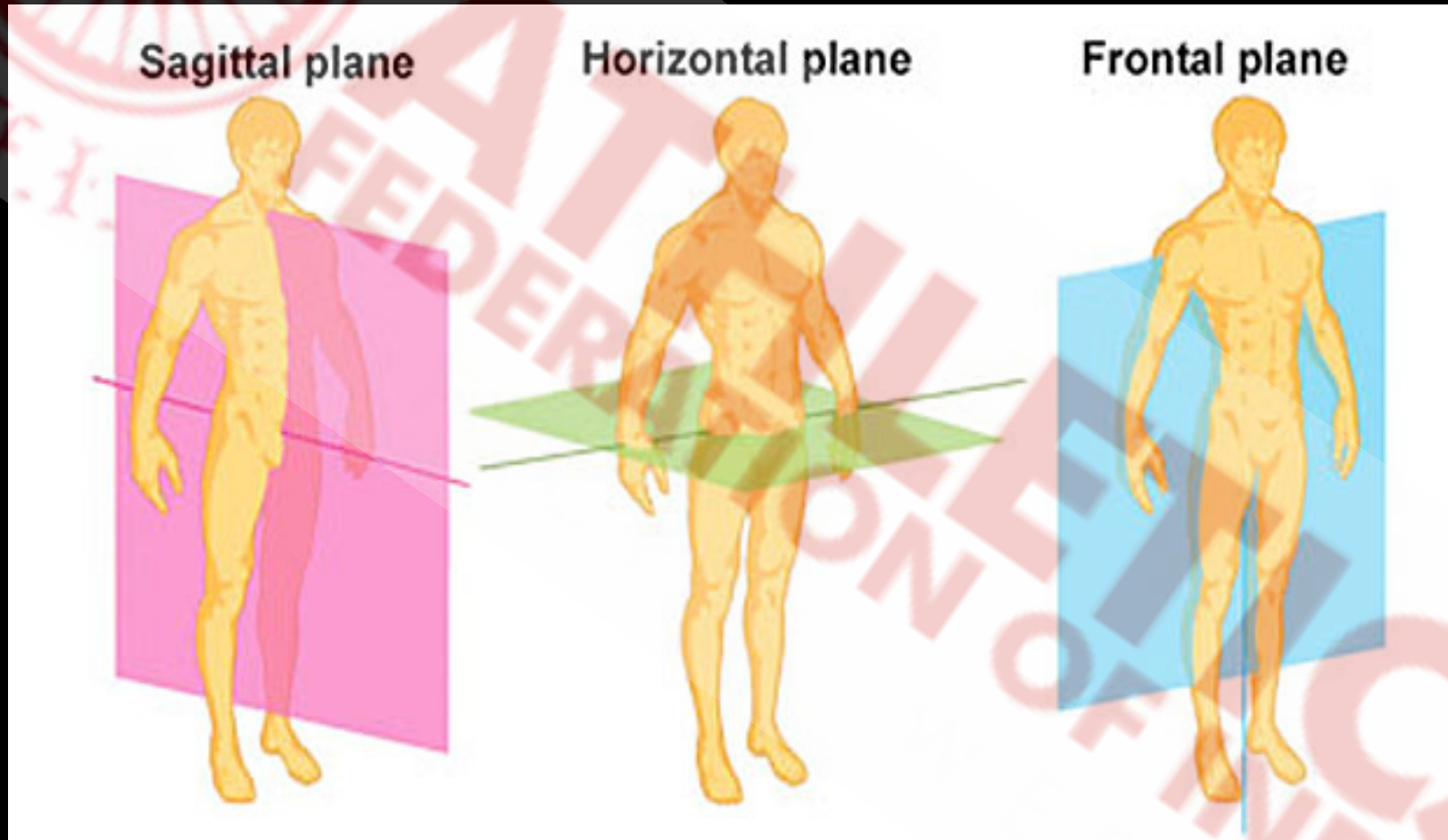


# Why do we know the functional Anatomy

1. Identify muscle(s)
2. Identify function
3. Identify main task in this movement
4. Helps you analyse your athlete's movements.



