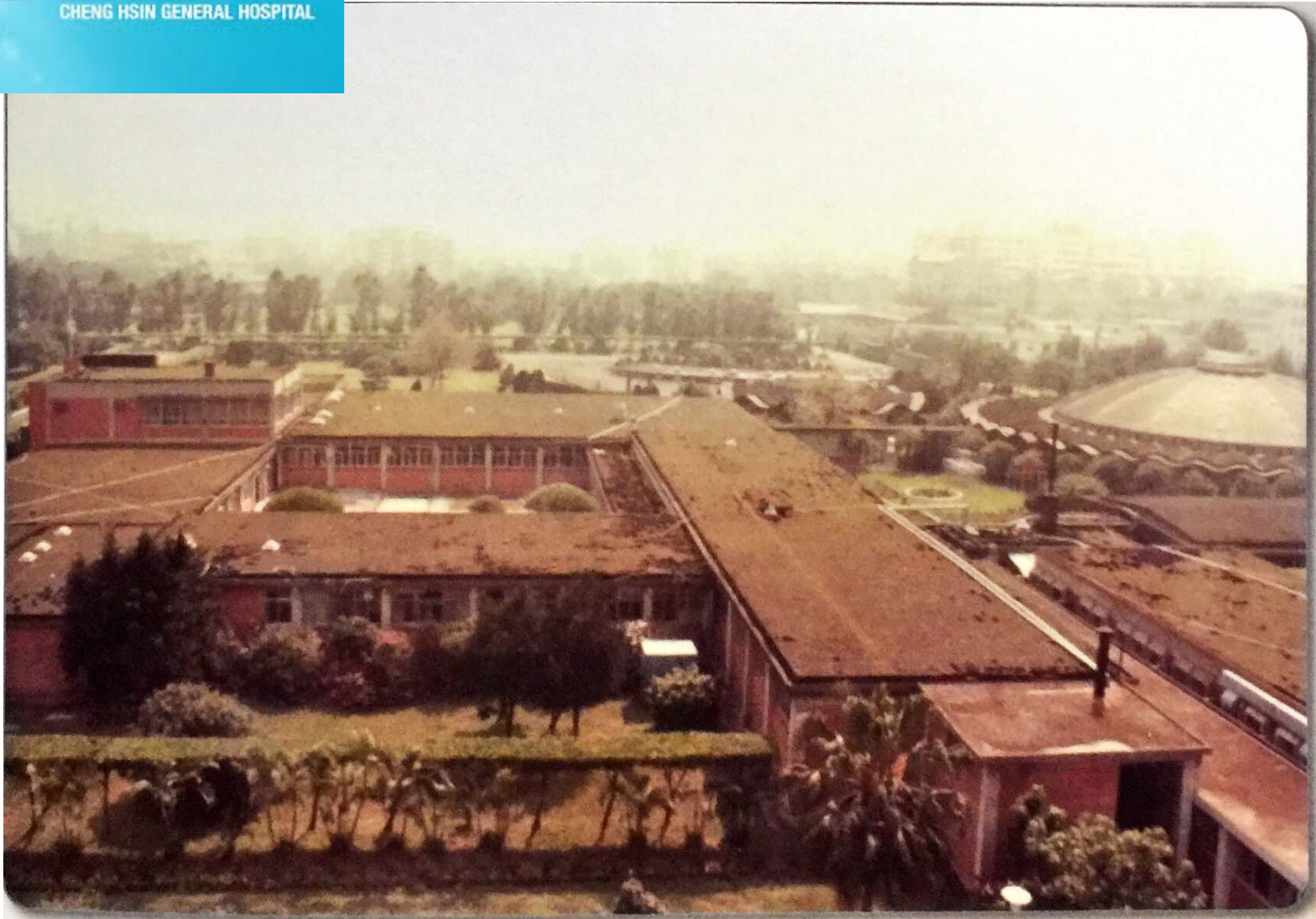




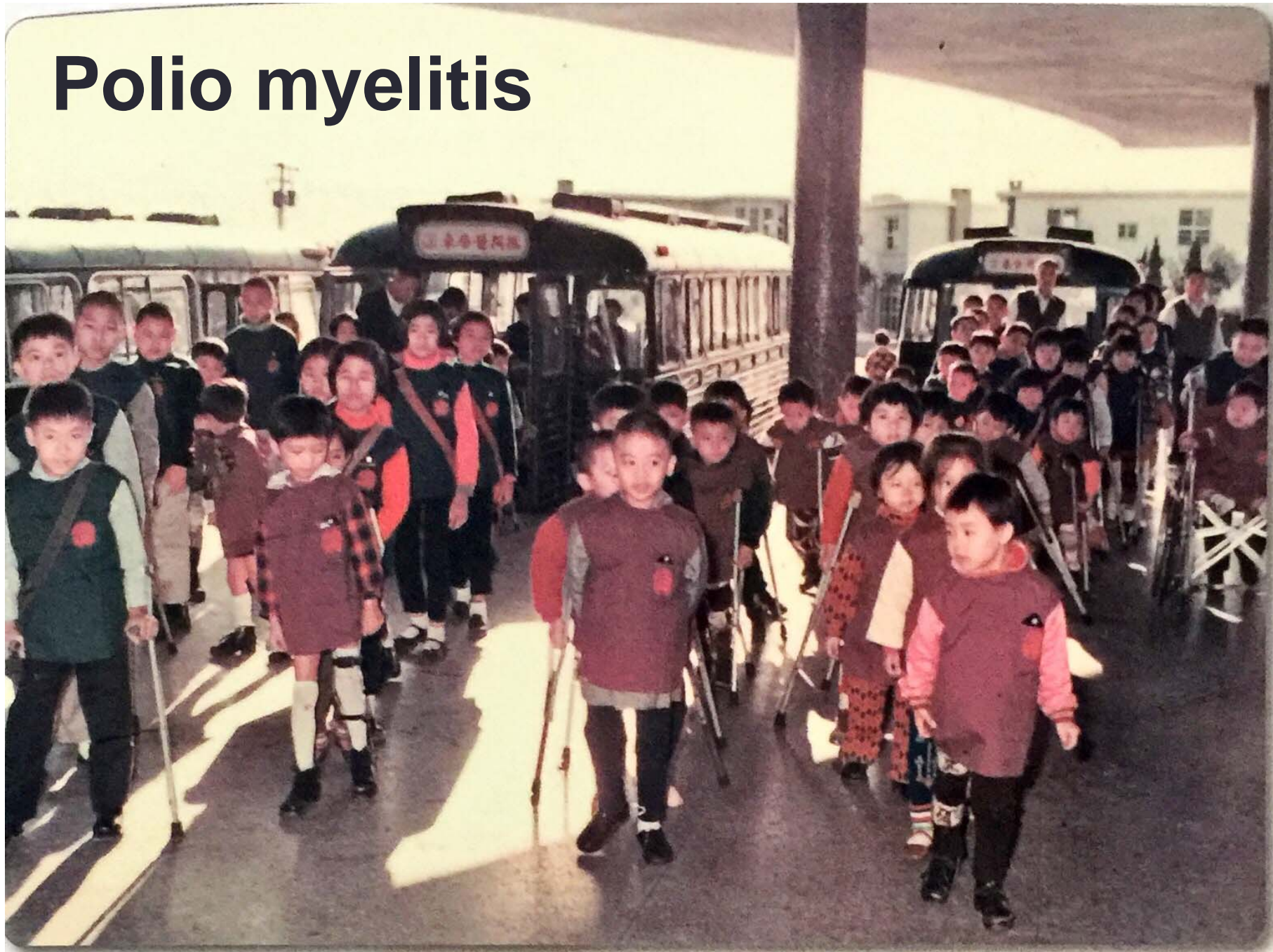
CNS INFECTION



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Polio myelitis



CNS Infections

- ➔ Meningitis
- ➔ Encephalitis
- ➔ Focal infections of brain parenchyma
- ➔ Central nervous system shunt infections
- ➔ Epidural abscess
- ➔ Subdural empyema
- ➔ Suppurative intracranial thrombophlebitis

