

CARDIOVASCULAR IMAGING

Arineta Ltd.

Dedicated CT scan for cardiovascular diagnostics

Instead of relying on a conventional whole-body computed tomography (CT) scan in a hospital setting for cardiac imaging, cardiologists could someday have a smaller, lighter and less expensive CT system in their own office. Israeli-based **Arineta Ltd.** is developing just such a dedicated cardiovascular CT device.

"CT is now recognized as being helpful in cardiac care, but it is big and bulky and cannot be used in an office setting," says Arineta's president Joseph Pepper. "Our system offers all the benefits of image quality found with standard CT." The new device is also expected to be 40% less costly to the end-user, as well as requiring approximately 60% less space and weighing about 50% less. Moreover, the Arineta device will deliver a radiation dose that is 50 to 80% less than conventional CT.

For many patients, interventional x-ray angiography could be replaced with Arineta's system. Up to 60% of patients who undergo angiography require diagnosis only, not the follow-up catheter therapy. "We are able to easily conduct this first diagnostic step, which makes it more convenient for both the patient and the doctor," Pepper says. "For patients who have had previous heart surgeries, the act of going through an angiogram is in itself a high-risk event. Our CT provides a much lower risk and it is a quicker, non-invasive alternative."

Pepper also notes that the dedicated CT system can be installed in the emergency

room, as a way to alleviate patient backup. For example, patients with low or medium risk for heart disease could be CT scanned immediately as opposed to being hospitalized for observation and waiting up to 24 hours for enzyme test results. "It is a more effective early rule-out for heart disease," Pepper says.

Pepper believes the installation base for the company's CT system encompasses the estimated 9,500 cardiology offices and departments worldwide, with about 40% in the US. Assuming a 20% annual turnover rate in equipment, the yearly market is \$2.1 billion. Arineta expects to receive both CE mark and 510(k) clearance in late 2013.

Arineta was founded in 2006 by Yosi Morik and Ehud Dafni. Several years prior, Morik co-founded and was chairman at Advanced Stent Technologies Inc., which developed the first bifurcated stent and was acquired by Boston Scientific Corp. in 2005. Through the evolution of that stent, Morik became familiar with the cardiac-care market and the challenges of angiography. Dafni, meanwhile, over a period of 20 years, had played a major role in the development and innovation of the CT product lines at Elscint Ltd., Picker International Inc., and Royal Philips Electronics NV.

Pepper served as CEO at OEC Medical Systems Inc. (mobile fluoroscopic imaging) from 1997 to 2000, the year it was sold to GE Medical Systems. His background also includes 15 years at The BOC Group, where he served as president of

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PO Box 3057
CAESAREA 38900, ISRAEL
Phone: +972 52 473 3330;
(408) 836-5891 (US)
Web Site: WWW.ARINETA.COM

Contact: Joseph Pepper, PhD, President
Business: Advanced imaging solutions for cardiovascular applications

Founded: June 2006

Founders: Yosi Morik, Chairman; Ehud Dafni, PhD, CEO

Employees: 8

Financing to Date: \$3 million

Investors: Yosi Morik; Private investors

Board of Directors: Yosi Morik; Ehud Dafni; Joseph Pepper

Scientific Advisor: Chaim Lotan, MD, Medical Director (Hadassah Medical Center Heart Institute, Jerusalem)

Ohmeda Medical Devices and Ohmeda Medical Equipment.

Through attending numerous cardiology meetings, Morik recognized the growing interest in CT, "but he knew there was a better method for cardiac imaging than using a whole-body CT," Pepper says. The two entrepreneurs finally joined forces in 2006 to design a CT system from scratch for cardiology applications only.

A prototype of Arineta's cardiac CT system is scheduled to be completed by next summer. The product will look like a small-size conventional CT device, with a donut-shaped gantry that contains the CT, the x-ray tubes and detectors. A patient table can also slide in and out of the center of the donut, which is smaller than a standard CT donut. "In a general-purpose CT, the donut needs to be large enough to image any body part for a wide range of the population," Pepper explains. "But if you only want to image the cardiovascular system – for example, from the carotids down to the renal arteries – the annular space does not need to be as large."

The steps in using the new CT system are also the same as for a traditional CT device. “Typically with a cardiac process, you insert a contrast agent to enhance the imaging,” Pepper says. “Our expectation, however, is that our cardiac process will require less contrast agent because imaging is shorter: a fraction of a second versus several seconds.”

One of the problems in designing and building a conventional CT machine over the past 15 years, according to Pepper, has been the trend toward wider detectors that cover more volume in each rotation of the x-ray tube. However, the use of wider detectors increases the cost of the equipment enormously and at some point results in deterioration in image quality. “Nearly all other CT machines take multiple rotations to image the heart,” he says. “Our machine images the heart in less than one rotation of the gantry, while still having premium image quality.”

The key areas covered in the company’s patents are a proprietary x-ray tube arrangement, a patented detector array and new algorithms for converting the scan data to images.

“The challenge of any imaging of the heart, including CT, is that the heart is beating while you are imaging it, which

causes motion artifact and can lead to a blurry image,” Pepper states. Traditional CT takes a series of images of the heart cycle at the most quiet moment. “Those four or five pictures are then pieced back together with computer software. But this inevitably leads to disconnects in the image quality,” Pepper says. “We eliminate most of this by a geometric arrangement that captures the heart in one rotation. The whole database is achieved in a single shot.”

Pepper is not aware of any other cardiac-dedicated CT system in development. “Special-purpose CT systems are available for other niches, such as brain only or dental only, but none are as fast as the Arineta machine,” he says. The four competitors for whole-body CT scan are **GE Healthcare/General Electric Co.**, **Siemens AG**, **Royal Philips Electronics NV**, and **Toshiba Corp.** However, these systems sell from \$750,000 to \$2 million, whereas the Arineta machine can be priced at the low end of that range. And although one of the Toshiba systems allows the heart to be captured in one snapshot, it is not cardiac-specific, Pepper says.

Furthermore, computer simulations of the Arineta design demonstrate its capability to dramatically reduce radiation dose compared with conventional CT. “The

reduction in radiation dose results from a shortened imaging time and the ability to image less body tissue,” Pepper conveys.

Arineta expects to begin selling its CT system in the US by the end of 2013, and in Western Europe by early 2014. No new insurance reimbursement codes are needed.

In July, Arineta inked a strategic partnership with CT market-leader GE Healthcare. Neither company chooses at this time to divulge any details of the alliance. “However, this partnership validates what we believe is the important need for cardiac CT,” Pepper says. “It also validates our technical approach.”

To date, Arineta raised a \$3 million Series A round from private investors and expects to close an \$18 million Series B round by the end of the year.

Arineta’s most likely exit strategy is acquisition by one of its four major competitors. “This could occur in as soon as two years, coinciding with our first images in humans,” Pepper says. “There is also an additional list of cardiovascular procedures that today are performed in cardiology offices, which we believe over time could be done with our CT system. These include perfusion studies of the heart and catheter angiography as therapy.”

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— BOB KRONMYER