Co-administration of TiO2 nanowired cerebrolysin and alpha-melanocyte stimulating hormone has superior neuroprotective effects on brain pathology following concussive head injury after Sleep deprivation

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Sleep deprivation (SD) is a serious problem in military personnel during combat operations. Previous observations from our laboratory showed marked brain pathology following SD in rats from 12 h to 72 h in a progressive manner. In this innovation we demonstrate that a an additional concussive head injury (CHI) that is very common in soldiers during combat operation could exacerbate SD induced brain damage and behavioral dysfunction. We found a several fold increase in BBB permeability to Evans blue albumin (EBA) and radioiodine ([131]-I), brain edema in several brain regions associated with neuronal injuries after CHI in SD at 48 h. Interestingly, the brain derived neurotrophic factor (BDNF) levels and alpha-melanocyte stimulating hormone (?-MSH) showed greater decline in CHI animals after SD. Thus, TiO2 nanowired tdelivery of cerebrolysin (2.5 ml/kg, i.v.) together with ?-MSH 4 to 6 h after CHI in SD significantly increased BDNF and ?-MSH levels and reduced brain pathology seen at 48 h. This treatment also improved behavioral functions significantly in CHI rats after SD. These observations are the first to show that nanodelivery of cerebrolysin with a-MSH has superior neuroprotective effects in SD following CHI, not reported earlier.

Brain derived neurotrophic factor

Brain pathology

Cerebrolsyin

Concussive head injury

Sleep deprivation in military

TiO2 nanowired delivery

?-MSH

Brain

Pathology

Rats

Sleep research

Titanium dioxide

Brain pathologies

Brain-derived neurotrophic factors

Cerebrolsyin

Head injuries

Sleep deprivation

TiO2 nanowired delivery

Cobalt compounds