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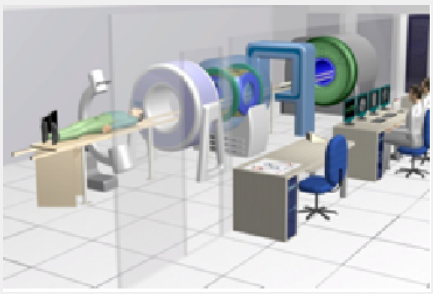
Advanced Cancer Targeting Technology



Contexte

Under the leadership of Professor Sylvain Martel, the nanorobotics team at Polytechnique Montreal has developed an advanced cancer targering technology based on Magnetic Resonance Navigation (MRN). This novel approach to targeted delivery holds significant promises for improving patient outcomes. Use of MRN to deliver chemotherapy is expected to reduce secondary toxicities, by allowing us to scale and deliver chemotherapy directly to the site of tumors, limiting systemic circulation.

Technologie

At the nano scale, materials develop new properties that can be exploited to deliver therapeutics, diagnostics and imaging agents to specific sites in the body with unprecedented accuracy. Sir Isaac Newton's first law of motion and other inertial forces are of little consequence at the nano scale – instead, atomic forces and chemical bonds dominate. Dr. Martel's research allows robotic control of tiny constructs of chemotherapy and magnetic matrices. This technology allows drugs to be targeted actively and precisely deep within the human body, in contrast to techniques using external permanent magnets which are limited to targets very close to the skin. To date, Dr. Martel's lab. has developed two vectors for magnetic resonance targeting: (i) Magnetic nanoparticles, with proprietary encapsulation & formulation techniques into microparticles, and (ii) Magnetotactic bacteria, which are self-propelled and rely on the MRN system just for directional control

Application

This technology provides an enabling platform to support development of multiple products that can be targeted to specific regions deep within the human body, where local administration is not feasible:
Cancer Therapeutics*:* Nanoparticles can penetrate tissue and capillaries and are taken up by cells, enabling drug accumulation at target sites.
Diagnostics and Imaging: MRN holds potential to prove useful for active targeting of selected regions of the body for imaging purposes. For example, one of the existing MRI contrast agents involves use of superparamagnetic particles, consisting of colloidal iron-based nanoparticles.
Interventional Approaches: This technology has the potential to be deployed in catheters and in combination with radio-frequency or ultrasound induced hyperthermia. In addition we can consider approaches such as implant-assisted magnetic drug targeting for thromboloytic therapy.

Avantages compétitifs

- Access to inaccessible sites
- Reduced drug side effects

Brevet

- US 7,962,194 "Method and system for propelling and controlling displacement of a microrobot in a blood vessel"
- PCT, US and CA Patent applications

POLYTECHNIQUE MONTRÉAL
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