

There is an old saying:
"Great power is often hidden in small things"



Prof. Dr. med. Christoph Alexiou has discovered the truth of this saying in tumor science and, together with his team, works on improving chemotherapy using magnetic nanoparticles. For his work, he was awarded the Innovation Prize of the German University Medicine in 2009 and the 2011 Anton von Trötsch-Prize of the German Society of Oto-Rhino-Laryngology, Head and Neck Surgery.



At SEON, an experienced team of medical professionals, biologists, chemists, nano-technologists and pharmacists works closely together to set the stage for transferring the results of basic research into clinical practice.

Bank account for donations

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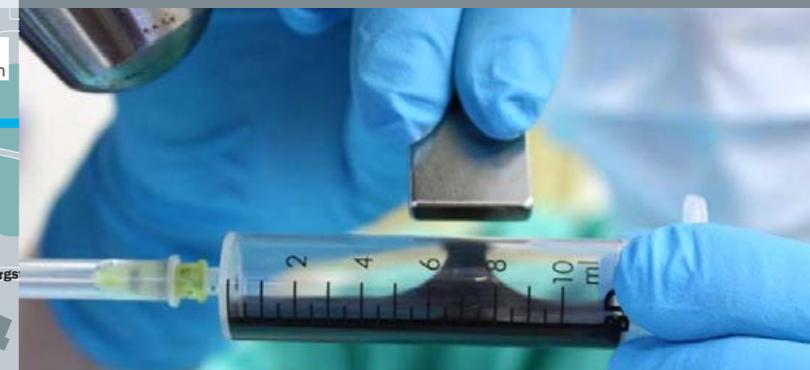
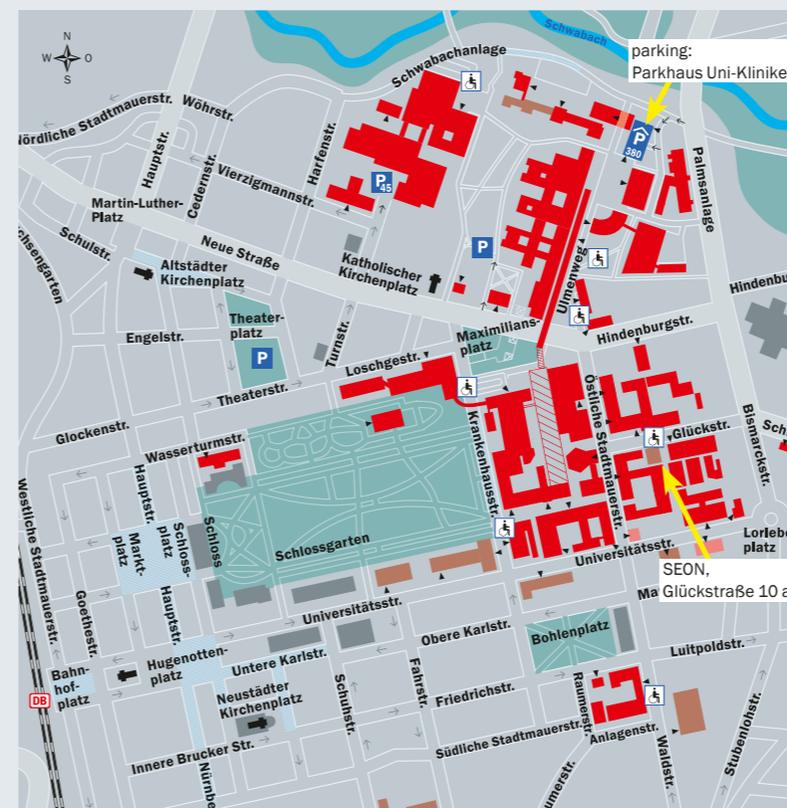
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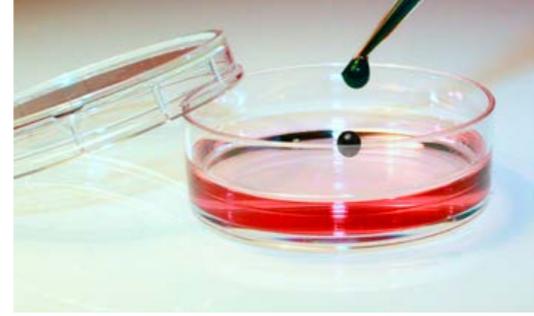
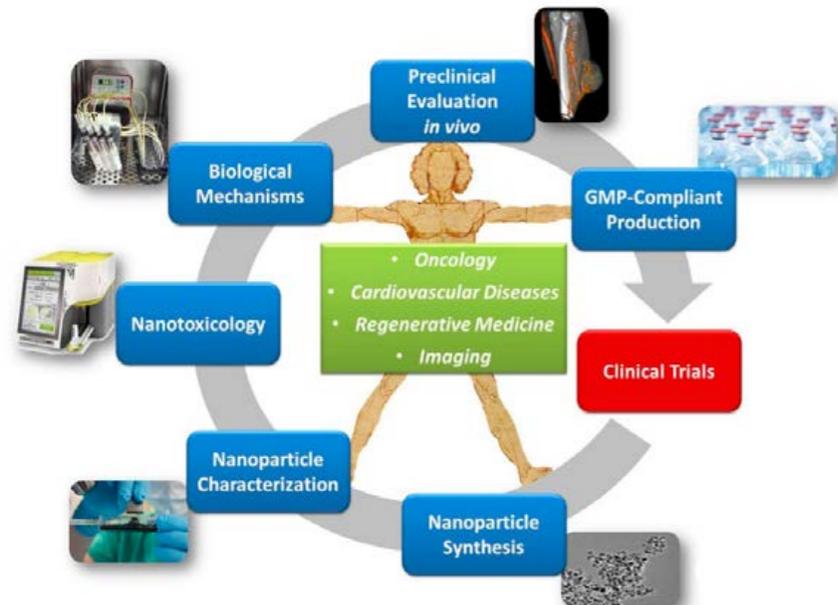


