Standing in the Way of the Common Cold
Pleconaril—Is It the “Key” to Keeping Rhinovirus Locked Out of Cells?


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Abstract
According to World Health Organization statistics, the human common cold is the most prevalent known disease of humans. The majority of colds are caused by the human rhinovirus—an enterovirus genetically similar to dangerous viruses like polio and hepatitis A. Rhinovirus infection can lead to 72-hour periods of morbidity, including symptoms like sore throat, runny nose, and muscle weakness, often causing people to miss school or work. Rhinovirus is inert until infection occurs causing the immune system to then combat the virus. Rhinovirus transmission is usually via aerosolized respiratory droplets or contact with contaminated surfaces. Once in the body, the virus binds to the cell surface, allowing it to enter cells. Cells use the Intercellular Adhesion Molecule 1 (ICAM-1) signaling protein to latch onto contaminated surfaces. Once in the body, the virus binds to the cell surface, allowing it to enter cells. Cells use the Intercellular Adhesion Molecule 1 (ICAM-1) signaling protein to latch onto the cell’s surface and begins the process of acquiring control of the cell. The virus has begun to inject its genetic material to take over the cell and begin the process of replication.

Rhinovirus
- Symptoms: sneezing, sore throat, runny nose, muscle weakness, coughing, and head aches
- Severe cases of rhinovirus in early childhood are believed to be the leading cause of asthma

Common strategies against viruses that cause very different diseases
- Polio
- Human Rhinovirus

Why No Vaccination?
- There is no vaccine because it is impossible to put every serotype into one vaccine, forcing people to receive at least 50 shots
- The rhinovirus is ever evolving with new serotypes being discovered every year, still forcing people to get a new shot every year in addition to the ones already received

Virus Mechanism of Intrusion
- The virus utilizes ICAM-1 to latch onto the cell’s surface and begins the process to take control of the cell.
- The virus has bound itself to multiple ICAM-1 receptors to bring itself to the cell surface in order to inject its genetic material.
- The virus has began to inject its genetic material to take over the cell and begin the process of replication.

The Body Response—Antibodies
- The antibodies found in humans work by attaching onto the canyon found on the virus and preventing it from binding to the cell. The issue though with antibodies is that they are specific to one type of virus causing a delay from when the virus is detected to the time that it is fought off. The main activity is also when the symptoms occur, because they are the body’s way of combating the disease.

Pleconaril
- The drug Pleconaril has been developed to combat the human rhinovirus by blocking the binding canyon of the virus. This mechanism works in the same way as the antibodies found in humans, because they both prevent the virus from ever latching onto the cell.

Effectiveness of Pleconaril in Virus Infected Mice
The data piece demonstrates the effectiveness of Pleconaril in mice. It shows that 100% of the mice survived infection when they were given 75 mg/Kg/day of pleconaril, and that the lesser doses resulted in more fatalities from the virus.

Conclusion
Human rhinovirus causes a majority of the sickness found in the world. Once infection occurs, a 72-hour period begins, when the antibodies found in humans begin to fight off the virus causing symptoms like sneezing and a runny nose. Although many viral infections can be controlled through vaccination, for rhinovirus this is impossible because vaccines cannot protect against the over 150 ever-evolving rhinovirus serotypes. This means that the multitude serotypes prevents researchers from creating a single vaccine forcing patients to receive hundreds of vaccinations. Therefore, scientists have begun to develop new drugs like pleconaril that bind to the canyon of the virus and thus preventing it from ever latching onto the host cell. Thus, the purpose of scientific exploration is to develop new drugs that can inhibit the virus from replicating and thus eliminating the spread of the virus and the symptoms caused by it.

References

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Rhinovirus
- Enterovirus
- Similar to polio and hepatitis A

Figure 1: The virus utilizes ICAM-1 to latch onto the cell’s surface and begins the process to take control of the cell.
Figure 2: The virus has bound itself to multiple ICAM-1 receptors to bring itself to the cell surface in order to inject its genetic material.
Figure 3: The virus has began to inject its genetic material to take over the cell and begin the process of replication.

Human Rhinovirus Capsid Section Bound to Pleconaril
- Primary model Color: Dodger Blue
- Beta Sheets: Medium Spring Green
- Alpha Helix: Green
- Pleconaril: Yellow
- H-Bonds: Light Grey
- Struts: White

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