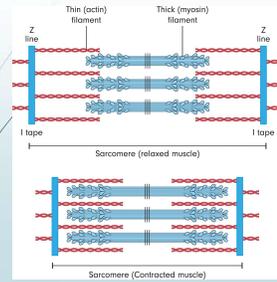


# IMPORTANT PROTEINS IN YOUR BODY

1

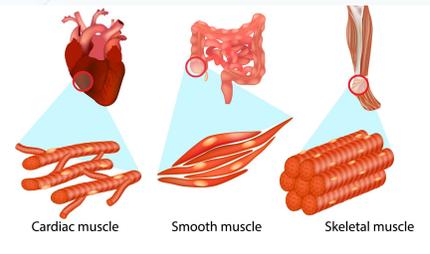
# MUSCLE



- MUSCLE** is made up of two proteins: **ACTIN** and **MYOSIN**
  - Interact to make muscles contract and relax
- Muscles contract and relax over and over
  - CONTRACT** – become shorter
  - RELAX** – back to original shape

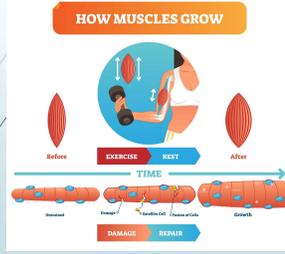
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# MUSCLE



3

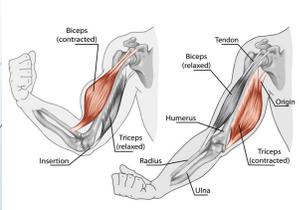
# SKELETAL MUSCLE



- You have about 650 skeletal muscles
- You are born with all the muscle fibers you will ever have
- The fibers can grow thicker, but you do not grow new fibers
- Any physical activity you do makes you stronger because you are using your muscles when you do

4

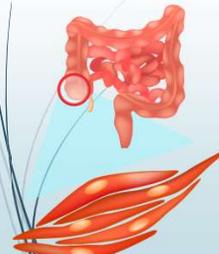
# SKELETAL MUSCLE



- Muscles only pull bone, they cannot push
- So have pairs of muscles to move a bone
  - Example:**
    - To bend the arm, contract biceps and relax triceps
    - To straighten arm, relax biceps and contract triceps

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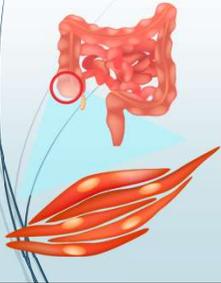
# SMOOTH MUSCLE



- Found in stomach and intestines
  - Contract (tighten) and relax to allow food to pass through the body (**PERISTALSIS**)
- Found in your bladder to hold your urine until you get to a bathroom
- Found in the arteries and veins that carry blood throughout the body

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## SMOOTH MUSCLE



- Found in the respiratory system, especially diaphragm which is important for breathing in and out
- Found in the reproductive system, especially the uterus for the mother to deliver her baby
- Found in your eyes to allow you to focus
- Found in your skin and can make hairs stand erect when you are cold or afraid

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## CARDIAC MUSCLE

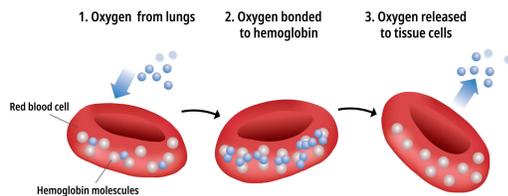
Cardiac muscle



- Muscles of the heart
- Thick muscles that contract to pump out blood and then relax to let blood back in after it has circulated through the body
- Your PULSE is a measure of how fast your heart is beating (beats per minute).

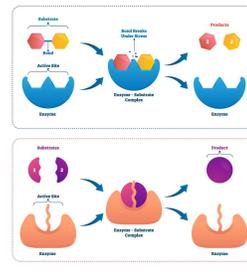
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## HEMOGLOBIN



9

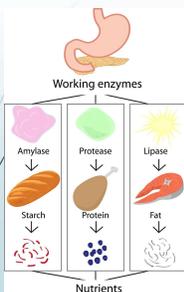
## ENZYMES - Miscellaneous



- Special proteins important for speeding up chemical reactions
  - Thousands of chemical reactions in your body every day
- Enzymes have an ACTIVE SITE that will recognize the SUBSTRATE to act upon
- Enzymes can BREAK APART substrates or COMBINE multiple substrates
- Enzymes can be used over and over again

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## ENZYMES - Digestive



- Digestive system has specific enzymes that help break down the food you eat
  - Amylases digest starch
  - Proteases digest protein
  - Lipases digest fat
- Nutrients released from digestion are then absorbed into the blood stream and moved to where they are needed.

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## HORMONES

- Special proteins your body makes to help it do certain things
- ENDOCRINE ORGANS release hormones in response to triggers
- HORMONES acts as messengers that act on other organs in the body

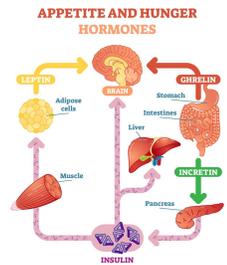
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# HORMONES

- Hormones tell you:
  - When to go to sleep (MELATONIN)
  - When to wake up (CORTISOL)
  - When to eat (GHRELIN)
  - When you are full (LEPTIN)

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# HORMONES

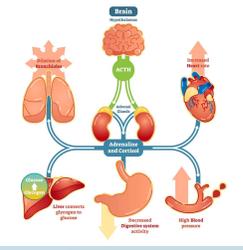


- GHRELIN – produced by stomach to tell brain your body needs food
- INCRETIN – produced by stomach that stimulates insulin secretion by the pancreas
- INSULIN – regulates blood sugar levels
- LEPTIN – produced by fat cells to tell your brain that you are full

