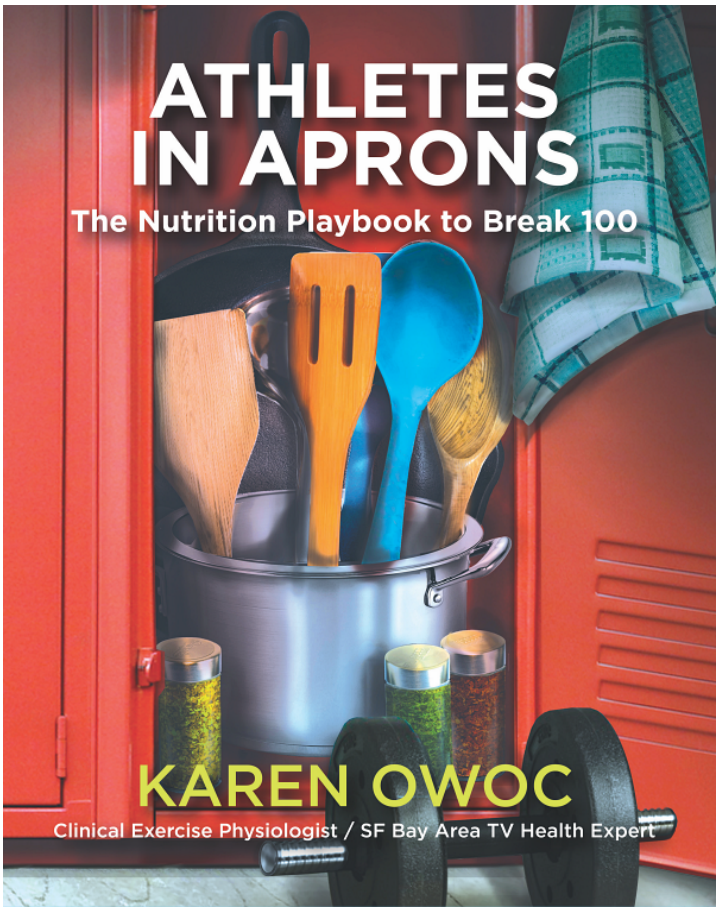


*This book reveals the causes behind growing old and the strategies for living a longer, more vibrant life. Lifestyle tips are based on published scientific studies and the author's expert knowledge on how to stay functionally independent.*

