

## AVIAN IMMUNE (DEFENSE) SYSTEM

The Latin term “IMMUNIS” means EXEMPT, referring to protection against foreign agents. The immune system of a bird enables it to resist and overcome infection.

Birds, like all animals, have very strong, built-in defenses (immunity) against diseases caused by invasion of the body by various microorganisms and toxins (collectively called ‘antigens’). The immune system is a highly complex physiological system that is yet to be fully understood.

### The Types of immunity (defenses) includes:

#### **A- Nonspecific defense mechanisms;**

- 1- Skin.
- 2- Mucous Membranes and their secretions
- 3- Blood component Blood ( white blood cells, antimicrobial proteins, inflammatory response)

#### **B- Specific defense mechanisms;**

- 1- Humoral immunity, B cell antibodies\*.
- 2- Cell mediated immunity, NK\*, T cells.

\***Humoral Immunity**; means ability to produce **antibodies** that are specific for one or a few extremely similar **antigens**,

\***NK; Natural killer** -Some kill cells, -Some stimulate antibody producing cells, -Some kill viruses.

**Antigen** – microorganisms or toxins, foreign to the body then body produce antibody and binds to a specific antigen.

**Antibody** – is an immune maternal body produced after antigen inter to the body binds to specific antigen.

### Function of immune system:

The primary role of the immune system

- 1- Is to recognize foreign or “non-self” organisms or substances, this may be in the form of an invading organism or an abnormal body cell.
- 2- Managed to enter the body and to initiate and manage the appropriate physiological responses to neutralize or eliminate them.

**The immune system uses a variety of mechanisms to achieve this goal, including:**

- 1-Inactivation of biological agents;
- 2- Phagocytosis (engulfing) of foreign agents.
- 3-Agglutination (clumping).
- 4- Lysis (rupture) of foreign cells.
- 5- Precipitation of molecules or cells.

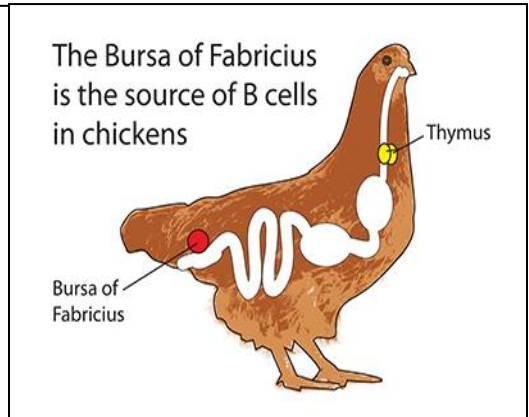
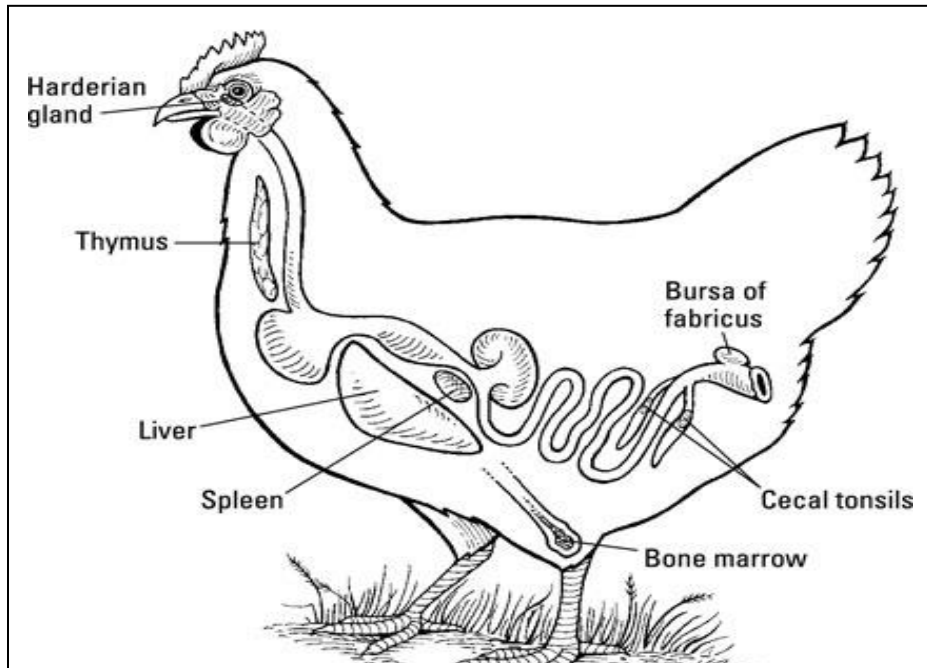
**Anatomy of immune system:****A- Primary lymphoid organs:**

- 1-Thymus, T cell lymphocyte.
- 2- Bursa of Fabricius in birds ,B cell or lymphocyte.
- 3- Bone marrow, (produce white blood cells)
- 4- Yolk sac, maternal immunity.

**Note; White blood cells functions are** **Monocytes** – main action against bacterial infections. **Eosinophils** – main action against parasitic infections. **Basophils** – responsible for responses to allergens. **Lymphocytes** – main action against viral infections, conversely **heterophil** increased when the number of lymphocyte decrease. **H/L ratio** shows the level of immunity when raised its indicator of disease.

**B- Peripheral lymphoid tissue:**

- 1- Harderian gland (eyes).
- 2- Cecal tonsils (digestive+ immune system).
- 3- Spleen (digestive + immune system).
- 4-Lymph nodes ( immune system)
- 5- Mucosal lymphoid tissues ; lungs (respiratory , immune system), gut (digestive+ immune system).



### The bursa of Fabricius & thymus gland

### Avian immune system

- **Bursa of Fabricius**; a glandular sac opening in to the cloaca of bird, producing B cells (introduced by Italian anatomist Girolama Fabrici).
- **Thymus Gland**; lymphoid organ situated the neck of vertebrates which produce T cell lymphocyte for immune system (Greek thyme bud).

The bird's immune system begins developing before hatch and is complete by sexual maturity. One of the most important stages of this development happens in the first six weeks of the chick's life, when **gene conversion is taking place in the bursa which referred to the organ is absent at first and then takes place.**

### How do antibodies fight infection?

- Antibodies do not have the capacity to kill disease organism directly.
- Antibodies perform their function by attaching to disease organisms and blocking their receptors and prevent them from attaching to their target cell.

