

# Clinic of poliomyelitis: Challenges to diagnosis

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# Conflict of interest

- I declare no conflict of interest
- Chair, National Verification Commission for the Elimination of Measles, Rubella, Congenital Rubella Syndrome 2013-Date
- Member, National Verification Commission for the Elimination of Polio 2013-Date



# Clinical case



- Age: 23 months
- Male
- From: Anapoima, Cundinamarca
- Companion: Mother, 21 years old
- Date of entry **FCI**: 03/28/23

- Perinatal: negative
- Pathologicals: scabies, 1st year
- Immunizations: EPI up to date
- Psychomotor development: normal
- Epidemiological: home with all services, no pets, no symptomatic contacts.

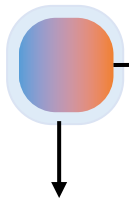
03/22-23/23

03/25/23

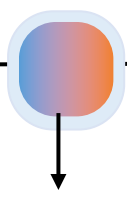
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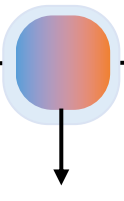
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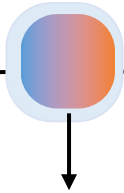
Fever 40°C  
Dry cough  
Vomiting



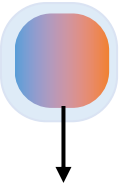
GE viral  
SRO



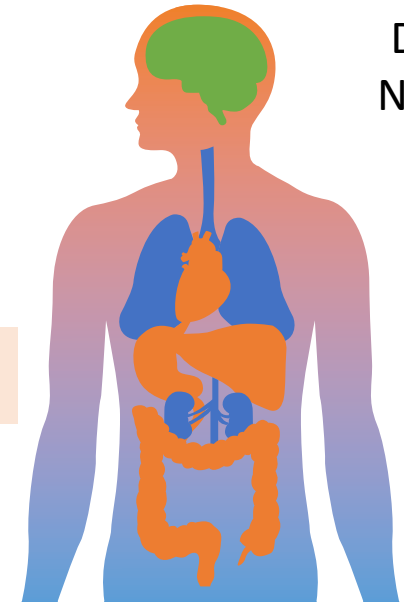
Fever  
Drowsiness  
Weakness



Laboratories  
Chest X-ray  
Pneumonia vs.  
Neuroinfection



**FCI** Admission



Drowsy  
No focus

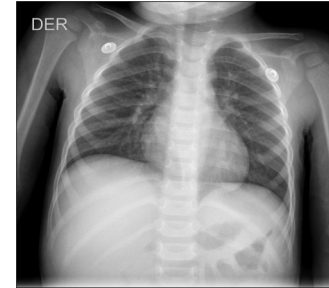
Dehydrated



# Clinical case

- Hemogram: Leu 9.170, N 5.530, L 2.820, Hb 12.4Gr%, Hcto 35.9%, Platelets 389.000
- Reactants: VSG 2 mm/h, PCR 0.42 mg/dL
- Electrolytes: Cl 97, P 5.6, Mg 2.2, K 4.7, Na 135
- Hepatic: ALT 18, AST 41, BT 0.3, BI 0.2, BI 0.1
- Uroanalysis: normal

Drowsy, normo-reactive isocoria, follows objects with gaze, follows simple commands, awakens with verbal stimulus, facial symmetry, central uvula, gag reflex present, generalized hypotonia, Brudzinski positive, Kernig negative.



