

## It's a Funny Thing About Phosphorus...

New York Yankees catcher and philosopher Yogi Berra has been credited with saying, "It's tough to make predictions, especially about the future." I'm sure anyone who thought they could predict this year's presidential race agrees



Dr. David Williams

wholeheartedly with Yogi. However, it's not always that tough to predict disease trends in this country. History has usually proven itself to be a frighteningly accurate method in forecasting health and disease trends.

One historian/investment advisor I enjoy following says that thousands of years of history have proven that you can always count on two things: 1) the ineptitude and lack of common sense in government, and 2) there will always be war and/or the threat of war.

His underlying philosophy is that if you invest in areas that benefit from government incompetence and profit from war-related activities, you'll always come out ahead in the long term. The only time you'll need to change your strategy is when governments shrink and become cost-cutting centers

of efficiency, and all politicians lose their ambition for power and influence, join hands, and sing "Kumbaya" around the campfire.

With that said, history could not have predicted one emerging trend we're starting to see that will dramatically alter the health of future generations. For the first time ever, Americans are spending more money dining out than buying groceries and eating at home.

Last year, Millennials (those born between the early 1980s and 2000) overtook Baby Boomers as the largest living generation cohort. While a recent Gallup poll found that Baby Boomers spend less at restaurants and more on groceries, Millennials are much more willing to spend money on "food away from home."

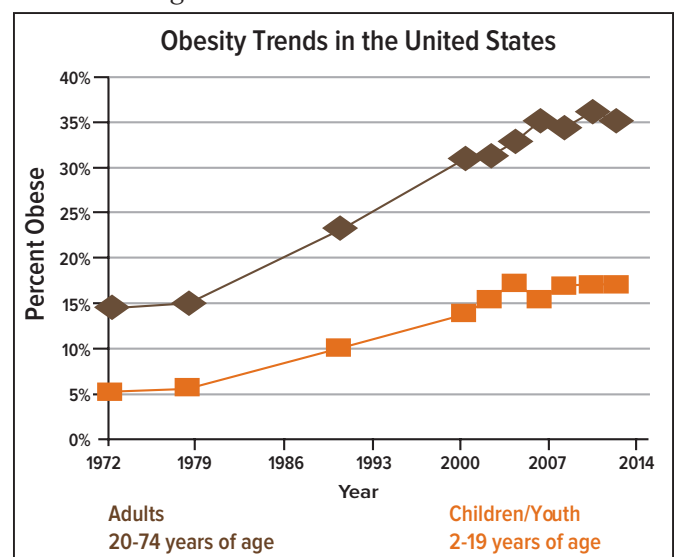
Millennials are also more cosmopolitan in nature. They are waiting longer to get married, are more apt to rent than buy a home, and place less emphasis on job security. They're the first digital generation and they're redefining many of the

social aspects of life. Much of this change is profound and exciting. When it comes to health, though, there's some concern.

I have repeatedly discussed the dramatic increase in obesity in this country. There are numerous theories as to the causes, but when you look at the chart below, it's rather obvious that the obesity epidemic began around the start of the Millennial generation in the late 1970s/early 1980s. In many ways, Millennials have been caught in the perfect storm.

