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- 28 **Site-specific labeling of cysteine-tagged Nanobodies for use in molecular imaging**  
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- 29 **Development of a hybrid probe for specific imaging of bacterial infections**  
**Bunschoten Anton**, Welling Mick M., Rood Marcus T. M., Buckle Tessa, van Leeuwen Fijs  
Leiden University Medical Center, Radiology, Interventional Molecular Imaging Lab - Leiden, Netherlands
- 30 **Development of radiotracers for PET imaging of CB2 receptor**  
**Slavik Roger**<sup>1</sup>, Grether Uwe<sup>2</sup>, Müller Adrienne<sup>1</sup>, Gobbi Luca<sup>2</sup>, Krämer Stefanie D.<sup>1</sup>, Weber Markus<sup>3</sup>, Schibli Roger<sup>1</sup>, Ametamey Simon M.<sup>1</sup>, Linijing Mu<sup>1</sup>  
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- 31 **Clinically-relevant, customizable agents for multimodal imaging**  
**Srinivas Mangala**<sup>1</sup>, Lajoinie G.2, de Korte Chris L.<sup>3</sup>, Heerschap Arend<sup>3</sup>, Versluis Michel<sup>2</sup>, Figdor Carl G.<sup>1</sup>, de Vries I. J. M.<sup>1</sup>  
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- 32 **The Development of Nuclear Receptor Imaging Agents**  
**Louis Allott**<sup>1</sup>, John Greenman<sup>1</sup>, Christopher Cawthorne<sup>1</sup>, Graham Smith<sup>2</sup>  
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- 33 **Synthesis and preclinical evaluation of <sup>18</sup>F-labelled F3 derivatives for the PET imaging of Tumour Angiogenesis**  
**Phoebe Y. H. Lam** , Katherine A. Vallis  
University of Oxford Gray Institute for Radiation Oncology and Biology, Radiobiology Research Institute, Churchill Hospital, Oxford, OX3 7LJ, Great Britain
- 34 **Nanoplatfoms for Bimodal Imaging of Sentinel Lymph Node**  
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#### Introduction

Sentinel Lymph Node Detection (SLND) is very important for cancer management [1]. The preoperative detection of SLN requires an intradermal injection of a radiolabeled colloid, whereas its intraoperative localization depends on the acoustic signal coming from the hand-held gamma probe as well as on visual confirmation of the radioactive node stained with a blue dye. Although widely used in the clinical setting for SLND, the properties of <sup>99m</sup>Tc-based colloids and blue dyes are far from ideal, hampering the surgeon's ability to identify and excise the SLN in a minimal invasive way [2, 3]. The presence of two imaging reporters (radioisotope and fluorophore) in the same probe would enable fast and accurate excision of SLN by radio- or near-infrared (NIR) guided surgery. Therefore, herein we report on new fluorescent radiolabeled mannosylated dextran-based probes for preoperative visualization of SLN by SPECT and PET, respectively, as well as on their use for real-time guidance during surgical excision by NIR optical imaging.

#### Methods

We have prepared bimodal imaging probes containing a radiometal, <sup>99m</sup>Tc or <sup>68</sup>Ga, a NIR fluorophore and mannose units for Mannose Receptor (MR) targeting. The pharmacokinetics and SLN mapping of the probes were evaluated in a Wistar rat model using nuclear and optical imaging.

#### Results

The probes, obtained with high radiochemical yield (> 95%) and specific activity, are stable *in vitro*. The biodistribution studies have shown that both probes presented an increased accumulation in the popliteal node with minimal spread to other organs after subcutaneous injection. Moreover, both probes enabled real time optical-guided excision of the SLN.

#### Conclusions

The new bimodal probes exhibit suitable biological properties for pre- and intraoperative mapping and excision of the SLN.

#### Acknowledgement / References

COST Action TD1004 is acknowledged for a STSM (STSM-TD1004-040213-027456). The authors also wish to thank the IAEA. M. M. thanks the Fundação para a Ciência e Tecnologia (FCT) for a PhD fellowship (SFRH/BD/48066/2008). FCT is also acknowledged for funding (EXCL/QEQ-MED/0233/2012).

