

Neuroprotective effects of cerebrolysin in exacerbation of blood-brain barrier breakdown, neuropathology and upregulation of nitric oxide synthase and hemeoxygenase in diabetes and hypertension after heat stroke

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Military personnel are quite vulnerable to heat stroke in hot environment leading to mental dysfunction. Due to severe work stress and irregular food habits they could develop hypertension and diabetes. In this innovation, we demonstrate that a combination of heat stress with diabetes (DB) and hypertension (HY) adversely affect brain function resulting in mental abnormalities and exacerbation of brain pathology. Our observations in a rat model show that a combination of diabetes (DB) and hypertension (HY) exacerbates blood-brain barrier (BBB) breakdown, edema formation and brain injury. It appears that excessive upregulation of nitric oxide synthase (NOS) and heme oxygenase-2 (HO-2) following heat stroke in DBHY rats resulting in excessive brain pathology. In such situation, TiO₂ nanowired delivery of cerebrolysin has superior effects in reducing BBB breakdown, brain edema, NOS and HO-2 expression and brain pathology in DBHY rats after heat stroke as compared to cerebrolysin alone, not reported earlier.

Blood-brain barrier

Brain edema

Brain pathology

Diabetes

Heat stroke

Heme oxygenase

Hypertension

Nitric oxide

TiO₂ nanowired cerebrolysin

Medical problems

Nitric oxide

Pathology

Porphyrins

Rats

Blood-brain barrier

Brain edema

Brain pathologies

Heat stroke

Heme oxygenases

Hypertension

TiO₂ nanowired cerebrolysin

Blood