Introduction

I. The human body is a complex machine. From eating breakfast, to running, or sleeping, everything your body does requires multiple systems carrying out specialized tasks. Each system has a focus but they must also communicate and work together.

In order to understand how the machine works, we must understand both the human anatomy and physiology. Anatomy is the study of the body's structure. That means the "parts". Physiology is the study of how the individual organs and systems function.

This event will cover a very simplified overview of Anatomy and Physiology and an in depth look at one system–The IMMUNE SYSTEM.

A. **Body Basics - Organization of the Body**

1. **Fluids** - The human body is about ⅔ water. The different substances dissolved in this water make up the fluids of the human body. Body fluids include those found within cells (intracellular), around the body tissues (interstitial), blood, lymph, sweat, saliva, digestive juices and urine.

2. Cells - Cells are the smallest living units in the human body. Different types of cells carry out different functions in the body. There are more than 200 different cell types in the human body.

3. **Tissues** - Cells performing similar functions are grouped together to form tissues. There are four main tissue types: Nervous, Epithelial, Muscle and Connective

a) **Nervous Tissue** - nerve cells form nervous tissue which make up the brain, spinal cord and all nerves throughout the body. Nervous tissue forms the high-speed communication system of the human body.

b) **Epithelial Tissue** - epithelial cells are tightly connected to each other forming a sheet of epithelial tissue that lines and covers the inside and outside surfaces in the body, including organs and body cavities.

c) **Muscle Tissue** - long thin muscle cells form muscle fibers which have the ability to contract and relax. Several different types of muscle tissue are responsible for tasks like moving bones or moving food through the digestive system.

d) **Connective Tissue** - There are several different types of connective tissue all of which provide protection and support to the other tissues and organs in the body. Connective tissue also fills the space between organs and holds them together. Blood is an example of connective tissue.

4. Organs - All of these types of tissues combine together to form organs. All organs must contain at least two different tissue types, but almost all organs contain all four major tissue types. Each organ works like an individual machine to carry out a specific function or role in the body. For example, your heart is an organ which has the specific function of pumping blood throughout your body.

B. Organ Systems

Groups of organs work together to carry out a specific function in the human body. These groups of organs form a specific body system. For example, the digestive system is comprised of many organs like the mouth, stomach, pancreas and colon all of which work together to take in and break down food so that your body will have building blocks and energy in order for you to grow and function. Some organs can play multiple roles in more than one system. For example, your kidneys are primarily involved in the excretory system but also have a role in the endocrine system. All the systems are interconnected and play a role in maintaining a fully functioning human body.

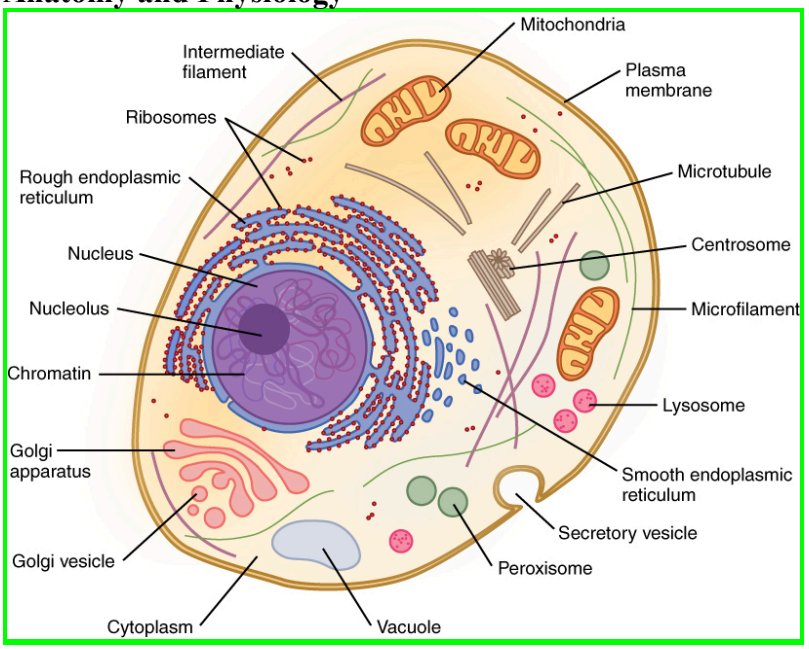
System	Function	Major Components
Muscular	Movement and postural support	Muscle types: Smooth, skeletal, cardiac
Skeletal	● **Supports** the overall structure of the body. ● **Protects** some internal organs (heart, lungs, brain)	● Bones ● Ligaments ● Tendons ● Cartilage
Nervous system	**High Speed communication** (Internal-to and from brain)	● Brain ● Spinal Cord ● Nerves
Digestive system	● Breaks down of food, absorption of nutrients ● Elimination of waste products	● Mouth ● Esophagus ● Stomach ● Liver ● Small intestine ● Large intestine ● Rectum
Endocrine	Diffuse messaging controlling metabolism and homeostasis	● Hypothalamus ● Pituitary ● Thyroid ● Pancreas ● Adrenals ● Gonads (Testes/Ovaries)
Cardiopulmonary	● Nutrient Delivery (food and oxygen) ● Waste removal	● Heart ● Lungs ● Blood vessels (arteries and veins)
Reproductive	● Create new organism. ● Production of haploid cells called gametes for sexual combination. ● Development/nurturance of new organism	● Gonads (ovaries in females and testes in males) ● Uterus in females
Urinary	● Remove cellular waste ● Maintain fluid balance (blood pressure, pH and electrolytes	● Kidney ● Bladder

System	Function	Major Components
Integumentary	• Protects against external environment • Regulates body temperature • Excretes waste (sweat)	• Skin • Hair • Nails • Sweat glands
Lymphatic	• Defends against infection (immunity) • Returns tissue fluid to blood • Transports fats	• Lymph Node • Spleen • Thymus • Vessels

II. The Cell

The cell is the basic function unit in the human body. Cells are like small towns- generating energy, building, repairing, using nutrients, expelling waste, growing and dying. Each cell in a human shares the same DNA. This is a coded library of instructions to make everything the cell could ever need. The basic blocks (macromolecules) that cells build are called proteins. These proteins come in a huge variety and perform lots of different jobs in the cell. While every cell in the body has the same DNA, different groups of cells decide to play a specialized role in the body and follow only some of the instructions. Maybe the cell decides to be a muscle cell and move the body. Or maybe the cell decides to be part of the brain and send messages at high speed. And sometimes cells protect the body from invaders (these are immune cells).

