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TD 03 – Immunology correction

Exercise 2:

a- Antigen-Antibody (Ag-Ab) Interaction Zone:

a-1- The antibody (Ab) has two arms called "paratopes" for antigen (Ag) binding. Each paratope is formed by the variable regions of the heavy and light chains. The antigen, in turn, has antigenic determinants called "epitopes," which initiate immune responses and trigger the production of specific antibodies.

From this presentation, we can say that the Ag-Ab reaction is due to the interaction between the paratope (VH/VL) of the antibody and the epitope of the antigen in a specific and reversible manner. This interaction requires complementarity between the two reactive zones.

a-2- During the Paratope-Epitope (Ag-Ab) interaction, several types of non-covalent bonds are involved:

- **Ionic bonds** (between residues carrying opposite charges),
- **Hydrophobic interactions** (aggregation of hydrophobic groups repelled by water),
- **Hydrogen bonds** (a hydrogen atom shared between two electronegative atoms),
- **Van der Waals interactions** (between the outer electron clouds of two or more atoms).

b- Concepts of Affinity and Avidity:

- **Affinity of an antibody for an antigen:** Represents the balance of attractive and repulsive forces acting between the paratope and the epitope. In other words, it is the strength with which the paratope binds to the epitope.
- **Avidity of an antibody for an antigen:** Measures the overall strength with which a multivalent antibody (with at least two paratopes) binds to an antigen that has multiple antigenic determinants.

Thus, **affinity** refers to the binding strength between a single antigenic determinant and a single antibody paratope, while **avidity** refers to the overall binding strength between multivalent antigens and antibodies.

c- Specificity of the Ag-Ab Interaction:

Generally, there is a high degree of specificity in an antigen-antibody interaction. However, in some cases, an antibody may react with more than one antigenic determinant.

Exercise 03:

Results:

Experiment 01:

- LTx + Cdx = Proliferation

- $\text{LTy} + \text{Cdy} = \text{No proliferation}$

Conclusion:

Dendritic cells are responsible for T cell (LT) activation.

Experiment 02:

- Thymectomized mice (X) = No thymus = No mature T cells + LTy
 - Splenic cells are collected = LBx
1. $\text{LBx} + \text{LT Y} + \text{C} \rightarrow \text{Antibody-producing cells detected}$
 2. $\text{LBx} + \text{X cells} + \text{C} \rightarrow \text{No antibody-producing cells detected}$

Conclusion:

B cell (LB) activation is thymus-dependent.