The American Poliomyelitis Epidemic

Alex HD

Poliovirus

1. Poliomyelitis or Infantile paralysis
   - Mostly affects children
   - Between 1949 and 1954, 35% of those who contracted polio were adults

2. Three types

3. Picornavirus family & Enterovirus group
   - ssRNA

4. Targets GI and CNS

5. “spherical and unencapsulated”

6. Fecal-oral route

7. **High season:** July, August, and September


http://www.virology.wisc.edu/virusworld/viruslist.php?virus=p1m
Pathology

1. Oropharynx (b/n soft palate and hyoid bone)
2. Swallowed (gastrointestinal tract)
3. Multiplies in intestinal mucosa and lymph nodes
4. Poliovirus’ incubation period lasts 1-2 weeks

5. Asymptomatic polio (90%-95%)
   a. Unaware!
   b. Carriers

6. Symptomatic polio (5%-10%)
   a. Abortive polio (5%)
      a. Headache
      b. Fatigue
      c. Vomiting
      d. Common cold symptoms
   b. Non-paralytic polio (1%-2%):  
      a. Non-paralytic aseptic meningitis
      b. Short-term stiffness
      c. Gastroenteritis (stomach inflammation)
   c. Paralytic polio (1%):  
      a. Verimic
      b. reaches nerve cells via bloodstream

Types

- Determined by which group of nerves is affected

- **Spinal (spinal cord):**
  - Most common
  - Causes flaccid paralysis and hyporeflexia

- **Bulbar (brain stem):**
  - Cranial nerves -> pharynx, vocal cords, respiratory muscles
  - Least common (2%)
  - Most deadly (75% death rate)
  - Permanent cranial nerve weakness
  - Long-standing gliosis (change in glial cells)
  - Encephalitis (inflammation of the brain)

- **Bulbospinal (brain stem and spinal cord):**
  - 19% of all cases
  - Less researched

Timeline

- **1894**: First outbreak
  - Rutland County, Vermont
  - Eighteen deaths
  - 132 permanently paralyzed
- **1908**: Polio is determined to be a virus
- **1916**: NYC Polio epidemic
  - 6,000 died
  - Thousands more were paralyzed
- **1921**: FDR gets polio

http://www.historyofvaccines.org/content/timelines/polio
FDR’s Paralysis
Timeline (cont.)

- **1929**: Iron Lung
  - Philip Drinker, PhD (1894-1972), and Charles McKhann, MD (1898-1988)
  - Boston Children’s Hospital and Harvard
  - Paralytic bulbar and bulbospinal polio

- **1935**: Early Polio vaccine trials

- **1936**: Discovery! Polio is in the Nervous System

- **1941**: Discovery! Polio is also in the digestive system

- **1948**: Koprowski designs an oral vaccine and test it on himself (successful)

- **1949**: Discovery! Bodian discovers that there are three types of Polio

https://rosemelnickmuseum.wordpress.com/tag/iron-lung/
The Surge of 1952

[Image: 1952 Polio Precautions]

[Image: Young patients on boards at the Texas Scottish Rite Hospital for Children in Dallas.]


http://www.texasobserver.org/lessons-unlearned/

Gravity of situation

- “I have just figured out that during the coming summer, thirty or forty thousand children will get polio. About fifteen thousand of them will be paralyzed and more than a thousand will die. If we have the capacity to prevent this, we have a social responsibility... we are supported by the people and it is our duty to save lives no matter how many difficulties may be involved.” - Basil O’Connor, president of March of Dimes, 1954

- Poliomyelitis occurred at a rate of 13.6 cases per 100,000 population.

- The incidence of cancer today, by comparison is 566.1 per 100,000.

- 57,628 polio cases were reported in the United States in 1952

- 21,000 were paralytic
FDR’s involvement

- **1934:**
  - Basil O’Connor (1892-1972)
  - Annual Birthday Balls for FDR
  - Raises money for polio research
  - Leads to Roosevelt’s creation of the National Foundation for Infantile Paralysis in 1938.

- **1938:** *March of Dimes* (Vaccine research)
  - Entertainer Eddie Cantor’s idea
  - Within a few weeks, people had mailed **2,680,000 dimes** to the President
  - Over the years, this “March of Dimes” raised tens of millions of dollars
  - Very successful

- **1944:** FDR pleads in his radio-broadcast for donations

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Timeline (cont.)

• **1952:** Early Salk vaccine trials
  • Jonas Salk
  • Funded by the *National Foundation for Infantile Paralysis*
  • Tested on disabled and “retarded” children
  • Dead viruses
  • Three shots just under the skin
  • Provokes immune reaction
• **1953:** Salk tests vaccines on himself, his wife and his children
• **1954:** National Salk vaccine trials
  • 80-90% effective
• **1954:** Sabin vaccine is developed by Albert Sabin
  • Attenuated live virus (occasionally causes disease)
  • Oral
• **1955:** *Cutter Incident:* Vaccine disables some children
  • Vaccine is suspended and then banned (11 dead and hundreds paralyzed)
• **1955-1957:** Incidences of polio in the U.S. fall by 85%-90%
• **1979:** Polio is eliminated in the US
• **1991:** Polio is eliminated in the Western hemisphere

[http://amhistory.si.edu/polio/virusvaccine/enlargevac_11.htm](http://amhistory.si.edu/polio/virusvaccine/enlargevac_11.htm)
• Oshinsky, David M. “Polio: an American story” (Oxford University Press, 2005)


Thank you!