

## Robotic scan for horses could hold promise for human health

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In this Thursday, Sept. 15, 2016, photo, Chief of Surgery Dr. Dean Richardson, right, and Medical Director Dr. Barbara Dallap Schaer guide a horse into a room to undergo a computerized tomography scan at the University of Pennsylvania's New Bolton Center Hospital for Large Animals in Kennett Square, Pa. Veterinarians hope an innovative type of CT scan can advance health care for horses and possibly be adapted for people. (AP Photo/Matt Rourke)

Veterinarians hope an innovative type of CT scan can advance medical

care for horses and possibly be adapted for humans, eliminating the need for people to lie still inside a tube.

Robotic CT at the University of Pennsylvania's veterinary school allows a horse to remain awake and standing as scanners on two mechanical arms move around it. The resulting high-quality images, including some in 3D, for the first time offer detailed anatomical views of the animal in its normal, upright state.

That's a huge difference from the standard CT for a horse, which requires administering anesthesia, placing the animal on its side and maneuvering a scanning unit around the affected area. Not all body parts fit in the machines.

Robotic CT "is much less stressful," said Dr. Barbara Dallap Schaer, medical director of Penn Vet's New Bolton Center. "It's a pretty athletic event for horses to recover from general anesthesia."

The New York-based company 4DDI created the Equimagine system with components from robot manufacturer ABB. First unveiled at Penn last spring, 4DDI now has orders for more than a dozen units at equine facilities around the world, according to CEO Yiorgos Papaioannou.

"The word is spreading," Papaioannou said.



In this Thursday, Sept. 15, 2016, photo, a computerized tomography scan is conducted on a horse at the University of Pennsylvania's New Bolton Center Hospital for Large Animals in Kennett Square, Pa. Veterinarians hope an innovative type of CT scan can advance health care for horses and possibly be adapted for people. (AP Photo/Matt Rourke)

At Penn, the large white robotic arms are installed at a barn at New Bolton Center, the vet school's hospital for large animals in the Philadelphia exurb of Kennett Square. Horses are given a mild sedative and walked into the facility for a scan that lasts less than a minute.

CT, or computed tomography, gives pictures of soft tissues that X-rays can't. While traditional CT requires the subject to be still, this new system compensates for slight movement. Eventually, vets hope they'll be able to capture CT images of a horse running on a treadmill.

The ease of imaging means more horses can get preventive scans, said

Dr. Dean Richardson, chief of surgery at New Bolton. As it stands, he said, many owners are reluctant to have their horses anesthetized for a diagnostic procedure because recovery can be treacherous. As the animals emerge from unconsciousness and woozily struggle to find their footing, they risk catastrophic injury if they stumble.

"So the whole beauty of this technology, we hope, is that we're going to be able to scan much greater numbers of patients much, much earlier in the process of things like stress-related injuries in a racehorse," Richardson said.



In this Thursday, Sept. 15, 2016, photo, Chief of Surgery Dr. Dean Richardson, left, and Medical Director Dr. Barbara Dallap Schaer make preparations to perform a computerized tomography scan on a horse at the University of Pennsylvania's New Bolton Center Hospital for Large Animals in Kennett Square, Pa. Robotic CT at the university's veterinary school allows a horse to remain awake and standing as scanners on two mechanical arms move around it. The resulting high-quality images, including some in 3D, for the first time offer

detailed anatomical views of the animal in its normal, upright state. (AP Photo/Matt Rourke)

For humans, the technology could be helpful when dealing with squirming children or claustrophobic adults. Doctors could also get clearer views of, say, spinal problems in a standing patient instead of relying on CT performed while the person is lying down. Penn's translational research team has partnered with other hospitals to look at the possibilities.

"This is an interesting concept—the ability to image in your natural state," said Dr. Raul Uppot, an assistant professor of radiology at Harvard Medical School who is not involved in the research. "It does offer something that doesn't currently exist in the market (for humans)."

Equimagine's base cost is \$545,000, according to Papaioannou, though he said some new customers are getting the equipment in exchange for a per-scan fee. The company plans to make another version of the system for smaller animals, he said.

Penn's system was made possible through a donor, said Dallap Schaer, noting the cost was comparable to standard CT scanners. Overall cost for the images will be less than CT scans that require anesthesia, she said.



In this Thursday, Sept. 15, 2016, photo, Medical Director Dr. Barbara Dallap Schaer, right, and Radiologist Dr. Kathryn Wulster hold a horse as a computerized tomography scan is conducted at the University of Pennsylvania's New Bolton Center Hospital for Large Animals in Kennett Square, Pa. Robotic CT at the university's veterinary school allows a horse to remain awake and standing as scanners on two mechanical arms move around it. The resulting high-quality images, including some in 3D, for the first time offer detailed anatomical views of the animal in its normal, upright state. (AP Photo/Matt Rourke)

Dennis Charles, of Allentown, brought his horse Bert to Penn Vet for an MRI earlier this year, before robotic CT was available. The procedure required anesthesia, and Charles said he was incredibly nervous watching a wobbly Bert regain consciousness afterward.

Last month, the horse again needed imaging but was able to have robotic CT. Charles, who described the robotic system as looking like something out of "Star Wars," said the scans assured him Bert's leg injury had healed.

"They get really precise images," he said. "I think it's a tremendous piece of equipment."

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