**Athletes in Aprons: The Nutrition Playbook to Break 100**

By Karen Owoc

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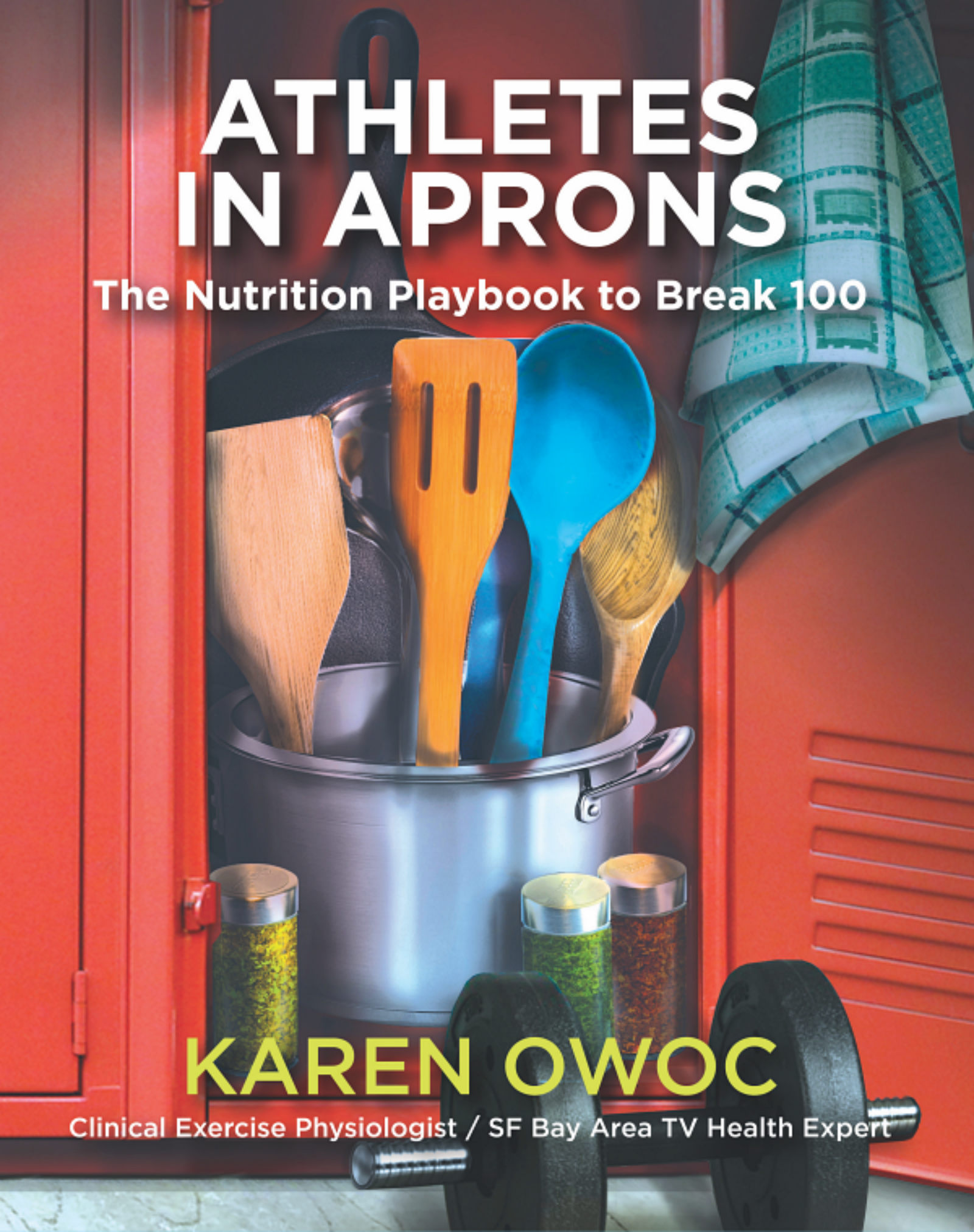
ATHLETES IN APRONS
The Nutrition Playbook to Break 100
KAREN OWOC
Clinical Exercise Physiologist / SF Bay Area TV Health Expert

# ATHLETES IN APRONS

## THE NUTRITION PLAYBOOK TO BREAK 100

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ISBN: 978-1-64719-538-0



Published by BookLocker.com, Inc., Trenton, GA.

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Cover and interior design by Kaneshige Design Associates

Library of Congress Cataloguing-in-Publication Data

Owoc, Karen.

Athletes in aprons: the nutrition playbook to break 100 / by Karen Owoc.

Includes bibliographical references and index.

ISBN: 978-1-64719-538-0

1. HEALTH & FITNESS / Longevity 2. COOKING / Health & Healing / Heart 3. HEALTH & FITNESS / Diet & Nutrition / Nutrition

Library of Congress Control Number: 2021924790

Printed on acid-free paper.

BookLocker.com, Inc.

2022

*We don't stop playing because we grow old;*
*we grow old because we stop playing.*

GEORGE BERNARD SHAW

# THE GAME

# NOTES FROM THE COACH

*"Age is not how old you are, but how many years of fun you've had."*

– Matt Maldre

Chronic diseases and disability were once synonymous with old age, but after over fifty years of research by the U.S. National Institutes of Health (NIH), you can prevent or at least control certain diseases through the way you live. "Normal aging" varies considerably and its rate is influenced by behavioral factors in your control, such as how well you eat, sleep, live, work, and play.

Depending on your lifestyle, your actual calendar age won't necessarily match up with your functional age (measured by how well or how poorly you look and function). For example, you may be 65 years old, but if you've avoided longevity threats like obesity, smoking, long bouts of sitting, distress, and processed, plant-less food, your functional age could be closer to 50.

"Acorns or chocolate cake?"

### Beyond Bingo

Attitudes on aging are changing. Today, people are living longer and there's been a substantial decrease in the rate of disability among older people in the last twenty years. People in their 80's (even 90's) are golfing, bowling, sailing, weightlifting, participating in Tai Chi, yoga, triathlons — and even surfing in their late 70's. The average life expectancy has changed dramatically.

