CARDIO CARE

CARDIOVASCULAR RESEARCH INSTITUTE • UNT HEALTH SCIENCE CENTER AT FORT WORTH • VOLUME 1, NUMBER 2 • JUNE 2000

CARDIO CARE is a publication of the Cardiovascular Research Institute at the University of North Texas Health Science Center at Fort Worth. Information contained in this publication is educational only and is not intended to replace proper medical evaluation. If you have specific medical questions concerning your personal health, please contact your family physician.

Welcome to the CRI...

In this issue of Cardio Care, we are beginning a series of reports to highlight our ongoing research in the fight against heart disease with an emphasis on what our research means to the patient.

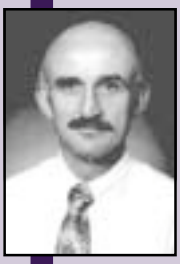
Division of Cardiac Endocrinology

James L. Caffrey, Ph.D., Director

Our attention is never more clearly focused on the delicate balance which maintains normal heart function than when we read about the sudden death of otherwise healthy young athletes. Cardiovascular diseases affect us all, exacting an enormous toll on the public health. Cardiovascular disease is often characterized by an imbalance between the hormones and nerves which control the heart. One group of hormones we produce are natural pain killers which behave much like morphine or opium. They are called internal or "endogenous" opiates. The endogenous opiates may influence the development of high blood pressure, heart failure, and the abnormal heart

continued on page 3

Meet the Associate Director...



James L. Caffrey, Ph.D., has been a faculty member at the University of North Texas Health Science Center at Fort Worth since 1977. He is a professor in the Department of Integrative Physiology and serves as director for the Division of Cardiac Endocrinology at the Cardiovascular Research Institute. His research program focuses on the interactions between stress, hormones, and nerves within the cardiovascular system with a special emphasis on endogenous opiates.

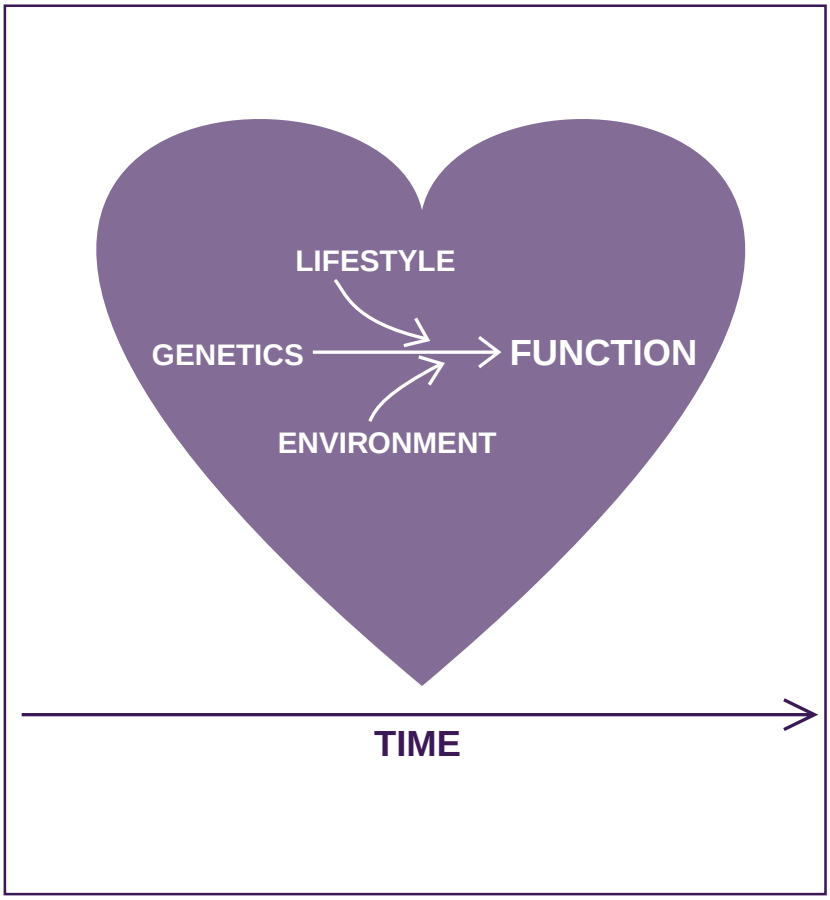
Dr. Caffrey has a long-standing interest in promoting diversity in higher education, currently through an active role in the UNT Health Science Center's McNair Scholars and Summer Multicultural Advanced Research Training programs. Dr. Caffrey is widely recognized for his ability to translate scientific information into lay language. He has also served as visiting professor at Ponce School of Medicine in Puerto Rico, at the University of Kuwait, and at the Universidad Autonoma de Guadalajara, Mexico.

