

Biological Applications of Dendrimers

The theme of this special issue is “Biological Applications of Dendrimers”. The contributed works highlight some of the contributions from the 7th International Dendrimer Symposium (IDS7), which was held in April 2011 on the NIST campus in Maryland, USA. The cover art captures some of the submissions revolving around the logo of IDS7.

The dendrimer field, like any, has matured over time. We have seen a shift from a purely synthetic pursuit in the 1990s toward commercial applications. The shift is not surprising: the ability to precisely control the composition, branching diversity and architecture, size, and surface and interior chemistries have been explored since the beginning of this field and provided models to explore structure activity studies. This shift is also reflected by the relatively modest number of submissions on biological applications at the first Dendrimer Symposium held in Germany in 1999, to over 50% of the abstracts at the recent IDS7. Now a dedicated biennial symposium on “Biodendrimers” is being held; the 3rd symposium occurs later this year in Spain.

A significant portion of the development has focused on realizing advances in the biomedical arena. Exploring the behaviors of these molecules in vitro and in vivo has yielded continuing understanding of dendrimer capabilities, and continues to influence the design and development of these materials. Advances are captured in descriptors like biocompatible, biodegradable, and predictable. Characteristics of interest include solubility, drug release kinetics, enhanced image contrast, desired pharmacokinetics, and safety profiles. The ultimate testament to the success of these endeavors is that dendrimers are now clinically used to benefit patients, with others in clinical trials and advanced preclinical development.

Growth over the past 20 years derives both from an established community and from newcomers who bring exciting new ideas, enthusiasm, and vigor to this ever growing field. In this issue, you will see contributions on a diversity of architectures including PAMAM, triazine, phosphorus, lysine, and carbosilane dendrimers. Research articles on SAR studies, anticancer drug delivery, gene delivery, and targeted imaging show the promise of these materials in combating cancer and infectious diseases, along with their potential as antibacterial and wound healing agents. We hope many of these concepts are transformed into products to help in disease prevention, diagnosis, and treatment.

We would like to acknowledge the contributions of many pioneers and newcomers alike in advancing our understanding of these novel dendritic materials over the last 25 years. A special thanks to all authors who immediately agreed to contribute upon our invitation and provided excellent research articles and to Ms. Kim Barrett of *Molecular Pharmaceutics* for her assistance in completing this project. We hope you enjoy these articles and learn from the science.

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