



Ahead of the game thanks to modern CT technology

More versatile, higher quality, more efficient: How a practice in Celle*, Germany, is preparing for the future with Revolution Maxima



- 25% shorter examination slots
- Satisfied technologists thanks to intuitive operation and quick training
- Improved image quality eliminates need for manual reconstructions
- Up to 50% dose reduction thanks to iterative reconstruction ASIR-V*
- Also suitable for sites with complex examinations and/or personnel with little CT experience

In early December 2020, the Celle Group Practice for Radiology and Nuclear Medicine introduced a real all-rounder for day-to-day operations in the form of the CT Revolution Maxima. This powerful CT system is designed for maximum efficiency at every step of the CT workflow – from referral to report – and offers innovative solutions for the entire CT experience, including an impressive new method for automatic patient positioning.

The cross-disciplinary group practice was founded in the north of Hanover in the 1970s. Although its focus was purely on nuclear medicine in the first few years, the group practice for radiology and nuclear medicine now.

It offers a comprehensive spectrum of radiological and nuclear medical services, serving the Südheide region around Celle (stretching 70 km north and west to Hamburg and Lüneburg).

The practice, which has two locations, has set itself the aim of guaranteeing its patients, referring doctors and cooperating hospitals – such as the Celle General Hospital (AKH Celle) – a prompt, effective and high-quality radiological and nuclear medical service at all times.

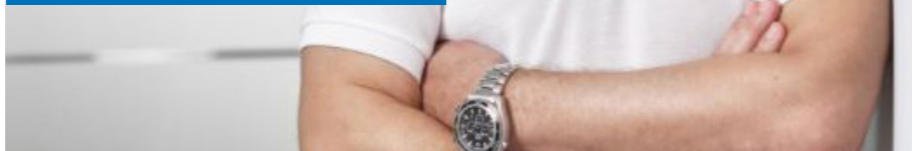
As such, all 76 employees work tirelessly to provide the most cutting-edge diagnostics at a consistently high standard.

The Revolution Maxima replaced an aging CT scanner that was no longer performing acceptably in the long run, particularly in terms of dose. With ASiR-V™, the current Revolution Maxima boasts proven GE dose reduction software for noise and object modeling. This enables consistent imaging with a dose that is up to 82 percent¹ smaller than in an image reconstruction with filtered back projection.

As the practice places particular importance on the satisfaction of its employees, the technologists in the team played an important role in the decision-making

Combining quality and efficiency

The Celle group practice puts a lot of emphasis on quality. The team ensures the further development of its quality level with continuous further training and by constantly adjusting and optimizing its work processes. *“This goes hand in hand with targeted investments in cutting-edge examination equipment,” says Dr. Deutsch. “This meant the CT Revolution Maxima from GE was an easy decision last year, because we see it as a combination of both quality and efficiency in one system. Compared to similar products in its class, it stood out especially thanks to the automatic positioning and the added value that it brings. The system will also be good value for money over its planned lifetime. Plus it looks good for a CT scanner.”*



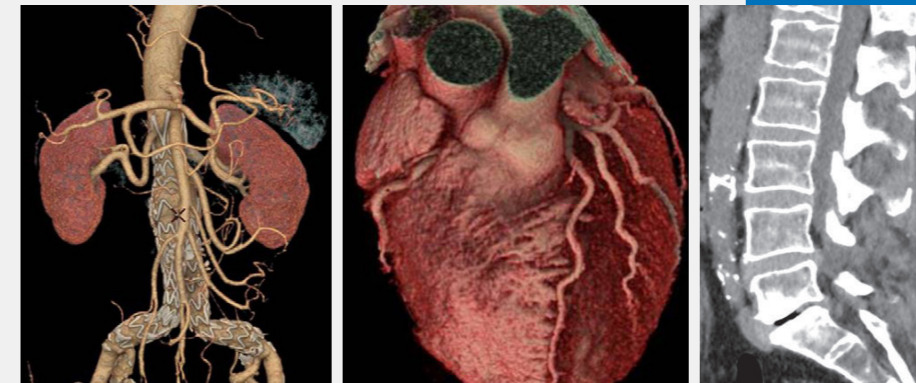
“It’s part of our philosophy to provide our referring doctors with conclusive findings and do so quickly and reliably. Thanks to the electronic transmission of findings, they usually reach the doctor on the day of the exam, or the next day at the latest.”

Dr. Tobias Deutsch, Radiologist at the Celle Group Practice for Radiology and Nuclear Medicine

process: *“The opinion of the team is very important to us – after all, it’s the technologists that work with the equipment every day,”* explains Dr. Deutsch.

