

Rodents' workouts, diets may hold health benefits for humans with heart failure and diabetes

July 22 2011, By Steven Copp

(Medical Xpress) -- Though rats, fish oil and beetroot juice read like ingredients in a witch's brew, to a Kansas State University research team, information from this combination could lead to health breakthroughs for aging populations and people suffering from heart failure and diabetes.

Steven Copp, a doctoral candidate in anatomy and physiology, Manhattan, is one of the researchers in K-State's Cardiorespiratory Exercise Physiology Laboratory who's studying the delivery and use of oxygen within the microvasculature of the skeletal muscles.

According to Copp, altered control of the peripheral blood vessels -- which results from aging or diseases like diabetes and [congestive heart failure](#) -- creates abnormalities in the circulatory system. This, in turn, causes dysfunction in oxygen delivery to the skeletal muscles and consequently, premature fatigue during exercise and normal daily activities.

By identifying what's responsible for the [oxygen delivery](#) and use increases during contractions in healthy skeletal muscles, Copp and colleagues could pinpoint how these processes become distorted in people during the onset of diabetes and [chronic heart failure](#) and with advancing age. Eventually these dysfunctions could be corrected while still in the early stages by new therapeutic treatments, pharmaceuticals,

exercise regimes or even nutritional supplements like [fish oil](#) and [beetroot juice](#).

"The overall goal is to be able to take someone who gets exhausted from doing things in daily life, like walking across a room, and allow that person to take a walk or play nine holes of golf -- just have a dramatically improved overall quality of life," Copp said.

Copp works on the study with David Poole, professor of kinesiology and anatomy and physiology, and Tim Musch, professor of kinesiology. Poole and Musch, who both direct the Cardiorespiratory Exercise Physiology Laboratory, previously found that it's also the peripheral blood vessels -- not just the heart as once believed -- that develop dysfunction and result in poor [skeletal muscle](#) performance.

To gather information, the team observes the treadmill workouts of rats and studies the data from it. Though pint-sized, rats share similar physiology and morphology to people, making it possible to easily translate findings to the human body.

Most recently the team has been investigating the role of altered nitric oxide function in older rats or rats that are diabetic or have [heart failure](#). Nitric oxide is a molecule important for normal blood vessel function in healthy individuals. Researchers are beginning a series of projects that will test if various combinations of exercise, fish oil, antioxidant or beetroot juice supplementation can restore exercise tolerance to these affected individuals.

"We're really excited about these projects because of what it could mean for everybody as we progress through our life cycle and have certain processes inevitably screw up," Copp said. "If we can figure out how to fix the dysfunction in those processes with something like beetroot juice or fish oil, the benefits are going to be tremendous for human life and

the quality of life is going to skyrocket."

Provided by Kansas State University

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