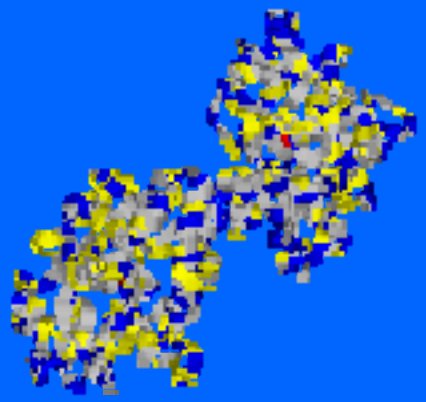
The 8th National Seminar on Nanoscience and Nanotechnology

In vitro efficiency of lipid nanostructures with anti-tumoral compounds

Anca Roseanu,Paula Florian,Florica Chelu, Magdalena Moisei, Mihaela Trif

Institute of Biochemistry, 296 Splaiul Independentei, Bucharest, Romania



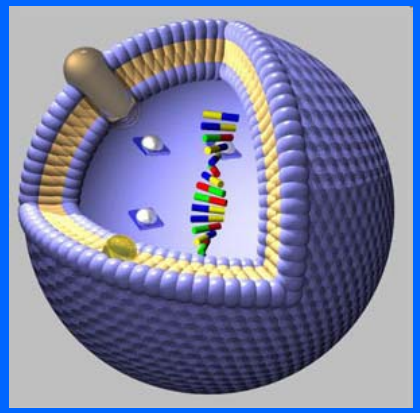
Lactoferrin (Lf)

-iron-binding glycoprotein of the transferrin family with a potent anti-tumoral activity *in vivo* and *in vitro*.

Chemotherapeutic agents

-Dacarbazine (D)

-Cisplatin (C)



Avanti Polar Lipids; www.avantilipids.com

Liposomes:

-vesicular structures prepared from natural, biodegradable and nontoxic lipids
-able to entrap hydrophilic drugs in the large aqueous interior and lipophilic drugs inserted in the lipid bilayer
-good candidates for targeting of therapeutic agents to the site of interest

Advantages:

-good stability during storage
-control over drug release rate
-high efficient entrapment of hydrophilic molecules
-suitable for *in vivo* experiments

Liposome – entrapped Lf /D/C

Lipid film

↓

Dispersion in PBS + Lf/D/C

↓

5 h incubation (annealing process)

↓

Freeze-thaw (5 cycles)

↓

Extrusion

↓

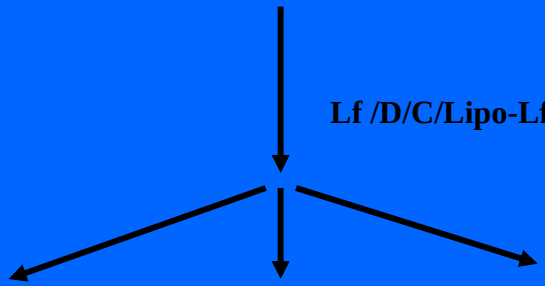
SUV (Small Unilamellar Vesicles~200nm) + Lf/D/C

Aim:

To investigate the effect of free and liposome entrapped Lf /D/C on human SK-28 melanoma cells

Experimental model

Human **SK-28** melanoma cells

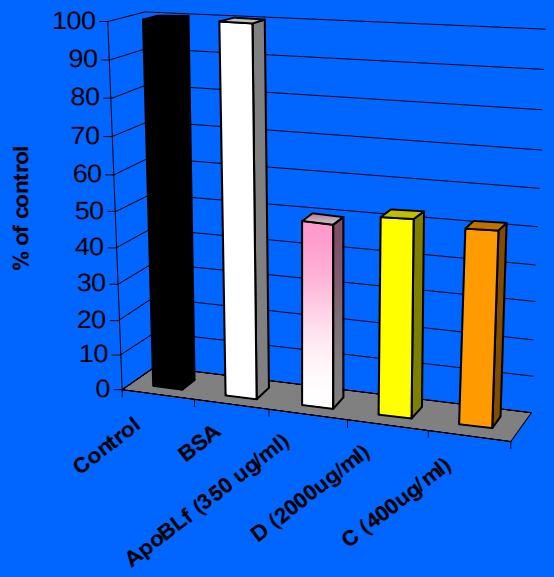


Cell viability (MTS)

Cell cycle (FACS)

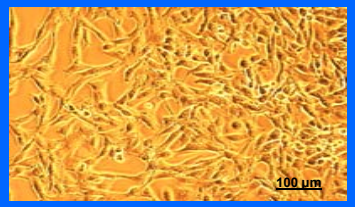
Cell morphology

Cell viability

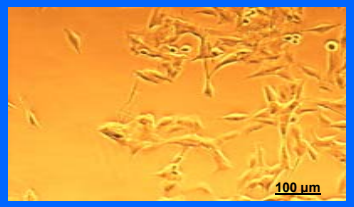


Lf, C and D affect the SK-28 cell viability. The inhibitory concentration required to kill 50% of cells (IC_{50}) was 350 µg/ml for Lf, 2000 µg/ml for D and 400 µg/ml for C. The effect of the compounds on the cell viability was enhaced by their entrapment into liposomes.

