Changes on the Surface of Rat Erythrocyte Membrane during Psycho-Emotional Stress

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Excess information causes stress in humans. Psychoemotional strain disturbs homeostasis and serves as a serious risk factor for various diseases. Stress can induce or increase the severity of tumors, heart diseases, and cerebrovascular disorders in humans. Stress conditions are associated with the development of gastric ulcer, diabetes, asthma, irritable bowel syndrome, depression, etc. [1, 2, 3, 4].

Stress is accompanied by significant changes in the structure of some blood cells. Here we have studied changes in surface properties of the erythrocyte membrane during prolonged psycho-emotional stress. Stress was modeled for 4 weeks, after N. Koshoridze et al. [5]. Experiments were performed on male albino laboratory rats with body mass of 100-150 g. The erythrocyte membrane surface was examined using standard lectins with different specificity for carbohydrates: PNA, peanut lectin from *Arachis hypogaea* L. (β-Dgalactose and lactose); PSA, pea lectin from *Pisum sativum* L. (mannose and glucose); WGA, wheat lectin from *Triticum aestivum* L. (N-acetyl-D-glucosamine, N-acetyl-D-glucosamine oligomers, and sialic acid oligomers); and SNA, elder lectin from *Sambucus nigra* L. (sialic acid).

In stressed rats, D-galactose-binding lectin PNA caused less pronounced agglutination of erythrocytes, compared to that in control animals; specific activity of PNA significantly decreased. In case of Man/Glc-binding lectin PSA no changes were found. Activity of other lectins decreased less significantly compared to PNA. Experiments with binding of galactose-specific and NANA- specific lectins showed that stress is accompanied by changes in the carbohydrate composition of the outer surface of the erythrocyte membrane. Binding of galactose-specific lectin PNA to the surface of erythrocyte membrane decreased by more than 90% in stressed rats. In the presence of sodium dodecyl sulfate, the lectin-binding fraction was electrophoretically separated into 3 major glycoprotein subfractions with molecular masses of 25, 37, and 50 kDa.

Literature

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