



Polio virus

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Introduction

- The cause of poliomyelitis
- Polios: gray
- Myelos: marrow or spinal cord
- Global eradication is anticipated in 21st century

History

- Exists from antiquity
- 1890: First described formally by Medin
- 1908: viral etiology
- 1953: Salk vaccine “IPV”
- 1961: Sabin “OPV”
- 1979: eradication in USA
- 1991: eradication in western world

Virology

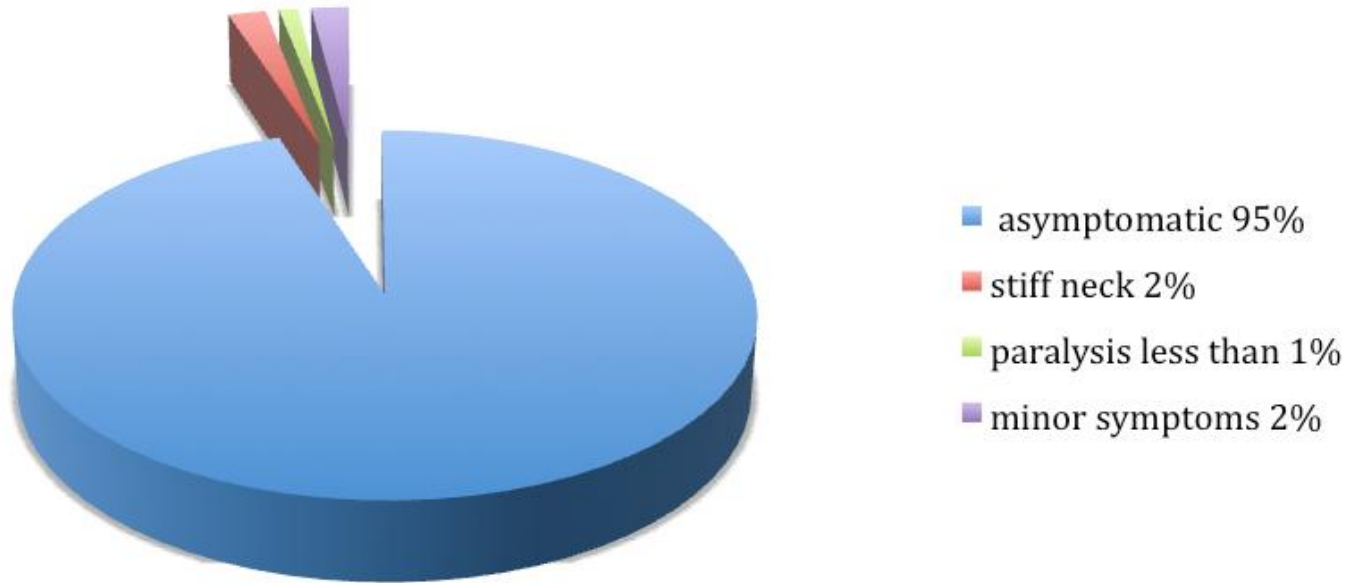
- The genus *Enterovirus*
- Three serotypes
- Infection causes type specific immunity
- Type 1, most common
- Humans are the only natural host
- CIRCULATING TYPES
 - Wild type
 - Live attenuated OPV
 - Virulent polioviruses derived from OPV (VDPV)

- OPV differ from wild type in 1% genetic composition
- VDPV arise from mutation in OPV after circulation in low immunity population for yrs

Pathogenesis

- Implantation at mucosa
- Replication in gut
- Disseminate to reticuloendothelial tissue
- Could be contained at this stage and immunity is formed (Ab)
- Others: major viremia: constitutional symptoms
- CNS invasion
- Neural spread once in CNS
- MOTOR AND AUTONOMIC NEURONS
- Destruction + inflammation