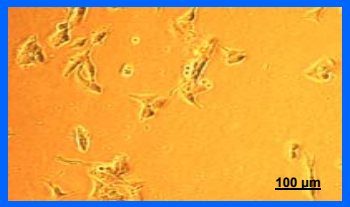
Morphology of SK-mel 28 cells



Control/Liposomes

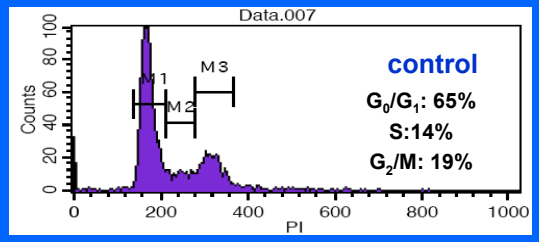


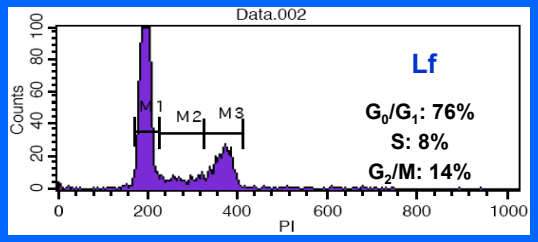
Lf

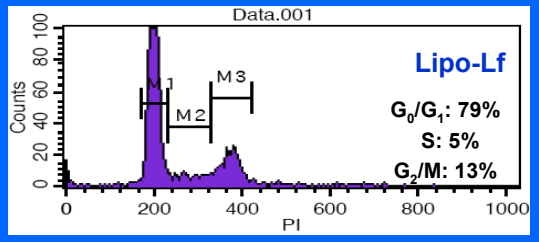


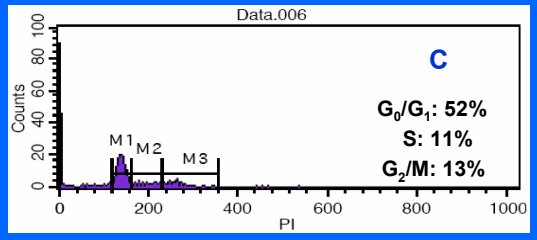
Lipo-Lf

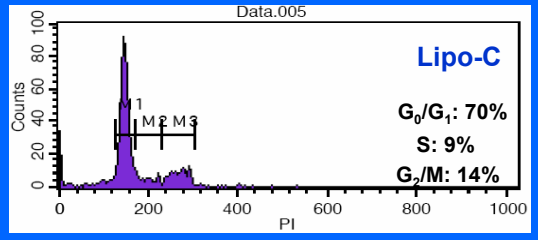
Cell cycle analysis

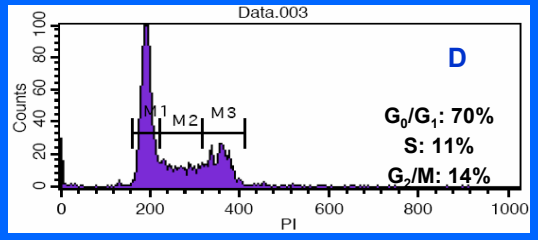


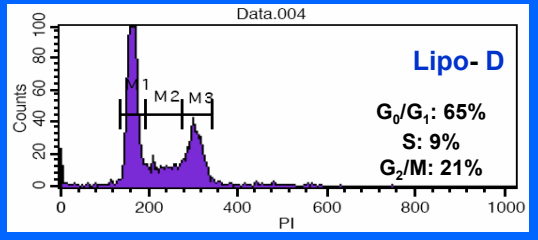




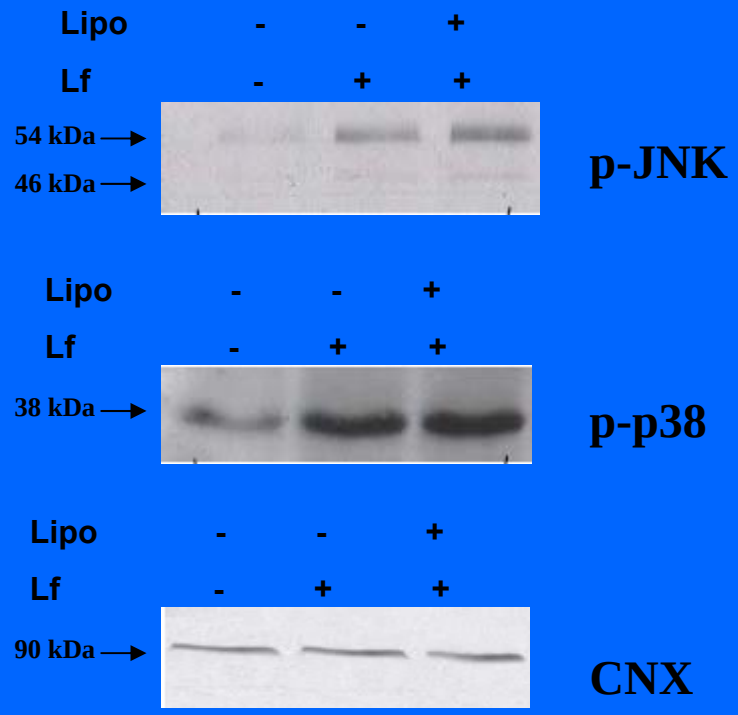








Expression of p-JNK and p-p38 MAPKinases



The liposome-lactoferrin system is more efficient than the free protein in modulating the expression of p-JNK and p-p38 MAPkinases, proteins involved in cell proliferation and apoptosis.

Conclusions

Liposomes containing either natural or synthetic compounds could be considered as a base for a new strategy in cancer prevention and/or treatment.

Acknowledgments

Dr. Mihaela Trif

Dr. Magdalena Moisei

Dr. Florica Chelu

Drd. Paula Florian

Institute of Biochemistry

Prof. Inger Mattsby-Baltzer
Univ. Goteborg

Prof. Robert Evans
Brunel Univ. London

Part of the work was supported by MATNANTECH program, project CEEX 57/2006 (NANOCONTER)