

# The Skyra<sup>fit</sup> Experience in Basel

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## Introduction

Merian Iselin is one of the leading clinics for orthopedic and surgical procedures in Switzerland and it has 120 acute care beds. In 2014 there were 4,893 orthopedic cases (71% of all new cases), 615 surgical cases, and specifically 514 urological cases registered. By 2014 we observed that

other institutions were catching up with our clinical service and we therefore evaluated how we could take advantage of new opportunities in MR imaging to differentiate and to improve existing services. The option we considered was a fit-Upgrade of our installed MAGNETOM Verio MRI scanner.

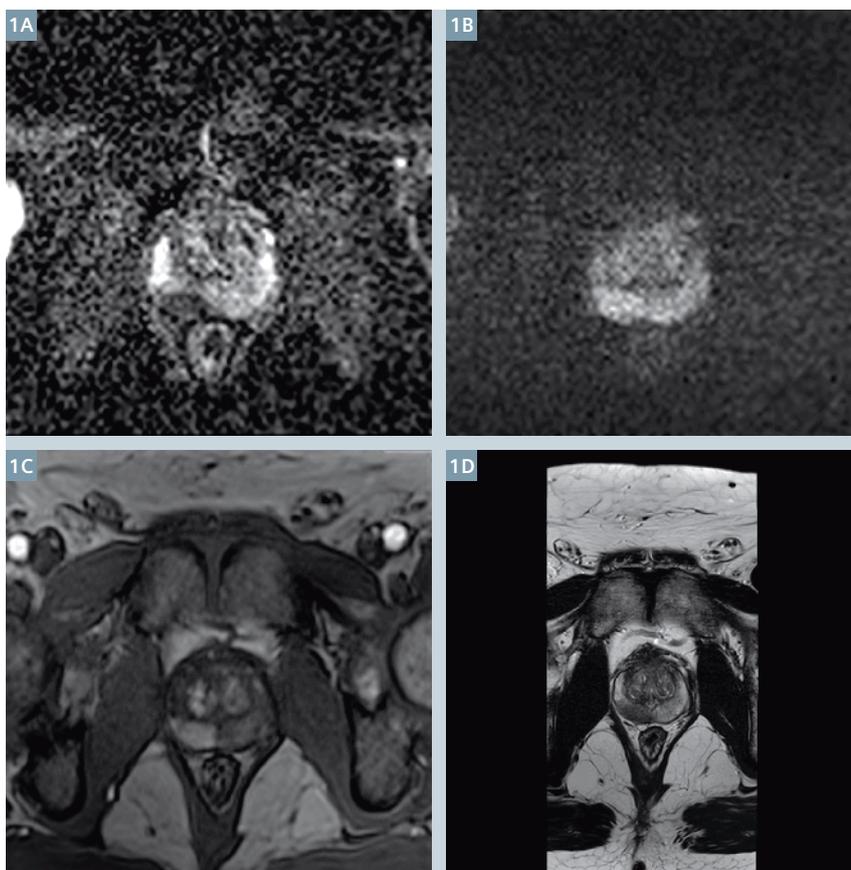
A fit-Upgrade is an upgrade of the installed 3T MRI system with the new Tim 4G coil technology, the new DotGO workflow and most recent applications available, including Quiet Suite. It also includes the installation of the new digital-in/digital-out RF system and new covers with Dot Display and Dot Control Centers, as well as the replacement of the control unit cabinet, body coil and surface coils, examination table and workstations.

## Challenges

As a surgery reference hospital, prostate evaluation and therapy have become important topics for Merian Iselin, and consequently for the Radiology Department as well. One frequent request by our urology department and external referrers is pre-biopsy imaging of the prostate in order to guide targeted biopsies. However, before the upgrade the imaging department lacked the means to offer additional guidance for a targeted biopsy.

