



Professor Dr. Henrik Michaely obtained his M.D. and Ph.D. from medical school in Heidelberg in 2003 and 2004 respectively. In the same year, he commenced his residency in Diagnostic Radiology at the Institute of Clinical Radiology at Munich University (Prof. M. Reiser). During this period, he spent four months as a research fellow at the University of California, Los Angeles (Prof. P. Finn) to gain expertise in cardiovascular and high-field body MR-imaging. He passed his radiology boards in 2008 and was immediately afterwards appointed section chief for MR-imaging and associate professor for radiology at the University Medical Center Mannheim (Prof. S. Schoenberg) where he remained for seven years. During this time, he was responsible for the entire spectrum of clinical MR-imaging and headed the research group for abdominal and vascular imaging. After a three-month position as visiting professor at the Martinos Center for Biomedical Imaging in Boston (Prof. A. Guimaraes), in 2011/12 he was appointed Vice Chair of the Institute of Clinical Radiology and Nuclear Medicine of the University Center Mannheim. In 2013 he joined a large private practice in Karlsruhe, Germany, where he is now executive associate. His main focus is on the implementation of new imaging techniques that allow for higher patient throughput and optimized patient care in a non-academic outpatient setting.

Modern Radiology from a Private Practice Perspective

It is an honor to write an editorial for MAGNETOM Flash – yet the perspective of a German radiologist from private practice may be unfamiliar to most readers. Therefore, I will briefly describe my work setting and the German medical system to which we belong.

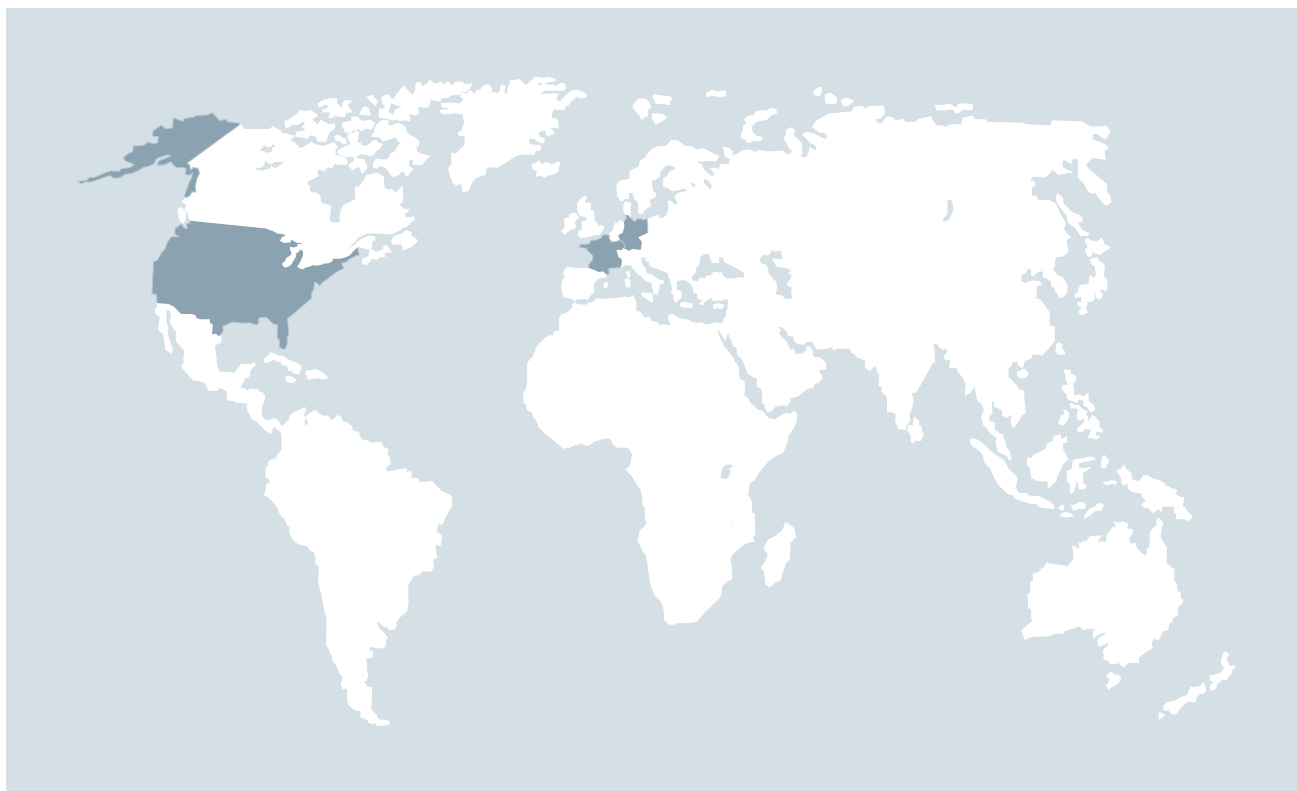
The “Diagnostische Gemeinschaftspraxis Karlstrasse” is a large physician-owned private practice in the heart of Karlsruhe, Germany. With a team of ten board-certified radiologists and physicians for nuclear medicine and over 60 radiology technicians and medical assistants, we are the largest private radiology group of the upper Rhine region surrounding Karlsruhe with approximately one million inhabitants. Our medical equipment comprises five 1.5T MR-scanners (MAGNETOM Aera, MAGNETOM Avanto, MAGNETOM Espree, Achieva ds, Achieva) a dual-energy 128-row MDCT (SOMATOM Definition AS+), digital X-ray, digital mammography, fluoroscopy, DEXA, ultrasound and two gamma cameras that are run in corporation with a neighboring

