



Nanoparticles in Lymphatic Imaging

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Technology

- ⊕ The lymphatic system is difficult to visualize with current imaging technology yet it plays an important role in cancer, vascular disease and congenital malformations.
- ⊕ The agents described will help doctors visualize the lymphatic system
- ⊕ Validation in animal models of disease
- ⊕ Stage of research: Pre-clinical but at the translation stage
- ⊕ US Patent Application 12/531,841 filed 8/17/09

Technology Applications

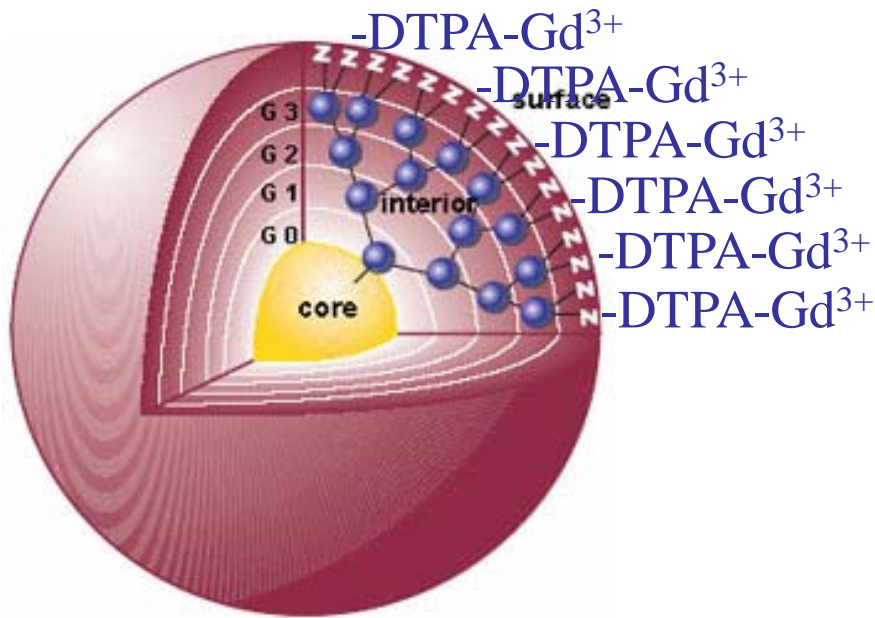
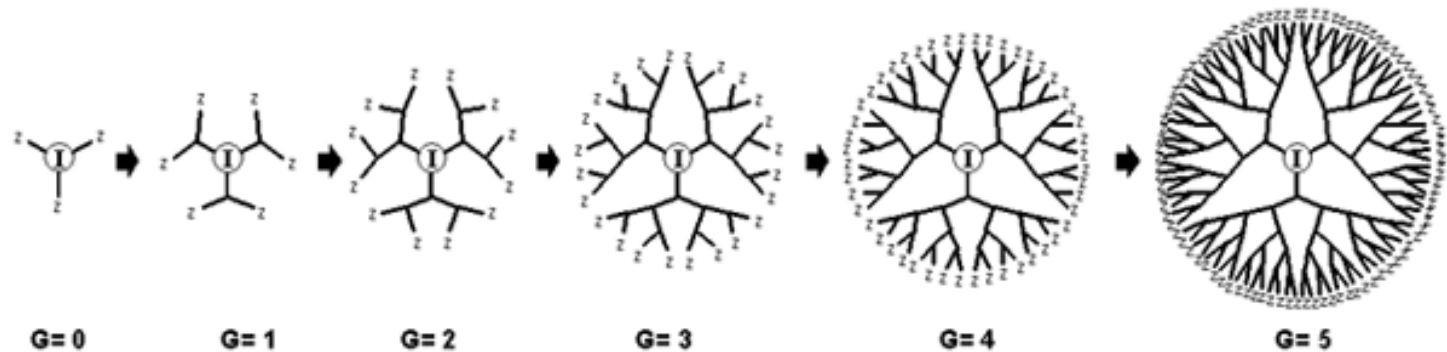
➊ Areas in which the technology can be applied