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**Keywords:** Bi-Modal Imaging, Nanoparticles, Sentinel lymph node

- 35 **Gold nanoparticles for targeted delivery of radiometals**  
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### Introduction

Gold nanoparticles (AuNPs) are emerging as very attractive platforms for the development of cancer theranostic agents since a single nanoparticle can be loaded with a wide range of distinct functionalizing molecules and incorporate both imaging and therapeutic modalities.<sup>1</sup> Herein, we present the <sup>67</sup>Ga-radiolabeling and biological profile of small core (3-5 nm) AuNPs stabilized with a DOTA based ligand (TDOTA), and also loaded with bombesin (BBN) as a target specific vector.

### Methods

Synthesis of the gold nanoparticles (AuNP-TDOTA) was based on the method described by Brust et. al.<sup>2</sup> which consisted on the reduction of HAuCl<sub>3</sub> with NABH<sub>4</sub> in the presence of a novel DOTA based ligand bearing a thiol pendant arm (TDOTA); loading of the BBN derivative into the AuNPs was done afterward by reaction of thiotic acid functionalized BBN[7-14] with AuNP-TDOTA. BBN-AuNP-TDOTA was radiolabelled with <sup>67</sup>Ga and its stability was evaluated *in vitro* in several relevant media (saline, human serum, apo-transferrin solution and cell culture medium). Receptor affinities of the AuNPs were assessed by competitive binding assay with [<sup>125</sup>I]Tyr-BBN. Cell studies of the <sup>67</sup>Ga-labelled AuNPs were undertaken in human PC-3 cell line and the biodistribution was evaluated in human PC-3 xenograft Balb/c mice after intravenous and intraperitoneal administration.

### Results

3-5 nm core AuNPs stabilized with TDOTA (AuNP-TDOTA) and loaded with BBN (BBN-AuNP-TDOTA) were successfully synthesized. Radiolabeling with <sup>67</sup>Ga was achieved with high radiochemical yield. Both radiolabeled AuNP constructs showed good *in vitro* stability in several biologically relevant media. Cells studies showed that the presence of BBN in the AuNPs increases its internalization into the cells. Biodistribution studies of BBN-AuNP-TDOTA-<sup>67</sup>Ga showed different pharmacokinetics profile depending on the administration via. Furthermore, a significant tumor uptake was observed in both animal experiments.

### Conclusions

New radiolabelled gold nanoparticles (<sup>67</sup>Ga-BBN-AuNP-TDOTA) were developed. Their radiochemical and biological behaviour suggests the high potential of these nanoplatfroms as theranostic tools.

### Acknowledgement / References

F. Silva acknowledges the Fundação para a Ciência e Tecnologia (FCT) for a PhD research grant (SFRH/BD/47308/2008). M. M. thanks the FCT for a PhD fellowship (SFRH/BD/48066/2008). FCT is acknowledged for funding (EXCL/QEQ-MED/0233/2012).

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**Keywords:** Gold nanoparticles, pharmacokinetic modeling, Theranostic

## 36 Production and SPECT/CT in-vivo mouse biodistribution of <sup>203</sup>Pb-chloride as surrogate dosimetric isotope in <sup>212</sup>Pb/<sup>212</sup>Bi alpha-therapy

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## 37 Synthesis and in-vivo use of tri-modality core-shell nanoparticles with PET, MRI and fluorescence signals

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## 38 Characterization of PEG-gold nanorods as contrast agent for photoacoustic imaging

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## 39 Characterization of hybrid nanoparticles as contrast agent for multi-modal photoacoustic and magnetic resonance imaging

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## PW 10 - Optical Imaging, Microscopy, Optoacoustic, Profiling <sup>top</sup>

Chair: **Giannis Zacharakis, Clemens W.G.M. Löwik**

### 92 Next generation tissue profiling – multiplex analysis of signaling pathway activity status

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### 93 Measuring renal clearance in real time in a kidney injury model with multispectral optoacoustic tomography (MSOT)

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