

A new test has been developed to predict sudden cardiac death in hemodialysis patients in whom such forecasts were previously impossible. The method was presented at the International Conference on Nuclear Cardiology and Cardiac CT (ICNC 12) by Dr Akiyoshi Hashimoto, a cardiologist at Sapporo Medical University in Japan. The test uses a combination of nuclear medicine, C-reactive protein and electrocardiogram (ECG).

ICNC is organised by the Nuclear Cardiology and Cardiac CT section of the European Association of Cardiovascular Imaging (EACVI), a registered branch of the European Society of Cardiology (ESC), the American Society of Nuclear Cardiology (ASNC), and the European Association of Nuclear Medicine (EANM). ICNC 12 is held 3 to 5 May 2015 in Madrid, Spain.

"Hemodialysis patients are at increased risk of sudden cardiac death because they often have latent ischaemic heart disease which reduces blood flow to the heart," said Hashimoto. "Latent means they don't have any clinical signs or symptoms, making it very difficult to predict a future heart attack. Ischaemic heart disease should be diagnosed at an early stage so that preventive therapies can be given. But exercise stress testing is inappropriate for diagnosis in hemodialysis patients who have multiple complications including muscle weakness, osteoporosis and peripheral arterial disease."

The current study investigated the ability of three methods, alone or in combination, to predict the risk of sudden cardiac death in hemodialysis patients. All three methods were performed at rest. The first was a nuclear medicine radioisotope technique called beta-methyl-p-iodophenyl-pentadecanoic acid (BMIPP) scintigraphy¹, which measures fatty acid uptake by the heart. ECG² was used to assess the Q wave and C-reactive protein³ levels in the blood were measured.

The study included 677 patients from the multicenter, prospective cohort study B-SAFE.⁴ BMIPP scintigraphy, ECG and C-reactive protein assessment was performed in all patients. During the 3-year follow up, 20 sudden cardiac deaths occurred. Patients who suffered sudden cardiac death were more likely to have abnormal BMIPP scintigraphy, abnormal Q wave and a greater C-reactive protein level compared to patients who did not experience sudden cardiac death. There were no differences between the three groups in other clinical, laboratory or hemodialysis parameters.

Taken on their own, patients with a BMIPP score greater than 16 had an 11-fold increased risk of sudden cardiac death, while an abnormal Q wave conferred an 18-fold increased risk, and a C-reactive protein level greater than 2.38 mg/dl predicted a 7-fold increased risk. Patients with two or three of the predictors had a sudden cardiac death risk that was 145 times greater than patients with normal levels on all three measures.

"The most powerful way to predict sudden cardiac death was to combine the measures. Hemodialysis patients who had 2 or 3 abnormal measures were at 145 times increased risk," Hashimoto said. "In hemodialysis patients, abnormal uptake of BMIPP has an independent and incremental value in the prediction of sudden cardiac death in combination with C-reactive protein and Q wave. This indicates impaired fatty acid metabolism by the heart which could be caused by latent ischaemic heart disease and may lead to fatal cardiac events.

"An abnormal Q wave indicates the presence of previous myocardial infarction or serious myocardial injury responsible for low cardiac output, heart failure and/or potentially fatal arrhythmias. High C-reactive protein levels reflect any active inflammatory reactions such as infection or atherosclerosis. For the first time there is a way to predict sudden cardiac death in hemodialysis patients. In a clinical setting, BMIPP scintigraphy can be used in hemodialysis patients who are identified as high risk by abnormal Q wave and increased C-reactive protein. Abnormal BMIPP identifies specific myocardial injury which could be an effective therapeutic target for preventing sudden cardiac death."

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