With our equipment prior to the fit-Upgrade, a prostate MR examination used to be rather uncomfortable for the patient because an endorectal coil was needed to achieve sufficient SNR. In many cases this device caused patient movement, affecting image quality and thus biopsy planning. Or, even worse, in some cases patients refused to undergo this kind of procedure at all.

Furthermore, scheduling of prostate patients required an extra time buffer to describe the procedure and to explain the use of an endorectal coil. While routine MR examinations take around 20 to 30 minutes, patient



**1** Prostate images.  
**(1A)** ADC RESOLVE b50, 800, 1500 transversal, SL 3 mm, FOV 150 x 150, matrix 100 x 100. **(1B)** DWI b 800 transversal, SL 3 mm, FOV 150 x 150, matrix 100 x 100. **(1C)** T1-weighted VIBE transversal post-contrast, SL 3.5 mm, FOV 180 x 180, matrix 122 x 160. **(1D)** T2w TSE transversal, SL 3 mm, FOV 240 x 120, matrix 384 x 192.

preparation for prostate examinations required additional time in the MR scanner – especially for non-German speakers because language barriers made it slower to explain.

Another key reason for the fit-Upgrade was the offered advantage in musculoskeletal imaging: As a hospital focused on orthopedic procedures, we need to evaluate the whole hand, especially for finger ligament diagnosis and degenerative pathologies. Ideally, a hand coil should support an examination where the wrist and finger can be examined as a whole.

Our analysis further revealed that time pressure had also been a major issue in Merian Iselin before the fit-Upgrade. In order to acquire images in all required orientations and contrasts as requested by the radiologist for some clinical questions, the team of technologists had occasionally found themselves under pressure to finish an examination within the patient time-slot. This was particularly the case for finger and hip examinations. And, in general, the team has been under pressure to reduce patient time in the scanner to the minimum.

## Solutions

After upgrading the system to MAGNETOM Skyra<sup>fit</sup>, we changed our prostate protocol and decided to abandon the use of an endorectal coil. With the upgraded 3T system and

using only the surface body 30 coil and the spine coil we now ensure patient comfort and compliance. We obtain images with high quality while eliminating the challenges associated with the endorectal coil.

We also replaced our standard diffusion-weighted imaging protocol, which is prone to susceptibility artifacts, with a high-resolution, diffusion-weighted imaging sequence (RESOLVE), and in general benefitted from a higher signal-to-noise ratio (SNR) and improved FatSat imaging. All these changes have very positively influenced the quality of our prostate MR exams provided to the urologists and improved diagnostic confidence (Fig. 1). Consequently, we are now able and confident to recommend if a biopsy is required or not, based on a MRI scan.

With the new hardware, providing higher coil density, we were able to improve the spatial and temporal resolution of our protocols in abdominal and pelvic imaging in general. One sequence of particular use is StarVIBE. Now it is possible to perform abdominal and pelvic examinations allowing patient's free breathing and reducing artifacts in the image.

The fit-Upgrade also included a new set of high element-density orthopedic coils. The 16-channel

hand and wrist coil, in particular, enables a complete hand examination, without additional coils or specific coil or patient repositioning (Fig. 2).

We have also been able to accelerate orthopaedic examinations such as hip exams with the high element-density of the body coil and the additional workflow support provided by the Large Joint Dot Engine (Fig. 3). In the case of ankle examinations we have been able to reduce the scan time while even improving image quality by using the 16-channel foot and ankle high element-density coil. This coil also requires less time for shimming.

## Results

The improvements introduced with our Skyra<sup>fit</sup> upgrade have been crucial for us, our referring physicians and our patients. We are now able to offer a very convenient and comfortable examination to patients referred for prostate MRI and can consistently acquire all images required for diagnosis and (as far as needed) targeted biopsy. The avoidance of an endorectal probe is especially appreciated by patients undergoing active surveillance where regularly repeated exams are standard.

