Heart medication best at bedtime, study reveals

May 9 2011

When doctors give heart drugs to patients, the time of day can make a big difference, according to new research by University of Guelph scientists.

Many doctors prefer to give heart drugs to patients in the morning. But the study revealed that angiotensin-converting enzyme (ACE) inhibitors – commonly given to patients with high blood pressure or after a heart attack or during heart failure – improve heart structure and function when given at sleep time. In fact, when administered during wake time, ACE inhibitors are no more effective than a placebo, the study found.

The research was conducted on mice with high blood pressure.

Guelph professors Tami Martino, Department of Biomedical Sciences, Jeremy Simpson, Department of Human Health and Nutritional Sciences and Nazneen Tata conducted the study in the laboratory of Dr. Michael Sole at the Peter Munk Cardiac Centre and the Heart and Stroke Richard Lewar Centre of Excellence in Toronto.

The study will appear May 17 in the *Journal of the American College of Cardiology*.

"Heart drugs are often given to patients in the morning for convenience without considering biological rhythms or time-related risks of adverse effects," said Martino. "But if they're given at bedtime, it's better."

That is because the drug affects a natural hormone involved in heart remodeling. Hormone levels increase at night and cause the heart to enlarge, which damages the organ in cardiac patients, said Martino.

"The sleep-time benefit of giving the ACE inhibitor correlates with the biological rhythm of this hormone," she said. "By targeting those hormones when they're highest during sleep, you're dropping their levels so they're not doing so much damage."

It's known that heart attacks and sudden cardiac death peak in early morning and night-shift workers with disturbed circadian rhythms have higher risk of heart disease and worse outcomes, said Sole, who is a cardiologist at the Toronto General Hospital.

"Earlier studies our group has worked on suggest that the heart repairs and renews itself during sleeping hours," he added.

These findings led the researchers to explore whether the effectiveness of ACE inhibitors is impacted by the time of day it's administered. The team used a short-acting version of the drug and studied the effects during wake and sleep time in a mouse model designed with high blood pressure.

Besides administering the drug to patients before bed, study results also suggest doctors should consider using a short-acting version of the drug, said Martino.

"Since the drug is most effective during sleep hours, it's not necessary to have its effects last throughout the span of an entire day. Using a short-acting version of the drug may help to reduce side effects."

Other researchers have also looked at using biological rhythms for drug treatment of other diseases, such as insulin release in diabetes and

chemotherapy for cancer patients, she added.

"We are now starting to learn that biological and physiological rhythms play an important role in health and disease."

Provided by University of Guelph