

THE INS AND OUTS OF CALORIE RESTRICTION AS AN ANTI-AGING THERAPY



Public Lecture by Dr. Laura Dugan Department of Medicine & Neuroscience

Wednesday, February 15, 2006, 7:00 PM
Garren Auditorium, Basic Science Building

Sponsored by
The Sam and Rose Stein Institute for Research on Aging
University of California, San Diego

A number of important advances have been made recently in our understanding of the basic process of aging. Using transgenic approaches, genes involved in aging have been identified in lower organisms such as the round worm, *C. elegans*, and the fruit fly, *Drosophila*. Among these are genes that regulate insulin signaling, the response of the organism to stress, and how chromosomal DNA is accessed. One additional intervention that has taught us an extraordinary amount about the aging process is caloric restriction. Calorie restriction, which has been studied for more than 50 years in species ranging from yeast to primates, involves eating a carefully balanced diet with 15-40% fewer calories than the average intake. In lower organisms, calorie restriction extends the life span of all species studied so far. More importantly, calorie restriction slows many of the physical changes associated with aging, such as cataract formation or loss of skin elasticity. In mammals, calorie restriction also results in decreased cancer incidence, improved immune cell function, and a “younger” state of the musculoskeletal system. However, despite this large body of data showing the positive effects of calorie restriction in other species, we do not yet know whether moderate calorie restriction will actually have these benefits for primates, including man, although tantalizing data are beginning to emerge.

A number of the genes identified in lower organisms as critical to the aging process are actually modified by calorie restriction, indicating an exciting convergence of the genetics of aging and a relatively simple life-style intervention. Although we all would like a set of “Mercedes” genes, it appears that calorie restriction may allow us to tune up our own genes to resist age-related diseases, and to retain better health and function.

This talk will discuss what we have learned about the aging process from model organisms such as *C. elegans*, *Drosophila* and mice, and will also present what is known to date about humans and calorie restriction, including some data from the Biosphere2 project. The presentation will also review some of the important questions that remain about how to bring the apparent benefits of calorie restriction to humans. Since there is some information that there may be a down-side to calorie restriction, it will be important to attempt to develop approaches that retain the benefits of calorie restriction without some of these less-welcome effects. As our population continues to age, interventions that promote healthy, active aging will become increasingly important. Targeted dietary approaches such as calorie restriction have the potential to contribute to a longer “health span” and to successful aging.