

Immunology Summing Up

1. The graft is accepted when the donor and the recipient are of the same line or same strain (cases of autograft and isograft), but it is rejected when they are of different lines or different strains (cases of allograft or xenograft).
2. The percentage of graft survival increases as the compatibility of MHC between the donor and the recipient increases. Hence the survival of a graft depends on the compatibility of MHC (HLA) between the donor and the recipient.
3. The type of the immune response against a graft is specific cell mediated immune response.
4. How does a virus replicate in a host cell?
 - It adheres to the plasma membrane of its host cell.
 - It releases its genetic material in the cytoplasm of the host cell.
 - The genetic material is then integrated in the genetic material of the cell.
 - Using the cell machineries, the virus produce its proteins which are assembled to form new copies of the virus.
 - The new copies of the virus bud outside the cell causing the cell death. They then infect other cells.
5. The modified self: The "self" might undergo certain modifications if its coding genes undergo mutation (cancer) or if the peptides associated to the HLA are derived from a foreign protein (viral RNA). This new association constitutes the modified "self"
6. The primary lymphoid organs are the bone marrow and the thymus.

The bone marrow is the site of production of B and T lymphocytes and the site of maturation of B lymphocytes. However the thymus is the site of maturation of T lymphocytes.

The secondary lymphoid organs are the spleen and the lymph nodes. They are the sites where the lymphocytes (B and T) and other immune cells are present. They are the sites of immune responses against antigens.

7. Double recognition: The TCR of T cells recognizes non self peptides or modified self peptides presented by self HLA.

8. The T cells (Tc or T8) destroy only cells that:

- are infected
- belong to the same line
- infected by the same virus that activated them

9. The immune response is either non specific or specific.

It is non specific because the immune cells (macrophages and the granulocytes) do not differentiate between pathogens. The same phagocyte can digest many different pathogens.

The effectors of the non specific immune response are the macrophages and the granulocytes. The mechanism is phagocytosis (adhesion, absorption, digestion)

It is specific because an animal which is immunized against an antigen may die from the infection by other ones.

10. Types of specific immune response:

Specific humoral : when the effectors are the antibodies present in the serum .

Specific cell mediated: when the effectors are the T cells (Tc-T8)

11. The activation of B lymphocytes (or Tc lymphocytes) necessitates the cooperation between macrophages, TH cells and B cells (or Tc), in the presence of the antigen.

How?

After **phagocytosis**, the macrophage **presents** the antigenic peptides at its surface by its **HLA-II**, then it migrates to the closest lymph node where it becomes an **APC** where specific TH cell **recognizes** the HLA-peptide complex. The TH is **activated**. It **multiplies**, then **differentiates** to become interleukin secreting cell that secrete IL2 or L4.

IL2 activates Tc cells which multiplies then differentiates to become ready to destroy the infected cells.

IL4 activates B cells which multiplies then differentiates to become plasma cells that produce antibodies.

Hence

The relation between macrophages and TH is direct (double recognition)

The relation between TH and B cells or Tc cells is by means of chemical substances (interleukins), and does not need direct contact.

12. Macrophages have a role in the specific immune response at two moments: At the beginning of the specific immune response where it becomes an APC to activate TH, and at the end where it phagocytosis the antigen antibody complex (opsonization).

13. The latency time of the specific immune response is 1-2 weeks since it is the time needed for the multiplication and differentiation of the TH cells after their activation by the macrophage in the lymphnode, and the time needed for the multiplication and the differentiation of the B cells (or Tc cells) after their activation by IL4 for B cells or IL2 for Tc cells.

14. Antibodies bind to antigens before the binding of the antigen (virus...) to the membrane receptors of the target cells, hence antibodies are said to neutralize the antigen. Thus antibodies inhibit the viral infection.

Antibodies by themselves cannot destroy the antigen. The destruction of the antigen needs, in addition to the antibodies, either a macrophage which destroy the antigen antibody complex by the process of opsonization or complements that perforates the antigen causing its destruction

Antibodies are very efficient in preventing the penetration of intracellular pathogens in their target cells.

Antibodies are specific. Complements are not.

15. The specific immune response against a virus is cell mediated. Since the virus integrates its DNA into the genome of infected cells and modifies their immunological self. This modified self is only recognized by the TH8 which are the effectors of the cell mediated response.

However the specific immune response against bacteria is humoral since most bacteria can multiply in the extracellular medium without infecting a cell, so they do not modify the immunological self, hence antibodies which are the effectors of the humoral immune response bind to them before being eliminated by macrophages or complements.

16. Tc cells destroy infected cells or cancer cells by releasing perforin then granzymes...

17. The secondary immune response, compared to the primary response, is faster, more amplified and more persistent.

This is due to the presence of memory cells that are more numerous and more differentiated than the cells of the primary response.

18. Two therapeutic applications against antigens are vaccination and serotherapy

Serotherapy is called passive immunization because it provides the individual with "ready-made" antibodies and does not activate his/her own immune system; on the other hand, vaccination is an active immunization because it activates the immune response of the individual, who then manufactures his/her own antibodies.

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