PHENOXYHERBICIDES AND THEIR DERIVATIVES DAMAGE ERYTHROCYTE MEMBRANE AND INDUCE CHANGES IN ERYTHROCYTE MORPHOLOGY

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Previous studies indicated that the sodium salt of phenoxyherbicides: 2,4-dichlorophenoxyacetic acid (2,4-D-Na); 2,4,5-trichlorophenoxyacetic acid (2,4,5-T-Na) and 4-chloro-2-methylphenoxyacetic acid (MCPA-Na) and their derivatives: phenol, 2,4-dichlorophenol (2,4-DCP); 2,4,5-trichlorophenol (2,4,5-TCP); 2,4-dimethylphenol (2,4-DMP) and catechol induced various changes in the organization of red cells.

In this study, we continued our investigations on the interaction of the phenoxyherbicides and their derivatives with the human erythrocytes and concentrated on the effects of these compounds on the fluidity of erythrocyte membranes and membrane protein. Fluorescent probes, ANS, DPH and TMA-DPH were used to estimate the fluidity of the erythrocyte membrane. SDS-gel electrophoresis of the cell proteins was carried out. Additionally, analysis of disturbances of erythrocytes shape and size, accompanied by the application of flow cytometry and microscopy examination, were undertaken.

It was observed that phenoxyherbicides: 2,4-D-Na, 2,4,5-T-Na and MCPA-Na and their derivatives: 2,4-DCP, 2,4,5-TCP, 2,4-DMP and catechol induced changes in membrane fluidity and perturbations in the content of the proteins of the cell membrane. Changes in the levels of spectrin, band 3, actin and molecular small mass proteins were noted. Using three fluorescent markers we noted differrent changes in membrane fluidity on different depth in the lipid bilayers. The use of flow cytometry and microscopy demonstrated also disturbances in the shape and size of erythrocytes.