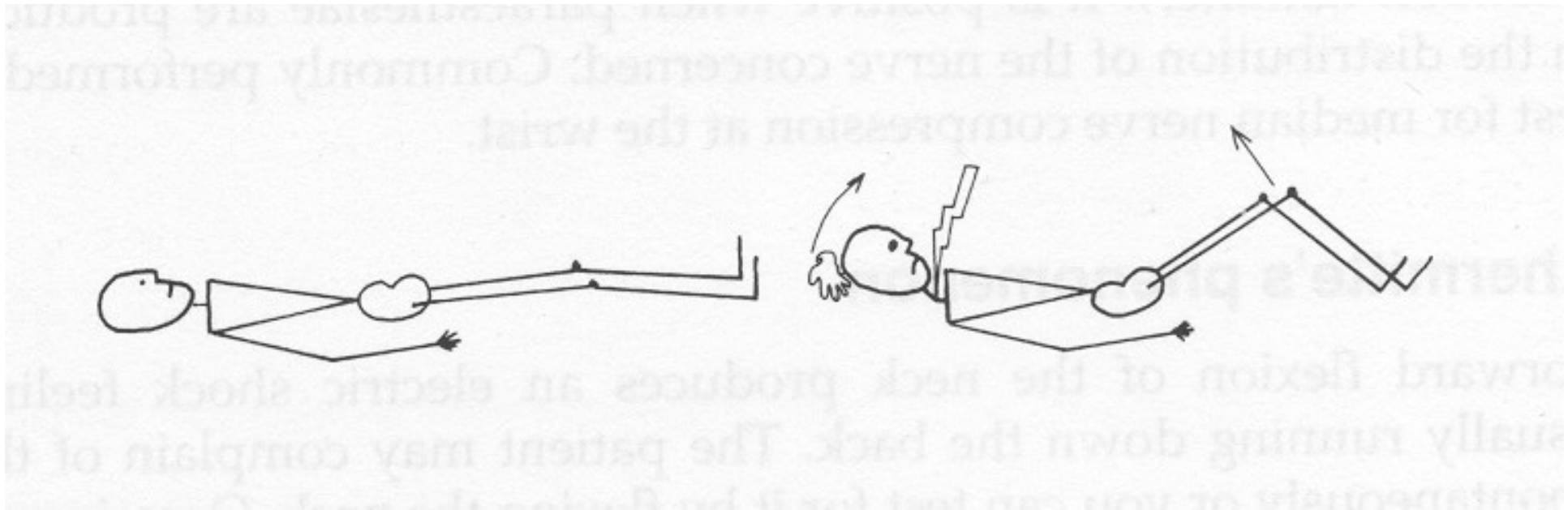
Types

Meningitis	Encephalitis
<p>Leptomeningitis – inflammatory process localized to the interfacing surface of the pia and arachnoid</p>	<p>Primary (Infectious) encephalitis – An inflammatory response following an acute systemic viral infection</p>
<p>Pachymeningitis – inflammation of the dura</p> <ul style="list-style-type: none">❑ Chronic sinusitis❑ Mastoiditis	<p>Secondary (post-infection) – Immune responds to a previous infection and mistakenly attacks the brain, typical onset that begins 2-12 days after the initial viral infection</p>

