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Inflammation Of Brain

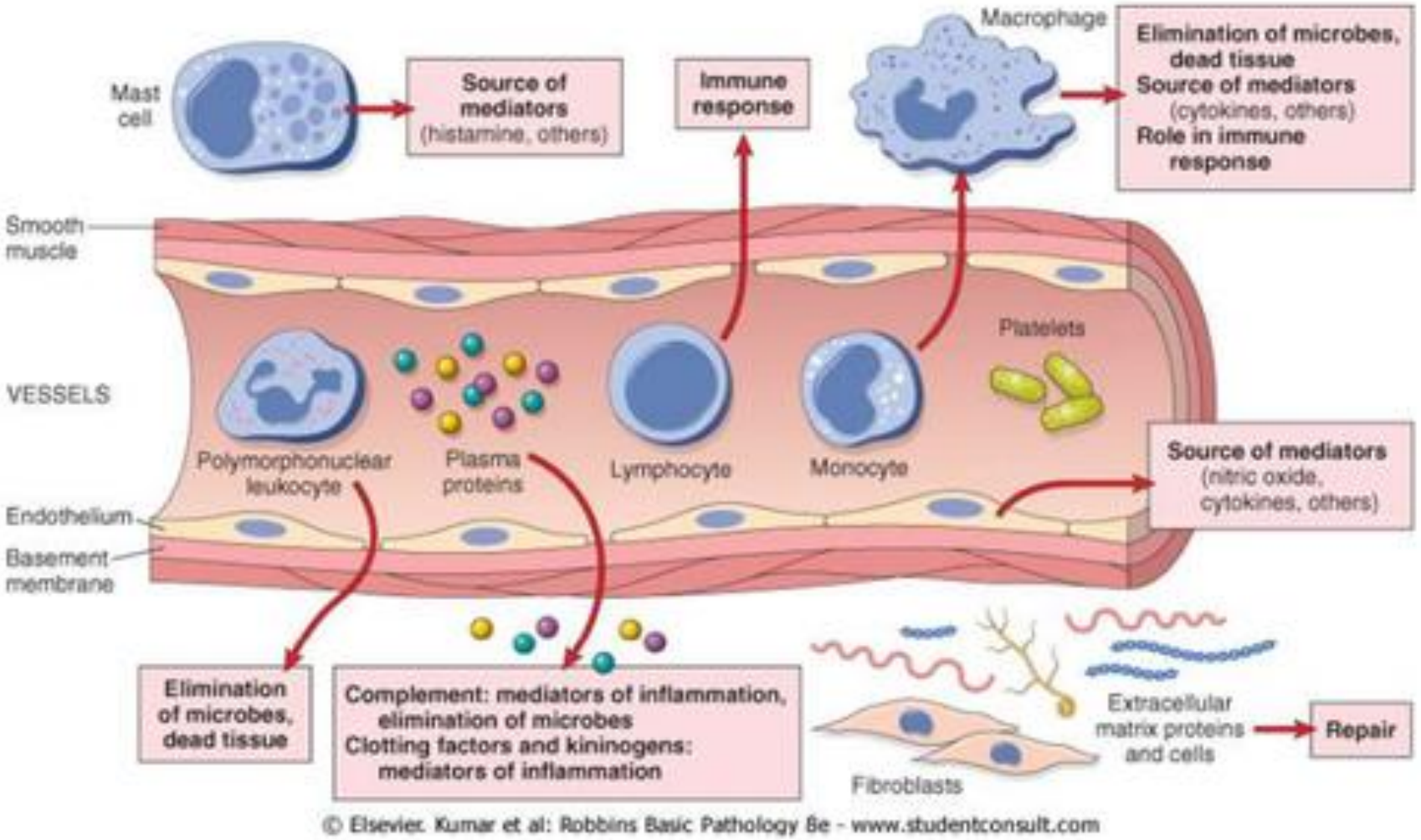
What is Inflammation

- a local response to cellular injury that is marked by capillary dilatation, leukocytic infiltration, redness, heat, and pain and that serves as a mechanism initiating the elimination of noxious agents and of damaged tissue

