The Biochemistry of Poliomyelitis Viruses: Unveiling Secrets of a Paralyzing Disease

:Poliomyelitis, commonly known as polio, is a devastating viral infection that has plagued humanity for centuries. The Biochemistry of Poliomyelitis Viruses delves into the intricate molecular mechanisms that underlie this debilitating disease, providing a comprehensive understanding of its pathogenesis, diagnosis, and treatment.

Structure and Genome of Polioviruses: Polioviruses are non-enveloped, single-stranded RNA viruses belonging to the family Picornaviridae. Their genome consists of a single-stranded positive-sense RNA molecule that encodes eleven proteins:

- 3 capsid proteins (VP1, VP2, VP3)
- 4 non-structural proteins (2A, 2B, 2C, 3A)
- 4 structural proteins (VP4, VP0, VPg, 2C-linked protein)

Viral Replication: Polioviruses primarily target the central nervous system (CNS) and gastrointestinal tract. Infection begins when the virus binds to specific receptors on host cells, such as the poliovirus receptor (PVR) and cluster of differentiation 155 (CD155).

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★★★★★ 5 out of 5

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After internalization, the viral RNA is released into the cytoplasm, where it undergoes translation to produce viral proteins. The capsid proteins assemble into a protein shell (capsid) that encapsulates the viral RNA.

Pathogenesis of Polio: Polioviruses can cause a wide range of clinical manifestations, from asymptomatic infection to paralytic disease. The most severe form of polio, paralytic polio, occurs when the virus invades the CNS and damages motor neurons in the spinal cord.

Infected motor neurons undergo apoptosis (programmed cell death),leading to muscle weakness and paralysis. The extent of paralysis depends on the number of motor neurons affected.

Diagnosis and Treatment: Diagnosis of polio involves virological testing of stool or cerebrospinal fluid (CSF) samples. Molecular techniques, such as RT-PCR, are employed to detect the presence of viral RNA.

There is no specific antiviral treatment for polio, and management focuses on supportive care and prevention. Vaccination with the inactivated polio vaccine (IPV) or the oral poliovirus vaccine (OPV) has been highly effective in controlling polio worldwide.

Molecular Mechanisms of Pathogenesis: The Biochemistry of Poliomyelitis Viruses sheds light on the molecular mechanisms that contribute to the virulence and pathology of the virus:

- **2A Protease:** The 2A protease cleaves host proteins and viral RNA, leading to inhibition of host cell translation and disruption of cellular pathways.
- **2C Protein:** The 2C protein interacts with host proteins involved in membrane formation, contributing to viral replication and release.
- **3A Protein:** The 3A protein forms ion channels in the host cell membrane, altering membrane permeability and contributing to viral pathogenesis.
- **VPg:** The VPg protein is covalently linked to the viral RNA and acts as a primer for RNA synthesis, facilitating viral replication.

:The Biochemistry of Poliomyelitis Viruses provides a comprehensive overview of the molecular basis of poliovirus infection, paving the way for advancements in diagnosis, treatment, and prevention. By unraveling the intricate mechanisms underlying this debilitating disease, researchers can develop more effective strategies to combat polio and protect human health.

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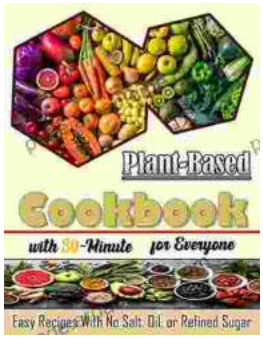

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