Foreword

The targeted drug delivery concept which has been predicted by Paul Ehrlich in 1891 has been not only successfully realized, but also achieved a tremendous advance in the research, development and implementation during the last decade, and is one of the frontiers based on the integrated multidisciplinary approach. The Drug Delivery Systems (DDS) which use variety of carriers, such as soluble polymers, nanoparticles, nanocapsules, lipoproteins, liposomes, micelles, cells ghosts, phytosomes, transfersomes, ethosomes, microspheres, emulsions, were timely developed in order to minimize drug degradation, to prevent side-effects, to increase drug bioavailability and drug targeting systems are currently under the development. The DDS, from drugs to therapeutic peptides, viral vectors, vaccines, gene therapy which were created for traditional oral and intravenous administration, have been expanded to transdermal, nasal, ocular, buccal, intramuscular, rectal, intrauterine, vaginal and pulmonary administration, ceramic implants, etc. The main factors in selection of the drug delivery route such as solubility, pH, ionization, concentration, particle size, temperature, crystallinity, molecular affinity, degree of absorption, state of hydration, resistance to an enzymatic and bacterial degradation, as well as drug biological interactions, distribution and ways of elimination, play crucial role in formulation, development and effective implementation of every type of the DDS.

Drugs delivery efficiency, targeting and safety concerns, solubility and cells microenvironment problems have created a huge demand for development of a new highly effective DDS. In order to be effective, the basic requirements for the DDS are: easy crossing biological barriers, maintaining concentrations of a drug in plasma over extended period of time, low cytotoxicity and ability to overcome host defence mechanism, reduction of the side-effects and dependency, bio-degradability, high absorption rate, physical and chemical stability, biocompatibility, guaranteed targeted and controlled drugs release in vivo based on molecular imprinting technology, reduced time of exposure at non-targeting tissues, ability to be mass-produced at the possibly low costs, reduced frequency of drug administrations per day which will improve patient compliance and overall wellbeing.

The amount of the Novel Drug Delivery Systems (NDDS) based on the achievements in pharmacodynamics, pharmacokinetics, bio-recognition, immunogenicity and nonspecific toxicity, as well as using modern advanced materials and progressive technologies has significantly increased during the past few years and will exponentially increase in the near future. The global market for drug delivery systems is expected to reach about $175.6 billion by 2016, $212.8 billion in 2018 and will continue to grow impressively. Novel carriers need to be designed out of a unique advanced material to enable the controlled release of active molecules, and new concepts of the NDDS formulation, development and applications need to be submitted for future publications.
The “Handbook of Research on Novel Approaches for Drug Delivery” which is an essential resource for anyone venturing into the area of drug development, is well written book based on the connection between pharmaceutical, biomedical and medical science. It is not only a comprehensive overview of various established and novel approaches to drug delivery systems and targeting, but it is also in depth discussion of a modern research and a critical analysis of the available information on NDDS and their numerous modern therapeutic and commercial applications. The handbook is not only containing available results and description for the NDDS, but also provide their comprehensive analysis and evaluation, integrate a variety of case studies, research results, existing and modern theories, but also summarize the diversity, method of preparation, efficiency, route of administration, biological activity and a variety of theoretical approaches. All the contributing authors demonstrate an exceptional expertise in the field of NDDS research and development, and provide a global perspective on current and future advances and discovery of new market opportunities.

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