- ❖ Cancer
- ❖ Neurosurgery
- ❖ Lymphatic malformations

➋ Advantages

- ❖ The lymphatics and lymph nodes are critical to the spread of tumor, yet few imaging techniques exist to visualize the status of lymph nodes and lymphatics. These agents will help visualize the lymphatics/lymph nodes.
- ❖ Moreover, in patients with congenital malformations of the lymphatics, it is critical for surgeons to understand the anatomy before it can be repaired.
- ❖ In neurosurgery, these agents may be used to monitor therapies.

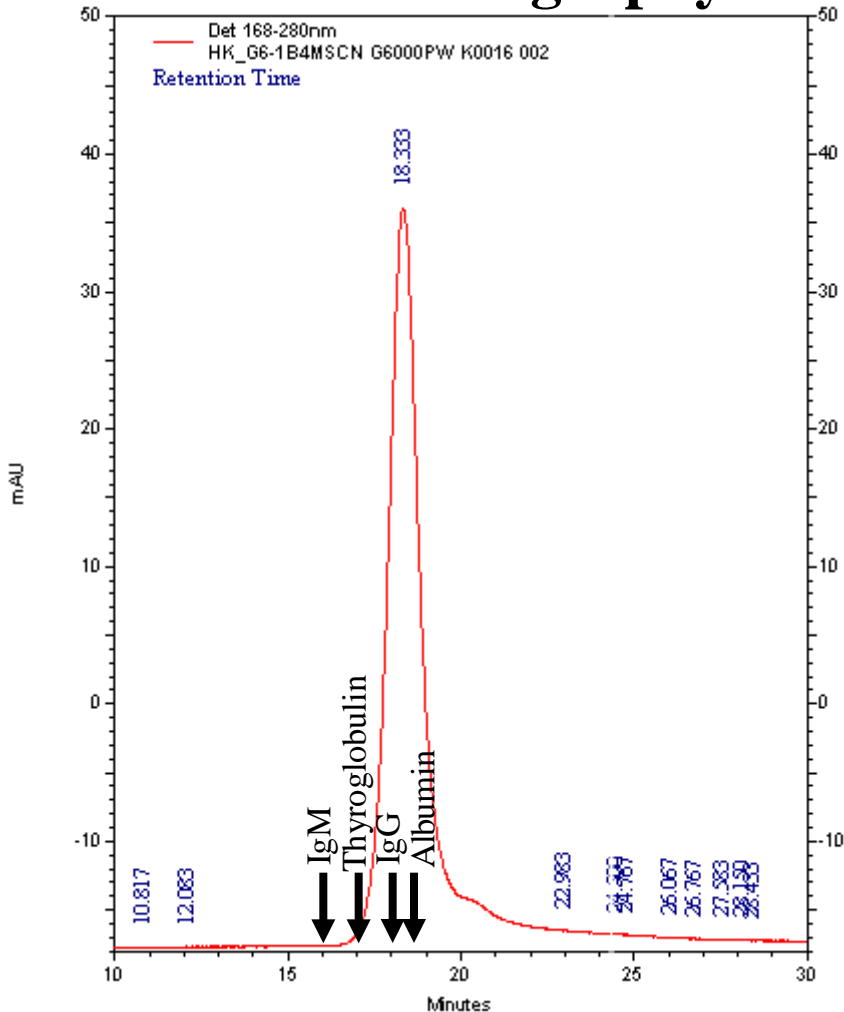
Dendrimer-contrast agent



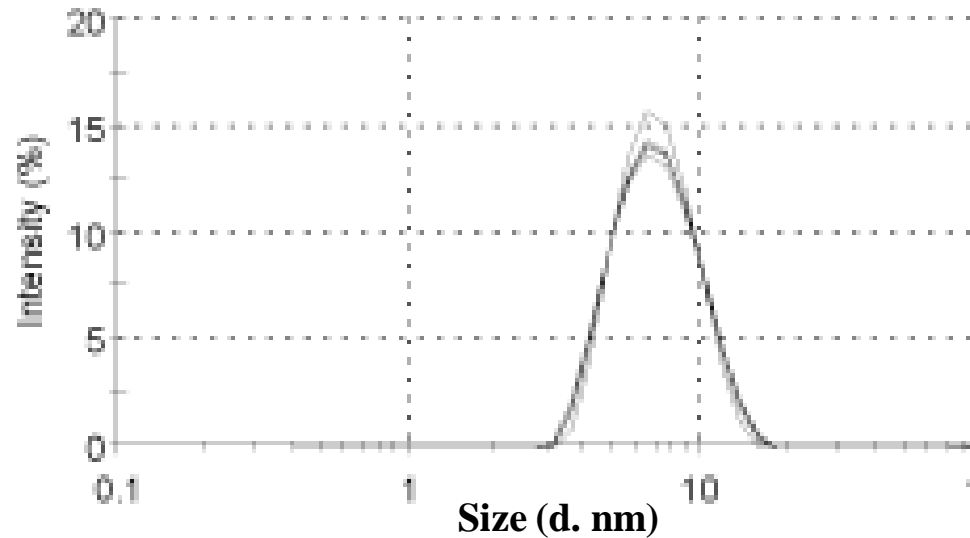
We used this series of molecules as cores to synthesize the Gd-based nano-size contrast agents with various sizes but identical chemical properties.

