FieldStrength

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Philips MRI Community

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Ingenia's dStream technology as upgrade for Achieva, Intera

Bonn proves the power of Ingenia 3.0T in prostate imaging

Leuven sees high quality, large coverage head-neck MRI with Ingenia

Partnership with Barrow: research to make clinical MR faster and better

Designed with patients in mind

Lukasz Kownacki, MD, PhD (left), **Magdalena Gola, MD, PhD** (right) are radiology specialists and diagnostic imaging researchers at European Centre of Health Otwock. Their clinical interests include Body MR with a clinical specialty in Cardiovascular MR.

"We have seen Achieva 3.0T TX perform exceptionally well everywhere, but we feel that abdominal and pelvic scans are especially good."

Abdominal, pelvic exams especially benefit from MultiTransmit and mDIXON

European Centre of Health Otwock uses Achieva 3.0T TX as its only MR scanner

European Centre of Health Otwock, (Otwock, Poland) is the only private hospital in Poland that includes three academic clinics: Oncology, Urology and Cardioangiology. The clinics are part of the Polish Medical Centre of Postgraduate Education (CMKP). About 3000 scans are performed on the Centre's Achieva 3.0T TX annually, mainly for oncology and cardiology inpatients, as well as a wide variety of outpatient scans. Clinicians here are seeing excellent image quality in their abdominal and pelvic scans, with the mDIXON technique and without.

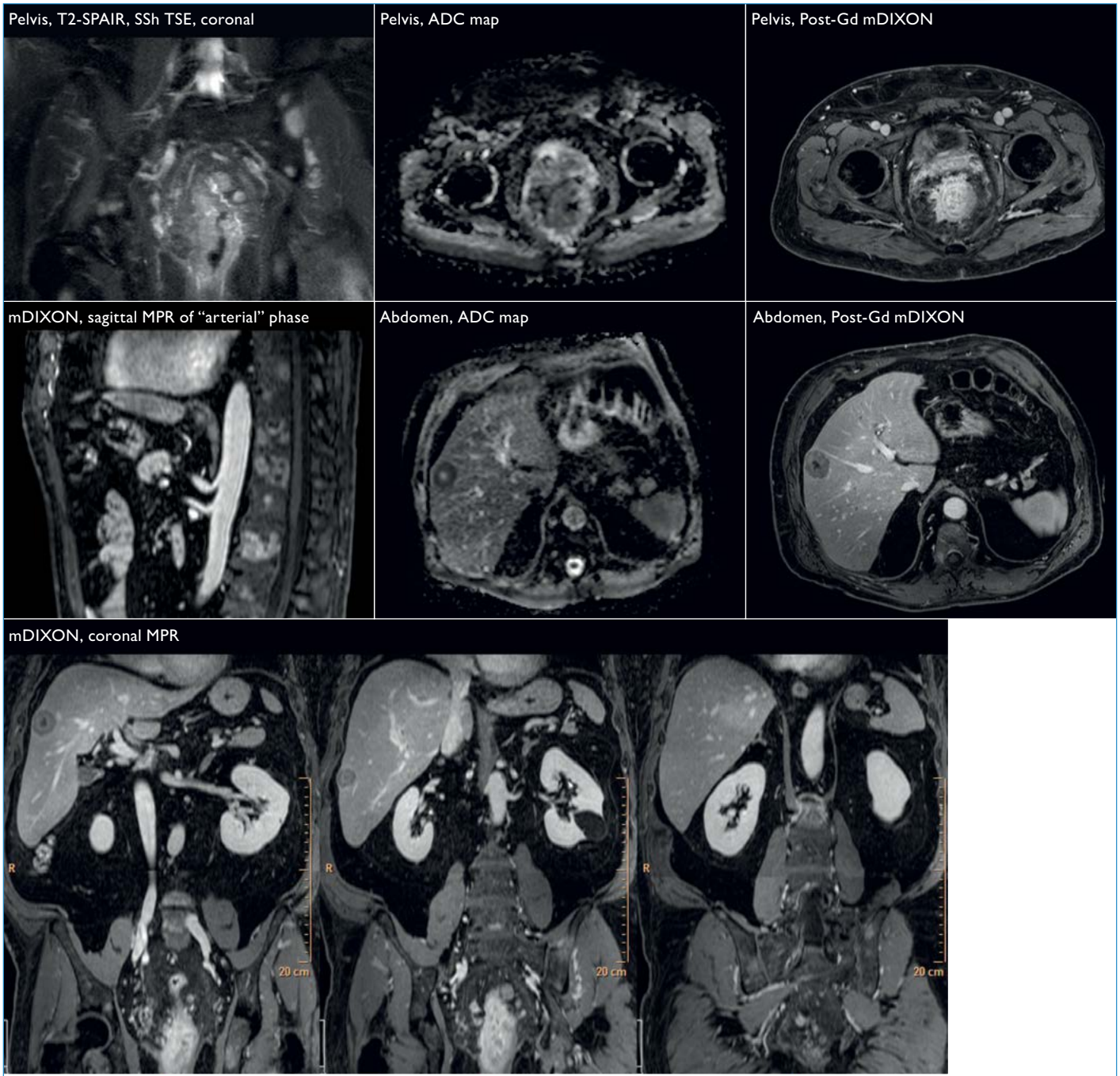
"Imaging at 3.0T opens many possibilities, and we wanted the opportunity to evolve and to have the highest possible obtainable image quality," Lukasz Kownacki, MD, PhD, explains. "We understood the power of MultiTransmit in body and pelvic scanning – the most important areas for our patient group – and so decided to make Achieva 3.0T TX our only MR scanner. It was installed in 2010. We are very proud of it."