A. Anatomy and Physiology



B. Structure of a cell

i. The individual cell can be seen with a microscope. The basic features of a cell include an outer plasma membrane, cytoplasm, nucleus, and organelles.

ii. The cytoplasm is the jelly-like fluid inside the cell. The organelles float in the cytoplasm. The nucleus is the cell's control center and house the genetic material, DNA. Below is a chart of organelles and their functions.

C. Organelles and their functions (4th/5th Grade Only)

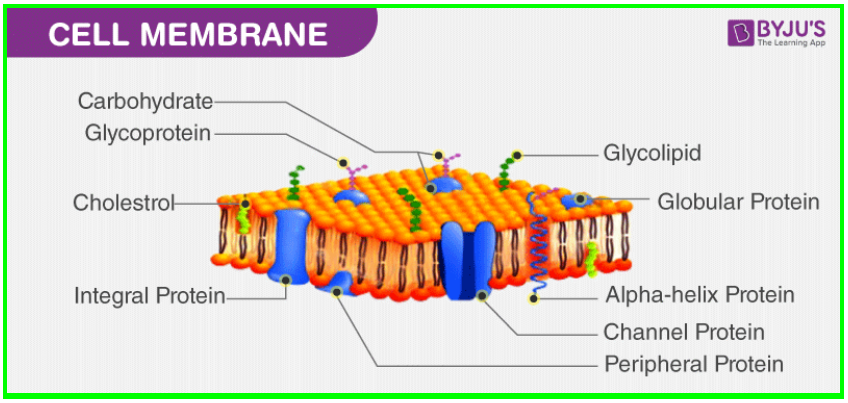
Organelle	Function
Mitochondria	Energy production
Ribosomes	Protein synthesis
Endoplasmic Reticulum	Protein/lipid transport, synthesis
Golgi apparatus	Packaging and shipping
Lysosomes	Waste breakdown
Vacuoles	Storage

D. Cell membrane

i. The plasma membrane is a semipermeable barrier surrounding all cells. It controls what enters and exits the cells.

ii. The membrane is made up of a **double layer of lipids** and proteins.The lipids and proteins move within the membrane giving it a "fluid mosaic" structure

iii. **Transmembrane proteins** are embedded in the plasma membrane or found on the surface of the plasma membrane. They are used for a wide range of important functions including (but not limited to): identification, absorption of nutrients, communications with other cells, and release of hormones.



III. The Immune System--Form and Function

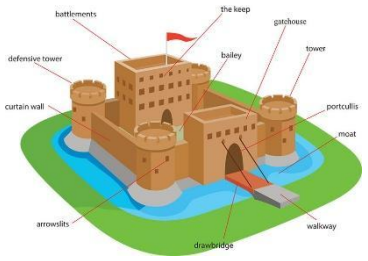
The theory of evolution offers the idea that the human body, with its multiple interconnected systems, has evolved from a single cell organism floating in an oceanlike milieu. One way to understand and think about human anatomy and physiology is to consider the **function** of the different parts and systems of the human body as adaptations to specific **conditions, contexts, and challenges** over its very long evolution from that single cell.

For instance, when a human ancestor moved out the ocean, they were exposed to the force of gravity. Our internal skeleton of bones is a one solution to the challenge of gravity in this new non-aqueus context (but not the only one nor even the most successful one.)

At its core, the human body is a squishy sphere (like the single cell) with a tube going through it. I always imagine it

like the wiggly water snake toy.https://www.youtube.com/watch?v=EgZbAzP6Agw . The outer part is our skin and the inner tube is everything from our mouth to our anus. **This adaptation is one of many whose main function is to allow us to both protect our bodies while allowing for controlled exchange with the outside worlds.**

As we explore the Immune system, we are going to come back to this **dual function** of the immune system: to protection while also allowing exchange with the outside world. Like soldiers or policemen, our immune system has a third important function which is to control misbehaving cells (a.k.a. cancer). As this goes along, we will be using the metaphor of a medieval castle to help explain the function of the many parts of the immune system (my son and I looked at the Castle CrossSection book upteen times), because castles like our bodies need to control misbehaving cells and also protect against invaders while also supplying necessities to its inhabitants.



A. **Innate vs Adaptive** --The Immune system is divided into two main parts.
   1. **Innate**—Non-specific. Includes things like skin, complement, and cells that target any invading cells including complement, phagocytotic cells (macrophages and neutrophils), and Natural Killer Cells (NK)
   2. **Adaptive** – Responsive to specific invaders. Has four main properties
      1. Specificity
      2. Diversity
      3. Memory
      4. Self/non-self recognition

B. Primary Organs

i. **Skin** – This is the wall of our body. Better than the stone wall of a castle, the skin moves, stretches, and grows with us.
   1. The largest organ in the body, 16% of body weight
   2. Covers the entire body, continuous with mucous membranes of the digestive system, the respiratory system, and the urogenital system.
   3. The Coagulation Cascade is a mechanism where the blood seals a breach in the wall and sends repair cells. (4th/5th Grade Only)

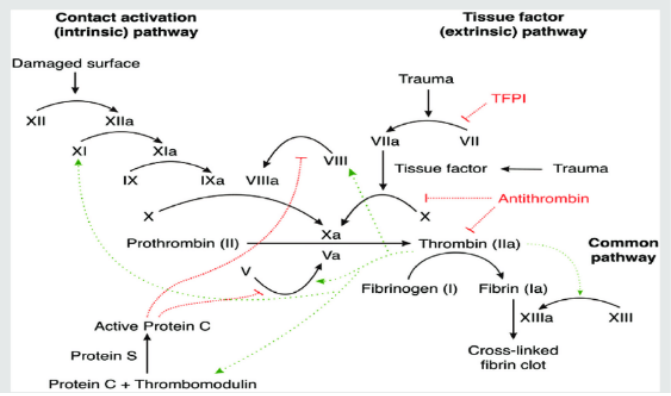
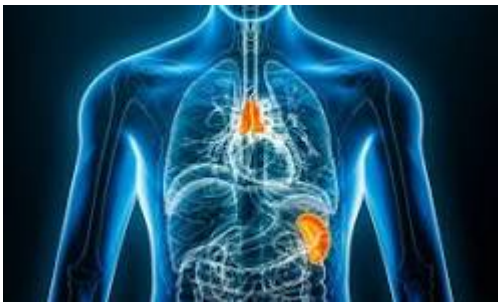


Image from Wikimedia Commons contributors. File: Coagulation full.svg. Wikimedia Commons, the free media repository 2017

ii. **Bone Marrow**- (The maternity ward—source of the population)
    1. Located in the marrow cavity inside long bones
    2. Responsible for hemopoiesis (making blood cells)
    3. Source of pluripotent stem cells inside the body.

