Nanodelivery of cerebrolysin reduces functionalized Gold Nanoparticles induced Blood-brain barrier disruption, brain edema formation and brain pathology

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Recently, gold nanoparticles (AuNPs) are used for drug delivery in treating several neurological disorders e.g., Alzheimer's disease (AD), Parkinson's disease, Stroke and trauma. In addition, use of AuNPs for diagnostic purposes in various diseases are also common in clinical medicine. However, the neurotoxic effects of AuNPs in vivo studies are not well explored. In this innovation we present evidences that functionalized AuNPs induced brain pathology that depends on size, dose and route of administration. These AuNPs induce breakdown of the blood-brain barrier (BBB) permeability to protein tracers causing brain edema formation and neuronal and glial cell injuries. The magnitude and intensity of brain pathology caused by AuNPs is inversely related to the size of the NPs. Interestingly, co-administration of cerebrolysin, a balanced composition of various neurotrophic factors and active peptide fragments reduces AuNPs induced brain pathology. This effect was much more pronounced when the cerebrolysin was administered using TiO2 nanowired delivery, not reported earlier. Thus, use of cerebrolysin with or without nanowired as adjunct therapy could be used where AuNPs are used either for drug delivery or for diagnostic purposes in clinics.

Blood-brain barrier

Brain edema

Brain pathology

Cerebrolsyin

Functionalized gold nanoparticles

Nanodelivery

Blood

Diagnosis

Fiber optic sensors

Gold

Metal nanoparticles

Nanoparticles

Neurodegenerative diseases

Pathology

Blood-brain barrier

Brain edema

Brain pathologies

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Nanodelivery

Medicine