Body scans benefit from Achieva 3.0T TX with MultiTransmit

Dr. Kownacki thinks abdominal and pelvic scans are where Achieva 3.0T TX with MultiTransmit really shines. "We have seen Achieva 3.0T TX perform exceptionally well everywhere," he says. "But we feel that abdominal and pelvic scans are especially good. The signal-to-noise ratio is clearly superior to what I've seen on 1.5T systems. Body scanning at 3.0T can be difficult in large patients, but also in very thin patients, because dielectric shading makes delineation of the anatomy very challenging. But with MultiTransmit, this problem is diminished."

"In our abdominal and pelvic scans, we primarily trace the tumor extent and infiltration, as well as the spread of metastases in our oncology patients," says Dr. Kownacki. "Achieva 3.0T TX performs exceptionally well in large patients and even in patients who ingest a lot of fluid or in patients with ascites. We don't have problems with dielectric shading in those exams."

"I have a special approach of giving pineapple juice during the 12 hours period prior to the MR study to all the patients scanned for abdomen or pelvis," says Dr. Kownacki. "The juice acts like a positive contrast medium on the liver on T1W images because it contains manganese – which is paramagnetic – that accumulates in the liver. If a patient with metastases drinks a lot of pineapple juice,



Rectal cancer with liver and bone metastases

A 53-year-old male with lower gastrointestinal tract bleeding symptoms. Colonoscopy revealed rectal carcinoma. Two focal liver lesions were seen using ultrasound. Two-station scanning was performed on Achieva 3.0T TX. The 16-channel SENSE XL Torso coil was carefully positioned to cover abdomen and pelvis.

In the pelvis, coronal T2W-SPAIR shows larger infiltration of the rectal wall on the right side, with surrounding edema and fat tissue infiltration. Metastatic lymph nodes and numerous bone metastases are seen. Abdominal Gd-enhanced mDIXON (water only) shows the metastatic lesion in the liver with a marked necrotic core.

The corresponding ADC map demonstrates restricted diffusion in the lesion but not in its necrotic core.

Coronal MPR from merged abdomen and pelvis mDIXON axial datasets demonstrates the metastatic lesions in the liver, as well as numerous suspicious bone lesions together with infiltrating primary tumor and surrounding fatty tissue. The sagittal MPR of the abdomen and spine region was derived from the first "arterial" phase of 3-dynamic mDIXON during Gd contrast administration. Numerous suspicious lesions with a very dynamic and strong contrast enhancement are seen in the vertebral bodies. In this case all lesions could be very well visualized with mDIXON method only.