# Body Planes





# Anatomy & Physiology

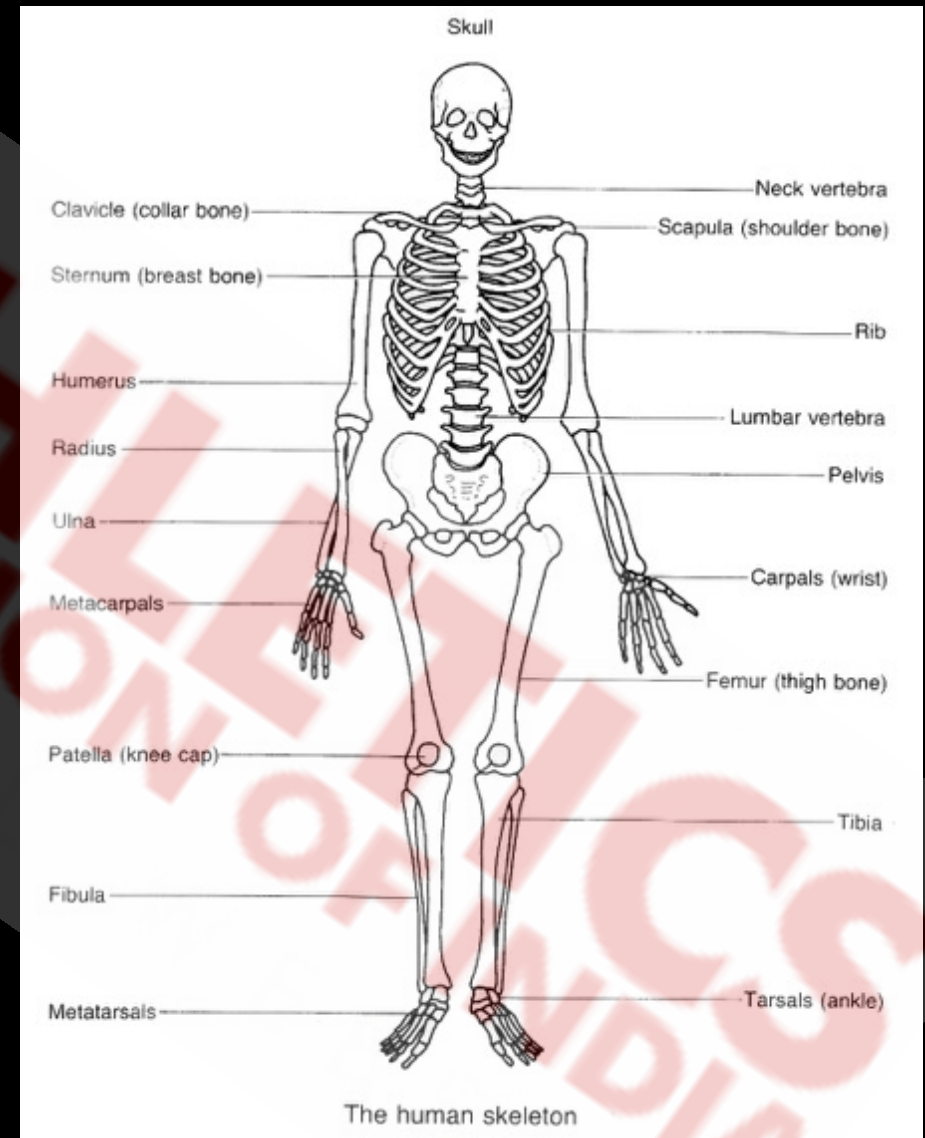
The body is composed of different systems:

- **Bone system**
- **Muscle system**
- **Nervous system**
- **Digestive system**
- **Cardio Vascular**

# The Skeleton

The skeleton has three major functions:

- **Support**
- **Protection**
- **Movement.**





# Joints

Formed when bones fit closely together

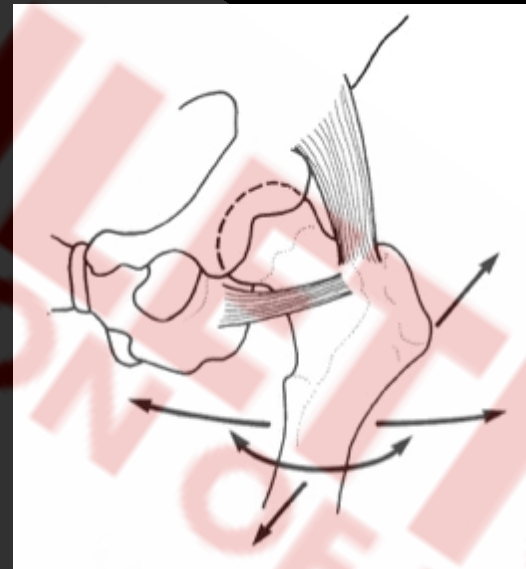
Different types of joint allow you to move in different ways

Examples:



Knee joint

This is a hinge joint, the bones can move in **one** direction only



Hip joint

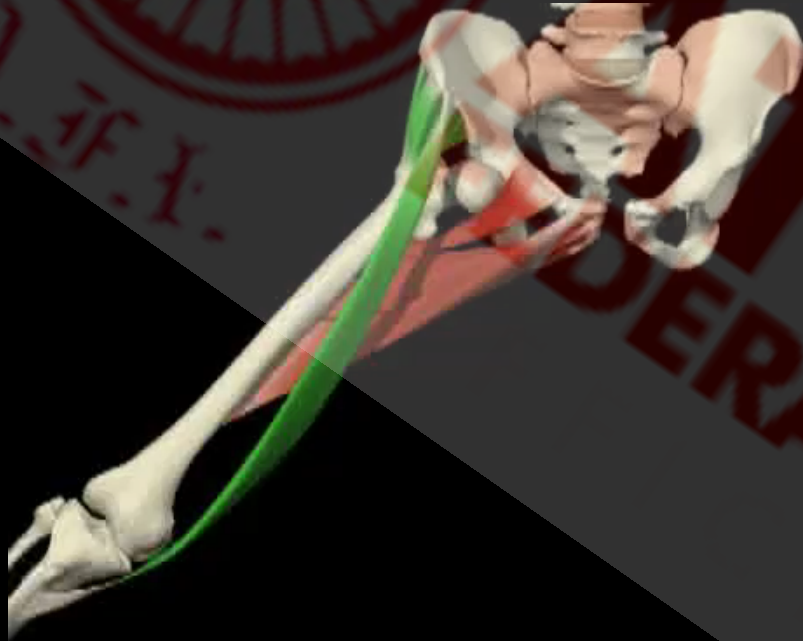
This is a ball and socket joint, the bones can move in **almost any** direction.

## F&E SHOULDER





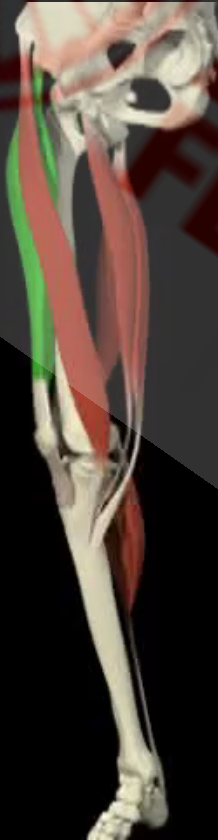
A&A Front View



F&E Hip Front View



F& E Side Medial



F& E Side Rear





# Muscle System

Muscles are:

- Contractile
- Elastic

They work

- in pairs
  - Agonist
  - Antagonist
- as a « muscle chain / sling »

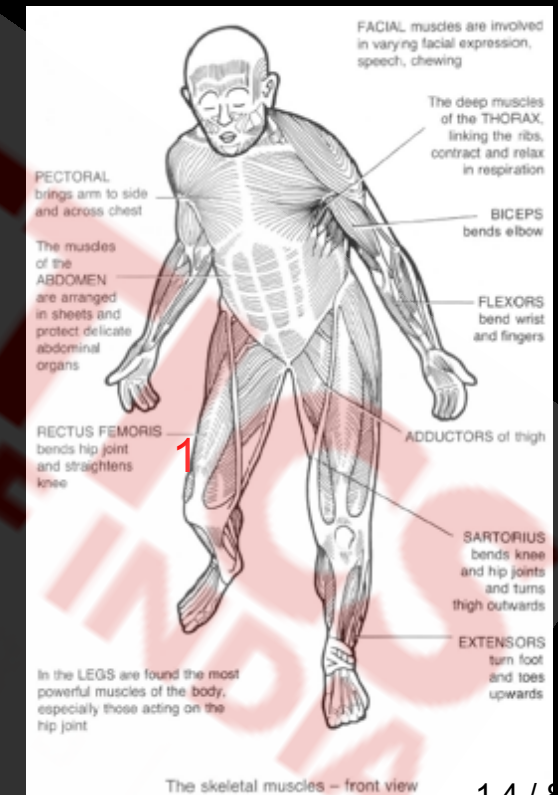


# Muscle Development

- In training there should be a **balanced** development of
  - A muscle (**agonist**) and its opposing muscle (**antagonist**)

- m.quadriceps **concentric** (shortening)
  - m.ischiocrurale **eccentric** (lengthening)
- Force Ratio: 1:1**

- Right and left sides of the body
  - Take Off Leg vs. other leg
  - Throwing arm vs other arm





