Virtual DCMIC Seminar Series 2021

The challenge of nanomedicine consists in carrying active molecules through the different biological barriers and reaching specific targets in an efficient and non-toxic way. In addition, some active agents require specific formulations to overcome intrinsic problems associated with aqueous insolubility, in vivo stability and bioavailability. A whole range of new carriers with different properties and functionalities are now available. However, the development of small biocompatible carriers with high loading capacity, extended circulation time, and favorable biodistribution has several unanswered issues.

This talk will give an overview of our recent findings regarding micellar assemblies obtained from original amphiphiles including diacetylene-containing photopolymerizable molecules, micelle-forming prodrugs, and photo-degradable o-nitrobenzyl derivatives, as well as some biomedical applications such as imaging and drug delivery with emphasis on both passive and active targeting of solid tumors. Furthermore, we will give an overview of our work on optimizing quantification strategies and developing experimental devices for MR-based molecular imaging applications at high magnetic field. A specific focus will be made on the use of fluorinated-based nanoparticles, especially on our last study related to the development of PERFECTA-loaded micelles targeting solid tumors, which combines several advantages for in vivo quantitative imaging (100% natural abundance of ^{19}F, high sensitivity and lack of endogenous fluorine atoms in living bodies).

Related Publications

1. *Genetically tailored magnetosomes used as MRI probe for molecular imaging of brain tumor.* M. Boucher, F. Geffroy, S. Prévéral, L. Bellanger, E. Selingue, G. Adryanczyk-Perrier, M. Péan, C. T. Lefèvre, D. Pignol, N. Ginet, S. Mériaux. Biomaterials 2017, 121, 167-178.
2. *Biotin-functionalized targeted polydiacetylene micelles.* A. Doerflinger, N. Nguyen Quang, E. Gravel, G. Pinna, M. Vandamme, F. Ducongé E. Doris. Chem. Commun. 2018, 54, 3613.
3. *Tumor targeted micellar nanocarriers assembled from epipodophyllotoxin-based amphiphiles*. J. Alliot, I. Theodorou, D.-V. Nguyen, C. Forier, F. Ducongé, E. Gravel, E. Doris. Nanoscale 2019, 11, 9756.
4. *Nanotoxicology at the particle/micelle frontier: influence of core-polymerization on the intracellular distribution, cytotoxicity and genotoxicity of polydiacetylene micelles*. F. Costamagna, H. Hillaireau, J. Vergnaud, D. Clarisse, L. Jamgotchian, O. Loreau, S. Denis, E. Gravel, E. Doris, E. Fattal. Nanoscale 2020, 12, 2452.
5. *Targeting brain metastases with ultrasmall theranostic nanoparticles, a first-in-human trial from an MRI perspective*. C. Verry, S. Dufort, B. Lemasson, S. Grand, J. Pietras, I. Troprès, Y. Crémillieux, F. Lux, S. Mériaux, B. Larrat, J. Balosso, G. Le Duc, E.L. Barbier, O. Tillement. Sci. Adv. 2020, 6, eaay5279.
6. *Tumor-targeted superfluorinated micellar probe for sensitive in vivo 19F-MRI*. L. Jamgotchian, S. Vaillant, E. Selingue, A. Doerflinger, A. Belime, M. Vandamme, G. Pinna, W. L. Ling, E. Gravel, S. Mériaux, E. Doris. Nanoscale 2021, 13, 2373-2377.

Seminar #2.5
March 19, 2021, 11:30 am

Micellar nanocarriers for biomedical applications and ^{19}F-MRI

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