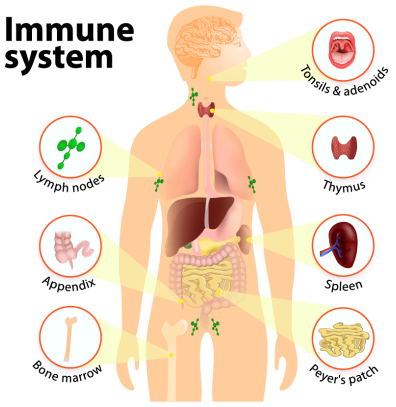
iii. **Thymus** – (The school – trains immune cells)
    1. Small, two-lobe organ
    2. Sits over the great vessels of the heart
    3. Trains and matures T-cells
    4. Teaches t-cell to distinguish "self" from "non-self"

iv. **Spleen** – (The Barracks/ReUse Center)
    1. Blood filtration-removing old Red Blood Cells (RBC) from circulation.
    2. Iron metabolism-salving iron from used RBCs
    3. Reserve of lymphocytes and macrophages
    4. Back-up of hemopoiesis for the bone marrow



C. **Mucosal Associated Lymphoid Tissues (MALT)**
The sentries of the body, these clusters of immune cells are stationed at high risk for invasion areas-- near entrances (like the mouth and nose) or site of exchange/absorption (like in the digestive system). These immune cells provide extra protection in areas where invaders (microorganism or toxins) are most likely to enter.

i. **Adenoids** (pharyngeal tonsils): Located behind the nose and soft palate (nose)
ii. **Tonsils** (palatine tonsils): Located at the back of your throat (mouth)
iii. **Peyer Patches**- Located mostly in the distal portion of the small intestine (small intestine)
iv. **Lymph nodes**—There are between 400-800 nodes all over your body. These are constantly filtering fluid (called lymph) to look for and get rid of foreign substances, damaged cells and cancer cells.



iV. Blood

Blood is the population of our castle body. It is the people or cells that move and flow through the structure carrying nutrients, repairing damage, and removing waste. Blood carries all the components of your immune system. It is made up of four main parts: **Plasma**, **Red Blood Cells (RBCs)**, **Platelets**, and **White Blood Cells (WBCs)**.

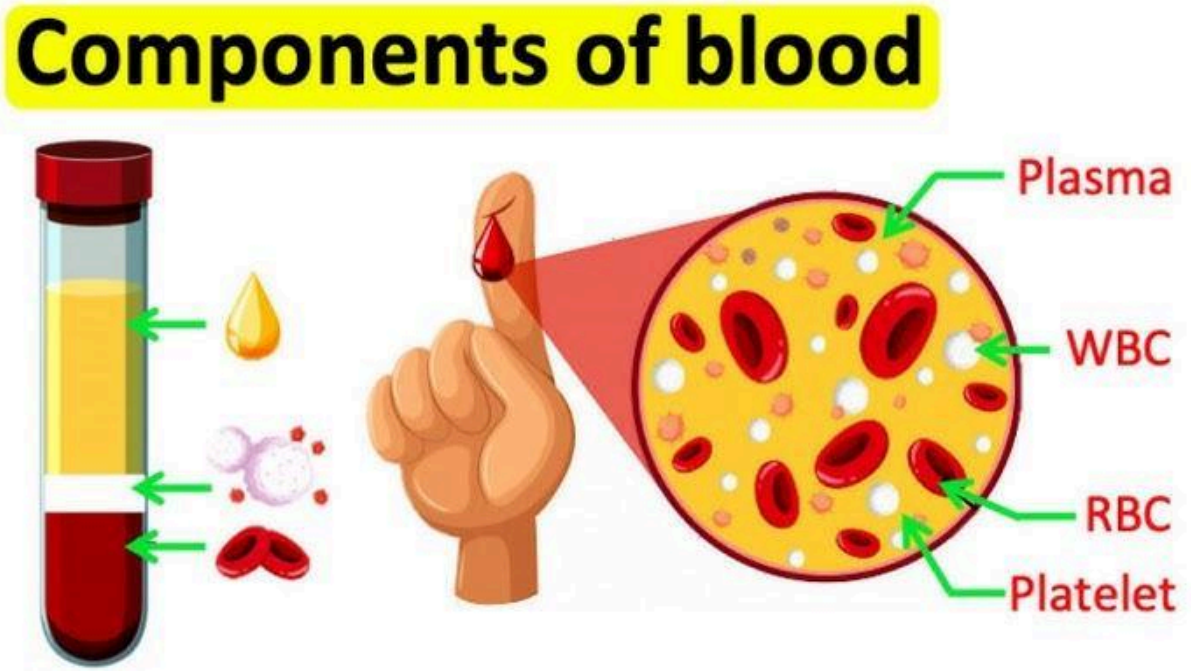
The Four Components of Blood

Component	What It Is	Where It's Made/Located	Main Function
Plasma	Yellowish liquid (mostly water)	Circulates throughout the body	Carries nutrients, hormones, and blood cells. It's the "taxi" of the blood.
Red Blood Cells (RBCs)	Tiny, donut-shaped cells	Bone Marrow	Carries **oxygen** from your lungs to the rest of your body.
Platelets	Small cell fragments	Bone Marrow	Stops bleeding by forming a **clot** (a sticky plug).
White Blood Cells (WBCs)	The "Soldiers" of the body	Bone Marrow, Lymph Nodes, Spleen	Fights germs and cleans up damaged cells. This is your immune system!

The Immune Cells (WBCs)

White Blood Cells are the most important part of the immune system. They are always on patrol, ready to fight.

Immune Cell Type	Nickname	Function in Health and Disease
Neutrophils	The "First Responders"	The most common WBC. They rush to the site of an infection and **eat** bacteria. They are key in fighting short, sudden (acute) infections.
Macrophages	The "Big Eaters"	They eat germs, dead cells, and debris. They also help start the antibody response.
Lymphocytes	The "Smart Soldiers"	These include **T-cells** (which kill infected cells) and **B-cells** (which make antibodies). They provide long-term protection.
Plasma Cells	The "Antibody Factories"	These are B-cells that have changed into super-producers of antibodies. They are located mainly in the lymph nodes and bone marrow.
Platelets	The "Clotters"	While mainly for clotting, they also release chemicals that help start the inflammation process to call other immune cells to the fight.

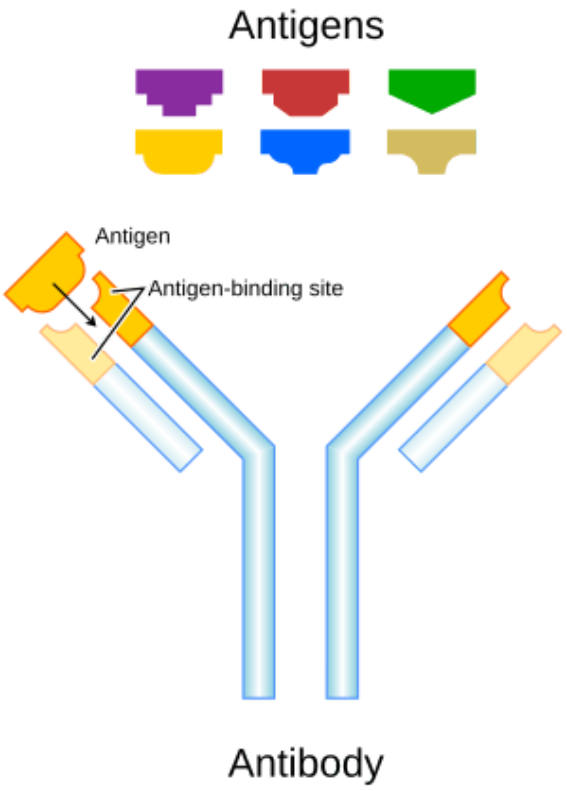


V. Antibodies and Immunity

A. What are Antibodies?

Antibodies are Y-shaped proteins made by your **Plasma Cells** (which came from B-cells). Think of them as **"smart missiles"** or **"flags"** that are perfectly shaped to stick to a specific germ or invader, called an **antigen**.

- **How they work:** When an antibody sticks to a germ, it either neutralizes the germ (stops it from working) or flags it for a Macrophage to come and eat it.
- **Production:** When your body sees a new germ, the B-cells learn how to fight it. They then turn into Plasma Cells and start mass-producing the perfect antibody.



1. Types of Immunity

Immunity is how your body protects itself. There are two main types:

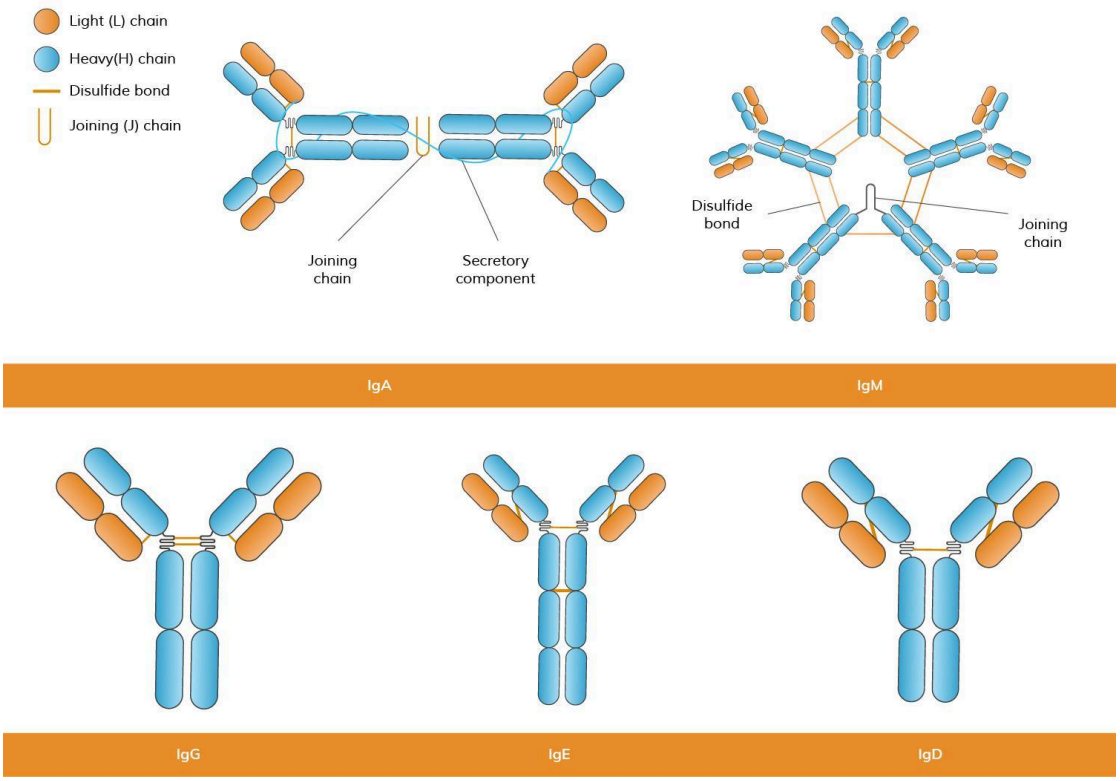
Type of Immunity	How You Get It	Example
Active Immunity	Your body **makes** its own antibodies after being exposed to a germ (either by getting sick or by getting a vaccine).	Getting the chickenpox and then being protected from it later.
Passive Immunity	You **borrow** antibodies from another source. This protection is immediate but temporary.	A baby getting antibodies from its mother through breast milk.

B. The Five Types of Antibodies (Immunoglobulins)

Antibodies are grouped into five main types, or classes, each with a special job and location in the body.

Antibody Type	Nickname/Structure	Main Function
IgG	"The Long-Term Defender" (Y-shaped)	The most common type. It provides long-term protection and is the only one that can cross the placenta to protect a baby before birth.

