



The reception area of the Radiology Department at Sonnenhof Hospital Berne reminds visitors more of a trendy hotel than a medical department.

## Research in a Niche Market

Today, improved magnetic resonance imaging with Tim technology provides for much more accurate prognoses regarding the therapeutic success for osteoarthritis in the hip. This should greatly support and increase the utilization capacity of the Radiology Department of the private Sonnenhof Hospital in Berne, Switzerland. The drivers of this boom could be new findings in the pathogenesis of hip impingement arthritis. These are presently determined through cooperative efforts between Sonnenhof Hospital and Inselspital Berne.

By Oliver Klaffke

The reception reminds one of an elegant designer hotel rather than the admission area of a radiology department. Things are not much different in the medical area immediately behind the sliding frosted glass doors. The equipment is modern and exudes the impression that professionalism and service are taken seriously here. The magnetic resonance imaging (MRI) systems of the private Sonnenhof Hospital Berne work nonstop. Densely packed examination plans glow on the screens in the hallway, showing that the diagnostic work in the hospital is precise, quick, and standardized. "We have modernized the department during the last two years. And right now, an additional MRI examination room

is under construction," explains Stefan Werlen, MD, Head of the Radiology Department. For the private hospital's key stakeholders, investments into the infrastructure of a completely new radiology department will bear success, not only from a medical point of view, but also from a financial one.

The simplified workflow saves valuable time – time that can now be invested into the diagnosis of images, which in turn results in better quality. "We believe that the future importance of MRI examinations will increase greatly through the use of Tim® technology," says Werlen. As a platform technology, Tim (Total imaging matrix) provides ideal prerequisites: flexi-

Increasingly younger patients suffer from arthritis of the hip. Early diagnosed cartilage damage can often be treated successfully – even without an artificial hip replacement.





Prior to the MRI exam, contrast media is injected into the affected hip (above). Tim technology then enables fast coil placement (top right) and acquisition. Thanks to advanced software, image analysis is also sped up. The contrast media accumulates in the affected cartilage tissue, making it clearly visible on the images.



bility through versatile coil combinations, accuracy through high signal strength, as well as spatial resolution and speed resulting from parallel imaging. These improvements enable completely new diagnostic possibilities in the future, among them in orthopedics. The new MRI techniques also allow for scientific examinations rarely performed to date. For that

purpose, the systems did not deliver the necessary resolution, user-friendliness or speed. But that has now changed.

### Better Images through Tim

In the next ten years, the percentage of the population that is older than 55 years will increase considerably in Europe and

North America. Given this fact, the demand for first-class diagnostics in orthopedics will increase as well. This demand will be amplified by advances in diagnostics made possible through the improved image quality and easy handling delivered by Tim. Together with Tallal Charles Mamisch, MD, of the Department of Orthopedic Surgery Inselspital Berne, Dr. Stefan Werlen is par-



icipating in research projects that show the considerable potential of the new MRI system generation. Their initial results indicate that the predictability of a successful therapy is greatly improved. As a result, a completely new range of applications is available for MRI examinations that could be of great interest, both medically as well as financially. "Radiology departments that

use state-of-the-art diagnostic technologies will certainly benefit from these developments," says Werlen. He hopes for his department that the high quality standard for diagnoses prevails and that his customers – and this includes referring physicians as well as patients – will not be satisfied with anything less than the resolution and speed of examination provided

by Tim. "This applies to the use of MRI in orthopedics, for example, when examining hip arthrosis," says Stefan Werlen. In many cases, only hip surgery shows that the articular cartilage has just about disappeared – despite being visible on X-ray images prior to surgical intervention. The reason for this is the pathological change in the biochemical composition of the

## Summary

### Challenge:

- Increase business to be able to afford latest MRI technology and use it at full capacity

### Solution:

- Transfer of new techniques in high-end research in disease fields with increasing incidence
- Develop a research platform to document the leadership role in those fields
- Exploit improved workflows and throughput
- Offer high-quality diagnosis and fast reporting

### Result:

- Expanded scope of applications
- Increased referrals
- Systems operate at full capacity



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Switzerland

cartilage. It seems intact on the X-ray image, although the contents of proteoglycans have already decreased and therefore the cartilage structure is damaged. But *syngo*® MapIt, a sequence and post-processing package for quantitative MRI assessment, provides approaches to assess proteoglycan decrease before surgery. With the help of this software, the deficit of proteoglycans is visible onscreen. The radiologist is able to provide the orthopedist with essential decision-making tools. He or she is able to state, with a high degree of reliability, whether an artificial hip joint is required because too much of

the cartilage has been destroyed. If enough cartilage is available, joint preserving treatment can be initiated.

