

## ERYTHROCYTE RESPONSE TO NEAR INFRARED RADIATION

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Light exposure is the most effective medical treatment of SAD patients (Seasonal Affective Disorder winter type). For these reasons the action of different wavelengths has been studied and the effectiveness of red and near infrared radiation (NIR) also. The rising question is if NIR effective in the SAD treatment can act on the erythrocytes membranes as a main constituent of blood and what molecular mechanism is responsible for the effects of this radiation.

We studied *in vitro* NIR irradiated bovine erythrocytes. The changes of: membrane structure and polarity, shape and viscoelastic properties of erythrocyte cells and electrokinetic potential were monitored.

Fluidity decreases or increases on dependence of the lipid region of the erythrocyte membrane, polarity decreases in the vicinity of polar heads, an oxidative factor outside the membranes is measured, rates of hemolysis are dropped from the control value, zeta potential, measured electroforetically, was changes upon irradiation as well as the shape of cells.

Observed phenomena are due to:

1. The hemoglobin excitation. The primary photochemical process is photo-dissociation of oxyhemoglobin to deoxyhemoglobin. The shape, ratio of hemolysis, structural changes and oxidative stress are consequences of the higher concentration of deoxyhemoglobin
2. The protein, water and lipid overtones excitation. After NIR absorption the dehydration of the membrane surface occurs what leads to enhanced protonation and dissociation of hydrogen bonded complexes thus the electrokinetic potential is changed.

In conclusion, the primary photo-effect of NIR radiation is dehydration of the erythrocyte cell.