Antibody Type	Nickname/Structure	Main Function
IgA	"The Mucus Protector" (Often a pair of Y-shapes)	Found in body fluids like tears, saliva, and breast milk. It guards the entrances to the body (nose, lungs, stomach).
IgM	"The First Responder" (A large star-shape)	The first antibody made when your body fights a new infection. It is very large and good at clumping germs together.
IgE	"The Allergy Trigger" (Y-shaped)	Protects against parasites, but is most famous for causing allergic reactions (like hay fever or asthma).
IgD	"The B-Cell Sensor" (Y-shaped)	Found mainly on the surface of B-cells, helping them sense when a germ is present and start the immune response.



C. Antibodies in Modern Medicine (4th/5th Grade Only)

The unique ability of an antibody to stick to only one specific target (antigen) makes them powerful tools in medicine.

Application	How Antibodies are Used	Example
Diagnostics (Testing)	Antibodies are used to find out if a person has a disease or has been exposed to a germ.	**ELISA Test:** Uses antibodies to find HIV, Lyme disease, or even pregnancy hormones in a blood sample.

Application	How Antibodies are Used	Example
Therapeutics (Treatment)	Scientists create special antibodies in a lab called **Monoclonal Antibodies (mAbs)** to treat diseases.	**Cancer Treatment:** An mAb can be designed to stick to a cancer cell and flag it for the immune system to destroy.
Plasmapheresis	A procedure to remove harmful antibodies from the blood of a patient with an autoimmune disease.	Used to treat severe cases of Guillain-Barré syndrome by removing the antibodies that are attacking the nerves.

VI. Inflammation

What is Inflammation?

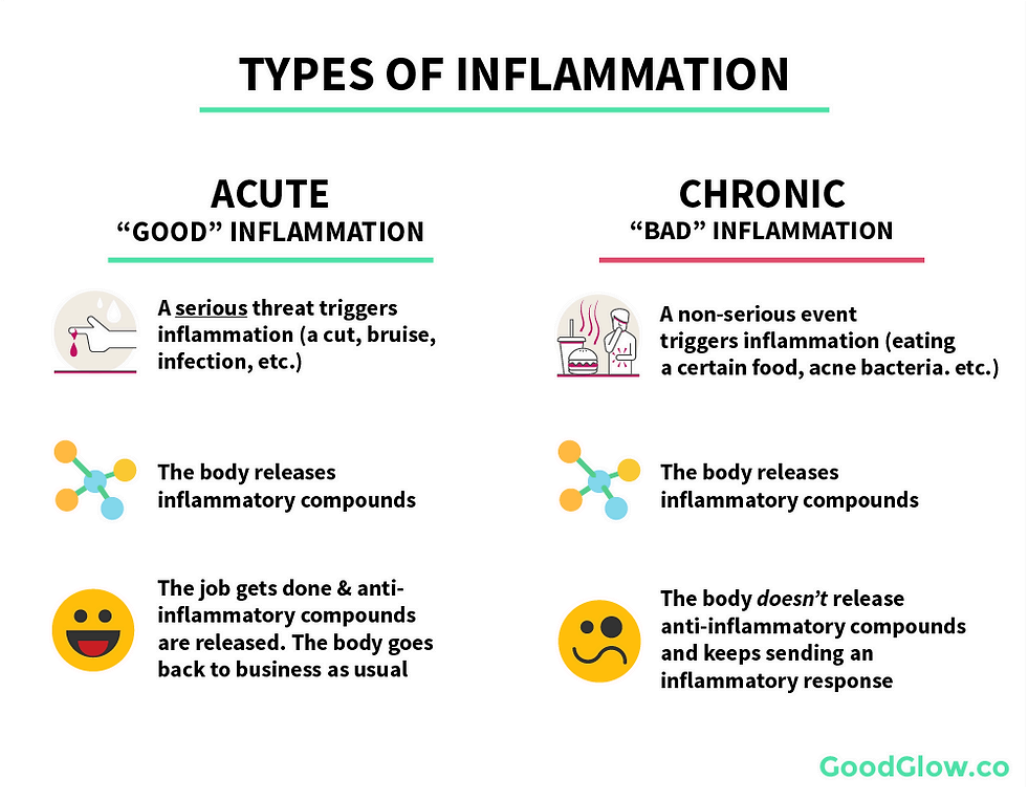
Inflammation is your body's natural response to injury or infection. It's the process that starts healing and calls the immune cells to the area.

A. **The four main signs of inflammation are:**
   A. **Redness** (due to more blood flowing to the area) (Rubor)
   B. **Heat** (also due to more blood) (Calor)
   C. **Swelling** (due to fluid leaking out of blood vessels) (Tubor)
   D. **Pain** (due to chemicals released by damaged cells) (Dolor)

B. Acute vs. Chronic Inflammation

Inflammation is a good thing when it's short and helps you heal, but it can be a problem if it lasts too long.

Feature	Acute Inflammation ("Good" Inflammation)	Chronic Inflammation ("Bad" Inflammation)
Duration	Short-term (minutes to days)	Long-term (months to years)
Purpose	Immediate defense and healing	Can cause damage to healthy tissues
Example	A paper cut, a bee sting, a sudden fever, or a broken bone.	Arthritis, asthma, heart disease, or long-term infections.
Main Cells	Neutrophils	Macrophages and Lymphocytes
Outcome	Healing and repair (like wound healing)	Tissue damage and scarring



C. Disorder of the Immune System

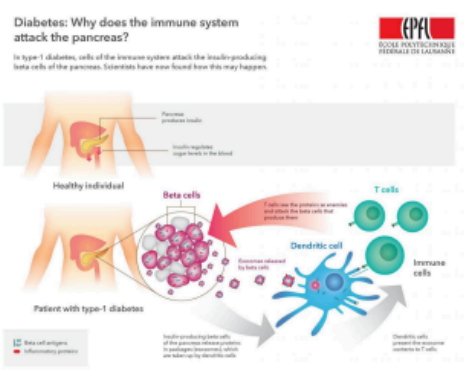
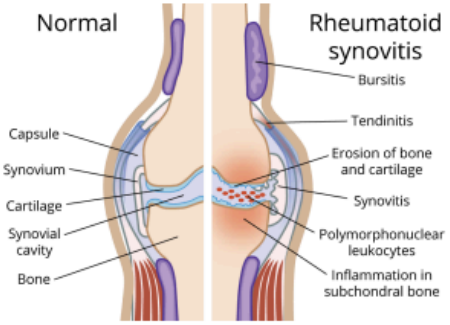
Sometimes, the immune system makes a mistake. It can either attack the body's own healthy cells (**Autoimmune Disorders**), or it can be too weak to fight germs (**Immunodeficiencies**), or it can grow out of control (**Immune-Related Malignancies**).