As such, the team favors devices that are as easy to learn as possible. Furthermore, standardized workflows make it possible to spontaneously react to personnel being off sick or staff planning changes.

Regardless of the technologists’ perspective, there is a risk of incorrect patient positioning in all CT examinations. When a patient is mispositioned, it can lead to an increase in



3D stent aorta

3D heart

Lumbar spine

Automatic positioning with just one click

As such, Dr. Deutsch sees a clear advantage in the positioning aspect after just four months with the CT Revolution Maxima:

“Our team has a considerably less complicated workflow and we guarantee optimal patient positioning, which is also reflected in image quality and the dose administered – and we do so with a high level of consistency across all examinations.”

The system owes this to the innovative AI-based automatic positioning system Auto Positioning. Using its real-time depth sensing technology, the ceiling-mounted Xstream camera generates a 3D model of the patient’s body. Following the 3D contouring of the patient and the fully automatic detection of the reference points, the CT Revolution Maxima pinpoints the 3D center of the scan range using its deep learning algorithm and automatically aligns it with the isocenter of the gantry. With just one click, the Auto Positioning system moves the table into the correct position and centers the patient. The tablets attached to the CT gantry can also be used to view patient data and select the appropriate scan protocol, which is suggested directly by the system through a special algorithm.

As such, all work steps can be performed at once right next to the patient, right up to activating the scan.

And that’s not all: for the radiologists, the new CT scanner also offers further promising aspects. What is decisive for Dr. Deutsch is the overall picture formed by the many pieces of the puzzle.

“We also see added value as our employees are able to focus more on the patients. They are simply closer to hand, which is beneficial to both patients and staff.”

“Alongside scan duration, setup time and dose reduction, the possibility of scaling our services is another relevant aspect. I could imagine that a practice cooperative with multiple CT locations could ensure consistently high quality, even with a lack of qualified staff. Potential operating errors would be reduced, making standardization and automation easier.”

In light of the future skills shortage, Dr. Deutsch sees the use of AI in the form of the Xstream camera unavoidable for ensuring a consistently high standard in the field of CT. *“Anything that helps us reduce errors will help us maintain a consistently high level of quality. Furthermore, I see the possibility of expanding operations without increasing staff numbers thanks to process optimization.”*



Gantry panel for viewing patient data and the scan protocol



Gantry panel for auto positioning of the patient





Anna Schlothauer

Technologists find it easy to use

The workflow improvements that were so essential for the practice have likewise been confirmed in recent months. Dr. Deutsch reports increased throughput, resulting in particular from the more reliable planning of examination slots. *“Additionally, staff workload has been reduced and satisfaction increased, simply because more goes according to plan. The system takes work off our hands – meaning there is less strain on our staff, even when patient numbers remain high,”* says Dr. Deutsch.

His colleague, Anna Schlothauer, training officer for cross-sectional imaging, can confirm this: *“With the Revolution Maxima, we have sped up our CT throughput from 20 to 15 minutes per patient, with the possibility of reaching 10 minutes in future.”* The introduction of the new system went hand in hand with a change of supplier and therefore also a new user interface – both of which went smoothly: *“The team even tried out the first steps before receiving any training, because they were already familiar with the user interface from working with a GE MRI system. The training was fast and very successful. Our technologists find the Revolution Maxima easy to use,”* Anna Schlothauer is pleased to say.

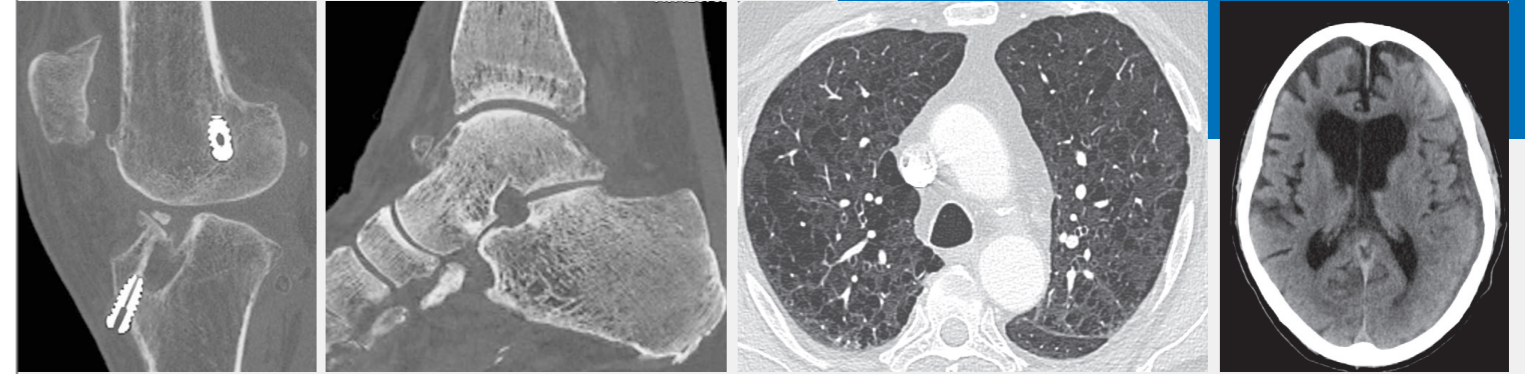
An expansion of examinations with regard to heart examinations was already possible after a few weeks. Dr. Deutsch also sees clear advantages in relation to the examination spectrum offered by the group practice:

“In general, we are seeing a considerable improvement in image quality, a reduction in noise and a significant reduction in dose alongside improved image clarity across all examinations. The functionality of Direct MPR stored in the scan protocols saves staff additional manual reconstruction work. Furthermore, the 1024 matrix option offers us a tangible improvement in resolution, especially in examinations of petrosal bones or joints.”

Broader examination spectrum and more reliable low-dose applications

The Institute performs a large number of low-dose lung CT scans. According to Dr. Deutsch, a significant improvement in image quality can be seen for these scans as well:

“Fifty percent of our CT examinations are oncological CTs, which now benefit from improved image quality in disease progression evaluations – alongside a 50 percent dose reduction thanks to iterative reconstruction. Positioning-related CT dose errors are now also a thing of the past thanks to the Revolution Maxima.”



Knee joint

Ankle

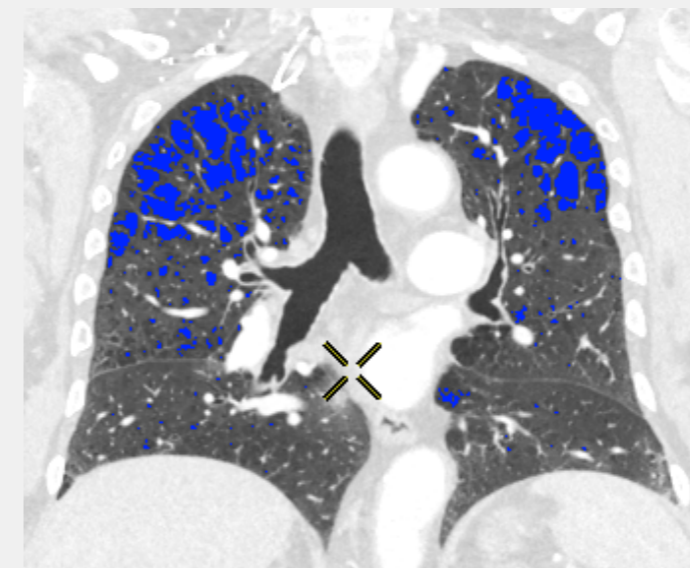
Lung

Head

“Our examination spectrum requires a high proportion of low-dose examinations – such as for thorax CTs, kidney stone detection, paranasal sinus CTs and plasmocytoma CTs. We are seeing big improvements in dose reduction here.”

The Revolution Maxima is also opening up new ways for the Celle group practice in the field of cardiac computed tomography.

The practice has worked with a nearby cardiologist for some time now who indicates cardiac CTs for his patients; the patients are referred from there and premedicated for examination in the group practice. Coronary CTs in the group practice are provided as a private medical service.



CT of the lungs with emphysema quantification



Gantry panel with the option of starting the scan and timing indicator





1. ASiR-V reduces dose by 50% to 82% relative to FBP at the same image quality, as defined by low contrast detectability. In clinical practice, the use of ASiR-V may reduce CT patient dose depending on the clinical task, patient size, anatomical location and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose to obtain diagnostic image quality for the particular clinical task.

2. Kaasalainen, T., Palmu, K., Reijonen, V., & Kortensniemi, M. (2014). Effect of patient centering on patient dose and image noise in chest CT. *American journal of roentgenology*, 203(1), 123–130.

3. Toth T, Ge Z, Daly MP. The influence of patient centering on CT dose and image noise. *Med Phys* 2007; 34:3093–3101

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* The results achieved by this facility may not be applicable to all institutions and individual results may vary. This case study is provided for informational purposes only and its content does not constitute a representation or guarantee from GE Healthcare.

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