**Chest X-ray:**  
bilateral parahilar  
interstitial infiltrates.



Simple cranial  
CT: normal

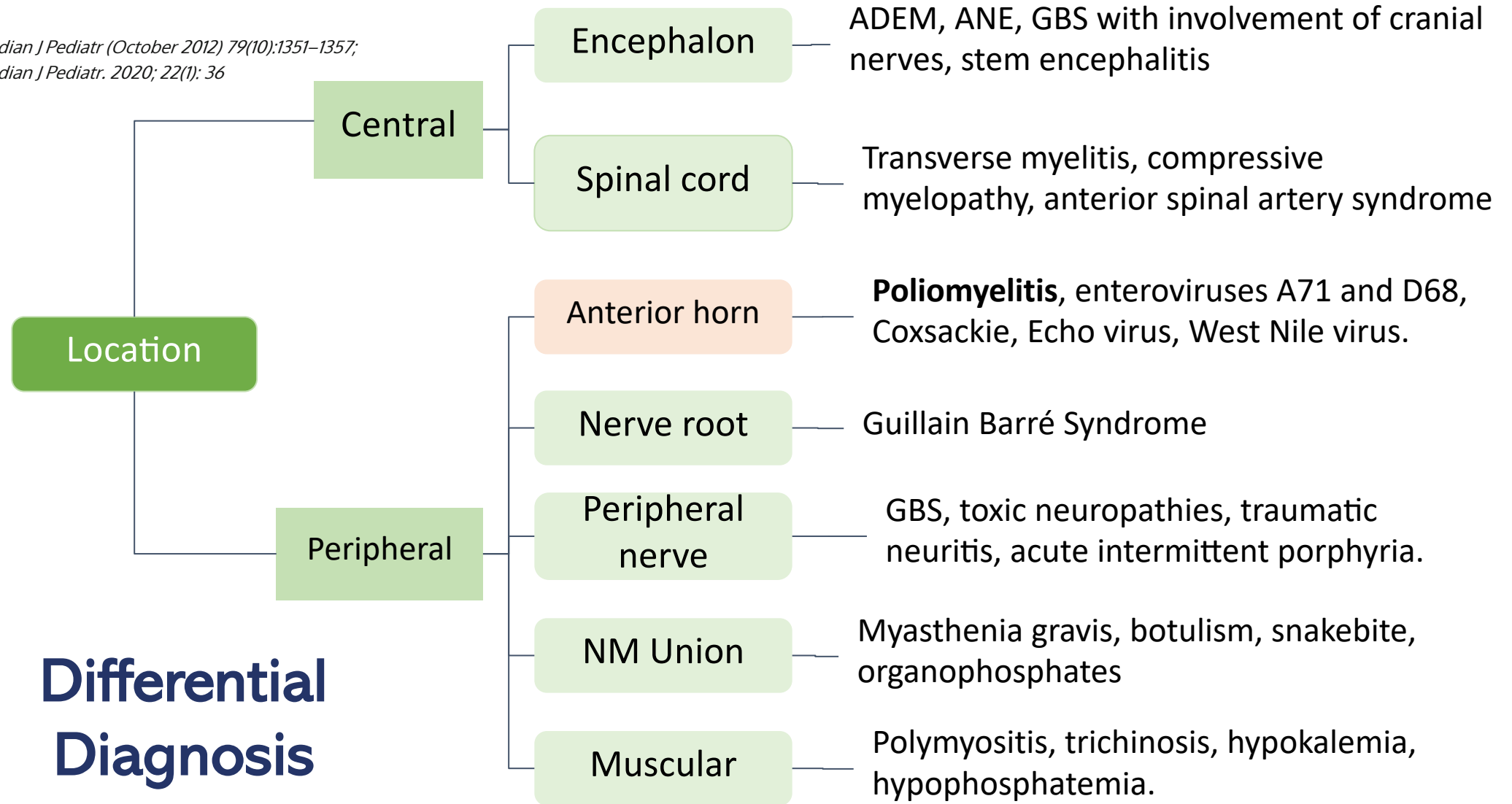
Lumbar  
puncture:  
normal

Acute flaccid paralysis



Comprehensive approach +  
management  
**UCIP**

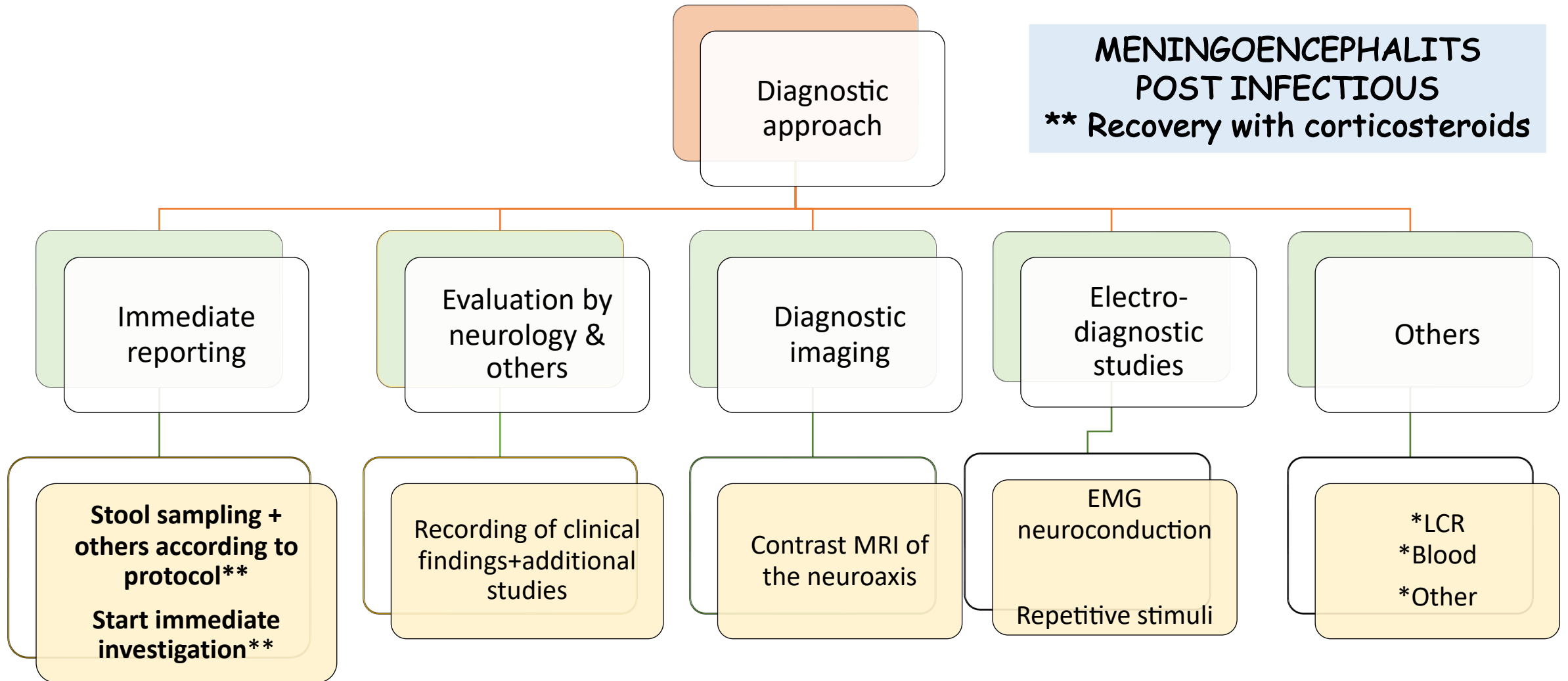
*Indian J Pediatr (October 2012) 79(10):1351–1357;  
Indian J Pediatr. 2020; 22(1): 36*



# Differential diagnostic evaluations

Topography	Clinic	LCR	EMG, NC, EEG	RMN	Etiology
Encephalon	AEC, multifocal deficits, meningismus, pyramidal signs; ROT+++	Normal or pleocytosis	V-EEG: diffuse or focal slowing	Diffuse T2 hyperintensities, white s., poorly demarcated	ADEM ANE
Spinal cord	Paraparesis, sphincteric involvement, sensory level ROT+++.	Normal or pleocytosis, elevated IgG	Normal MCV	Central hyperintense T2 spinal cord lesion of more than 2 sec. thoracic	Transverse myelitis Epidural abscess
Anterior horn	<b>Fever, meningismus, asymmetrical weakness ROT-</b>	<b>Pleocytosis</b>	<b>Denervation Normal MCV</b>	<b>Anterior horn hyperintense on T2; owl's eye</b>	<b>Poliomyelitis, other non-poliovirus enteroviruses, etc.</b>
Root, peripheral nerves	Ascending distal paralysis ROT -	AC dissociation, bands	< VCM	Thickening and enhancement of anterior nerve roots, cauda and conus medullaris	GBS, enterovirus, WNV, toxics
Neuromuscular junction	Cranial paresis, bulbar Oculomotor ROT ++	-	Repetitive stimulus test	-	Botulism Myasthenia O/phosphates
Muscle	Proximal paresis, nuchal ROT +/-	> CPK	Normal MCV	High signal T2WI and STIR (edema), enhancement	Polymyositis Dermatomyositis