1. Autoimmune Disorders

In these diseases, the immune system attacks the body's own healthy cells, thinking they are invaders.

Disease	What the Immune System Attacks	Symptoms and Clinical Image	Treatment
Systemic Lupus Erythematosus (SLE)	The body's own DNA and cells in many organs (skin, joints, kidneys).	A classic **"butterfly rash"** across the cheeks and nose, joint pain, and fatigue.	Medicines to calm the immune system (immunosuppressants).
Graves' Disease	The thyroid gland (a gland in the neck that controls energy).	The thyroid makes too much hormone, causing weight loss, fast heartbeat, and sometimes **bulging eyes** (exophthalmos).	Medicines to block the thyroid hormone or surgery to remove the thyroid.

Disease	What the Immune System Attacks	Symptoms and Clinical Image	Treatment
Type 1 Diabetes	The **beta cells** in the pancreas that make **insulin**.	High blood sugar because the body can't make insulin to move sugar into cells for energy.	Daily insulin injections or an insulin pump.
Rheumatoid Arthritis (RA)	The lining of the joints (synovium).	Painful, swollen, and stiff joints, especially in the hands and feet.	Medicines to reduce inflammation and slow down the immune attack

Clinical Image	Description
	**Type 1 Diabetes:** The immune system destroys the cells that make insulin, which is needed to control blood sugar.
	**Rheumatoid Arthritis:** The immune system attacks the joint lining, causing swelling and damage to the bone and cartilage.

2. Immunodeficiencies

This is when the immune system is weak and can't fight off infections.

Type	Cause	Example
Genetic (Primary)	A person is born with a faulty gene that affects immune cell production.	**Severe Combined Immunodeficiency (SCID):** Babies with this condition have almost no immune system and must live in a sterile environment (sometimes called "bubble boy disease").

Type	Cause	Example
Acquired (Secondary)	The immune system is damaged later in life by a disease, medicine, or poor nutrition.	**AIDS (Acquired Immunodeficiency Syndrome):** Caused by the HIV virus, which attacks and destroys the T-cells (the "smart soldiers"), leaving the body defenseless against common germs.

3. Immune-Related Malignancies (Cancers)

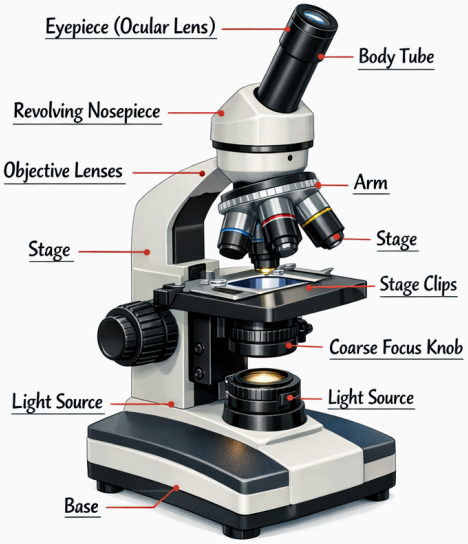
These are cancers that start in the cells of the immune system.

Cancer	What Cells Are Affected	Description	Clinical Image
Leukemia	Cancer of the White Blood Cells (WBCs) in the **Bone Marrow**.	The bone marrow makes too many abnormal, non-working WBCs, crowding out healthy RBCs and Platelets.	*[Image failed to load: Microscopic image of a blood smear showing many abnormal white blood cells (blasts) characteristic of leukemia.]*
Lymphoma	Cancer of the **Lymphocytes** (T-cells or B-cells) in the **Lymph Nodes**.	Causes swelling of the lymph nodes (glands in the neck, armpits, and groin) as the cancerous cells multiply.	(No image provided, but a picture of a swollen lymph node could be used here)
Multiple Myeloma	Cancer of the **Plasma Cells** in the **Bone Marrow**.	The cancerous plasma cells produce too much of one type of antibody, which can damage the bones and kidneys.	(No image provided, but a picture of a bone lesion could be used here)

VII. The Immune System in Patients

One of the most important tools doctors use to understand your immune system is the **Complete Blood Count (CBC)** and looking at a **Blood Smear** under a microscope. By looking at the numbers and the shapes of the cells, we can figure out what kind of invader the body is fighting.

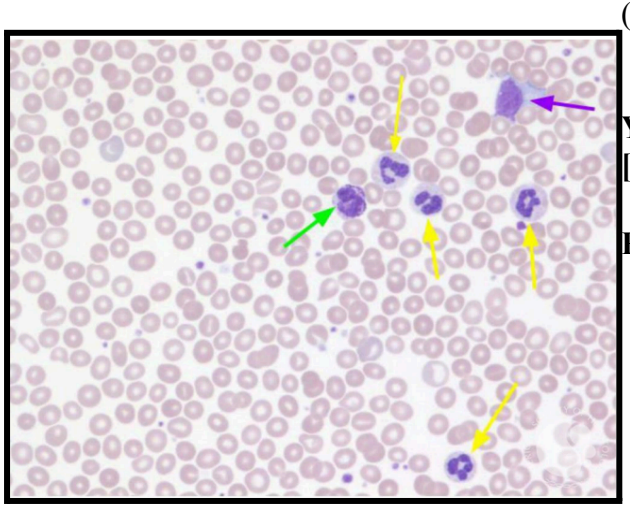
A. The Compound Microscope



Part	Function
Eyepiece (Ocular Lens)	Magnifies the image for viewing
Body Tube	Holds the eyepiece and connects to the lenses
Revolving Nosepiece	Holds and rotates the objective lenses
Objective Lenses	Lenses with different magnifications
Arm	Supports the microscope
Stage	Platform where the slide is placed
Stage Clips	Hold the slide in place
Coarse Focus Knob	Moves stage up and down for general focusing
Fine Focus Knob	Adjusts the focus precisely
Diaphragm	Controls the amount of light
Light Source	Illuminates the specimen
Base	Provides stability and support