# Muscles – Controlling movement

Bones are moved at joints by muscle

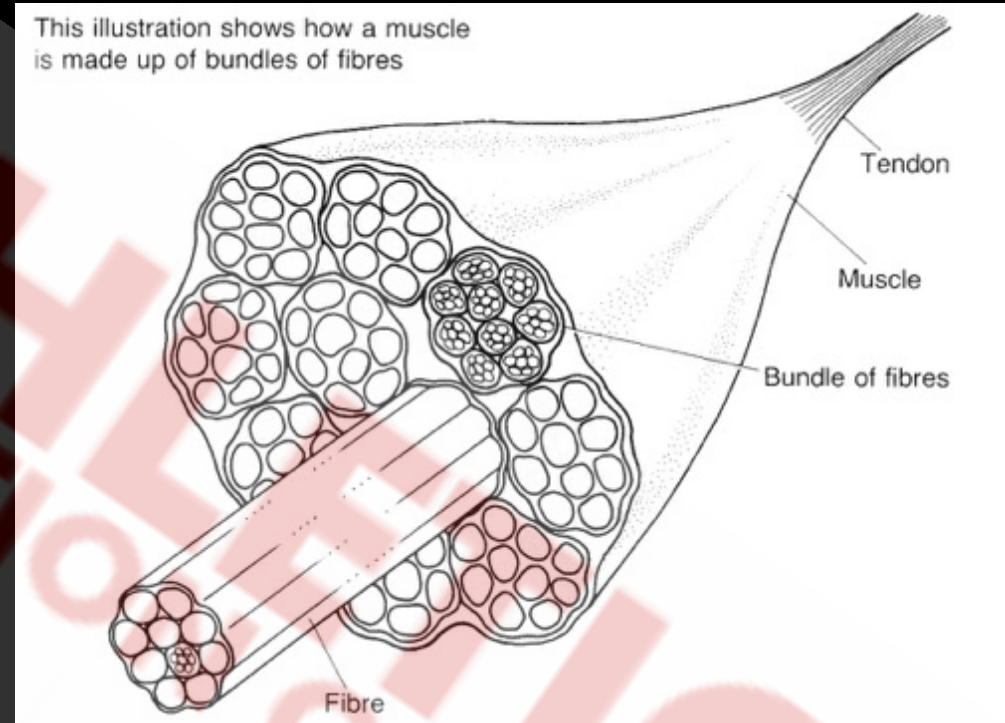
- Contraction
- Relaxation

**Tendons** at each end of the **muscle**  
attach them to **bones**

Your body has over **600** muscles

They allow you to

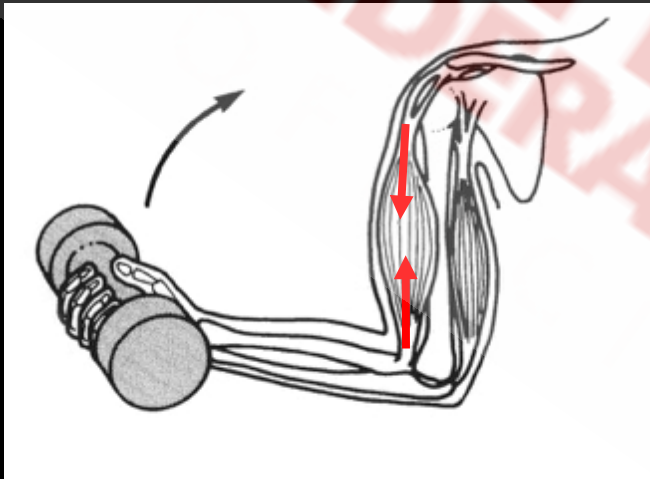
- Move
- Breathe
- and even stand still.



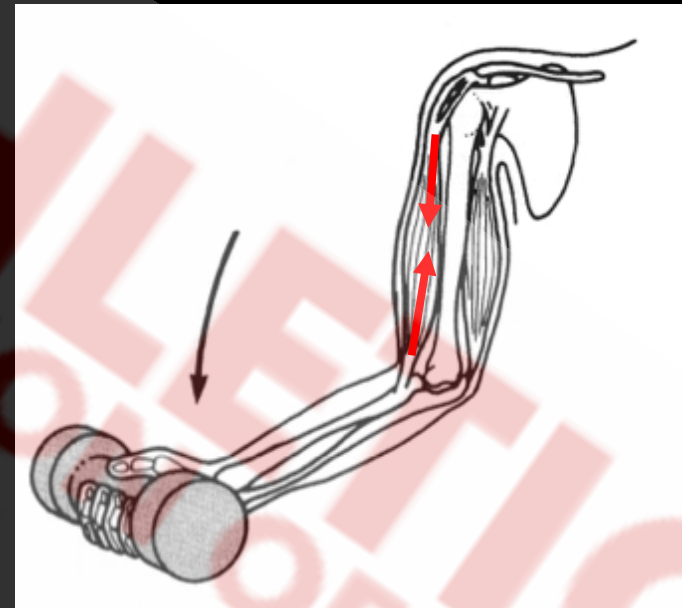
# How Muscles Pull –

## Dynamic Contractions involve:

- A change in muscle length
- Movement at a joint or joints.



