

Noninvasive imaging technique may help kids with heart transplants

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Cardiologists at Washington University School of Medicine in St. Louis have developed a noninvasive imaging technique that may help determine whether children who have had heart transplants are showing early signs of rejection. The technique could reduce the need for these patients to undergo invasive imaging tests every one to two years.

The new method is described online in the [Journal of Heart and Lung Transplantation](#).

The invasive imaging test, a [coronary angiogram](#), involves inserting a catheter into a blood vessel and injecting a dye to look for dangerous plaque on the walls of arteries feeding blood to the heart. This plaque build-up indicates coronary artery disease and is a sign that the body may be rejecting the [new heart](#). Since pediatric heart transplant patients are at high risk of developing coronary artery disease, doctors monitor their arteries on a regular basis. But recurring angiograms become problematic.

"Many of these children have undergone so many operations, we have lost access to their big blood vessels," says Charles E. Canter, MD, professor of pediatrics. "Sometimes it's impossible to do catheterization procedures on them."

Based on experience imaging other types of inflammation in arteries, senior author Samuel A. Wickline, MD, professor of medicine, and his colleagues, including Canter and medical student Mohammad H.

Madani, a Doris Duke Clinical Research Fellow, examined whether they could assess coronary artery disease in these children using [magnetic resonance imaging](#) (MRI). In this case, the MRI was enhanced with a commonly used contrast agent called gadolinium that is injected into the arteries. Gadolinium is not radioactive and makes areas of inflamed arteries and heart muscle show up brighter on an MRI.

"The brighter it is, the more it is associated with coronary artery disease," Canter says.

The study included 29 [heart transplant patients](#) and eight healthy children who served as controls. The transplant patients underwent standard coronary angiograms as part of their normal care. They also had MRIs of the coronary arteries to examine whether the noninvasive method correlated with the degree of coronary artery disease found in the angiograms. The eight children who served as controls only had MRI scans. The researchers assessing the MRI results were blinded to the results of the transplants patients' angiograms.

While all of the transplant patients' angiograms showed evidence of plaque build-up, in only six of them was it severe enough for a diagnosis of coronary artery disease.

These six patients had the brightest coronary arteries on the MRI scans, compared to both the transplant patients without coronary disease and the healthy controls. Still, the 23 transplant patients without diagnosed coronary disease had significantly brighter arteries than the healthy participants. Such evidence demonstrates the need to continue monitoring these patients.

Although the brightness of the arteries on MRI correlated well with a diagnosis of [coronary artery](#) disease, gadolinium can be toxic to the kidney, Canter points out. This means the technique can't be used for

patients with poor kidney function. Furthermore, clear images with MRI are difficult in very young children because of their high heart rates. In this study, no participant was younger than age 10. Nevertheless, Canter sees a possible future place for this technique in helping to monitor the progress of [coronary artery disease](#) in [transplant patients](#).

"The results of this pilot study were very promising," Canter says. "But we need to look at more patients. We're in the process of developing a bigger study to confirm and refine the results. I think eventually this could be used as a screening technique, not so much to eliminate, but to reduce the number of angiograms."

More information: Madani MH, Canter CE, Balzer DT, Watkins MP, Wickline SA. Noninvasive detection of transplant coronary artery disease with contrast-enhanced cardiac MRI in pediatric cardiac transplants. *Journal of Heart and Lung Transplantation*. Online July 2, 2012.

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