

## 7 Tesla MRI at DZNE-Bonn, Bann, Germany

### Institution

The German Center for Neurodegenerative Diseases (DZNE) is a research institute dedicated to the investigation of neurodegenerative diseases and all its facets. The DZNE consists of nine sites across Germany, where the largest site is located in Bonn. Here, 7 Tesla MRI is an important research tool for DZNE clinical science, directed by Prof. Thomas Klockgether, as well as for DZNE population science, directed by Prof. Monique M.B. Breteler. The MR Physics group, headed by Prof. Tony Stöcker, develops tailored MR sequences in close collaboration with clinical science, population science, and with national and international external partners.

### Principal Investigators



T. Klockgether M.M.B. Breteler T. Stöcker

### 7T equipment

**Hardware** Research only whole body MR (Siemens) equipped with parallel transmission technology. Available head coils: ITx-32 Rx and 8Tx-32Rx, both from Nova.

**Operational since** 2014

**Other equipment (human imaging):** 3T MR (Siemens Skyra): Clinical science research scanner, 2 x 3T MR (Siemens Prisma): Population science research scanner (Rhineland Study), Skope clip-on field camera at 7 Tesla

### 7T Methods (as relevant for EUFIND)

#### Acquisition

Sequence development at ultra-high field:

- 2D accelerated 30-EPI with sub-second TR
- 20 accelerated MPRAGE imaging
- DIR and FLAIR imaging
- 30-EPI for QSM
- IH MR Spectroscopy, especially GABA
- Perfusion (PCASL)
- Fast B0 and B1 mapping sequences
- Parallel transmit techniques
- Field monitoring (Skope field camera)

#### Analysis

Development of automated image analysis pipelines:

- Brain morphometry
- Structural and functional connectivity
- Advanced diffusion MRI: crossing fibers, NODDI,
- Automated LC segmentation
- CEST analysis
- QSM / iron load quantification
- Myelin quantification
- Phantom and in vivo QA
- Body fat and carotid imaging (so far, only 3T)

### Research in neurodegeneration

Clinical and population research topics

- Biomarker and natural history studies
- Interventional trials
- Multimodal analysis of cerebral network function
- Structure and function of the aging brain in the population and in disease
- Population Imaging

Cohorts:

Currently mostly 3T – subset to be scanned at 7T

- Healthy young and older controls
- Subjective memory complainers (DELCODE)
- Preclinical AD and MCI (DELCODE) Ataxia (several multi-centric studies)
- General adult population (age 30-100 yrs; Rhineland Study)

### Ethics Procedures

Approval for volunteers at 7T in place, including development and application of new sequences.