Modern looks on athopic diseases as on system diseases.
Allergic diseases.
Classification, clinical examples.

HYPERSENSITIVITY REACTIONS

EXAGGERATED IMMUNOLOGICAL REACTIONS

↓

HARMFUL INFLAMMATORY REACTIONS

↓

DISCOMFORT
TISSUE DAMAGE

HYPERSENSITIVITY REACTIONS ASSOCIATED WITH

- ALLERGIES
- RHEUMATOID ARTHRITIS
- INSULIN-DEPENDENT DIABETES
- REJECTION OF TRANSPLANTED ORGANS
- INFECTIOUS DISEASES LIKE TUBERCULOSIS
- WEARING OF NICKEL-CONTAINING JEWELERY
- DRUG USE EG.ANTIBIOTICS

DIVISION ACCORDING TO GELL & COOMBS

TYPE 1	TYPE 2	TYPE 3	TYPE 4
EARLY PHASE IgE	IgG, IgM	IgG, IgM	-
MAST CELLS BASOPHILS	NEUTROPHILS	NEUTROPHILS	T-CELLS MACROPHAGE
LATE PHASE Th2-CELLS EOSINOPHILS			

TYPE 1 HYPERSENSITIVITY REACTION

SYNONYMS:

- ALLERGY, ATOPY
- IgE-MEDIATED TYPE HYPERSENSITIVITY REACTIONS
- IMMEDIATE TYPE HYPERSENSITIVITY (EARLY PHASE)

PREVALENCE OF ALLERGY

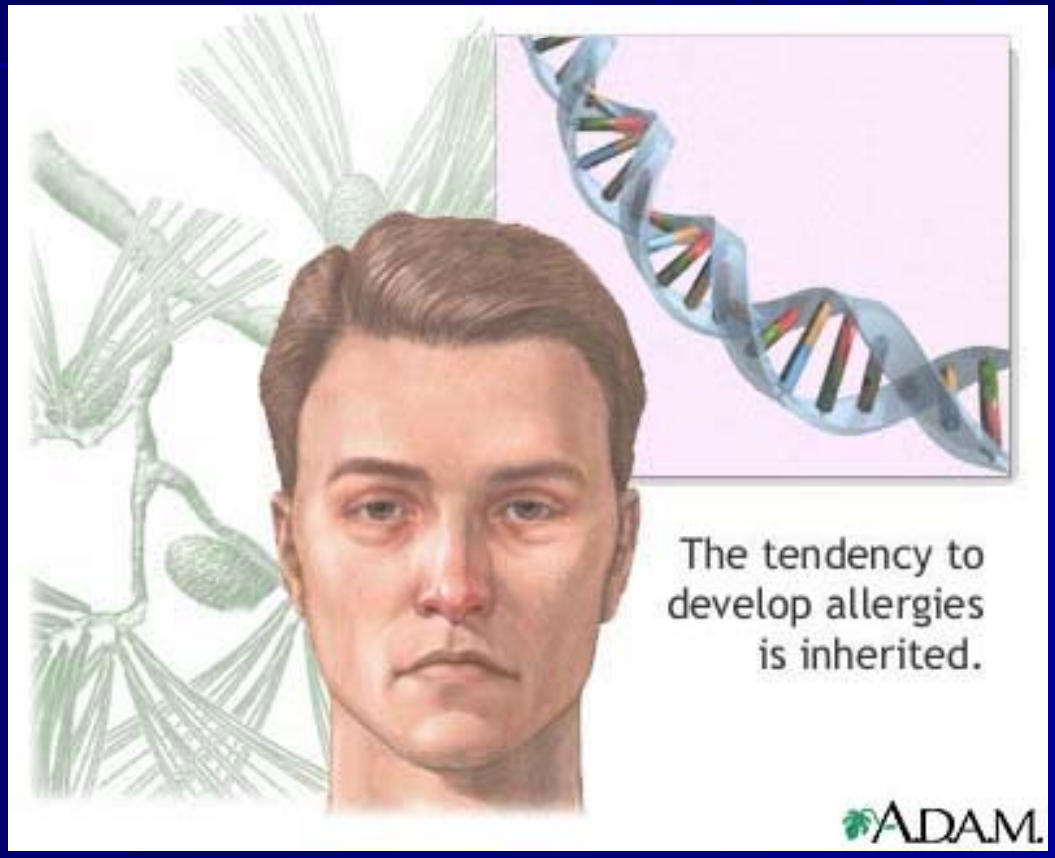
- 20% OF WORLD POPULATION
- IN US ESTIMATED ON 50 MIL.
- IN US: 6TH LEADING CAUSE OF CHRONIC DISEASE

P67, 13.2

TYPE 1 HYPERSENSITIVITY REACTION:

THE SUSCEPTIBILITY OF CERTAIN INDIVIDUALS
TO BE ALLERGENIC
TO ENVIRONMENTAL ALLERGENS

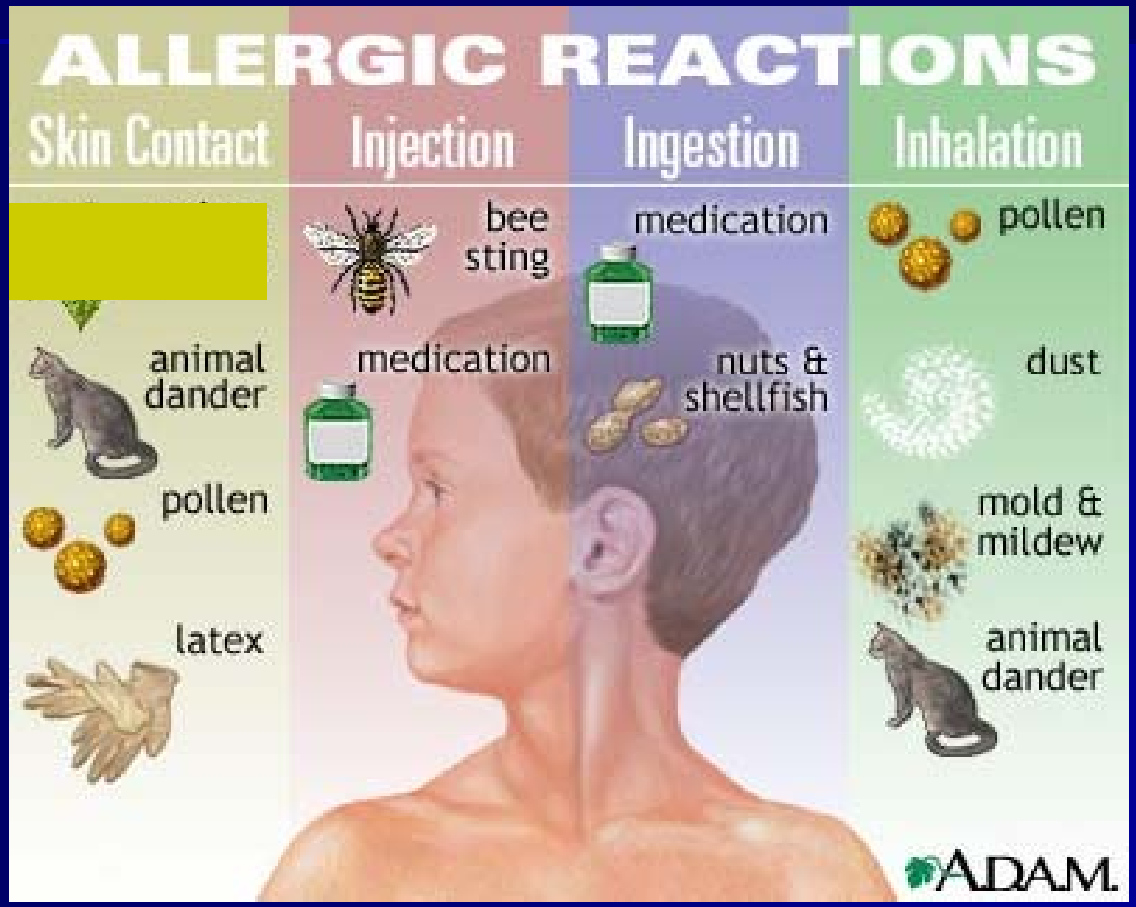
P67, 13.2



ENVIRONMENTAL FACTORS ALSO PLAY A ROLE

- ALLERGY CAUSED BY ENVIRONMENTAL FACTORS
- SEASONAL NATURE OF ALLERGIES
- CHILDREN, RAISED IN HOMES OF SMOKERS, AT INCREASED RISK TO HAVE ASTHMA
- INCREASED RISK OF ALLERGIES IN DEVELOPED COUNTRIES

ALLERGENS


ALLERGIC REACTIONS
Skin Contact
Injection
Ingestion
Inhalation
animal dander
pollen
latex
bee sting
medication
medication
nuts & shellfish
pollen
dust
mold & mildew
animal dander
A.D.A.M.

HOUSE DUST MITE

COCKROACHES

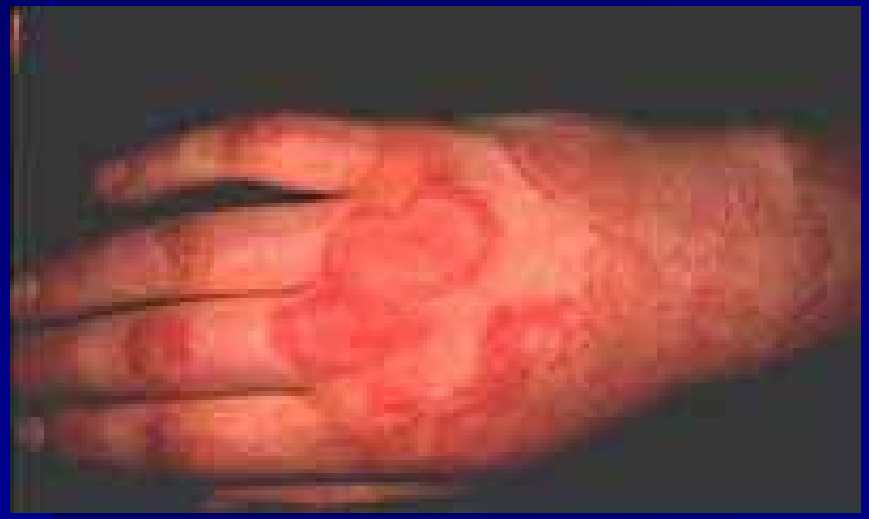
ABOUT ALLERGENS

- THEY ARE ANTIGENS THAT EVOKE $CD4^{+}TH_2$ CELLS THAT DRIVE AN IgE RESPONSE
- INHALED ALLERGENS ARE SMALL, HIGHLY SOLUBLE PROTEINS, CARRIED ON PARTICLES
- ALLERGENS ARE PRESENTED TO IMMUNE SYSTEM AT VERY LOW DOSES

ALLERGIC CONDITIONS

ALLERGIC RHINITIS
ALLERGIC ASTHMA
ATOPIC DERMATITIS
FOOD ALLERGY
SYSTEMIC ANAPHYLAXIS
URTICARIA

URTICARIA or HIVES



NON-ALLERGIC CONDITIONS

i.e. ABSENCE OF IGE-MEDIATED ALLERGY

EXAMPLES:
NON-ALLERGIC RHINITIS
ECZEMATOUS DERMATITIS
NON-ALLERGIC ASTHMA

DISTINCTION BETWEEN TYPES OF ASTHMA

ALLERGIC ASTHMA

- FAMILY HISTORY OF ATOPY (ALLERGY)
- GENERALLY DEVELOP DISEASE EARLY IN LIFE (USUALLY IN INFANCY & CHILDHOOD)
- HIGH CIRCULATING IgE
- POSITIVE SKIN TEST
- SEASONAL OR EPISODIC NATURE