Polio Morbidity

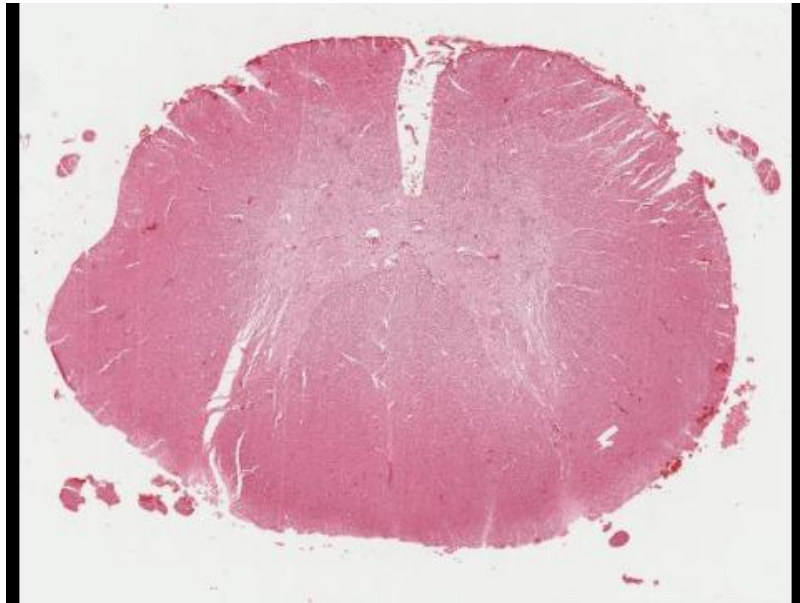


Suzanne Humphries,MD
2012

Pathology

- Grey matter of anterior horns
- Motor nuclei of pons and medulla
- Recover virus in early days
- Inflammation persist for months