Dr. Caffrey is a member of the American Physiology Society, American Heart Association, Endocrine Society, and the International Narcotics Research Conference.

The Cardiovascular Research Institute was established in 1995 as an Institute of Discovery of the UNT Health Science Center. It is a multidisciplinary program designed to promote basic and clinical research, education, clinical practice and community outreach programs in the prevention, diagnosis, treatment and rehabilitation of cardiovascular disease of human beings of all ages.

The Heart… does it age?

Of course it does! Just like all other parts of our body, the heart changes with the passage of time. Because the heart performs practically constant mechanical work every minute of our lives, even during sleep, one might think it ages more quickly than other organs. However, this is not necessarily true. Changes occur in the chemistry, structure and function of the aging heart. Like most age-related changes in our bodies, these changes in general cannot be called improvements, but they are a normal and unavoidable part of our aging process.



Chemical changes in the aging heart

Researchers blame much of the aging process, including that of the heart, on oxidizing chemicals in the body. Oxidizing chemicals are those naturally occurring chemicals that combine with oxygen. The cumulative action of that combination over years of time damages genes and proteins in heart cells. The study of antioxidant vitamins is currently a field of important study.

There are also proteins in the heart that control how thoroughly heart muscle relaxes between beats and activity of these proteins decreases with age. This causes an inadequate relaxation between beats and contributes to the stiffening of the heart with age.

Glucose, a primary fuel for the body, tends to link proteins (interweave proteins) together inappropriately, which over time decreases the elasticity of the proteins. In one study, old dogs were given a chemical which breaks these protein links caused by glucose. The treatment decreased the stiffness of the aged dogs' hearts, and improved their heart function to that of younger dogs.

Who says you can't teach old dogs new tricks!

Aging of cardiac structure and function

Heart cells die with aging, much more so in men than in women. As a result, heart tissue becomes more fibrous (less elastic). The death of heart cells and the loss of elasticity decrease the heart's ability to contract strongly.

Therefore, atrial contraction becomes more important to heart pumping in old age. The atrial contraction that helps fill the ventricles must work more to fill the ventricles as one gets older due to increased ventricular stiffness (decreased elasticity).

Electrical activity of the heart also changes with age. Heart beat initiation and electrical conduction in the heart both slow down as we get older. Maximum heart rate decreases with age and blood flow to the heart (flow in the coronary arteries) commonly decreases with age. Some degree of coronary artery and heart valve calcification probably occurs in even the healthiest oldster. In fact, arteries throughout the body normally become stiffer with age, which increases the work performed by the heart to pump blood to all tissues. In spite of the changes with aging, hearts from donors in their sixties have been successfully transplanted into younger recipients.

