# Molecular imaging can identify a potentially deadly blood vessel condition, research suggests

April 30 2010

According to research published in the May issue of *The Journal of Nuclear Medicine,* molecular imaging can help physicians identify aortic dissection—an often fatal blood vessel condition—and help guide treatment. Aortic dissection occurs when a tear in the wall of the aorta causes blood to flow between the layers of the wall of the aorta and force the layers apart.

"Many conventional forms of imaging are not able to clearly differentiate between acute and chronic dissection," said Hans-Henning Eckstein, M.D., Ph.D., a professor at the Technical University of Munich in Germany and corresponding author of "Imaging of Acute and Chronic Aortic Dissection by 18F-FDG PET/CT." "It is critical to patients' survival that doctors are able to verify acute or exclude chronic aortic dissection so they can decide the best course of treatment—whether that means rushing the patient to surgery in some cases or using beta blockers to lower the blood pressure."

Aortic dissection is the tenth leading cause of death in Western societies. It is the second most frequent cause of acute chest pain. In 2003, actor John Ritter died suddenly of complications from aortic dissection. Ritter's doctors were not able to identify his true condition until just before his death.

In clinically unclear cases, use of an advanced imaging

technique—positron emission tomography (PET) with the imaging agent fluorodeoxyglucose (FDG) and computed tomography (CT)—may help determine the age of an aortic dissection, the degree of risk and the need for surgery. Articles by researchers in Japan, Germany and the United Kingdom reported on the results of two studies that used FDG PET/CT to diagnose aortic dissection.

In the Munich study, researchers examined patients with symptoms of aortic dissection and patients with chronic asymptomatic dissection using FDG PET/CT to acquire images of the affected area, just above the heart. These images were studied to determine the difference between the two forms of aortic dissection. The researchers reported that acute dissection of the aortic wall led to elevated metabolic activity in freshly lacerated segments of the aortic wall, while stable chronic aortic dissection showed no increased metabolic activity.

Researchers speculate that increased metabolic activity in cases of acute aortic dissection is due to repair mechanisms of the aortic wall injury, causing cell activation and accumulation, and that low metabolic activity in chronic aortic dissection is due to scar tissue. Further studies are needed to prove these hypotheses.

In another study reported in JNM, researchers in Japan found that greater metabolic activity in acute aortic dissection was significantly associated with increased risk for rupture and progression. The study shows that FDG PET/CT may be used to improve patient management, although more studies are still needed to clarify its role in the clinical setting.

"Usually, it is difficult to predict poor outcome for patients receiving medical treatment for acute aortic dissection," said Toyoaki Murohara, M.D., Ph.D., F.A.H.A., a professor at Nagoya University Graduate School of Medicine in Japan and one of the authors of the study. "This

study will give us new information to evaluate the degree of the patients' illness."

"Early diagnosis and treatment are essential for survival of patients with this rare and often fatal disease," said James H.F. Rudd, M.D., Ph.D., M.R.C.P., a researcher and consultant cardiologist at the University of Cambridge, United Kingdom, who authored an invited perspective article in JNM on the role of 18F-FDG PET in aortic dissection. "Although further studies are needed, this research suggests that FDG PET imaging might be used to identify patients who are at a very high risk of complications, allowing them to be fast-tracked to surgery."

Provided by Society of Nuclear Medicine