Polio

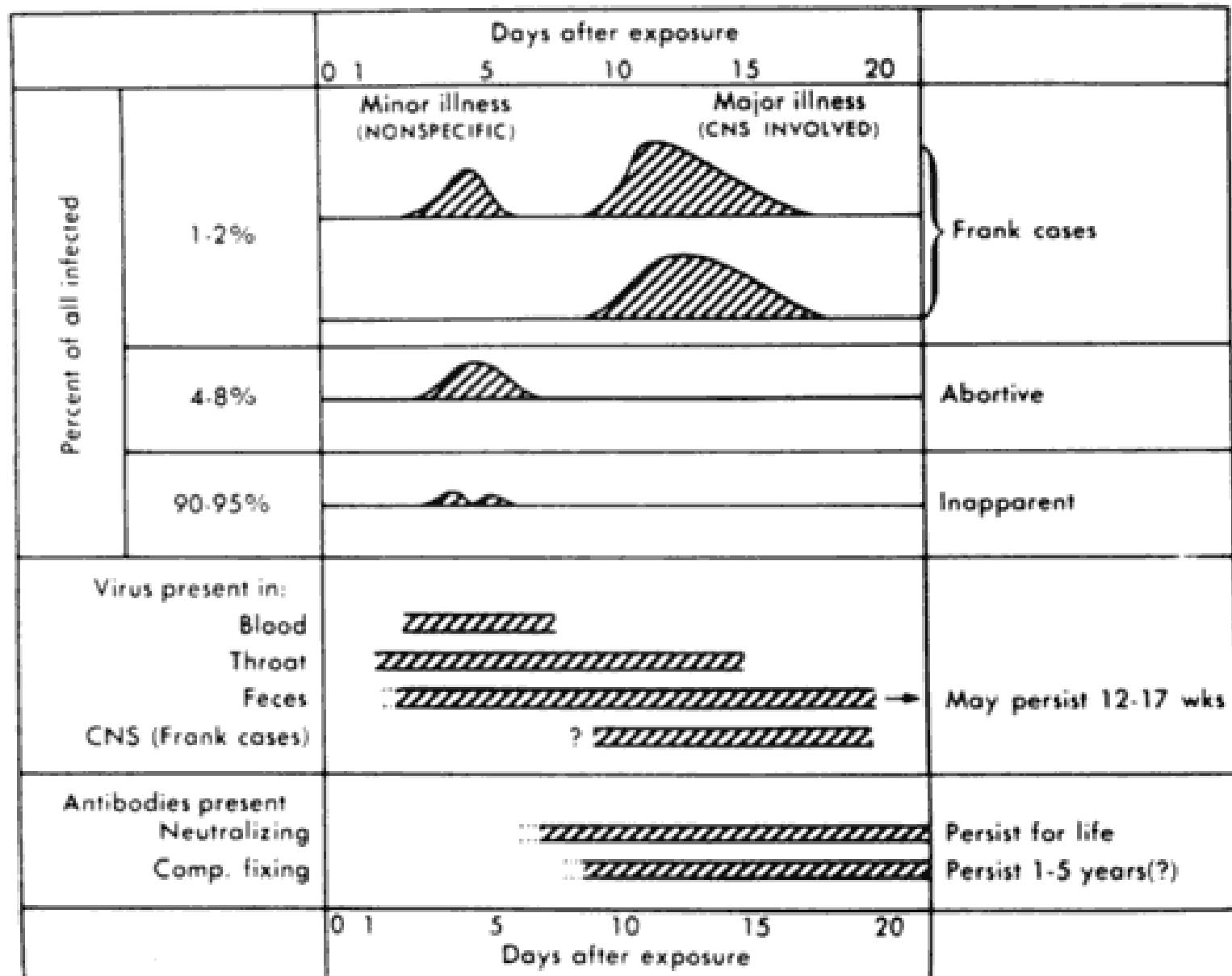


Normal



Clinical features

- IP: 9-12 days until first symptoms and 11-17 days until paralysis
- Types:
 - Asymptomatic 95%
 - Abortive polio: 5%: fever, HA, vomiting
 - Nonparalytic polio: meningeal irritation
 - Paralysis: 0.1%



Paralytic polio

- Severe myalgia
- Localized cutaneous hyperesthesia
- Muscle spasm
- After 1-2 days: paralysis
- Severity: single muscle –quadriplegia
- Flaccid
- Asymmetric
- Proximal ms >> distal ms
- Legs>>arms
- One leg > one arm > both legs + both arms
- 2-3 days to paralysis
- Sensory loss is very rare

Bulbar polio

- Cranial nerves
- 5-30% of paralytic cases
- Dysphagia
- Nasal speech
- Dyspnea

Polio-Encephalitis

- Confusion
- Infants
- Uncommon
- Sz
- Indistinguishable from other encephalitis

Complications

- Respiratory compromise
 - Intercostal ms
 - Diaphragm
- Airway obstruction
 - Bulbar involvement
- Myocarditis: rare
- GI:
 - HRG
 - Paralytic ileus
 - Gastric dilatation

Risk factors

- Paralysis more common in boys
- Pregnant
- Heavy exercise (during major illness)
- IM injection
- Tonsillectomy (to bulbar polio)

D Dx

- **E 71**
- WNV
- Guillain Barre syndrome

TABLE 53-3 Clinical Aspects of Poliomyelitis, Guillain-Barre Syndrome, and Transverse Myelitis

Signs and Symptoms	Poliomyelitis	Guillain-Barre Syndrome
Fever at onset	Yes	No
Meningeal irritation	Usually	Usually Not
Muscle Pain	Severe	Variable
Paralysis	Usually asymmetric	Symmetric ascending
Progression of Paralysis	3-4 days	2 weeks
Residual paralysis	Usually	Usually not
Paresthesia	Rare	Frequent
Sensation	Normal	Maybe diminished
Tendon Reflexes	Diminished or absent	Diminished, may return in few days
Spinal fluid at onset	WBC high; protein normal to 25% increase	WBC normal or slight increase; protein very high
Case fatality	2-20%	5-10%

(From the World Health Organization: Global Poliomyelitis Eradication by the Year 2000. Manual for Managers of Immunization Programmes. WHO/EPI/Polio/89.1.1989, with permission.)

