BETTER CONTRAST AGENT PROVIDES SAFER DIAGNOSES

Image Senior Scientist Rodrigo Petoral (left) and head of research Oskar Axelsson at Spago Imaging that develops a new, nano particle based contrast agent for more efficient MRI examinations.

The biotech company Spago Imaging has developed a contrast agent with nanoparticles that provides safer diagnoses of tumors in soft tissue – such as breast cancer. The composition and structure of the nanoparticles could be verified at the MAX IV Laboratory – saving time and resources in the product development process.

"Our nanoparticles have a complex and dispersed structure, which means that not all individual particles are exactly alike, and entails that methods such as mass spectrometry and electron microscopy do not work to verify them at a detailed level", explains Rodrigo Petoral, Senior Scientist at Spago Imaging. "The measurements at the MAX IV Laboratory, which were made possible thanks to Science Link, confirmed that the theoretical calculations we made corresponded to reality and that our hypothesis is correct. In addition, we got measurement data that showed the sensitivity to air in our material – something that makes great demands on packaging."

MINIMIZING INCORRECT DIAGNOSES

The company's nanoparticles consist of a polymer matrix with manganese ions that reinforce the magnetic signal in magnetic resonance imaging (MRI), and clarify the difference between healthy and diseased tissue. This sometimes means that it is easier to detect tumors at an early stage and that the risk of so-called false positives, decreases.

"More efficient MRI investigations bring many benefits, both to society and to the individual", says Oskar Axelsson, Head of Research at Spago Imaging. "Today, incorrect diagnoses are relatively common, which means unnecessary worry and suffering for the patient and costs for public healthcare. A better contrast agent will make MRI into a safer diagnostic tool for tumors in soft tissue."

DETECTING CANCER EARLIER

Breast cancer is responsible for a large proportion of soft tissue tumors today and within this field, Spago Imaging sees clear benefits with the use of more efficient MRI diagnosis. This mainly concerns women at greater risk of getting breast cancer, due to genetic factors for example. "For women who need to be examined often, mammography is not a very good investigative method, as repeated mammograms can expose them to excessive radiation", says Oskar Axelsson. "With MRI examination this is not a problem – and furthermore, any changes to the tissue can be detected earlier. Another large area of application for our contrasting agent could be MRI diagnosis of suspected prostate cancer."

THE NEXT PHASE

Spago Imaging is currently working intensively on development, which includes stepping up production of nanoparticles to an industrial scale. There is a lot of work left to do before the company will be able to produce large quantities of the contrast agent. Over the next year, it is planning to carry out so-called tox experiments before entering the clinical phase of testing on humans. If everything goes well, the product could be on the market by around 2020.

Figure NUMBER ONE

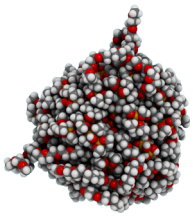

Figure 1 A model of Spago Imagings tailored nano particle that was examined at MAX IV Laboratory.

"Our contrast agent has a structure that cannot be verified even using mass spectrometry or electron microscopy. At the MAX IV Laboratory, there was not only the equipment we needed – we also got extremely qualified help in interpreting and analyzing the results."

Rodrigo Petoral, Senior Scientist, Spago Imaging AB

Fact box:

Through Science Link, Spago Imaging got access to two different instruments at the MAX IV Laboratory. The first, EXAFS or extended X-ray absorption fine structure, is used to investigate the structure of materials at the atomic level. The method is based on scanning the X-ray photon energy over a so-called absorption edge, i.e. the energy at which the inner electrons in the atoms of a specific element start to absorb photons and are ejected from the atom. The appearance of the absorption spectrum provides information on what other kinds of atoms are present in the vicinity and the distance to these. Spago Imaging was interested in the way in which manganese was bound to other substances.

The results the company obtained from EXAFS were complemented with measurements using so-called SAXS or "small-angle X-ray scattering" which can be used to find out the structure of various types of nanomaterials. For example, SAXS provides an answer to what size and shape the nanoparticles in a sample are and how they interact with each other. The method involves allowing an X-ray to be scattered by a sample containing nanomaterials and the resulting pattern is then picked up by a 2D detector. The pattern that is shown on the detector provides information on the properties of the nanomaterial.

For further information visit
science-link.eu

Science Link is a network between leading research facilities of photon and neutron sources and its users. The project aims to support and encourage innovation and entrepreneurship in the Baltic Sea Region. Apart from the research facilities, the network also includes scientific institutes, universities and regional organisations that serve as service and promoting units. Science Link is part-financed by the European Union (Baltic Sea Region Programme) and involves 17 partners from 8 countries during the project period 2012 to 2014.

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Research facilities

DESY
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MAX IV LABORATORY