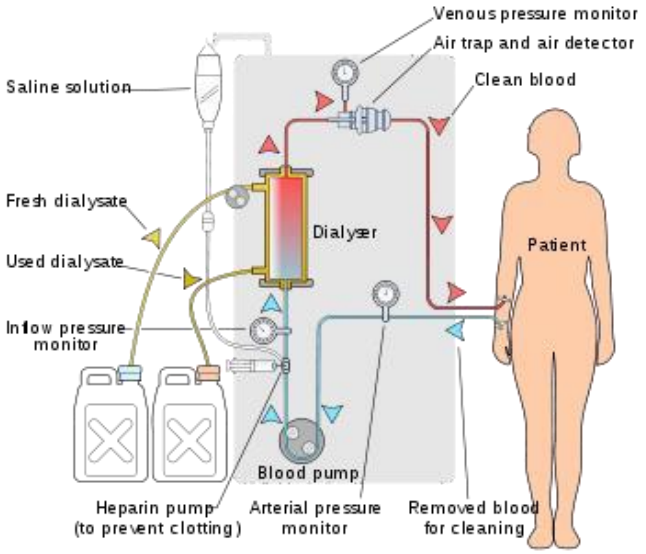
Dialysis

In medicine "dialysis", meaning dissolution, "dia", meaning through, and "lysis", meaning loosening) is primarily used to provide an artificial replacement for lost kidney function in people with renal failureالفشل الكلوي. Dialysis may be used for those with an (acute renal failure) الفشل الكلوي الحادor for those with progressive but chronically worsening kidney function–a state known as chronic kidney disease مرض الكلية المزمن.

There are two types of dialysis:

1. **hemodialysis**
2. **peritoneal dialysis**

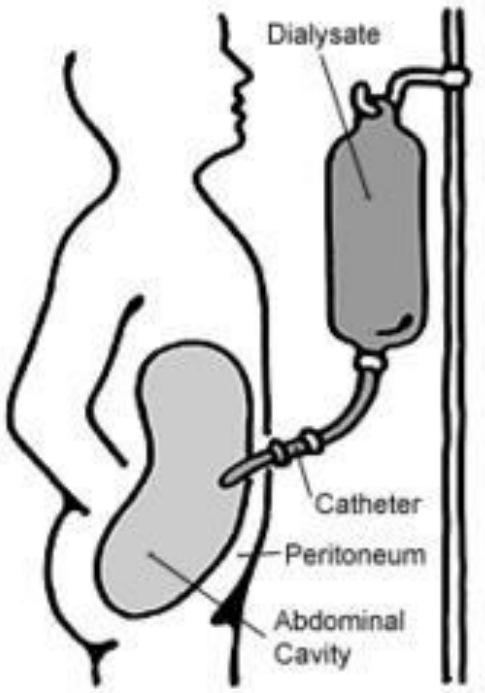
1. **In hemodialysis,** the patient's blood is pumped through the blood compartment of a dialyzer, exposing it to a partially permeable membrane. The dialyzer is composed of thousands of tiny synthetic hollow fibers. The fiber wall acts as the semipermeable membrane. Blood flows through the fibers, dialysis solution flows around the outside the fibers, and water and wastes move between these two solutions. The cleansed blood is then returned via the circuit back to the body. Ultrafiltration occurs by increasing the hydrostatic pressure across the dialyzer membrane. This usually is done by applying a negative pressure to the dialysate compartment of the dialyzer. This pressure gradient causes water and dissolved solutes to move from blood to dialysate, and allows the removal of several litres of excess fluid during a typical 3 to 5 hour treatment.



2. **In peritoneal dialysis**: sterile solutionمحلول معقم containing glucose is run through a tube into the peritoneal cavity, the abdominal body cavity around the intestineاألمعاء, where the peritoneal membraneالغشاء البريتوني acts as a semipermeable membrane. The peritoneal membrane or peritoneum is a layer of tissue containing blood vesselsشعيرات دموية that lines and surrounds the peritoneal, or abdominal, cavity and the internal abdominal organs (stomach, spleenالطحال, liver, and intestines).

After the canula القسطرة,the dialysateمحلول is leak to the abdominal body for 4-5 houres then because of concentrations different the waste products absorb from dailysate , and then it is

drained out through the tube and discarded. This cycle or "exchange" is normally repeated 4-5 times during the day, (sometimes more often overnight with an automated system). Each time the dialysate fills and empties from the abdomen is called one exchange.



