Special Issue - Bubbles, Droplets and Micelles for Acoustically-Mediated Drug/Gene Delivery

Submission Deadlines
31 March 2019 - Abstract
31 July 2019 - Manuscript
Dr. Jean-Michel Escoffre and his co-editors invite you to submit your publication in his special issue in Frontiers in Pharmacology on Bubbles, Droplets and Micelles for Acoustically-Mediated Drug/Gene Delivery.

**About this Research Topic**

Despite the increasing number of sophisticated drugs and the development of novel targeted strategies, the therapeutic progresses remain modest for many prevalent and costly diseases (e.g., neurodegenerative and cardiovascular diseases, diabetic nephropathy, etc.). Major obstacles are the non-specific delivery of drugs but also the presence of physiological barriers, (e.g., endothelial barrier, extracellular matrix, etc.), hence restraining their efficacy. In this context, any targeted and active drug delivery method allowing an increase of drug bioavailability into the diseased tissues while minimizing side effects to healthy tissues remains a critical challenge in therapy.

Besides the well-known and wide use of ultrasound in diagnostics, the therapeutic use of ultrasound has recently emerged. The better understanding of the action of ultrasound waves at the cellular and tissue level has stimulated an increased use of the ultrasound alone or in combination with ultrasound-responsive particles (e.g., bubbles, droplets, micelles, liposomes, etc.) in several therapeutic applications. These particles can be intravenously co-injected with drugs and/or they can carry these molecules. This capacity, in combination with ultrasound provides unprecedented possibilities for a high selective therapeutic action. Indeed, ultrasonically-activated particles including bubbles and droplets can result in the reversible disruption of nearby endothelial barriers. This leads to an increase in vascular permeability, thus facilitating extravasation of drugs into targeted tissues and in turn increasing their bioavailability. In addition, ultrasound can also induce the local release of drugs from nanoparticles through a mechanical and/or thermal stimulus in the target tissue. In comparison with other physical drug delivery methods, ultrasound is a non-invasive, easy to apply and cost-effective method. It thus provides a high potential for the delivery of a wide range of drugs to superficial and deep organs under the guidance of magnetic resonance imaging (MRI) or ultrasound imaging. Indeed, MRI and ultrasound imaging modality allow a real-time imaging of targeted tissues, thus improving the localization and the targeting of pathological tissues. Hence the delivery of drugs in the targeted tissue can be controlled spatially and temporally through ultrasound focusing and action. In addition, the co-loading of drugs with contrast agents inside the ultrasound-responsive nanoparticles also allows a real-time visualization of drug release. In conclusion, the acoustically-mediated drug delivery is a promising drug delivery method for the treatment of several diseases including cancers, neurological disorders, cardiovascular diseases, etc.

The present Research Topic here in Frontiers in Pharmacology aims to bring a collection of research articles or reviews describing

- Design and characterization of bubbles, droplets, liposomes and micelles;
Basic mechanisms of acoustically-mediated drug/gene delivery;
Pharmacokinetic aspects upon acoustically-mediated drug/gene delivery;
Acoustically-mediated immune stimulation for the treatment of cancers and other diseases;
Proof-of-concept, preclinical and clinical investigations;
Imaging guidance for acoustically-mediated drug delivery.

Keywords
Ultrasound, drug delivery, droplet, bubbles, liposomes, micelles, pharmacology, imaging guidance.

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Important Note
All contributions to this Research Topic must be within the scope of the section and journal to which they are submitted, as defined in their mission statements. Frontiers reserves the right to guide an out-of-scope manuscript to a more suitable section or journal at any stage of peer review.

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