NON-ALLERGIC ASTHMA

- NOT ASSOCIATED WITH ATOPY
- A FAMILY HISTORY OF ASTHMA ONLY)
- GENERALLY OCCUR IN ADULT LIFE
- NORMAL LEVELS OF IgE

CHARACTERISTICS OF TYPE 1 HYPERSENSITIVITY

2 PHASES:

EARLY PHASE:

- WITHIN MINUTES
- INITIATED BY IgE STIMULATION OF MAST CELLS,BASOPHILS

LATE PHASE

- WITHIN 6-24 HOURS
- INFLUX OF Th2, EOSINOPHILS

ROLE PLAYERS IN ALLERGY

Th_2 LYMPHOCYTES
B-LYMPHOCYTES
IgE
MAST CELLS and BASOPHILS
EOSINOPHILS

ACTIVATION OF Th2 AND PRODUCTION OF IgE

ALLERGENS INHALED

↓

DENDRITIC CELLS IN AIRWAY MUCOSA INGEST ALLERGENS

↓

PRESENT THEM TO CD4+ Th0 CELLS

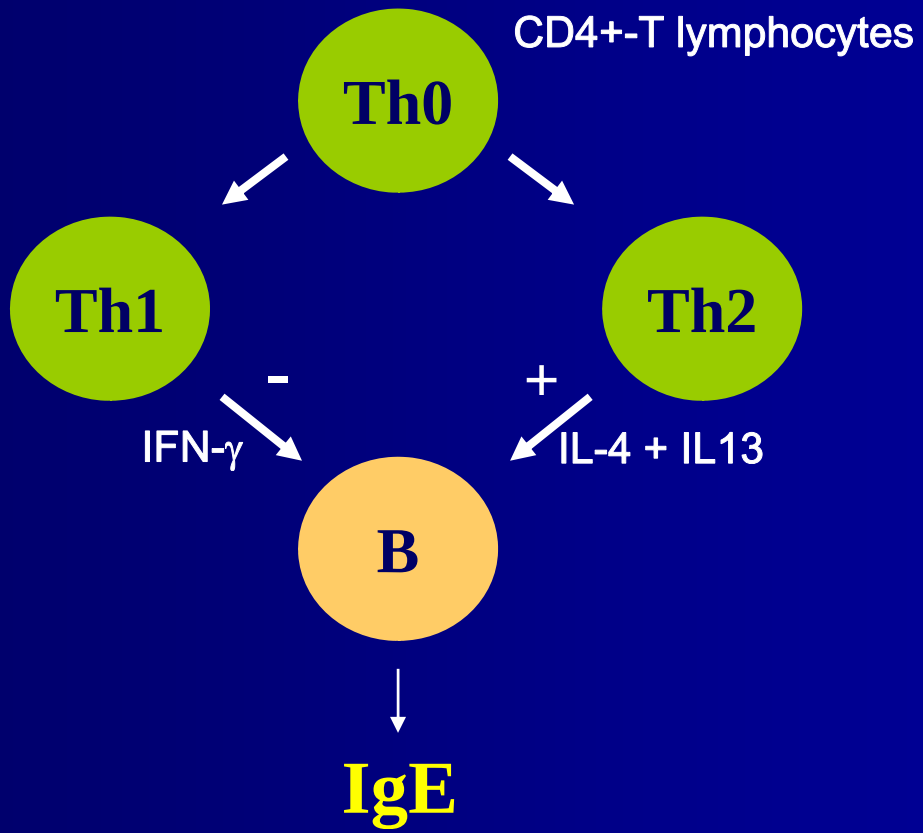
↓

LOW DOSES FAVOUR DIFFERENTIATION OF Th2

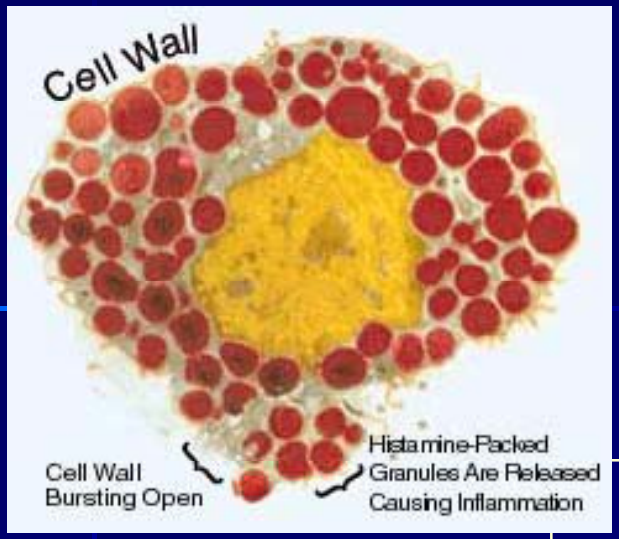
↓

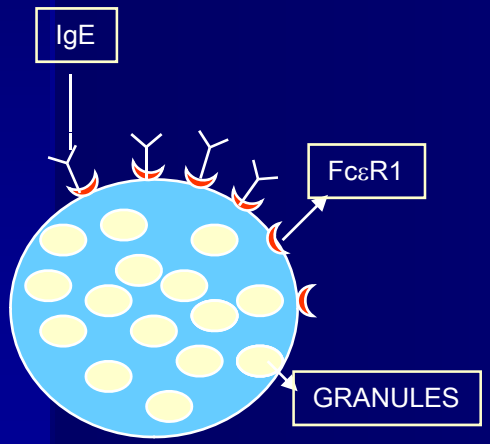
Th2 RELEASE IL4 THAT DRIVES B-CELLS TO PRODUCE IgE

IgE



MAST CELLS





SCATTERED IN CONNECTIVE TISSUE THROUGHOUT THE BODY eg.

- SKIN, LUNG ALVEOLI, GUT MUCOSA;
- AROUND SMALL BLOOD VESSELS

- CONTAINS FcεR1: HIGH AFFINITY R FOR IgE
- IL 4 (& IL 10) ↑ MAST CELL GROWTH

EOSINOPHILS

- IL5 BY TH2 CAUSE GROWTH, DIFFERENTIATION, SURVIVAL.
- PARTICIPATE IN LATE PHASE OF ALLERGIC REACTION
- RELEASE ENZYMES→TISSUE DAMAGE

COURSE OF TYPE 1 HYPERSENSITIVITY REACTION

EARLY PHASE

- FIRST EXPOSURE TO ALLERGEN (POLLEN) OF A SUSCEPTIBLE INDIVIDUAL

- SMALL, HIGHLY SOLUBLE PROTEINS (ALLERGENS) CARRIED ON PARTICLES EG POLLEN GRAINS/MITE EXCRETIONS

↓

INHALED

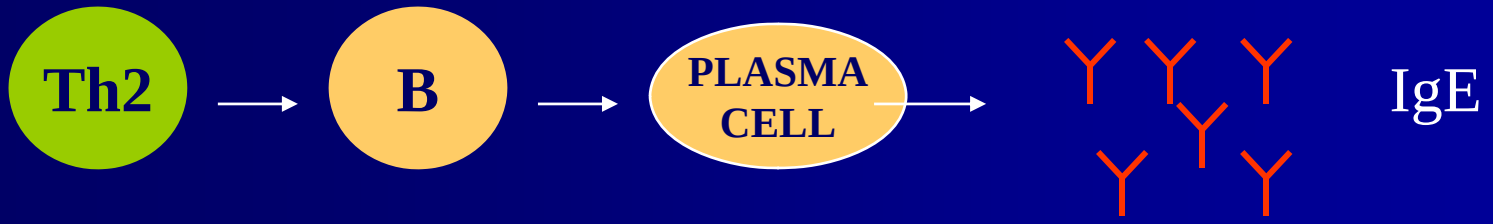
↓

- SOLUBLE ALLERGEN ELUTES FROM PARTICLE & DIFFUSES INTO MUCOSA OF AIRWAYS

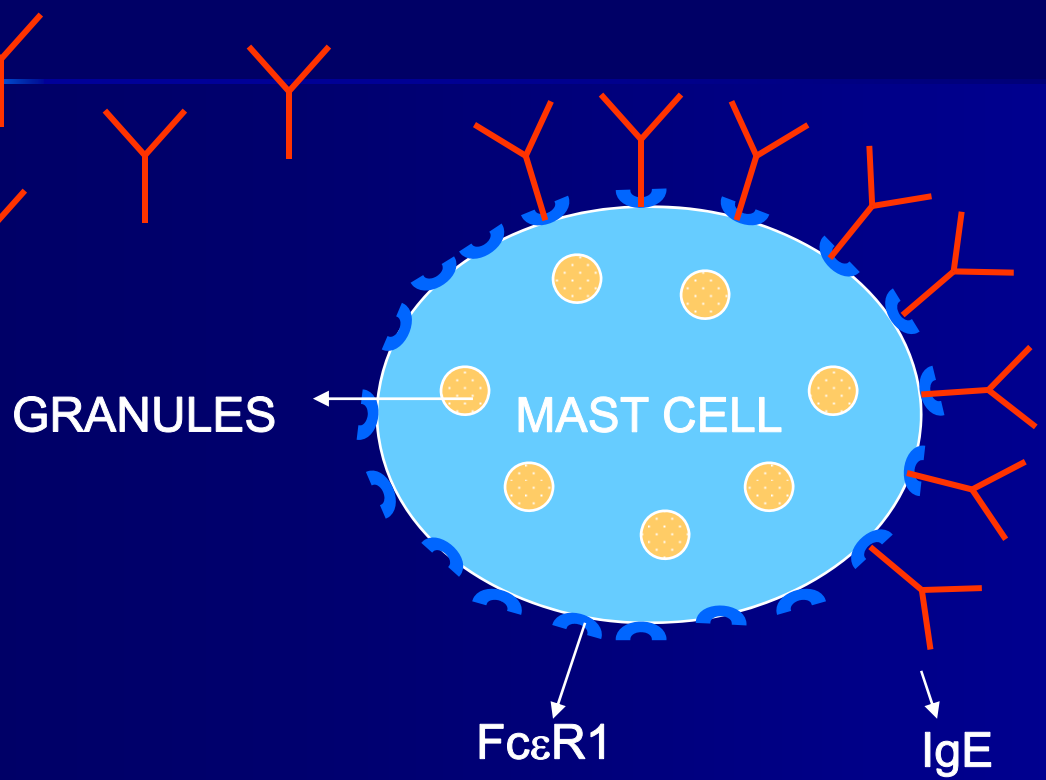
↓

- DENDRITIC CELLS TAKE UP ALG & PRESENT TO Th0. LOW DOSES FAVOUR DEVELOPMENT OF Th2

↓

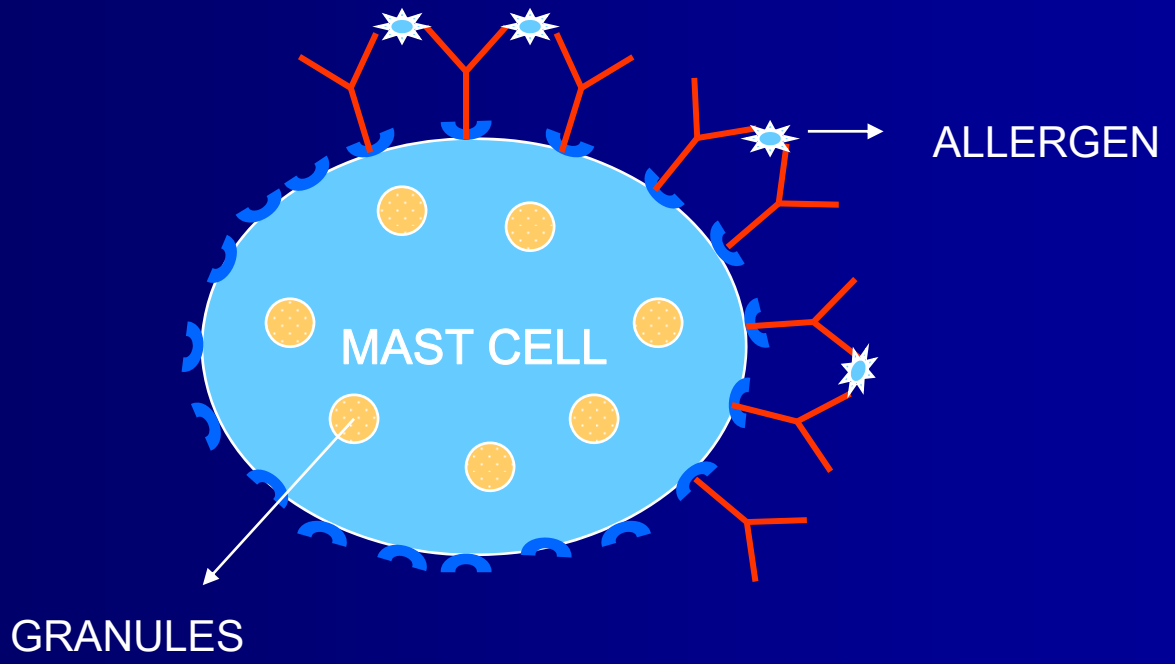


- IgE BINDS TO MAST CELLS

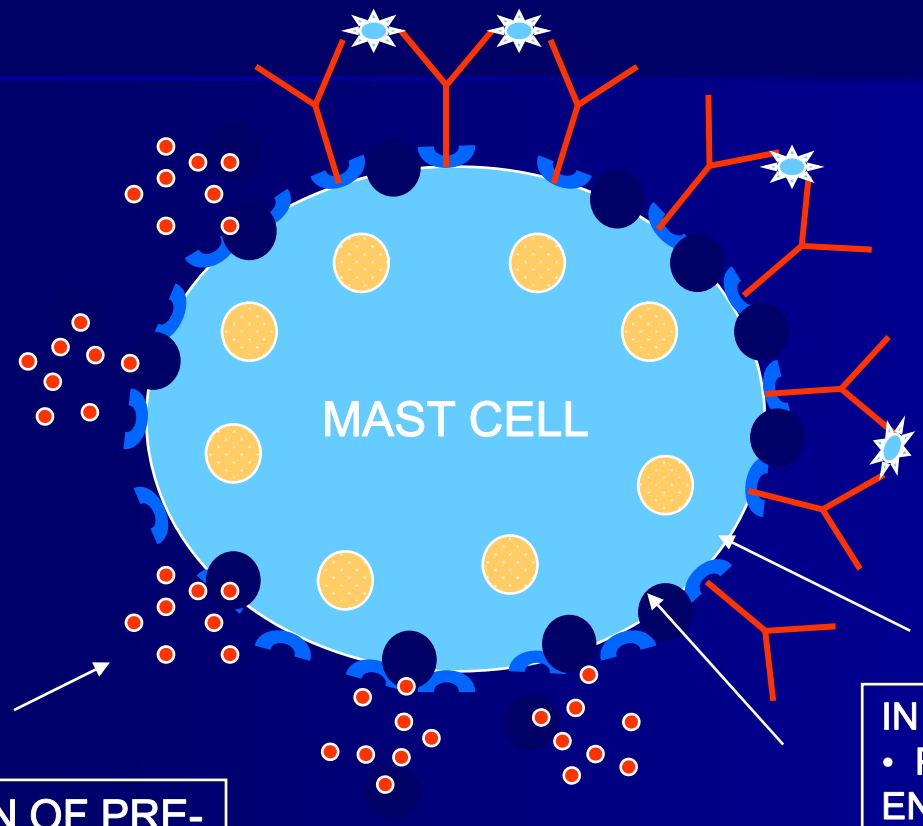


- WITH SUBSEQUENT EXPOSURE TO THE SAME ALLERGEN:

ALLERGENS BIND TO Fab-REGIONS OF IgE ON SURFACES OF MAST CELLS



CROSS-BINDING OF IgE BY ALLERGEN LEADS TO ACTIVATION AND DEGRANULATION OF MAST CELL



DEGRANULATION OF PRE-FORMED FACTORS
EG HISTAMINE

IN MEMBRANE:
- PLA2 ACTIVATED→ ENZYMATIC ACTION ON PHOSPHOLIPIDS→
- ARACHIDONIC ACID→ PROSTAGLANDIN D2 & LEUKOTRIENES C4 & D4

THE MEDIATORS OF THE ALLERGIC RESPONSE CAUSE:

Histamine, prostaglandin D2, leukotriene C4 & D4, cytokines, leukoattractants

1. INTESTINAL & BRONCHIAL SMOOTH MUSCLE CONTRACTION
   - ↑ peristalsis in GIT: vomiting, diarrhoea (eg food allergy)
   - bronchospasm (eg asthma)

2. BLOOD VESSEL DILATION AND INCREASED PERMEABILITY
   →leakage of plasma

   Swollen patches on skin: wheal & flare reaction
   Swelling (edema) in submucosa of airways (asthma)
   Generalised reaction: drop in blood pressure eg systemic anaphylaxis

3. INCREASE IN MUCUS SECRETION (eg bronchi in asthma)

4. INFLUX OF LEUKOCYTES (Th2, eosinophils)

LATE PHASE

INFLAMMATORY RESPONSE WITH:

- ↑ Th2 lymphocytes
- ↑ Eosinophils

ENZYMES DAMAGE AIRWAY EPITHELIUM

LEUKOTRIENES, PROSTAGLANDINS EFFECTS (Previous Slide)

CHRONIC INFLAMMATION IN MUCOSAL LINING WITH DAMAGE TO EPITHELIUM AND OTHER EFFECTS

↓

BRONCHIAL HYPERRESPONSIVENESS

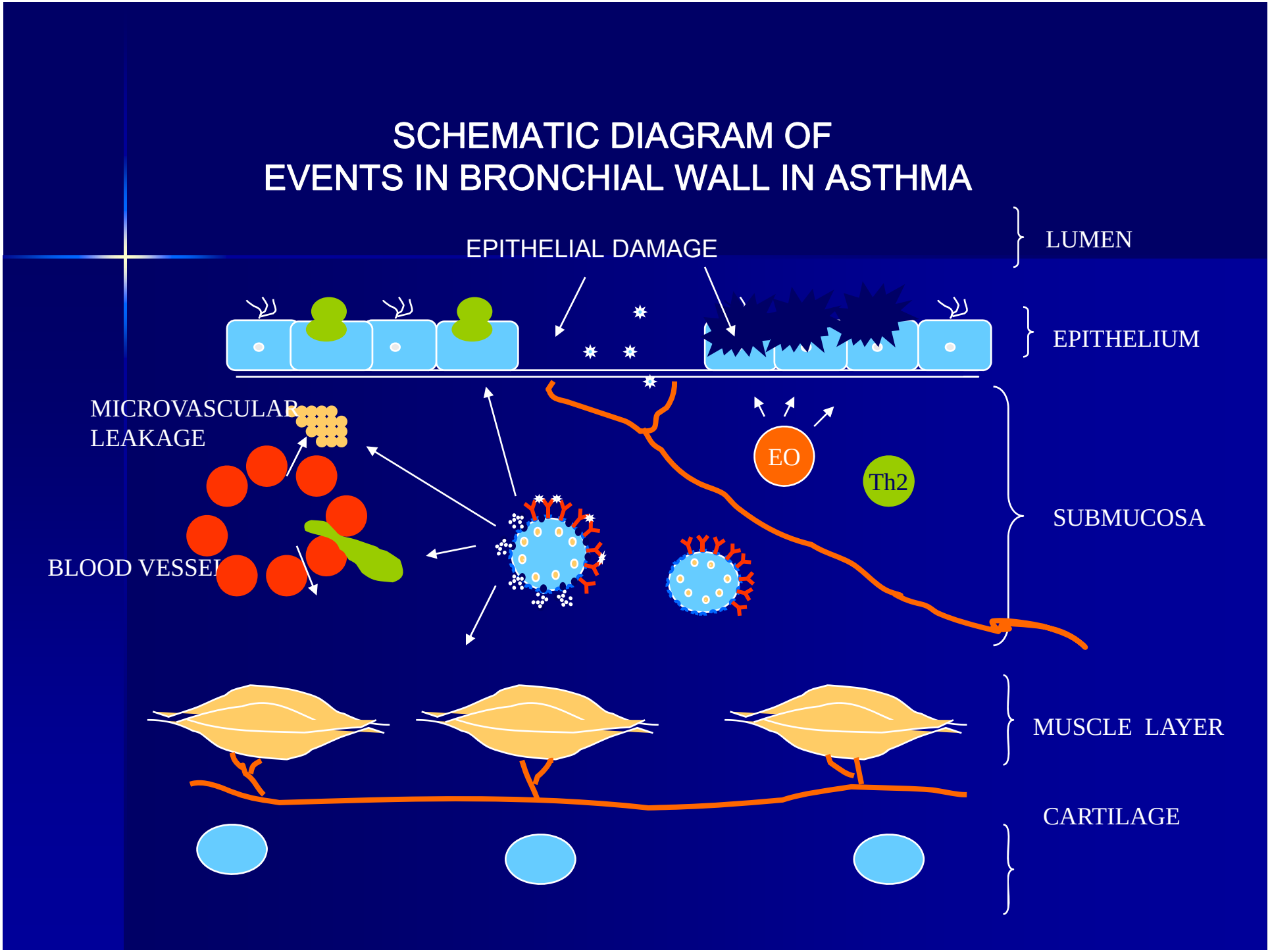
BRONCHI SENSITIVE TO NON-IMMUNOLOGICAL TRIGGERS:
COLD AIR
VIRAL INFECTIONS
EXERCISE
AIR POLLUTION
STRESS

