JOINT INFLAMMATION

RHEUMATOID ARTHRITIS

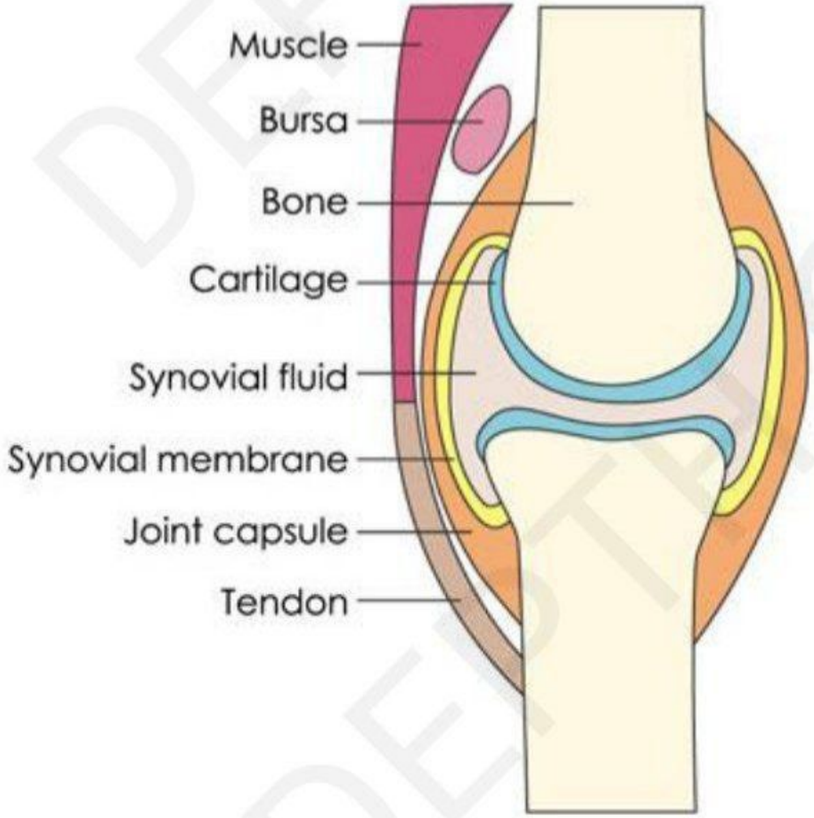
(Rheumatism)

[DEPTH OF BIOLOGY]

A chronic inflammatory disorder affecting many joints, including those in the hands and feet.

[DEPTH OF BIOLOGY]

NORMAL JOINT



orther organ also affected like skin and lungs

- Comes from rheumatism- musculoskeletal illness

ARTICULAR CARTILAGE— type of connective tissue that act like protective cushion; a lubricated surface for bones to smoothly glide against

[DEPTH OF BIOLOGY]

- ***KNEE JOINT=*** synovial joint; connect 2 bones with a fibrous joint capsule that continues with ***periosteum*** (outer layer of bone).

[DEPTH OF BIOLOGY]

- Here the fibrous capsule is lined by synovial membrane that has cell which produce **synovial fluid** & remove debris.

Viscous fluid { jelly like part of chicken egg}

- It helps to lubricate joint
- To help synovial cells the synovial membrane also has blood vessel & lymphatic running through it