# Diagnostic evaluation in acute flaccid paralysis



# Objectives



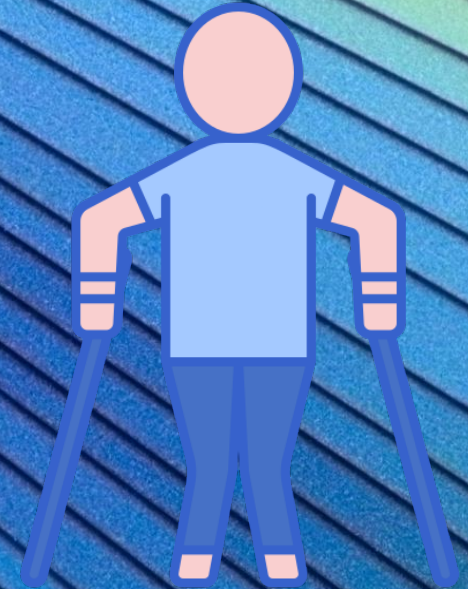
Highlight and report on the types of presentation of poliomyelitis.



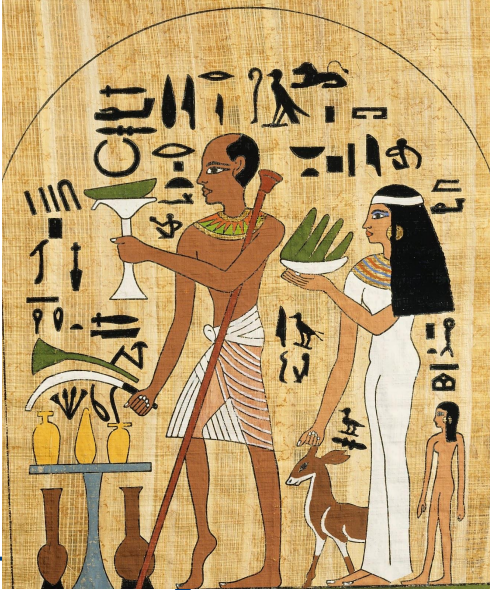
Illustrate the clinical features of acute forms of poliomyelitis & post poliomyelitis syndrome.



Emphasize the importance of the diagnostic approach & immediate reporting of flaccid paralysis.







**> 3000 years ago**

\*Outbreaks of paralysis are documented in Egyptian papyri.

**1887**

\*Polio epidemic shakes Stockholm, Sweden.

\*Other epidemics arise in Europe and North America

## **Beginning of the 20th Century**

\* 1905: Ivar Wickham, MD discovers poliomyelitis

\*1908: Karl Landsteiner & Erwin Popper succeed in identifying & isolating the virus

## **1910-1960**

\*1910 vaccine idea initiated

\*1951-1955 Salk develops vaccine, approved use of IPV

\*1960s Approval of OPV vaccine

## **1968-2000's**

\*1968 Salk vaccine eliminated in US, OPV only

\*1994 Polio eliminated from the Americas

\*1997 New vaccine [IPV] introduced in the U.S.

\* 2014 begins transition to IPV

# Poliomyelitis

A viral disease caused by one of the polioviruses, which is highly feared for its short- and long-term neurological effects.

Dramatic ↓ ↓ since the introduction of vaccination in the mid-1950s with elimination in the Americas in 1994.



Millions of people affected between 1940-1950 worldwide

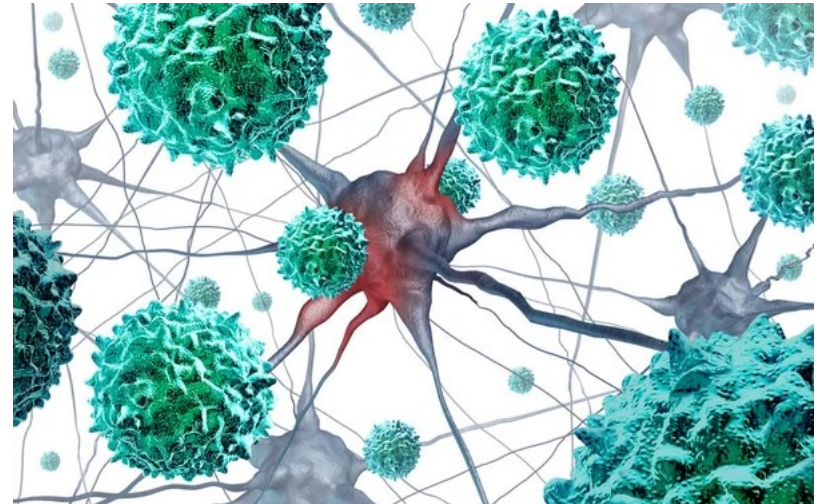
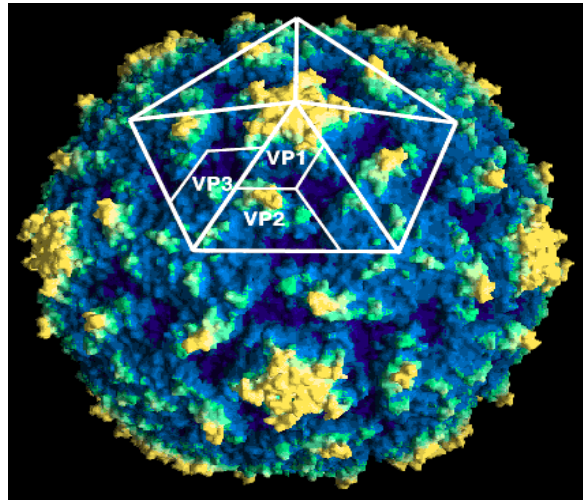
Vaccine development brought hope!

Despite progress and elimination in many areas of the world:

- ✓ Millions of people still with sequelae [post polio syndrome].
- ✓ Some areas with wild poliovirus transmission.
- ✓ Cases of oral vaccine virus-associated poliovirus by ↓ of vaccination coverages.