LATE PHASE CAN EVOLVE IN CHRONIC INFLAMMATION

- ALLERGY INITIALLY DRIVEN BY ALLERGEN

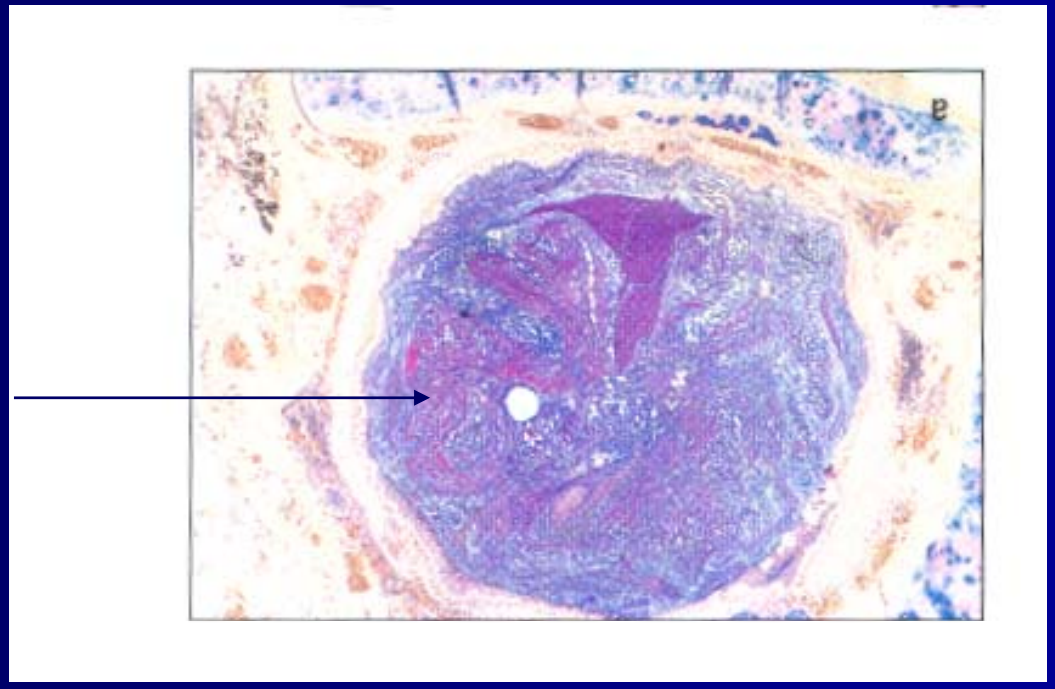
- CHRONIC INFLAMMATION CAN BE PERPETUATED EVEN IN ABSENCE OF FURTHER EXPOSURE TO ALLERGEN

- CHARACTERISED BY ↑ NO'S OF Th2 (TYPE IV HYPERSENSENSITIVITY), EOSINOPHILS, NEUTROPHILS, & OTHER LEUKOCYTES.


SCHEMATIC DIAGRAM OF
EVENTS IN BRONCHIAL WALL IN ASTHMA
EPITHELIAL DAMAGE
LUMEN
EPITHELIUM
MICROVASCULAR
LEAKAGE
BLOOD VESSEL
EO
Th2
SUBMUCOSA
MUSCLE LAYER
CARTILAGE

SECTION OF BRONCHI OF PERSON WHO DIED FROM ASTHMA

LUMEN OF BRONCHI



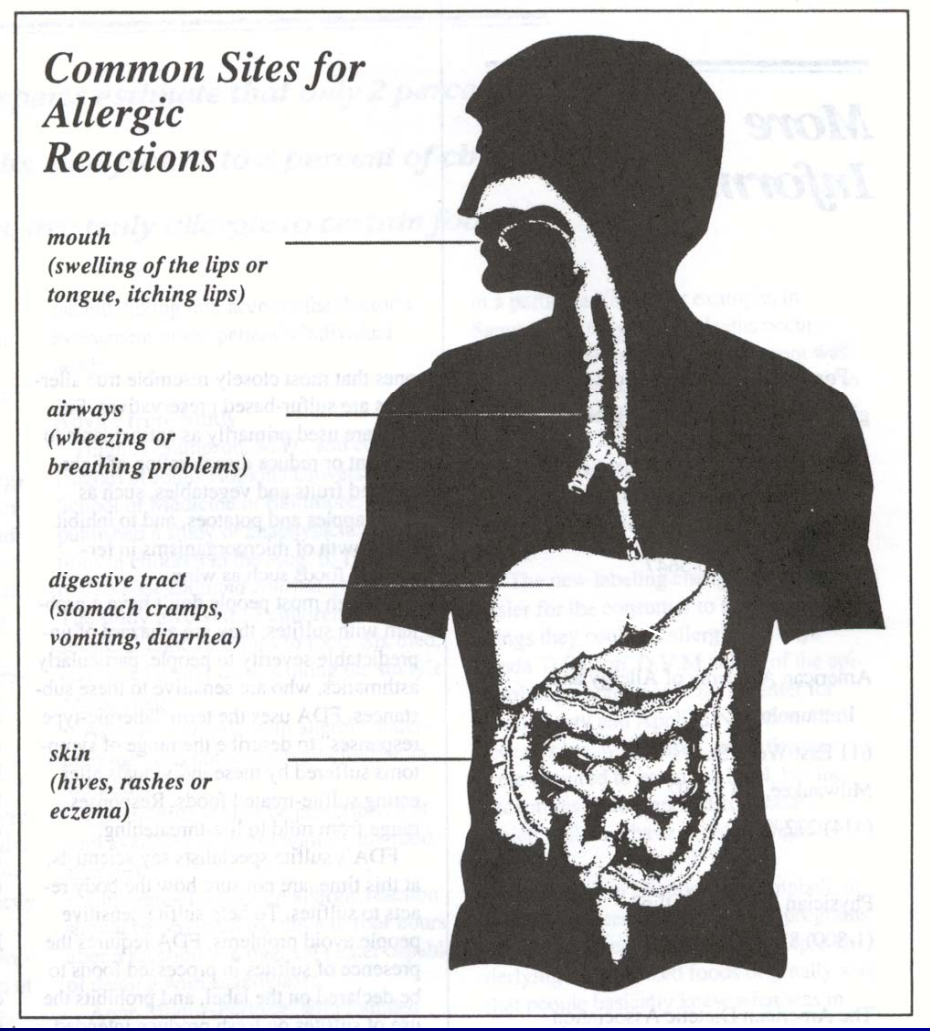
FOOD ALLERGIES

TRUE FOOD ALLERGIES PRESENT IN:

1-4% OF GENERAL POPULATION
6% IN CHILDREN

FOODS THAT CAUSE ALLERGIES

SYSTEMS AFFECTED



NON-ALLERGIC FOOD INTOLERANCE

TOXICITY, FOOD ADDITIVES

↓

CHEMICAL REACTIONS, NOT TRUE ALLERGIC REACTIONS

HAPTENS

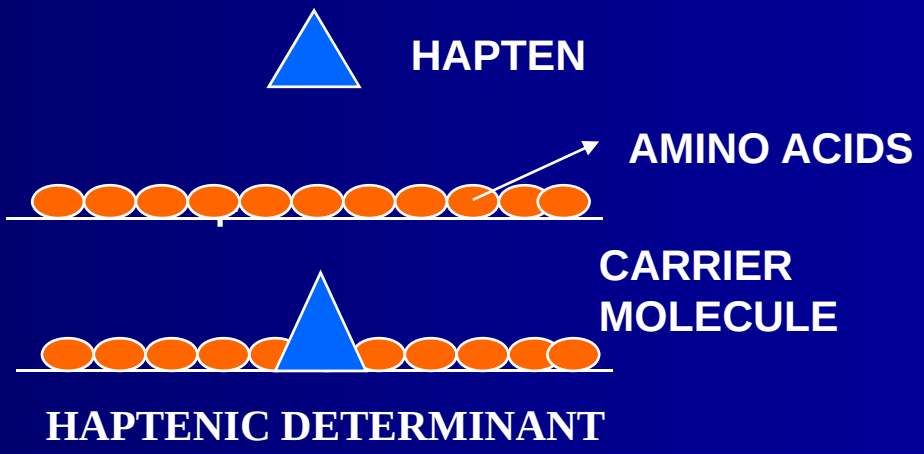
MOLECULAR MASS <1000: NOT TRUE AGs (ALLERGENS)

•BIND TO LARGER MOLECULE

(CARRIER MOLECULE)

↓

IMMUNOGENIC/ALLERGENIC



PENICILIN ALLERGY

(HAPTEN= not an AG)

TRANSFORMED IN VIVO AND BIND TO PROTEINS TO BECOME ALLERGENIC:

PENICILIN

PENICILLENIC ACID (haptenic form)

PENICILIOIC ACID (haptenic form)

REACTS WITH FREE NH2-GROUPS ON PROTEINS TO FORM A HAPTENIC DETERMINANT

EVOKE ALLERGY

TESTS FOR PENICILIN SENSITIVITY

SKIN TEST
UNICAP TEST

NB: PREPARATION USED IS SYNTHETIC HAPTENIC DETERMINANT FORM:

Penisilloyl:polylysine

LOCALISED ALLERGIC REACTIONS

AREA	CONDITION	ALLERGEN
LUNG	Allergic bronchial asthma	Grass, house dust, animal hair, pollen, fungal AG's, foodstuffs
NOSE	Allergic rhinitis(hayfever)	Same
EYES	Conjunctivitis (hayfever)	Same
SKIN	Atopic dermatitis, urticaria	Foodstuffs, drugs, bee venom, chemicals
GIT	Vomiting, cramps, diarrhoea	Food Allergens

GENERALISED (SYSTEMIC) ANAPHYLAXIS

- ALLERGEN INTRODUCED DIRECTLY INTO BLOODSTREAM
- RAPIDLY ABSORBED FROM GUT

↓

WIDESPREAD MAST CELL ACTIVATION

CAUSE OF MAST CELL ACTIVATION

- WIDESPREAD ↑ IN VASCULAR PERMEABILITY:
  LOSS OF BLOOD PRESSURE
- URTICARIA
- CARDIAC ARRYTHMIA
- AIRWAYS CONSTRICT-> breathing difficulties
- SWELLING OF EPIGLOTTIS CAN CAUSE SUFFOCATION

CAUSES OF ANAPHYLAXIS

- HYPOSENSITISATION
- PENICILIN
- FOOD-ALLERGENS
- INSECT STINGS

TREATMENT

EPINEPHRINE INJECTIONS

RELAX BRONCHIAL
SMOOTH MUSCLES

CONSTRICTION
SMOOTH MUSCLES IN VESSELS

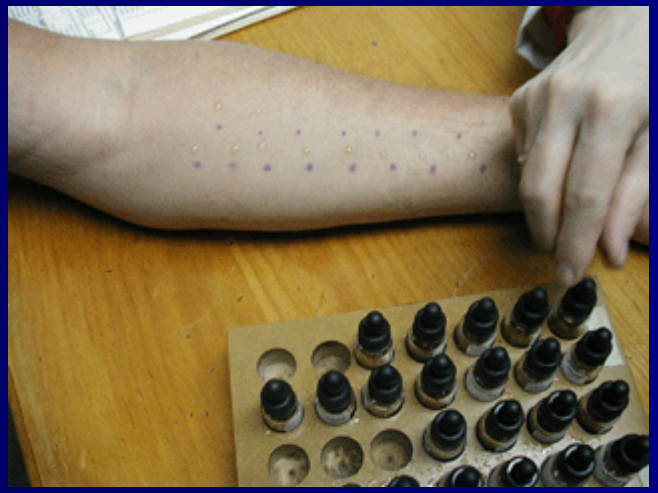
CLINICAL APPROACH TO ALLERGIC INDIVIDUAL

