The department provides all radiological services for Ulm University Medical Center as a tertiary hospital center. Additionally, it supplies two further hospital centers, one focused on Neurosciences and the other serving as a secondary hospital center. The department is equipped with cutting-edge technology.

Three divisions have been established. The Division of Neuroradiology (headed by Prof. B. Schmitz) was founded some years ago and has rapidly grown to encompass the fields of both diagnostic and interventional neuroradiology. The interventional treatment of intracerebral aneurysms has been expanded to include flow diversion in addition to surgical clipping and coiling procedures. The interventional treatment of acute stroke patients has considerably been improved through the use of stent retrievers.

The impact of functional neuroimaging has significantly increased in recent years. The Division of Neuroradiology focuses its clinical and scientific interests especially on the areas of speech production and recognition by using functional MRI techniques (fMRI). fMRI studies allow a precise planning of primary surgery in brain tumor patients (figure 1). Additionally, fMRI studies in obese patients receiving minimal invasive therapy with a balloon catheter were started in order to analyse the interdependency between obesity and brain activation.

Two divisions were founded in 2013. The Division of Interventional Radiology performs a wide range of hepatic, vascular and biopsy interventions. The second division, the Division of Experimental Radiology founded in 2013, serves as a core facility for imaging in cooperative projects with other departments and develops its own imaging techniques.
One project deals with new T2* techniques for determination of liver iron content. Iron overload is an increasing clinical problem. New MR techniques based on multiple flip angles allow reliable measurements even at high levels of iron overload. A recent multicenter study, headed by our department, develops and applies these new state-of-the-art MRI techniques for non-invasive liver iron monitoring.

Research activities of the department also cover the field of cardiovascular radiology. CTCA (CT-coronary angiography) is applied for the planning of coronary interventions as well as minimal-invasive heart valve replacement (TAVI). The implementation of cutting-edge technologies for lowest dose-protocols allowed a significant improvement of CTCA techniques (figure 2a+b).

Further research projects are performed in collaboration with the Core Facility Imaging (headed by Prof. V. Rasche) and the Department of Nuclear Medicine (headed by Prof. A. Beer). Future research directions encompass neuroradiologic morphometric analyses (voxel-based volumetry), oncologic, metabolic and molecular imaging techniques (31P-MR-Spectroscopy and Diffusion-weighted Imaging -DWI) and, finally, noninvasive MRI-based tissue typing techniques (T1/T2/T2*-mapping and 1H-double triggered 1H-MRS).

Selected Publications: