THE EFFECT OF PAMAM DENDRIMER (G3.5) ON ISOLATED RAT LIVER MITOCHONDRIA

M. ŁABIENIEC, T. GABRYELAK

University of Łódź, Poland

Dendrimers, being highly branched polymers, have become the subject of extensive studies, because of their functional groups and specific shape. Dendrimers have found several pharmaceutical applications including the encapsulation/solubilization and transepithelial transport of drugs, delivery of DNA and oligonucleotides, and platforms for the development of cancer therapeutics.

The purpose of the present study was to evaluate the activity of PAMAM dendrimer (G3.5) used at the concentrations of 30, 50 and 100 μM on rat liver mitochondria.

Changes in mitochondrial membrane potential were estimated with the fluorescent cationic dye rhodamine 123 (Rh123) using flow cytometry. The decrease in fluorescence intensity of Rh123 indicates that used PAMAM dendrimer depolarizes mitochondrial membrane after 30 min of incubation.

Among mitochondrial roles, energy production and Ca^{2+} uptake are crucial for maintaining cell functionality. Both of these functions are critically dependent on mitochondrial membrane potential. The influence of PAMAM dendrimer (G3.5) on Ca^{2+} uptake was measured with the fluorescence probe Fluo-3AM using flow cytometry. The data obtained revealed that at all the used concentrations the tested compound caused an increase in the influx of calcium ions into mitochondria.

Oxygen uptake by mitochondria in the presence of dendrimer was measured with a Clark oxygen electrode using Oroboros Oxygraph-2k. It was noticed that the used chemicals inhibit the respiratory chain at all the used concentrations.

Our observations suggest that PAMAM dendrimer could have a negative influence on mitochondria but further studies are required to confirm the presented hypothesis.