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TiO2 nanodelivered Cerebrolsyin: A novel Therapeutic approach for brain pathology in CNS Injuries

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Central nervous system (CNS) injuries either caused by trauma or metabolic insults induces brain pathology involving neuronal damages, astrocytic reaction and myelin vesiculation resulting in serious behavioral, psychological, mental and physical abnormalities. Thus, novel efforts are needed to contain neuronal cell damages and to restore loss of function by reducing agents causing neurotoxicity as well as enhancing endogenous factors helping in neurorepair or neuroregeneration. Thus, no single drug or compounds are capable to induce multifunctional aspects of CNS injuries and accomplishing the goal in patients for neurorehabilitation or neurorecovery. Keeping these views in mind multimodal drugs are the need of the hour. However, presence of the blood-brain barrier (BBB) in the CNS could reduce or prevent access of several drugs and compounds when given through systemic routes. Thus, effective concentration of drugs to reach injured brain tissues under traumatic, metabolic or ischemic insults is normally not possible for achievingthe desired therapeutic goals. Recently nanodelivery of drugs has attracted great attention in medical science that allowed rapid penetration of active compounds in the brain and also to reduce their fast metabolism because of their bindingtonanoparticles. Our laboratory is engaged in TiO2 nanowired delivery of drugs in CNS injury and found great benefit of using thismode of nanodelivery as compared to the parent compounds in high doses. Cerebrolsyin (Ever Neuro Pharma, Austria) is a multimodal drug containing a balanced composition of several neurotrophic factors and active peptide fragments is thus quite suitable for nanodelivery to treat CNS injuries. Our experiments show that trauma either caused by impact injury or lesions of the brain or spinal cord results in exacerbation of pathophysiology and behavioral disturbances in diabetic or hypertensive rats as compared to identical trauma in healthy animals. In such circumstances TiO2 nanowired delivery of Cerebrolysin significantly protected the exacerbation of brain pathology and behavioral disturbancesas compared to the parent compound. Our results have thus opened new avenues for the treatment of neurological diseases using multimodal compound Cerebrolysin with nanowired approach to achieve good neuroprotection in patients suffering from several co-morbidity factors, a feature not addressed before by clinicians. These observations raise hope for the better treatmentofbrain-inuredpatientsin near future in clinics.The possible mechanisms and functional significances of our findings will be discussed.

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Interventional Psychiatry-Era of Neurostimulation for Treatment refractory Depression

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Major Depressive Disorder affects 16% of population and is one of the most disabling illness of our times. There are many pharmacological and psychotherapeutic interventions available. However, despite advances in treatment, 1/3 rd of patients suffering from depression progress to treatment refractory state where in they do not get any benefit from conventional treatment modalities. US FDA has approved several neuromudulation treatments such as Electro-convulsive treatment (ECT), Vagus nerve stimulation (VNS) and TMS (transcranial magnetic stimulation). Recently deep Brain Stimulation (DBS) has become an experimental treatment available for patients failing to respond to ECT. DBS can be used for conditions for which neural circuitry has been developed. Our center is exploring Median Forebrain Bundle (MFB) as possible target for DBS for treatment refractory depression.

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