Chapter 6

Why We Age

When you have eliminated the impossible,
whatever remains, however improbable, must be the truth.

—Sir Arthur Conan Doyle (1859–1930)

EIGHT THEORIES OF AGING

Scientific research has led to the formulation of a number of aging theories, but truthfully, aging most likely results from a combination of theories, such as the eight discussed in this chapter. Similarly, the four secrets of longevity are an amalgam of these same theories and can, in combination with the four pillars of wellness, illuminate your gateway to the ageless zone.

1. THE DNA/GENETIC THEORY

Some scientists regard this as a planned obsolescence theory because it focuses on the programming encoded in our DNA, the blueprint each of us has received from our parents. We are born with a unique code and a predetermined tendency for certain ways of functioning, physically and mentally, that under this theory regulate our rate of aging. But the timing of this type of genetic clock can be greatly influenced. For example, DNA is easily oxidized, and free-radical damage can result from diet, lifestyle, pollution, radiation, toxins, or other outside influences, which means that each of us has the ability to either accelerate or slow down the damage caused by oxidized DNA.

The telomerase theory of aging is one of the most recent regarding gene damage. First discovered by scientists at the Geron Corporation in California, it is now understood that telomeres (the sequences of the nucleic acids in DNA that extend from the ends of chromosomes) shorten every time a cell divides. The shortening of these telomeres is believed to lead to cellular damage because the cell is not able to duplicate itself correctly. Each time it divides, it duplicates itself a little less precisely than the time before, and each subsequent reproduction makes the cell

weaker and weaker until, eventually, there is cellular dysfunction leading to aging and, ultimately, death.

Further recent research by Don Kleinsek, Ph.D., one of very few genealogists looking for the genes involved with aging, indicates that telomeres can be repaired by the introduction of the relevant hormone. If this theory holds up, it means that once we know what each telomere is responsible for, it *may* be possible to precisely introduce the necessary hormone or nutrient to aid genetic repair, as well as maintain balance in the body.

Another key element in rebuilding the disappearing telomeres is the enzyme telomerase, currently found only in germ and cancer cells. Telomerase appears to repair and replace telomeres, which helps to regulate the clock that controls the life span of dividing cells (*see* The Hayflick Limit Theory of Aging on page 118).

2. THE NEUROENDOCRINE THEORY

First proposed by Professor Vladimir Dilman and Ward Dean, M.D., this theory focuses on the neuroendocrine system and elaborates on its wear and tear. It is a system with a complicated network of biochemicals, which control the release of hormones that are governed by the hypothalamus, a walnut-sized gland located in the brain.

The hypothalamus also governs the various chain reactions that instruct other organs and glands to release their hormones. The hypothalamus responds to the body's hormone levels, acting as a guide and feedback system controlling the body's overall hormonal activity.

As we grow older, however, the regulatory ability of the hypothalamus loses its precision, and the receptors for individual hormones in the body become less responsive to them. Accordingly, as we age, the secretion of many hormones around the body declines, and their effectiveness is also reduced due to the diminished sensitivity of their receptors.

These are some of the reasons why some doctors recommend drugs that act as receptor *resensitizers*. One such drug improves insulin sensitivity (metformin), and another improves noradrenaline sensitivity (modafinil).

One theory for why the hypothalamus loses its ability to regulate is that it becomes damaged by the hormone cortisol, which is produced by the adrenal glands located on the kidneys. Cortisol is now considered to be a *dark* hormone produced when the body undergoes prolonged stress. It is known to be one of the few hormones that increases with age and, over time, is responsible for a vicious cycle of continued hypothalamic damage, leading to an ever-increasing degree of cortisol production, and then even more hypothalamic damage—a real catch-22 situation.

As the hypothalamus loses its ability to control the system, the resulting damage could lead to hormonal imbalance. If this is the case, spa-medicine programs that decrease stress, and therefore decrease cortisol levels, are important for restoring hormonal balance.

3. THE FREE-RADICAL THEORY

This now-familiar theory of aging was developed by Denham Harman, M.D., at the University of Nebraska in 1956. The term *free radical* denotes any molecule that has a free, unpaired electron, which makes it react with healthy paired molecules in a destructive way.

Because the free-radical molecule has an additional electron, it creates an extra negative charge. This unbalanced energy incites the free radical to bind itself to another balanced molecule as it tries to steal an electron. If it succeeds, the balanced molecule becomes unbalanced and is now turned into an unpaired free radical, itself looking to annex an electron.

It is known that chemical toxins, diet, drugs (including alcohol and tobacco), heavy metals, lifestyle, radiation, and strenuous exercise, and so on, all accelerate the body's production of free radicals.

Moreover, there are additional, *natural* free radicals in the body, a result of energy output, particularly from the mitochondria (the cell's engine). The simple acts of breathing, eating, and drinking form free radicals as the body yields the universal energy molecule adenosine triphosphate (ATP). And oxygen is a particularly potent free-radical producer. What a paradox that oxygen—vital for life—generates life-shortening free radicals.

