Setting the stage for a new paradigm in treatment of heart failure

New evidence shows the root of heart failure lies in misfolded proteins in the heart's cells, according to UNC researchers. The finding may pave the way for dramatically new treatment approaches.

L-R: Cam Patterson, MD, MBA, and Monte Willis, MD, PhD

CHAPEL HILL, N.C. – Despite a substantial increase in the number of people suffering the debilitating and often deadly effects of heart failure, treatments for the condition have not advanced significantly for at least 10 years. An analysis by researchers at the University of North Carolina School of Medicine shows new breakthroughs could be closer than we thought.

The analysis points to striking similarities between heart cells in patients with heart failure and brain cells in patients with Alzheimer's disease, raising the possibility that some treatment approaches being developed for Alzheimer's may also help reverse the damage from heart failure.

"We know that Alzheimer's is a process of wear and tear on the brain, and the same sort of wear and tear affects the heart," said Cam Patterson, MD, MBA, UNC's chief of cardiology. "The good news is now that we recognize that — and can understand how the wear and tear actually affects proteins in the heart — it offers us a new chance to identify strategies to reverse that wear and tear. It's like providing a key to preventing aging of the heart."

The analysis, co-authored by Patterson and Monte Willis, MD, PhD, associate professor of pathology and laboratory medicine at UNC, appears in the Jan. 31, 2013 issue of the New England Journal of Medicine.

The researchers say a variety of recent studies point to one conclusion: misfolded proteins in heart cells are a key factor in the process of heart failure. "There's a convergence of data pointing to this being a real problem," said Patterson.

The analysis brings together three main lines of evidence. First, studies of heart tissue from patients with heart failure reveal large accumulations of misfolded proteins within damaged heart cells, similar to the accumulations found in the brain cells of patients with

Alzheimer's. Second, recent studies using mice show heart problems can result from defects in the body's quality-control system for monitoring and maintaining proteins. Finally, studies of a rare genetic disorder link severe heart problems to misfolding of two proteins, known as desmin and CryAB.

The new conclusion opens enticing avenues for possible treatments. Scientists studying Alzheimer's and other neurological disorders have long focused on ways to correct or prevent protein misfolding, and have even developed drugs that accomplish this feat. "This raises the possibility that that same type of strategy, and maybe even some of those compounds, will be beneficial in heart failure," said Patterson. "It's an entirely new treatment paradigm."

Heart failure, in which the heart fails to pump as effectively as it should, is a chronic, debilitating and often deadly condition affecting millions of adults in the United States. It can result from heart attacks, coronary heart disease and many other causes. Increases in heart attack survival rates mean more people are living with the debilitating effects of heart failure, including fatigue, shortness of breath and increased mortality.