HARMFUL ASPECTS OF THE IMMUNE RESPONSES – DISORDERS IN IMMUNITY.

Hypersensitivity:

Antigen: Allergen
Sensitizing dose
Shocking dose

Atopic, Atopy

Classified into
1) Immediate H
2) Delayed H

4 Types:
  Type I, II, and III – humoral Ab
  Type IV – effector T – cells in CMI

A) Type I:  Anaphylaxis Reactions

- Mast cell or basophil + IgE \(\rightarrow\) Degranulation (release chemical mediators)
**Circulating basophils might be a precursor of mast cells.
- Mediators: histamine, leukotrienes, prostaglandines, kinins

Systemic anaphylaxis:
Mediators may cause dilation of peripheral blood vessel – drop of pressure causing shock
Chest constrictions. e.g. bee sting, penicillin treatment with epinephrine

Localized anaphylaxis:
Associated with ingested (food) & inhaled (pollen) depending on the route of Ag entries.
  e.g.  Upper respiratory – hay fever.
  Lower respiratory – asthma (symptoms wheezing & shortness of breath).
  Digestive tract – hives.

Prevention of Anaphylactic Reactions:
**Desensitization** – to produce IgG rather than IgE by injection of a series of dosages of Ag under the skin.

B) Type II:  Cytotoxic Reactions

Ag on the host tissue + Ab + C'(involved)
1) Lysis of tissue cells
2) Attach to the phagocytic cells which will destroy the host tissue – opsonization

  e.g.1  ABO blood transfusion
  e.g.2  ITP (Idiopathic Thrombocytopenic Purpura) drug induced blood disease after viral infection.

Drug (hapten) + platelet + Ab + C' \(\rightarrow\) lysis of the platelet
Low counts of the platelets – Hemophiliac
C) **Type III: Immune Complex Reactions**
Mostly IgG & IgM involved.
Ratio differences in Ags & Abs
\[
\begin{align*}
[\text{Ag}] &>> [\text{Ab}] \quad \text{Inflammation} \\
[\text{Ag}] &<< [\text{Ab}] \quad \text{Phagocytosis} \\
[\text{Ag}] &\geq [\text{Ab}] \quad \text{Soluble small Ag - Ab complex escape phagocytosis.}
\end{align*}
\]
*e.g. Glomerulonephritis:* inflammatory damage in glomeruli
*Rheumatoid arthritis:* Ag – Ab - C’ deposits in the joints, causing chronic inflammation
*Rheumatic fever:* Ag – Ab - C’ damages the heart valves or heart muscle

D) **Type IV: Cell Mediated Immune Responses**
T-cell mediated, delayed type hypersensitivity
*e.g.* Tuberculin test, contact dermatitis, organ rejection

**TRANSPLANTATION:**
Organ transplantation
Tissue grafts
Privileged sites – areas where Abs are not circulating.
*e.g.* Cornea (interior chamber of the eyes)
Privileged tissue – does not stimulate an immune rejection.
*e.g.* Pig’s heart valve – human heart valve.

*Autocraft:* One’s own tissue
*Isocraft:* Identical twin’s tissue
*Allocraft:* HLA antigen are matching graft between persons who are not twins
*Xenocraft:* Organs from animals. *e.g.* Baby fæ with a baboon heart.

**IMMUNOSUPPRESSION MEDICINE:**
Should be specific.
X-ray irradiation, drug, antilymphocytes – not too general, suppress both humoral & CMI
A drug "cyclosporine" – transplantation medicine specifically suppress CMI, block T – cell proliferation.

**Immune Deficiency:**
AIDS by Retrovirus.
Genetic disorder
**ABO – Blood grouping**

Human blood typing
A, B, AB, O – ABO blood grouping system

RBC: considered as Antigen

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<thead>
<tr>
<th>Blood group</th>
<th>Ags on the cells</th>
<th>Serum Abs</th>
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<tbody>
<tr>
<td>A</td>
<td>A</td>
<td>α – B</td>
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<tr>
<td>B</td>
<td>B</td>
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<td>AB</td>
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<tr>
<td>O</td>
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**Rh factor**

1. Rhesus monkey RBC
2. 85% human RBC Rh⁺
3. Rh antigen in Rh⁺ individuals
4. Rh⁺ person will develop Rh antibody if exposed to Rh antigen – Second dose may lead hemolytic reaction against transfused Rh⁺ blood.