Free radicals attack the structure of cell membranes, which then create metabolic waste products. These toxic accumulations, in turn, interfere with cell communication; disturb DNA, protein synthesis, and RNA; lower energy levels; and generally impede vital chemical processes.

There is a solution to this problem, however, as free radicals can be transformed by free-radical scavengers, otherwise known as antioxidants. Specific antioxidants will bind to particular free radicals and help to stabilize them.

Free radicals come in a hierarchy according to their potential for damage, with the hydroxyl-radical and the superoxide-radical at the top of the list. In order to successfully combat the damage of dangerous free radicals, therefore, it is necessary to take a variety of antioxidants—you can thus help to eliminate many of them. Included in this broad cross-section of antioxidants are alpha-lipoic acid, beta-carotene, coenzyme Q_{10}, grapeseed extract, and the important vitamins C and E. All these substances will be discussed in full in Chapter 8.

4. THE MEMBRANE THEORY OF AGING

The membrane theory of aging was first described by Professor Imre Zs-Nagy of Debrechen University, Hungary. According to this theory, age-related changes and inflammation in the cell impair its ability to transfer chemicals, electrical processes, and heat.

As we grow older, the cell membrane becomes less lipid (less watery and more solid). This impedes its efficiency in conducting normal cell function and leads, in particular, to a toxic accumulation. As we grow older, this cellular toxin, lipofuscin, develops deposits in the brain, heart, lungs, and skin. Indeed, some of the age pigments in the skin, commonly called liver or age spots, are composed of lipofuscin. It is known that lipofuscin levels are much higher in people with Alzheimer's disease than in healthy people.

The cell's declining efficiency also means that the essential, regular transfer of sodium and potassium between cells is impaired, thus reducing communication. It is also believed that transfer of electricity and heat between cells is also impaired.

Professor Zs-Nagy researched substances that could help remove lipofuscin deposits and improve cellular membranes and communication, and developed the drug centrophenoxine (Lucidril), perhaps the most efficient drug currently available. Other, nondrug substances that have shown an ability to remove lipofuscin include DMAE and the amino acids acetyl-L-carnitine and carnosine.

5. THE HAYFLICK LIMIT THEORY OF AGING

Named after its discoverer, Dr. Leonard Hayflick, this theory of aging suggests that the human cell has a limited number of times it can divide. Part of this theory may be affected by cell-waste accumulation.

Working with Dr. James Moorehead in 1961, Dr. Hayflick theorized that the human cells' ability to divide is limited to approximately fifty times, after which they simply stop dividing (and hence die). As cells split to help repair and regenerate themselves, it is possible that the DNA/genetic theory of aging plays a role here. Maybe each time a cell divides, it loses some blueprint information, until eventually (after fifty-odd times of dividing), there is simply not enough DNA information left to complete any sort of division.

Dr. Hayflick showed that nutrition has an effect on cells, with overfed cells dividing much faster than underfed cells. And studies by him and others have shown that caloric restriction in animals significantly increases their life span and that, in essence, animals that are fed less live longer. Is this because they are subject to less free-radical activity and therefore less cellular damage? Or is it that

inflammation caused by insulin and glucose damage is less prevalent in them than in overfed animals?

Whatever the reason, the Hayflick Limit Theory indicates that we need to slow down the rate of cell division if we want to live long lives. Cell division can be slowed down by expanding your lifestyle to include the four pillars of wellness and the four secrets of longevity.

6. THE MITOCHONDRIAL DECLINE THEORY

The mitochondria are the power-producing structures found in every cell of every organ. Their primary job is to create adenosine triphosphate (ATP), which they accomplish with the help of nutrients, such as acetyl-L-carnitine, coenzyme Q_{10}, NADH, and some of the B vitamins. ATP is literally the life-giving chemical because every movement, thought, and action we make is generated from it. Yet very little ATP can be stored in the body, and it cannot by itself be introduced into the body, as a supplement would be. It is estimated that a 180-pound man needs to create, on average, 80–90 pounds of ATP daily. Under strenuous exercise, the body's use of ATP can rise to as much as 1.1 pounds per minute, but its reserves of ATP are generally no more than 3–5 *ounces* so, under those same strenuous exercise conditions, this works out to approximately eight seconds' worth of ATP available. Given this factor, it becomes apparent that the mitochondria have to be very efficient and healthy in order to produce a continuous supply of the essential ATP that makes possible the necessary repair and regenerative processes. Chemically speaking, under normal conditions the mitochondria are fiery furnaces and are themselves subject to a lot of free-radical damage. They also lack most of the defenses common to other parts of the body, so as we age, the mitochondria are continually damaged by free radicals and become less efficient, fewer in number, and tired. Some eventually die, which results in a decline of crucial ATP production.