Types Of Inflammation

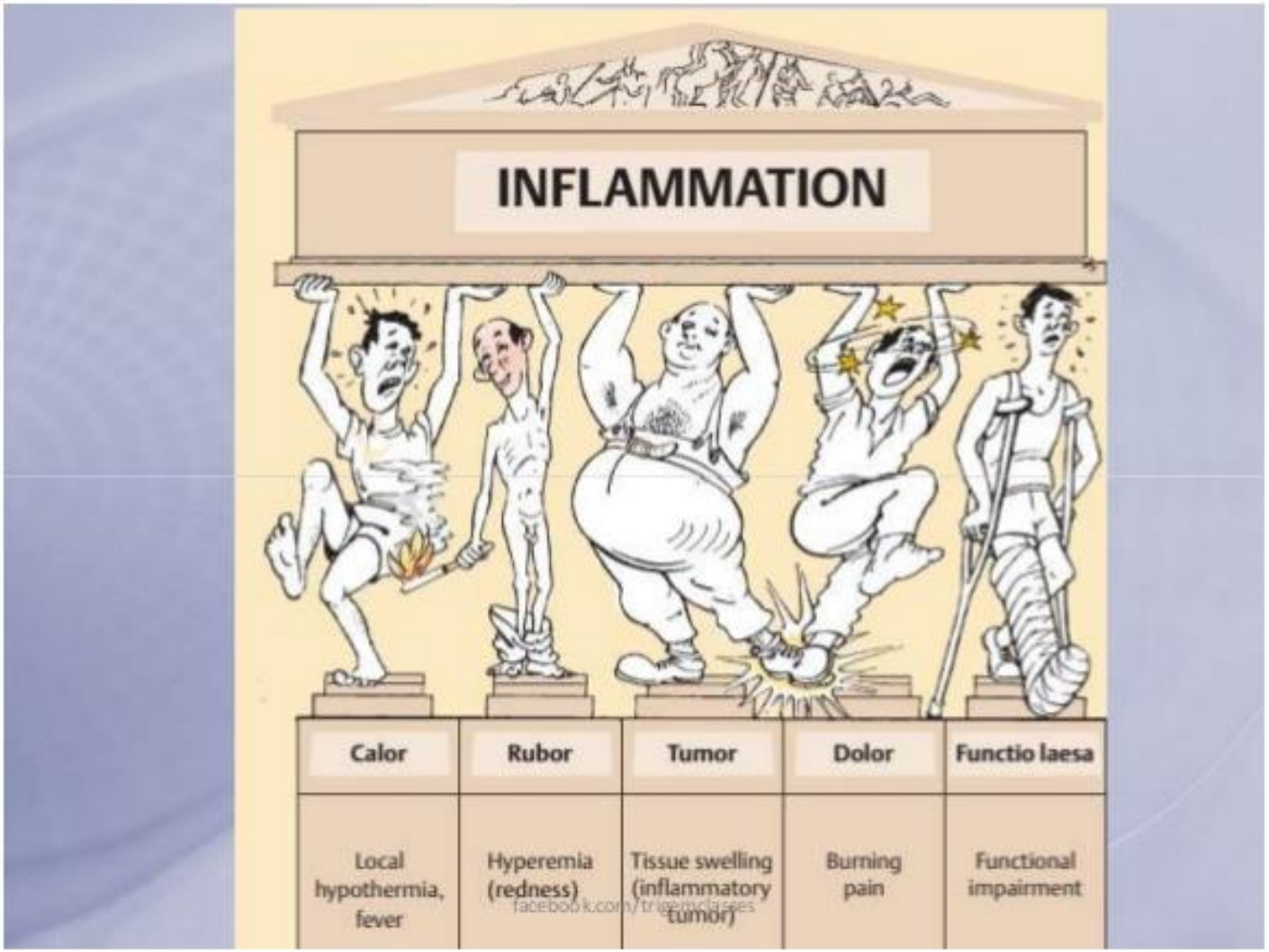
- Mainly of 2 types i.e. acute and chronic • Acute Inflammation – short duration – represents the early body reaction- followed by healing
- Chronic inflammation – longer duration – causative agent of acute inflammation persists for a long time • Another variant, Chronic active inflammation : stimulus is such that it induces chronic inflammation from the beginning