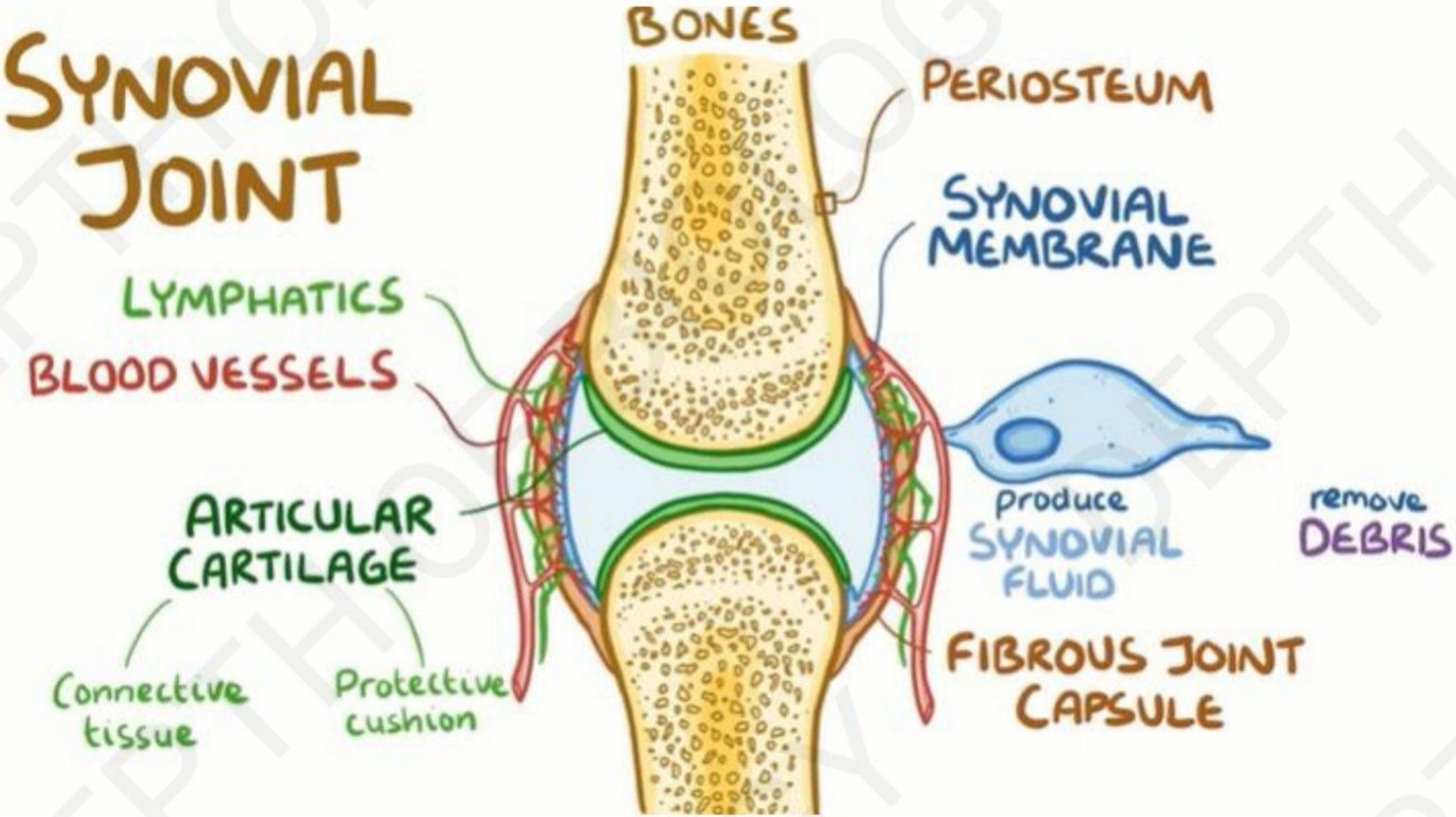
[DEPTH OF BIOLOGY]

SYNOVIAL MEMBRANE + ARTICULAR CARTILAGE

Forms the inner lining of joint space

[DEPTH OF BIOLOGY]

SYNOVIAL JOINT



DEPTH OF BIOLOGY

Rheumatoid arthritis is autoimmune disorder caused by interaction between genetic factor & environment.

