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Biography

The aim of my research is towards designing and evaluating drug delivery systems (DDS) to efficiently deliver biopharmaceuticals to otherwise seriously ill patients. I focus on drug design and delivery of therapeutic peptides/proteins and other challenging hydrophilic drugs like antibiotics and oligonucleotides for them to reach their target in sufficiently high amounts. The molecular properties of biopharmaceuticals, including large size, charged nature and high enzymatic lability, highly challenges efficient delivery to target site in different ways than for small-molecule synthetic drugs. In order to advance the field of drug delivery of biopharmaceuticals, interdisciplinary research is extremely essential since only by implementing expertise in various aspects of chemistry, biology, and analysis in relation to pharmaceutical sciences, we as researchers will be able to lead the field towards success.

I apply pharmaceutical formulation design implementing expertise on the chemistry of drugs and excipients, processing technologies with expertise on drug design and delivery; namely the biological matrix interaction, uptake and transport of the active drug molecule through delivery barriers to target site. Thoroughly understanding the importance of the properties of the drug delivery system (DDS), drug, and excipients and their interactions with biological matrices, I believe is crucial for advancing the design of future for biopharmaceutical drugs. Importantly, the effect of drug formulation processing parameters may be decisive for the properties of the DDS and thus also the safe use and applicability of such biopharmaceuticals. Further, important parameters also addressed are the analytical processing of samples and quantitative assessment of data obtained by applying relevant *in vitro* and *in vivo* models in order to translate to expected outcome in man. I have expertise in state-of-the-art technologies and novel approaches on how to mediate efficient delivery of biopharmaceuticals through drug and drug delivery systems design, development, testing, analysis and interpretation of data. Especially, I am skilled in preparation and characterization of drug delivery systems, such as self-assembling nanogels or polyelectrolyte complexes, and polymeric or lipid-based particles, and I possess expertise on how to experimentally investigate and analyse the behavior of e.g. peptide, proteins, excipients and (nano)particles in biomatrices. Particularly, cell membranes, junctions of tight epithelial tissues, and the mucus that surface-line all mucosal tissues. Present projects comprise research in drug delivery of peptides and proteins, specifically related to: (1) design of advanced drug delivery systems based on e.g. carrier peptides and biopolymers, (2) cell-penetrating and junction-modulating peptides, (3) antimicrobial peptides, (4) interaction with and transport across biological matrices such as mucus, epithelia and biofilms, (5) biosimilar *in vitro* models
Group home page: http://pharmacy.ku.dk/research/biologics/peptide-and-protein-drug-delivery/
Section home page: http://pharmacy.ku.dk/research/biologics/

I received the PhD degree from the Royal Danish School of Pharmacy, comprising research conducted at Leiden/Amsterdam Center for Drug Research, in 2000, and was granted a research fellowship from the Alfred Benzon Foundation to pursue Post Doc studies at ETHZ (Swiss Federal Institute of Technology). In 2004, I was employed as Associate Professor in the group *Drug Formulation/Biomacromolecules*, now *Section for Biologics* at the Department of Pharmacy, University of Copenhagen. In 2016, I was appointed Professor in Biopharmaceuticals – Drug Design and Delivery at University of Copenhagen. Center head of *Center for Biopharmaceuticals and Biobarriers in Drug Delivery* and co-PI in *LEO Foundation Center for Cutaneous Drug Delivery*. More than 100 peer-reviewed publications have been published in high-impact journals within the field and H-index 29, two patents, two book editions and several book chapters etc. I have supervised numerous PhD students and Post Docs and attracted substantial funding together with national as well as international collaborators in industry and academia.