### 80 is the New 60

According to the U.S. Census Bureau (International Database and National Vital Statistics System), the average life expectancy was:[1]

- 63.6 years in 1940
- 68.1 years in 1950
- 70.8 years in 1970
- 76.9 years in 2000 (9.3 million aged 80 years and older)
- 77.7 years in 2006
- 78.1 years in 2009
- 78.8 years in 2014
- 78.6 years in 2017

By 2030, it's estimated that individuals aged 80 years and older could grow to 19.5 million, and the "oldest-old" (aged 85 years and beyond) could grow to 10 million people.

### What is "Normal Aging"?

Normal aging brings about many physiological changes. Here's what happens to some of your body systems as you age:[2]

### Heart

- Your heart muscle thickens.
- The maximum pumping rate diminishes making your heart less efficient.
- The ability to extract oxygen from your blood diminishes.
- Maximal oxygen consumption during exercise declines 7.5%-10% with each decade of your life.

### Blood Vessels

- Your arterial walls stiffen. Arteries transport oxygenated blood away from your heart. In order to propel blood through stiff, less elastic arteries, your heart must work harder to exert more force.
- Your capillary walls become more fragile and prone to rupture, and tissues supporting these vessels weaken. Capillaries are tiny, extremely narrow blood vessels.

### Brain

- The arteries in your brain and those traveling to your brain (the carotid arteries of your neck), stiffen due to atherosclerosis (a.k.a. hardening of the arteries).
- Connections between your neurons (nerve cells) decrease. Neurons are one of the major players in healthy brain function.
- Individual nerve cell function declines. According to recent studies, the adult nervous system is capable of producing new neurons, but the exact conditions necessary for this to take place are yet to be determined.
- Brain volume diminishes (that is, your brain shrinks in size) at about 5% per decade after age 40. The rate of decline increases with age after age 70.

### Kidneys

- The number of nephrons (your filtering units) decreases, so your kidneys can't filter waste material from your blood as efficiently.
- Efficiency at removing waste from your blood (filtering ability) also diminishes because the blood vessels to and within your kidneys become stiff and hard.
- The amount of tissue in your kidneys decreases.
- More than 1 in 7 (15% of Americans or 37 million people) has this disease and 9 in 10 don't know their kidneys are starting to fail.[3, 4]

### Bladder

- Your muscles atrophy (that is, they waste away) and weaken, which affect your bladder control and result in incontinence.
- Elastic tissue stiffens, and your bladder's "stretchability" diminishes, so total bladder capacity declines.

### Lungs

- The vital capacity of your lungs decreases by about 40% between the ages of 20 and 70. (Vital capacity is the maximum amount of air you can expel from your lungs after first filling them up to their maximum capacity and then expiring to their maximum extent.)

### Vision

- At age 40 and older, focusing on objects that are close becomes difficult.
- At age 50 and older, the susceptibility to glare increases, and your ability to see in low light becomes increasingly difficult.
- At age 70 and older, the ability to distinguish fine details diminishes.


### Bones

- Your bone density diminishes. Although bone mineral loss is continually replaced, at around age 35, replacement cannot keep up with the loss. Bone loss accelerates in menopause.

### Body Fat

- Percentage of your body fat increases until middle age, stabilizes until late life, then typically declines along with body weight.
- The cushion of fat just beneath your skin redistributes to deeper organs.

### Muscles

- Between ages 30 to 70, you become less lean without exercise. Men lose an average of 23% of their lean body mass (muscle), and women lose about 22%.

### Immune System

- The ability of your lymphocytes, specifically T-cells, to renew and function efficiently diminishes. T-cells attack cells that have been infected or damaged and also produce chemicals, which direct how your immune system responds.
- Your thymus gland, where T-cells develop, shrinks in size.

### Hearing

- Hearing higher frequencies becomes difficult.
- Understanding speech becomes difficult, especially where there is background noise — even with good hearing thresholds. The rate of hearing loss is greater in men than in women.
- Many studies have found an association between hearing loss and cognitive decline. Hearing loss puts you at a greater risk of developing dementia because some parts of the brain (the auditory areas) shrink.



*The human body is the only machine that breaks down when not used.*

THOMAS CURETON

## PLAY 1 — GET IN THE GAME

### What Makes You an Athlete...Yes, *You!*


"Can't take my dog? I don't even know HOW to run without my dog."