# Poliovirus

- \*RNA virus, enterovirus C, highly contagious.
- \* Virus with affinity for central nervous system.
- \*There are 3 types of wild-type viruses: 1 [> pre-vaccination cause], 2, 3
- \*Viruses related to oral vaccine have been identified.



# Poliovirus

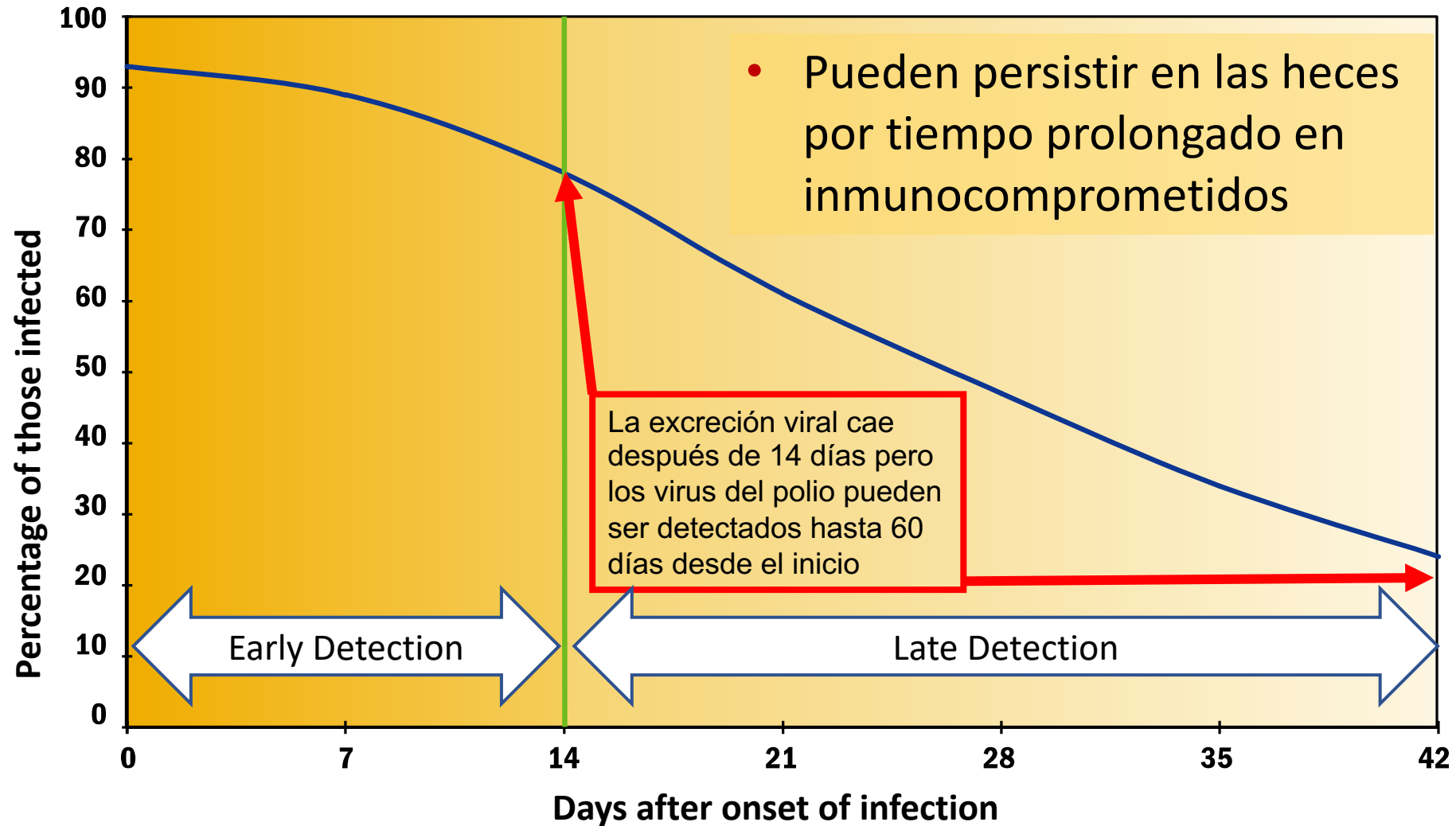
- The only reservoir is the human being
- It is transmitted by fecal-oral route due to poor hygienic conditions through pharyngeal secretions.
- It can also be transmitted by droplets [pharyngeal or respiratory secretions].
- Can be shed in saliva up to +/- 1 week
- Can be transmitted from people with or without symptoms
- Can remain in wastewater for long periods



**Unvaccinated persons are at high risk for paralytic poliomyelitis if exposed to wild-type or oral vaccine-derived viruses**



