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Portfolio Sample

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American College of Cardiology (JACC)*

For every issue of the Journal of the American College of Cardiology, the ACC sends out a email that works as press release and teaser. Editors choose the key study to highlight, and my task was to write a piece that appealed to layperson readers, enticing them to read more and present the information to the public. The trick? Wading through intricate study details, asking the right questions, and explaining the information in a simple yet interesting manner.

Common Treatment for Blocked Arteries May Hamper Heart's Self-Healing Mechanism New Research Suggests Need for Increased Caution with Drug-Eluting Stents

Coronary collateral function is nature's bypass system, a method the heart uses of rerouting blood past blocked arteries. When physicians use stents to keep blocked arteries open, further blockages can occur, including a rare condition called stent thrombosis. Coronary collateral function can prevent complications that can lead to heart attack, one of the most frequent causes of death in industrialized countries. According to new research that appears in the January 2, 2007 edition of the Journal of the American College of Cardiology, coronary collateral function could be significantly impaired with the use of drug-eluting stents, the most common and effective kind of stents.

The research was conducted at the University Hospital in Bern, Switzerland. Lead researcher Christian Seiler, MD, professor and co-chairman of cardiology at University Hospital, said the goal of the study was to determine the effects of these stents on an unstudied area of coronary collateral function, and investigate whether the potential toxicities of drug-eluting stents extended to these little natural bypass channels of collaterals.

"The new finding of our study is that patients who received drug-eluting stents have a lower collateral flow than patients receiving bare metal stents," said Dr. Seiler. "The combination of sudden arterial blockages due to a rare condition called stent thrombosis, and the absence or impairment of the self-healing mechanism of coronary collateral function, potentially leads to a larger and deadlier heart attack in patients with drug-eluting stents."

Drug-eluting coronary stents are metallic, expandable, mesh-like tubes placed at the site of blockage in coronary arteries. Bare-metal stents were the first of this type of coronary intervention, but may result in scar tissue formation at the site of insertion. This often results in restenosis, or recurring blockage in the arteries. Drug-eluting stents are coated with medication designed to prevent the formation of scar tissue, dramatically reducing the risk and occurrence of restenosis.

"Our results show that drug-eluting stents may hamper the heart's ability to salvage its own muscles," said Dr. Seiler. "Drug-eluting stents work in part by slowing down wound healing and reducing the inflammatory response in order to prevent scar tissue from forming and arteries becoming blocked. This may negatively affect the development of collaterals. In the event of a coronary stent occlusion, such as stent thrombosis, this could lead to a more severe heart attack."

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The researchers note that the beneficial effects of drug-eluting stents are relatively long-term, and result in far fewer cardiovascular interventions. Previous research has shown that the stents may pose some rare but serious risks in terms of the occurrence and severity of blood clotting. These are stent thromboses, a rare but deadly form of blockage that may occur with drug-eluting stents. Currently patients receive blood thinning medications after stent insertion to protect against this complication.

However, this study may indicate yet another risk of drug-eluting stents with decreased coronary collateral function. According to Dr. Seiler, a well-grown system of collaterals provides blood from another area of circulation to the heart muscle area usually supplied by the blocked artery. Coronary collateral function remains an area of active investigation. But Seiler and other cardiologist researchers recognize the important role collateral function plays in patients with coronary artery disease.

For the study, the researchers measured coronary collateral function in 120 patients six months after either bare-metal stent or drug-eluting stent implementation. The researchers used coronary pressure measurements by catheter-inserted monitoring wires as well as ECG changes to determine functioning of collateral flow. Participants were similar in age, duration of chest pain, ECG results before the study, and frequency of cardiovascular risk factors. Patients with drug-eluting stents had the two most common medications on the stents, sirolimus and paclitaxel.

Those with drug-eluting stents exhibited significantly lower coronary collateral function (30 to 40 percent) than those with bare-metal stents.

Morton J. Kern, MD, a professor of medicine and associate chief of cardiology at University of California-Irvine, did not participate in the study, but said it provides important insight into another downside of drug-eluting stents. Dr. Kern is the author of an editorial comment about the study that will accompany publication of the new research.

“This research continues to emphasize that drug-eluting stents may have some significant risks in addition to their benefits,” said Dr. Kern. “We already know that these stents are related to more subacute thromboses. This new information means physicians must apply even more caution in using drug-eluting stents since the consequences are greater than previously expected.

“The clinical implications for this study are several,” Dr. Kern continued. “Cardiologists must ensure that drug-eluting stents are necessary and indicated, meaning that blockages are limiting blood flow. Implantation procedures must be optimal, as must post-procedural pharmacological therapy. Finally, patients must understand the medication requirements for preventing stent thrombosis.”

Dr. Seiler and team recommend their study be followed with more scientific investigation into the role and mechanism of coronary collateral function and the effect of drug-eluting stents. Dr. Kern agrees.

“This study should prompt further research to improve collateral function and to identify optimal
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treatments for thromboses. When considering the use of drug-eluting stents, physicians must weigh the risks and benefits, and so far the benefits of this intervention are high. We must continue to find ways to treat artery blockages in the ways that provide the least risk and most benefit.”

Dr. Seiler reports no disclosures with this research. Funding for the study was provided by the Swiss National Science Foundation.

Also in this issue of JACC

While high blood pressure is known to increase the risk of cardiovascular problems in the general population, low blood pressure can be just as disastrous for patients suffering from heart failure. A medication shown in previous trials to improve cardiac health, the fixed-dose combination of isosorbide dinitrate and hydralazine (I/H), may work by lowering blood pressure. As such, many cardiologists treating heart failure hesitate to prescribe these types of drugs, concerned their patients with dangerously low blood pressure will be endangered further.

Researchers from two U.S. universities and three medical agencies sought to determine the effects of blood pressure on the effectiveness of I/H. They revisited data from the African-American Heart Failure Trial, in which 1,050 patients with heart failure (self-identified as African-American) received I/H or placebo. I/H was discovered to be effective in reducing mortality. In this study, researchers sought to determine if lowering blood pressure was necessary for this beneficial effect. They examined blood pressure in participants before and after receiving I/H, as well as the effects of the medication.

Researchers reconfirmed that treatment with I/H significantly decreased blood pressure throughout the study participants. However, those patients with the lowest (and most dangerous) blood pressure did not experience a decrease. In fact, their blood pressure increased slightly. The effectiveness of I/H was just as strong, as the patients with the lowest blood pressure experienced a 67% decrease in mortality.

The results indicate, according to the researchers, “vasodilator therapy [such as that with I/H] can usually be well tolerated by patients with severe heart failure, and that low blood pressure should not preclude a trial of these agents.” In addition, since heart failure patients with low blood pressure have the greatest risk and worse prognosis, “patients with a low [blood pressure] would be expected to derive the greatest absolute benefit from this treatment.”

Institutions participating in this study were the University of Minnesota, Minneapolis, and the University of North Carolina, Chapel Hill. Other researchers participating are employed by: NitroMed, Inc., Lexington, Massachusetts; Virtu Stat, Ltd, North Wales, Pennsylvania; and the VA Medical Center, Minneapolis, Minnesota.