You train. You put in the effort. You have goals to achieve. But do you reverently reserve the designation of "athlete" for the top 1% who gets paid to play? Or wears a team uniform? Or breaks a new record? If so, join those who share a mindset that's ingrained in our sports culture. But athletes are much more than that. Athletes aren't defined by dollars and cents, the number they wear, or where they finish.

The term "athlete" is loaded with these stereotypes and defined differently depending on who you ask. Let's hear what the following gents have to say…

- **Merriam-Webster:**

  "A person who is trained in or good at sports, games, or exercises that require physical skill and strength."

- **Urban Dictionary:**

  "An individual who participates in sports. Characterized by dedication, focus, intelligence, and work ethic."

- **Legendary University of Oregon track and field coach and Nike co-founder Bill Bowerman:**

  "If you have a body, you are an athlete."

Not sure if what you do counts as a sport? Let's refer to good ol' Merriam-Webster again who not only defines sport as a competitive physical game, but defines it as: "a physical activity (such as hunting, fishing, running, swimming, etc.) that is done for enjoyment".

There you go. Contrary to popular belief, the athletes' club is not so exclusive, but in fact, all-inclusive. Whether you're a retired jock, weekend warrior, back-of-the-packer, cardiac patient, or cancer survivor, you have what it takes. Everyone has the capacity to be an athlete. Being revered as an athlete doesn't hinge on your performance; it's grounded in your perseverance. True athletes focus on commitment, crave being better than yesterday, and strive to finish. So now that you're clear on what makes you an athlete…step up to the plate, embrace the identity, and read on!

# PLAY 2 — FREE AGENTS

## Understanding Free Radicals And Why You Age


You reminisce longingly of your athletic prowess and the glory days when you moved like a gazelle on the court. What happened to the strength, speed, and stamina that you flaunted back in the day? Sadly, you chalk it up to two words that make even the most macho of men want to whimper. It's called old age. Ouch. No, *double* ouch.

So why do you age? As you enter your 50's, 60's, 70's and beyond, you may think you're entering the inevitable end — call it the 'back nine of life' — but once you understand what causes you to age, you can self-correct. Aging is evidence of the minute, cumulative effects of "free radical damage" that affect your cells and the tissues in your skin, heart, blood vessels, brain, lungs, tendons, and joints.

### The Energizer Bunny Within

You're pumped up, full of energy, and head out to set a new personal best. Ever wonder how your body gets energized? Well, simply put, it comes down to the oxygen you breathe and your mitochondria

("my-toh-KON-dree-ah"). Mitochondria are the "power plants" of your cells. They're called power plants because they break down or "burn" glucose from the food you eat to release energy. If you eat crummy food, don't expect to produce energy that keeps you going and going and going and going…

### Fill 'Er Up With ATP

The energy molecules that your power plants produce have to be in a form that your cells can use, which is in a *chemical* form called ATP. Think of ATP (adenosine triphosphate) as your own personal high-octane fuel. Without a constant supply of ATP, your body won't work — e.g., your heart won't beat, your muscles won't contract, you won't heal, you won't absorb nutrients.

A single human cell contains thousands of these power plants. The number of mitochondria in a cell depends on your cells' energy needs. For example, your active heart, brain, liver, kidneys, and beefy muscles have thousands of mitochondria, while less active cells have a lot fewer.

**Coach Karen says**

Your power plants need high-quality food and oxygen to generate limitless energy and endurance.

### Oxygen + Iron = Energy

Your power plants need oxygen to produce ATP. They get oxygen from proteins in your red blood cells (hemoglobin) and inside your heart and muscles (myoglobin), which function as "oxygen storage units". When you take a breath, the oxygen you inhale travels through your bloodstream in these storage units until they reach your power plants.

But to make these oxygen storage units, your body needs iron, so a healthy diet is critical for you to produce ATP. That's why doctors routinely order blood tests that check iron, red blood cell, hemoglobin, and myoglobin levels if their patients complain of fatigue and generalized weakness.

**Coach Karen says**

Red blood cells don't contain any mitochondria. That's because they get their energy from glucose (sugar).

### How Oxygen Goes Free and Goes Rogue

In the process of turning air and food into energy, an oxygen molecule may break apart into two single atoms with unpaired electrons. These atoms are aptly named "oxygen free radicals" or "free radicals" for short. Electrons (like snow skis and golf shoes) like to be in pairs. When unpaired, the chaos begins! These single atoms are highly charged and scavenge the body seeking out electrons to complete its pair.