## Attractive Market Niche

Because the radiology team at Sonnenhof Hospital is highly proficient in these diagnostic techniques, it was able to develop a highly attractive market niche. Orthopedists from the surrounding area who want to err on the side of caution and want the best possible information about the status of their patients' hips refer them to Sonnenhof Hospital for examination. “The rise in demand justifies the investments in the infrastructure of our department,” says Werlen. In addition to the quality of both images and diagnoses, the service has to be suitable as well for the referring orthopedists: They receive reports and images on the same day. To ensure this, an easy system operation and an efficient workflow are necessary. “We can meet our own demands and the expectations of our customers only when the handling of both system and evaluation software is as easy as possible.” This saves time and money and provides enough breathing room for a sometimes time-consuming diagnosis, which is important in the interest of optimal service.

## Preventive Approach

“Tim, combined with *syngo* MapIt, will greatly improve the early detection of, for example, impingement-induced arthritis,” explains Mamisch. Impingement-induced arthritis is the result of a misshapen femoral head impacting the acetabular socket. Werlen and Mamisch assume that damage to the hips relates for the most part to impingement. The scan of the articular head frequently shows small bone protuberances which are responsible for the damaging impacts. The source for these changes in the bone is completely unknown. Over time, however, the mechanical effect destroys the articular cartilage. The earlier the impacts are detected, the more promising the success of therapy. For this purpose, Mamisch and Werlen are conducting screening studies to detect the prevalence of changes in the hip joint during adolescence. The preventive approach is of major importance: The study should detect the risk for serious, long-term hip damage early enough to

determine who will most likely require an artificial hip joint sometime in the future. If it is possible to determine the adolescents who run the risk, it may be possible to remove the bone appendage with a simple surgical intervention. This type of development would be of enormous economic importance. The costs incurred through nonproductive times due to hip damage are enormous: "Calculations show that they are as high as approximately one percent of the gross domestic product," adds Mamisch.

Werlen and Mamisch also extend the research for the sources of impingement-induced arthritis to athletes. It is known that certain types of sport activities frequently cause damage to the hip joint or are prevalent in high-performance athletes. A lot of ice hockey players and fencers suffer from severe damage to the hip joint. As likely as not these are impingement-induced arthritis. "The causes for their accumulated occurrence in athletes are vague at the moment," says Werlen. The scientists assume that during the adolescence of athletes, certain movements interfere with bone growth in the joints, which in turn are responsible for impingement-induced arthritis.

### The Road of a Private Hospital

Stefan Werlen suggests another diagnostic field for Tim technology: prostate examinations. To date, these are difficult to perform with conventional MRI systems

and do not meet the quality required by a diagnostician. The potential of Tim in prostate diagnostics has not been tapped. Considering the aging population, the frequency of prostate tumors is rising, and the number of associated preventive medical check-ups is increasing as well. Tim offers a host of promising possibilities. Up until now, MRI examinations were not considered an alternative to biopsies. However, biopsies are time-consuming and uncomfortable for the patient. Tim technology could make for easy and highly reliable routine examinations with MRI, according to Werlen and Mamisch.

Today, physicians rely heavily on prostate specific antigen (PSA) value when diagnosing prostate cancer. If the value is elevated, it is seen as a tumor indicator. With the improved MRI method, it seems possible to detect the tumor directly onscreen.

"This enormously increases security for the patient," says Werlen. The risk of false-positive diagnoses is reduced, because the treating physician is able to assure himself of the presence of the tumor. In addition, close viewing of the tumor also enables a more secure, exact localization of the tumor in case of surgical intervention.

"From a hospital's economic point of view, this opens up interesting possibilities," believes Werlen. "The example from orthopedics and the potential of prostate examinations clearly demonstrate that modern MRI equipment with Tim technology is an economically feasible investment especially for a private hospital which has

to financially stand on its own two legs." The race for referrals in radiology will be won by those who are able to provide the highest quality standards in diagnostics and service.

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### Further Information

[www.siemens.com/MAGNETOM-1-2007](http://www.siemens.com/MAGNETOM-1-2007)  
[www.siemens.com/news-prostate-biopsy](http://www.siemens.com/news-prostate-biopsy)



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