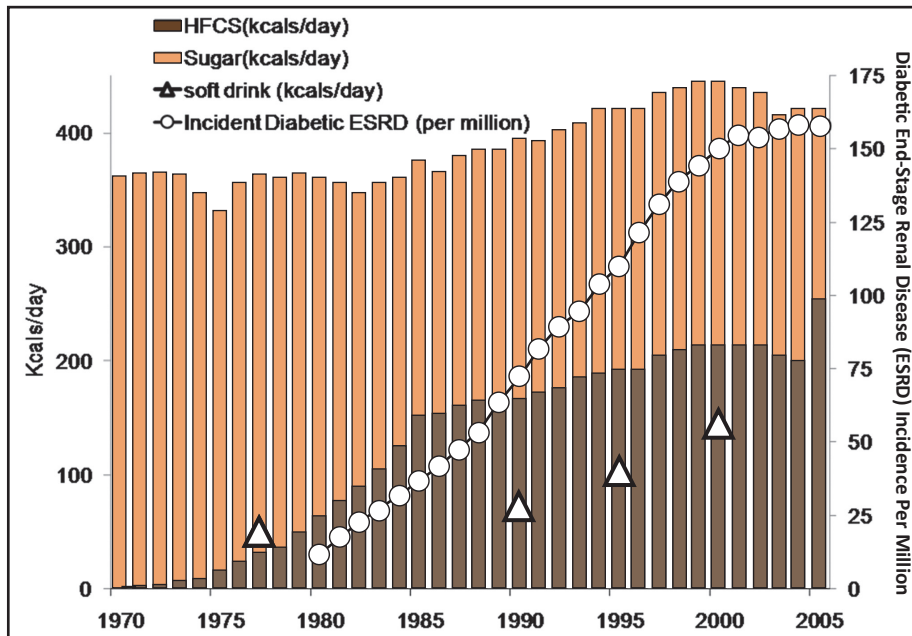
### What Happened?

The standard explanation has been increased food consumption combined with less physical



Source: [nhlbi.nih.gov/research/resources/obesity](http://nhlbi.nih.gov/research/resources/obesity)

Trends in Soda Consumption and Diabetic Renal Disease



Source: *Shoham DA, et al. PLoS One. 2008;3(10):e3431*

activity. And while it's true that physical activity has been on the decline since the 1950s, the drop has been slow and steady. There wasn't any striking change in 1980 that would signal or trigger an obesity epidemic.

However, since the 1980s, we have seen a rise in daily caloric intake of about 350 calories, which is significant. Roughly 65 percent of the increase is from added carbohydrates, 25 percent from fat, and 10 percent from protein.

It's impossible to make a direct link, but also during this period of time we began to see a significant rise in the consumption of soft drinks sweetened with high-fructose

corn syrup (HFCS), as well as higher incidence of diabetes.

To make matters worse, the Millennial generation began around the same time that low-fat dietary guidelines were issued and there was a major push to abandon traditional fats for vegetable oils. While the overall increase in fat consumption hasn't been that dramatic, the *type* of fat is highly significant. And this is where eating out can and will make a difference in health.

When we eat out, we are letting the people who run the restaurants determine what kinds of fat we eat. Almost all restaurants utilize vegetable oils because they're less expensive, have been chemically altered to

improve shelf life, and don't impart any additional flavor to foods. And much of the problem has to do with our increased use and consumption of vegetable oils.

It's somewhat ironic to me that even though many powers-to-be are being forced to admit (because of overwhelming research) that cholesterol and saturated fat are not the health-wrecking culprits they were once portrayed to be, consumption of vegetable oils continues to increase.

In just the last year, the consensus within organized medicine against cholesterol has begun to shift and fall apart. In the *Scientific Report of the 2015 Dietary Guidelines Committee*, the long-standing recommendation to limit dietary cholesterol to 300 mg/day was removed. In fact, the report states that, "cholesterol is not a nutrient of concern for overconsumption." Duh!

If you've been a reader of *Alternatives* for any length of time, you know I've been trying to set the record straight on cholesterol for decades. It is essential for life, and our diet has very little influence on blood cholesterol levels. The vast majority of cholesterol (roughly 80 percent) is produced by the body itself. It needs cholesterol to make cell membranes and insulation for nerves, and to

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produce bile salts and hormones such as estrogen, progesterone, testosterone, and vitamin D.

## The Latest Guidelines

I know you probably couldn't care less about government nutrition guidelines. (I don't either.) But, like many aspects of life these days, the government wields an enormous amount of influence in this area. Through various programs, the government currently helps to feed about 1/4 of the entire US population. Around 79 million people receive all or a portion of their meals from the government. This is obviously a huge market for food manufacturers, and they readily adjust their products to comply with these guidelines, which often determines what common food items become available to the general public.