# Duration of fecal excretion of wild poliovirus from infected persons.

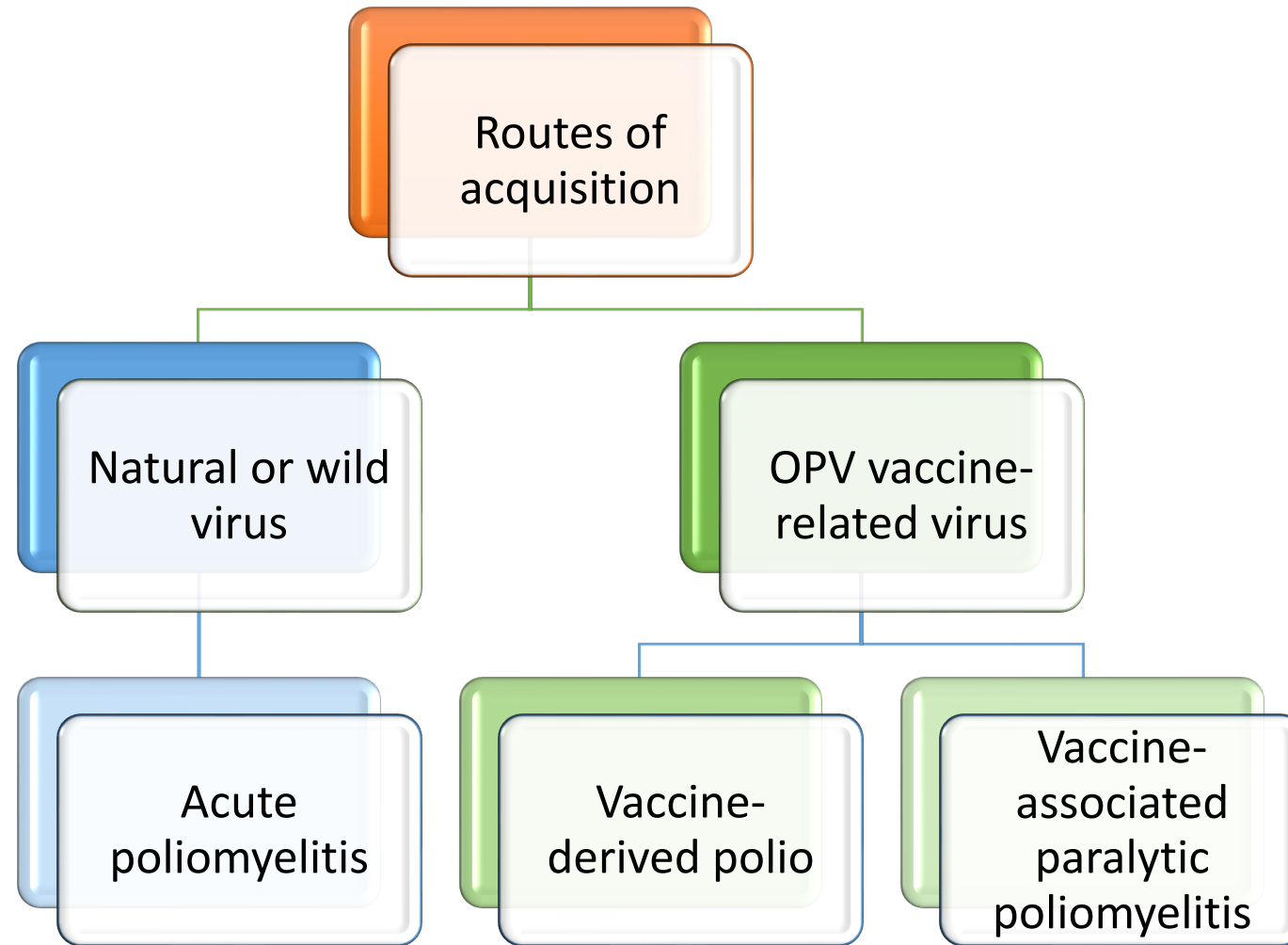
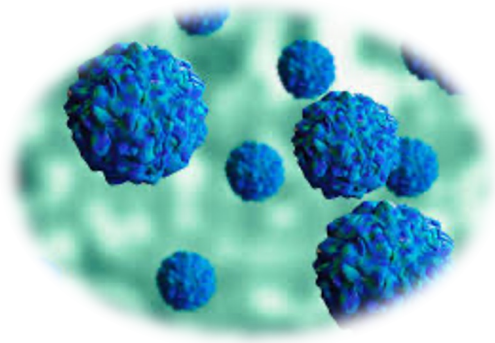


# Poliovirus transmission

- **Seasonality**
  - Seasonal climates: > summer transmission
  - Tropical zones: any time being > during the rainy season
- **High infectiousness**
  - 90-100% of non-immune household contacts will be infected
- Sub-optimal sanitary conditions and overcrowding ↑ transmission.



