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SOLUTIONS

Digital tomosynthesis, filling the gap between classical 2D X-ray and 3D CT

For Powiatowy Szpital w Ilawie in Poland, the DR 800 with digital tomosynthesis offers a new choice: a fast, economical and low-dose technique to separate anatomical overlap in a variety of applications

Case study – Powiatowy Szpital w Ilawie (Ilawa Hospital)
Ilawa, Poland

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Case study

**Interview with Dr. Robert Zbyslaw,
Radiologist, Ilawa Hospital, poland**

“Having the digital tomosynthesis with our DR 800 offers us an additional imaging choice that speeds up diagnosis. It reveals things that might not be visible with classical X-ray. Yet it can be done without moving the patient from the X-ray department.”

Robert Zbyslaw
Radiologist

For Powiatowy Szpital w Ilawie, implementing the DR 800 with digital tomosynthesis has added a key new tool to its imaging portfolio: one that gives the hospital’s radiologists more choices than found in legacy equipment. By using multi-slice image reconstruction, the DR 800 provides the depth to see beyond dense structures, revealing more details than classical X-rays. Yet it uses the low radiation dose and fast workflow of general radiography. It thus can fill the gap between X-ray and CT, supporting radiologists to diagnose X-ray images that are often too complex to read due to anatomical overlap, without sending the patient to another department. This means greater convenience and comfort for staff and patient alike.

Versatility and efficiency: a perfect fit

Powiatowy Szpital w Ilawie (Ilawa Hospital), in Ilawa, Poland, is a 325-bed municipal hospital with a catchment of around 100,000 people. The hospital provides a range of care services, including general and trauma orthopedic surgery, neurology, pediatrics, obstetrics and gynecology, emergency assistance, and more.

“As a local hospital, one of our functions is also to provide initial triage and diagnoses that will lead to specialist treatment in other hospital facilities,” explains Dr. Robert Zbyslaw, Radiologist at the hospital.

Ilawa Hospital has been an Agfa customer for more than 6 years. In 2018, the facility began looking for a new X-ray room to add to its existing Agfa DR unit. The DR 800 was selected following a competitive bid process.

In the hospital’s varied imaging and diagnostic environment, the multi-purpose DR 800 room is a perfect fit. The DR 800 enables Ilawa Hospital to carry out general radiography, fluoroscopy and advanced clinical applications, including full leg/full spine imaging. In addition, with only an additional software license, the hospital has added digital tomography to its range of imaging tools.

“The DR 800 with digital tomosynthesis supports my work and my goals. I am delighted with this choice, and with the continued support and collaboration we receive from Agfa.”

Robert Zbyslaw
Radiologist

Seeing more, faster

"Having the digital tomosynthesis with our DR 800 offers us an additional imaging choice that speeds up diagnosis," Dr. Zbyslaw continues. "It reveals things that might not be visible with classical X-ray, including microfractures, kidney stones, problems with prostheses, and more. Yet it can be done without moving the patient from the X-ray department, whereas the CT requires additional organization. CT exams are more complicated, take more time and resources – and require a greater radiation dose. With the DR 800 and digital tomosynthesis, I can do the imaging right away, see the image on the screen and then decide immediately whether additional imaging exams, such as CT, are required. The digital tomosynthesis solution thus fills the gap between classical X-ray and full CT."

As part of the DR 800, Agfa's digital tomosynthesis solution[1,2], automatically presents three-dimensional images with optimal contrast, and provides consistent MUSICA image quality across the individual slices and images. The 2D X-ray projection data produced by a single sweep of the X-ray source can be used to compute multiple slices, through iterative reconstruction.

Fast multi-slice image reconstruction

Agfa's dedicated MUSICA workflow for tomosynthesis delivers images with less noise and fewer artefacts, while Agfa's patented iterative 3D reconstruction algorithms enable very fast image reconstruction.

Used with Agfa's DR 800 direct radiography room, the digital tomosynthesis solution can capture no fewer than 46 low-dose images in a 30-degree arc, in only 10 seconds. Image reconstruction takes just around 30 seconds. The reconstruction slice thickness can flexibly be set from 2 to 9 mm. Additional reconstructions based on the existing acquisition are easily configurated.

1 The digital tomosynthesis software license is available for the DR 800 and DR 600 X-ray rooms.

2 Tomosynthesis is not yet available in the U.S. and Canada. Tomosynthesis for DR 600 is pending 510(k) clearance in the U.S.

