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For Immediate Release

New Bolton Center's Robotics-Controlled Imaging System to Impact Research for Animal and Human Medicine

[April 27, 2016; Kennett Square, PA] – The EQUIMAGINE™ robotics-controlled imaging system at Penn Vet's New Bolton Center has the potential to improve and expand research as well as diagnoses and clinical care in animal and human medicine.

Penn Vet researchers and clinicians are in discussions with colleagues at Penn Medicine, Nemours Children's Health System, and other human medical centers about possible applications of the new imaging system.

The University of Pennsylvania School of Veterinary Medicine (Penn Vet) is the first veterinary teaching hospital in the world using the EQUIMAGINE™ system, which can be used with the standing and moving horse.

New Bolton Center veterinarians are developing the application-related protocols for use of the system with large animals, in collaboration with Four Dimensional Digital Imaging (4DDI), the company behind the innovation of the system. ABB, a leading global manufacturer of industrial robots, supplies the robots and many of the control components used in 4DDI systems.

"This initiative attests to Penn Vet's commitment to 'One Health.' Whether you are a bipedal human or a quadruped, you are going to benefit from this," said Dr. Thomas Schaer, Director of Penn Vet's Preclinical Service Core & Translation in Orthopedic Surgery. "It is incredibly exciting."

The EQUIMAGINE™ system can perform multiple modalities, unencumbered by an enclosed gantry or a C-arm, making it possible to scan any part of a patient.

The robot-powered imaging modality can collect typical, two-dimensional CT images; create three-dimensional images; produce 360-degree digital radiographic studies; and capture fluoroscopic images at up to 16,000 frames per second. Tomosynthesis, a modality that produces extremely high-resolution images of a focused

area of clinical interest, will be explored in the near future. Eventually, researchers, clinicians, and engineers hope to program the robots to capture images of a horse running on a treadmill.

The ability to use the system while the patient is in motion or load-bearing is one key component to this revolutionary technology.

“The system is going to allow us to explore tissues in a dynamic setting, in motion. Being able to image a veterinary or human patient in motion can be a game changer,” Schaer said. “For example, evaluating joints or the spine when they move will allow us to expand our knowledge to better understand certain clinical symptoms.”

Regarding diagnosis, having the ability to compensate for accidental motion in imaging could be a significant factor in working with children and infants who are too compromised or too sick for sedation or general anesthesia.

Children could be awake, talking with their parents, or playing a game on their phones, while the images are taken in less than a minute.

The technology could be used in many human medicine specialties. Excellent imaging capabilities such as MRI and CT exist, but they are static. Dynamic imaging can add an entire new dimension, Schaer said.

“If we can evaluate patients while they are moving, we might see clues as to why they have back pain,” Schaer said. “Other areas of interest are the elbow, the shoulder, and the knee.”

Additionally, robotics-controlled imaging has the potential to improve intra-operative imaging and workflows. Operating suites equipped with imaging robots with no constraints to a gantry, as is usually the case with current intra-operative imaging systems, will allow for quick and precise imaging studies of virtually any part of the patient’s body on demand. Another attractive feature is the potential for integrating the robotic imaging platform into the surgical navigation system.

“We will image the lower limb of the horse on the treadmill to look for clues in joints while in motion,” Schaer said. “These dynamic studies could help us better understand patterns that could explain why joint degeneration occurs.”

As the experts at New Bolton Center work with the new system and better understand its full potential, these discoveries can then be translated to clinical use. “These are hypothesis-driven research applications that ultimately will funnel into improved clinical care,” Schaer said.

For research purposes, one goal is to first understand “normal” and then “abnormal” in imaging at a greater resolution. “We now have another tool that allows us to image our

patients in areas we've never been able to image, or image well, and there is a lot to learn," he said.

"We will have the opportunity to explore beyond what we have ever been able to do," Schaer continued. "This technology enables us to push the research frontiers in understanding potential new pathologies that haven't been detected before."

Penn Vet's Preclinical Service Core & Translation in Orthopedic Surgery collaborates with academic and industry partners in translational research and development with the goal of improving animal and human health.

For more information, visit www.vet.upenn.edu/equimagine. Members of the media can download video, images, and press kit materials at www.vet.upenn.edu/equimagine-press.

About Penn Vet

The University of Pennsylvania School of Veterinary Medicine (Penn Vet) is a global leader in veterinary education, research, and clinical care. Founded in 1884, Penn Vet is the first veterinary school developed in association with a medical school. The school is a proud member of the One Health initiative, linking human, animal, and environmental health.

Penn Vet serves a diverse population of animals at its two campuses, which include extensive diagnostic and research laboratories. Ryan Hospital in Philadelphia provides care for dogs, cats, and other domestic/companion animals, handling more than 30,000 patient visits a year. New Bolton Center, Penn Vet's large-animal hospital on nearly 700 acres in rural Kennett Square, PA, cares for horses and livestock/farm animals. The hospital handles more than 4,000 patient visits a year, while the Field Service treats nearly 37,000 patients at local farms. In addition, New Bolton Center's campus includes a swine center, working dairy, and poultry unit that provide valuable research for the agriculture industry.

For more information, visit www.vet.upenn.edu.

About 4DDI

4DDI's technology was developed over the past decade as a solution to address many of the shortcomings and limitations of conventional imaging technology. Originally intended for human application, 4DDI's robotic-controlled imaging system has been adopted for animal and industrial applications. Its innovative employment of industrial robots to manipulate the imaging apparatus, coupled with 4DDI's proprietary software, provides an unlimited scanning geometry capable of producing images of an unprecedented quality and resolution.

For more information, visit www.equine4ddi.com.

About ABB Robotics

ABB Robotics is a leading supplier of industrial robots - also providing robot software,

peripheral equipment, modular manufacturing cells and service for tasks such as welding, handling, assembly, painting and finishing, picking, packing, palletizing and machine tending. Key markets include automotive, plastics, metal fabrication, foundry, electronics, machine tools, pharmaceutical and food and beverage industries. A strong solutions focus helps manufacturers improve productivity, product quality and worker safety. ABB has installed more than 250,000 robots worldwide.

For more information, visit www.abb.com/robotics.

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