

Nanomedicine hype: from Covid to Brain Diseases

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Extended Abstract

The research of non-invasive therapy for the treatment of neurodegenerative diseases is one of the most important topics of the last years by the pharmaceutical technology. Even if less than 1% of both industrial and university research projects on neuroscience displays of a Blood-Brain Barrier (BBB) crossing and CNS targeting aims, the study and progress of drug delivery strategies to cross the BBB are supposed to be widely addressed. Non-invasive techniques based on colloidal carriers could represent a huge potential, since nanocarriers (polymeric nanoparticles, nanoliposomes, solid-lipid nanoparticles (SLN), nanostructured lipid carriers (NLC), micelles, nanogels and dendrimers) could protect the drugs (or gene material) and deliver them to CNS.

Above a wide overview on the most interesting and recent applications of nanomedicines to the CNS targeting, in this talk, the most recent works on poly-lactide-co-glycolide and other polymer-based NPs differently modified for BBB crossing will be reviewed. In particular, different strategies based on different ligands for BBB crossing, as exogenous-like peptides, endogenous-like peptides BBB-receptor antibodies and glyco-peptides will be detailed. In vivo and in vitro results will be commented to underline which mechanism is responsible for BBB crossing, which pathways are exploited for cell entry and specific accumulation-tropism in brain areas and even in cell type are present, dependently on type of ligands.

With this talk, we will therefore try to draw an overview of the main advantages of the use of nanomedicine-based approach from Covid Vaccines to innovation in crossing the most "defensive" barrier in our body, with particular relevance to neurodegenerative diseases. Besides these aspects, a critical analysis on the main causes that slow the application of nanomedicine to brain disorders will be discussed along with the identification of possible solutions and possible interventions.