Preface

Liposomes and other assemblies as drugs and nano-drugs: From basic and translational research to the clinics

This *Journal of Controlled Release* Special Issue is based on presentations at the conference “Liposomes in Jerusalem 2011” (lj2011), held on May 15–19, 2011, at Kibbutz Maale Hachamisha near Jerusalem. The conference, honoring Chezy Barenholz on his 70th birthday, was attended by more than 300 participants from 20 countries. The lj2011 conference integrated 3 closely related fields:

> Liposomes and membrane basic research;
> Applied research on delivery systems by liposomes and other means (polymers, emulsions, micelles), for drugs, antigens, proteins, and nucleic acids;
> Sphingolipids – from chemistry, biology, and biophysics to potential drugs and nano-drugs.

The conference included 4 days of oral presentations by 85 researchers, more than 100 posters, 3 major workshops, as well as a few shorter discussions (for more information see www.lj2011.com).

This Special Issue of *Journal of Controlled Release* includes 36 peer-reviewed papers originating from presentations at the lj2011 conference. An additional 16 papers that deal with various aspects of lipids, liposomes, and sphingolipids have been published in a separate Special Issue of *Chemistry and Physics of Lipids*.

This issue brings together the work of several outstanding investigators on liposomes and other assemblies as potential drugs and nano-scale drug delivery vehicles. It covers a broad spectrum of topics from biophysics and nanotechnology to pharmaceutical and medical aspects, of a broad range of applications including low molecular weight drugs, proteins, peptides, and nucleic acids (with focus on siRNA).

Liposomes, discovered by Alec Bangham in 1965, thirty years later, in 1995, were approved by the FDA as a nano-scale drug delivery system for the anticancer drug doxorubicin. This liposomal doxorubicin (Doxil®) was the first nano-drug to be approved by the FDA. This special issue honors Prof. Barenholz’s contributions to the fields of lipids in general and liposomes in particular. Prof. Barenholz reviews the development of Doxil® from its conception as an academic idea to its approval as the first nano-drug by the FDA and the European regulatory agencies. Liposomes, which first emerged as the most relevant model for biological membranes and for understanding lipid biophysics, later became the most successful drug delivery system with more than 12 drugs (including vaccines) in routine clinical use (9 of them FDA approved). Many more liposomal products are in different stages of development. This success was enabled by the vast amount of knowledge gained in these two fields in the last 47 years. The combination of the vast knowledge of lipids and their biophysical and biochemical properties with nanotechnology, anatomy, biochemistry, physiology, medicine, pharmacology, and pharmacy, was translated into the development of this new class of therapeutic and diagnostic modalities benefitting many people around the globe.

Similarly, the field of sphingolipids, which was “dormant” for many years, became very active and popular as a result of the understanding of sphingolipids’ role in signal transduction (at the level of basic cell biology and the consequences in the development process) and in the formation and maintenance of “membrane rafts” (at the level of membrane biophysics and cell biology). This dramatic increase in the understanding of the various functions of sphingolipids led to the development of several novel drugs, the first of which, a sphingosine-1-phosphate agonist for oral treatment of multiple sclerosis, was recently approved by the FDA.

Other drug delivery systems benefit from the knowledge gained during the development of liposome-based drugs.

This issue includes papers on the following topics, with the corresponding authors listed:

Four papers on the relevance of biophysical properties of lipids and liposomes to liposomes’ application by G. Cevc; A. Goldblum; P. Quinn; and D. Danino.

Eight papers on nucleic acids delivery by D.G. Anderson; N. Oku; M.A. Maslov; E. Cantin; M. Zenkova; B.J. Crielaaard; N.Allon; and S. Benita.

Eight papers that focus on nanomedicines for cancer therapeutics or diagnostics by M. Coimbra; M. Ahmed; A Gabizon; T.L. Andresen; V. Torchilin; N. Oku; Y. Barenholz; and G.N.C. Chiu.

Eight papers that focus on other applications of nanodrugs and nanomedicine by Y. Naparstek; E. Heldman; D. Stepensky; S-I. Kuroda; J. Turanek; O. Regev; H. Kanaan; and N. Emanuel.

Seven papers that focus on immuno-nanomedicine by K. Maruyama; A.M. Carmona-Ribeiro; J. Szebeni; T. Turanek; R. Margali; E.L. Vodovozova; and A. Domb.

We are grateful to all the authors who contributed outstanding manuscripts and shared their knowledge and findings with the readers.

We hope that this JCR issue will benefit many researchers and students from the fields of drug delivery and nanomedicine as well as from the general scientific community.

Chezy Barenholz and Dan Peer

Yechezkel (Chezy) Barenholz
Laboratory of Membrane and Liposome Research, Institute of Medical Research Israel–Canada (IMRIC), The Hebrew University–Hadassah Medical School, Jerusalem 91120, Israel Corresponding author. Tel.: +972 3640 7925; fax: +972 3640 5926. E-mail addresses: yb@cc.huji.ac.il, chezyb@gmail.com.

0168-3659/$ – see front matter © 2012 Elsevier B.V. All rights reserved. doi:10.1016/j.jconrel.2012.03.025
Dan Peer
Laboratory of Nanomedicine,
Department of Cell Research and Immunology,
George S. Wise Faculty of Life Science, Tel Aviv 69978, Israel
The Center for Nanoscience and Nanotechnology, Tel Aviv University,
Tel Aviv 69978, Israel
Correspondence to: D. Peer, Laboratory of Nanomedicine,
Department of Cell Research and Immunology,
George S. Wise Faculty of Life Sciences, and the Center for Nanoscience and Nanotechnology, Tel Aviv University, Tel Aviv,
69978, Israel. Tel.: +972 3640 7925; fax: +972 3640 5926.
E-mail address: peer@tauex.tau.ac.il.