Concentric contraction,  
muscle shortens and thickens to  
raise a load

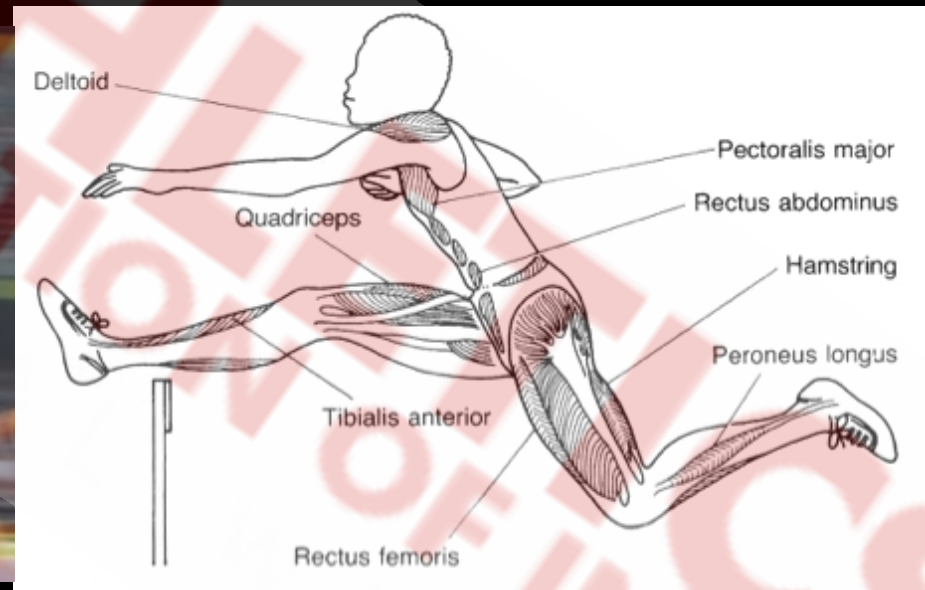


Eccentric contraction,  
muscle lengthens and controls  
lowering of load

Example: Dynamic Contractions of the Biceps muscle.

# Analysing Muscle Actions

As a coach an understanding of Anatomy helps you analyse your athlete's movements.



Example: the muscles involved in the hurdle clearance

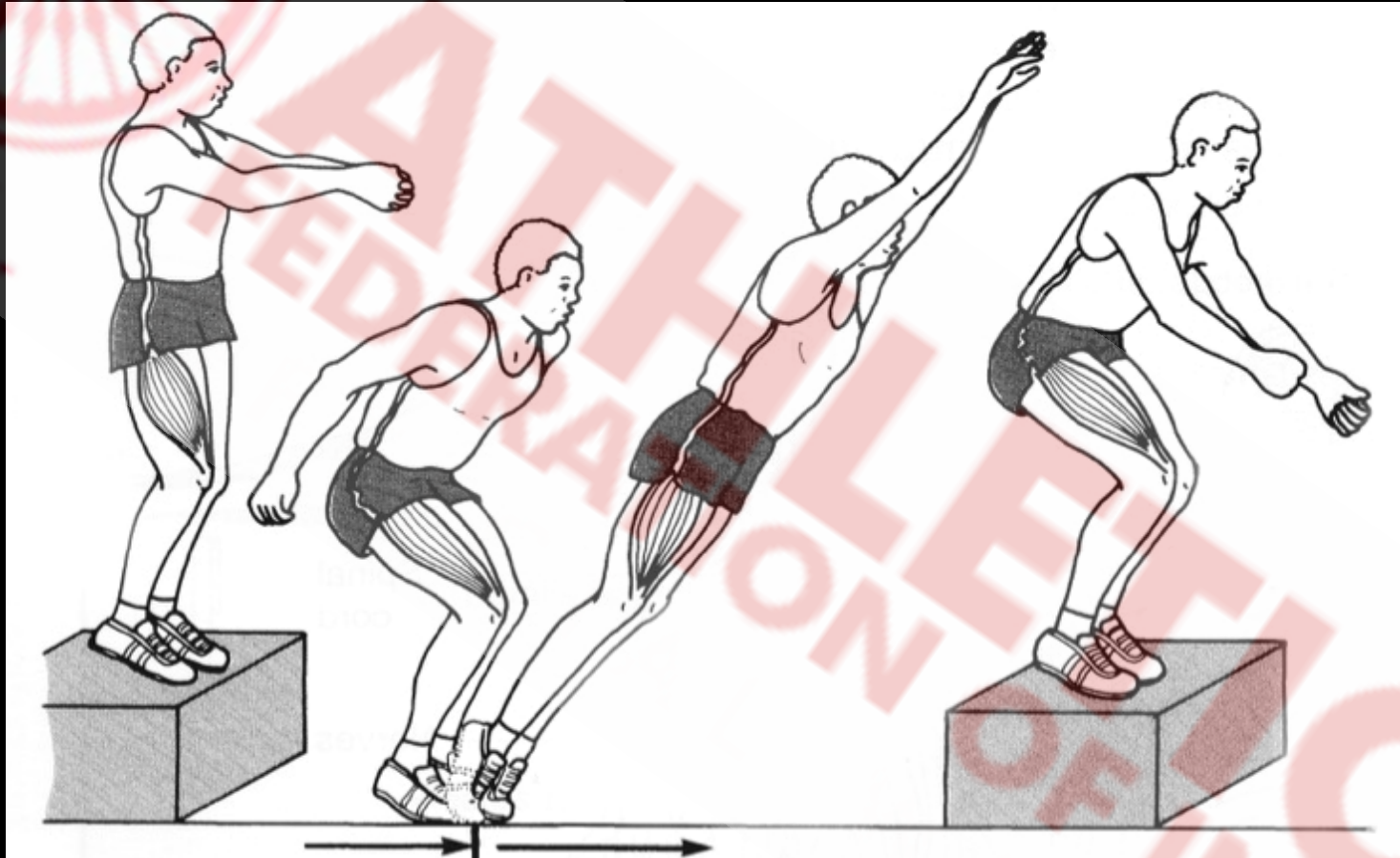


# Static Muscle Contractions

- No lengthening or shortening of the muscle
  - No movement at the joints
- also known as **Isometric Contractions**.



# Dynamic Muscle Contractions

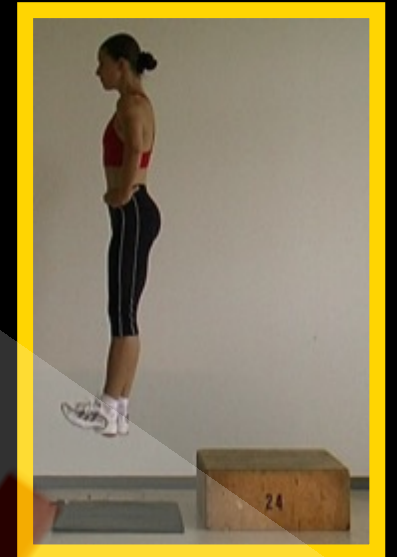
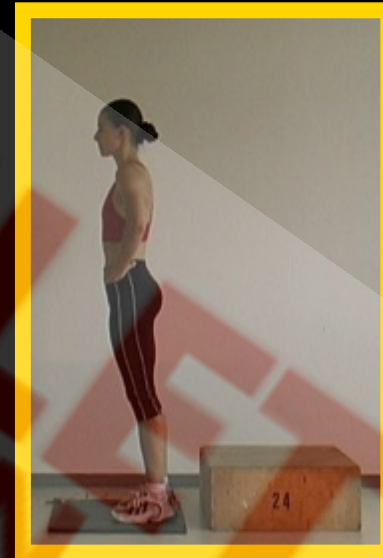
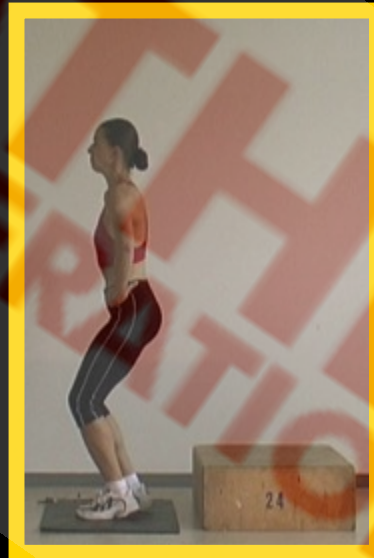
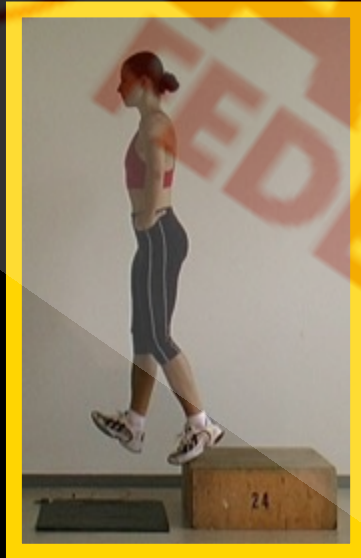
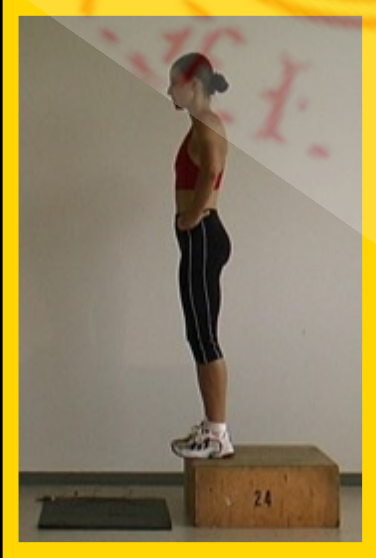


Eccentric contraction

Concentric contraction

**Stretch – Shortening Cycle**

# Dynamic Muscle Contractions



Eccentric contraction

Concentric contraction

**Stretch – Shortening Cycle**



# Muscle Fibre Types

- In every muscle we find a mixture of muscle fibre types
  - **Fast** twitch fibres
  - **Slow** twitch fibres
  - Intermediary twitch fibres
- Different people have different amounts of slow and fast twitch fibres
- Your mixture of fast and slow twitch fibres is
  - Fixed at **birth** by heredity
  - **Determines the events you are suited to**
  - Possibly changed by training, for some fibres.

