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Band 3 protein function in oxidative and inflammatory diseases

Morabito R¹, Remigante A^{1,2}, Spinelli S¹, Vitale G¹, Loddo S³, Trichilo V³, Dossena S², Marino A¹

¹Department of Chemical, Biological, Pharmaceutical and Environmental Sciences, University of Messina, Italy; ²Institute of Pharmacology and Toxicology, Paracelsus Medical University, Austria; ³Department of Clinical and Experimental Medicine, AOU Policlinico Universitario G. Martino, Italy

SO₄⁼ uptake through Band 3 protein (B3p) represents a tool to monitor erythrocytes function under different conditions, such as diseases associated to oxidative stress, related to metabolic dysfunctions or inflammation. In the present investigation in vitro experiments have been conducted to monitor B3p function in several pathological conditions. Blood samples were withdrawn from patients affected by Systemic Sclerosis (SSc), or with high glycated hemoglobin (HbA1c) levels or elevated serum C-reactive protein (CRP) levels. The rate constant for SO₄⁼ uptake, determined by turbidimetric method and accounting for efficiency in anion exchange through B3p, was significantly lower in SSc patients than in healthy controls. Under high HbA1c levels, the rate constant and SO₄⁼ content were higher than in control patients. Elevated serum CRP levels induced a significant increase in both anion exchange capability through B3p and in SO₄⁼ trapped by the cells with respect to healthy volunteers. Once serum CRP levels were brought back to control values, anion exchange capability was restored. Overall, these results indicate that: measurement of the rate constant for SO₄⁼ uptake is a suitable tool to monitor the effect of acute inflammation and oxidative stress on erythrocytes homeostasis; high CRP and HbA1c levels seem to accelerate anion exchange capability through B3p; B3p from SSc patients is significantly altered; inflammation remission seems to correspond to B3p function restoration. Future studies will evaluate whether this modification may depend on an altered B3p conformation in crosslink with Hb, or on cellular signaling reflecting on B3p function, in an attempt of better understanding the impact of inflammation and oxidative processes on erythrocytes homeostasis.

PP.304

Role of antioxidants in preventing H₂O₂-induced damage on Band 3 protein

Spinelli S¹, Vitale G¹, Remigante A¹, Morabito R¹, Marino A¹

¹Department of Chemical, Biological, Pharmaceutical and Environmental Sciences, University of Messina, Italy

Hydrogen peroxide has been already proven to elicit oxidative damage on Band 3 protein (B3p), anion exchanger essential to erythrocytes homeostasis. B3p capability in mediating anion exchange can be measured by determining the rate constant for SO₄⁼ uptake. In the present investigation the role of different antioxidants in preventing oxidative damage induced by H₂O₂ has been evaluated. To this end, blood samples, pre-incubated or not with different antioxidants (melatonin, Mg²⁺) for 1 h, were treated with 300 μM H₂O₂ for 30 min. The rate constant for SO₄⁼ uptake, GSH levels and -SH membrane groups have been determined. Magnesium improves the rate constant for SO₄⁼ uptake with a significant GSH and -SH groups levels restoration. Melatonin restored rate constant for SO₄⁼ uptake, Band 3 protein expression levels and cell shape alterations provided that concentrations not producing malondialdehyde (MDA, index of lipid peroxidation) are used. Our results confirm that: i) anion exchange capability measurement through B3p is a suitable model to prove the beneficial effect of antioxidant against oxidative stress; ii) H₂O₂ at not hemolytic concentrations reduces anion exchange capability through B3p; ii) Mg²⁺ and melatonin prevent oxidative damage and can be useful in therapy against oxidative stress-related pathologies. Further studies are recommended to better focus on pathways associated to this beneficial effect.

PP.305

Complete blood count in neonates

Satti S

Department of physiology, Al-Neelain University, Khartoum, Sudan

Complete blood count (CBC) with differential is one of the most common laboratory tests performed today. This test is helpful in diagnosing anemia, infections, acute hemorrhagic states, allergies, and immunodeficiencies as well as conditions secondarily affecting blood and bone marrow such as renal failure and certain cancers. It helps in monitoring for side effects of certain drug and toxic substances exposure that cause blood dyscrasias, at birth, full term newborns (FTN) have significantly different CBC compared to older children and adults. There is relative polycythemia with macrocytosis (high MCV). CBC in neonates also showed marked polychromasia with nucleated RBCs, and a high WBC count. Platelet count in neonates is similar to the adult platelet count. The study objective was to compare hematological parameters in newborns (FTN) outcome of normal vaginal delivery (NVD) and cesarean section (C/S). We recruited 46 neonates (52%) born by NVD and 44 neonates (48%) CBC were estimated in blood samples