The latest nutrition guidelines suggest roughly the same amount of carbohydrate intake, but recommend consuming even *more* vegetable oils. This, despite the fact that more and more clinical trials are linking the increase in cardiovascular disease to the effect of replacing saturated fats with polyunsaturated fatty acids (PUFAs) such as vegetable oils.

In one very recent study, researchers concluded that replacing saturated fats with PUFAs (corn oil and corn oil margarine) lowered cholesterol rates but not the risk of death from heart disease or any other causes. In fact, for people older than 65, lowering cholesterol levels by 30 or more points resulted in a 35 percent *greater* risk of death. And according to autopsy records, among those consuming saturated fats, only 22 percent revealed evidence of a heart attack

compared to 44 percent of those in the PUFA group. (*BMJ 2016 Apr 12;353:i1246*)

The takeaway is that, even though cholesterol and saturated fats are being scientifically exonerated, they aren't being reintroduced into the diet, and most Americans continue to consume harmful vegetable oils. If you want to reduce your risk of obesity, diabetes, and cardiovascular disease, don't count on the government or the food industry to give you the right advice. You're on your own.

Additionally, mainstream medicine has focused so much of its attention on cholesterol and saturated fat that it's oblivious to many other major contributors to cardiovascular disease. Consumption of sugar and trans fatty acids, underactive thyroid conditions, imbalanced omega-6/omega-3 ratios, low vitamin D levels, and chronic inflammation are other issues that must be taken into consideration.

And there's another elephant in the room that nobody (other than me) seems to be concerned about.

I wrote about this problem more than 19 years ago, but since the situation is getting worse, I would be totally remiss if I didn't cover it again. The following is an excerpt from that article, originally published the January 1997 issue of *Alternatives*. I've added notes (in italics and parentheses) where updates were needed. Unfortunately, most of the notes only substantiate that, despite my warnings back then, the problem has not gotten any better today...

## Focus on Phosphorus

When it comes to your health, there's one mineral you hear

very little about. It's phosphorus. Phosphorus is the second most abundant mineral in your body. It is necessary for practically every chemical reaction that takes place in life. In fact, no life form can exist without phosphorus.

As important as phosphorus is to good health, an excess of the mineral can lead to serious problems. However, you won't read about the ill effects of too much phosphorus for a couple of reasons.

Traditionally, phosphorus has been considered a nontoxic, harmless mineral. If you study any of the standard nutritional texts, you'll discover that only the positive attributes of phosphorus are mentioned. Very few human studies have been done on the possible ill effects of ingesting excess phosphorus. (*About the only time excess phosphorus is mentioned as dangerous is in patients with kidney disease, particularly those undergoing dialysis. To this day, the most comprehensive lists of high-phosphorus foods are those compiled for kidney disease patients.*) Additionally, it has only been in the last few years that the Department of Agriculture food surveys have shown our phosphorus intake to be above normal.

I suspect that it will be years before the public is made aware of the potential seriousness of the problem I'm about to relate to you. (*I was wrong here...I said years, but it's been decades and the public still doesn't have a clue. I guess I was a little more optimistic—naive might be a better term—19 years ago.*)

To understand how serious an excess of phosphorus can be to your health, it helps to have a little



background on what phosphorus does in your body.

Among dozens of other functions, phosphorus helps mediate calcium levels. It performs this function by acting on four BB-sized glands called the parathyroids. (There are two lobes to your thyroid gland, which makes it a four-cornered structure. In each corner you have a small, BB-sized parathyroid gland.)

The parathyroid glands produce parathyroid hormone (PTH). Working in conjunction with vitamin D, PTH regulates calcium levels in your blood and tissues.

When you have insufficient levels of calcium either from poor absorption, a low-calcium diet, or excess phosphorus in the diet, the parathyroid glands produce additional PTH.

PTH raises blood calcium levels by taking calcium directly out of your bones. In the general population, it now appears that each of the above three circumstances are becoming exceedingly common.