hospital. The entire workflow from patient registration to reporting and image distribution to referring physicians is paperless. We perform almost 100,000 diagnostic studies per year with a focus on orthopedic, neurologic and oncologic abdominal studies. Our policy is for radiologists to present the images and the report to all patients immediately after the exam – which is the most time-consuming and demanding part of daily work. Yet, the direct contact with patients often allows a further narrowing of the diagnosis and provides a better visibility of radiology and its capabilities to all patients.

Reimbursement for diagnostic procedures varies according to the insurance status of the patients. For all patients with private medical insurance there is a linear relationship between performed studies and payment (i.e. if an MRI and a CT are performed, both can be billed separately). These patients make up 5-15% of all patients. Roughly 90% of the patients are within the statutory health insurance. For these patients

reimbursement is not linear, and if, for example, an MRI study of the brain and a CT study of the chest are performed after bronchial carcinoma resection only a flat fee of 70-90 EUR will be paid per annual quarter for all performed studies. On the plus side, an easy and quick exam such as a chest X-ray will be reimbursed by the same amount. In addition, each physician has an allowed number of studies that can be billed per quarter of the year: if this number is exceeded, any study above this limit will only be partly reimbursed or if significantly exceeded not reimbursed at all.

Despite those legal restrictions the need for imaging is high and continuously increasing as modern radiology is a pivotal medical specialty that helps to detect and stage diseases, and allows us to define and monitor therapy and to set up further steps in patient management. In addition, patients actively demand from their referring physicians that imaging studies be performed before a specific therapy is initiated. In



	# CT exams per 1000 inhabitants	# MR exams per 1000 inhabitants	Ratio CT : MR	Total cost per inhabitant [€]
Germany	114	97	1 : 0.85	22
France	130	49	1 : 0.38	28
USA	228	91	1 : 0.40	53

Table 1: There is a clear shift towards MR-imaging in Germany while the costs per inhabitant in Germany are minimal.
 Source: Barmer GEK-Arztreport 2011.

Germany particularly MR exams are requested as many patients are afraid of X-rays (see Table 1). This overall picture leads to an increase in the number of MR exams while easy/cheap CT-exams and even X-ray exams decrease in number. The reimbursement – as stated above – is the same for both imaging modalities putting private practices under a high economic pressure. Of course, every radiology practice strives to provide optimal equipment and state-of-the-art exams such as low-dose CT, new MRI equipment, multiparametric prostate MRI, whole-body diffusion imaging or dual-energy CT. Unfortunately, technical advances and improved diagnostic approaches are not reflected in higher reimbursement.

For example, reimbursement for PET-CT in Germany is still limited to two indications.

These premises lead to an extremely high workload in private practice with productivity being the most important economic aspect thereof in Germany. As a consequence, cutting or strictly controlling your fixed cost is key for success. As the overall quality of the studies performed does not change reimbursement, some private practices might try to minimize the costs by saving on equipment investments. While this might work in rural areas with no other competitor, radiology practices in urban areas have taken another approach and tried to improve their

patient experience and referring physician experience. Patient acquisition can be achieved by offering wide-bore MRIs, silent scan modes such as Quiet Suite, described in recent editions of MAGNETOM Flash [1-4], and low-dose CT.

