

Applications:

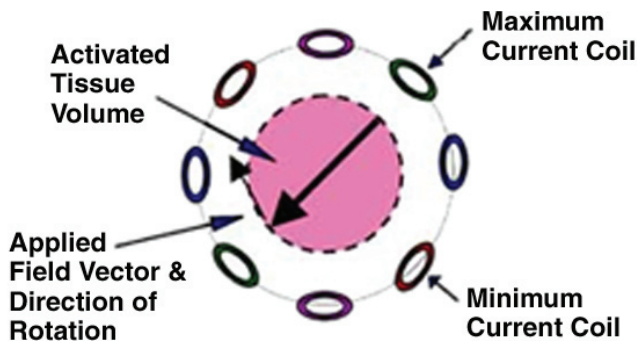
- Diagnosis and treatment of cancer
- Gold Coated nanoparticles can be used in an array of biotechnology applications

Benefits:

- Low incidence of false positive/negative diagnosis
- Simple, quick method for detection, visualization and treatment of cancer cells
- Noninvasive treatment
- Does not use any radiation
- Gold coating on nanoparticles increases biocompatibility for technique

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Using special oscillating external magnetic fields, nanoparticles are heated resulting in the selective destruction of all bound cancer cells within the treatment envelope by an artificially induced "fever" (the rotating magnetic field heats particles more than 25°C in much less than 1 minute).

Summary:

Los Alamos National Laboratory (LANL) holds a patent on a revolutionary new technique for noninvasive, nonionizing diagnosis and treatment of cancer. This technique, termed MagnetoCarcinoTherapy (MCT), enables rapid identification and destruction of cancerous tissue.

MagnetoCarcinoTherapy employs magnetic markers for both the visualization and treatment of tumors. The magnetic nanoparticles used in MCT can be specifically labeled with recognition markers for cancer cells. Thus, the magnetic markers attach specifically to cancerous tissue and can be visualized using a sensor array of superconducting quantum interference devices (SQUIDs). Because of the specificity of the recognition markers, MCT results in fewer false positives than traditional diagnostics and does not require the use of any radiation techniques.

Once the magnetic nanoparticles are localized at the tumor site, a low frequency magnetic field is used to manipulate the nanoparticles. The manipulation causes the nanoparticles to rotate rapidly, raising the temperature of the surrounding cancerous tissue. The increased temperature induces necrosis in the cancer cells, while leaving the surrounding healthy tissue untouched. The MCT technique should be effective at treating a number of cancers, and research has focused particularly on breast cancer.

In addition to the patent for the MCT technique, LANL has also applied for a patent on a method for coating the magnetic nanoparticles used in MCT with gold. Gold is a biologically inert material, which, when coated on the samarium cobalt nanoparticles, prevents direct biological contact with the magnetic material and helps to improve biocompatibility. The use of gold as a coating on the nanoparticles also serves as an excellent surface for coupling the cancer binding recognition markers. Gold coated nanoparticles have a wide variety of applications for biotechnology applications outside of MCT as well.

Development Stage: Proof-of-concept experiments have been conducted and prototypes exist. A partner is needed to further develop the technologies and to commercialize them.

Patent Status:

US Patent 6,470,220 Diagnosis and Treatment of Cancers Using *In Vivo* Magnetic Domains

Other patents are pending

Licensing Status: Available for exclusive or non-exclusive licensing.