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# HORMONES

## STRESS RESPONSE SYSTEM

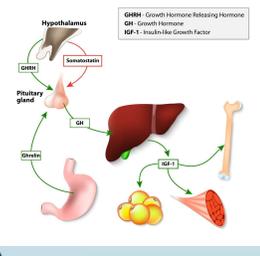


- HYPOTHALAMUS in the brain secretes ACTH which is a hormone that tells the adrenal gland to secrete hormones
- ADRENAL GLANDS secrete adrenaline and cortisol
  - Liver converts glycogen to glucose so more energy available for flight or fight
  - Lungs become more efficient so you can get more oxygen
  - Heart rate goes up to get oxygen and glucose to muscles
  - Blood pressure goes up
  - Activity of digestive tract decreases

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# HORMONES

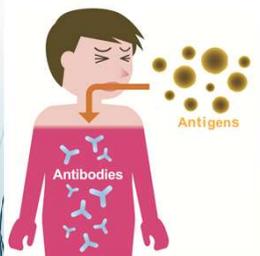
## GROWTH HORMONE



- HYPOTHALAMUS in the brain secretes GROWTH HORMONE RELEASING HORMONE (GHRH) to stimulate the pituitary gland
- PITUITARY GLAND secretes GROWTH HORMONE (GH) which acts on the liver
- LIVER releases INSULIN-LIKE GROWTH FACTOR (IGF-1) which works on various tissues involved in you growing

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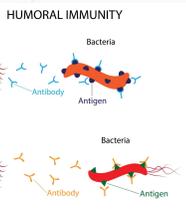
# ANTIBODIES



- IMMUNE SYSTEM helps to protect you against diseases caused by PATHOGENS such as viruses and bacteria
  - Called ANTIGENS
- Antigens trigger the immune system to fight off the invaders with Y-shaped ANTIBODIES

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# ANTIBODIES

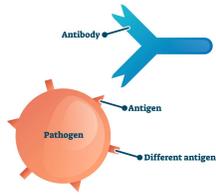


- How to tell the good from the bad?
  - ANTIBODIES have specific binding sites that will only bind with certain parts of ANTIGENS
    - Antibodies specific for each antigen

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# ANTIBODIES

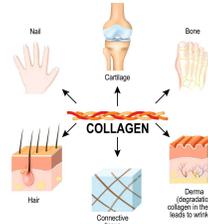
## ANTIGENS



- How to tell the good from the bad?
  - ANTIBODIES have specific binding sites that will only bind with certain parts of ANTIGENS

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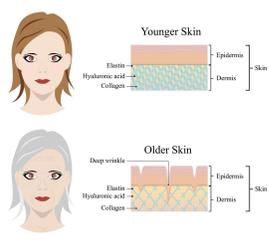
# COLLAGEN



- Only found in animals
- Found throughout the body
- Examples:
  - Bone, tendons, ligaments, cartilage
  - Skin
  - Cornea of eye
  - Blood vessels
  - Digestive tract
  - Material between vertebrae

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# COLLAGEN

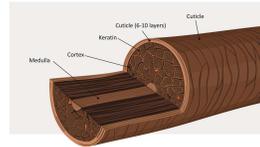


- Collagen production declines with age
- Exposure to cigarette smoke decreases collagen levels (and ages your skin)
- Exposure to too much ultraviolet light (from sun or tanning salons) decreases collagen levels (and ages your skin)

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# KERATIN

## HAIR STRUCTURE - HAIR SHAFT

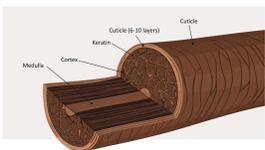


- Main components of structures that grow from the skin:
  - Hair
  - Fingernails
  - Toenails

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# KERATIN

## HAIR STRUCTURE - HAIR SHAFT

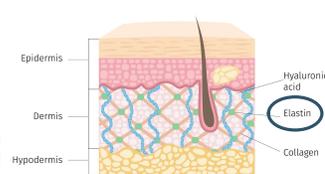


- For other animals:
  - Horns
  - Hooves
  - Claws
  - Shells of tortoise/ turtle
  - Beaks
  - Feather
  - Wool

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# ELASTIN

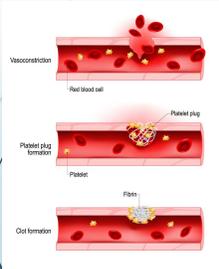
## SKIN STRUCTURE



- Flexible and gives tissues their elasticity
- Mostly in the SKIN
- Protein in connective tissue throughout the body
  - Arteries and veins

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## FIBRIN

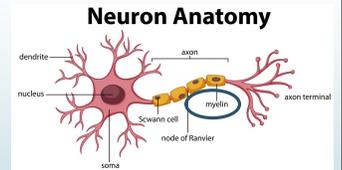


- Protein involved in blood clotting
- Fibrin produced in the liver
  - ↳ Activated to form fibrin
    - Fibrin starts the clotting process to stop blood flow
    - Forms a scab over the wound

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## MYELIN

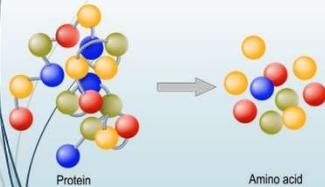
- Substance that coats nerve cells (neurons)
- 80% fat and 20% PROTEIN
- Speeds up the transfer of electrical messages in the nervous system



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## PROTEIN IN THE DIET

### Digestion of protein



- There are many different types of protein in the body
- Your body makes these proteins from amino acids
- Amino acids are provided in your diet when you eat protein

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