

# Sample research paper on polio virus

[Health & Medicine](#), [Disease](#)



## **Introduction**

The Polio virus was first identified by Landsteiner and Popper in the year 1908 as an etiological agent for poliomyelitis. The polio virus was the first virus to be grown in cultured cells which was in itself a great breakthrough leading to (1) development of a killed virus and a live attenuated vaccine; (2) physical and chemical characterization of the virion along with its assembly intermediates, and (3) the characterization of the virus life cycle within the infected cell . Poliomyelitis is a highly infectious disease which may be caused through a virus through the invasion of the nervous system. It is often spread through person to person contact. Polio can strike at any age.

## **Structure**

Poliovirus is a member of the picomavirus family, which is also known for foot and mouth disease virus, hepatitis A virus, the rhinoviruses, and the Coxsackie viruses. Poliovirus is nearly 310 A in diameter with a molecular mass of  $8.6 \times 10^6$  Daltons. The virion consists of 60 copies of each of the four-coat proteins sub-units subunits-VP1 (306 amino acids, - 33 kD), VP2 (272 amino acids, -30 kD), VP3 (238 amino acids, -26 kD), and VP4 (69 amino acids, -7.5 kD), and a single-stranded, plus-sense RNA genome of approximately 7500 nucleotides .

## **Source:**

Source:

Epidemiology

Poliovirus Types 1, 2, 3 are known to cause acute, short term infections.

Usually, the ingested virus infects the epithelial cells of oropharynx, tonsils,

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lymph nodes of the neck, small intestines and the Peyer's patches. The infection of susceptible cells spreads through virus replication cycles and the release of virus with cell destruction. The CNS (Central Nervous System) may be infected through the circulation of blood. The infection may cause mild illness, aseptic meningitis, or paralytic poliomyelitis. The Type 1 is most paralytogenic and Type3 is the least.

**It is found that up to 95% of persons infected with Polio have no symptoms. However, following symptoms may be common:**

- Fever
- Fatigue
- Nausea
- Headache
- Flu-like symptoms
- Stiffness in the neck and back
- Pain in the limbs

The Poliovirus may be detected in specimens from oropharynx for 1 to 2 weeks and from intestines for 1 to 2 months after infection. Poliovirus is usually detected in the feces of almost all poliomyelitis patients at the onset of paralysis.

The Poliovirus is transmitted by infected humans directly or indirectly through droplets or aerosols from the oropharynx or by fecal contamination of hands, eating utensils, food and water. At least 80% of the infection may occur from person to person (fecal-oral or oral-oral).

## **Survival in the Environment**

Poliovirus is highly resistant to inactivation by common disinfectants such as alcohol and Lysols but may be easily inactivated by dilute solutions of formaldehyde or free residual

### **Chlorine.**

Soil: The contamination of soil can take place through human defecation, crop fertilization with untreated night soil or sewage, and recycled wastewater for irrigation. Poliovirus may be able to survive in soil for weeks to months, often longer than it does in water. The survival in soil may be affected adversely through increased temperature, decreased moisture, low organic content, exposure to sunlight, and the presence of aerobic bacteria. The presence of aerobic microorganisms is an important factor in the decreased survival of poliovirus in soil.

Sewage: The amount of poliovirus in sewage is a direct indicator of the hygienic level of the population and the prevalence of infection in the community. High temperature, ammonium concentrations, and pH are key factors in the natural inactivation of poliovirus in sewage or its byproducts.

Surface Water: The contamination of surface waters with the polio virus may be caused due to the discharge of untreated or inadequately treated sewage, overland runoff, and seepage from underground flows. Polioviruses appear to be more rapidly inactivated in marine than in fresh water. The presence of aerobic microorganisms is the most important factor for poliovirus inactivation in natural fresh waters. The proteolytic bacterial enzymes may inactivate virus particles through cleavage of viral proteins and exposure of RNA to nuclease digestion.

Thus, it can be said that poliovirus in the environment is the direct result of recent poliovirus infections in the human community.

Poliovirus remains viable in the laboratory at freezing temperatures for many years, in the cold for many months, and at room temperatures for days to weeks.

## **Reservoirs**

Humans are found to be the only reservoirs of Polio virus in addition to the laboratory samples which may be the reservoirs after eradication.

## **Vaccination helps in interruption of infections**

Trivalent vaccine (OPV) is found to successfully interrupt poliovirus transmission by production of both serology and intestinal immunity. In industrialized countries, three doses of OPV result in high rates of seroconversion whereas in developing countries, lower seroconversion rates are reported. Since the excretion of wild poliovirus is prevented or is brief and lower in immunized persons, transmission dies out in highly immunized vaccinated populations.

According to WHO recommendations, four doses of OPV should be administered to all infants during routine immunizations. The simultaneous administration of OPV to all children in a specified geographic area is found to interrupt wild poliovirus circulation by boosting population immunity.

## **Vaccination of children should be done with four doses at the following age groups:**

- A dose at 2 months
- A dose at 4 months

- A dose at 6-18 months
- A booster dose at 4-6 years

## **Key facts about Poliomyelitis**

- Polio (poliomyelitis) usually affects children who are under 5 years of age.
- One in 200 infections may lead to irreversible paralysis.
- Among those who are paralyzed, 5% to 10% die when their breathing muscles become immobilized.
- A reduction in global cases by over 99% since 1988, from estimated 350 000 cases then, to 406 reported cases in 2013 has been scene worldwide due to the global efforts to eradicate the disease.
- As per latest data, in 2014, only 3 countries (Afghanistan, Nigeria and Pakistan) remain polio-endemic, down from more than 125 in 1988.
- As long as a single child remains infected, children in all countries are at risk and the failure to eradicate polio could then result in as many as 200 000 new cases every year, within 10 years, all over the world.

## **Conclusion**

Vaccination in developed countries such as US has made them polio free since 1979. There is a need for an extensive vaccination drive to eradicate the disease from the world. Due to the consistent efforts by WHO, physicians and vaccination drives held in various countries, the world may one day be free of this disease.

## **References**

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