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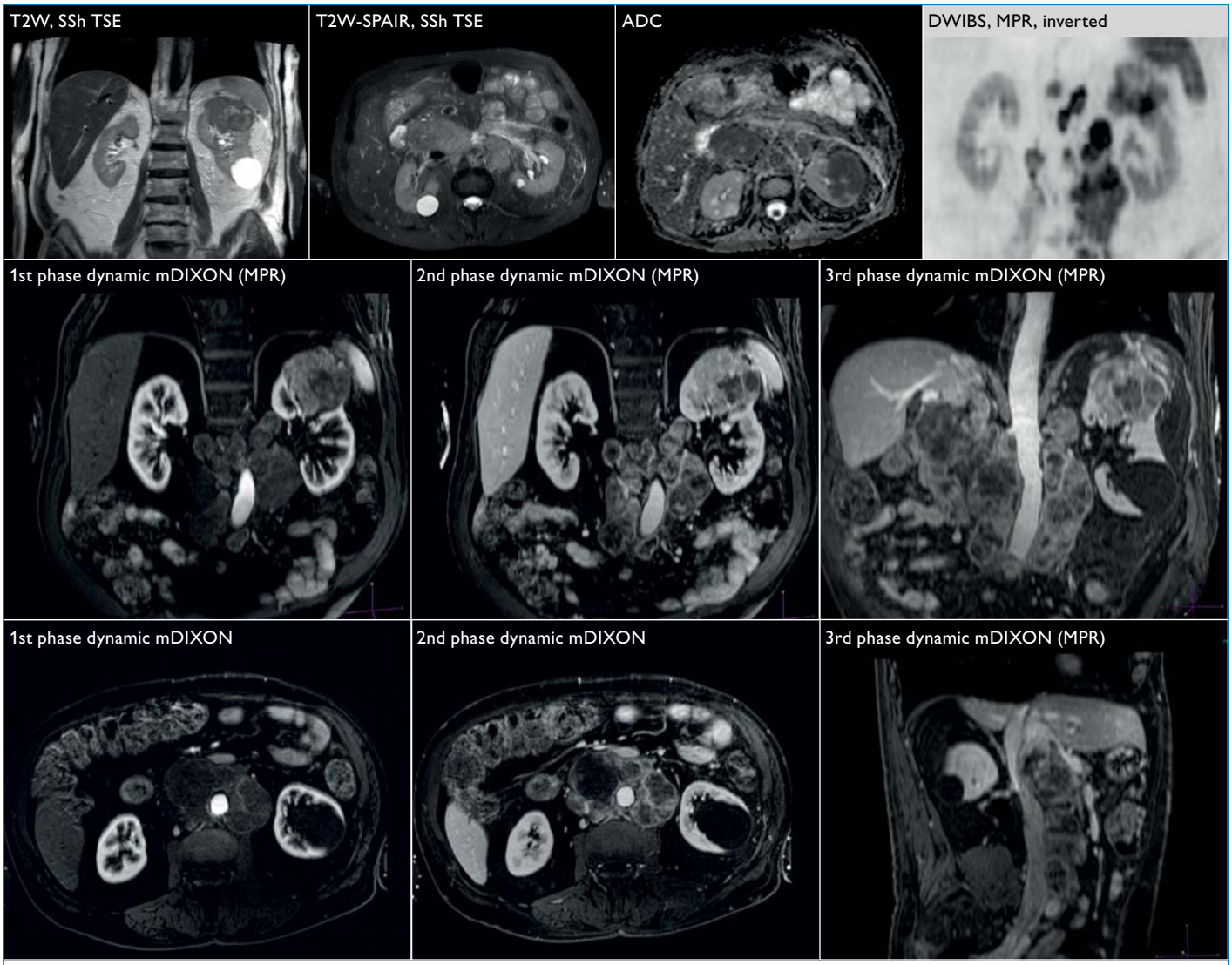

Kidney cancer with retroperitoneal lymph nodes metastases

78-year-old male with kidney cancer and inconclusive CT (possible vena cava infiltration?) was scanned on Achieva 3.0T TX with the 16-channel SENSE XL Torso coil.

