



# Explore What's Next in CT with Revolution Frontier

As radiology grows more competitive in an environment of constant change, facilities and clinicians are seeking ways to expand the clinical value of CT imaging technology to further enable a far-reaching impact on patient outcomes. It is a quest to push the boundaries of CT imaging beyond anatomy to explore new areas of care.

Revolution Frontier™ is a brand-new premium CT system with the dependability, excellent image quality and advanced capabilities to help facilities expand and grow. It was designed from the inside out with a state-of-the-art imaging chain and new tube technology featuring the powerful Performix™ HD Plus and next-generation ASiR-V™ iterative reconstruction. It delivers on the promise of spectral CT with Gemstone™ Spectral Imaging (GSI) Pro introducing a simplified workflow that easily fits in with the important work you do.

Advanced clinical applications such as spectral imaging can now be considered routine with Revolution Frontier. Built to provide the best in diagnostic efficiency, Revolution Frontier delivers higher spatial resolution and lower radiation dose for head, neck, chest, body and musculoskeletal imaging. Its advanced applications push the envelope on routine studies in terms of IQ, radiation dose, spectral imaging and workflow with a proven system that can help facilities expand service lines, such as cardiac, TAVR, pediatrics and ER.

“Revolution Frontier is the culmination of our passion and vision to deliver extraordinary technologies, from routine CT to spectral CT, that enable clinical exploration and enhance patient outcomes,” says Scott Schubert, General Manager, Global Premium CT, GE Healthcare. “In today’s healthcare environment, clinicians need tools that get to the diagnosis quickly. We believe that CT is that fast and effective tool, and that spectral



CT further enhances disease characterization, reducing the need for follow-on diagnostic tests. We’ve designed Revolution Frontier to provide this improvement in diagnostic efficiency, translating innovation to outcomes... everyday.”

## Innovation across the entire imaging chain

Revolution Frontier can collect more image data with less radiation dose exposure to your patients. Advances in image quality start with the same Clarity detector modules used on Revolution CT. Built with the proven Gemstone material, the miniaturized design of each module shortens the distance information has to travel for a 25% reduction in electronic noise and improvement in image quality.

An all-new liquid metal bearing X-ray tube significantly reduces the wear that is typical with conventional ball bearing technology. The result is a shorter tube warm-up time between patients as well as two times longer tube life.



What's more, Revolution Frontier includes our latest iterative reconstruction technology, ASiR-V. By addressing key factors such as dose neutrality, lower image noise and improved low-contrast detectability in patients of any size so you can see up to 82% reduction in dose across all applications.

## Don't wait for spectral CT any longer

Revolution Frontier takes spectral imaging to the next level of performance. GSI Pro features a brand new reconstruction engine for significantly reduced reconstruction times. It's breakthrough spectral CT technology with a two times faster workflow that processes gigabytes of data at a time.

By rapidly switching between two different kV energies at a rate of up to 0.25 ms with sub-millimeter Z-axis registration, temporal registration with GSI Pro is over 165 times faster than other dual energy technologies. And the advantage of its single source architecture is the ability to generate material decomposition images over the full 50 cm field of view.

As a result of this simplified workflow, the clinical benefits of GSI are now routinely accessible, including tissue characterization, contrast dose reduction, metal artifact reduction and quantitative information about chemical composition. Designed to help clinicians find disease quicker, with more accuracy, it's the spectral capability you've been waiting for.

The clinical benefits of GSI Pro include up to a 50% improvement in beam-hardening artifact due to bone, metal and other high-contrast materials such as iodine. It also has the ability to detect very small concentrations of iodine accurately and to deliver non-contrast-like images by subtracting detected iodine from an image.

And with ASiR-V, Revolution Frontier delivers dose neutrality, lower image noise and improved low contrast detectability for patients of any size.

## Forward-thinking technology from innovation to application

As a premium system with advanced technology and capability, Revolution Frontier delivers all of the potential of CT and lets you move effortlessly from one acquisition to the next. You can image with a stunning 0.23 mm spatial resolution and then switch to rapid kV switching for 50 cm spectral imaging of the entire body. Choose to see up to a six times improvement in motion artifact using SnapShot™ Freeze and reduce

all-around dose with ASiR-V iterative reconstruction. On top of all of these acquisition choices, you can scan at a 0.35 second rotation in any exam.

Add to this the potential to go beyond with unmatched spatial resolution and the latest in spectral imaging applications. Built to provide the best in diagnostic capabilities and the ability to explore new clinical applications, it's an impressive tool for better understanding disease.

Revolution Frontier is built from our passion to help you reach the right diagnosis, effortlessly. To push the boundaries of what you expect from your CT applications with the ability to see beyond anatomy, explore new areas of care and advance the clinical value of CT.