Dr. Georg Katz particularly points out: "Now urologists ask us to revise cases

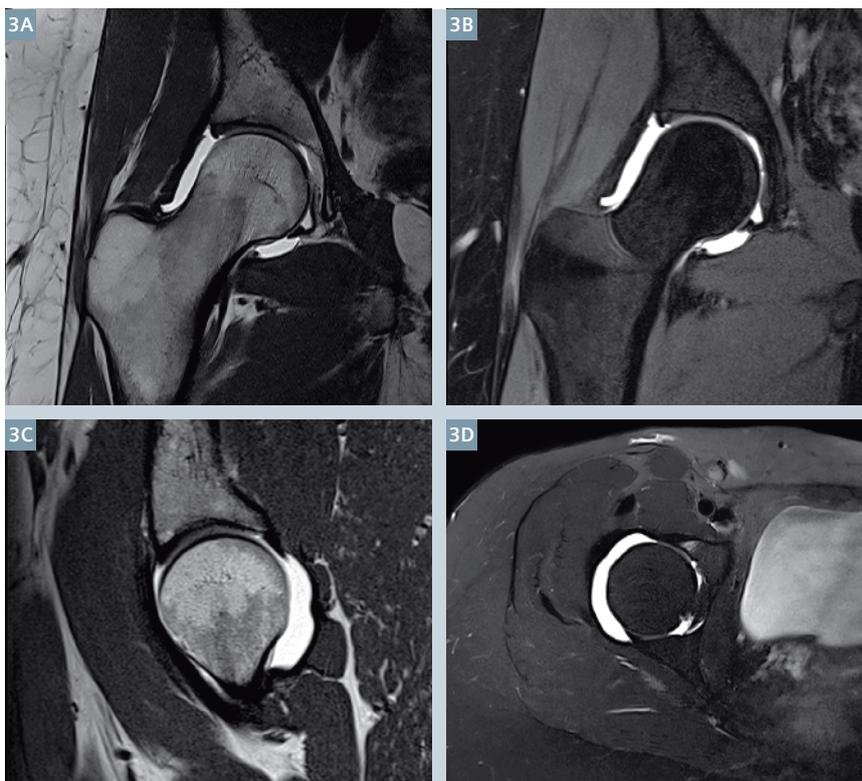


previously diagnosed in other sites or perform follow-up examinations.”

Since the introduction of the new orthopedic coils, wrist and finger lesions referrals have increased in the region and we have also seen an increase in scanning rheumatic hands. For finger evaluations, Technologist Claudia Maise commented: “It is now easier and faster to perform an MRI scan than an ultrasound and we provide to the orthopedic physicians complete wrist and finger evaluation.” In this way, orthopedic physicians offer patients a targeted treatment or physiotherapy.

Being able to scan faster has resulted in having more time available within the patient time-slot for techs to ensure all possible sets of images are available. They are under less stress and this also guarantees a good result.

We provide the treating physician and the patient all the possible images needed for the diagnosis, therapy, surgery and follow-up questions which may later arise. Thus ensuring that no recall of patients is needed.



**3** Hip images. **(3A)** T1w TSE coronal, SL 3 mm, slices 20, FOV 160 x 160, matrix 269 x 448, A 3:56 min. **(3B)** PDw TSE FatSat coronal, SL 3.5 mm, slices 20, FOV 150 x 150, matrix 272 x 320, TA 2:42 min. **(3C)** PDw TSE sagittal, SL 2 mm, FOV 130 x 130, matrix 230 x 256. **(3D)** T2w TSE FatSat transversal, SL 3 mm, FOV 192 x 200, matrix 279 x 384.

## Conclusion

Given challenges and the tremendous improvements achieved, the fit-Upgrade with software version *syngo* MR E11 has proved to be the best cost-benefit solution. The building costs were very low, installation was fast and the upgraded system is practically the same as a new scanner. Even though patients don't recognize the changes to the system, our referring physicians have specifically noticed the difference. And all this has been achieved with a reduced investment.



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