The functioning of the cells of the nervous system can also be altered by a wide variety of outside agents – for example - viral, bacterial or fungal infections or toxic substances. The following are just a few related disorders.

Classic Creutzfeldt-Jakob Disease (CJD) - a transmissible encephalopathy
- Rare (1/1,000,000) progressive dementia, motor problems, and death
- Usually cause is unknown, but some may be caused by exposure to tissue (transplants, human growth hormone injections, contamination from previous brain surgery on infected patient). A few (5-10%) cases are familial (genetic).
- May have a long, long incubation period; usually seen in older adults
- Caused by tiny abnormal forms of proteins called prions which are very resistant to inactivation

Bovine Spongiform Encephalopathy (BSE)
- Related animal disease transmitted by cattle eating feed containing tissue from infected animals ("mad cow disease")
- 1996 – evidence that BSE could cause a faster "variant CJD" in humans – about 200 cases in U.K.
- Similar transmissible encephalopathy has been seen after eating squirrel/mink brains in Kentucky
- http://www.youtube.com/watch?v=UZK7N8WymgU

Transmissible spongiform encephalopathies can be transmitted when bodily bi-products are consumed by another species

Of concern: Chronic Wasting Disease in US (11 states so far) Deer
- Resembles BSE
- Thus far those states not showing ↓CJD, so CWD may not be easily transmissible to those consuming infected deer, but hunters advised to stay clear of wasted, unhealthy deer.

Lyme Disease (150,000 cases since 1982)
- Infected by bacterium Borrelia burgdorferi transmitted from deer or mice to humans by ticks
- untreated can cause arthritis and neurological problems like
  - Cranial nerve problems like Bell’s palsy (facial paralysis)
  - Peripheral neuropathy symptoms (tingling, weakness)
  - Meningitis or encephalitis
  - Headache and extreme fatigue
  - Concentration or memory problems
  - Disorientation and cognitive decline
- http://www.youtube.com/watch?v=gLX4KF7xv0
Tick Bite

- Adult tick
- Must be in place 24-36 hrs to transmit disease

Bull's Eye Rash 7-14 days later

- Feel tired, achey, low grade fever
- Treat with antibiotics

Some Other CNS Infections

- Viral Infections
  - May be pantropic (general infections of many tissues like mumps or herpex) or neurotropic (virus has specific affinity for nerves).
  - Example: viral encephalitis – many varieties (St. Louis, Equine, HIV) – virus spreads to brain itself with high risk of mortality or disability
  - Common forms spread from animals to humans by mosquitos

Rabies – a neurotropic infection

55,000 deaths/yr worldwide

- Virus is picked up by nerve endings at the site of the bite & slowly (2 weeks-6 months) travels to CNS via retrograde transport up the axon. If the virus reaches the CNS before vaccination it is almost invariably fatal.
- Symptoms may appear in 2 forms: “furious rabies” - hyperexcitable, irritable, muscle pain and spasms, may viciously bite at anything (like Cujo or Old Yeller), or “dumb rabies” - lethargy progressing to paralysis & coma
- http://www.youtube.com/watch?v=08n385Mun6

Anterograde vs retrograde axonal transport
Can now spread to others.