**Nanodrug delivery and neuroprotection in the central nervous system**

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**Introduction**

The research of efficacious non-invasive therapy for the treatment of neurodegenerative diseases is one of the most important topics faced in the last years by the pharmaceutical technology. The interest in this topic was triggered by the prevision that the number of people affected by disorders of the central nervous system (CNS) at the end of the 20th century should significantly increase owing to increasing of the life expectancy. The Blood-Brain Barrier (BBB) is a barrier designed to protect the CNS from microbial contamination and toxic agents. Unfortunately, the BBB hampers a lot of effective drugs to reach the CNS.

Even if less than 1% of both industrial and academical research projects on neuroscience displays of a BBB crossing and targeting aim, 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 [1-2] .

Active targeting of the CNS is on the contrary found on surface engineering with suitable ligands. In this talk, an overview of recent works on poly-lactide-co-glycolide and other polymer-based NPs differently modified for BBB crossing is reported. In particular, different ligands were tested for BBB crossing, as

* Exogenous-like peptides
* Endogenous-like peptide
* BBB-receptor antibodies
* Glyco-peptides

Moreover, Cerebrolysin a peptide mixture able to ameliorate symptomatology and delay progression of neurological disorders such as Alzheimer's disease and dementia was encapsulated in polylactic-co glycolide (PLGA) nanoparticles (NPs) as sustained release systems for i.v. administration of cerebrolysin. In vitro and in vivo experiments assessed with the success of this approach.

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