References:


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TIBIA FRACTURE-INDUCED OXIDATIVE STRESS IN MEN IS ABLE TO UP-REGULATE METALLOTHIONEINS AND TRIGGER CASPASE-3-MEDIATED APOPTOSIS

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Trauma is avowed as an increasingly portion of the global burden of injuries and disorders. It displays a dominant clinical and socioeconomic issue especially in the context of osteoporosis which is constantly increasing nowadays and is able to cause higher rate of bone fragility and can enhance a risk of fractures. Nevertheless the risk of tibia fracture is relatively high all over the world, particularly in male (21.5 incidence/100,000/year) its pathogenesis is studied sporadic and not clear (Mills et al., 2017).

Material and methods. In regards of abovementioned we evaluated the parameters of oxidative stress which plays a major role in the development and progress of number of pathologies, and metabolic changes in men who had tibia fracture due to trauma. Also, metallothioneins (MTs) as the metal-buffering proteins with putative antioxidant function were estimated. The cytotoxicity markers namely caspase-3, DNA strand breaks and lactate dehydrogenase (LDH) were detected to evaluate the severity of lesions. About 15 men from each of control (C) and fracture (F) groups were screened. The panel of markers was applied due to the guidelines.

Results. The lower activity of catalase (by the 29%) and glutathione-S-transferase (by the 23%) as well as the level of glutathione (by the 83%) in the injured fellows were observed when compared to the control. Patients with bone fracture had several signs of oxidative stress namely TBARS and protein carbonyls. Meanwhile F-group was characterized by the higher concentration of MTs. Obviously MTs have been involving in scavenging of reactive oxygen species which are overexpressed when antioxidants are down-regulated and attenuate the fracture-induced oxidative stress. Tibia fracture provoked a cytotoxicity which was manifested by increasing LDH, DNA fragmentations and caspase-3 activity, the key effector of apoptosis in osteoclasts. The greatest variability was shown for glutathione (IV=5.8), protein carbonyls (IV=3.3) and LDH (IV=2.4).

To sum up when tibia fracture occurs in men, a remarkable outflow of oxidative injury products have been generating by the damaged tissue and the caspase-3 mediated apoptosis in cells was triggered. Continuous oxidative stress could impair healing of fractured bones, but antioxidant supplementation in post-traumatic rehabilitation of patients is able to ameliorate cell redox-state and accelerate remodelling of fractured bones. This work has been granted by the Ministry of Education and Science of Ukraine (Project # 1338).

References:


Key words: Tibia fracture, metallothioneins, apoptosis, oxidative stress

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