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**to:**

*Vassily Vorobiev, University of Geneva*

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**Bern, 22. August 2017**

## Nano-Micelles – a Blood Pool Contrast Agent for MRI

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**Introduction:** Efficient cardio-vascular imaging procedures are needed to enable the accurate diagnosis of related diseases, such as stroke, thrombosis or heart failure for example. Magnetic Resonance Imaging (MRI) is a non-invasive technique providing a clear benefit compared to other imaging techniques by avoiding ionizing radiation for signal creation. However, MRI suffers from poor inherent sensitivity. To improve the quality of images MRI contrast agents (CAs) are frequently injected before imaging. Unfortunately there are no CAs currently on the market that allow imaging of central blood compartment (blood-pool agents). These CAs circulate in the vasculature without rapid diffusion into tissues and kidney elimination. Commercially available CAs diffuse rapidly into tissues and do not allow the addition of targeting moieties for targeted molecular imaging.
**Aims:** Recently, we have synthesized a macromolecule, acting as a building block for a self-assembly nano-micelles containing a DOTA-chelate loaded with gadolinium (Gd) (Figure 1). The aim of the present work was to fully characterize the nano-micelles and evaluate their potential as blood-pool CA for MRI.

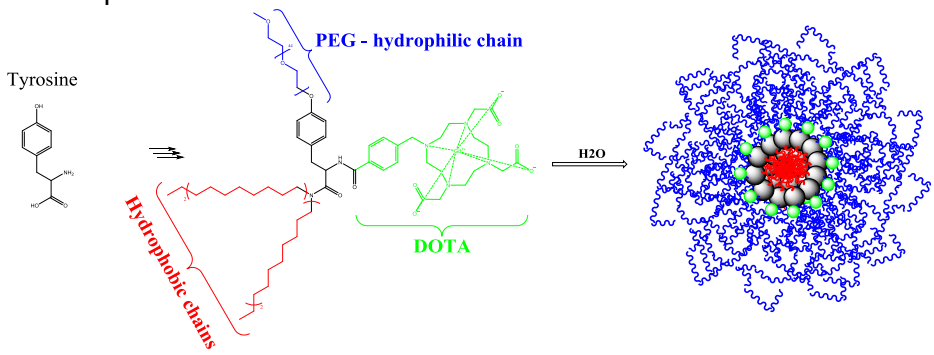


**Figure 1:** Building blocks and Nano-micelle formation

**Methods:** Full characterization of the nano-micelle building block has been reported. In this work we have produced the nano-micelles in water by nanoprecipitation and analyzed the parameters such as size and size distribution by dynamic light scattering (DLS), stability at room temperature (T=20 °C) over 4 weeks, cytotoxicity on HT1080 cells and relaxivity by Nuclear Magnetic Resonance (NMR). Finally, the micelles were injected in the tail vein of C57BL/6J mice for first *in vivo* imaging of the whole body.
**Results:** The nano-micelles have a mean size of 10 ± 3 nm and remain stable for at least 4 weeks. They do not show any significant cytotoxicity in HT1080 cells with the viability higher than 80% at the concentration required for imaging. First *in vivo* MR images show that they retained in the central vascular compartment for more than 4 h.
**Conclusions:** Compared to marketed CAs our nano-micelles seem to enable cardiovascular imaging due to their nano-micellar structure, size, and high Gd-loading [1]. As a consequence of these carefully engineered parameters, the nano-micellar CA remains in the vascular compartment for prolonged periods of time. They are therefore promising candidates as blood pool CA for vascular- and cardio-MRI [2]. Additional *in vivo* experiments are ongoing to confirm the encouraging first results. In the future, ligands will be added to the surface of MRI nano-micelles to allow targeted molecular imaging.

**Keywords:** MRI, contrast agent, blood pool, cardio-vascular, micelles.

**References:**
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