[DEPTH OF BIOLOGY]

GENETIC	ENVIRONMENTAL
➢A person with a certain gene for human protein like human leukocyte antigen or HLA-DR1 & HLA-DR4 might develop rheumatoid arthritis after getting exposed to something in the environment. ➢Due to susceptibility gene HLA-DR1 &HLA-DR4 ; immune cell get confused by these changes ➢& no longer recognize this protein as self antigen	➢Like cigarette smoking or specific pathogen like a bad bacteria that lives in the intestine ➢This environment factors cause modification of our own antigens such as IgG antibodies or other protein like type II collagen or vimentin. ➢Can get modified through the process of citrullination ➢Amino acid like arginine found in this

[DEPTH OF BIOLOGY]

convert into citrulline

ANTIGENS GET PICKED UP BY ANTIGEN PRESENTING CELLS → LYMPH NODE

[DEPTH OF BIOLOGY]

* ANTIGEN PRESENTING CELLS activate CD4 T-helper cells

* T-helper cells stimulate B-CELLS

* B-CELLS PROLIFERATE
* Differentiate into PLASMA CELLS

Produce specific AUTOANTIBODIES against self-antigens

[DEPTH OF BIOLOGY]

DEPTH OF BIOLOGY

In rheumatoid arthritis; T-helper cells & antibodies circulate & reach the joints.

[DEPTH OF BIOLOGY]

***Now T-cell secrete cytokine like interferon* γ & interleukin-17 to recruit more inflammatory cells like macrophages into joint space.**

[DEPTH OF BIOLOGY]

***Macrophages will also produce inflammatory cytokine like tumour necrosis factor TNF* α, interleukin-1 & interleukin-6, which together with T-cell cytokines.**

Stimulate synovial cell to proliferate

[DEPTH OF BIOLOGY]