# Forms according to poliovirus acquisition



Strain circulation  
in areas of low  
Immunity to susceptible

Reversion in the TGI  
of neurovirulence  
\*LB IDP



Vaccine-derived case in a child  
from Peru

# PAHO



Pan American  
Health  
Organization



World Health  
Organization  
REGIONAL OFFICE FOR THE  
Americas

## Epidemiological Update Poliomyelitis in the Region of the Americas

23 March 2023

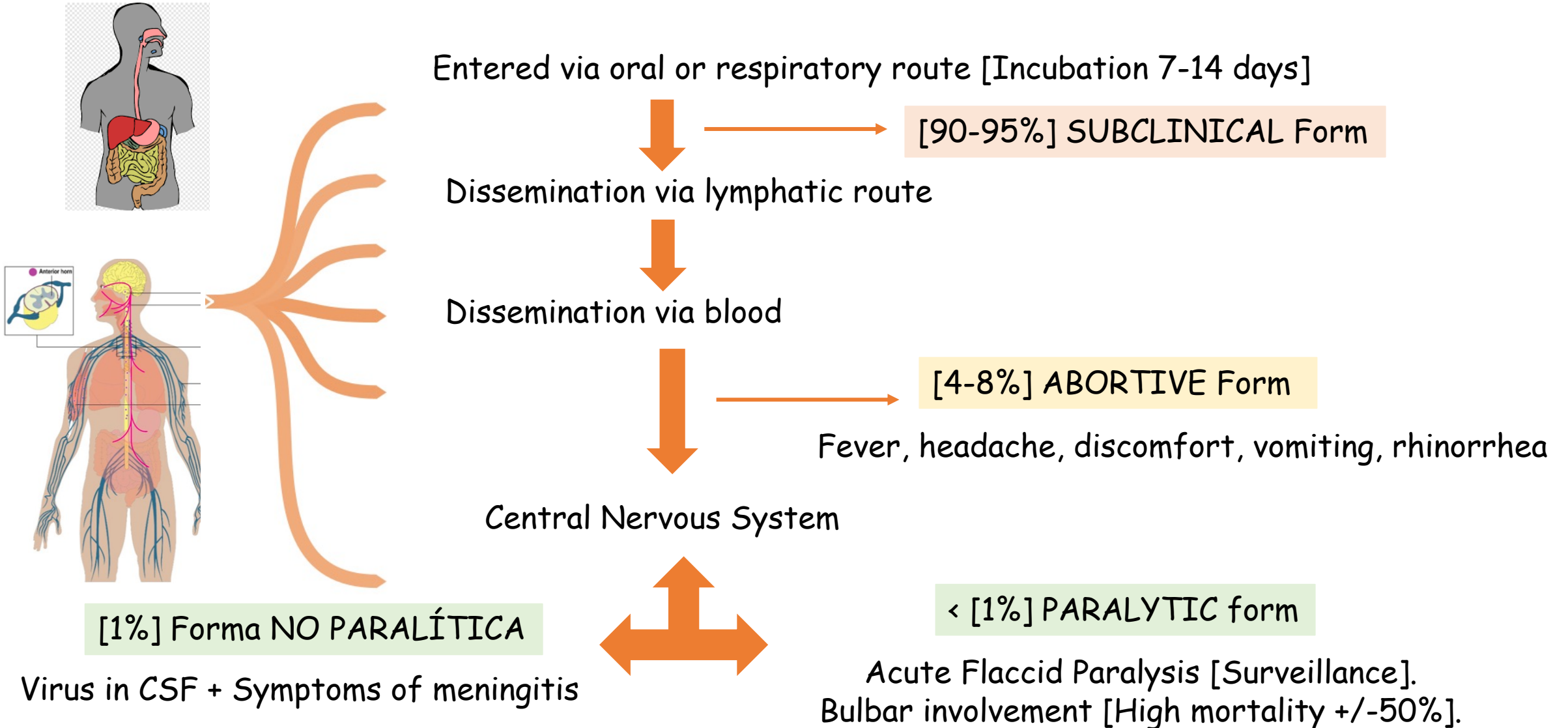


The global and regional epidemiological situation summary of poliovirus circulation is presented in this epidemiological update, as well as information on a confirmed vaccine derived poliovirus case recently reported by Peru. The Pan American Health Organization / World Health Organization (PAHO/WHO) reiterates to Member States the importance of achieving and maintaining polio vaccination coverage greater than 95% in each district or municipality to minimize the risk of a poliomyelitis outbreak, strengthen epidemiological surveillance of acute flaccid paralysis (AFP) and update national poliovirus outbreak preparedness and response plans to detect and respond promptly and timely to an importation of wild poliovirus or vaccine-derived poliovirus (VDPV), or the emergence of a VDPV in any country of the Region.

*PAHO/WHO. Epidemiological Update: Poliomyelitis in the Region of the Americas. March 23, 2023, Washington, D.C.: PAHO/WHO; 2023.*



# Pathogenesis & clinical manifestations



# Poliomyelitis



## Cuadro Clínico

### Mild illness

Fever, headache, odynophagia and fatigue.  
Self-limited [2-5 days].

### Serious illness

Non Paralytic  
Poliomyelitis  
IP [7-21 days].

Absence of motor weakness  
Symptoms typically include fever,  
headache, vomiting, and  
meningismus  
Recovery [3-10 days].

Paralytic  
Poliomyelitis\*\*



# Paralytic Poliomyelitis



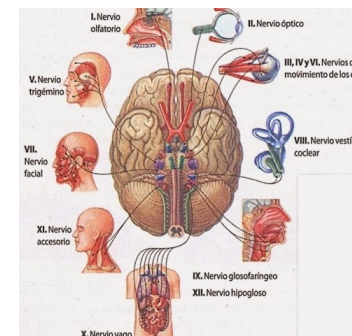
**ASYMMETRIC** paralysis, **ascending**, proximal predominance, flaccidity or atony, intense myalgias, loss of reflexes, atrophy [1-5/200 cases]. Appears 1-2 weeks after nonspecific or mild symptoms.

## CRANIAL NERVES III, VII, IX, X, XI

Paralysis of eye, face, pharynx [dysarthria], palate [dysphagia].]

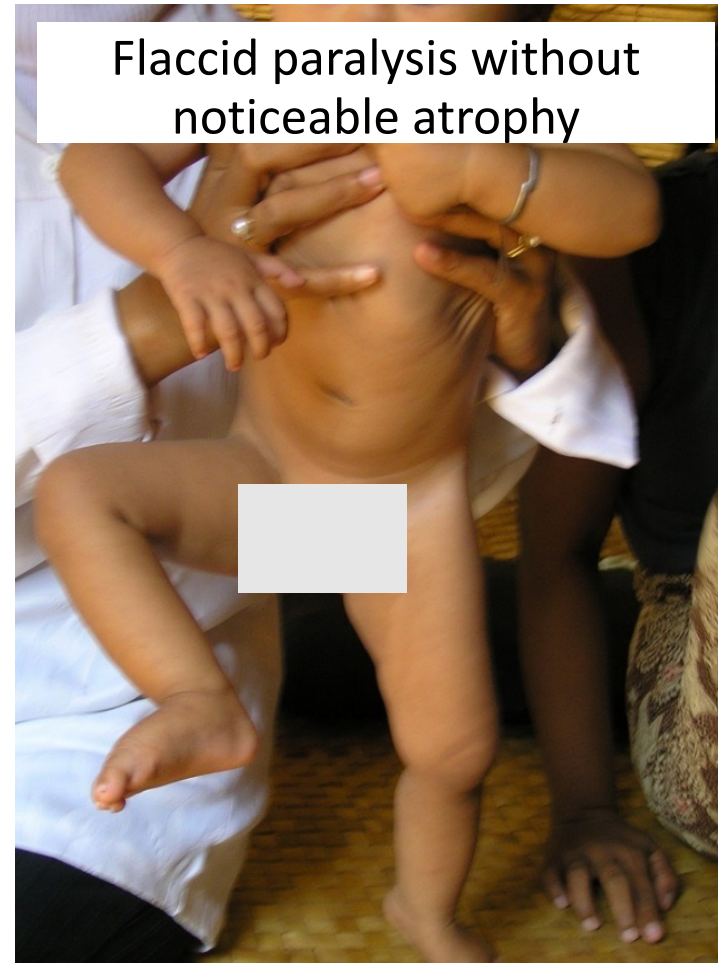
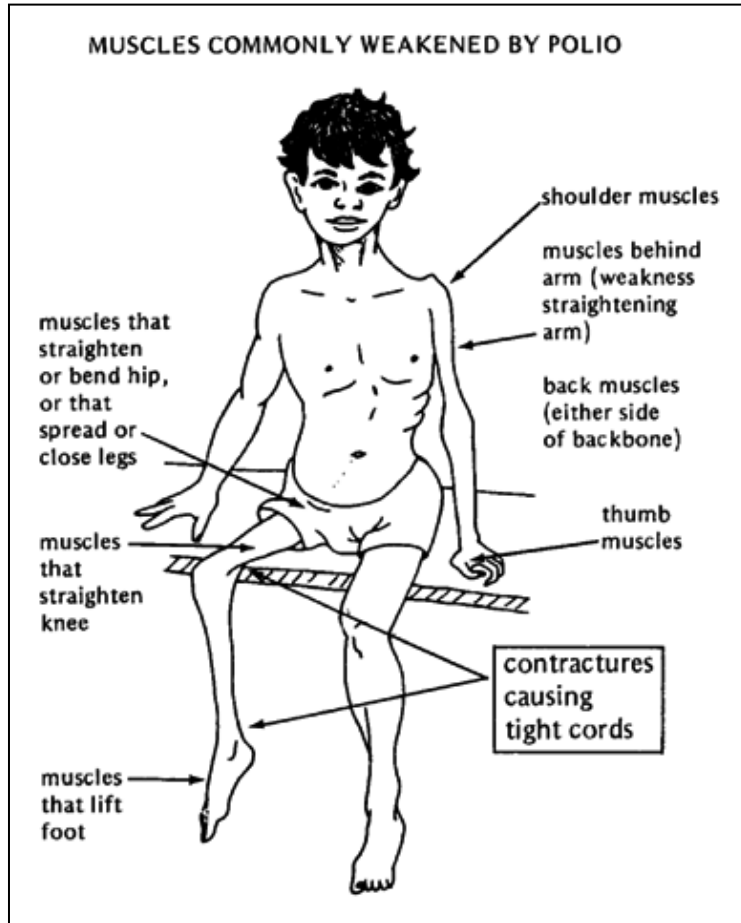
**BULB:** severe respiratory and circulatory damage [death].

