

hypersensitivity

type 3

i.e immune-complex reactions

mechanism

- involves soluble antigens that are not bound to cell surfaces
- immune complexes of different sizes form
- Circulating Immune complex deposition, it is generally due to high quantity of soluble antigens and/or antibody

causes

- Persistent infection: strep. Viral hepatitis
- Autoimmune disease: SLE, Rheumatoid arthritis
- Frequent inhalation of antigen : extrinsic allergic alveolitis (IgG)
- Injection of large quantity of Ag (injection of high quantity of penicillin or antitoxins for long period called serum sickness)
- Impaired clearance of the immune complex as in SLE

tissue damage results from

- recruitment of leukocytes causing platelet and basophils aggregation or release their mediators that increase vascular permeability
- Increase anaphylatoxins (C3a, C5a)
- phagocytes react with complex because high immune complex size, they release mediators out side lead to inflammation and tissue damage
- Activate macrophage release IL-1 and TNF alpha

examples

- Systemic lupus erythromatosus (SLE), high anti-DNA and anti-nuclear proteins antibody, immune complex in kidney, skin joints
- Post strept-glomerulonephritis, high ab against strep Ag-immune complex on joints
- Poly arteritis nodosa; chronic infection of viral hepatitis, high ab, immune complex on vessels

symptoms

- arthritis
- fever developed in patients (serum sickness), skin eruptions (mainly consisting of urticaria), and lymphadenopathy
- glomerulonephritis

tests

- Symptoms depending on site of precipitation
- Tissue biopsy and staining by Immunofluorescence (granular appearance)
- Assay for circulating immune complexes using patient serum (C1q binding assay)

hypersensitivity

type 4

i.e Delayed hypersensitivity develops 24 to 48 hours after antigen challenge in second exposure

caused by

- Autoimmune; As in rheumatoid arthritis (RA), multiple sclerosis, type 1 diabetes, psoriasis and inflammatory bowel disease
- non autoimmune is contact dermatitis (poison ivy, chemicals, heavy metals, etc.) and in TB test, the lesions are more papular.

mediated by cells

- CTLs may contribute to type 4 reaction as in type 1 diabetes (cell mediated) after viral hepatitis
- lymphocytes and macrophages over activation is involved in the granulomas formation after intracellular infection result from. (leprosy, histoplasmosis, toxoplasmosis, leishmaniasis, etc.)

treatment

- a soluble form of the TNF receptor and anti-TNF antibodies, which bind to and neutralize TNF. In rheumatoid arthritis (RA), Crohn's disease, and the skin disease psoriasis
- Antibodies to the IL-6 receptor have been successfully used in trials for adult rheumatoid arthritis (RA).

types

Contact dermatitis

48-72 hr
Local eczema; mostly from nickel or rubber; the Ag is very small & lipophilic (haptens). react with self proteins

Two phases:

- Sensitization after first exposure; takes 10-14 days
- the elicitation (activation) phase in second exposure (gives the symptoms)

langerhans cells process Ags, then activate T cells in LN to TH1,17 with the consequent production of memory T cells, which end up in the dermis.

leads to antigen presentation to memory T cells in the dermis, with release of T-cell cytokines such as IFN- γ and IL-17.

This stimulates the keratinocytes of the epidermis to release cytokines such as IL-1, IL-6, TNF- α .

inducing the migration of macrophages (Giant cells), T cell accumulation with macrophages (granuloma)

Cessation of reaction is as a result of

Removing the Ag, more IL-10 (from TH2 cells), TGF beta (from keratinocytes) & PGE (from macrophages)

tuberculin

Tuberculin test (PPD test or mantoux test)

after second exposure to tuberculin Ag develop a delayed hypersensitivity reaction manifested by inflammation and hardening in the dermis (from TB). local induration

a positive TB skin test means they probably have TB germs in their body, latent TB infection or TB disease

should be confirmed by chest X-ray

used for
general measure of the efficacy of cell mediated immunity by using injection with common antigens as candida albicans.

-Test for TB.

A false positive result may be caused by nontuberculous mycobacteria or previous administration of BCG vaccine

A false negative in Those who are immunologically compromised

48-72 hr
Mediated by memory Th1 and macrophages (IL-1, TNF and IFN gamma).

Granulomatous

after 21-28 days

Causes:

- immune granuloma as in TB, Leprosy, leishmania. Immune mediated crohns and sarcoidosis (Ag is unknown)
- Inorganic Antigen as talc and silica (non immune-granuloma, no T lymphocytes involvement)

Epithelioid cells are activated macrophages resembling epithelial cells