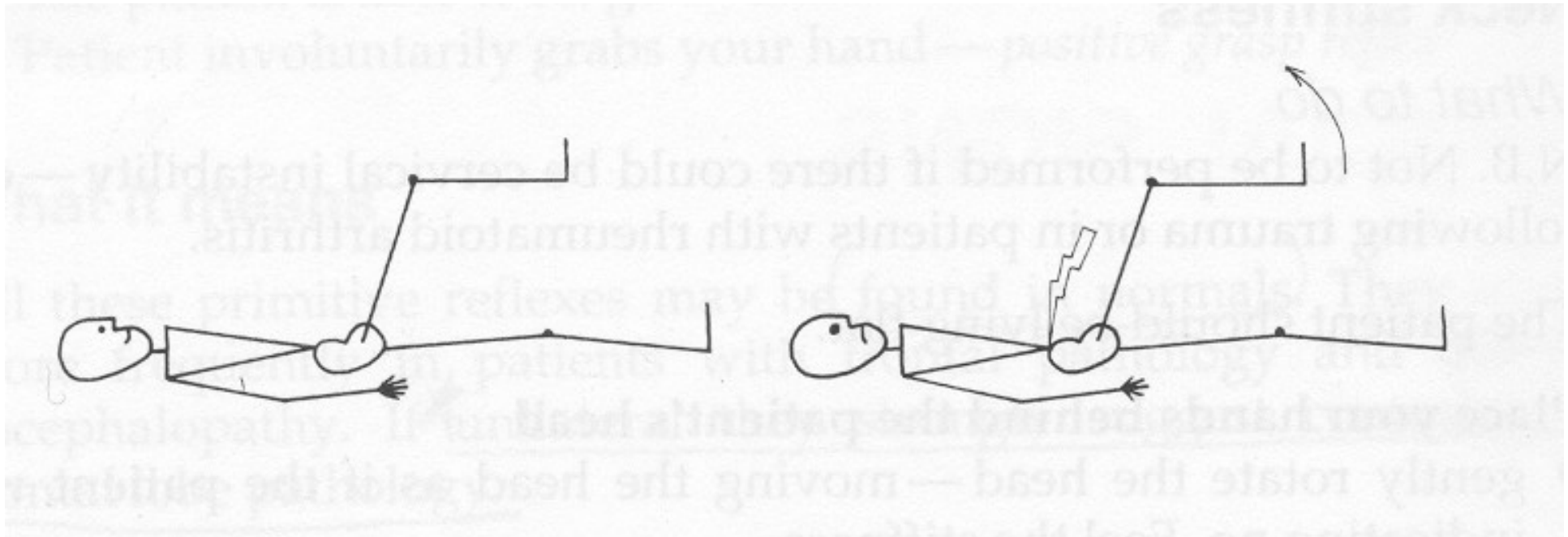
Symptoms/Signs

Meningitis	Encephalitis
Common	
Fever, headache, neck rigidity (positive Kernig and Brudzinski signs, but may be absent in newborn, elderly, or comatous patient)	Fever, headache, photophobia, nuchal rigidity, stiffness of the limbs, slow movement, clumsiness
More Serious	
IICP(severe headache, nausea, vomiting), seizure, conscious change, coma	IICP(severe headache, nausea, vomiting), confusion, disorientation, memory loss, speech/hearing problem, hallucination, seizure, coma (<u>with focal neurologic deficiency</u>)