Inflammation



Signs of Inflammation

- 4 cardinal signs (Celsus) – rubor (redness); – tumor (swelling); – calor (heat); – dolor (pain) 5th sign functio laesa (loss of function)


INFLAMMATION
Calor
Rubor
Tumor
Dolor
Functio laesa
Local hypothermia, fever
Hyperemia (redness)
Tissue swelling (inflammatory tumor)
Burning pain
Functional impairment
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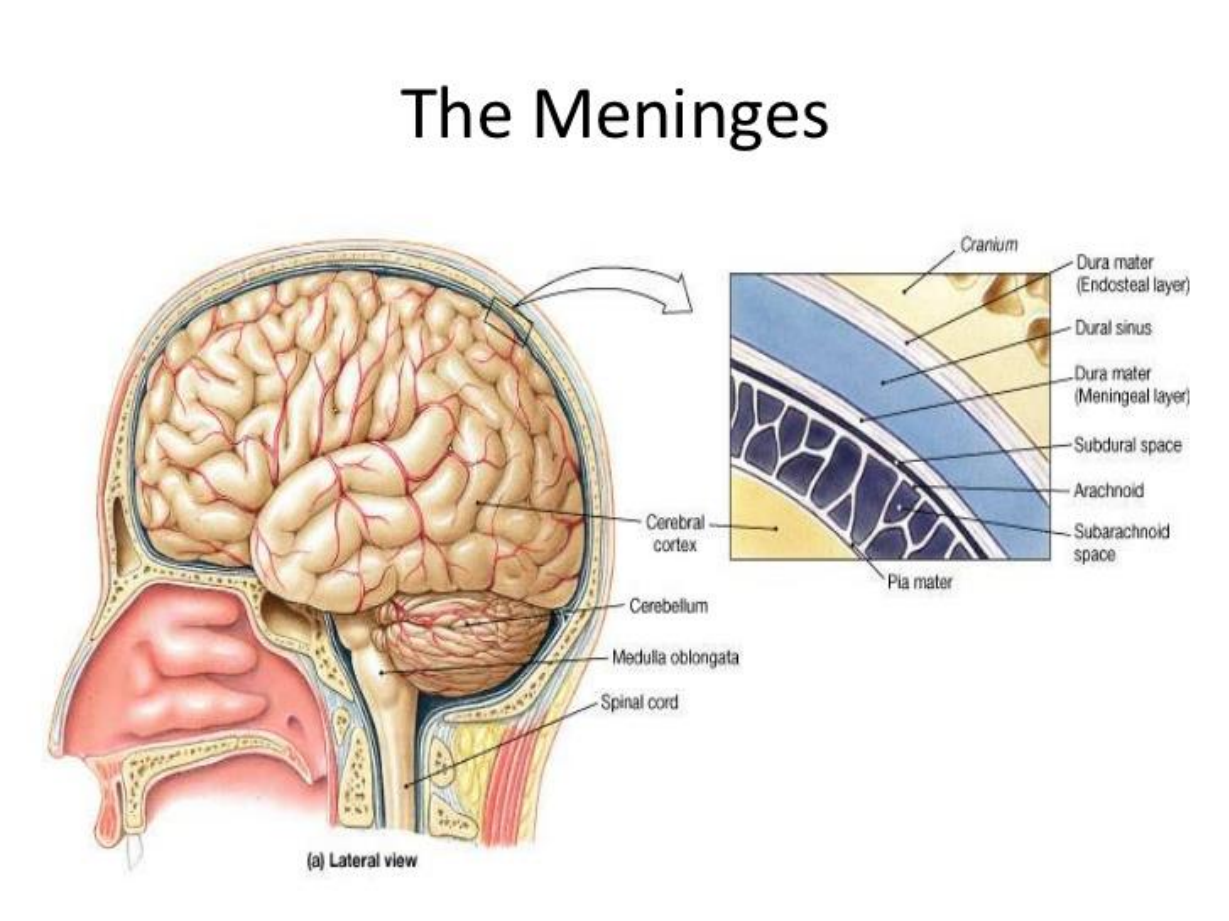
ANATOMY OF BRAIN