INFLAMMATORY CYTOKINES

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MULTIPLE ORGAN SYSTEMS

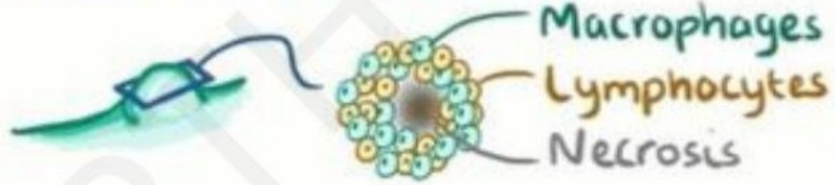
└ Extra-articular problems

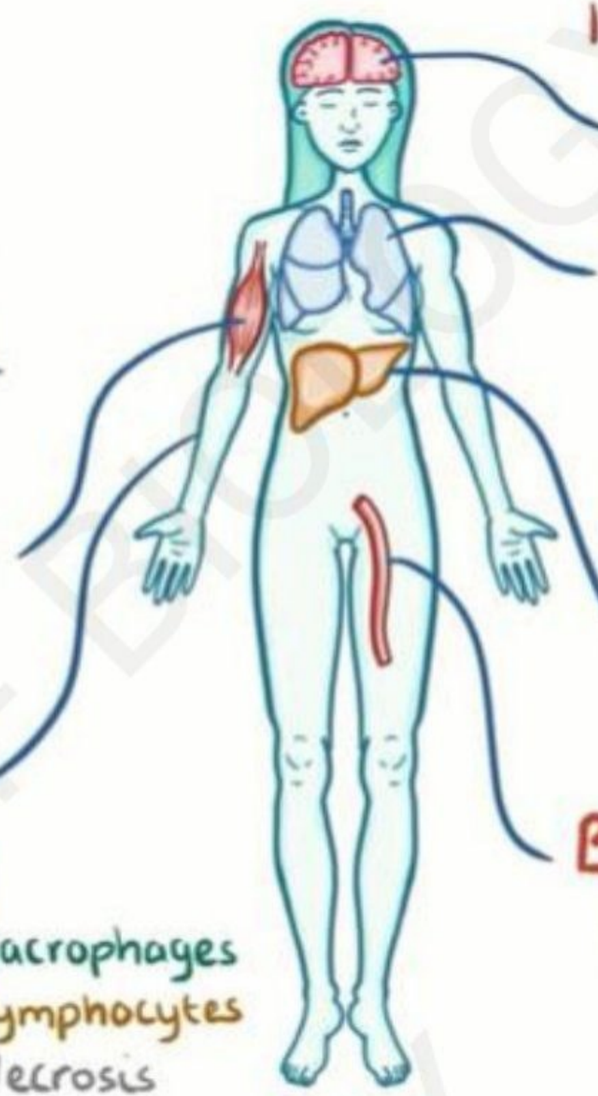
SKELETAL MUSCLE

└ Protein breakdown

SKIN

RHEUMATOID NODULES





INTERLEUKIN 1 or 6

↓

BRAIN

Pyrogens → FEVER

LUNG

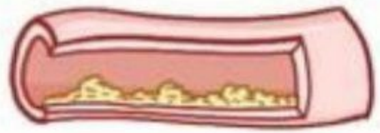
* **INTERSTITIUM**
  Fibroblasts → SCAR TISSUE
  ↓ Gas exchange
* **PLEURAL CAVITIES**
  Fill with fluid → PLEURAL EFFUSION

LIVER - HEPCIDIN

└ Causes ↓ iron by inhibiting absorption + trapping in macrophages / liver cells

BLOOD VESSELS

Atheromatous plaques

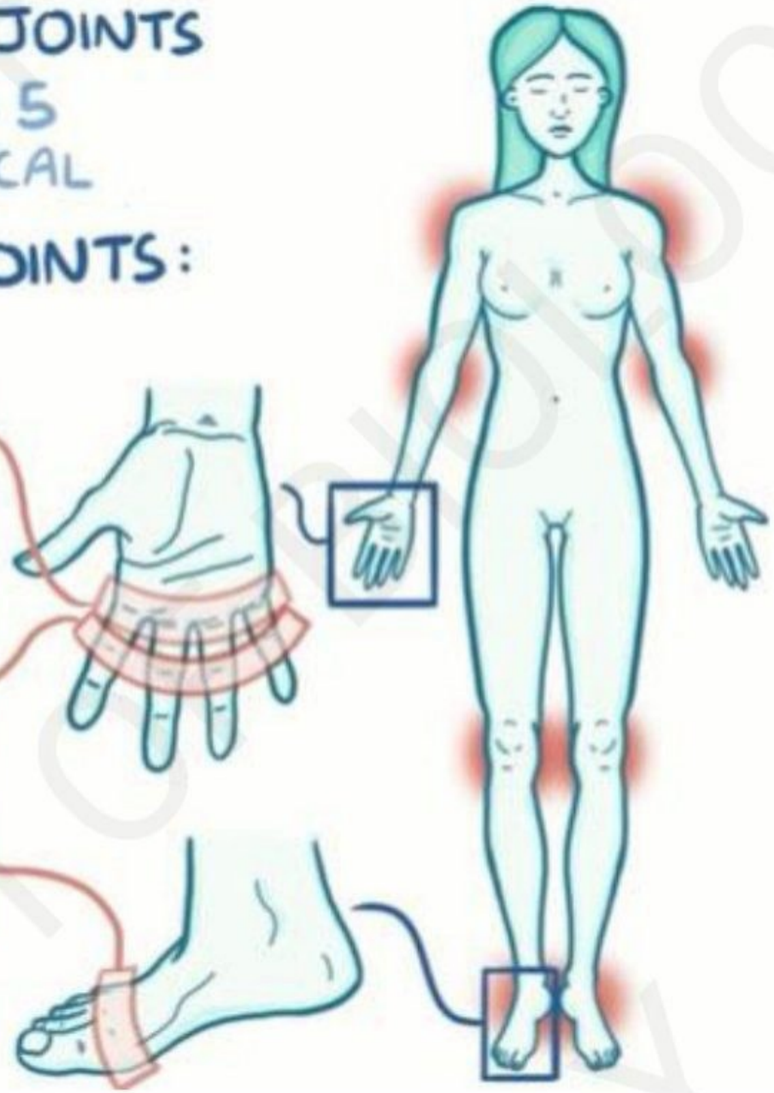


* MULTIPLE JOINTS
  - USUALLY ⩾ 5
  - SYMMETRICAL

* COMMON JOINTS:

Small Joints

- Metacarpophalangeal (MCP)
- Proximal interphalangeal (PIP)
- Metatarsophalangeal (MTP)



