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Biologics delivery across the blood brain barrier

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There are approximately 400 known neural disorders some of which being due to a disruption or failure (breakdown, opening, damage) of the blood brain barrier (BBB), while other disorders may still be due to unknown effects on it. Examples include: 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. Of interest here are those disorders requiring treatment by delivery of biologics across the BBB, more particularly, glioblastomas. It is therefore of utmost importance to grasp the difficulties encountered when attempting to deliver biologics at the right brain locations and at the right time-dose fractionations.I will first briefly review the brain diseases, particularly cerebral glioblastomas,, and describe how immune cells can deliver cancer drugs to the brain. Neutrophils, in particular, loaded with the chemotherapy drug paclitaxel (a cationic liposome) can traverse the BBB and kill residual cancer cells after tumor-resection surgery and slow the growth of new tumors (as demonstrated in mice). I will also discuss the capabilities of the method, its advantages and limitations.

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