Mayo genomic discovery: Protecting kidney function during heart failure

June 16 2009

Mayo Clinic cardiology researchers have found a peptide that helps preserve and improve kidney function during heart failure, without affecting blood pressure. Earlier variations of this peptide caused blood pressure to drop limiting the potential benefits to the kidneys. The findings appear in the current *Proceedings of the National Academy of Sciences*.

"Heart failure itself and some of the approaches used to treat it can have detrimental effects on the kidneys," says Mayo cardiologist and lead researcher Robert Simari, M.D. "Our hope is that this compound will help protect kidney function while you're being treated, and possibly shorten your hospital stay and keep you out of the hospital."

This new peptide (a unique link of amino acids) has been tested in the laboratory and in animal models and is expected to move into clinical trials next year.

"One of the biggest additional concerns for patients with heart failure is the health of their kidneys," says Dr. Simari. "The extreme case is that it can lead to the kidneys shutting down completely." Nearly 5 million Americans are living with heart failure, a condition where the heart can't pump enough blood to meet the body's needs. Symptoms include shortness of breath, exercise intolerance and fluid retention. All can occur when heart function is impaired.

Seven Years of Research

The mapping of the human genome (2000-2003) revealed a gene that produces a protein called BNP (B-type natriuretic peptide). BNP was not only useful in diagnosing heart problems, it also proved therapeutic in treating heart failure. Unfortunately, says Dr. Simari, it had limited use because many heart failure patients experience low blood pressure and BNP lowered it further.

The Mayo investigators discovered an alternative splicing (AS) of BNP in messenger RNA (produced by the same gene). When they shortened the amino acid sequence of ASBNP for testing, they found that it had the same therapeutic benefits as BNP, but without the side effects to blood pressure. Positive impacts include increasing the kidney filtration rate, suppressing harmful protein production, and keeping water and salt flowing from the body. Potentially, this new drug would be given by IV to patients who are being treated in the hospital.

"There's an important reduction of kidney function every time one of these acute heart failure episodes happens," says Dr. Simari. "And by stopping one or more of those decrements, we hope there will be an overall improvement in long-term maintenance of kidney function."

Source: Mayo Clinic (news : web)