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Nanocompositions of CNS Pharmacological Agents as a Promising Approach for the Treatment of Neurodegenerative Diseases

Sergey Bachurin*

Institute of Physiologically Active Compounds, Russian Academy of Sciences, Russia

The efficient treatment of such multifactorial neurodegenerative diseases as Alzheimer's or Parkinson's diseases is one of the most serious and requested problems in modern medicine. No new drug for pharmacological intervention of such disorders was approved during the last 9 years, though hundreds of chemical compounds have shown promise at early stages of clinical and preclinical trials [1]. Such a low outcome of positive results is connected with number of problems in construction of efficient neurotherapeutics. In particular, the insufficient level of knowledge of pathogenesis of these disorders results in the absence of adequate models of such neurodegenerative disorders for conducting efficient screening, and problems in bioavailability of potential pharmacological agents towards biotargets in the brain. To resolve at least the last problem, a number of drug delivery systems have been proposed in the last decade. In the field of neuropharmacology, the special attention was focused on different nanostructured carriers which are able to penetrate blood-brain-barrier (BBB) and therefore provide efficient delivery of "*in vitro* active" compounds to the corresponding CNS targets [2]. The well described approach in this field relates to utilization of lipid carriers for improvement of biavailability of CNS agents [3]. Another actively developed area connected with natural nanostructural compounds such as carbohydrate-containing plant metabolites [4,5], or cyclodextrin and chitozan complexes [6] act as active carriers for biologically active compounds. One of the very recent and promising directions in the field of developing efficient nanocarriers for therapeutical agents relates to utilization of new forms of nanocarbon particles, in particular, fullerenes [7] or nanotubes [8]. In October 2012, Nature journal published the article of Nobel awarder K. Novoselov, where the potential utilization of graphene for design of novel drug-delivery system was discussed [9]. Although the practical applications of such approaches unlikely to be realized close in time, further basic studies in this area can open radically new ways for designing highly efficient CNS agents.

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***Corresponding author:** Sergey Bachurin, Institute of Physiologically Active Compounds, Russian Academy of Sciences, Severny pr.1, Chernogolovka Moscow Region, 142432, Russia, E-mail: bachurin@ipac.ac.ru

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