3rd National Congress on Physical Sciences, 29 Sep. – 2 Oct. 2016, Sofia
Section: Physics of Living and Soft Matter. Physics in Medicine

Membrane Phospholipids as Useful Target for Anti-Tumor Treatment with Erufosine

V. Uzunova[1], **T. Stoyanova**[1], **M. Berger**[2], **A. Momchilova**[1], **R. Tzoneva**[1]

[1]Institute of Biophysics and Biomedical Engineering, Bulgarian Academy of Sciences, Acad. G. Bonchev Str., bl. 21, 1113 Sofia, Bulgaria
[2]German Cancer Research Centre, Heidelberg 69120, Germany

Abstract. Activation of lipid metabolism is an early event in carcinogenesis and a central hallmark of many cancers. The membrane phospholipids including phosphatidylcholine (PC), phosphatidylethanolamine (PE), and phosphatidylinositol (PI), as well as sphingomyelin (SM) and ceramide (Cer), are the most increased lipids in tumors. Changes in lipid metabolism can affect numerous cellular processes, including cell growth, proliferation, differentiation and motility and thus the lipid metabolism is an attractive target for cancer therapy.

Alkylphospholipid (APL) derivatives are novel anti-tumor agents that selectively inhibit the growth of transformed cells and induce apoptosis. In contrast to the currently used chemotherapeutic drugs, they do not target DNA but act at the cell membrane level. Erufosine is the first compound belonging to the APL group which is suitable for intravenous administration due to the long 22 carbon chain and the ω-9 cis-double bond which shows anti-proliferative effect *in vitro* and increased therapeutic ratio *in vivo*.

In the present study we report analysis of phospholipids profiles from two breast cancer cell lines (MDA-MB-231 – high metastatic and MCF-7 – low metastatic) treated with Erufosine using thin layer chromatography.

Erufosine treatment caused dose-dependent decrease of phospholipids in cancer cells. In untreated cells the detected levels of PC and SM were 23%/6% for MDA-MB-231 and 21%/5% for MCF-7 cells. The levels of PC and SM in treated cells were reduced. For instance for MCF-7 cells treated with IC_{50} values of Erufosine the ratio PC/SM was 18%/5% and for MDA-MB-231 cells that ratio was 17%/4%. The same trend of reduction was observed and for other phospholipids - PE, PI and PS.

Since the above phospholipids are the main membrane constituents which maintain the membrane integrity and functionality their reduction by Erufosine treatment may alter cell proliferation and migration and thus can lead to death of cancer cells. Thus, the presented results

imply that the membrane phospholipids are an adequate target for anti-tumor treatment with Erufosine.

Acknowledgments: This work was supported by DFNI B02/5.