Scenerio

- 22 years young boy presented with headache for 8 days, fever for 8 days, neck pain for 5 days.
- O/E: he has neck stiffness and fibrile
  - What is your Diagnosis
  - How will you investigate
  - What is route of spread of infections to brain

Inflammation Of Brain

- Inflammatory brain disease is a condition that causes the brain and/or spinal cord to become inflamed.
- Inflammation in brain causes irritation and swelling of brain tissues or blood vessels.

Classification of Brain inflammation

- 1) Infectious causes
- 2) Non-Infectious causes

Infectious Causes

- Meningitis
- Encephalitis
- Brain abscess

MENINGITIS

- Meningitis is an inflammation of the membranes (meninges) surrounding your brain and spinal cord

ENCEPHALITIS

- Inflammation of brain Parenchyma. It can present as seizures, focal neurological defect, altered conciousness

Brain abscess

- **Brain abscess** (or **cerebral abscess**) is an abscess caused by inflammation and collection of infected material, coming from local (ear infection, dental abscess, infection of paranasal sinuses, infection of the mastoid air cells of the temporal bone, epidural abscess) or remote (lung, heart, kidney etc.) infectious sources, within the brain tissue. The infection may also be introduced through a skull fracture following a head trauma or surgical procedures.

Non- Infectious Causes

- Antibody Mediated Diseases
  Anti-NMDA Receptor Encephalitis
  Limbic Encephalitis
  Hashimoto's Encephalitis

- Demyelinating Diseases
  Acute Disseminated Encephalomyelitis
  Multiple Sclerosis
  Optic Neuritis
  Neuromyelitis Optica
  Acute Transverse Myelitis

- T-Cell Mediated Diseases
  Rasmussen's Encephalitis

- Granulomatous Diseases
  Neurosarcoidosis
  ANCA-Associated Vasculitis

Infectious causes

- Bacterial
- Viral
- Fungal
- Parasitic

Routes of CNS Infection

- There are four routes through which pathogen reaches CNS
  1. Haematogenous : most common
  2. Direct implentation
     a) trauma
     b) Iatrogenic (LP)
     c) Congential (Meningomyelocoel
  3. Local Extension: most commonly from paranasal sinuses and mastoid
  4. From peripheral nervous system to brain: for example Rabies infection

Clinical Presentation

Meningitis:

Headache, Fever, Neck stiffness, altered consciousness, vomiting, fits

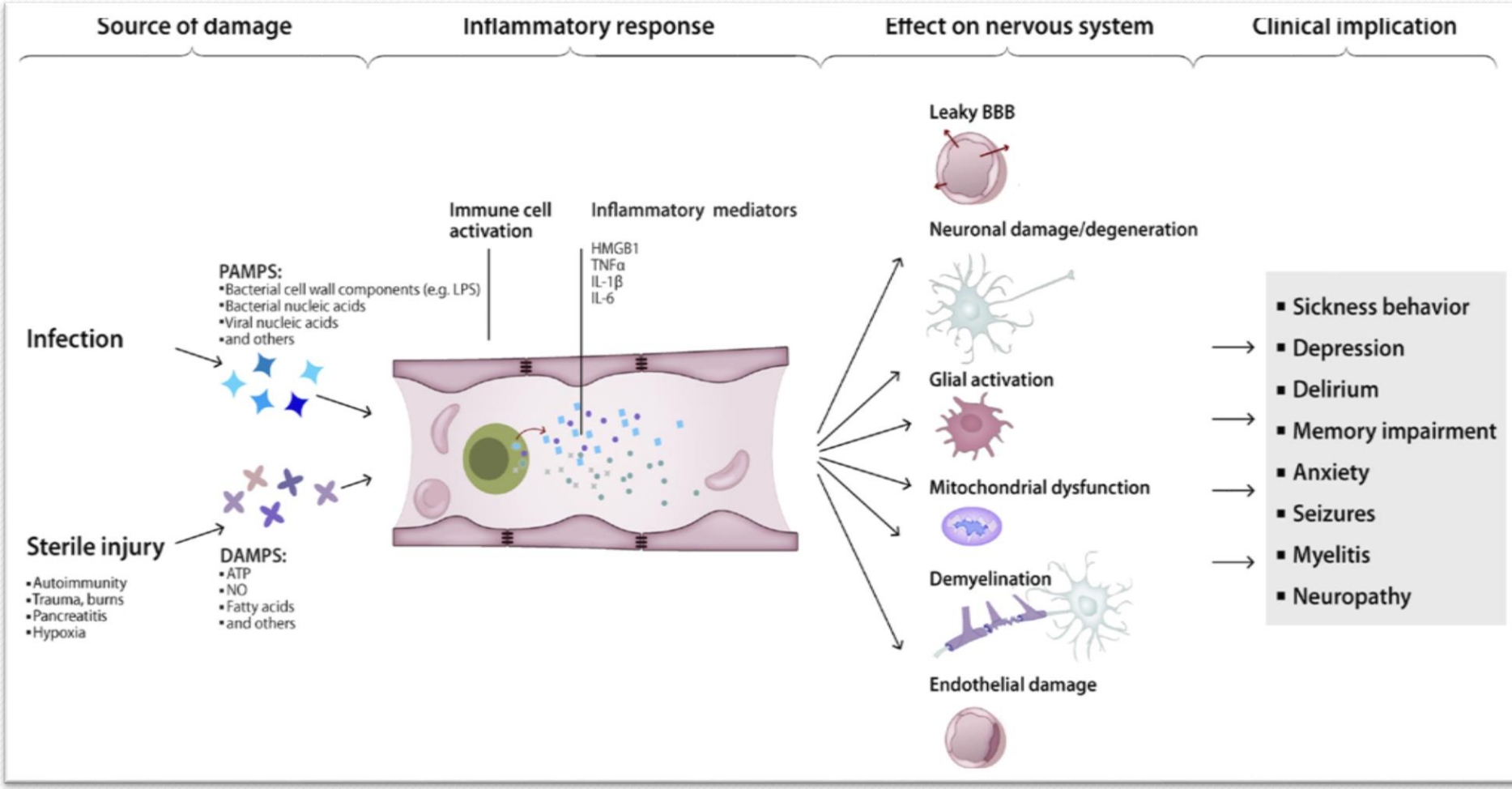
Encephalitis:

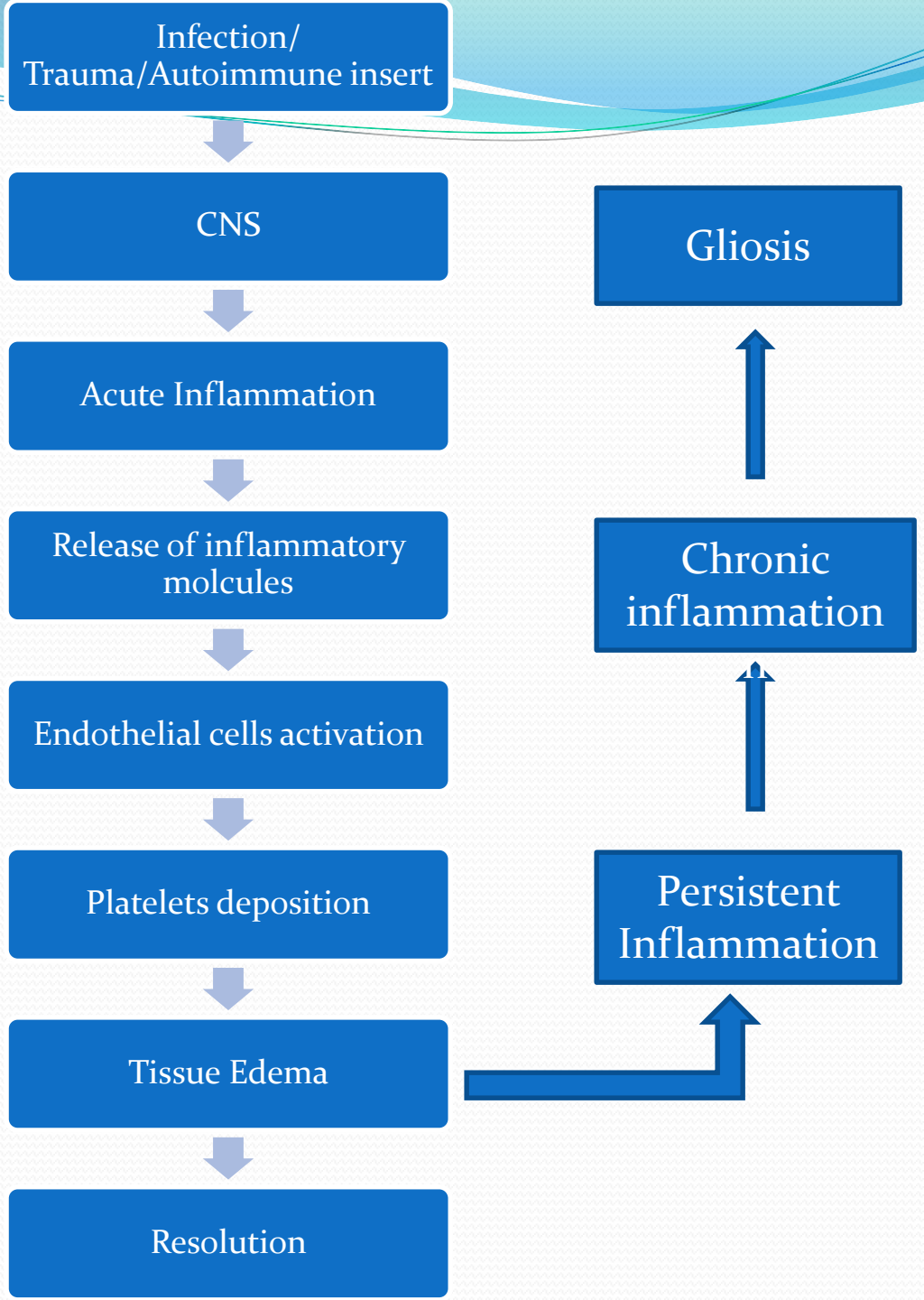
Fits, Altered consciousness, focal neurological defect, disorientation, fever, psychiatric symptoms

Abscess: Fever, headache, vomiting

- Non infectious diseases that involve CNS can be presented as encephalitis, visual loss, paraplegia(spinal cord involvement), focal neurological defect.

Pathogensis of brain inflammation




Infection/ Trauma/Autoimmune insert
CNS
Acute Inflammation
Release of inflammatory molcules
Endothelial cells activation
Platelets deposition
Tissue Edema
Resolution
Persistent Inflammation
Chronic inflammation
Gliosis

Examination findings

- Neck stiffness
- Cranial nerve palsies
- Focal neurological defect
- Low GCS
- Disorientation
- Papillary edema

Investigations

- CBC,ESR, CRP, LFTS, RFTs, Electrolytes, RBS
- Blood Cultures
- MRI/ CT brain with contrast
- EEG
- CSF R/E, cultures, PCR
- Autoimmune screening (SLE, Anti NMDA etc)
- ACE levels (Neurosarcoidosis)
- Chest Xrays (Neurosarcoidosis)

Management

- Antipyretic
- Antibiotics
- Anti viral
- Anti Fungal
- Steriods
- IVIG
- Antiepileptics

THANK YOU

a 45 year old man presented in E/R with acute meningitis ,what is the most common route of infection in this man

a) Haematogenous

b) from dental abscess

c) Trauma

d) from paranasal sinuses

- Which of the following cell is involve in CNS inflammation
  - 1) Neuron
  - 2) Microglial
  - 3) oligodendrocytes
  - 4) schwann cells