**Coach Karen says**

An oxygen molecule is composed of two oxygen atoms that are bonded together ($O_2$).

### The Radical Chain Reaction

A free radical is unstable while scavenging to find a sidekick for its unpaired electron. The scavenger looks for the nearest target and steals an electron from another molecule. Then that molecule becomes unpaired and scavenges the body to seek out other electrons, so they can become a pair. It's the classic domino effect. During this electron stealing spree (called oxidation), parts of the cell, such as DNA, proteins, and cell membranes, are damaged. The damage builds up until eventually, the cell is so damaged, it can't function and survive. The cell may die.

### How Cell Damage Translates to Disease

If the cell damage is in your eyes, you could have macular degeneration or cataracts. If it's in your blood vessels, you could have clogged arteries or high blood pressure. If it's in your heart, you could have a heart attack or stroke. If it's in your cartilage, you could have arthritis. If it's in your kidneys, you could develop chronic kidney disease. If it's in your brain, you could have memory loss or develop full-blown Alzheimer's or Parkinson's disease. Get the picture?

**Coach Karen says**

Free radicals are natural waste products from various chemical processes in the cell that can build up and do bodily harm.

Sometimes damaged molecules don't die, and DNA is damaged — a major culprit in tumor initiation and progression. All cancers begin when one or more genes in the DNA of a particular cell mutate, which makes a normal cell go horribly awry.

To summarize, oxygen free radicals are highly reactive, unstable particles that eventually damage healthy cells of any type. Free radicals speed up cell death and cause you to "rust" from the inside out. The imbalance between free radicals and your body's defense team (the ***anti***-oxidants) is what's known as *oxidative stress*.

### How Mitochondria Are Damaged and Lost

Cells that require a lot of energy to function, such as your eyes, brain, and heart, have more mitochondria. If you're healthy, you have the right amount of these power plants in a given cell but become chronically ill, and you may only have half that amount. How many mitochondria you have and how well they're functioning determines your level of energy. Damage to your mitochondria not only impairs energy production, it also increases production of toxic free radicals. So if you want to keep playing your sport and more importantly, if you want to continue to thrive, you have to take care of your mitochondria.

How do mitochondria get damaged? Well, first, aging is a factor. As you age, you lose mitochondria, and they just don't work as well

anymore. But remember, you have control over how well and how fast you age. There's increasing evidence that supports the link between preventable environmental factors and disease.[1] Besides aging, here are the top five offenders that can reduce your mitochondria number and their ability to function:

1. **Heavy metals (non-essential)** — Mercury and arsenic are two of the most toxic pollutants.[2]
2. **Medications**
3. **Parasites**
4. **Viruses**
5. **Severe oxidative stress** — Heavy metals, medications, parasites, and viruses are all causes of significant oxidative stress. Severe oxidative stress is also caused by lifestyle influences, such as:
   - **Air pollutants**
   - **Chemicals** — e.g., chemical cleaners, chlorine, deodorizers, nail polish, synthetic fragrances
   - **Chronic stress**
   - **Cigarette smoke**
   - **Excessive alcohol consumption**
   - **Exercising too much or too little**
   - **Exposure to fungal toxins** — e.g., environmental molds in bathrooms and basements
   - **High blood sugar levels**
   - **Lack of sleep**
   - **Pesticides**
   - **Plastics and phthalates**
   - **Pro-inflammatory foods** — e.g., food that's fried, charred, over-processed, overcooked, over-sugared, over-salted, and high in saturated fat
   - **Radiation exposure** — e.g, from excessive sunlight to X-rays
   - **Unhealthy microbiome** (gut bacteria imbalance)

**Coach Karen says**

Avoid these pro-inflammatory foods that damage your mitochondria:

- Fried
- Charred
- Over-processed
- Over-cooked
- Over-sugared
- Over-salted
- High in saturated fat

**MITOCHONDRIAL MENACES (MEDICATIONS)**

Medications have now emerged as a major cause of mitochondrial damage.[3] The medications documented to damage mitochondria include:

- **Analgesic (for pain) and anti-inflammatory** — e.g., aspirin, acetaminophen (Tylenol®), naproxen (Aleve®, Naprosyn®)
- **Anesthetics** — e.g., lidocaine (Xylocaine®), propofol (Diprivan®)
- **Angina medications** — e.g., amiodarone (Cordarone®)
- **Antiarrhythmic medications** (regulates heartbeat) — e.g., amiodarone (Cordarone®)
- **Antibiotics** — e.g., tetracycline, antimycin A
- **Antidepressants** — e.g., citalopram (Cipramil®), fluoxetine (Prozac®, Symbyax®)
- **Antipsychotics**
- **Anxiety medications** — e.g., alprazolam (Xanax®), diazepam (Valium®)
- **Barbiturates**
- **Cholesterol medications** — includes statins, e.g., atorvastatin (Lipitor®), simvastatin (Zocor®), lovastatin (Mevacor®), colestipol (Colestid®)
- **Diabetes medications** — e.g., Metformin (Glucophage®, Fortamet®)
- **Mood stabilizers** — e.g., lithium
- **Others,** such as medications for alcoholism, cancer

### Damage to Disease

Damage to mitochondria is now understood to be associated with a wide range of common diseases, disorders, and conditions, such as:[4]

- **Alzheimer's disease, a.k.a. type 3 diabetes** (progressive death of brain cells resulting in brain atrophy, or shrinkage, caused by cellular changes, such as chronic inflammation and the abnormal buildup of plaque in the arteries of the brain and between brain cells) — Per recent estimates, Alzheimer's disease is now the third leading cause of death in the U.S. after cardiovascular disease.[1]

- **Ataxia** (degeneration of the brain causing loss of muscle control, speech, and balance)
- **Atherosclerosis** (hardening and loss of elasticity within the arteries due to plaque buildup in the arterial wall)
- **Cardiomyopathy** (disease of the heart muscle that makes it harder for the heart to pump blood to the rest of the body and can eventually lead to heart failure)
- **Chronic fatigue syndrome**
- **Dementia**
- **Diabetes, type 2** (inability to process food as energy)
- **Fibromyalgia**
- **Hepatitis C**
- **Macular degeneration** (central vision loss caused by the buildup of plaque in the macula, a part of the retina, and subsequent atrophy and death of photoreceptors and retinal cells in the eyes)
- **Migraine headaches**
- **Neuropathic pain**
- **Parkinson's disease** — Parkinson's is an example of a disease where the mitochondria are ultimately destroyed and brain cells slowly die.
- **Liver cirrhosis** (death of liver cells)
- **Retinitis pigmentosa** (degenerative eye disease causing vision loss)
- **Schizophrenia**
- **Strokes**
- **Transient ischemic attacks (TIA)**

### The Anti-Aging Antidotes

Free radicals also contribute to the visible signs of *external* premature aging. Yes, those sporty crinkles around your eyes and freckles on your face. You can blame them on oxidative stress too. What do your wrinkles say about your lifestyle?

Most free radicals can be repaired and passivated with reasonable efficiency via antioxidants. But when antioxidants are outnumbered, they can't keep up with high levels of free radicals that have accumulated in your cells. If cell death outpaces building new well-functioning cells, disease wins.

You may already be experiencing signs and symptoms of aging and oxidative stress. How quickly do you heal? Do skin wounds take weeks or months to close and heal? Is your hair turning gray? Is it harder to see close objects and read small print? Do you have headaches or muscle and joint pain? Are you tired and fatigued? Is your memory as sharp as it used to be?


Antioxidants stop the degenerative chain reaction of free radicals. They donate an electron to a free radical, so the radical no longer has an unpaired electron and is no longer a scavenging threat. Antioxidants can donate an electron without becoming a free radical themselves. Your body produces some antioxidants on its own, but not a sufficient amount. The solution? Acquire them through the food you eat. Thousands of antioxidants reside in the colorful roots, seeds, leaves, and flesh of plants (more on pg. 38).

# PLAY 3 — THE BENCHWARMERS

## Foods To Ditch

If you've ever moaned, "Ugh. It's tough growing old," you're likely in pain or you simply can't move like you used to do. Swinging, running, throwing, and even bending over are now HARD. Walking, for that matter, can be a stretch. But all is not lost. You can control how well you feel and how fast you age. Let's start with why sugar makes your once limber body, brain, and arteries *old*.

### DITCH: Sugar

**Blame Aging on Sugar.** Eating too much sugar not only adds empty calories to your diet and inches to your curves, it overcharges your system. One of the key suspects of cell deterioration (aging) is your own blasts of circulating blood sugar (glucose). These glucose molecules cling to proteins in a process called "glycation", and a chain of chemical reactions takes place in your body.