## First worldwide installation at Alta View Hospital

Alta View Hospital, a part of Intermountain Healthcare, is the first worldwide installation of Revolution Frontier. When the hospital first broke ground in 1982 in Sandy, Utah, there were acres of open land. Today, Alta View is a bustling urban community hospital providing an array of inpatient and outpatient services. It's where many of Intermountain's complex procedures and medical care is delivered to residents throughout the community.

Installed in October 2017, Revolution Frontier is the hospital's first spectral CT scanner. According to Karen E. Conner, MD, CT Section Chief for Intermountain Healthcare and a chest and body radiologist at Alta View, Revolution Frontier will help the hospital's radiologists provide additional information on injuries and disease across numerous clinical conditions.

"This scanner can help us further build our chronic thromboembolic pulmonary hypertension treatment clinics by looking at perfusion in addition to filling defects," Dr. Conner says. "Also, we expect it will help our urology partners in identifying the composition of renal stones. We are also excited to use the new system in planning complex pancreatic cancer treatment, as it appears we can see the lesions as well as liver metastases better than without spectral imaging."

As a busy urban hospital, Alta View provides all levels of care for inpatients and also provides an array of services for outpatients. The fast processing time of GSI Pro was an



important consideration in the purchase decision-making process as it will help with the overall CT scanning workflow.

Sue Smith, RT(R) (CT), had an opportunity to be one of the first technologists to scan patients on Revolution Frontier. One of the key differences she noticed was the scan field-of-view for head CT has increased from 25 cm to 32 cm. This is particularly useful in neuro imaging.

It was the ease-of-use operating the scanner that really made an impression, and she saw an immediate impact during a CTA pulmonary scan. The system's SmartPrep Dynamic Transition allows the scan phase to start automatically when the HU of the transition ROI reaches the desired enhancement threshold. This enables the technologist to chase and catch the bolus quickly.

"We were able to obtain excellent scans as far as the bolus timing," Smith explains. "We have some patients who can't hold their breath properly or have renal insufficiency. With spectral imaging, we can make some adjustments so the scan is diagnostic for the radiologist. That's exciting for us to not have to re-scan and re-dose a patient—it really helps reduce the radiation dose to our patients."

Dr. Conner was impressed with the impact of ASiR-V on image quality and low dose. "We are getting fantastic images at low dose in routine scanning with ASiR-V," Dr. Conner says. "It has really lowered our dose and that's a huge benefit for our patients." She anticipates working with the CT team to further refine protocols and determine the appropriate dose reduction across numerous clinical indications.

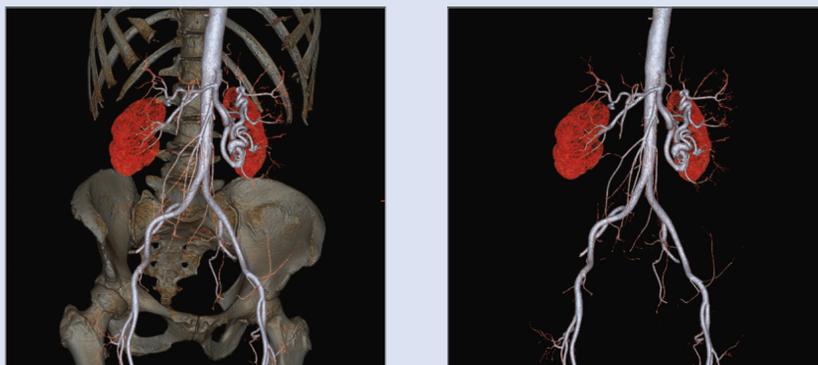
ASiR-V also helps address noise, Smith adds. And, with kV assist, she can reduce dose right after capturing the scout images, regardless of the patient's body habitus. "It's great for reducing dose and noise and the high resolution mode is great for small anatomy imaging."

Smith also used the organ dose modulation, which she thought was a great idea to help reduce dose to sensitive areas.

Although Dr. Conner is "just getting started" with spectral imaging on Revolution Frontier, she can already see a population where it will make a significant impact: patients with implants, such as bi-lateral hip replacement.

"I was absolutely stunned to see through the metal artifact and actually see the bladder in a patient with bi-lateral hip replacement," Dr. Conner says. "Spectral imaging also performed exceptionally well on a pulmonary embolism case."

Even with limited experience on the new scanner, Dr. Conner can see it will make a big impact in patient care. There was one very large-size patient whose body touched the side of the gantry. "I was so impressed there were not significant streak artifacts. I could see all the way through the images with the excellent image quality. It was something I've not seen on other scanners." ■



**Figure 1.** 3D rendering of a CT angiography exam of the aorta.



**Figure 2.** Abdominal study with a scan range of 168.25-1503.25 mm and a CTDI<sub>vol</sub> of 3.92 mGy.