

**Docket #:** S06-409

# **Novel molecular imaging contrast agents for photo-acoustic imaging**

Researchers in the Molecular Imaging Program at Stanford have developed several novel small molecule agents designed to enhance photoacoustic imaging in living subjects. These molecules have two components (a targeting moiety and a light absorber) bound together with a small linker. The targeting moiety directs the molecule to the site of interest within the patient or small animal, providing high contrast for images. Additionally, the inventors have developed "smart" probes with a light absorbing component that is only activated when the molecule interacts with the target. This version of the technology is designed for even lower background noise.

The agents can be used to interrogate the location(s) of molecular targets on vasculature and cell surfaces, as well as extracellular and intracellular space. Furthermore, multiplex imaging can be achieved by simultaneously injecting multiple probes with different targets.

## **Stage of Research**

Small molecule photoacoustic imaging agents (both regular probes and "smart" probes) have been synthesized and characterized.

## **Ongoing Research**

The inventors plan to use this technology to image tumors in living mice.

## **Applications**

- **Clinical imaging of:**
  - tumors
  - vasculature
- **Small animal imaging:**
  - research

- preclinical
- **Wide range of potential target locations** - vasculature, cell surface, extracellular and intracellular space

## Advantages

- **Specific molecular imaging** - can visualize molecular events not apparent with conventional photoacoustic imaging
- **High contrast:**
  - probes are concentrated in the area of interest
  - “smart probes” are activated by interaction with target to limit background noise
- **Multiplex capability** - different probes can be introduced at the same time to target different molecular events
- **Stable** - much longer shelf-life than PET probes
- **Sensitive** - can be imaged at 8 - 10 cm of depth
- **Range of targeting moieties** - peptide, small molecule, or protein

## Publications

- U.S. Patent Application No. [12/595,525](#)
- Jelena Levi, Sri Rajasekhar Kothapalli, Te-Jen Ma, Keith Hartman, Butrus T. Khuri-Yakub and Sanjiv Sam Gambhir, [Design, Synthesis, and Imaging of an Activatable Photoacoustic Probe](#), J. Am. Chem. Soc., 2010, 132 (32), pp 11264-11269.

## Patents

- Published Application: [WO2008124834](#)
- Published Application: [20100111871](#)
- Issued: [8,574,547 \(USA\)](#)

## Innovators

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