Our ability to absorb calcium lessens with age. Hydrochloric acid from the stomach is required to absorb calcium. And research has shown that by age 50, the stomach is only releasing 15 percent of the amount of acid that is released at age 25.

From 1989 through 1991, the Department of Agriculture performed a food survey to determine dietary calcium and phosphorus levels in the US population. The survey involved over 12,000 people from 48 states and Washington, D.C. Only children under 11 years of age were found to be getting the 1989 Recommended Dietary

Allowances (RDA) set for calcium. Adolescent girls were getting only 56 percent of the RDA for calcium and young women only 48 percent. Adults over the age of 60 were often getting less than half the RDA for calcium.

Phosphorus levels, on the other hand, were at or above the RDA for all age and sex groups except for girls and young women under the age of 25. Obviously, there will be errors in these types of food surveys due to underreporting and other factors, but in the case of phosphorus, there is another very important factor that would cause the amount of intake to be underestimated.

Over 45 different phosphorus-containing food additives, which are not accounted for in these surveys, are now added to foods as preservatives of color and moisture, and as emulsifiers and sequestrates.

Five different phosphate-containing food starches have been approved for use in ready-to-eat frozen foods and desserts. Phosphorus additives are widely used in frozen pizzas, chicken, and fish. Additionally, more than 70 phosphorus compounds are in use as indirect additives in packaging materials, sanitizers, and production acids.

*(Phosphates were first approved by the USDA in 1971 for use in bacon and ham. They were added to poultry and other meats in the 1980s, the start of the Millennial generation. Some reports say that as many as 45 percent of all grocery items contain added phosphorus. For manufacturers, phosphates have become the jack of all trades. They are inexpensive and*

*can make foods creamier, prevent the ingredients in beverages from separating, maintain the juiciness in meats, cause foods that wouldn't normally melt to melt, and can even help preserve foods and extend shelf life. The FDA requires that added phosphates be included on the label, but listing the amount isn't required.)*

Fast foods, which are often loaded with phosphate compounds to help retain moisture and to act as anti-caking agents, also contribute to the problem. Even though fast food consumption has been steadily increasing, none of the Department of Agriculture surveys reflect the phosphorus content of these foods. Researchers now believe that phosphorus-containing food additives contribute as much as 30 percent of the total adult phosphate intake. *(Today, phosphorus additives in food have increased to such a degree that they probably account for at least 50 to 75 percent of our total daily phosphate intake.)*

Additional phosphorus comes from hard water sources and soft drinks, neither of which is accounted for in these food surveys.

A 12 oz. soft drink contains around 50 mg of phosphorus and the average annual consumption of soft drinks in this country now exceeds 50 gallons per person. Soft drink consumption surpassed water consumption sometime in the early 1980s. As strange as it may sound, the average person in this country consumes over 50 gallons of soft drinks a year, while only drinking 40 gallons of water.

Unlike calcium, which is difficult to absorb, roughly 70 percent of all dietary phosphorus is

readily absorbed from the intestine and directly transported into the bloodstream. Also, unlike calcium, your body has very little control over how much phosphorus is absorbed. Certain minerals such as iron and magnesium can interfere with phosphorus absorption, but only when large amounts are taken. High-fat diets increase the absorption of phosphorus.

When your body detects high phosphorus levels in the bloodstream, accompanied by low calcium, certain events are triggered. First, the parathyroid glands begin to produce additional amounts of PTH. This increased parathyroid activity is called secondary hyperparathyroidism. In an effort to balance the amount of phosphorus by increasing calcium, the parathyroid hormone causes a release of calcium from your bones.

Animal studies have shown repeatedly that certain bones (those with the greatest trabecular bone and the lowest ash content) are the ones most affected. These include the large leg bone (femur), which forms the hip joint, the spinal bones (vertebrae), the large bone in the upper arm (humerus), and the jawbone.

(As a side note, estrogen makes bone less sensitive to the parathyroid hormone and can help stop the removal of calcium. This helps explain why osteoporosis occurs less in premenopausal women and those taking estrogen.)