EARLY IDENTIFICATION:

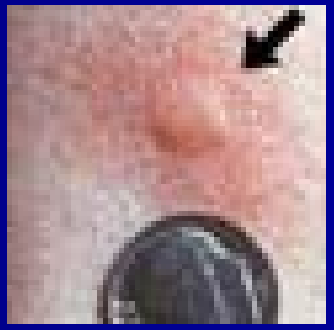
a) History (food and drug allergens); familial tendency
b) Laboratory investigation

DIAGNOSIS OF ALLERGIC CONDITION 1

- SKIN TEST SENSITIVITY



POSITIVE SKIN TEST



WHEAL & FLARE REACTION

DIAGNOSIS OF ALLERGIC CONDITION 2

- DETERMINATION OF TOTAL SERUM IgE
- DETERMINATION OF SERUM LEVELS OF SPECIFIC IgE (USING UNICAP)

UNICAP TEST

- USED FOR BABIES & YOUNG CHILDREN
- NO POSSIBILITY OF SERIOUS REACTIONS
- CAN BE USED FOR PATIENTS ON ANTI-ALLERGIC CHEMOTHERAPY

SKIN TESTS

- CHEAPER
- RESULTS AVAILABLE IMMEDIATELY
- POSSIBILITY OF SERIOUS REACTIONS
- CAN NOT BE USED FOR PATIENTS ON ANTI-ALLERGIC CHEMOTHERAPY
- DIFFICULT TO USE ON YOUNG CHILDREN

PREDISPOSING FACTORS IN THE PATHOGENESIS OF ALLERGIC DISEASES

IMMUNOLOGICAL/GENETICAL

- ↓ IgA
- Th1:Th2 imbalance
  ↓ IFNg, ↑IL4
  ↑IgE

PRESDISPOSING FACTORS 2

ENVIRONMENTAL

EXPOSURE TO ALLERGENS

PREVALENCE OF ALLERGY ↑ IN DEVELOPED COUNTRIES:

- ENVIRONMENTAL POLLUTION
- CHANGES IN ALLERGEN LEVELS
- CHANGES IN EXPOSURE TO ANTIGENS/ALLERGENS IN EARLY CHILDHOOD

TREATMENT OF ALLERGIC CONDITIONS

PHARMACOLOGICAL TREATMENT

- Anti-histamine
- β-adrenergic stimulants
- cAMP-phosphodiesterase inhibitors
- Chromoglycates
- Corticosteroids
- Leukotriene receptor antagonists
- Anti-IgE monoclonal antibodies

Cetyrisine

Film 1

levocetirizine_affinity.mpeg

Film 2

levocetirizine_enantiomer.mpeg

HYPOSENSITISATION

- CONTROLLED INJECTION OF INCREASING AMOUNTS OF CAUSATIVE ALLERGEN FOR MONTHS->YEARS.
- THIS DIVERTS IgE RESPONSE DRIVEN BY Th2 →Th1 → DOWN REGULATION OF IgE
- PURIFIED MIXTURES OF ALLERGEN USED

WHO CAN BE DESENSITISED?

INDICATIONS

ALLERGIC RHINITIS
BEE-STING ANAPHYLAXIS

CONTRA-INDICATIONS

BRONCHIAL ASTHMA
ATOPIC DERMATITIS
FOOD ALLERGIES

SLIT (SUB LINGUAL IMMUNOTHERAPY
(ALLERGEN DROPS UNDER TONGUE)

USED IN CERTAIN PARTS OF THE WORLD.
THEY CLAIM THAT SLIT CAN BE USED FOR:

CHILDREN
HIGHLY REACTIVE PATIENTS
ASTHMATICS
THOSE WITH FOOD ALLERGIES

TYPE II HYPERSENSITIVITY

MEDIATED BY ANTI-TISSUE ANTIBODIES (IgG & IgM)

OUTO-AB's BIND TO AUTO-AG;s ON TISSUES

↓

ACTIVATION OF COMPLEMENT

↓

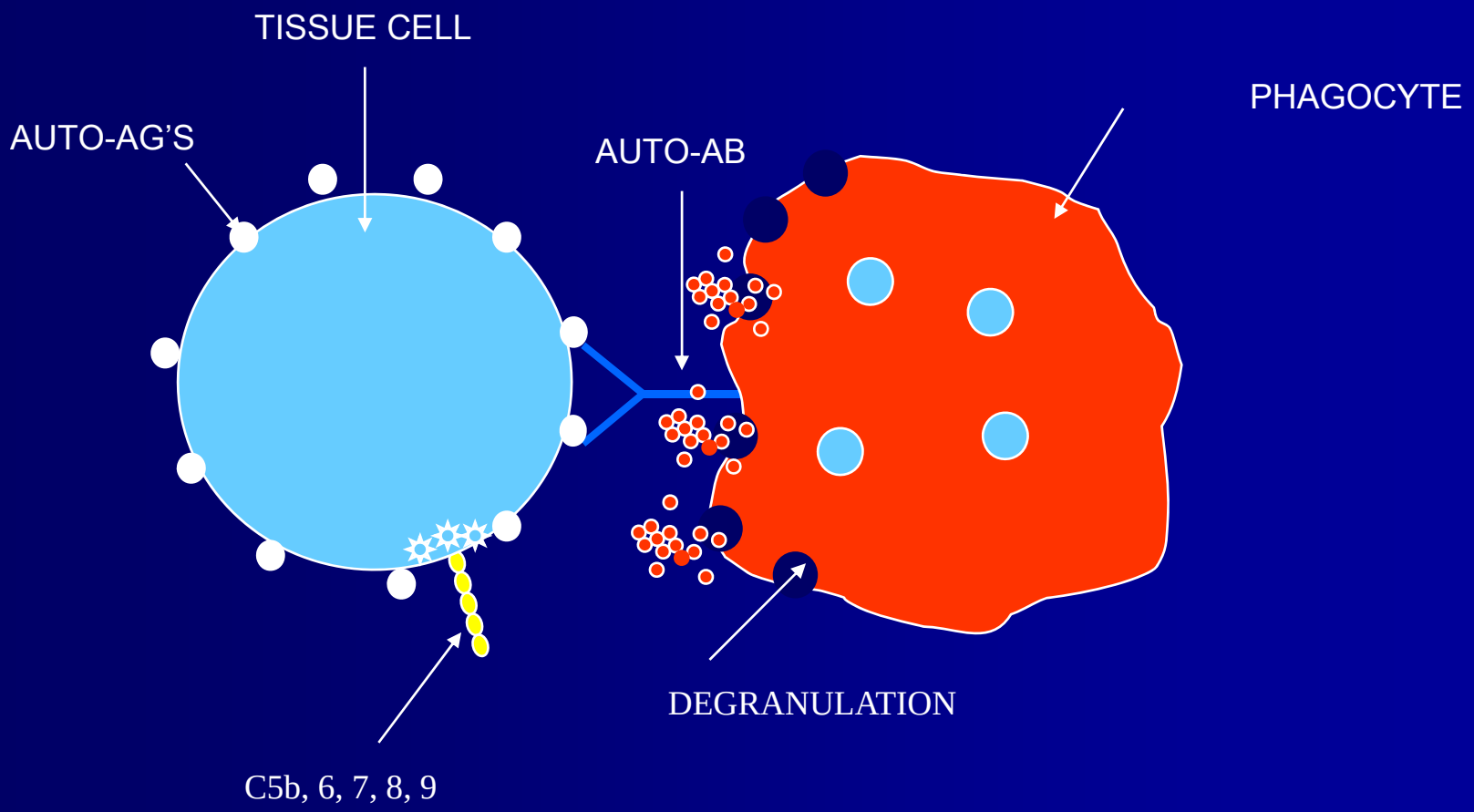
ATTRACTION OF PHAGOCYTES

↓

TISSUE DESTRUCTION

DIAGRAM OF TYPE II HYPERSENSITIVITY

Mechanism:



EXAMPLES OF ONLY TYPE II

- AUTO-IMMUNE HAEMOLYTIC ANAEMIA
- GOOD PASTURE SYNDROME
- DRUG-INDUCED HAEMOLYTIC ANAEMIA

THE TISSUE DAMAGE IN OTHER AUTO-IMMUNE DISEASES IS CAUSED BY COMBINATIONS OF TYPES II, III & IV

AUTO-IMMUNE HAEMOLYTIC ANAEMIA

COLD & WARM VARIANTS OF AIHA

↓ ↓

I ANTIGEN Rh ANTIGEN

ON SURFACE OF RBC

↓

LYSIS OF RED BLOOD CELLS

GOOD PASTURE SYNDROME

AUTO-ABS FORMED AGAINST BASEMENT MEMBRANE COLLAGEN
IN RENAL GLOMERULI, & PULMONARY ALVEOLI
↓
SEVERE TISSUE INJURY

ALL PATIENTS -> GLOMERULONEPHRITIS,->ACUTE RENAL FAILURE
40% DEVELOP PULMONARY HAEMORRHAGE

ENVIRONMENTAL CO- FACTORS INFLUENCE DISEASE

PULMONARY HAEMORRHAGE ONLY PRESENT WHEN SMOKING

SMOKING CAUSES INFLAMMATION

↓

INJURY TO EC LINING OF PULMONARY CAPILLARIES

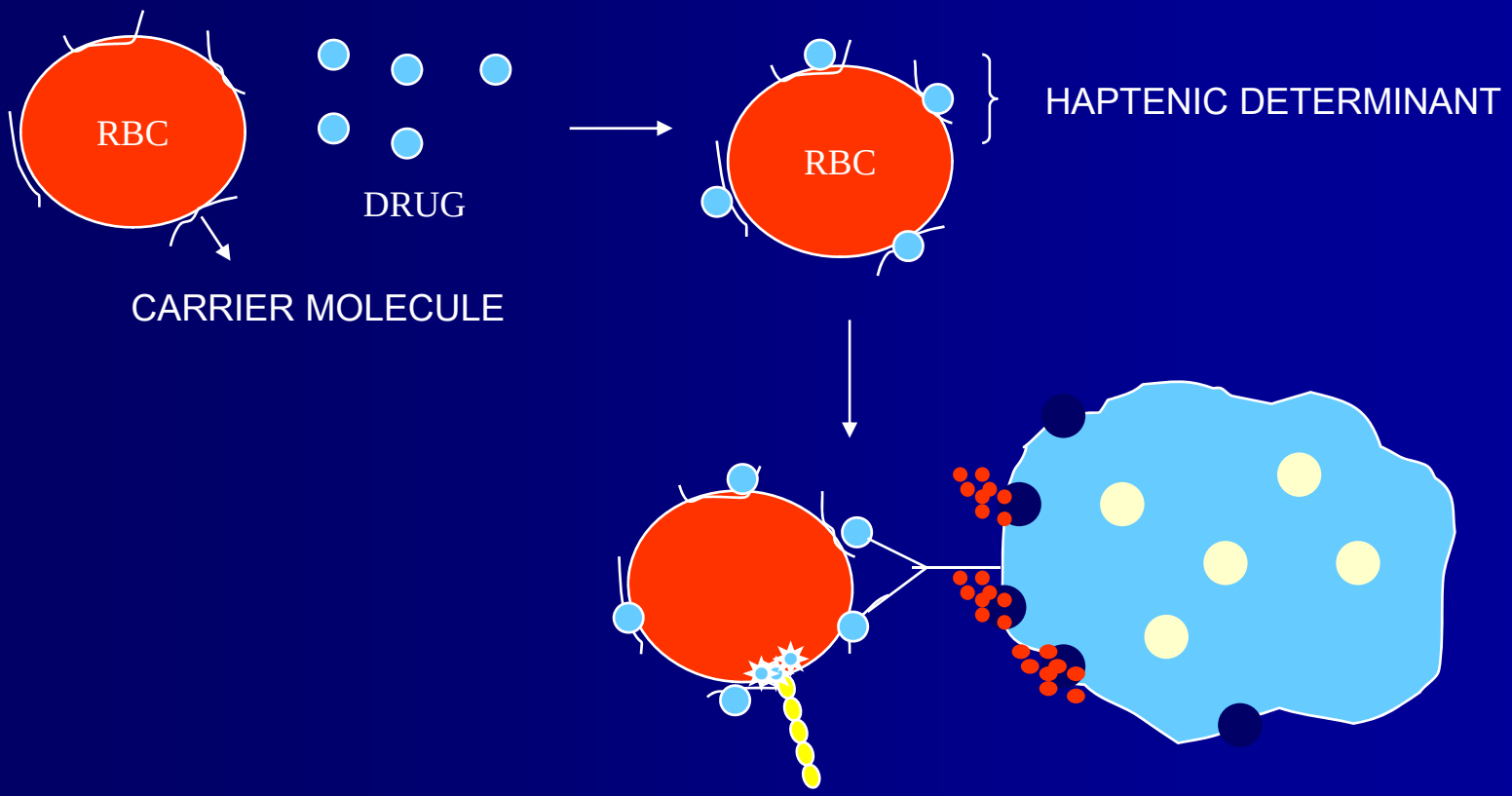
↓

AB'S CAN GAIN ACCESS TO BM

DRUG-INDUCED HAEMOLYTIC ANAEMIA

p87

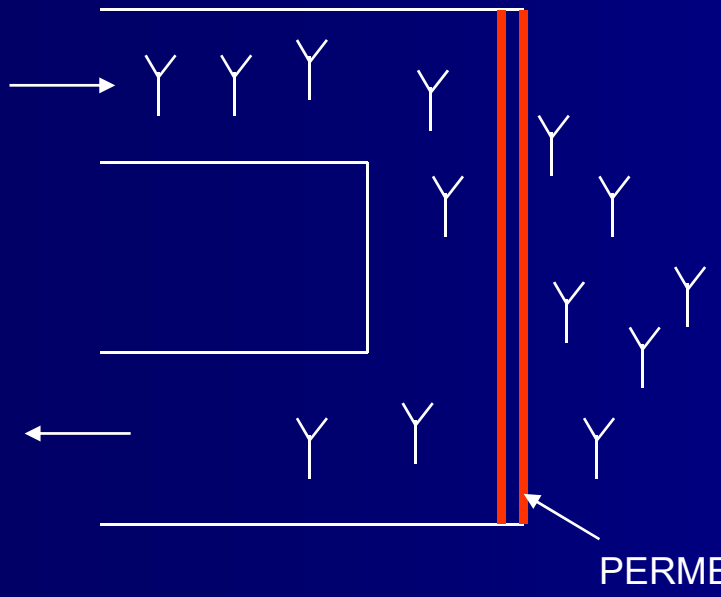
Mechanism: drug act as hapten



TREATMENT OF TYPE II

- PHARMACOLOGICAL: IMMUNOSUPPRESSIVE AGENTS:
  CORTICOSTEROIDS & CYTOTOXIC AGENTS
  ↓
  INHIBIT AB PRODUCTION
- PLASMA PHERESIS
- DRUG-INDUCED: STOP USING DRUG

PLASMAPHERESIS

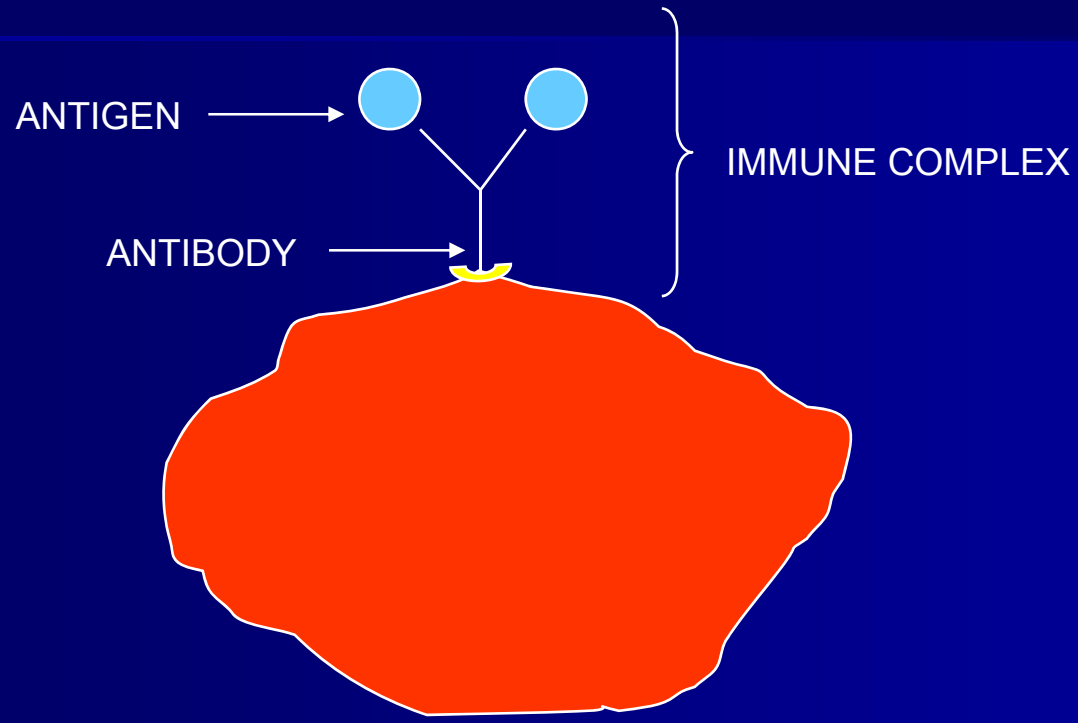


BLOOD PUMPED AGAINST PERMEABLE MEMBRANE WHICH ALLOW Ig TO MOVE THROUGH

TYPE III TYPE HYPERSENSITIVITY

SYNONYM; IMMUNE COMPLEX-MEDIATED REACTIONS

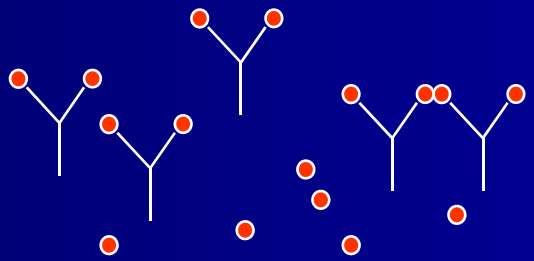
IMMUNE COMPLEX REMOVAL



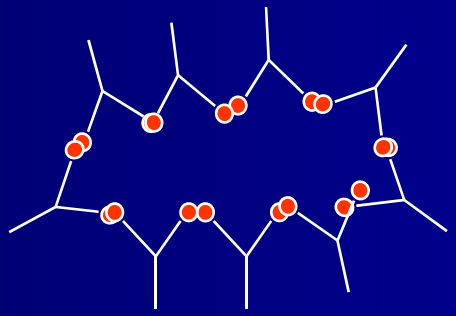
REMOVED BY MACROPHAGE/MONOCYTE SYSTEM

DIFFERENT TYPES OF IMMUNE COMPLEXES

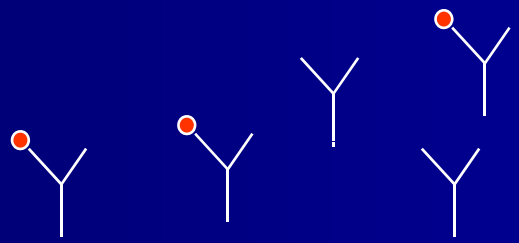
EXCESS OF ANTIGEN
(SOLUBLE IC)



AG & AB IN OPTIONAL
PROPORTIONS
(INSOLUBLE IC)



EXCESS OF ANTIBODY
(SOLUBLE IC)



FAILING IF IC REMOVAL→ IMMUNE COMPLEX DEPOSITION

CHRONIC PRODUCTION OF IC
DURING AUTO-IMMUNE DISEASES
(INSOLUBLE COMPLEXES)

↓

EXHAUSTION OF MONOCYTE/
MACROPHAGE SYSTEM

ACUTE & EXCESSIVE PRODUCTION OF
IC DURING INFECTIONS & SERUM SICKNESS
(SOLUBLE IC WITH AG EXCESS

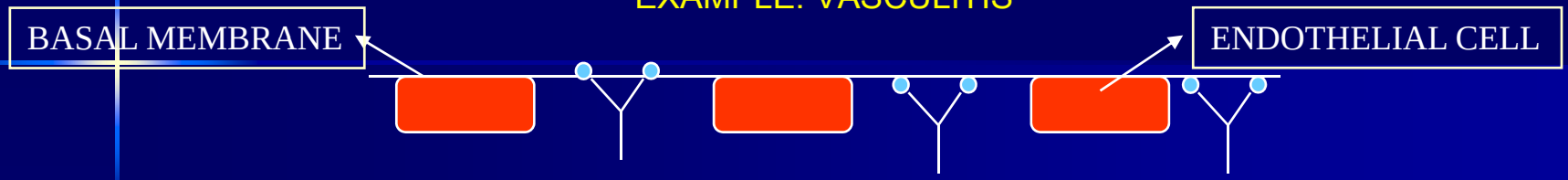
↓

POOR PHAGOCYTOSIS

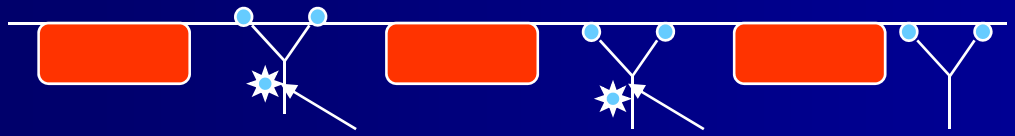
ACCUMULATION OF IC IN THE BLOOD VESSELS & ORGANS,
PARTICULARLY KIDNEY

SEQUENCE OF EVENTS DURING TYPE III REACTION

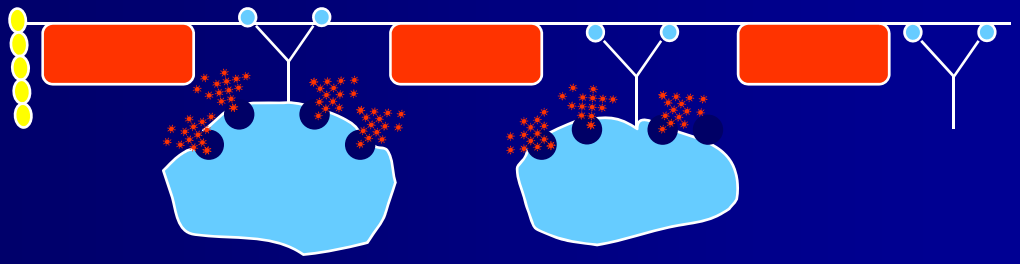
EXAMPLE: VASCULITIS



IMMUNE COMPLEX DEPOSITION ON BASAL MEMBRANE



COMPLEMENT ACTIVATION
ATTRACTION OF PHAGOCYTES



HAEMORRHAGE & THROMBOSIS: TISSUE DAMAGE & DYSFUNCTION

OTHER EXAMPLES OF TYPE III CONDITION

VASCULITIS-BLOOD VESSEL
ALVEOLITIS- LUNG
GLOMERULONEPHRITIS- KIDNEY
ARTHRITIS-JOINTS

POST-STREPTOCOCCAL GLOMERULONEPHRITIS

DUE TO A COMPLICATION OF ACUTE INFECTIONS WITH GROUP A B-HAEMOLYTIC STREPTOCOCCI OF SKIN OR RESPIRATORY TRACT

↓

RELEASE OF STREP. M AG

↓

CIRCULATING IC

↓

ACCUMULATION IN GLOMERULI

↓

TYPE III GLOMERULONEPHRITIS

SERUM SICKNESS

DEVELOP AFTER INJECTION OF LARGE QUANTITIES OF FOREIGN SERUM
(EG PASSIVE IMMUNISATION WITH HYPERIMMUNE SERUM)