**Onset of pain and weakness may coincide with or follow the onset of a serious illness**





# Paralytic Poliomyelitis





# Síndrome Post Poliomiелitis

Neurological condition affecting polio survivors decades after their initial infection [ $\pm$  15 years], affecting up to 20-85%.

Marker: motor involvement

Despite its high prevalence:

- ✓ Etiology is unclear
- ✓ Mechanisms of progression are unknown
- ✓ Limited research

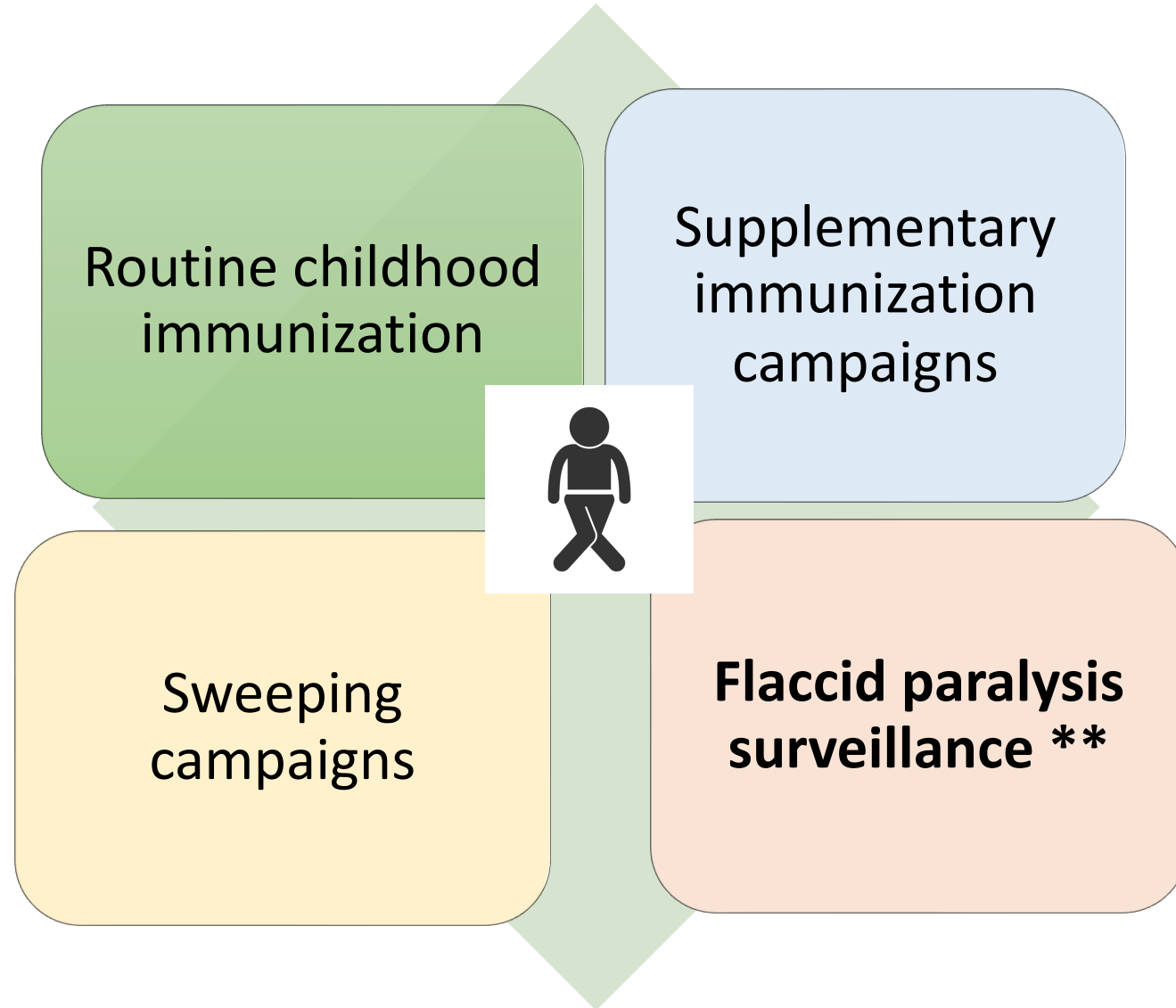


New & persistent onset of progressive muscle weakness, muscle atrophy, limb fatigue, myalgias, arthralgias, dysphagia, generalized fatigue.