Physical characteristics of dendrimer

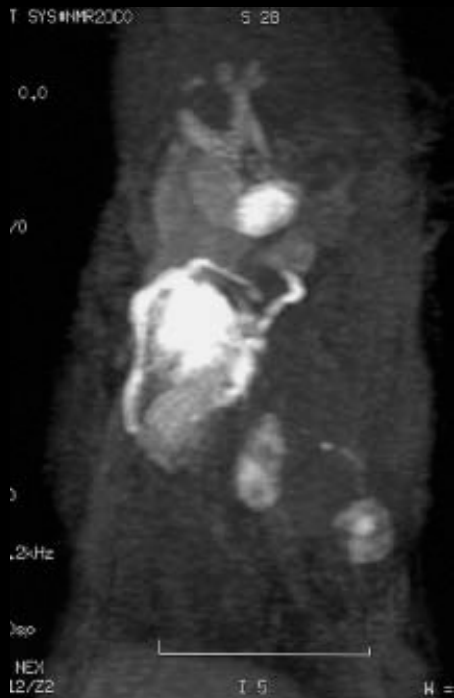
a Gel chromatography



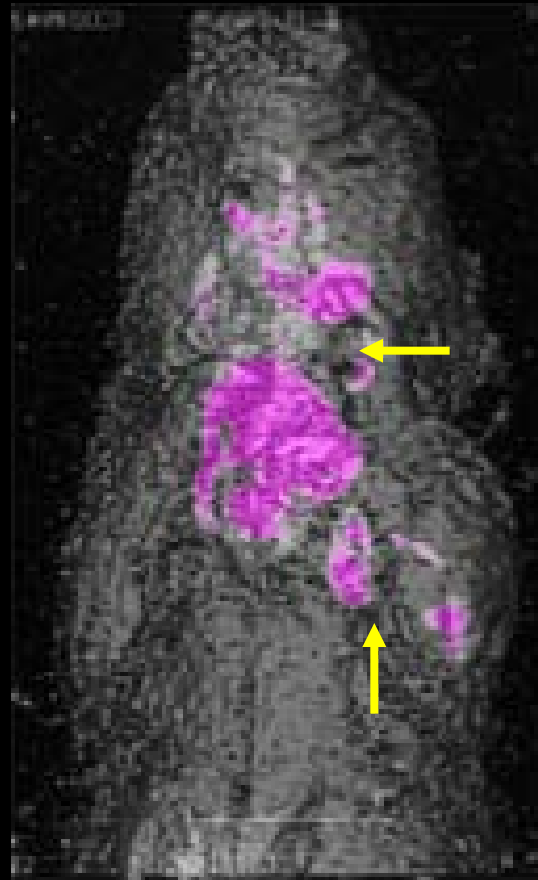
b Dynamic light scattering



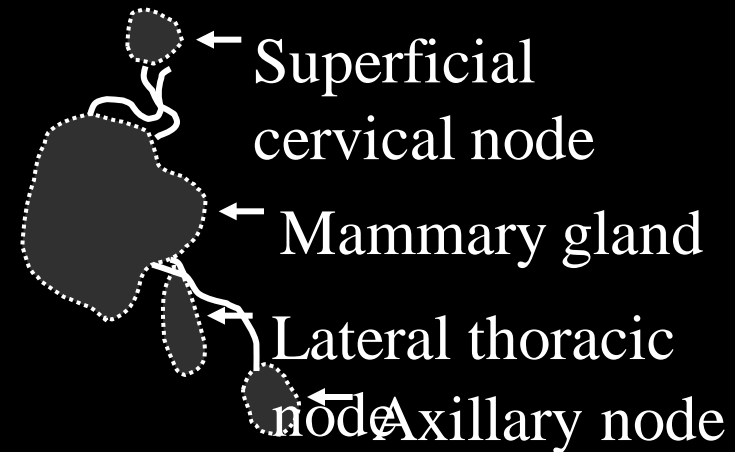
Micro-MRML of the left breast cancer in a mouse with the G6 (9 nm) contrast agent



3D rotation display



3D see-through display



Schema

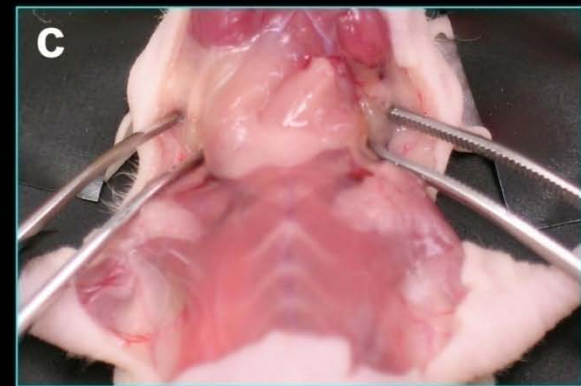
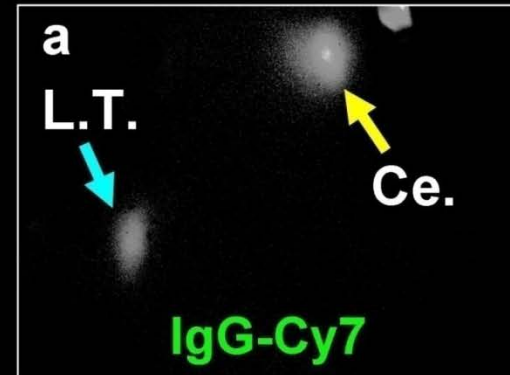
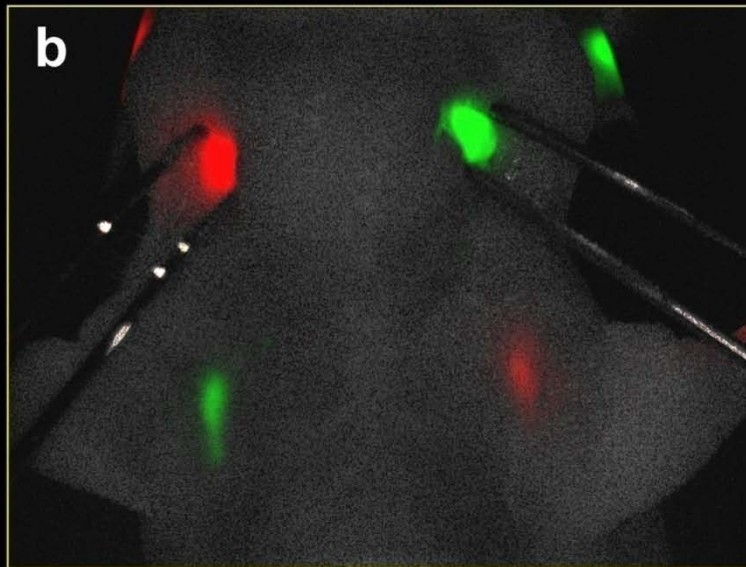
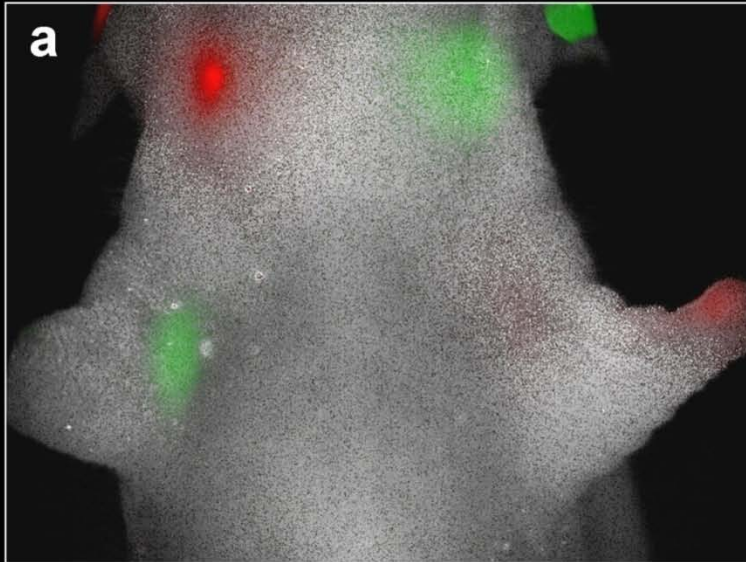
MR lymphangiography of a pig

(G6-dendrimer agent: 3 $\mu\text{molGd/kg}$)

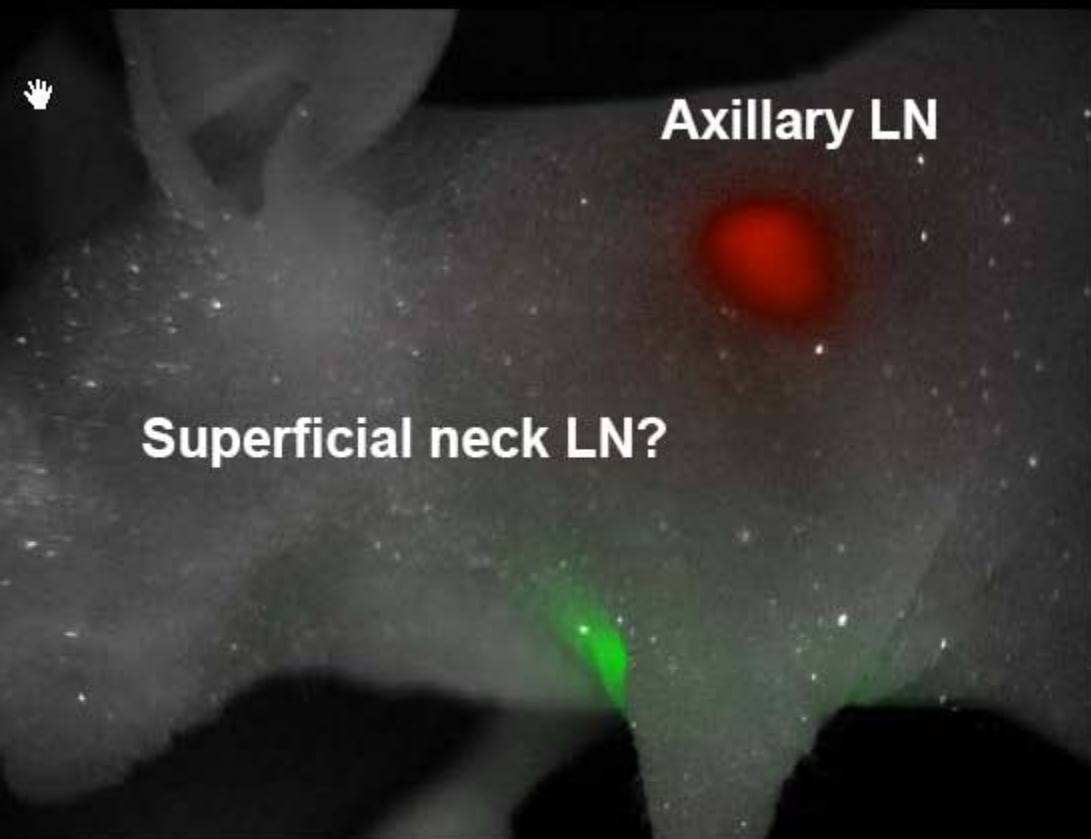


Collaboration with Boston Children's hospital

Optical Imaging of the Lymphatics: Organic Dyes



In vivo two-color fluorescence imaging



Spectral resolved imaging

Qdot 800 from the breast
(green)

Qdot 705 from the upper

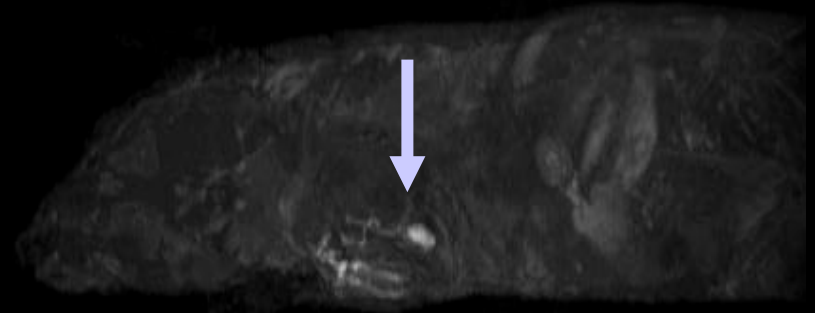
Sup. neck

Lat. thoracic

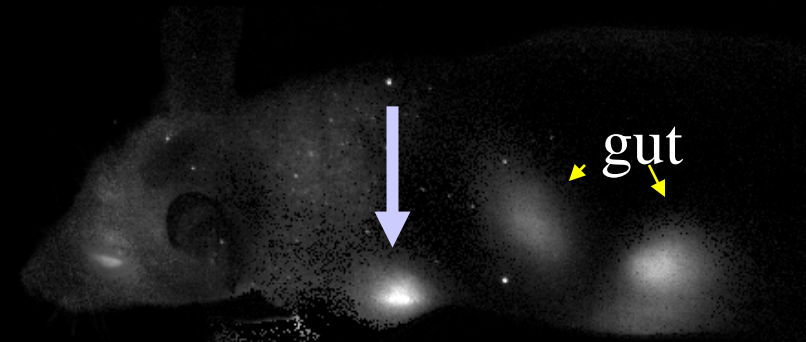
Axillary

Resected LNs

Mammary MRL and optical Imaging of living mouse with G6-Cy5.5 dual probe (Sentinel LN; Axillary LN)



MRI



Fluorescence

Commercial Applications

- ⊕ The anticipated market will be to diagnostic radiology and surgery--to assist in the diagnosis and therapy of a variety of conditions
- ⊕ No other product is able to demonstrate the lymphatic vessels as well as this agent. It can be used with MRI, optical and even radionuclide imaging (or a combination).
- ⊕ Its closest competition comes from iron based agents, but the dendrimer technology is particularly well suited to the lymphatics.

Collaboration Opportunities

- ✿ There are opportunities for licensing the agent for commercial development as a diagnostic agent.
- ✿ Potential therapeutic applications

Contact Information

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