* AS DISEASE WORSENS

Large Joints

- Shoulders
- Elbows
- Knees
- Ankles

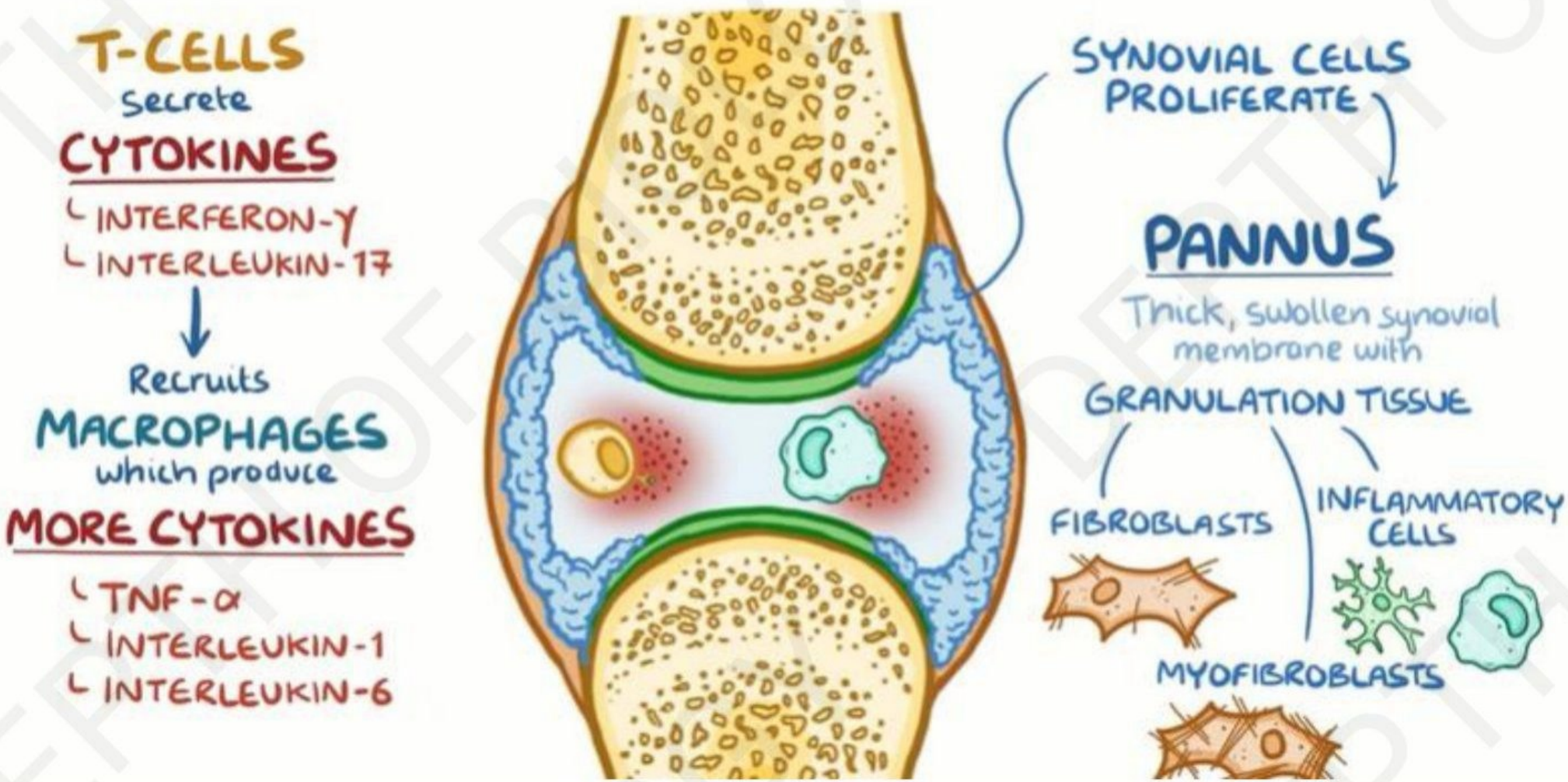
* FLARES
(Sudden worsening)
  - SWOLLEN
  - WARM
  - RED
  - PAINFUL

* STIFF
  - Morning (after inactivity)

DEPTH OF BIOLOGY

The increase in synovial cell & immune cell creates a PANNUS, which is thick swollen synovial membrane with grannulation or scar tissue.