↓

RECIPIENT PRODUCES AB's TO AG IN SERUM

↓

IC FORMATION

↓

SPREADING & DEPOSITION OF IC THROUGHOUT THE BODY
(BLOOD VESSELS, SKIN, KIDNEY, JOINTS)

↓

GENERAL REACTION

CLINICAL PICTURE OF SERUM SICKNESS

- RAISED TEMPERATURE
- ENLARGED LYMPH GLANDS
- ARTHRITIS
- URTICARIA
- ↓ COMPLEMENT LEVELS

DIAGNOSIS OF TYPE III REACTIONS

- CLINICAL HISTORY
- BIOPSY TO SHOW:
  - NEUTROPHIL ACCUMULATION
  - DEPOSITION OF COMPLEMENT
  - DEPOSITION OF IgG & IgM
- DETERMINATION OF IC IN SERUM
- DECREASED TOTAL SERUM COMPLEMENT
- PRESENCE OF SERUM ACTIVATION PRODUCTS: C3a, C5a

TREATMENT

- CORTICOSTEROIDS
- CYTOTOXIC AGENTS
- PLASMAPHERESIS

TYPE IV HYPERSENSITIVITY REACTION

SYNONYM:
CELL MEDIATED HYPERSENSITIVITY REACTIONS
DELAYED TUPE HYPERSENSITIVITY REACTION

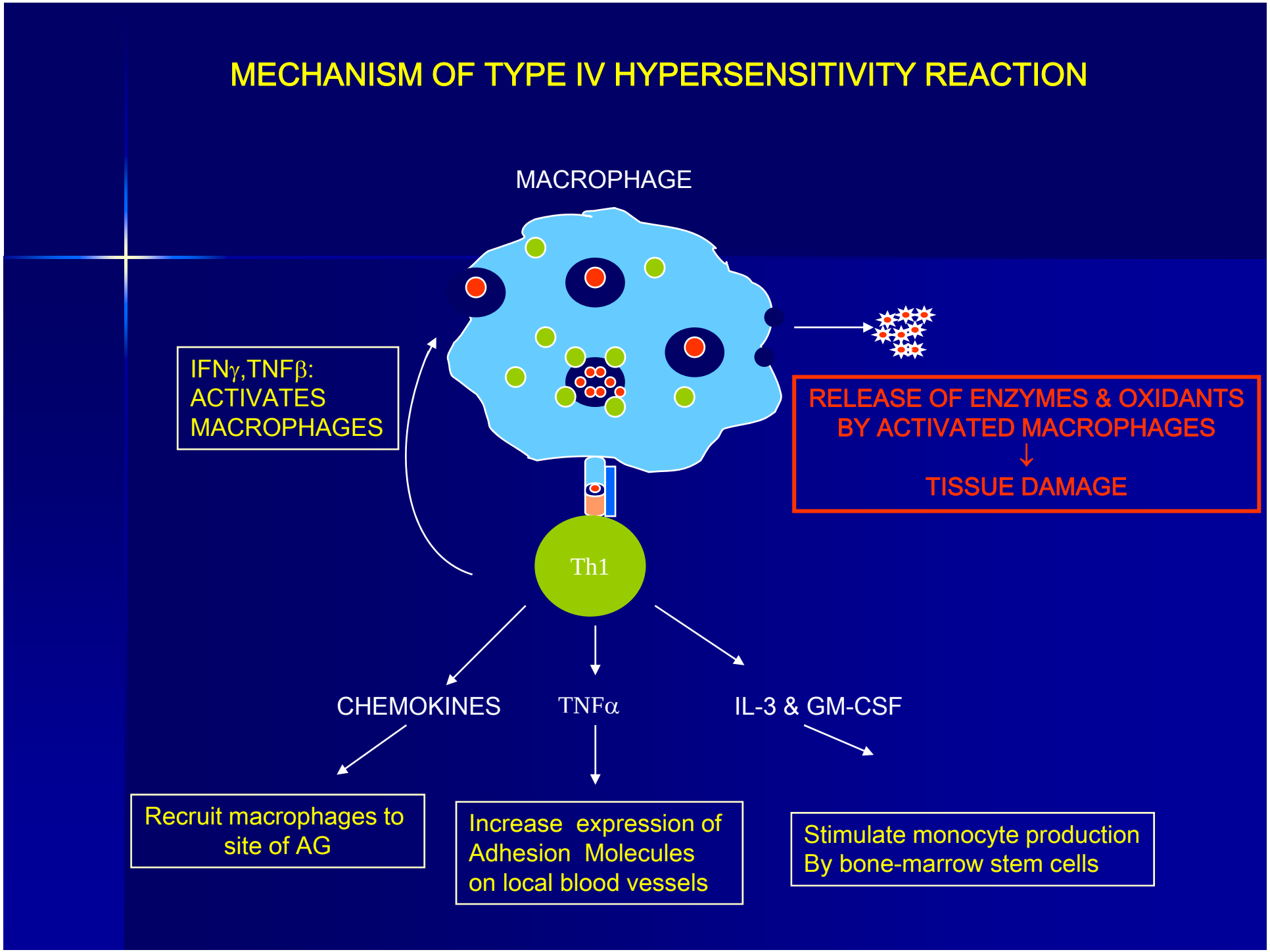
TYPE I, II & II HYPERSENSITIVITY REACTIONS →
HARMFUL EFFECTS OF AG & AB REACTIONS ON TISSUES

TYPE IV→
TISSUE DAMAGE MEDIATED BY CMI:
INTERACTIONS BETWEEN
AG-ACTIVATED CD4+T-LYMPHOCYTES & MACROPHAGES;
CD8+ T LYMPHOCYTES AND INFECTED CELLS

EXAMPLES OF TYPE IV HYPERSENSITIVITY-MEDIATED TISSUE DAMAGE

- GRANULOMATOUS LESIONS: LEPROSY, TB
- CAVITATION & CASEATION (IN LUNG) IN TB
- TISSUE DAMAGE ASSOCIATED WITH FUNGAL & PARASITIC INFECTIONS
- REJECTION OF TRANSPLANTED ORGANS
- DESTRUCTION OF HOST TISSUE'S IN AUTO-IMMUNE DISEASES
- SKIN DAMAGE IN CONTACT DERMATITIS (DYES, MINERALS, CHEMICALS)
- BRONCHIAL OBSTRUCTION IN ASTHMATIC INDIVIDUALS

MECHANISM OF TYPE IV HYPERSENSITIVITY REACTION



GRANULOMAS

FORMS WHEN MICROBES RESIST EFFECTS OF MACROPHAGES EG IN TUBERCULOSIS

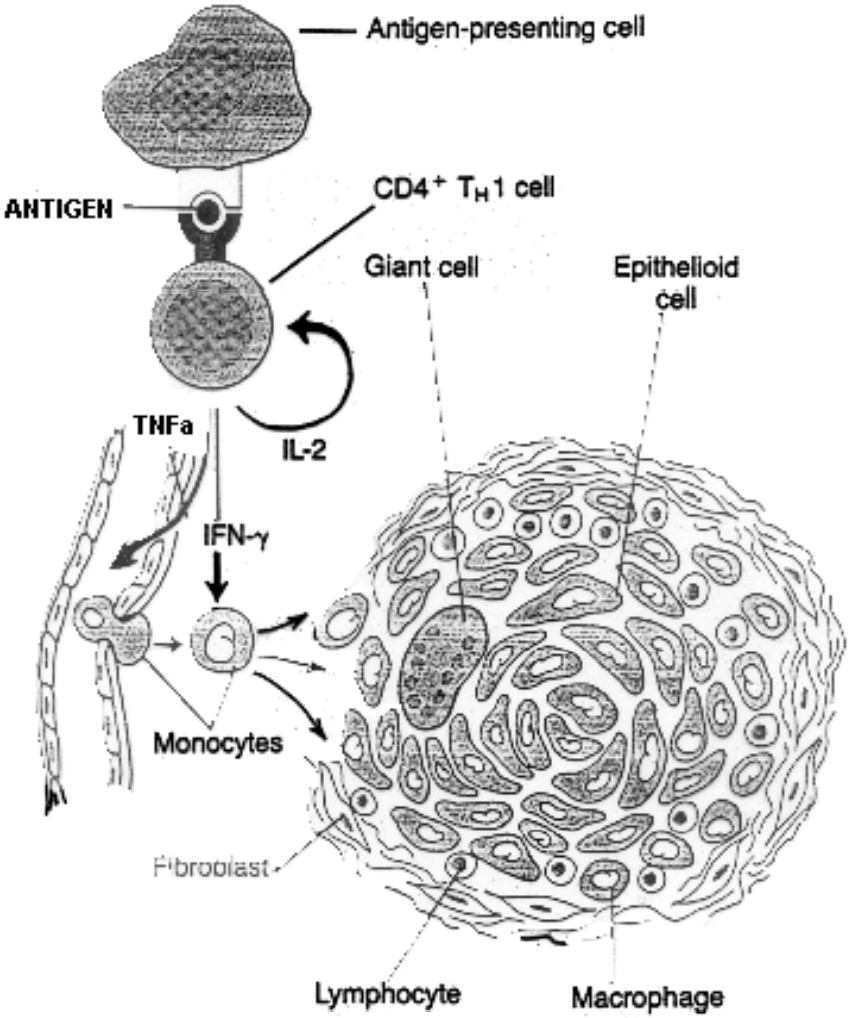


Figure 6–16. Schematic illustration of the events that give rise to the formation of granuloma in type IV hypersensitivity reactions. Note the role played by T_H1 cell–derived cytokines.

