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In vivo diagnostika - Lett synlig kjemi

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In many cases in vivo diagnostics make the invisible visible. Medical imaging utilizes most of the electromagnetic spectrum and includes such diverse technologies as X-ray/CT, MRI, Ultrasound and Nuclear medicine (SPECT and PET). The different imaging techniques have different characteristics which determine where in the diagnostic process they are used. Effective in vivo diagnostics for X-ray/CT, MRI, Ultrasound and Nuclear medicine have been developed for diagnosis of diseases within the cardiovascular, oncology, neurolgy and pulmonology fields.

Different types of diagnostic information (anatomical, functional or molecular) can be obtained depending on the techniques applied. Early diagnosis of disease is utmost important. This usually requires detailed understanding of the disease process itself. Nuclear medicine techniques have the required sensitivity to image at the molecular level which makes early intervention possible, may guide therapy and disease follow-up and improve therapy outcome.

Attributes of high performance in vivo diagnostics are high diagnostic efficacy, high safety and high user friendliness. The chemistry to achieve these challenging goals must start with knowledge of what contrast parameter to impact as well as understanding the disease target. Furtermore, being developed for the commercial market other aspects like synthesis scale-up, production costs and environmental aspets are very important, especially regarding contrast media for X-ray/CT which are produced in ton scale and where a single injection into a human contains several grams af the active ingredient.

The short halflife of the radioisotopes used in nuclear medicine has made it necessary to develop automated synthesis platforms with plug-in chemistry cassettes as well as an automated product quality control system. Effective syntheseis of ^{18}F labelled agents has been developed.

Using ^{3}He, ^{129}Xe or ^{13}C in its hyperpolarized state has given the basis for a new type of MRI contrast media. Hyperpolarized ^{13}C labelled small molecules may give metabolic information relevant for diagnosing certain diseases.