

IMMUNOLOGICAL TOLERANCE

PROF. ANAND PRAKASH
DEPARTMENT OF BIOTECHNOLOGY
MAHATMA GANDHI CENTRAL UNIVERSITY
MOTIHARI
BIHAR

TOLERANCE AND AUTOIMMUNITY

- Tolerance is *the state of non responsiveness* of an immune system against a particular antigen to substances or tissues which are immunogenic and can evoke an immune response.
- The primary goal of the immune system is to discriminate between self and non-self.
- It has elaborate mechanisms to filter out or calm, immune cells, which can cause harm to the body's own cells, tissues, and organs.
- In an event of loss of tolerance, disorders such as autoimmune diseases or allergy to food may develop.

CLONAL SELECTION AND TOLERANCE

- Tolerance to self/auto antigens occurs during development of foetus.
- Tolerance to non-self antigens occurs after birth
- An antigen for which tolerance develops is called a **tolerogen**.
- Tolerance is both antigen and cell clone-specific:
- The tolerance is selective for the **tolerogen** that induced it. The immune response to other antigens is retained as such.
- Tolerance is not immune suppression (such as that induced by post-transplant drugs like cyclosporine)

CENTRAL VS. PERIPHERAL TOLERANCE

- Tolerance dependent on the tutelage of lymphocytes (B and T cells) to become non-responsive or tolerant towards encountered antigens
- It occurs not only in the primary lymphoid organs such as bone marrow, thymus (Central) but also in the secondary lymphoid organs and tissues such as spleen, lymph nodes (Peripheral).
- The processes or mechanisms operative towards induction and maintenance of tolerance are different for B and T cells, and that operative in the central and peripheral lymphoid organs

ANTIGENS

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graph TD; A[ANTIGENS] <--> B[FOREIGN ANTIGENS]; A <--> C[SELF ANTIGENS]; B --> D["• Hetero antigens<br>• No part of Human Body"]; C --> E["• Auto-antigens<br>• Own Cells and Molecules"];
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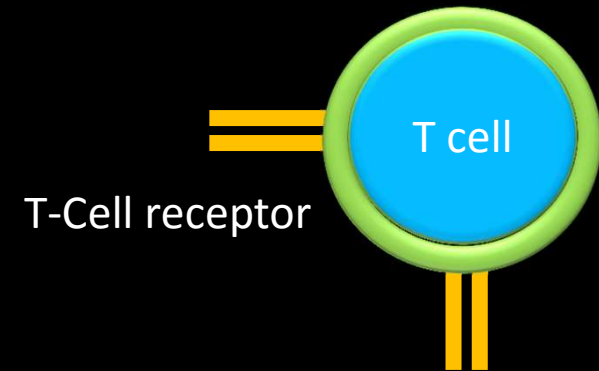
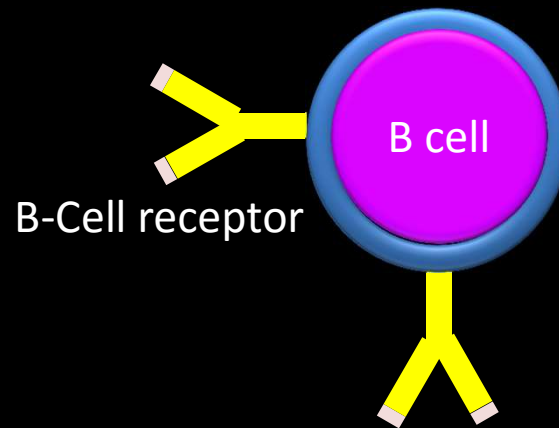
The diagram is a flowchart on a black background. At the top is a purple-outlined box labeled 'ANTIGENS'. Below it are two boxes: 'FOREIGN ANTIGENS' on the left with an orange outline, and 'SELF ANTIGENS' on the right with a green outline. A light blue double-headed arrow connects the 'ANTIGENS' box to the space between the two lower boxes. Below 'FOREIGN ANTIGENS' is a yellow-outlined box containing two bullet points: 'Hetero antigens' and 'No part of Human Body'. Below 'SELF ANTIGENS' is a yellow-outlined box containing two bullet points: 'Auto-antigens' and 'Own Cells and Molecules'. Light blue arrows point from the 'FOREIGN ANTIGENS' and 'SELF ANTIGENS' boxes down to their respective detail boxes.

