

Liposomal Formulations from Phospholipids of Greek Almond Oil. Properties and Biological Activity[§]

Fotini Malisiova^a, Sophia Hatziantoniou^a, Kostas Dimas^b, Dimitrios Kletstas^c, and Costas Demetzos^{a,*}

^a School of Pharmacy, Department of Pharmaceutical Technology, University of Athens, Panepistimiopolis, 15771, Athens, Greece. Fax: +3021 07274596.

E-mail: demetzos@pharm.uoa.gr

^b IIBEAA, Basic Research, Laboratory of Pharmacology and Pharmacotechnology, S. Efesiou 4, 11527, Athens, Greece

^c Laboratory of Cell Proliferation and Ageing, Institute of Biology, N. C. S. R. Demokritos, 15310, Athens, Greece

* Author for correspondence and reprint requests

Z. Naturforsch. **59c**, 330–334 (2004); January 14/February 12, 2004

The seeds of the almond tree [(*Prunus dulcis* (Mill.) D. A. Webb. (syn. *Prunus amygdalus*)] were collected in two different periods of maturity and were studied for their lipid content. The total lipids (TL) were extracted by the Bligh-Dyer method and the lipid classes have been isolated by chromatographic techniques and were analyzed by HPTLC coupled with a flame ionization detector (HPTLC/FID) and GC-MS. The oils were found to be rich in neutral lipids (89.9% and 96.3% of total lipids) and low in polar lipids (10.1% and 3.7% of total lipids) for the immature and mature seed oils, respectively. The neutral lipid fraction consisted mainly of triacylglycerides whereas the polar lipids mainly consisted of phospholipids. GC-MS data showed that the main fatty acid for both oils was 9-octadecenoic acid (oleic acid). The unsaturated fatty acids were found as high as 89.4% and 89.7%, while the percentage of the saturated fatty acids was found 10.6% and 10.3% for the immature and mature seed oils, respectively. Liposomes were prepared from the isolated phospholipids using the thin lipid film methodology, and their physical properties were characterized. Cytotoxicity was found absent when assayed against normal and cancerous cell lines. These new formulations may have future applications for encapsulation and delivery of drugs and cosmetically active ingredients.

Key words: Almond Oil, *Prunus dulcis*, Liposomes