

61: Synthesis, characterization, and test of lipid nanoparticles dedicated to *in vivo* fluorescence imaging

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Fluorescence imaging is a powerful tool for the non invasive visualization of biological processes in living tissues, potentially within a few centimeters deep [1-3]. Numerous applications are envisioned for this technique in the near future, from drug discovery to clinics [1-3].

The technique relies upon the injection of a fluorescent probe, which is aimed to target the area of interest to be imaged. Similarly to drug delivery applications for which a very precise localization of the drug is desired in order to optimize therapy efficiency, good image contrast relies on an efficient targeting of the fluorescent label. The use of nanoparticle-based vectorization systems is therefore a promising pathway to achieve this goal [4-5]. The encapsulating nano-vectors can play a protecting role, both for the principle to be delivered and the body to be injected. Indeed, active principles such as drugs and contrast agents can have a limited chemical stability, and a low aqueous solubility. Their intrinsic toxicity can also limit their injected dose without any appropriate formulation [4-5]. Moreover, the nano-encapsulation of these active principles influences their pharmacokinetics. Free small molecules such as dyes are mainly cleared rapidly by the kidneys, which can reduce their potential side-effects, but can also limit their efficient targeting to the area to image. On the contrary, passive targeting of nanoparticles to cancer cells is favored by the increased porosity of the tumor vasculature, along with the low lymphatic drainage of the tumors, in comparison to the healthy tissues (EPR effect) [6].

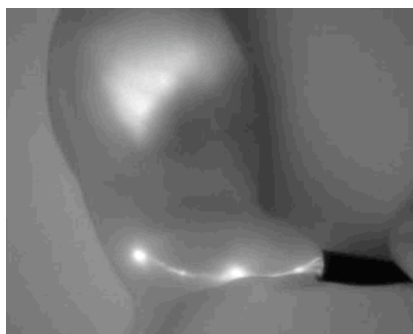
In this tutorial we propose:

Morning:

- the synthesis of dye-loaded lipid nanoparticles (LNP) dedicated to *in vivo* applications
- the morphological and optical characterization of the dye-loaded LNP

Afternoon:

- information to ethics in animal experimentation
- non invasive fluorescence imaging of the lymphatic circuit and lymph nodes in mice using dye-loaded LNP
- fluorescence image analysis and data processing



Lymph nodes imaging after injection of dye-loaded LNP.

References

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