**Immunity to infection**

**Immunity to bacterial infection**

1. **Humoral immune response –** Antibodies appear following infections or immunization.

**A/ IgM**  antibody appears in blood first followedby IgG. IgM disappears early but IgG antibody persist longer.

**B/**  **Neutralization antibodies**  appear in serum in response to toxins and enzymes produced by some bacteria (e.g Clostridia, *Str. pyogenes*, *Staph. aureus* etc). Specific antibody combines near the active site of toxin and neutralizes its effect.

**C/ Encapsulated bacteria** are coated with specific capsular antibody. The rate of clearance of these antibody-coated microorganisms by phagocytes is high due to opsonization.

**D/ Direct binding of antibody with bacteria/** The bound antibody can kill the bacteria on its own or in conjunction with host factors (complement C3, properdin) leading to effective phagocytosis.

**D/ Secretory IgA protects mucosal surfaces /**  of gastrointestinal respiratory tracts and prevent colonization of pathogenic bacteria on mucosa surfaces**.**

1. **Cell-mediated immune response**

Antigen-sensitized T-cells potentiated bacterial clearances, produce lymphokines that attracts phagocytes to the site of infection. Lymphokines also activated macrophages, many bacteria are killed by activated macrophages. Some pathogenic bacteria haveevolved mechanisms to parasitise and replicate within phagocytic cells (macrophages) to evade host defence mechanisms (e.g tubercle bacilli, leprosy bacilli).

**Immunity to viral infection**

Viruses are usually strongly immunogenic and elicit both humoral and cellular response. Specific antibodies can neutralize virions. Cellular response kills virus infected cells which express viral proteins (glycoprotein of envelope and sometimes core proteins).

**A/ Huomral response –** Antibodies can not penetrate the host cell, so it has got no role against latent virus infection and those that spread from cell to cell. Some viruses bud off from the surface of infected cell and spread to adjacent cells without becoming exposed to antibody. Spread of virus from cell to cell can be prevented by antibodies to the fusion antigen.

1. Specific antibodies combine with free virus leading to neutralization of virus particles.
2. Even if the virus that entered into a host cell, the uncoating with its release of viral nucleic acid into the host cell cytoplasm can be stopped if the virus is covered by antibody.
3. Antibodies can bring about aggregation of virus particles, which limits the spread of virus from cell to cell. The Ag-Ab complex thus formed is readily phagocytosed.
4. Complement can aid in the elimination of virus either by enhance neutralization by opsonizing the virus particles or by lysing enveloped virons or by inactive some viruses.

**B/ Cell-mediated immune response**

Cell-mediated immunity is important in intracellular viral infections and in the eradication the virus from the host. The destruction of virus infected cell may be brought about by direct killing by cytotoxic T-cell and by antibody-dependant cell-cytotoxicity (ADCC).

**ADCC / The killer cells have macrophage markers rather than T-cell markers, they possess surface immunoglobulins. They recognize Fc portion of Ab bound to viral antigens present on the infected cell surface and react with the same and cause death of the cell. The interaction brings the two cells closed together and toxic molecule is released onto the target cell membrane causing cell death.**

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