

15th International Conference on

PHARMACEUTICAL FORMULATIONS & DRUG DELIVERY

September 17-18, 2018 | Philadelphia, USA



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Drug delivery across the brain protective barriers

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 bloodstream); 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 of 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, disruption of the BBB system, the use of molecular Trojan horse systems and the various nanoparticle and nano delivering devices.

Biography

Alain L Fymat is a medical-physical scientist and an educator who was educated at the Universities of Bordeaux and Paris-Sorbonne, France and the University of California at Los Angeles. He is the current President/CEO and Professor at the International Institute of Medicine & Science. He was formerly Professor of Radiology, Radiological Sciences, Radiation Medicine (Oncology), Critical Care Medicine and Physics at several U.S. and European Universities. His current research interests lie at the interface between science and medicine (precision medicine, nanobiotechnology, nanomedicine, genetics/epigenetics/ecogenetics). He has extensively published (~350 scholarly publications) and lectured in several national and international academic, professional, governmental and industrial venues. He is a Board member of several institutions, Honorable Editor of the Journals “Cancer Prevention and Current Research” and “Nanomedicine Research” and Editor of the Journals “Nanobiotechnology” and “Global Nanomedicine” and “Tumor Medicine and Prevention”.

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