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Robert Zbyslaw
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A wide variety of applications

Dr. Zbyslaw uses the digital tomosynthesis for a variety of applications, in some situations eliminating the need for further specialized imaging (such as CT). He shares a few cases:

A 82-year old woman was referred to us with back pain, but the neurologist had determined that it was not related to a problem with the back itself. Using the digital tomosynthesis, we quickly observed she had a microfracture in her right hip, which was not visible on the regular X-ray image. The orthopedist decided a CT was not necessary before operating: the image was clear and the calcification line of the break (which had occurred a month before) was visible.

A young practitioner of martial arts presented with pain in his fingers and hands. Using the DR 800 with digital tomosynthesis, we were able to find a very small fracture measuring only 2 millimeters! No CT was required or even useful (given the size of the lesion) for the diagnosis, and treatment began right away.

Using the digital tomosynthesis, I was able to distinguish between a stone and a polyp in a patient's urethra. It was not visible using classical X-rays, due to the contrast agent and gas, but in the tomosynthesis image layer I could clearly see it was a stone.

The X-ray exam of a 73-year old patient showed a pathology near the bladder. Additional exams were necessary, but the patient also had a hip prosthesis. With CT, metal in protheses can create streak artefacts. While CT has algorithms to suppress these specific artefacts, with digital tomosynthesis the artefacts are neglectable. We were able to examine the patient during the X-ray exam, while the contrast agent was still in the bladder and urethra.


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A better patient experience

Digital tomosynthesis is only one of the features Dr. Zbyslaw appreciates from the ergonomic, flexible DR 800, which is the digital imaging 'multi-tool' of the hospital's radiology department.

"The DR 800 is efficient and fast, and the MUSICA image processing for both static and dynamic images is excellent. We get clear images with very good quality and resolution. With the immediate image availability and centralized workflow, we can see more patients, increasing our productivity. This is very useful in a hospital like ours, where we have more and less busy moments: with the DR 800, even during our 'rush' hours, everything keeps moving quickly and smoothly."

Dr. Zbyslaw also highlights the advantages, for patient, technologist, radiologist and clinician:

- "The table can be lowered, for less mobile patients, and is sturdy enough for patients of all weights.
- We can even do hip and lumbar spine imaging more easily for heavier patients: whereas previously, we needed to do two lateral projections, with the DR 800, I can see both upper and lower sacrum with only a single projection.
- The source imaging distance (SID) is very convenient, and enables us to do all images in one place, without additional equipment and calibrations for e.g. chest imaging.
- The technologist can check the images immediately, to make sure everything is correct, reducing retakes. Plus, the system is very straightforward to learn.
- For radiologists, there is so much more that can be seen!
- For clinicians (and patients), fast availability of information improves diagnostic confidence and makes a real difference."

"With the DR 800, images are available on the screen very quickly, with a good resolution that enables diagnosis. We can minimize dose without impacting image quality – which is especially important for pediatric imaging! The DR 800 with digital tomosynthesis supports my work and my goals. I am delighted with this choice, and with the continued support and collaboration we receive from Agfa."

Agfa solutions

DR 800

- Digital imaging multi-tool for radiography and dynamic imaging applications, including Dynamic MUSICA image processing
- Ergonomic in-room, table-side and remote-control systems
- Immediate image availability, from a cost-effective, high-quality flat panel detector
- Robust weight capabilities, for patient loads of up to 265 kg (507 lbs) with full functionality, and 320 kg (705 lbs) with limited functionality
- Simplified access, even for patients with limited mobility thanks to the smooth motorized table and low height adjustment capability
- 180 cm Source Image Distance (SID), enabling chest imaging at the standard SID without additional equipment
- EasyStitch technology, for seamless automatic full leg/full spine stitching without extra in-room equipment

Digital tomosynthesis

- Empowered by MUSICA, and requiring only an additional software license, the digital tomosynthesis solution offers very fast, multi-slice image reconstruction with a higher than CT in plane resolution.
- It automatically presents three-dimensional images with optimal contrast, and provides consistent MUSICA image quality across the individual slices and images.
- It provides depth information, while eliminating the general problem of pathologies 'hidden' behind dense tissue. This makes it ideal for a wide range of applications: including orthopedics, pulmonology, urology IVP exams, etc.
- It uses equivalent radiation dose to a general radiography exam, and offers a genrad-sized field of view and genrad in-plane resolution – all within a workflow that is faster than computed tomography (CT).

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