[DEPTH OF BIOLOGY]

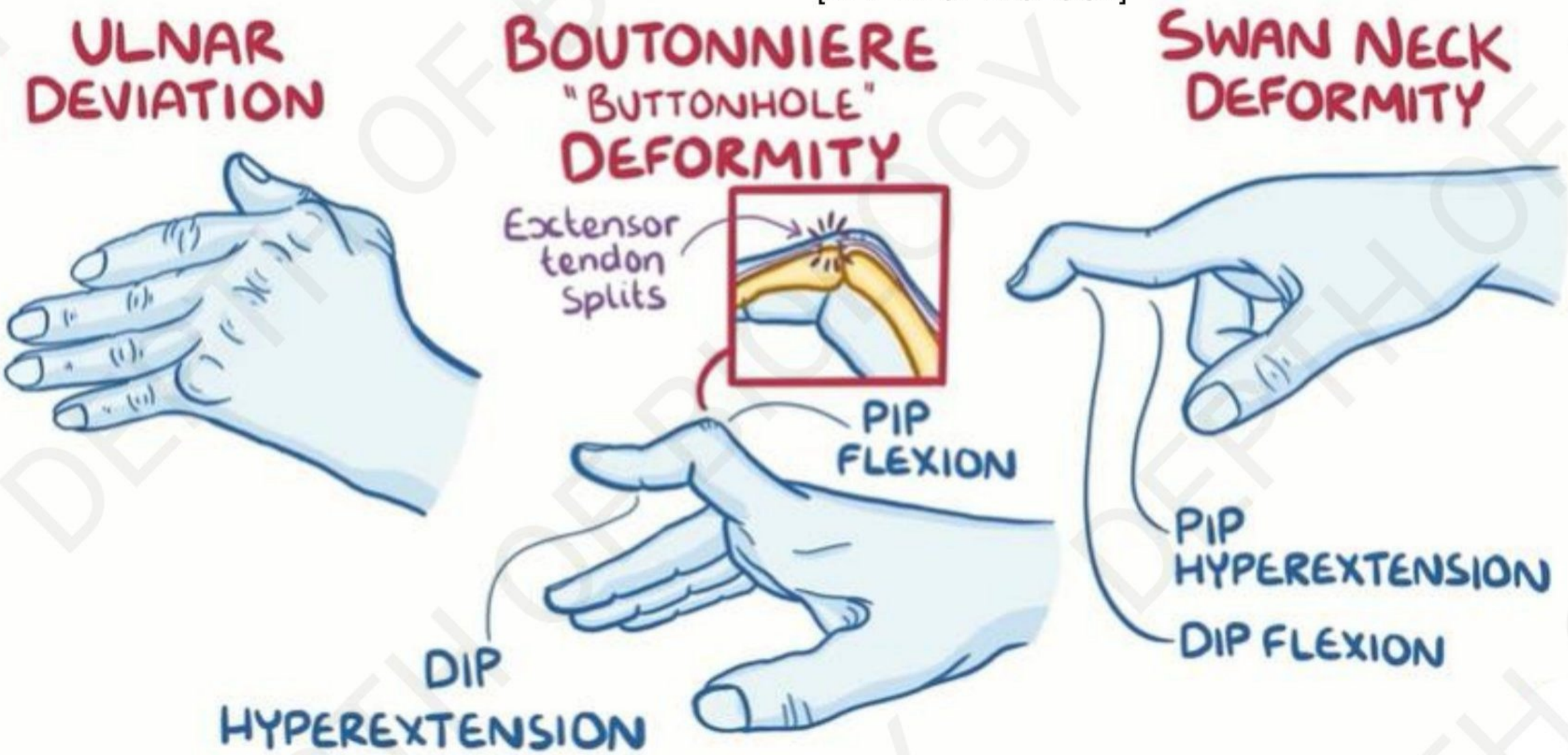


SPECIFIC DEFROMITIES

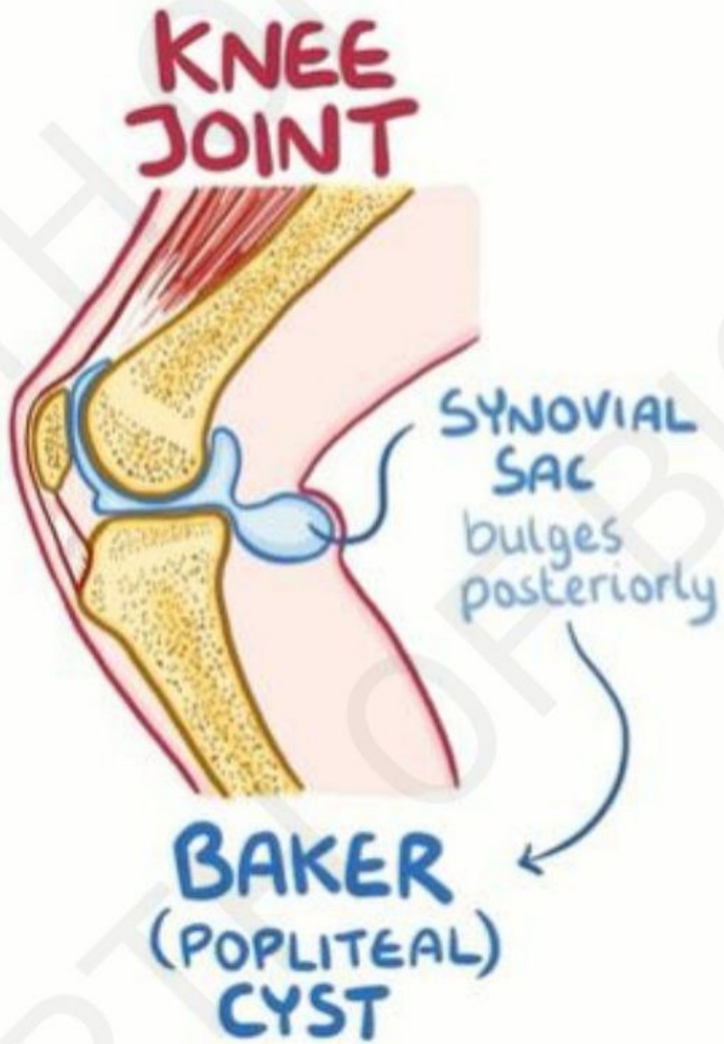
- Usually of the meta-carpo phalangeal joints in the hands such as ulnar deviation of fingers. [DEPTH OF BIOLOGY]
- Deformities also common in interphalangeal joints so called ***BOUTONNIERE*** or ***BUTTON HOLE DEFORMITIY.***
- This occurs when the extensor tendor in the back of finger splits &the head of proximal phalanges pokes through like a button/ button hole [DEPTH OF BIOLOGY]

Specific Deformities

[DEPTH OF BIOLOGY]



[DEPTH OF BIOLOGY]



EXTRA-ARTICULAR

* FEVER
* MALAISE
* LOW APPETITE
* WEAKNESS

Organ Specific:

* RHEUMATOID NODULES
  - Pressure points (E.g. Elbow)
  - Rarely: Lung, heart, sclera
* ↑Risk of ATHEROSCLEROSIS
  - Heart attack, stroke
* ANEMIA
* INTERSTITIAL LUNG FIBROSIS
* PLEURAL EFFUSIONS
  - Progressive shortness of breath

SWAN NECK DEFORMITY-

- Extra articular manifestation include non-specific symptoms of inflammation such as- fever, low apetite, malaise or muscle weakness.
- Organ specific manifestation include rheumatoid nodules from bumps of tissue & these most commonly in the skin around pressure point [elbows].
- More rarely {heart, lung, sclera}

[DEPTH OF BIOLOGY]

- Also increase rate of arthersclerosis [heart attack or stroke].
- There is also anemia, interstitial lung fibrosis & pleural effusion which can cause progressive shortness of breath