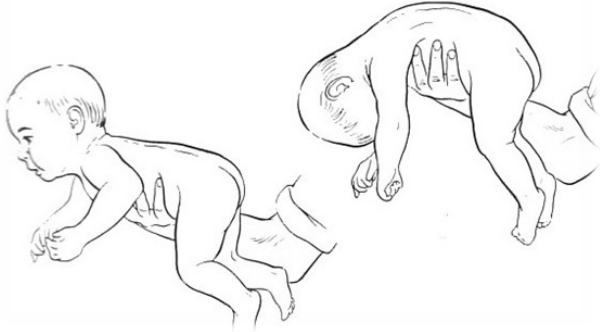
may persist for decades with impact on quality of life.

Neuropsychological aspects are very important especially sleep disorder & polypharmacy.

# Global Polio Eradication Initiative [GPEI]



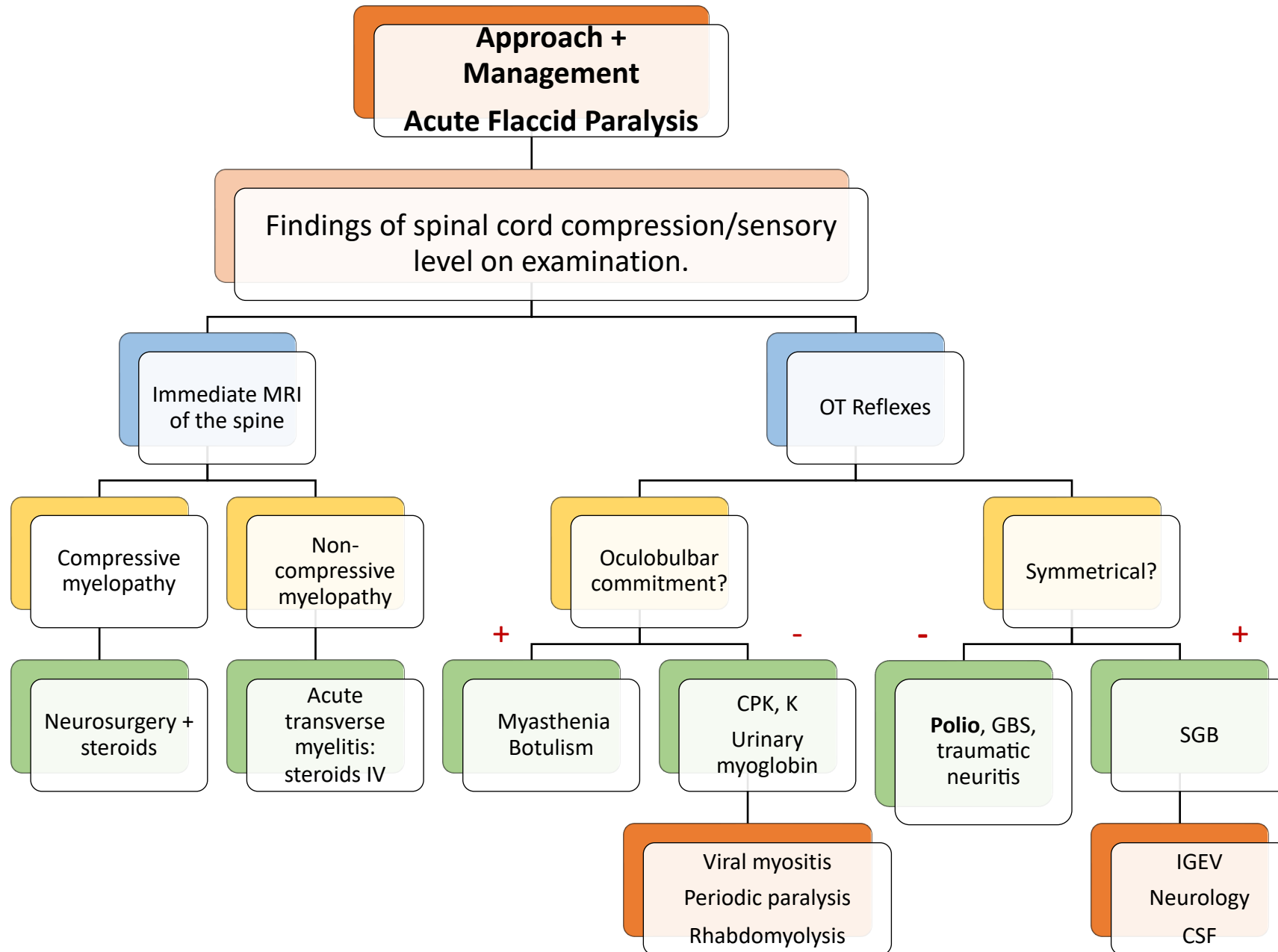
# Acute Flaccid Paralysis



Clinical picture of decreased or loss of strength and muscle tone of one or more limbs in children under 15 years of age, with acute or hyperacute onset in less than 5 days.

**Surveillance for eradication of poliomyelitis.**

- Guillain Barré Syndrome 40-60%
- Transverse myelitis 17%
- ADEM 15%
- **Vaccine-associated polio/poliomyelitis**
- Polio-like EV-D68 and EV-A71
- Traumatic neuritis
- Botulism
- Myasthenia gravis
- Toxins: organophosphorus heavy metals
- Neurotoxins: tick bites





# Diagnosis of polio

**Confirmation of polio cannot be based on clinical manifestations.**

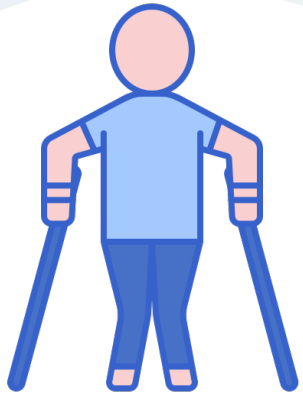
- \*Other conditions must be excluded
- \*Not all cases of polio will present with paralysis



## **Definitive diagnosis includes:**

- \*Stool samples collected < 2 weeks
- \* Samples > 2 weeks do not exclude diagnosis
- \*Clinical examination > 2 weeks to confirm if samples were not collected early

**Residual paralysis suggests diagnosis**



## Take-away messages...

Each case of flaccid paralysis identified suggests possibility of poliovirus circulation: [Not the only one].  
Diagnostic challenge

Immediate reporting of each case of flaccid paralysis is mandatory.

Early evaluation with appropriate sampling & differential diagnosis is imperative:  
Rule out poliomyelitis

**Gracias!**

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