High-phosphorus diets, especially when you're low in calcium, will lead to osteoporosis, which leads to hip fractures and collapsing of the spinal vertebrae, resulting in the characteristic humping of the back and shoulders (Dowager's

hump). When you consider how the phosphorus content in our diet has increased during the last couple of decades, it shouldn't be much of a surprise to learn that each of these diseases is becoming more and more common. The surprise comes when you look a little deeper.

The following is a list of less obvious problems that are linked to high-phosphorus/low-calcium diets. If you happen to suffer from any of these problems, I'll show you how they can be easily treated by readjusting your phosphorus/calcium levels and improving parathyroid function.

### **Muscle Cramps**

Practically everyone knows about the connection between muscle cramps and a lack of calcium. Early signs of a calcium deficiency may come as twitching in the facial muscles. The twitches are often small muscle cramps. However, when most people think of muscle cramps, they think of cramps in the legs, toes, etc. Cramping of the larger muscles is easy to recognize. It's the muscle cramps you can't feel that can have the greatest impact on your health.

### **Mini-Stroke**

Transient ischemic attack (TIA), or a mini-stroke, is a condition that is becoming more and more common. The problem occurs when, for no apparent reason, the blood supply in various parts of the brain gets cut off for a short period of time. TIAs result in temporary or permanent loss of function of some part of the body, blackouts, and/or a loss of memory.

Diagnosing TIAs can be difficult, since they happen with no

regularity and often leave very little, if any, permanent damage that can be detected with CAT scans or other equipment.

The problem is obviously a nightmare for the patient. Often, TIAs are precursors to major strokes. Patients are usually given blood thinners and anticoagulants in hopes that the problem will eventually resolve itself. A variety of factors have been implicated as causes of TIAs, including hemorrhages and blood clots. However, there is another causative factor of TIAs that often gets overlooked.

Both large and small blood vessels are surrounded by muscular layers. And just like the larger muscles in your legs or calves, these small muscles will cramp if there is not enough calcium. If it happens, you probably won't feel the cramp itself, but the spasm will temporarily shut off the blood supply to an area of your brain, causing a mini-stroke.

What you experience with a TIA will depend on the area of the brain involved. It might be temporary blindness, paralysis, double vision, confusion, memory loss, slurred speech, falling, or vertigo.

In addition to addressing problems like high blood pressure, blood vessel fragility, and abnormal clotting, calcium imbalances need to be addressed.

### **Periodontal Disease**

Bacterial infections that flourish in gum pockets surrounding a tooth also deteriorate the area of the jawbone supporting the tooth.

The problem rapidly worsens when calcium has been leached from the jawbone due to high blood levels of phosphorus. This

osteoporosis condition limits the options available to treat the problem. Without a good jawbone structure for support, bone grafting, or dental implants, removing loose teeth and fitting for dentures are often the only options left.

### **High Blood Pressure**

Studies have shown that chronically low levels of calcium may be a risk factor for developing high blood pressure. And, in some individuals, oral calcium supplements will lower blood pressure. Surprisingly in others, calcium supplements will do nothing or may even raise blood pressure. Because of the effects that both calcium and sodium have on kidneys, hypertensive individuals that respond favorably to a reduction of salt in their diet will generally benefit from calcium supplementation.

Before you try to treat high blood pressure with calcium, I suggest that you have your doctor monitor the situation. When it comes to hypertension, calcium, like sodium, can affect different individuals in different ways.

### **Osteomalacia**

Osteomalacia is a term used to describe a softening of the bones. It is usually accompanied by aching bone pains (often referred to as rheumatism). I have seen tremendous reductions in deep, aching bone pains when calcium levels were increased in patients. In addition to inadequate amounts of calcium in the system, osteomalacia has also been linked to the use of antacids containing aluminum hydroxide.

### **Torticollis**

Torticollis is one of the most difficult conditions I have ever

treated. It involves almost constant spasms in certain neck muscles, which continually draw the head to one side or the other. Parathyroid treatment can often help lessen the severity of the problem.

