

Neurotropic Viruses: Trojan for Complex Neurodegenerative Diseases?

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Neurotropic viruses have been reported to lead to various neurodegenerative diseases [1,2]. The cause and the mechanisms are although undetermined. Various case reports suggest that on the entry of these viruses within the Central Nervous System (CNS) the resident microglial cells become activated [3,4,5]. Microglial cells on activation lead to release of various chemokines and cytokines which results in bystander killing of the neurons [6]. Viruses often possess a short life cycle within their hosts which after replication to a certain extent gets cleared off by the host immune responses. The major destruction is brought about by the aftermath [7]. This has been reported in cases of various RNA viruses like Japanese Encephalitis Virus (JEV), Chikungunya Virus (CHIKV), Dengue etc [7,8]. On the other hand there are various viruses which prefer to integrate their genome into the host and persist within them. These viruses often get triggered to fast replication when a secondary stimulant or infection attacks the host. Virus induced apoptosis of neuronal cells is one of the major cause of neurodegeneration. The process of apoptosis is often triggered as a host response to various metabolic stress brought about within the cell due to viral replication [9,10]. Hence this uncertainty in gauging the behaviour of each virus makes it difficult to augment a uniform anti-viral strategy against these invading neurotropic viruses.

Neurotropic viral infection leading to encephalitis has often been reported to be linked with cognitive and motor disability in the survivors. There are several insights to the question which reasons that these viruses may have some target cells within which they prefer to replicate [11-15]. Hence various studies in animal models have been conducted to surface the underlying mystery of these neurotropic viruses. In case of neurotropic RNA virus full symptomatic animals show familiar symptoms such as hind limb paralysis and decerebrate posturing [16,17]. The movement disabilities often resemble that of Parkinson's disease. Hence detailed studies on molecular basis of the pathogenesis of neurotropic viruses are required to find answers to the underlying question that whether these viral infections are the sources of sporadic Parkinson's disease or other neurodegenerative disease such as Alzheimer's Disease and Amyotrophic Lateral Sclerosis Disease (ALS).

The basic question of this article is to whether the neurotropic infections may form root cause for many of the sporadic cases of neurodegenerations. If we put the molecular studies conducted to identify the common mechanism of the neurodegenerative disease under the magnifying glass a common trend is often observed. All these neurodegenerative diseases bring about the neuronal death through a common mechanism of neuronal apoptosis [18,19]. In most of the neurodegenerative diseases there are primarily two root causes one happens to be genetic another happens to be sporadic. In this report we are concerned about sporadic cases since neurotropic virus attack in early stage of life may stimulate the onset of these neurodegenerations [20, 21]. In sporadic cases of various neurodegenerative diseases phenomena like oxidative stress holds an important cue [22,23]. Neurotropic viruses bring about neurodegeneration stimulating oxidative stress leading to processes such as endoplasmic reticulum stress (ER stress), mitochondrial stress. These stress induction and starting of the process of neurodegeneration at some early point of life by infection of neurotropic viruses may have a persistent effect in the

victim host. It can be hypothesized that molecules pertaining to the same pathway may undergo some mutations which through the course of time influence the onset of various neurodegenerative diseases.

In conclusion, to address this type of complex problem investigators need to understand each phases of these diseases along with their underlying molecular events. With the advent of various branches of modern day interdisciplinary science concepts like systems biology along with other omics branch of studies need to be integrated to understand and "fish out" the pivotal molecules which plays key role in the neurodegenerative diseases. We have to remember that targeting viral genome which is highly susceptible to mutations as anti-viral therapies are outdated approach. Anti-viral therapies to neurotropic viruses must be targeted towards a stronger "host response" and thus cut out the chances of the aftermath of viral infections leading to severe complex neurodegenerative diseases.

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