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Chronic hydrogen sulfide alters microglial activation in the spinal cord of Streptozotocin-induced diabetic rats

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Long-term diabetic patients suffer immensely from diabetic neuropathy. The present study was designed to investigate the effects of Hydrogen Sulfide (H₂S) on peripheral neuropathy, activation of microglia and the cascade secretion of pro-inflammatory cytokines, such as IL-1 β , IL-6 and TNF α , in the Streptozotocin-induced peripheral diabetic neuropathy rat model. Male Sprague-Dawley Rats (SD) were injected intraperitoneally (ip) with Streptozotocin STZ (55 mg STZ/kg body) to induce type-1 diabetes mellitus. Diabetic-induced rats were treated with water-soluble, slow-releasing H₂S donor GYY 4137 (50 mg/kg) daily i.p. for four weeks to deliver exogenous H₂S to the spinal cord. The effect of multiple doses of GYY 4137 on rat's anti-allodynic/anti-hyperalgesic activities was evaluated by Von Fery Test, Paw pressure test and hot plate. Moreover, the histopathology of the spinal cord examined and the effect of GYY 4137 on the spinal expression of microglial pro-inflammatory cytokines analyzed with Western blot. The present study showed neuro protective effects of GYY 4137 on the spinal cord of diabetic animals and modulated their sensory deficits that tested with neurobehavioral tests. H₂S treatment decreases allodynia ($p < 0.05$) and mechanical hyperalgesia ($p < 0.01$) in comparison to diabetic rats and increases thermal hyperalgesia ($p < 0.00$) compare to diabetic rats. GYY 4137 treatment decreases microglia in both grey and white matter of the spinal cord compared to diabetes. Also, pro-inflammatory cytokines levels were reduced in treated rats compared to diabetic rats. GYY 4137 has a potential ameliorative effect on the neuropathic pain through the control of microglial activation and microglia-mediated inflammation that may be considered in the future as a possible treatment of peripheral nerve sensation in diabetic patients.

Biography

Alyaa Mousa is Clinical Neuro-immunologist. She has completed her BSc and EdB with Degree of Honor in 1986 from Science and Education College, Jeddah. She has also completed her MSc in 1992 from King Saud University, Saudi Arabia and her MED-PhD in 1998 from Karolinska Institutet, Stockholm, Sweden. She has pursued her Post-Doctoral Fellow at Karolinska Institutet, Stockholm, Sweden. She published 25 papers in reputed journals. She supervised and participated in many M.S./PhD Examination Committees, acted as potential reviewer for many journals, received several awards. She is also an active Member in many International Scientific and Medical Societies and Associations.