# Digestive System

**MOUTH**  
Food is chewed and mixed with saliva

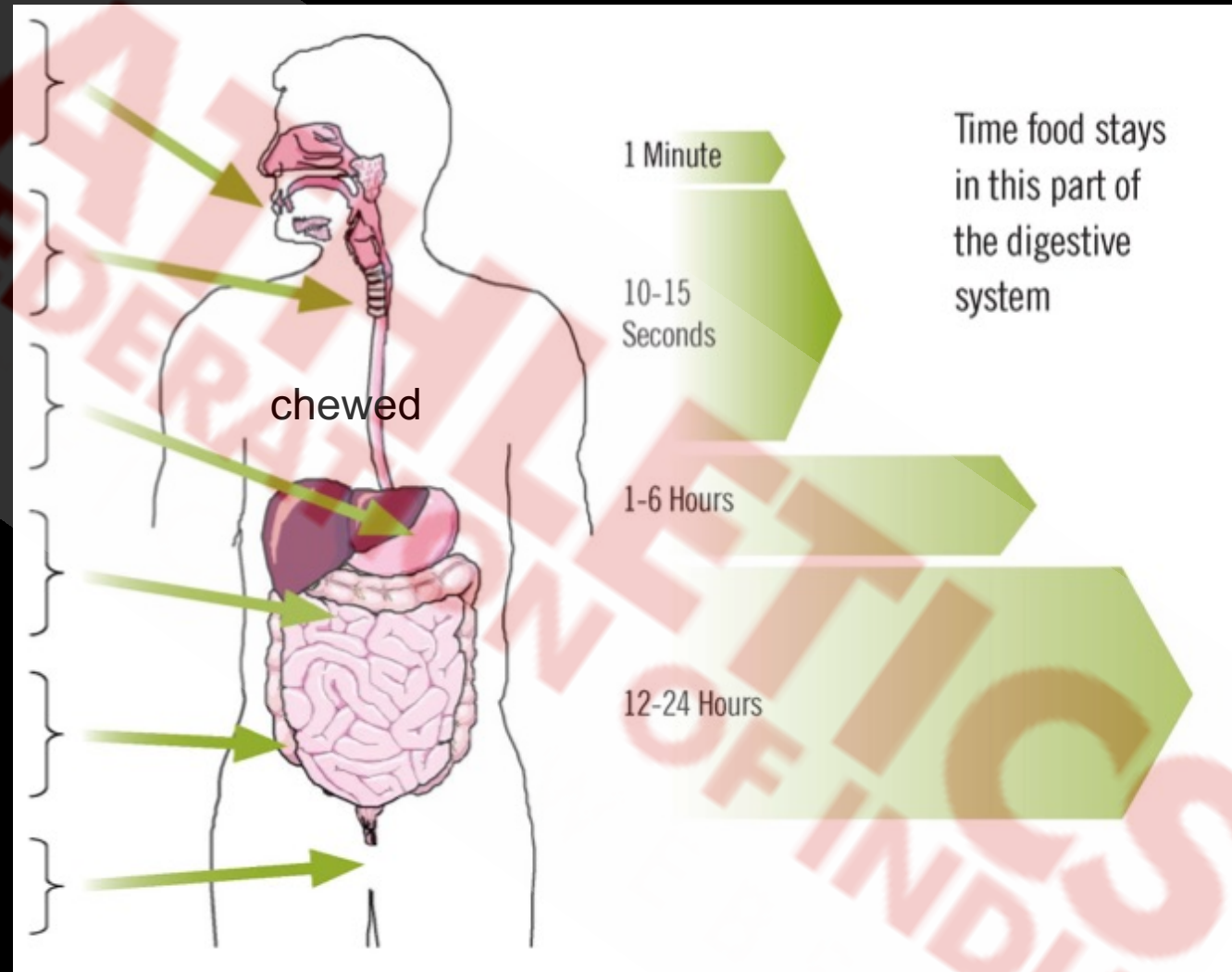
**GULLET**  
Takes chewed food from mouth to stomach