The look-and-feel of the scanners and the entire practice is more important to patients, since the majority is unable to assess the medical quality. After each exam the report is discussed with patients for three reasons: firstly, talking to the patients allows us to double check the exam results with the patient’s symptoms and often improves the quality of our reports. Secondly, the radiologist’s visibility

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vis-a-vis the patient is significantly increased. And thirdly, patients appreciate the direct contact and interaction which will give us an edge over competing institutions/practices in which no direct contact between patients and radiologist takes place.

The referring physicians request high-quality studies using new techniques such as CAIPIRINHA, TWIST, Dixon fat-saturation or quantitative evaluations such as liver reporting. Quite a few of these techniques are reflected in the current issue of MAGNETOM Flash, such as fast, motion insensitive imaging (see Marco Ravanelli et al. on the strength of FREEZEit in head and neck imaging in uncooperative patients; Jan Fritz et al. on 3D CAIPIRINHA SPACE¹ as a new technique to enable the isotropic acquisition of high-quality 3D data sets for efficient and comprehensive MRI of joints; Advanced and accelerated diffusion-weighted imaging throughout the body with Simultaneous Multi-Slice as shown by Valentin Tissot et al., or Robert Sellers' How-I-do-it on LiverLab for non-

invasive, quantitative liver imaging). But also standardization of exam protocols and structured reports play a role. In this issue streamlined workflow is shown by Christos Loupatatzis on the advantages of DotGO and the various Dot engines; or by Bac Nguyen on fast and robust workflow with the Pediatric 16 coil.

Yet another important aspect is the electronic transmission of reports and images. At our practice for example, images and written reports in pdf-format are available online to the referring physician 10-20 minutes after the end of the exam. Any help from manufacturers in further pursuing those aims is highly appreciated and a major selling point for new equipment. Quantitative assessment of liver fat content in MRI or automatic labelling of vertebral bodies in MRI – as provided by the Spine Dot Engine (see Loupatatzis on page 12) – or in CT are highly welcomed steps in this direction, particularly as they occur 'inline', meaning no further user interference and hence no additional personnel is required.

Other key selling points include the robustness of the equipment and ease of use of the equipment (see Loupatatzis on the benefits of SlideConnect coils, or Nancy Talbot on the Tim Dockable Table).

The robustness is important in two ways: firstly, with a high hourly throughput and long working times in private practice, equipment down times can barely be tolerated. Protocols need to provide good image quality within minimal exam time: one of the reasons CAIPIRINHA and Dixon-techniques are used at our practice. Secondly, patients tend to have higher BMI's which increases the wear and tear of the equipment and requires adequate equipment (e.g. increased table load capacity or larger joint coils). Not being able to provide high-quality knee exams in obese patients is an obvious flaw that all referring physicians and even most patients will notice. Beyond

¹ WIP, CAIPIRINHA SPACE is currently under development and is not for sale in the US and in other countries. Its future availability cannot be ensured.

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these hardware requirements, support from the scanners' software is required to facilitate the quick and consistent planning of the exams.

These advantages in medical technology allow us to streamline the workflow and hereby increase the number of examinations. As the external economic pressure from increasing staff costs, increasing amount of regulation and competing practices is gradually but steadily increasing, a market adjustment is already underway. Private radiology practices in larger cities in Germany are consolidating to create larger groups that can use their equipment and their employees to the greatest economic benefit. Similar developments could be observed in the dialysis market which resembles radiology in its technical character and the ability to precisely plan patient throughput. In dialysis there is meanwhile an oligopoly with only four major countrywide groups partly dominated by Germany's largest stock corporations.

The future of radiology in private practice in Germany is being shaped right now. If we can adjust to the economic pressure whilst also meeting patients' wishes and the referring physicians' needs, consolidated physician-owned private practices will prevail. Failure to make this adjustment will most likely lead to corporate practices. In the meantime, however, we will keep focusing on our patients and providing the best image quality and medical care for them.

I hope you enjoy reading about the many new advances in MR imaging that we present to you in this RSNA-issue.

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