Peritoneal dialysis is less efficient than hemodialysis, but because it is carried out for a longer period of time the net effect in terms of removal of waste products and of salt and water are similar to hemodialysis. Peritoneal dialysis is carried out at home by the patient.

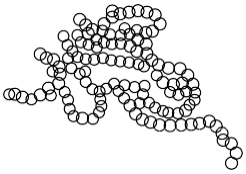
Immunological Chemistry

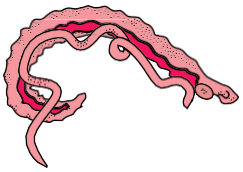
Immunology is defined as the study of the molecules, cells, organs, and systems responsible for the recognition and disposal of foreign material. ***Immunity*** is body's ability to resist or eliminate potentially harmful foreign materials or abnormal cells. Immunity is classified in to two major groups

- Nonspecific immunity (natural or innate) first line of defense like skin, tears and plasma.
- Specific immunity (acquired or adaptive) second line of defense, lymph nodes, T cells and B cells.

Immune system is a network of cells, tissues, and organs that work together to defend the body against attacks by “foreign” invaders. These are primarily *microbes* (germs)—tiny, infection causing organisms such as bacteria, viruses, parasites, and fungi. Because the human body provides an ideal environment for many microbes, they try to break in. It is the immune system’s job to keep them out or, failing that to seek out and destroy them.

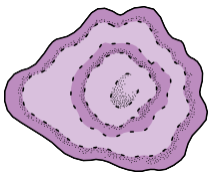
Bacteria

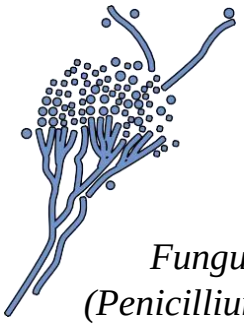




Parasite

Virus





Fungus (Penicillium mold)

When the immune system hits the wrong target or is crippled, however, it can unleash a torrent of diseases, including allergy, arthritis, or AIDS. The immune system is amazingly complex. *It can recognize and*

remember millions of different enemies, and it can produce secretions and cells to match up with and wipe out each one of them.
The secret to its success is an elaborate and dynamic communications network. Millions and millions of cells, organized into sets and subsets, gather like clouds of bees swarming around a hive and pass information back and forth. Once immune cells receive the alarm, they undergo tactical changes and begin to produce powerful chemicals. These substances allow the cells to regulate their own growth and behavior, enlist their fellows, and direct new recruits to trouble spots.

The Structure of the Immune System
The organs of the immune system are positioned throughout the body. They are called ***lymphoid organs*** because they are home to ***lymphocytes,*** small white blood cells that are the key players in the immune system.
Bone marrow, the soft tissue in the hollow center of bones, is the ultimate source of all blood cells, including white blood cells destined to become immune cells.

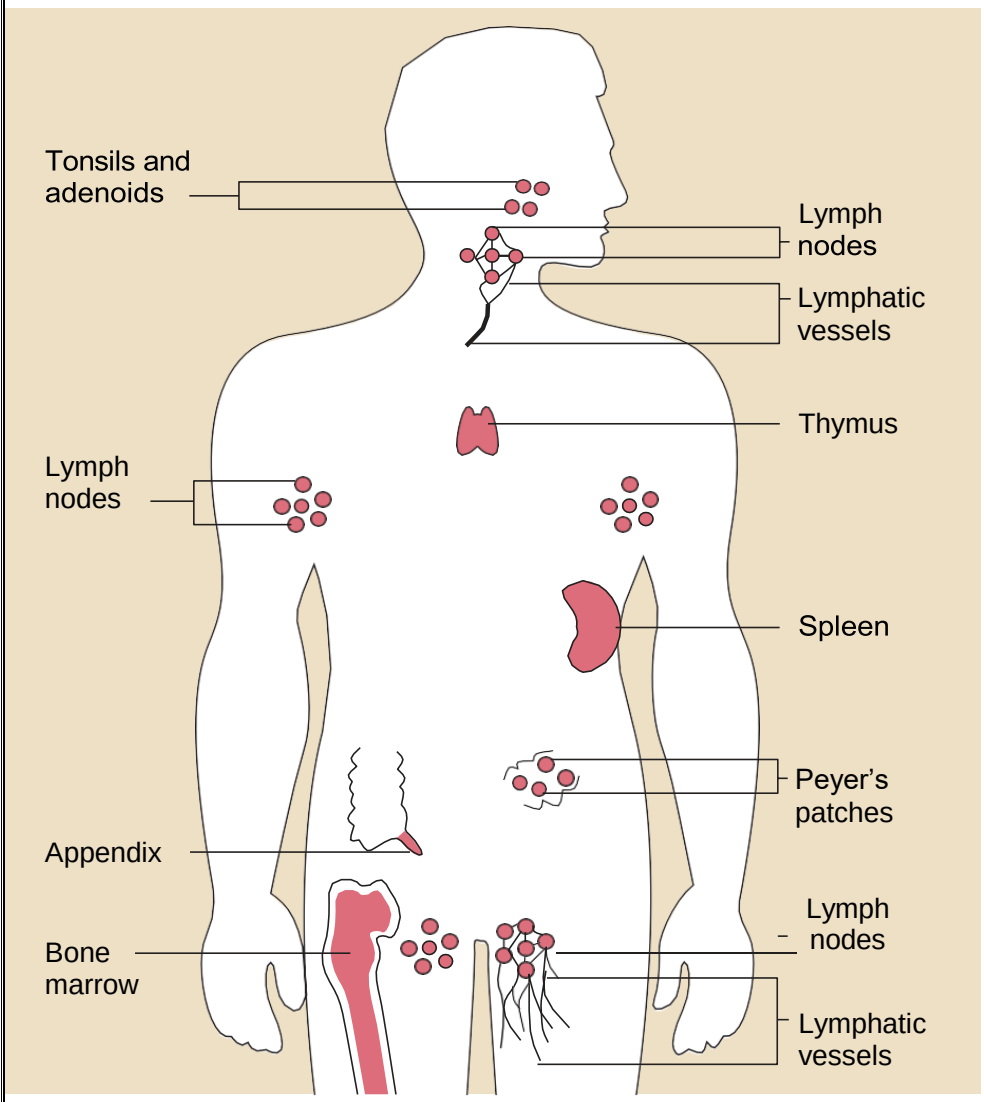
The ***thymus*** is an organ that lies behind the breastbone; lymphocytes known as *T lymphocytes*, or just "*T cells*," mature in the thymus. *lymph*, a clear fluid that bathes the body's tissues.

The ***spleen*** is a flattened organ at the upper left of the abdomen. Like the lymph nodes, the spleen contains specialized compartments where immune cells gather and work, and serves as a meeting ground where immune defenses confront antigens.
Lymph nodes acts like lymphoid filters in the lymphatic system. It responds to antigens introduced distantly and routed to them by afferent lymphatic. Generalized lymph node reactivity can occur following systemic antigen challenge.

B cells and T cells are the main types of lymphocytes.

B cells work chiefly by secreting substances called *antibodies* into the body's fluids. Antibodies ambush antigens circulating the bloodstream. They are powerless, however, to penetrate cells. The job of attacking target cells either cells that have been infected by viruses or cells that have been distorted by cancer is left to T cells or other immune cells. Unlike B cells, T cells do not recognize free-floating antigens. Rather, their surfaces contain specialized antibody-like receptors that see fragments of antigens on the surfaces of infected or cancerous cells. T cells contribute to immune defenses in two major ways: some direct and

regulate immune responses; others directly attack infected or cancerous cells.



The organs of the immune system are positioned throughout the body.

Approximate percentages of lymphocytes in lymphoid organs

Lymphoid organ	T-lymphocytes	B-lymphocytes
Thymus	100	0
Blood	80	20
Lymph nodes	60	40
Spleen	45	55
Bone marrow	10	90

Disorders of the Immune System

- *Allergic Diseases*

The most common types of allergic diseases occur when the immune system responds to a false alarm. In an allergic person, a normally harmless material such as grass pollen or house dust is mistaken for a threat and attacked.

- *Autoimmune Diseases*

Autoimmunity represents a breakdown of the immune systems no one knows exactly what causes an autoimmune disease, but multiple factors are likely to be involved. These include elements in the environment, such as viruses, certain drugs, and sunlight, all of which may damage or alter normal body cells. Hormones are suspected of playing a role, since most autoimmune diseases are far more common in women than in men. also genetic factor and age seems to be important.

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