BRUDZINSKI'S SIGN



KERNIG'S SIGN



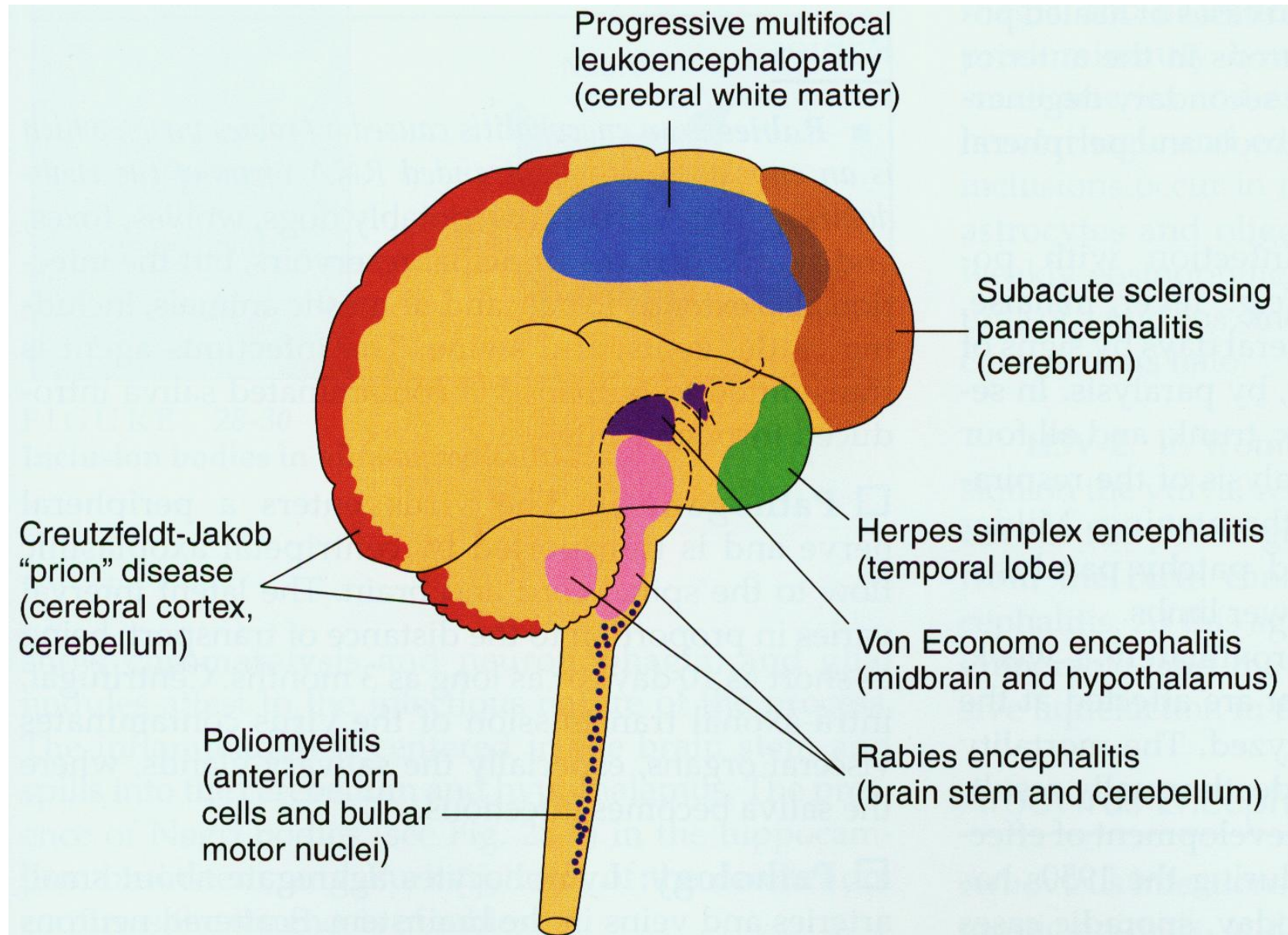
Infection pathway

Meningitis	Encephalitis
<ul style="list-style-type: none">❑ Infected by septicemia❑ Metastasis from infection of the heart, lung, or other viscera❑ Direct extension from a septic focus in the skull, spine, or parenchyma of the nervous system (e.g., sinusitis, otitis, osteomyelitis, and brain abscess)❑ Compound fracture of the skull and fractures through the nasal sinuses or mastoid❑ After neurosurgical procedures	<ul style="list-style-type: none">❑ Infected By the hematogenous route or spread along nerve fibers❑ Mosquitoes bite – Japanese encephalitis, West-Nile encephalitis❑ Ticks bite – Tick-borne encephalitis❑ Mammal bite – Rabies encephalitis

Pathogenesis

Meningitis	Encephalitis
<p>Acute purulent meningitis</p> <ul style="list-style-type: none">❑ Escherichia coli– among newborns, G(-)❑ Haemophilus influenzae – between 3months and 3 years, G(-)❑ Streptococcus pneumoniae – later in life❑ Neisseria meningitidis (meningococcus) – frequents the human nasopharynx, and airborne transmission in crowded environments – epidemic meningitis	<ul style="list-style-type: none">❑ Common viruses – Herpes virus (Herpes simplex, Epstein-Barr virus, Cytomegalovirus)❑ Children viruses – Measles, Mumps (myxovirus), Enterovirus (Poliomyelitis, Coxackie virus B, Echovirus)❑ Arboviruses – Japanese encephalitis, West-Nile encephalitis, Tick-borne encephalitis
<ul style="list-style-type: none">❑ Aseptic meningitis	<ul style="list-style-type: none">❑ Meningoencephalitis