T2W TSE demonstrates the tumor of the kidney and two cysts on the left side. On T2W-SPAIR TSE giant retroperitoneal lymph nodes are seen as well as cysts in both kidneys.

The ADC maps show restricted diffusion in the primary tumor in the left kidney as well as in the metastatic lymph nodes. Coronal and coronal-oblique MRP/MIP DWIBS clearly demonstrate the restricted diffusion in the tumor and in a large volume of metastases.

On the first and second dynamic mDIXON images, the tumor and metastases are well visualized. The original axial images are from the level where the largest lesions are seen.

On the third dynamic, the sagittal image shows compression of inferior vena cava lumen by extensive retroperitoneal metastatic lymph nodes. No infiltration of venal lumen and wall is seen.

3D T1W-FFE mDIXON allows very high spatial resolution in dynamic abdominal scans. In this case all the lesions could be very well visualized with this method only.

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I have observed that the lesions are easy to see, even without contrast. The pineapple juice in the intestines lowers their lumen signal on T2W/T2W SPAIR images – it is very useful in MRCP but also nicely differentiates peritoneal fluid (with higher signal) from intestinal fluid (lower signal due to Mn presence). On the other hand, intestinal lumen enhancement on 3D T1W images gives a very nice and interesting effect that really enriches the viewing experience in MPR mode. My patients like this 'juice approach' very much as it is natural and ecological."

mDIXON is important in routine exam

Dr. Kownacki optimizes his body ExamCards for both image quality and speed. "First we consider the breath hold. Because we want to reasonably achieve the highest possible resolution (reconstructed voxel size 0.94 x 0.93 x 1.7 mm), all of our abdominal and pelvic patients are given oxygen during their examinations to allow them to have comfortable breath holds. If a patient still cannot hold the breath as long, we downgrade the slice thickness somewhat (to 3 mm) to have fewer slices but still high quality."

"We focus on the mDIXON sequence because of the high resolution it offers, and the possibility to perform multi-planar reformatting (MPR) especially of post-contrast sequences," says Dr. Kownacki. "mDIXON has also replaced pre-contrast in-and-out-of-phase T1W-FFE."

"In our body exams we typically perform T2-weighted TSE scans in coronal, sagittal (only in pelvis) and axial orientation with and without fat suppression. For T1-weighted imaging, we use primarily an mDIXON approach for generating water, fat and in/out phase images.

Then we go to dynamic contrast-enhanced imaging, where mDIXON gives us the possibility to scan the entire abdomen or pelvic region with high resolution in 3-4 dynamics followed by a late phase imaging. We typically use only axial mDIXON for further MPR, but occasionally we also perform coronal and sagittal mDIXON." Dr. Kownacki appreciates the excellent quality of the mDIXON images made with Achieva 3.0T TX, as well as its significantly faster scanning and robustness.

"The team really likes mDIXON because it's so fast and convenient. We prefer those images for diagnosis over CT in many cases, especially in pelvis," Dr. Kownacki concludes.

Achieva 3.0T TX is the right choice

"Achieva 3.0T TX is very flexible," Dr. Kownacki says. "MultiTransmit even benefits image quality in the head region, for instance when scanning patients with metallic implants or dental metal that could disturb the optimal performance. Another application that was difficult to scan before are patients with gastrointenstinal stoppage, who have their intestines filled with fluid. Thanks to MultiTransmit we can now make diagnostic images even in these patients."

"Achieva 3.0T TX has such big potential," he adds. "The power of Achieva 3.0T TX, as of any Philips MR scanner, is its flexibility. It opens a great field for experimenting and developing new approaches for all MR professionals. We chose to have this 3.0T system as the one and only MR scanner on site, and we are very pleased with our decision. Every day brings new and exciting results to our experience."

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"We don't have problems with dielectric shading."