

PATHOGENESIS OF VIRUS IN THE HUMAN BODY

Abstract

Viral infection in humans generally results in disease or accompanying inflammation. Clinical inflammation develops when leukocytic and steady-state cell-intrinsic immunity to the virus is compromised. The disease-causing microbes are known as pathogens. Pathogens' effects differ from disease to disease or organ to organ.

The central nervous system (CNS) in humans also gets affected with virus which is very interesting to understand. In spinal cord Cerebrospinal fluid or CSF flows. Also, brain-blood Transfusion Multiple methods have been proposed to explain how viruses interact with the cells and membranes separating the blood from vulnerable cells in the brain.

The fundamental cause of inflammation and disease can be distinguished from its effects in the complex conflict between various viruses. Few viral diseases are RNA-based and few are known as DNA-based viruses (e.g., herpesviruses and poxviruses) infections. So, before designing a protocol to study the pathogenesis of viral infection, we should identify whether it is a DNA or RNA virus. The viral entry mechanism includes the entry pathway of the virus, Viral replication, Epidemiological factors for viral infections, accessibility of the virus from blood to other different tissues etc are very important to studying a pathogen.

Keywords: Central Nervous system, Japanese Encephalitis, Inflammation, RNA, DNA.

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I. INTRODUCTION

Viral infection in humans generally results in disease or accompanying inflammation. Clinical inflammation develops when leukocytic and steady-state cell-intrinsic immunity to the virus is compromised. Inflammation is a sign that freshly recruited and activated leukocytes are working to clear an infection in the blood or tissues. The fundamental cause of inflammation and disease can be distinguished from its effects in the complex conflict between a wide variety of viruses. Few viral diseases are RNA based (e.g., flaviviruses such as dengue virus) and few are DNA-based (e.g., herpesviruses and poxviruses) infections. So, before designing a protocol to study the pathogenesis of viral infection, we should identify whether it is a DNA or RNA virus. The viral entry mechanism includes the entry pathway of the virus, Viral replication, Epidemiological factors for viral infections, accessibility of the virus from blood to other different tissue etc are very important to study about a pathogen. By reducing or stopping viral replication, the host's innate and adaptive immune systems perform a significant protective role against virus-induced illness.

II. PATHOGENESIS OF VIRAL INFECTION

The disease-causing microbes are known as pathogens. Pathogens' effects differ from disease to disease or organ to organ. The vital organs of humans are even very difficult in stages while they get affected by pathogens.

III. PATHOGENESIS OF VIRAL INFECTION IN THE NERVOUS SYSTEM

The human central nervous system (CNS) consists of mainly brain and spinal cord. In the spinal cord Cerebrospinal fluid or CSF flows. Also, brain to Blood Transfusion Multiple methods have been proposed to explain how viruses interact with the cells and membranes separating the blood from vulnerable cells in the brain. These processes include both more direct blood-brain channels and those involving blood-cerebrospinal fluid-brain. The *choroid plexus* (CP) is a possible pathway for blood borne viruses to get into the cerebrospinal fluid and proliferate. Cerebrospinal fluid (CSF) is produced by the choroid plexus (CP), an organ found in the lining of the brain ventricles that serves as a selective entry point for immune cells and other agents into the brain parenchyma. Though less frequent than bloodstream dissemination, viral entrance through the nerves is a prevalent way for many serious infections to propagate. Herpes virus, Japanese encephalitis virus, and rabies virus all use this technique. For instance, the rabies virus spread through the bite of a rabid animal replicates in muscle tissue and subcutaneously reaches nerve endings. The virus spreads mostly in the neurites (axons and dendrites) and perineural cells, where it is protected from antibodies, according to the evidence. The central nervous system, which is where the rabies virus enters the body, is reached by this nerve pathway.

Virus-induced infections of the central nervous system can result in conditions like:

The layers of tissue that envelop the brain and spinal cord become inflamed in viral meningitis.

The brain itself is infected and inflamed in encephalitis (example-Japanese encephalitis).