Since organs cannot borrow energy from one another, the efficiency of each organ's mitochondria is essential to that particular organ's repair processes and functions. If a particular organ's mitochondria fail, then so does that organ (which of course can lead to death). Unlike nuclear DNA (the DNA in the nucleus of a cell, as opposed to the DNA in the mitochondria outside the nucleus), mitrochondrial DNA does not have natural regenerative mechanisms, which makes enhancement and protection of the mitochondria an essential part of preventing and slowing aging. This protection can come from a broad spectrum of antioxidants, such as coenzyme Q_{10}, alpha-lipoic acid, and vitamin C, as well as such substances as pregnenolone and D-ribose (a five-sided sugar). In addition, acetyl-L-carnitine and hydergine may be particularly useful—experiments have shown that both substances greatly improve the mitochondrial condition of aged animals.

7. THE CROSS-LINKING THEORY OF AGING

Proposed by J. Bjorksten, this theory, also referred to as the glycosylation theory of aging, holds that it is the binding of glucose (simple sugars) to protein, a process that occurs in the presence of oxygen, which causes various problems associated with aging. Once this binding (cross-linking) has occurred, the protein becomes impaired and is unable to perform as efficiently. Living a longer life is going to lead to the increased possibility of oxygen meeting glucose and protein and causing known cross-linking disorders, including cataracts and tough, leathery, yellow skin. To witness cross-linking in action, simply cut an apple in half and watch the oxygen in the air react with the glucose in the apple, first turning it yellow and brown, and then, eventually, tough. Diabetes is often viewed as a form of accelerated aging and the imbalance of insulin and glucose leads to numerous health complications. In fact, people with diabetes have two to three times the numbers of cross-linked proteins and glucose as their healthy counterparts.

The cross-linking of proteins and glucose may also be responsible for cardiac enlargement and the hardening of collagen, which may result in an increased susceptibility to cardiac arrest. Cross-linked proteins and glucose have also been implicated in kidney disorders, skin aging, and Syndrome X (metabolic syndrome).

It is also theorized that sugars binding to DNA may cause damage that leads to malformed cells and thus cancer. The contemporary diet is, of course, a very sweet one—we are bombarded with simple sugars in everything, from soft drinks to processed foods. An obvious way to reduce the risk of cross-linking is to reduce sugar (and all refined carbohydrates) in your diet. In addition, there are an increasing number of supplements that show great promise in the battle to prevent, slow, and even break existing cross-links.

8. THE WORLDVIEW–WELL-BEING THEORY

Dr. Simpson believes that an integral worldview (*see* Appendix A) is the key ingredient for inner health, wholeness, and longevity. The psychohistorical development of consciousness is central to this theory. Once we assimilate the entirety of our human existence into our awareness, we develop a sense of coherence—we see the world as comprehensible, manageable, and meaningful. This integral worldview, besides helping individuals make healthy lifestyle choices, also has a direct effect on a person's well-being and longevity. This probably works in tandem with several of the above mechanisms of aging. For more information on this ordering of consciousness (integral worldview), visit the website www.eternitymedicine.com.

Whatever aging theory we consider, the final result is a monumental cellular deficiency primarily resulting from inflammation and toxic overload.

THE RATE OF AGING

Women outlive men by ten years, partly because women are routinely screened for breast and uterine cancer, whereas men will usually see a physician only after becoming ill. Another reason may be that, up to this point, most hormone replacement therapy has been directed toward women, even though men have the same symptoms as menopausal women and have similar hormonal levels, low testosterone, and elevated FSH and LH levels.

For most of us, the aging process begins around age thirty, and after age forty, all of us are slowing down. The medical term is *catabolic,* or breaking down. Prior to age thirty, most individuals are in an anabolic state—they are building new body tissue. One of the goals of *Spa Medicine* is to help you reverse the catabolic state and move you once again toward an anabolic state in order to help you *live better longer.*

Obviously, the earlier you start, the simpler it is and the more benefits you will receive; however, it is never too late. People who start a program in their sixties and seventies can still realize significant benefits.

We now know that the major diseases of aging, such as cancer, diabetes, heart disease, and osteoporosis, are largely preventable. Thanks to recent scientific progress, we have the tools to decrease genetic damage, enhance immune function, improve the circulation to the brain and heart, and generally augment a person's vitality.

We encourage all clients visiting medi-spas to first complete their wellness program, since detoxifying the body, nutrition, exercise, and mind-body practices are all vital for longevity. In a medi-spa longevity program, we focus on practical methods to enhance your life span—we are not only looking to increase the number of your years but also to improve the quality of those extra years. The program is individualized for each participant—different nutraceuticals, enzymes, cosmeceuticals, hormones, pharmaceuticals, and cell therapy may be included as part of your longevity program.

The ultimate goal of the longevity program is to square the normal aging curve (*see* Figure 6.1 on page 122). As you can see, you can intervene at any time and shift the curve to the right with a medi-spa program (MSP).