The SEON-Concept

From bench to bedside

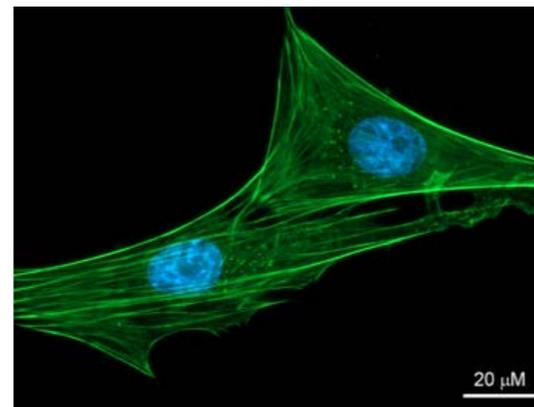
The aim of our interdisciplinary team is the development of magnetic nanoparticles, their physicochemical characterization and biological testing. These nanoparticles constitute the basis for multiple potential applications in medicine, including tumor therapies, regenerative medicine, imaging or treatment of cardiovascular diseases.

SEON is equipped with a number of cutting-edge analytical methods and instruments that are absolutely necessary to characterize various nanoparticles concerning their physicochemical and biological properties *in vitro* and *in vivo*, in order to predict their potential effects in humans.

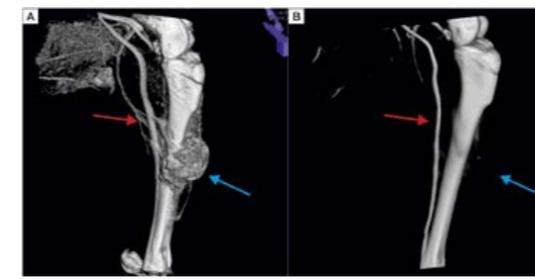


Nanotoxicology

In order to achieve an approval for clinical use, the nanoparticles intended for medical applications must undergo extensive toxicological evaluation to estimate their biological effects and to exclude the potential health risks for the patients. Since every nanomaterial shows unique properties, it is necessary to adapt the test procedures accordingly. The toxicological analyses are at first performed *in vitro*, i. e., in experiments on different types of cells outside of the living organism, in order to investigate the time- and dose-dependent effects of nanoparticles on general toxicity, genotoxicity and the development of free radicals. For these analyses, a state-of-the-art infrastructure is available at SEON, including complementary methods of cytotoxicity testing. Our aim is to use the obtained data in order to identify the most biocompatible and efficient nanosystems, to facilitate their translation into clinical practice.



Morphology of vocal fold cells (blue: nucleus, green: actin cytoskeleton)



CT before (A) and after (B) successful treatment of a tumor (blue) in the hind leg of a rabbit with a single dose of drug-conjugated nanoparticles. Tumor-supplying blood vessels are clearly recognizable (red).



Operating room with angiography system Artis Zee Floor®, Siemens

Preclinical evaluation *in vivo*

To circumvent the problem of poor efficacy and severe side effects of systemic chemotherapy, we developed a method of local accumulation of pharmaceuticals using magnetic nanoparticles. In “Magnetic Drug Targeting” (MDT), chemotherapeutics, bound to the surface of superparamagnetic iron oxide nanoparticles, are accumulated in the tumor tissue using an external magnet. SEON demonstrated the efficacy of MDT in the worldwide largest preclinical animal study (Nanomedicine, 2013).



SEON Medication production according to the GMP-guidelines in the pharmacy of Universitätsklinikum Erlangen



GMP-compliant production

Through close cooperation with our partner, the pharmacy of Universitätsklinikum Erlangen, we have the opportunity to produce the nanoparticle systems according to cGMP (current Good Manufacturing Practice) guidelines. To analyze the prepared specimens, established characterization methods, such as dynamic light scattering (DLS), HPLC-UV or FTIR are used. The pharmacy of Universitätsklinikum Erlangen has a manufacturing authorization for investigational medicinal products according to § 13 AMG for selected drugs. The available manufacturing facility complies with all relevant regulations, such as the EU GMP Guide, the GCP Regulation and the German Pharmaceutical Law.



SEON's synthesis unit in the Pharmacy of Universitätsklinikum Erlangen