Dx

- CSF: Aseptic meningitis
- Virus from throat
- **Virus from feces**
- Serology

Prognosis

- Permanent in 2/3
- Rare full recovery
- Bulbar polio: usual recovery
- Respiratory: rare recovery
- Mortality 5% (old data)

Mx

- No specific treatment
- Bed rest
- Physical therapy once paralysis ceased
- +/- mechanical ventilation

Post polio syndrome

- Some pt who recover
- Fatigue, ms weakness yrs later
- 20-30% of paralytic polio pt
- Not severe disease

Vaccines

- IPV / OPV x 30 yrs at least
- Efficiency: OPV >> IPV
- OPV
 - LOWER COST
 - MORE IMMUNOGENIC
 - EASE ADMINISTRATION
 - HERD IMMUNITY
 - INDUCE GI IMMUNITY

Salk



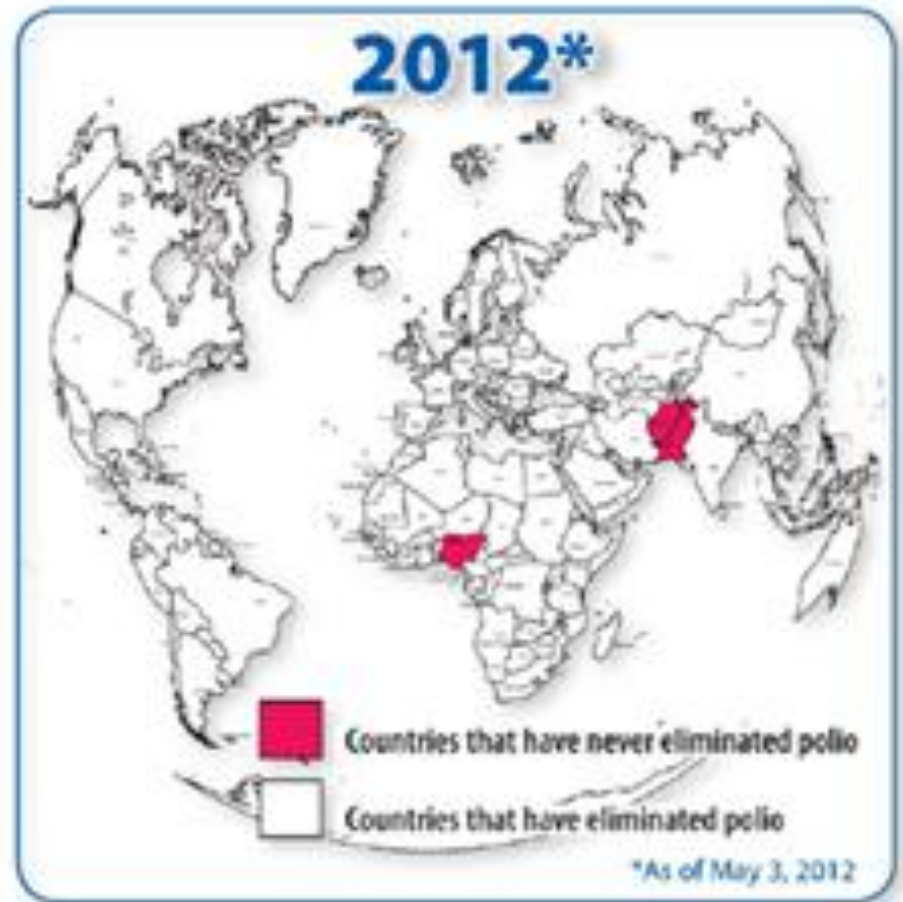
Sabin



Vaccines

- OPV: causes paralytic polio
 - 1: 2.6 million doses
- Developing countries: OPV
- Developed countries: IPV

Eradication



Afghanistan, Nigeria, and Pakistan

Arabic region

- 37 cases in Syria
- 2 cases in Iraq