

## Gold complexes for radiopharmaceutical application

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Theme: Tissue structure

**Background:** The diagnosis of "cancer" and the detection and treatment of tumor diseases continues to be a major challenge for our society. Gold compounds represent a new class of biologically active substances that are of particular interest as potential anticancer agents. In recent years, a number of structurally distinct gold complexes (1) have been reported that are stable under physiological conditions and show promising cytotoxic effects against selected tumor cell lines, making them good candidates for use as antitumor agents.

**Hypothesis:** In this innovative project, the gold compounds will be "spiked" with radionuclides to improve their biological activity. Depending on their toxicity profile, we aim to use diagnostic or therapeutic radionuclides (e.g. gallium-68 or gold-198). In an additional step, the compounds will be modified with biomolecules to target specific cancer entities. Beside the synthesis of novel compounds, the project will focus on the biological evaluation in vitro and in vivo.

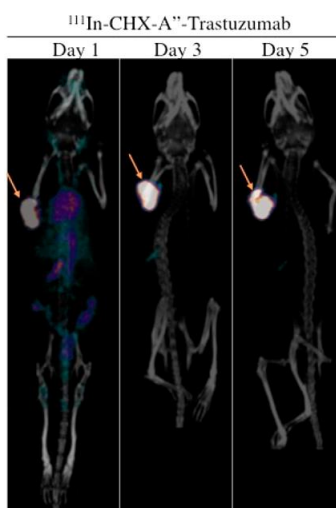


Figure 1. SPECT/CT images of a selected radiopharmaceutical in tumor bearing mice (2)

**Methods:** In this project, basic organic as well as inorganic chemistry will be used to design novel compounds. Additionally, the synthesized compounds will be radiolabeled with "hot" metals including quality control (e.g. TLC or HPLC). The efficacy of the novel compounds will be analyzed using cell culture and animal models.

**Collaboration:** The PhD student will work closely together with Dr. Sarah Spreckelmeyer and will have daily meetings with other PhD students from the nuclear medicine department of the Charité which will be the primary working site.

**Impact:** The outcome of this project will provide a combined diagnostic and therapeutic tool (theranostics) to visualize and/or treat specific types of cancer.

### References:

1. Sucena, S.F., Gold Complexes and Cages with Aroylthioureas, in Department of Biology, Chemistry and Pharmacy of Freie Universität Berlin. 2018, FU Berlin.
2. Spreckelmeyer, S., et al., p-NO<sub>2</sub>-Bn-H<sub>4</sub>neunpa and H<sub>4</sub>neunpa-Trastuzumab: Bifunctional Chelator for Radiometal pharmaceuticals and (<sup>111</sup>In)Immuno-Single Photon Emission Computed Tomography Imaging. *Bioconjug Chem*, 2017. 28(8): p. 2145-2159.

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