B. Blood Smear?

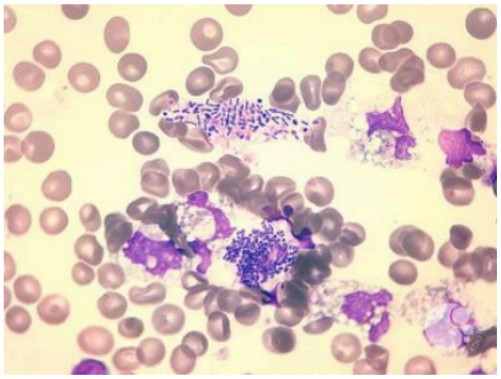
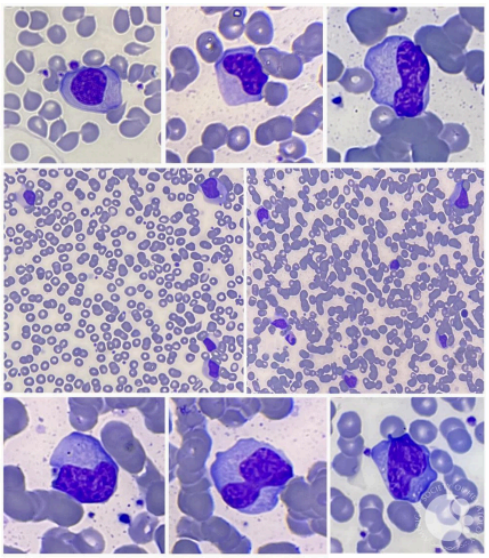
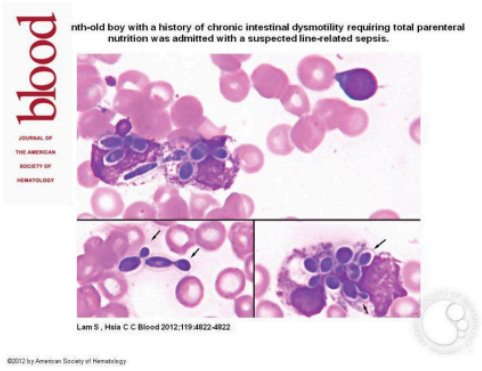
A blood smear is a drop of blood spread thinly on a glass slide and stained with special dyes. It allows us to see the different types of blood cells up close, often at a high magnification (like 20X or 100X).

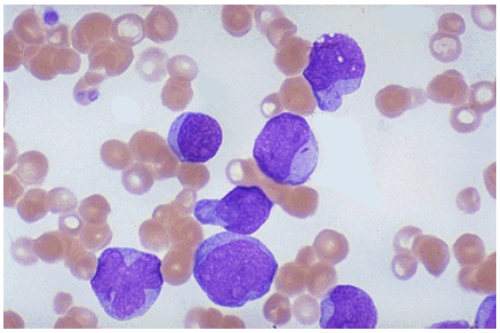
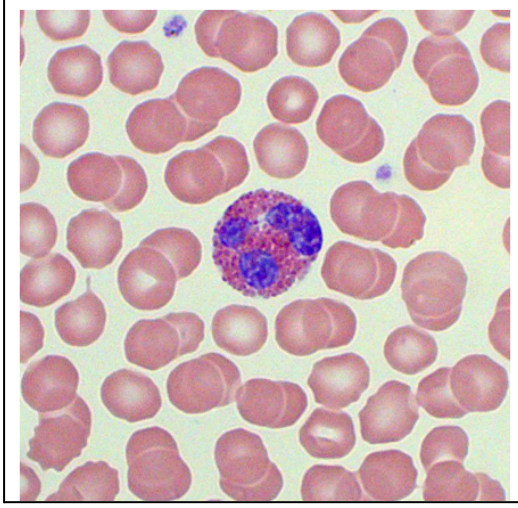


Yellow arrow- Neutrophils [polymorphonuclear leucytes (PML)]

Purple- Monocyte

Reading the Blood

Blood Smear Image	Condition	Description
	**Bacterial Infection**	A Neutrophil is actively eating bacteria (Phagocytosis).
	**Viral Infection**	Large, oddly shaped Lymphocytes (Atypical Lymphocytes) are a sign of a strong viral fight.
	**Fungal Infection**	The fungus itself (yeast cells) can sometimes be seen in the blood, often surrounded by immune cells.

Blood Smear Image	Condition	Description
	**Acute Leukemia**	The blood is crowded with large, immature white blood cells (Blasts) that cannot do their job.
	**Allergic Reaction**	An Eosinophil, the cell that responds to allergies, is clearly visible with its bright granules.

Case	Brief History	Key CBC Change	Immune Cell Response	Blood Smear Finding	Treatment (4th and 5th)
1. Bacterial Infection	Child with a high fever, sore throat, and a cough for the that is producing thick, yellow mucus. For more than two weeks.	**High WBC** (Leukocytosis), **High Neutrophils** (Neutrophilia).	The "First Responders" (Neutrophils) are rushing to the site of infection to eat the bacteria.	Many Neutrophils are present, some may be seen eating bacteria.	Antibioticss
2. Viral Infection	Teenager with a low-grade fever, extreme fatigue, and swollen lymph nodes in the neck for five days.	**Normal or slightly High WBC**, **High Lymphocytes** (Lymphocytosis).	The "Smart Soldiers" (Lymphocytes) are multiplying to fight the virus. Some may look "atypical" (different shape).	Many Lymphocytes are present, some are large and oddly shaped (Atypical Lymphocytes).	Symptom Support (Fluids and Rest)
3. Fungal Infection	Patient with a weakened immune system (like after a transplant) develops a persistent, unexplained fever.	**High WBC** (Leukocytosis), **High Neutrophils** (Neutrophilia).	The immune system is trying to fight a difficult invader. The fungus itself may sometimes be seen.	Neutrophils are active, and sometimes the yeast or hyphae (threads) of the fungus are visible.	Anti-Fungals
4. Acute Leukemia	Child with pale skin, easy bruising, and frequent infections that won't go away.	**Very High or Very Low WBC**, **Low RBC**, **Low Platelets**.	The bone marrow is making too many abnormal, non-working WBCs (**Blasts**), crowding out all the healthy cells.	The smear is full of large, immature, abnormal white blood cells (Blasts).	Chemo-therapy
5. Allergic Reaction	Child with chronic asthma and seasonal hay fever who is having a flare-up.	**Normal WBC**, **High Eosinophils** (Eosinophilia).	The immune system is overreacting to a harmless substance (like pollen). **Eosinophils** are the cells that respond to allergies and parasites.	A higher than normal number of Eosinophils are visible (cells with bright red/pink granules).	Anti-histamines

Standardize Patient Station:

Interacting with patients is the most important skill a health professional can develop. Human beings are unique among living organisms in our verbal ability to express the status of our body. We can say we feel warm or that our heart is racing. More than a blood test and imaging, the patient is your best source of information, if you know how to ask and listen.

