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EU Research Making Headway in Early Cancer Detection

An EU-funded project is pushing the envelope on cancer treatment delivery, through the development of emerging technology based on magnetic resonance imaging (MRI) and high-intensity focused ultrasounds (HIFU).

Researchers are combining MRI-guided HIFU with selective nano-medicine to provide a full spatial and temporal control of the drug-release process, enabling cancer treatments to be delivered exactly where they are needed, when they are needed.

The NANOSMART ('Smart Nano-systems for Advanced Cancer Therapy') project is built around two main objectives. The first is the design of novel biocompatible thermo-sensitive carriers (i.e. carriers that will not be rejected by the body and are programmed to release their payload when temperatures change) based on inorganic-organic hybrid nano-spheres.

The second goal is to be able to carry out in vitro and in vivo evaluations of MRI-guided HIFU-triggered drug release. The team behind the project believes that the proposal represents a unique opportunity for tailored chemotherapy, representing a significant step towards better cancer treatment.

A major challenge facing scientists in the field of cancer research has been detecting the disease early enough. Statistics have irrefutably shown a direct correlation between early cancer discovery and the chances of recovery.

Once the disease has been detected, however, there is still the issue of effectively targeting the affected cells and monitoring progression. This is not always straightforward. Conventional treatment options can sometimes be limited in their effectiveness, because the affected parts of the body are so hard to reach.

Furthermore, cancer cells are constantly evolving, with metastatic and multi-drug resistant varieties. These require new strategies to tackle this complex and deadly disease. This is why nanotechnology-based solutions are being developed at such a rapid pace, and are poised to play a vital role in diagnostic and therapeutic interventions.

One role of these smart new nano-devices, being developed by the NANOSMART project, is to deliver drugs in a more targeted manner than conventional means. Difficulties in delivering drugs effectively can diminish the power of treatments. A selective and safe carrier for drug delivery that can be actively targeted to malignant cells - and display stimulus-responsive behaviour controlled by external means - could revolutionise cancer treatment. Multifunctional nano-systems can be used to deliver a variety of payloads - anticancer drugs, genes and imaging agents - for cancer intervention and monitoring.

This then is the goal of the NANOSMART project, which runs until 2014. The project team is currently working on developing targeted delivery vehicles that can release required doses of chemotherapeutics in response to local temperature increases. They are pioneering the development of MRI technology in the belief that novel MRI-assisted, triggered drug delivery will improve the performance of chemotherapy and enable better monitoring of the disease.

The project's work is central to two of the 10 themes of the FP7 Cooperation Programme; Health and Nano-sciences, Nanotechnologies, Materials and New Production Technologies. Current research into smart drug-delivery nano-devices requires a highly multidisciplinary approach, with a significant potential impact on advanced therapies. There is also the opportunity for further collaboration and networking between European groups and industrial partners, which this project is fostering.

For more information, please visit: University of Utrecht

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