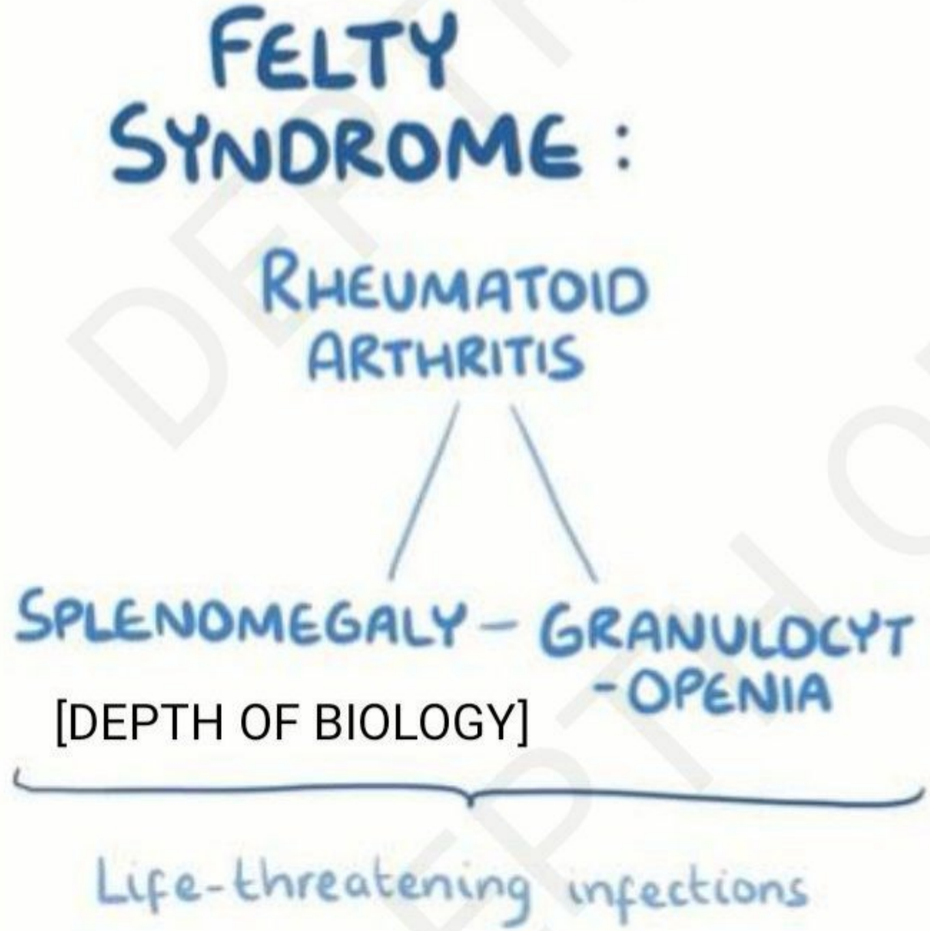
DEPTH OF BIOLOGY

- **FELTY SYNDROME-**

Serious condition in rheumatoid arthritis

Triad of rheumatoid arthritis , splenomegaly & granulocytopenia [DEPTH OF BIOLOGY]

It may lead to life-threatning infection



DIAGNOSIS

1. ***<u>CONFIRMATORY BLOOD TEST-</u>*** looking for the presence of rheumatoid factor & anti citrullinated peptide antibody.

2. ***<u>X-RAY</u>*** : decrease in bone density around affected joints ; soft tissue swelling, narrowing of joint space, bonyerosion

DEPTH OF BIOLOGY

TREATMENT

1. ***<u>DISEASE MODIFYING ANTI RHEUMATOID</u>*** MEDICATIONS- methothreaxate, hydroxychloroquine, sulfasalazine ; helps to supress inflammation [DEPTH OF BIOLOGY]

2. There are variety of medication called biological response mediators or biologivs – some biologics such as ABATACEPT work by supressing the activity of T-cells or others

Such as rituximab- supress B-cell

Anakinra- block interleukin I [DEPTH OF BIOLOGY]

3. Or give NSAIDS [non- inflamatory medication]