In the end, proteins clump together, known as "crosslinked" proteins, which accumulate over time and disrupt the normal functioning of

your cells. This is why diabetes — a disease caused by prolonged elevated levels of sugar in the blood — is considered an "accelerated model of aging".

### Why You Get Stiff

These "crosslinks", also known as advanced glycation end products (AGEs) or glycotoxins, seem to stiffen tissues. A stiff body is an aging body, and the most vulnerable proteins to crosslinking are **collagen** and **elastin**. Collagen is one of the most common and longest living protein molecules in the human body. Skin care companies spend billions of dollars trying to replicate, package, and sell it as their revolutionary secret to erasing wrinkles.

Collagen not only provides structure, support, and elasticity to your skin, but to other tissues as well. It's in your muscles (including the heart), blood vessels, bones, joints, tendons, ligaments, organs, skin, intestinal lining, corneas, teeth, and other connective tissues. Think of collagen as the "glue" that holds your parts together. In addition to AGEs, the following factors promote the breakdown of collagen and result in skin laxity and wrinkling:

- Cigarette smoke
- Hormone loss (estrogen levels decline after menopause)
- Pesticides
- Pollution
- Sun exposure, radiation
- Other sources of free radicals

**Coach Karen says**

Eating a diet high in added sugar and refined carbohydrates results in a stiff, aging, less functional body.

The skin is the largest organ of the human body and one of the most revealing places where aging occurs. The condition of your skin is a good reflection of what's happening on the inside. Do you notice a lot of wrinkles or is your skin loose and fragile like crepe paper? When skin ages, it loses its suppleness, elasticity, and rebound.

When your skin becomes less flexible, expect your internal tissues like your lungs, arteries, and tendons to correspondingly stiffen too. When your arteries are stiff, they lose their contractility, and are limited in their ability to expand and contract. When that happens, your vessels lose their power to squeeze large volumes of blood through them.

### HOW WELL DO YOU REBOUND?

Elasticity (the ability to stretch and rebound) diminishes as AGEs accumulate. Fibrous connective tissue, or elastic tissue, loses specialized cells called elastin fibers. In your prime, these fibers could be stretched, but returned to their original length instantaneously.

Take the following "Skin Rebound Test" to measure your skin's elasticity:

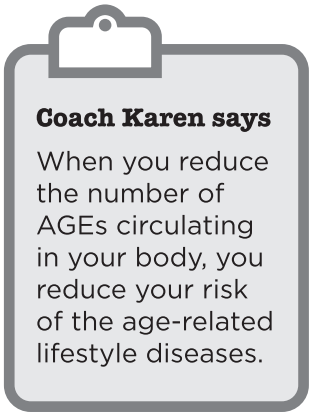
1. Gently take a pinch of skin between your thumb and forefinger (on the back of your hand).
2. Raise it 1/4" above the surface into a little ridge, hold for 5 seconds, then let go.

If the ridge completely flattens out in **less than 2 seconds or in nothing flat**, then your skin is very elastic and youthful; **2 seconds or more**, then your skin is probably that of someone in their 50's or 60's; **6-7 seconds**, then your skin is probably that of someone in their 70's.

### Age-Related Diseases Linked to AGEs

Stiff tissues can contribute to the development of inflammation and the progression of age-related diseases, such as:

- **Atherosclerosis** (hardening of the arteries) — AGEs trap "bad" cholesterol in the inner walls of blood vessels, which develop into hardened plaque. It's now known that coronary arteries start developing plaque as early as age 15.[1] Atherosclerosis is a chronic, slow, progressive disease, so without dramatic game changers, the disease will progress.
- **Cancer cell metastasis** (when cancer cells spread to a different body part from where it started)
- **Cataracts** (clouding of the lens of the eye due to proteins clumping together)
- **Diabetes (type 2) and insulin resistance** — Studies show 65% of those with type 2 diabetes will go on to develop Alzheimer's.
- **Nephropathy** (reduced kidney function)
- **Neurodegenerative disease** (such as Alzheimer's) — Studies suggest Alzheimer's is a form of diabetes that occurs in the brain.