CYTOTOXIC EFFECTS OF MACROFAGES/CD8+ CELLS

↓

TISSUE DAMAGE

ROLE OF CD8+ T-LYMPHOCYTES IN TISSUE DAMAGE

ORGANISMS THAT ESCAPE INTO CYTOPLASMA OF MACROPHAGES MAY ALSO BE PRESENTED TO CD8+ T-LYMPHOCYTES

↓

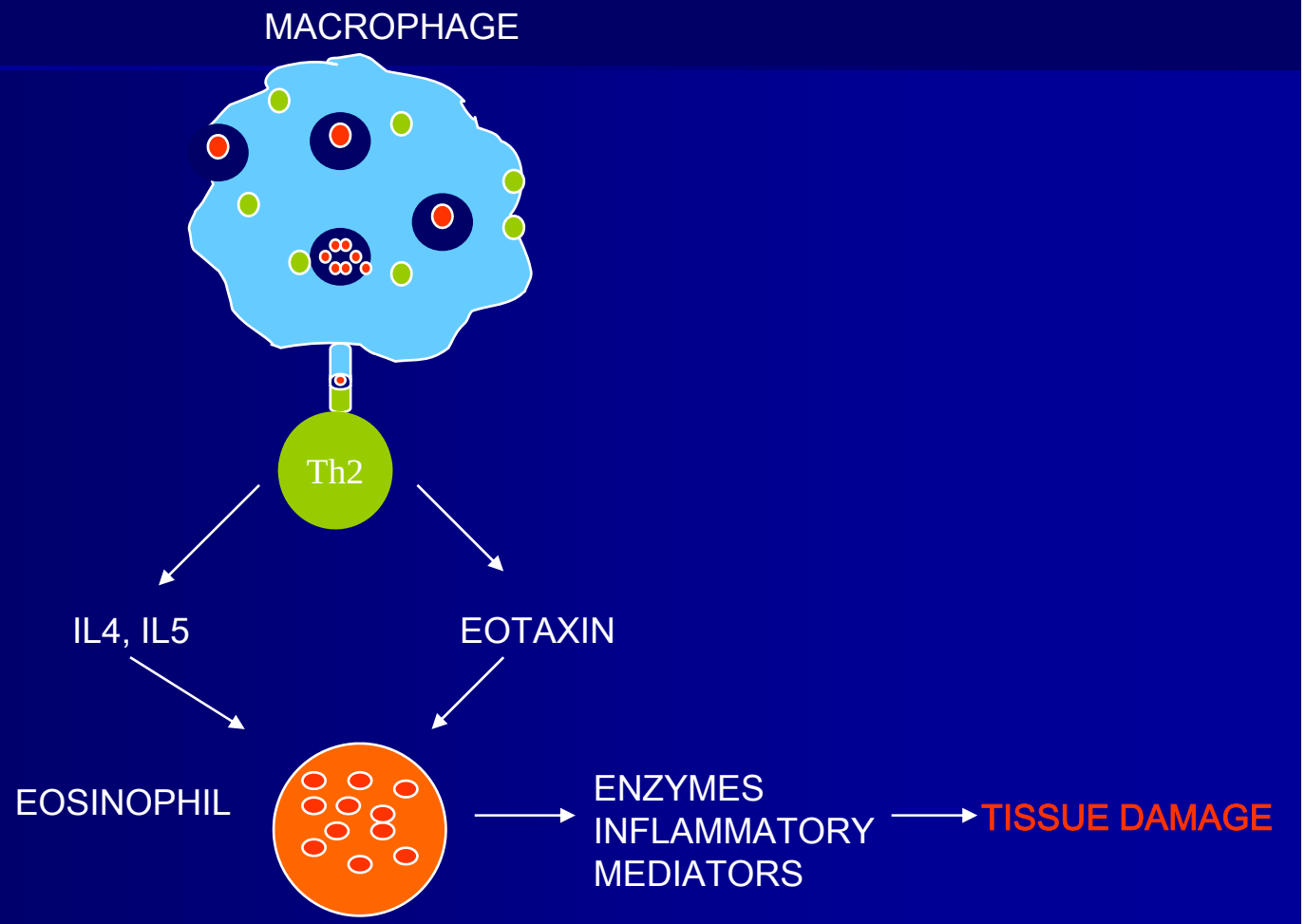
KILLING OF INFECTED MACROPHAGE

↓

TISSUE DAMAGE BY RELEASED ENZYMES & OXIDANTS

ORGANISMS PHAGOCYTOSED BY FRESH MACROPHAGES

TISSUE DAMAGE IN CHRONIC ASTHMA, CHRONIC ALLERGIC RHINITIS



CONTACT HYPERSENSITIVITY REACTION

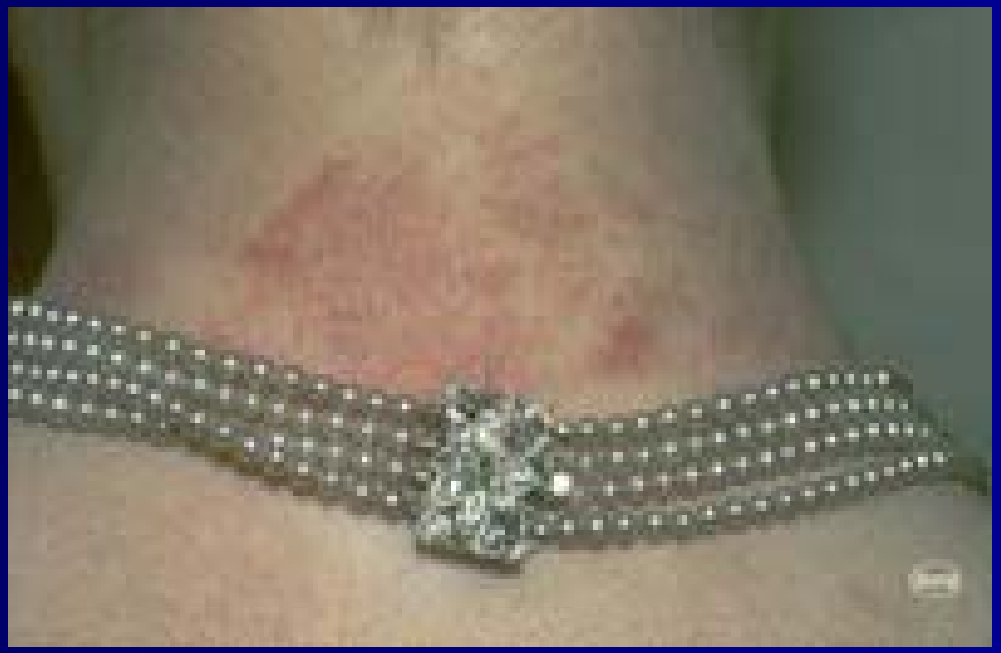
(CONTACT DERMATITIS)

IMMUNE RESPONSE BY CD4+Th1 OR CD8+ T LYMPHOCYTES, DEPENDING ON THE ROUTE OF AG PROCESSING.

ANTIGENS ARE HIGLY REACTIVE SMALL MOLECULES THAT EASILY PENETRATE SKIN, ESPECIALLY IF ITCHING CAUSE SCRATCHING.

AG IS A HAPTEN THAT BIND TO CARRIER PROTEIN MOLECULES IN SKIN.
EXAMPLES:
METALS , CHROMATE& NICKEL
CHEMICALS
POISON PLANTS

NICKEL ALLERGY



TREATMENT OF SERIOUS TYPE IV REACTIONS

TREATMENT BASED ON INHIBITION OF

- PHAGOCYTE ACCUMULATION
- RELEASE OF HIGHLY REACTIVE OXIDANTS AND PROTEOLYTIC ENZYMES
- PROLIFERATION OF CD4+ & CD8+ T-LYMPHOCYTES

CORTICOSTEROIDS
CYTOTOXIC DRUGS

CLINICAL APPLICATIONS OF TYPE IV SKIN TEST.

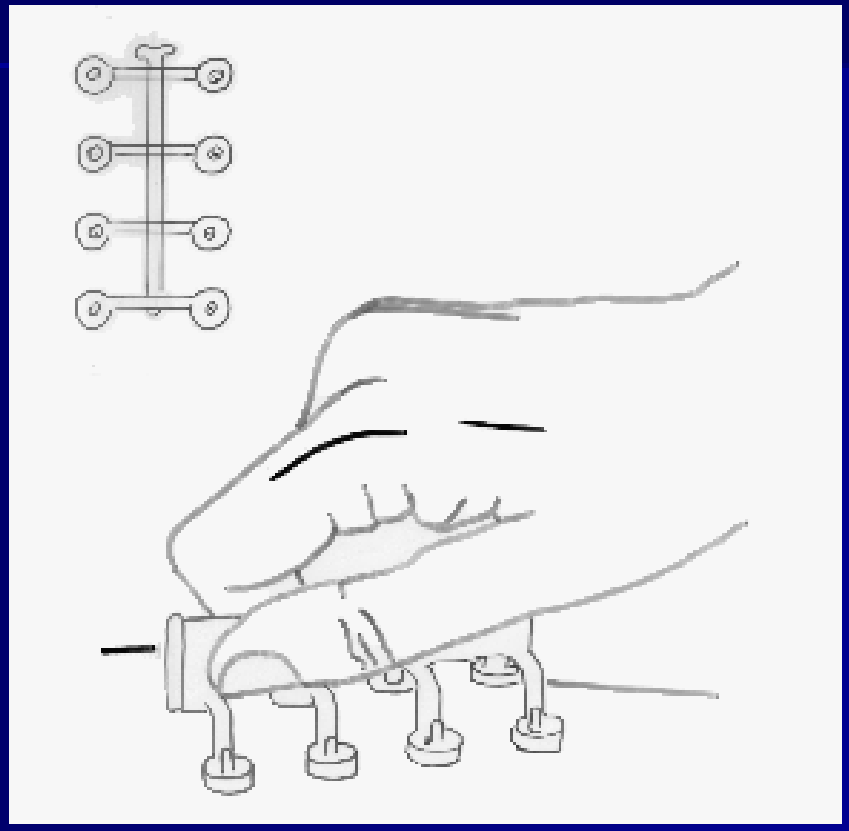
TUBERCULIN TEST
MULTITEST-CMI

TUBERCULIN TEST

- TO DETERMINE WHETHER A PERSON IS, OR HAS BEEN INFECTED WITH *MYCOBACTERIUM TUBERCULOSIS*
- TO TEST IF A PERSON WAS VACCINATED WITH BCG

PERSON INJECTED WITH PPD, AG OF BACTERIA.

MULTITEST CMI



MULTITEST-CMI

USED TO TEST GENERAL STATUS OF THE CMI IN INDIVIDUALS WITH SUSPECTED ACQUIRED OR CONGENITAL ABNORMALITIES OF CMI.

APPARATUS CONTAINS 7 ANTIGENS + CONTROL
INJECTED INTO SKIN

TETANUS TOXOID, DIPHTHERIA TOXOID, STREPTOCOCCAL AG, PPD, CANDIDA ALBICANS
TRICHOPHYTON MENTAGROPHYTES
PROTEUS MIRABILIS

IF POSITIVE TO AT LEAST 4 AG'S, CMI INTACT.

COMMON AUTO-IMMUNE DISEASES

TYPE II

- AIHA
- GOODPASTEUR's SYNDROME
- ACUTE RHEUMATIC FEVER
- AUTO-IMMUNE THROMBOCYTOPENIC PURPURA

TYPE III

- SLE
- RA

TYPE IV

- DIABETES TYPE I (IDDM)
- RA