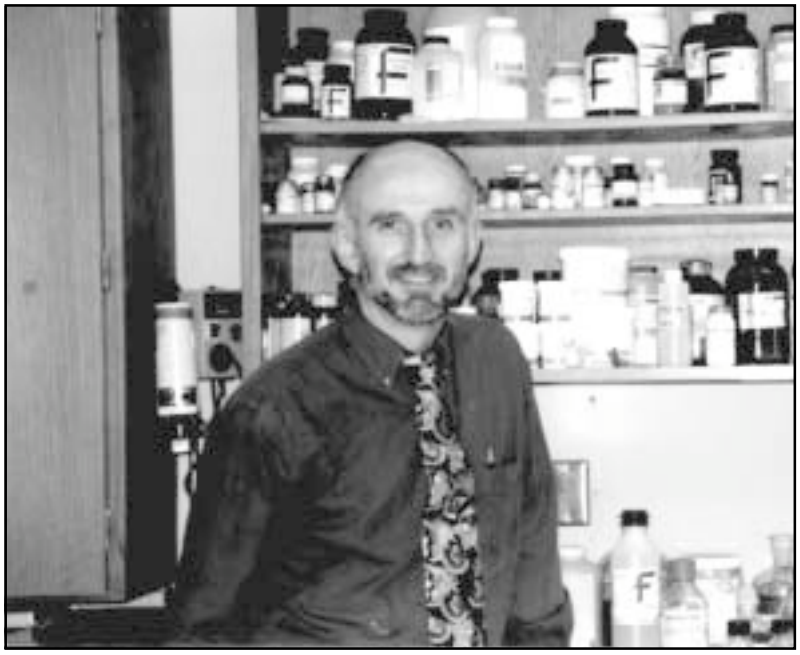
Aging cannot be called disease, yet changes from aging do make the heart more prone to disease processes and decrease the reserve capacity of heart function available for coping with stress and disease. Although damaging chemicals in the body are naturally occurring, many factors associated with lifestyle (dieting, smoking, ethanol) and environment (pollution) increase levels of and damage from such chemicals. We can control many such factors to help our hearts help us age with health. In the future, we may also learn to alter genetic factors, but we will never stop the passage of time.

Dr. Watenpaugh is a Research Assistant Professor in the Department of Integrative Physiology at UNT Health Science Center and a CRI faculty member.

Welcome *continued from page 1*

rhythms which often kill victims during heart attacks. Opiates also increase in the aging heart.

We have recently identified one group of opiates in heart muscle – enkephalins. We believe that the proper function of these hormones within the heart maintains normal heart function during periods of extreme stress. We do not, however, know what controls their release, what cardiac functions they regulate, or how these actions are accomplished.



Dr. Caffrey in the Cardiac Endocrinology Laboratory.

We are currently addressing the specific questions:

1. Which and how do heart opiates control the strength and speed of the heart beat?
2. Where in the heart do they act and when and how are they released?

In addition to understanding the disease processes, we are also developing therapeutic interventions. If we can determine how these hormones function under normal circumstances, we will be much better able to intervene when they are involved in cardiovascular disease processes.

Glossary of Terms used in this issue:

calcification: abnormal depositing of calcium salts in tissue.

oxidizing chemicals: naturally occuring substances that combine with oxygen.

protein: building blocks for tissue.

CRI Faculty

James L. Caffrey, Ph.D.
Associate Director of the CRI
Division of Cardiac Endocrinology

S. Dan Dimitrijevich, Ph.D.
Division of Cell & Tissue Engineering

H. Fred Downey, Ph.D.
Division of Cardiac Hemodynamics

Stephen Grant, Ph.D.
Division of Molecular and Vascular Genetics

Robert T. Mallet, Ph.D.
Division of Cardiac Metabolism

Michael L. Smith, Ph.D.
Center for Sleep Research

Associate Faculty
Neeraj Agarwal, Ph.D.
Mark Baker, D.O.,
Barbara A. Barron, Ph.D.
Joan F. Carroll, Ph.D.
Glenn Dillion, Ph.D.
Richard Easom, Ph.D.
Michael J. Forster, Ph.D.
Robert W. Gracy, Ph.D.
Patricia A. Gwirtz, Ph.D.
Robert L. Kaman, Ph.D.
Andras Lacko, Ph.D.
Robert R. Luedtke, Ph.D.
Muriel Marshall, D.O., Ph.D.
Michael Martin, Ph.D.
Walter McConathy, Ph.D.
William McIntosh, D.O.,
A. H. O-Yurvati, D.O.
Frederick A. Schaller, D.O.
Xiangrong Shi, Ph.D.
Craig W. Spellman, D.O., Ph.D.
Scott Stoll, D.O., Ph.D.
Donald E. Watenpaugh, Ph.D.
Martin Weiss, D.O.
Thomas Yorio, Ph.D.

UNIVERSITY of NORTH TEXAS
HEALTH SCIENCE CENTER at Fort Worth
★
Education, Research,
Patient Care and Service

CARDIOVASCULAR RESEARCH INSTITUTE
3500 Camp Bowie Boulevard
Fort Worth, Texas 76107-2699