Researchers refer to Alzheimer's as **"type 3 diabetes"** or **"brain diabetes"** because brain cells don't respond to insulin, which lead to impairments.[2]

- **Sarcopenia** (loss of skeletal muscle due to aging)

### Anti-AGEing Defense Team

Your body fights glycation with immune cells that have special AGE receptors. (Relate this to your golf ball finder that locates your errant golf balls.) When AGEs are detected, your immune cells surround the AGEs, attack them, and break them down. Once the crosslinked proteins are 'unlinked', they make their way into your bloodstream, travel to your kidneys, and race to the nearest exit via your pee.

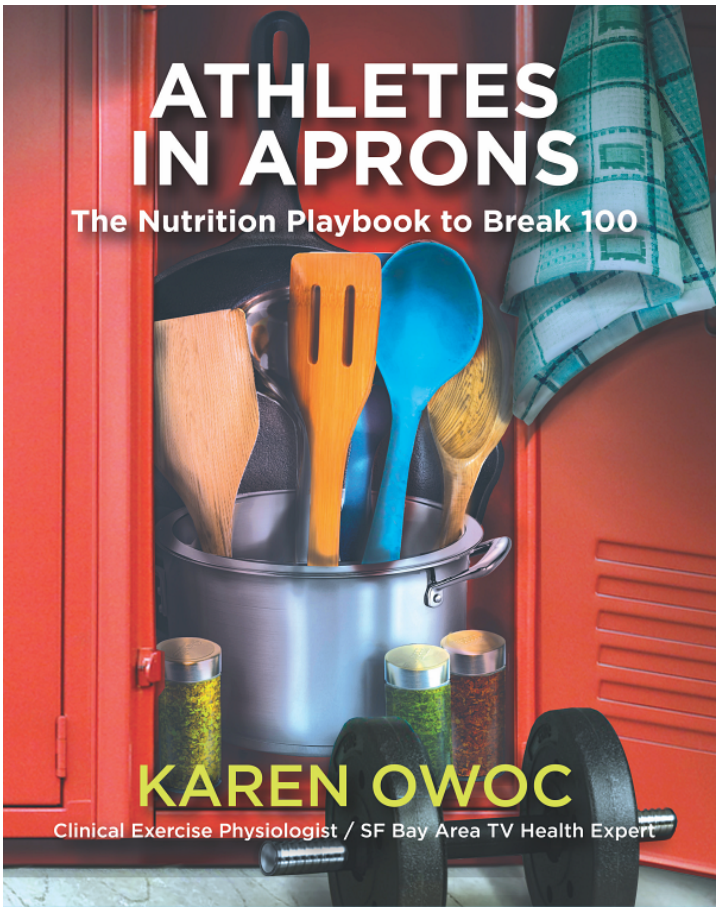
But whoa! Not so fast. You're not out of the sand trap just yet. As you age, your kidneys become less functional, and your immune cells become less active. When you tack on more years, it's more difficult for your natural defense system to win the battle against the AGEs, and you become even more susceptible to serious diseases. It's no coincidence that everything starts breaking down as you get older, and you're constantly calling on your doctor about one ailment or another. Being vigilant about controlling the production of AGEs is the key to crossing the 100-year mark.

### DITCH: Collagen Supplements

**The Perfect Counterpunch to AGEing?** Supplements are not regulated by the FDA, so anyone can claim their wonder pill contains what (and does what) they say it does. Ingestible collagen, in the form of supplement powders and pills, are being touted as the answer to reversing aging. But even if you swallowed collagen supplements by the fistful, they won't end up as collagen somewhere else. Here's why…

Once swallowed, collagen molecules are dismantled into 'chains of amino acids' by your potent digestive juices (pepsin in your stomach). These new chains scurry down to your small intestine where they're broken apart and become very small individual amino acids that run amuck. Imagine how American footballers line up in formation and at hearing the quarterback shout "Hut! Hut! Hut!", everyone scatters and starts running at each other. Same as these 'free' amino acids. After breaking loose, they reassemble in different ways to become different proteins like enzymes, antibodies, or hormones. At that point, they're absorbed and make their way into the bloodstream.

With that said, your body is absorbing the smaller fragments of what was once a whole intact collagen molecule. Currently, no randomized




*This book reveals the causes behind growing old and the strategies for living a longer, more vibrant life. Lifestyle tips are based on published scientific studies and the author's expert knowledge on how to stay functionally independent.*

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