FOREIGN ANTIGENS

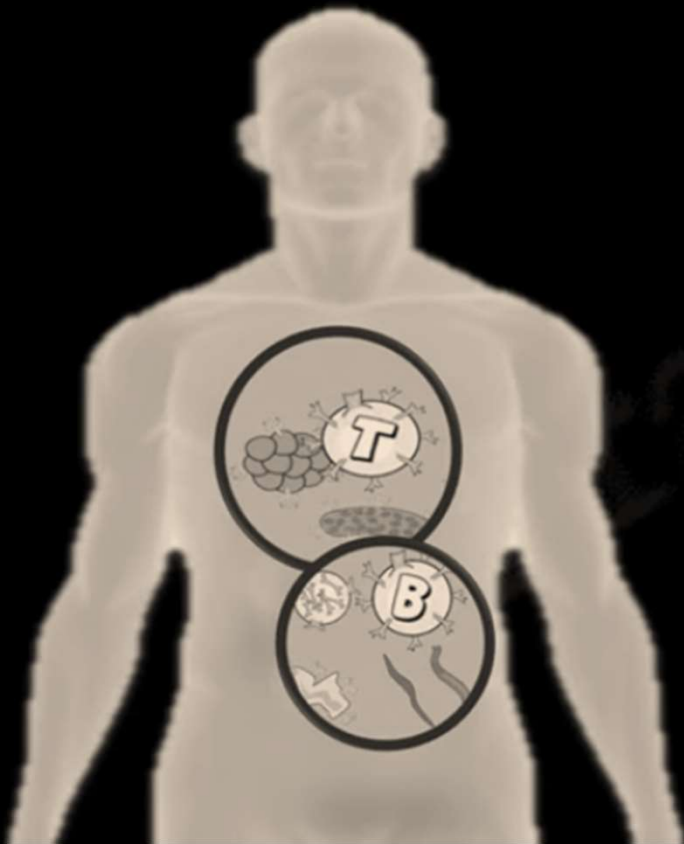
- Hetero antigens
- No part of Human Body

SELF ANTIGENS

- Auto-antigens
- Own Cells and Molecules



B-Cells and T- Cells with distinct
receptors present in the immune
system which can virtually bind any
antigen



The lymphocytes with TCRs and BCRs with diverse specificities are constantly produced in the bone marrow and some of these may be having specificity for self antigens

Self Antigens
Auto Antigens
Own Cells and
Molecules

Auto reactive or
self reactive
lymphocytes

This means that our immune system can attack our own cells and molecules and cause self destruction. It will be very interesting to find out how these self reactive lymphocytes are filtered out from immune system to prevent auto-immunity?

Our immune system has a distinct feature which enables it to react to in numerous number of foreign antigens but shows no reactivity to self or auto-antigens. This phenomenon is called

TOLERANCE

The state of unresponsiveness of our Immune System to Foreign antigens is called

IMMUNE TOLERANCE

The state of unresponsiveness of our immune system to self antigens is called

SELF TOLERANCE

SELF TOLERANCE

If self tolerance fails the immune system starts attacking self.

AUTO-IMMUNITY

Immune system attacks itself

AUTO-IMMUNE DISEASES

The immune system starts destroying it's own molecules, cells and organs in an individual

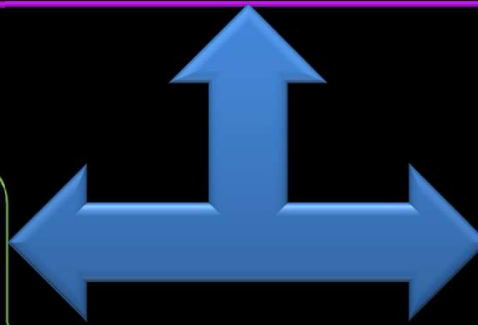
*How immune responses to
self are prevented ?*

SELF TOLERANCE

*Attained by distinct processes and mechanisms
operative on the cells of the immune system*

Central Tolerance

*Peripheral
Tolerance*



CENTRAL TOLERANCE

Central refers to the primary Lymphoid organs where the lymphocytes develop and differentiate

THYMUS and BONE MARROW

The T-Cells and B-Cells receptors are formed in the Primary Lymphoid organs

CENTRAL TOLERANCE

Central tolerance is induced during the early development of T-Cells and B-Cells

Central tolerance mechanisms and processes operative during early stages of Lymphocyte development eliminate the such T-Cells and B-Cells which are self reactive.

Central Tolerance does not result in 100% removal of Self reactive Lymphocytes. It is not **FOOL PROOF**.

PERIPHERAL TOLERANCE

*Peripheral tolerance is induced in
mature T-Cells and B-Cells*

PERIPHERAL TOLERANCE REMOVES
AUTO-REACTIVE MATURE T-CELLS AND
B-CELLS FROM AND PREVENT SELF
ATTACK

Thank You

To be continued....