Fluorescence studies of potential antitumoral 6-heteroarylthieno[3,2-b]pyridines in solution and in nanoliposomes
Photobiology, biophysics and skin photochemistry

M. Solange D. Carvalho, Elisabete M. S. Castanheira, Andreia D. S. Oliveira, Ricardo C. Calhelha, Maria João R. P. Queiroz

Centre of Physics (CFUM) and Centre of Chemistry (CQ/UM), University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal; msolangeddc@gmail.com

Thienopyridine derivatives have been shown interesting biological activities. New fluorescent 6-heteroarylthieno[3,2-b]pyridines (Figure 1), recently synthesized by us, have shown interesting inhibitory growth activity on three human tumor cell lines, MCF-7 (breast adenocarcinoma), NCI-H460 (non-small cell lung cancer) and A375-C5 (melanoma) [1].

In this work, the fluorescence properties of compounds 1-4 were studied in solution and in liposomes of different compositions. Compounds 1-4 present very reasonable fluorescence quantum yields in different solvents ($0.05 \leq \Phi_F \leq 0.50$), but are not fluorescent in alcohols and water.

Nanosized liposomes (diameter $\leq 120$ nm, measured by DLS) with incorporated compounds were prepared using egg yolk phosphatidylcholine (Egg-PC), dipalmitoyl phosphatidylcholine (DPPC), distearoyl phosphatidylcholine (DSPC), dipalmitoyl phosphatidylglycerol (DPPG), with or without cholesterol (Ch) and distearoyl phosphatidylethanolamine-(PEG)2000 (DSPE-PEG).

The four compounds exhibit reasonable fluorescence emission when incorporated in liposomes (example of compound 3 is presented in Figure 2). Fluorescence anisotropy measurements indicate that compounds 1-4 can be transported in the hydrophobic region of the lipid bilayer. The liposomal formulation Egg-PC:Ch:DPPG (7:3:1) is the one with smaller size and lowest polydispersity. These results may be important for future drug delivery applications of these potential antitumoral compounds using nanoliposomes as drug carriers.

Figure 1. Structure of the compounds 1-4.

Figure 2. Normalized fluorescence spectra of 3 in nanoliposomes.

Acknowledgements: FCT, QREN and FEDER for financial support to CFUM [PEst-C/FIS/UI0607/2011 (F-COMP-01-0124-FEDER-022711)] and CQ/UM [PEst-C/QUI/UI0686/2011 (FCOMP-01-0124-FEDER-022716)] and to the research project PTDC/QUI/81238/2006 (FCOMP-01-0124-FEDER-007467). M.S.D. Carvalho thanks her PhD grant (SFRH/BD/47052/2008) to FCT, POPH-QREN, FSE.

References: