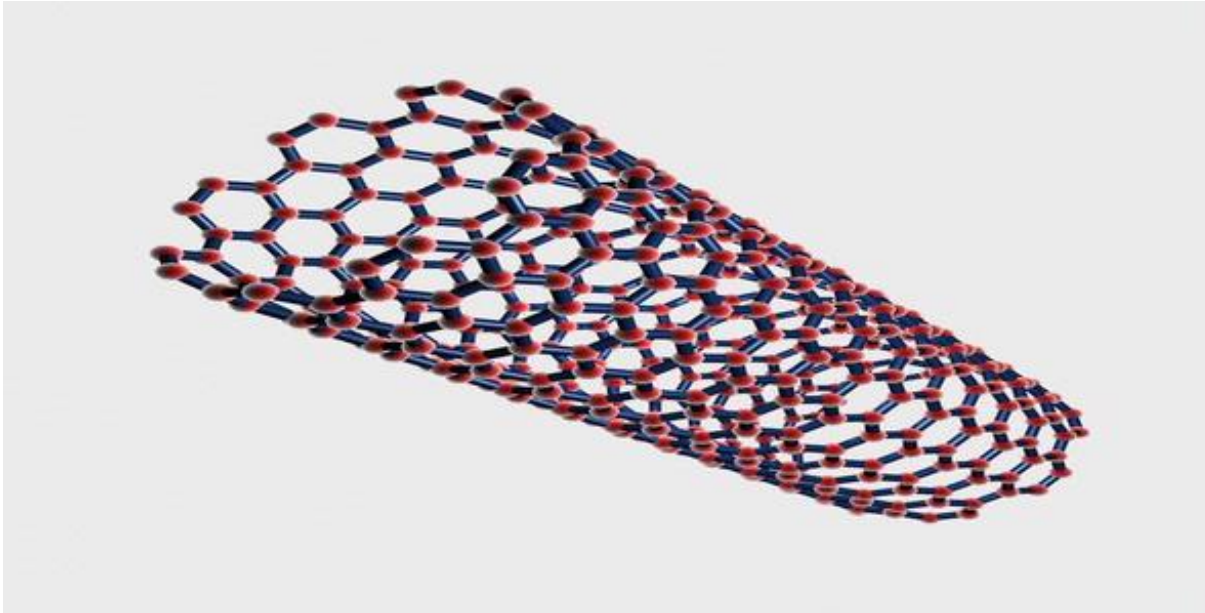




## Activatable Therapeutic Radionuclides for Cancer Treatment



One form of cancer treatment includes the use of radionuclides to emit ionizing radiation that is absorbed by the tumor cells in attempt to eliminate these cells. This type of treatment is beneficial in that it can be personalized to specific patients with particular dosage to preferentially harm tumor cells while sparing surrounds healthy cells. Researchers at UNC have developed this technology to address the concerns related to the handling of large amounts of radioactivity during preparation, storage and transport of therapeutic radionuclides by providing a stable, activatable particle that can be produced in a non-radioactive state and later activated to produce the radiotherapeutic agent.

### Benefits

1. This technology allows nanoparticles to be rendered radioactive AFTER they have been manufactured. Thus, the particles can be prepared without having to handle hazardous radioactive materials and without the time constraints imposed by the decay/half-life of radioactive materials. They can also be manufactured using current Good Manufacturing Practices (cGMP) under FDA guidances and undergo full Quality Assurance assessment prior to irradiation and administration.
2. The particles can withstand the relatively harsh conditions (heat, radiation, etc.) of a nuclear reactor. They do not change in size and are able to retain the radionuclide after irradiation.
3. The radioactive particles can be administered to a patient shortly after irradiation, thus minimizing the time that radioactive materials must be handled by health care personnel.



## For More Information

If you would like more information about this technology or UNC - Chapel Hill's technology transfer program, please contact:

Henry Nowak  
Office of Technology  
Development  
Phone: 919-966-3929  
Fax: 919-962-0646  
Email: [hnowak@unc.edu](mailto:hnowak@unc.edu)

<http://research.unc.edu/otd/>

Office of Technology  
Development  
UNC - Chapel Hill  
308 Bynum Hall  
CB 4105  
Chapel Hill, NC 27599-4105

Ref: 11-0118

03.04.13

## The Technology

---

Therapeutic radionuclides used in treating a variety of tumors works by radionuclides being contained within particle-based carrier moiety systems emitting ionizing radiation at particular tumor cells. Ideal radionuclides are chosen for short half-lives as well as emission of both high energy beta particles and gamma rays, one in particular would be  $^{166}\text{Ho}$  (Holmium). The emission of gamma rays allows for visualization of the particle after administration via MRI. The use of the radionuclide therapy allows for personalized treatment between subjects because the localization of the particles can be determined by targeting agents attached to the carrier moiety and the amount of ionizing radiation can be control according to quantities administered. With the use an activatable agent, a neutron activator can be used to activate the agent into a radiotherapeutic agent after it is manufactured to address current concerns of over-exposure and handling of radioactive agents.

Radiotherapeutic agents and compositions as well as the methods for making these agents are included in this technology. This technology encompasses a stable activatable particle consisting of an activatable radionuclide precursor and a carrier moiety. This radiotherapeutic agent must be within a pharmaceutically acceptable carrier. The activatable particle also consists of conjugating a hydrophobic and/or lipophilic activatable radionuclide precursor to the carrier moiety. A targeting agent is associated with the carrier moiety to direct the localization of the particles upon administration. Neutron activation would be used after the particle is manufactured to generate the radioactive agent, which takes into account concerns related to exposure and handling of radioactive agents. This technology also encompasses a method for treating disorders with this radiotherapeutic agent.

Uses for this technology include: 1) Targeted treatment of tumor cells,  
2) Radiotherapeutic treatments with minimal exposure and handling of radioactive agents

## Opportunity

---

UNC's Office of Technology Development seeks to stimulate development and commercial use of UNC-developed technologies. UNC is flexible in its agreements, and opportunities exist for joint development, academic or commercial licensing (exclusive, non-exclusive, and field-of-use), publishing, or other mutually beneficial relationships. For this technology, intellectual property is being pursued in the US.