Viral Encephalomyelitis

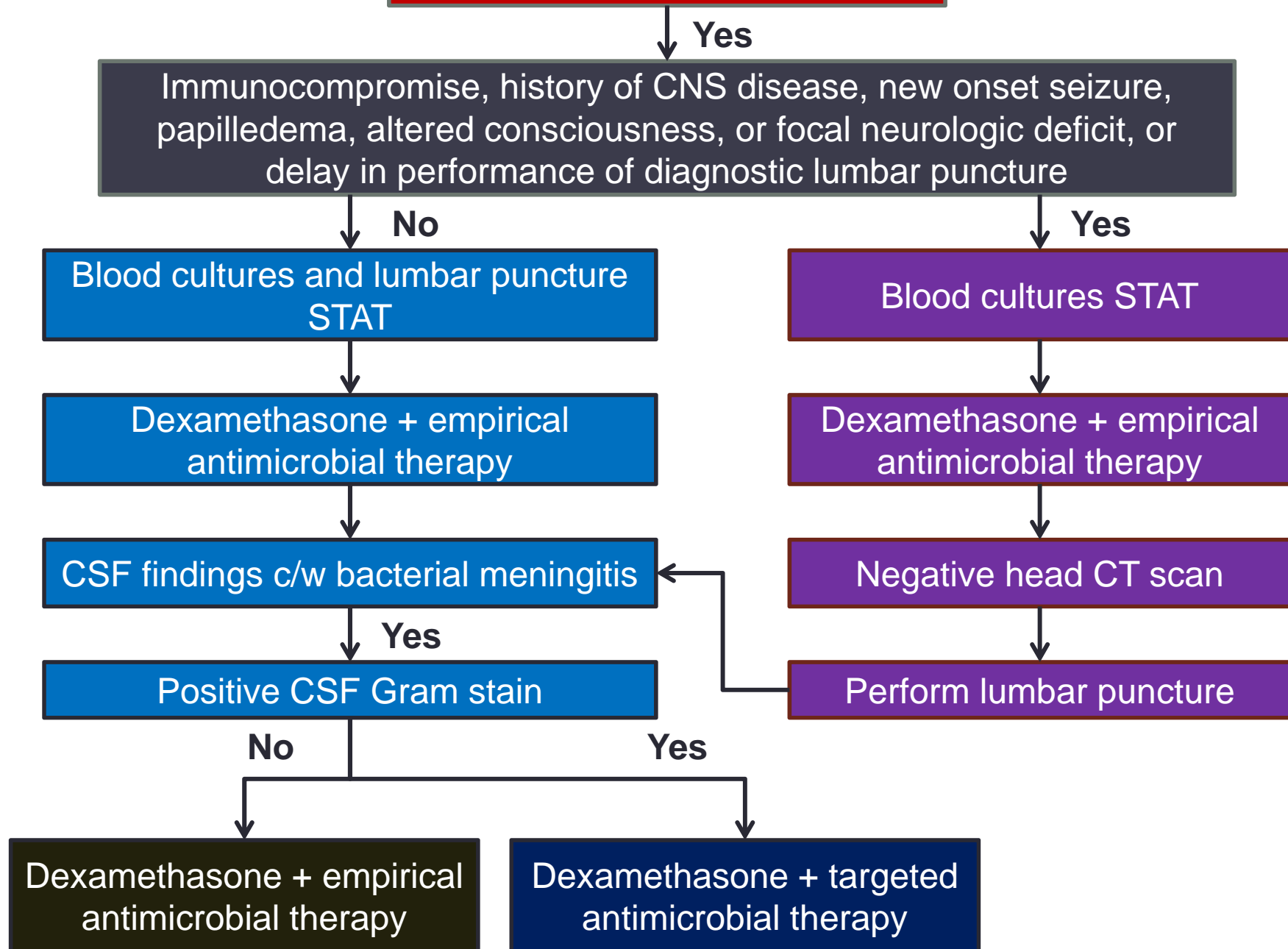


Viral infection

Viral (aseptic) meningitis, encephalitis, myelitis

- ✧ Viral meningitis
 - ✧ Usually a self-limited illness
 - ✧ Headache, photophobia, neck stiffness, fever
- ✧ Viral encephalitis
 - ✧ Involvement of parenchymal brain tissue
 - ✧ Convulsive seizure, conscious alternations, focal neurologic abnormalities
- ✧ Meningoencephalitis
- ✧ Myelitis – infection of spinal motor neurons, sensory neurons, autonomic neurons, demyelinations of white matter (transverse myelitis)

Suspicion for bacteria meningitis



Empiric Antimicrobial Therapy for Bacterial Meningitis

Age Group	Antimicrobial Agent
Neonates	Ampicillin plus cefotaxime or cefepime
Infants and children	Ceftriaxone, cefotaxime, or cefepime plus vancomycin
Adults (15-50 years)	
Community acquired	Ceftriaxone, cefotaxime, or cefepime plus vancomycin
Postneurosurgical	Ceftazidime plus vancomycin
Immunocompromised	Ceftazidime plus ampicillin
Older adults	Ceftriaxone, cefotaxime, or cefepime plus vancomycin plus ampicillin

Principles of Treatment for CNS Infection

- ✧ Fluid supplement
- ✧ Tx for hyponatremia (overzealous free water or SIADH)
- ✧ Heparization if DIC occurred.
- ✧ Anticonvulsants
- ✧ Osmotic diuretics or corticosteroids (only if early or impending cerebral herniation)
- ✧ Rifampin (only prophylactic measure for N. meningitides)

Urgent action

- ✧ Patients with suspected herpes simplex encephalitis should receive 10mg/kg intravenous acyclovir every 8h for 10 days or more.
- ✧ This treatment should begin immediately and be stopped only if diagnosis is not confirmed during that period.
- ✧ **Key! Don't miss!**
 - ✧ Remember to test for tuberculosis infection as a possible treatable cause of signs and symptoms.

Examination

- ✧ Is the patient alert? Orientated to person, place, and time?
- ✧ Can the patient be roused? Can he or she follow commands?
- ✧ Is the patient febrile or hypothermic?
- ✧ Is the neck flexible or rigid?
- ✧ Are petechiae or purpura present on the skin?
- ✧ Is there evidence of cranial trauma?
- ✧ Are there focal findings in the neurologic examination?
- ✧ Is there a history of malignance?