VolumeRAD® Tomosynthesis technology from GE Healthcare now supports lung nodule detection

University of Washington Medical Center, Seattle, Washington

The University of Washington (UW) Medical Center is one of the nation’s leading academic medical centers, providing highly specialized medical care in areas such as cardiology, high-risk pregnancy and neonatal intensive care, oncology, orthopedics and organ transplantation. UW Medical Center is part of the UW Medicine health system, which also includes Harborview Medical Center, Northwest Hospital and Medical Center, Valley Medical Center, UW Neighborhood Clinics, UW Physicians, UW School of Medicine, and Airlift Northwest. UW Medical Center also partners with the Fred Hutchinson Cancer Research Center and Seattle Children’s Hospital through the Seattle Cancer Care Alliance to provide the most advanced cancer diagnosis and treatment available.

Dr. Gautham Reddy is the Professor of Radiology and Vice Chair for Education and Director of Thoracic Imaging in the Department of Radiology at the University of Washington. His responsibilities include supervising thoracic imaging, setting protocols, research and teaching, and reading chest and cardiac imaging exams including radiography, CT and MRI. He has been actively involved in the use of GE Healthcare’s VolumeRAD Tomosynthesis technology at the institution.
Adoption of new imaging technology

In 2008, the University of Washington Medical Center began using GE Healthcare’s VolumeRAD Tomosynthesis technology. The institution implemented the technology primarily as part of several research studies, including a study specifically oriented to its efficacy at detection of lung nodules compared to X-rays. Based on these studies and the potential uses of the technology, the medical center decided to begin using VolumeRAD in clinical practice as well. The VolumeRAD units are currently located at the medical center itself, with plans to expand to additional locations.

A GE-sponsored multi-center clinical trial study was completed to determine whether the use of VolumeRAD increases physician accuracy in the detection of lung nodules and identification of cases to be recommended for follow-up and further imaging when compared to conventional two-view chest radiography.

No clinical evidence has been established supporting the lung nodule claims in patients with active lung or pleural disease that could obscure pulmonary nodules, including fibrosis, emphysema, compressed lung, scarring, severe lung disease, and in patients with objects in or around the lungs that could obscure pulmonary nodules. The effectiveness of the device may vary depending on nodule prevalence and type.

The study results revealed a significant increase in nodule detection sensitivity with VolumeRAD compared to two-view chest radiography.

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<tr>
<th>NODULE SIZE RANGE</th>
<th>INCREASE IN SENSITIVITY</th>
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<tr>
<td>3–4 mm</td>
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<td>4–6 mm</td>
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Compared to chest X-ray, VolumeRAD is more effective in supporting a radiologist to manage patient follow-up according to the Fleischner Society guidelines. With a VolumeRAD exam, there was no decrease in specificity.

The dose level of the VolumeRAD exam, including a PA radiograph, is less than 0.1 mSv, only 1.6 times greater than a two-view (PA and LAT) chest X-ray exam.

What is VolumeRAD?

VolumeRAD Tomosynthesis is a respected, broad-indication technology embraced by radiologists for years. The process involves multiple acquisitions during a single rapid sweep of the X-ray tube over a limited angle. This enables multiple tomographic slice images of the patient to be reconstructed. VolumeRAD technology removes overlying structures and enables better anatomy visualization from front to back. It is then possible to see abnormalities that may not be seen with a standard X-ray examination.
A promising solution

In 2008, Dr. Reddy and the medical center were not entirely sure what value VolumeRAD could bring to their patients and workflow. According to Dr. Reddy, “When the technology was first implemented, VolumeRAD augmented our existing technology rather than truly replacing any of it, given that we hadn’t yet seen the full capabilities of this new imaging modality.” Shortly after VolumeRAD was put to use, however, the medical center and Dr. Reddy began to see what the technology could offer.

Lung nodule detection

The detection of lung nodules and subsequent patient management can be difficult with traditional chest radiography. Dr. Reddy highlights the difficulty in determining if opacities on a chest radiograph are actionable nodules. “We are not [always] sure that [what we see] is actually a true nodule.” A CT exam may be a solution that offers higher detection sensitivity, but it comes with the drawback of substantially increased radiation. Instead of turning to CT, Dr. Reddy points out that VolumeRAD can offer an intermediate solution. “Rather than simply getting a CT, we can do a VolumeRAD to verify whether it’s a nodule or not. [For] something that has low likelihood of being a nodule, VolumeRAD will probably exclude the possibility of a nodule and there won’t be as much radiation [delivered to the patient]. Traditionally, we used to go to CT even though the likelihood was very low of finding a nodule in the area of concern.”

Dr. Reddy believes VolumeRAD may have value in situations like this – and ultimately, when it comes to lung nodule detection and patient management, the medical center has seen the value of VolumeRAD in comparison to standard two-view chest radiography.

“[VolumeRAD is] better in terms of sensitivity for the detection of the nodules as well as for actionability as far as making the actual decisions of what to do next,” Dr. Reddy says.

Radiation minimization

When it comes to minimizing radiation doses, the medical center prides itself on leading the charge. “We are very careful in our use of ionizing radiation and we try to reduce it across the board using different methods, and also thinking about the type of study we choose so we can avoid a CT [if possible],” says Dr. Reddy. However, he believes this dose reduction should not come at the sacrifice of clinically relevant and necessary information. “We want the information that we need for the patient’s diagnosis and management. If we can get that information without a CT, [it] would be helpful, [but] we can’t always do that with a radiograph.” Dr. Reddy points to the value of VolumeRAD once again. “That is one of the reasons why VolumeRAD would be helpful. We could get more information [with VolumeRAD] than with a [radiograph and] without as much radiation as a CT.”
Workflow efficiency

The University of Washington Medical Center has also found efficiency to be a benefit of VolumeRAD technology. According to Dr. Reddy, the images produced using VolumeRAD are intuitive to read and understand, resulting in almost no learning curve when it comes to utilizing the technology. “They’re not confusing. They’re not alien-looking. I think they’re intuitive to read, so even people who haven’t trained on them before can read them pretty easily. The whole appearance of the image is intuitive. It’s easy to understand. It’s easy to interpret.”

In terms of the VolumeRAD workflow, the medical center discovered it to be on par with that of a simple radiograph. “It’s almost like a radiograph in terms of workflow. It doesn’t take much longer than a radiograph to interpret, so [the VolumeRAD] workflow is very straightforward.”

Flexible use

Dr. Reddy turns to VolumeRAD for more than just lung nodule detection. He utilizes VolumeRAD’s ability to remove overlying structures to improve the visualization of airways and inspect them for foreign bodies, especially in the cases of young children who might put objects in their mouths. “They either swallow or aspirate them and we want to figure out where they are,” he said. “Some of them are very difficult to see on a chest radiograph, and those patients typically go to CT, [but] in a child especially, that’s quite a bit of radiation.” Thus, for Dr. Reddy and the medical center, VolumeRAD provides a minimal-dose alternative to CT that may improve visualization relative to standard radiography for these cases.

Looking ahead

Dr. Reddy and the University of Washington Medical Center plan to continue using VolumeRAD technology and may conduct additional research studies to appreciate the full spectrum of what this exciting technology can accomplish. “It’s a new technology. It has the potential to produce, to offer clinical information at a markedly reduced radiation dose compared to CT,” he says. In addition, there are plans to place additional VolumeRAD units in other locations within the UW health system, including Seattle Children’s Hospital and the Fred Hutchinson Cancer Research Center.
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