IV. PATHOGENESIS OF VIRAL INFECTION IN THE CARDIAC SYSTEM

Blood is pumped throughout the circulatory system by the heart muscle or myocardium. Cardiomyopathy, a condition that affects the heart muscle, can cause pathological alterations to the muscle and have a detrimental effect on how well it functions. Cardiomyopathies with dilated cardiomyopathy (DCM), hypertrophic cardiomyopathy, restricted cardiomyopathy, arrhythmogenic cardiomyopathy, or Takotsubo cardiomyopathy are among the most prevalent. Myocarditis, also known as inflammatory cardiomyopathy of the heart muscle, is typically brought on by viruses but can also be brought on by bacteria, fungi, parasites, or an autoimmune reaction.

The different types of viruses, which can infect our heart are—Adenovirus, Cytomegalovirus (CMV), Coxsackievirus B, Enteric cytopathic human orphan viruses (ECHO), Human parvovirus B19, Rubella etc.

V. PATHOGENESIS OF VIRAL INFECTION IN THE DIGESTIVE SYSTEM

The gastrointestinal tract (GI), liver, pancreas, and gallbladder are all parts of the body's digestive system, which aids in food digestion. It takes digestion to turn food into the nutrients that our body needs for energy, growth, and cell repair. While some digestive illnesses and ailments are acute and only last a short while, others are chronic and endure for a long time.

Generally speaking, swelling and/or decreased salivation might be effects of viral infections of the salivary gland. According to Fields et al. (1996), the paramyxovirus that causes mumps is the most prevalent salivary gland infection. Droplet infections conveyed in the saliva are a source of paramyxovirus transmission.

An infection called viral hepatitis damages and inflames the liver. When body tissues are harmed or infected, inflammation, or swelling, takes place. Organs can suffer harm from inflammation. Hepatitis A, B, C, D, and E are only a few of the viruses linked by researchers to the disease's development. They can again be classified as acute and chronic illnesses of liver infection. Many hepatitis sufferers are unaware of their infection and lack any symptoms. Symptoms of an acute infection may show up anywhere between two weeks and six months after contact. Fever, exhaustion, loss of appetite, nausea, vomiting, abdominal discomfort, light-coloured faeces, dark urine, joint pain, and jaundice are all possible signs of acute hepatitis. Chronic viral hepatitis symptoms can take decades to manifest.

An inflammatory condition known as acute pancreatitis (AP) affects the exocrine portion of the pancreatic parenchyma. Acute necrotizing pancreatitis is a more serious and quickly lethal variation, whereas acute interstitial pancreatitis is a milder self-limiting variation. It can also affect the peripancreatic region in addition to pancreatic tissue, and it is frequently accompanied by a systemic inflammatory response that, if left untreated, can lead to multi-organ failure. The two most frequent etiological causes of AP are gallstones and drinking.

In conclusion, it is unclear how many illnesses caused by gut viruses begin. Villous enterocytes are thought to be the primary target of infection for the majority of gut viruses,

according to investigations on both humans and animals. As a result, there is a reduction in surface area and an impairment of the digestive and absorptive processes. A net secretory condition could also occur from this. All of these alterations could trigger as acute but brief malabsorptive diarrhoea, coupled with others including decreased enzymatic activity and diminished epithelial integrity.

VI. CONCLUSION

A complicated set of interactions between viruses and hosts are known as viral pathogenesis, and they affect whether a virus is able to infect a host successfully. This is very important to understand about the role of viral pathogens in the progression of diseases. Because the route of entry, target organs and incubation period of the virus are a few important objectives which we should not avoid.

The target organ in systemic infections is typically reached late during the stepwise transit of the virus through the body, and clinical illness begins there. Virus replication in the target organ mirrors replication at other body sites. The local recovery mechanisms (local bodily defences, including interferon, local inflammation, and local immunity) are engaged at each stage of the virus's transit through the body. As a result, the previously infected locations may be in varying stages of recovery when the target organ becomes infected.

Virus pathogenesis is a complicated, variable, and somewhat uncommon condition. Pathogenesis is governed by the balance between host and virus components, much like the course of a virus infection. The immune system also contributes significantly to cell and tissue damage, therefore not all pathogenic symptoms associated with virus infections are directly brought on by the virus. During a virus infection, cells may undergo changes that allow them to continue growing forever. This is very important to understand the awareness about the severity of the virus and the disease.