Atypical Virus-like Agents

(1) **Defective Viruses** are composed of viral nucleic acid and proteins but cannot replicate without a "helper" virus, which provides the missing function. Defective viruses usually have a mutation or a deletion of part of their genetic material. During the growth of most human viruses, many more defective than infectious virus particles are produced. The ratio of defective to infectious particles can be as high as 100:1 .

For example certain **Adenoviruses** and **Hepatitis -D virus** are defective viruses.

(2) **Pseudovirions** contain host cell DNA instead of viral DNA within the capsid. They are formed during infection with certain viruses when the host cell DNA is fragmented and pieces of it are incorporated within the capsid protein. Pseudovirions can infect cells, but they do not replicate.

(3) Viroid's :- Consist of a single molecule of circular RNA without a protein coat or envelope. There is extensive homology between bases in the viroid RNA leading to large double-stranded regions. viroids replicate but the mechanism is unclear. They cause several plant diseases but are not implicated in any human disease.

(4) Prions are infectious particles that are composed of only protiens i.e, they contain no detectable nucleic acid.

Is a type of protein that can trigger normal proteins in the brain to fold abnormally. Prions are composed of a single glycoprotein with a molecular weight of 27,000-30,000. prion diseases are called spongiform encephalopathies (slowly progressive diseases) because of the post mortem appearance of the brain with large vacuoles in the cortex and cerebellum and Prion diseases in

humans are probably primarily a genetic neurotoxic disorder which include Creutzfldt-**Jakob disease or Kuru** in humans and **scrapie** in sheep and bovine spongiform encephalopathy (BSE) in cattle and also called Mad cow in cattle.

Because neither DNA nor RNA has been detected in prions, they are clearly different from viruses . Furthermore, electron microscopy reveals filament rather than virus particles. Prions are much more resistant to inactivation by ultraviolet light and heat than are viruses. They are remarkably resistant to formaldehyde and nucleases. However, they are inactivated by hypochlorite, NaOH, and autoclaving.

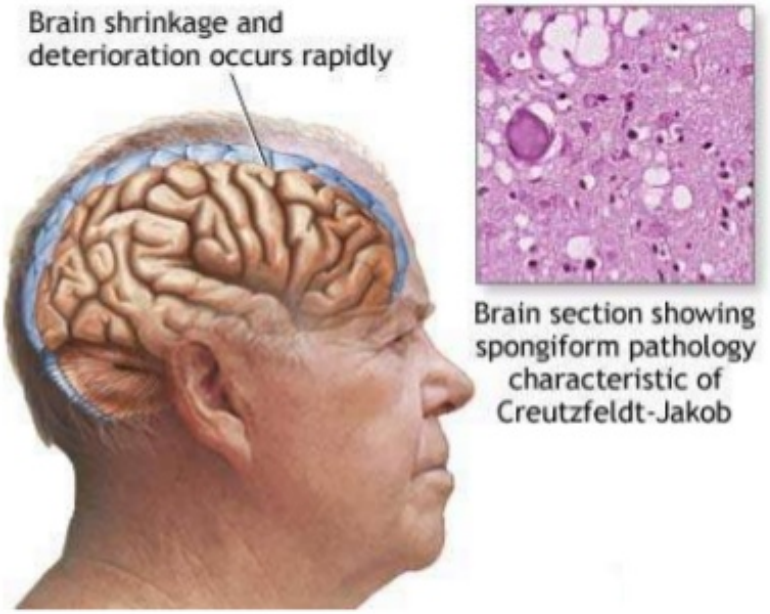
Comparsion between prions and conventional viruses

Feature	Prions	Conventional viruses
Nucleic acid	No	Yes
Protein	Yes , encoded by cellular genes	Yes ,encoded by viral genes
Heat inactivation	No	Yes
Appearance	Amyloid- like	Icosahedral
Antibody response	No	Yes
Inflammatory responses	No	Yes

Causes of prion disease

Prion diseases occur when normal prion protein, found predominantly on the surface of neurons , becomes abnormal and clump in the brain, causing brain damage. This abnormal accumulation of protein in the brain can cause memory impairment, personality changes, and difficulties with movement. Experts still don't know a lot about prion diseases, but unfortunately, these disorders are generally fatal.

Prions



Creutzfeldt-Jakob disease (CJD) is caused by prions in human brains. It starts with memory loss and dementia, leading to loss of muscle control and death.