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Drug delivery across the brain protective barriers

Alain L Fymat
International Institute of Medicine and Science, USA

There are approximately 400 known neural disorders some of which being due to a disruption or failure of the blood brain barrier (BBB) such as, for example: meningitis (an inflammation of the meninges or membranes surrounding the brain and spinal cord), epilepsy (chronic or acute seizures caused by inflammation), multiple sclerosis (MS-a disease of the immune system or/and the breaking down of the BBB in a section of the brain or spinal cord), Alzheimer disease (AD-a disease in which amyloid beta contained in blood plasma enter the brain and adhere to the surface of astrocytes), possibly prion and prion-like diseases such as Parkinson disease (PD) and AD, HIV encephalitis (a precursor of HIV-associated dementia in which latent HIV can cross the BBB inside circulating monocytes in the blood stream) and systemic inflammation (sterile or infectious) that may lead to effects on the brain, cause sickness behavior and induce or/and accelerate brain diseases such as MS and PD. There are currently active investigations into treatments for a compromised BBB. As a consequence of the growing aging population, many such neurodegenerative diseases, cancer and infections of the brain will become more prevalent. Of interest here are those disorders requiring treatment by delivery of drugs across the brain protective barriers. I will review the difficulties inherent in the delivery of drugs across the BBB in the treatment if the above neurological disorders and discuss the mechanisms for drug targeting both "through" and "behind" the BBB. I will also suggest approaches for the enhancement of drug delivery including physiological approaches, chemical and biological delivery and disruption of the BBB system, the use of molecular Trojan horse systems and the various nanoparticle and nano delivering devices.

alain.fymat@fiimas.org