Aging, like the weather, is a subject everyone talks about but no one seems able to do much about. Theories and nostrums abound, from wrinkle creams to hormone supplements, many with compelling evidence in their favor, but none has earned the consensus of the scientific community, save one. There is substantial and accepted evidence that caloric restriction (CR) can increase lifespan by at least 30% in every animal tested. So far these experiments have indicated that the maximum effect is reached at a 33% reduction in daily calories, but a more modest 10% is presumed to have at least some beneficial effect. They also suggest that a longer interval between meals is an important factor, independent of total calories consumed. The principal drawback to these studies is that they are by-and-large limited to subjects with short life spans, like mice, rats, flat worms, insects and a variety of one-celled organisms. The few human subjects that have produced reliable data, such as those in Biosphere 2, seem to have fared well despite substantial weight loss, but they have yet to reach even their actuarial lifespan.1

This information certainly gives one pause to reflect on where a nation that is 60% overweight is headed, in spite of our miraculous advances in medicine and health care. One might say that the popular vote favors death and disease over hunger. Isn’t there an easier way?

Although explanations abound, the stress consequent upon reduced caloric intake takes center stage as a fundamental factor. A variety of adaptive scenarios has been proposed.

- Stress induces cells to slow their growth rate, and the lifespan of cells appear to be limited to a finite number of cell divisions.
- As growth slows, so does metabolism, reducing the population of reactive oxygen species (ROS) that cause oxidative damage, a principal mechanism of disease activation.
- CR lowers blood glucose and consequently levels of insulin and the variety of associated hormones. Recollecting the numerous destructive effects of diabetes brings the advantages of this metabolic alteration into sharp perspective.
- A coincident mechanism lowers body fat, reducing the detrimental excess of adipose-generated hormones.
- At the same time, the stress of CR promotes protective hormones and stimulates the immune system.

The favored explanation currently circulating is that reduced mitochondrial damage accompanies the lowered metabolic rate. Mitochondria are poorly protected from oxidative damage by free radicals (ROS) and have but a single enzyme to effect repairs in mitochondrial DNA. As the cells’ sole energy source diminishes, so do all their other functions. The result is aging.

An extension of these theories and findings has been explored by David Sinclair at Harvard Medical School.2 He notes that the many beneficial chemical nutrients derived from plant products all come from stressed plants. Organically grown foods are stressed by insects and disease, theoretically making them far healthier food sources. Is Nature indeed so well designed that there is universal benefit from stress, as long as it is contained within defined limits?

A fresh concept is achieving growing recognition in toxicology these days. Hormesis is the term applied to J-curve phenomena, where a certain amount of a toxin is better than none at all. It is obviously true of basics such as sunlight, food, water and sleep. It has proved true of alcohol, where an ounce of ethanol is protective against heart disease. And some believe it is miraculously true of radiation, where, putting aside the obvious negative effects for a moment, low levels of exposure reduce the incidence of cancer.3 Sinclair calls his theory xenohormesis – the observation that stressed plants (and animals?) produce nutritional benefits for organisms higher up the food chain. It embraces both nutrition and pharmacology, whence come all our foods and most of our medicines.

It need not be proposed that we need more stress in our lives. Leave that to the plants. There is convincing evidence, particularly from the cardiologists, that our stress levels are far to the right on the J curve and that stress reduction is fundamental to improving the health of the population.
Putting aside its metaphysical inclinations, yoga has a remarkable ability to counteract stress. A recent study from the Amen Clinic in California sponsored by the University of California at San Diego recorded SPECT brain images before and after 12 minutes of meditation. The after images showed a more generalized distribution of tracer and illuminated the previously dark thalamus. These findings were interpreted as improving attention, concentration, and short-term memory, according to the principal investigator, Dharma Singh Khalsa, MD.

Sinclair and others are discovering ways to fool cells into thinking they are stressed, without the negative effects. A certain ubiquitous protein called sir2 seems to produce this life-extending effect in multiple species of laboratory animals. Stay tuned; this may be real.

On the additive side of anti-aging interventions, two supplements have shown considerable promise, both in preclinical and in clinical studies — thymus extract and dehydroepiandrosterone (DHEA). Hormones associated with these two supplements invariably decline with age and are inversely related to most of the diseases of aging.

The thymus produces a remarkable variety of hormones. Specific to the thymus are half a dozen immunostimulants, but thymic tissue also expresses oxytocin, vasopressin, beta-endorphin and calcitonin. Salmon calcitonin is available by prescription, but crude thymus tissue has been shown to have the same effect in preventing bone loss in postmenopausal women. Added benefits from thymus supplementation include immune augmentation and antioxidant activity.

Declining levels of DHEA have been specifically associated with many major diseases of the elderly — osteoporosis, menopause, sarcopenia, dementia, depression, cardiovascular disease, cancer, chronic inflammatory diseases, type 2 diabetes and shortened lifespan. DHEA supplementation has been shown to favorably influence these same conditions. DHEA is an intermediary in the metabolic conversion of cholesterol to estrogen and testosterone, but it also appears to have activity of its own. Its sulfated form crosses the blood-brain barrier to influence cognition and mood. In peripheral tissues DHEA is an activator of calcium-gated potassium channels, which are essential to both muscle activity and nerve signaling. Its conversion to estrogens and androgens, controlled by enzymes such as aromatase, adds yet another layer of complexity to its already elaborate physiology. DHEA activity depends upon its local chemical environment, producing different responses in men than in women. Its association with major disease conditions is so closely (and inversely) related to cortisol levels that many researchers studying aging speculate that it is the DHEA/cortisol ratio that is the controlling factor.
Aging Gracefully

With such a complicated physiology and so many feedback systems controlling the activities and metabolic pathways of DHEA, it is unlikely that simply pumping more into the system will produce predictable results. Yet the implications of declining DHEA and its association with other major hormones that alter dramatically with age, clearly demand attention.

Summary
Caloric reduction is the only method of age extension that has earned a consensus within the scientific community, yet several other interventions have shown convincing experimental results and have much to recommend them for their numerous and solid associations with aging and its related conditions. Stress has demonstrated a J-curve association known as hormesis, with implications across the biosphere. Stressed plants, for example, those that are hormetic, with implications across the biosphere. Stressed plants, for example, those that are hormetically, produce most of the nutritional and pharmaceutical factors enjoyed by those of us higher up the food chain. Anti-aging effects of yoga and meditation, thymus extract and DHEA are all supported by solid laboratory and clinical evidence from numerous experiments.

Progress is being made. A protein common to all complex organisms appears to control aging and may someday be the panacea we are all talking about.

Dr. Gina L. Nick has published a new book entitled Yogic Nutrition. In this book, Dr. Nick marries modern medical research with the age-old wisdom of Ayurvedic medicine to help you on your path to greater health and vitality. Learn more about the book and new supplements researched and formulated by Dr. Nick by visiting www.YogiHealth.com.

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