The basis for this section is a standard SOAP note. This is a way for summarizing health care visits. We are only expecting students to know a VERY abbreviated version. S: Subjective, O: Objective, A: Assessment, P: Plan.

https://www.ncbi.nlm.nih.gov/books/NBK482263/

Patient Visit Components: These are the components of how each student will be evaluated on. The Standardize Patients are volunteers with various levels of health professional training (everything from medical assistants and nursing students, to kinesiology students and recently graduated MD). The event supervisors will provide them with a rubric for their experience with the WESO competitors.

A. Greeting: Competitors should greet the patients and ask how they are.
B. Hand Hygiene: When entering the room, the competitors should demonstrate good hand hygiene. This can be at a sink, with hand sanitizing gel, or simply by putting on gloves. Ideally, you would both clean the hands AND then put on glove before the physical portions.

SUBJECTIVE

C. Chief Concern : Single sentence describing why the patient has come to see the health care provider
    a. History of Present Illness: This is when a health professional asks the patient about their condition/concern. OLDCATS is one way to do this part.
    b. **O**nset: When did it start?
    c. **L**ocation: Where is it located?
    d. **D**uration: How long has it lasted?
    e. **C**haracterization: What is it like?
    f. **A**lleviating/Aggravating: What relieves the symptom? What makes it worse?
    g. **T**iming: Is it better or worse at different times of the day?
    h. **S**everity: Using a scale 1 to 5, how does the patient rate the severity of this symptom.

OBJECTIVE

D. Physical Exam: For this event, competitors should do the following physical exams
    a. Put on gloves
    b. Explain everything you are going to do and ask consent from the patient
    c. EXAM
        i. Examine the throat (say ah)
        ii. Take a temperature (follow the instructions with the thermometer)
    iii. Feel for the lymph nodes in the throats.

SPECIAL NOTE: With a standardized patient there is no way to test the accuracy of the physical exam. Standard Patients are not actually sick and will not test positive. So this part is ALL evaluated by RUBRIC.

ASSESSMENT

E. Differential Diagnosis: Students should make a list of conditions (3-4) that are most likely in order of most likely

F. <u>Share your Differential Diagnosis with the patient.</u>

PLAN (4th/5th Grade Only)

G. Order Test: Based on the differential, decide the test to order.
    a. CBC
    b. Blood Smear
    c. X-Ray/MRI

Students will choose a marked envelope that will have the results. They will then use this information to make their treatment choice.

H. Choose treatment. Using the results of their chosen test, together with the information gathered from the history and physical exam with the patient, competitors will choose treatment. These will be class-type options NOT specific drugs. There are examples:
    a. Antibiotics
    b. Anti-viral
    c. Symptom Support
    d. Vaccination
    e. Cancer Treatment

I. **<u>Closure:</u>**
    a. **<u>Convey test results and treatment to patien</u>**t. .
    b. Ask if they have any questions
    c. Say goodbye and leave

SAMPLE QUESTION (Types of questions)

These will NOT be used in this years competition

Multiple Choice

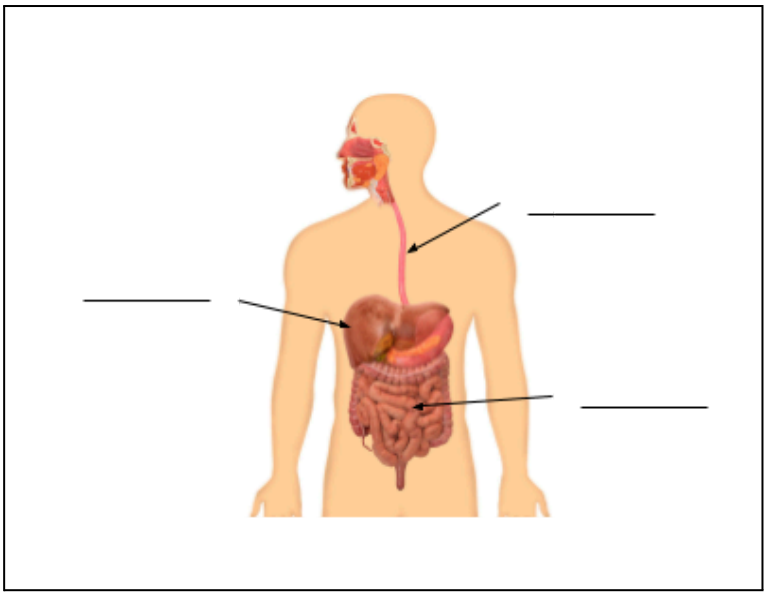
1. Which organ functions as part of the endocrine system and the digestive system:
    a. Gallbladder
    b. Esophagus
    c. Pancreas
    d. Bone Marrow
    e. Thymus

Fill in the Blank (Spelling is not counted)

2. The liver makes _____, which helps your body absorb fats.

Labeling

3. Label the organs in the image



True/False

Circle True or False for the following questions:

1. Arteries are the smallest blood vessels in the body. T or F
2. The heart has four chambers. T or F
3. Veins are blood vessels that carry deoxygenated blood. T or F

Matching–Match the building block with its description.

Building Block	Description
1. Atoms and molecules	**A. Organs are at the center**
2. Cell	**B. Different tissues combined to make larger structures**
3. Tissue	**C. Made up of molecules**
4. Organ	**D. Cells are grouped to perform same function**
5. Body system	**E. Smallest parts in body**

Sample Standard Patient Script:

“Hi, how are you?”

“What brings you in today?”

“Oh, I’m sorry you aren’t feeling well. How long has that been going on?/What color is that?/What makes it worse?”

“I’d like to take your temperature?/I’d like to feel your lymph nodes? Would it be okay if I did that?.”

“On review of your history and physical exam it is like you have one of the three following conditions–A, B, C. I’d like to do the following XXXX test.”

“Your test showed XXXX, this is consistent with YYYY conditions. I’ve going to prescribe/suggest ZZZZ medication/treatment. “

“Thank you for coming in. Please make sure to finish all the mediciation/rest/drink fluids. I hope you feel better soon.”