**STOMACH**  
Digestive juices added and mixed with food

**SMALL INTESTINE**  
Digested food absorbed into blood

**LARGE INTESTINE**  
Undigested waste. Water removed leaving solid waste

**ANUS**  
Solid waste eliminated



# Nervous System

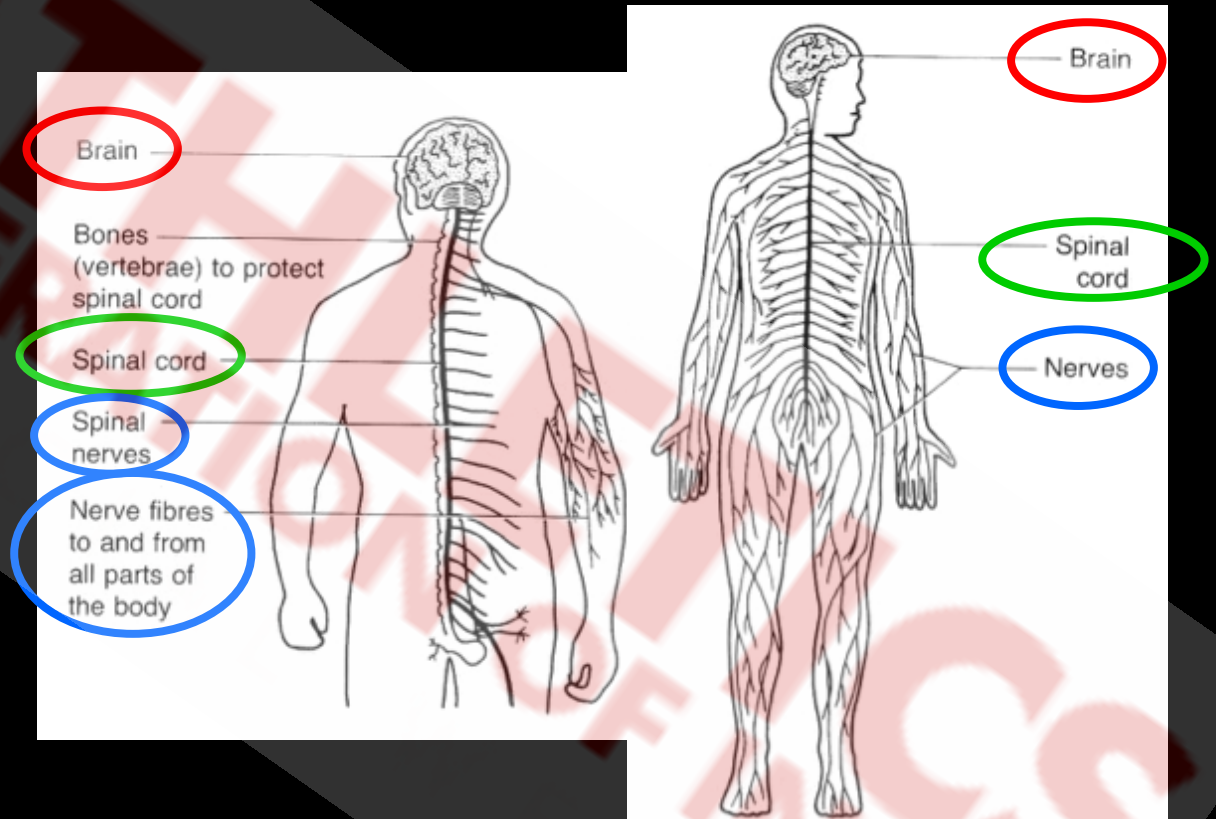
- Muscles pull (contract) when signals from the brain tell them to.

It is composed of:

**brain**

**spinal cord**

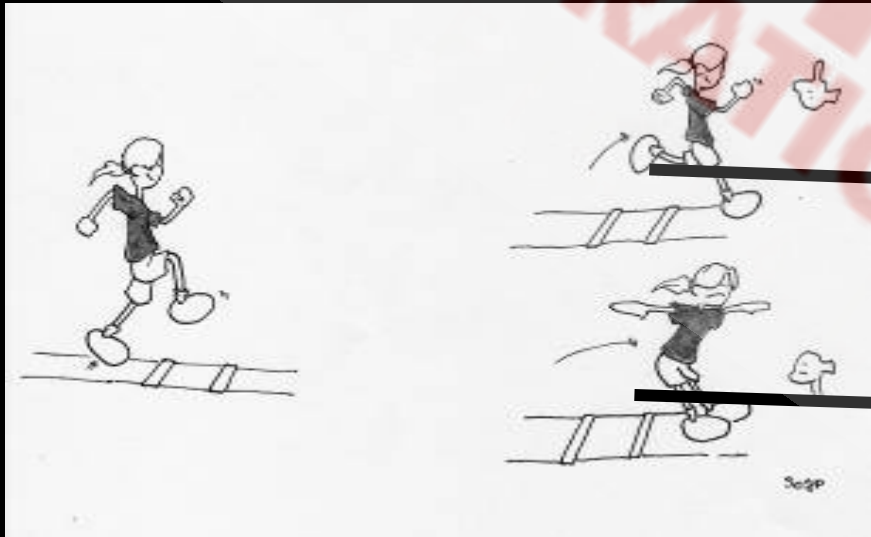
**spinal nerves**





# Anatomy

- The nervous system allows us to think and move.
- It is the basis of all the actions and any learning process



learning

reflex

# « Neuronal Variability »

Informations-  
input