### **Chronic Hoarseness**

A spasm of one of the vocal cords will cause the voice to become rough and deep. It can quickly progress to hoarseness. I wouldn't be surprised to learn that President Clinton has this problem. Treating the parathyroids and the phosphorus/calcium imbalance will often correct the condition with no problem.

*(Ironically, since this was written, Bill Clinton has undergone quadruple coronary artery bypass surgery and now Hillary Clinton is running for president...and has unexplained hoarseness.)*

### **Parkinson's Disease**

The trembling and other symptoms associated with Parkinson's disease will often respond favorably to treatment of the parathyroid glands and balancing phosphorus and calcium levels. I'm not suggesting that this is a cure by any means, but I've seen very positive changes by using the very simple techniques I explain ahead.

### **Kidney Stones/Atherosclerosis**

High-phosphorus/low-calcium diets can increase the deposition of calcium in soft tissue. Two of the most common areas where calcium was found to accumulate were the kidneys and the aorta. The problem was worse when there were low levels of magnesium.

There seems to be a common misconception among many people concerning calcium. They worry that taking extra calcium

will cause it to be deposited in their joints, leading to arthritis or increased chances of developing kidney stones or calcium deposits in their arteries. Research has shown the reverse to be true.

Animals on a high-phosphorus/low-calcium diet developed calcium deposits in various soft tissues. The two most common areas of deposition, again, were the kidneys and the aorta. High-phosphorus/low-calcium diets can contribute to kidney stone formation and atherosclerosis or clogging of the arteries.

*(You can now add to this list increased inflammation, reduced mitochondrial energy production, fatigue, emphysema, skin atrophy, loss of muscle, deterioration of the spleen and thymus glands, hypogonadism, loss of coordination, heart failure, infertility, dementia, tissue atrophy, calcification and rigidity of blood vessels, and generally all the processes associated with aging.)*

*Scientists in both the US and Japan have shown in animal studies that higher levels of phosphorus accelerate the signs of aging and can cut lifespan by 25 to 60 percent. Soda—both diet and regular—is one of society's most common sources of excess phosphorus. A single can or bottle may contain 400–600 mg. [[FASEB J 2010 Sep;24\(9\):3562–71](#)]*

*After reviewing the damning research on excess phosphorus, the editor of the journal that published this work, Dr. Weissmann, had the following to say: "Soda has become the caffeine delivery vehicle of choice for millions of people worldwide, but it comes with phosphorus as a passenger."*



*This research suggests that our phosphorus balance influences the aging process, so don't tip it."*)

## The Lack of Awareness Continues...

Doctors 19 years ago, and still most of them today, think that excess phosphorus is only a problem for individuals with kidney disease. However, as I've explained, that wasn't the case then and it certainly isn't the case now.

Excessive phosphorus intake is a significant risk factor for developing cardiovascular disease and other life-threatening problems. It just hasn't been recognized or acknowledged yet. For anyone willing to investigate, there's a considerable amount of new research on how pervasive phosphorus additives have become in our food supply and the threat they pose.

Since the primary way of excreting excess phosphorus is through the kidneys, those with kidney disease are the most susceptible to its harmful effects. But after a certain threshold of intake, even healthy individuals are at risk.

The RDA for phosphorus has been set at 700 mg for adults. As of six years ago, in 2010, it was estimated that the daily intake was *at least* 1,550 mg for men and 1,120 mg for women. And some researchers feel these estimates could be off by as much as 100 percent considering how phosphorus-based additive use has exploded the last few decades. But since food manufacturers aren't required to list the amount of phosphorus additives on their labels, no one has a clue as to the actual intake. As a result, current food databases

grossly underestimate phosphorus content.

What we do know is that a daily intake exceeding 1,400 mg has been directly linked to increased mortality in healthy people who do not have any kidney disease. And we are probably greatly exceeding that amount.

Phosphate additives are used as leavening and anti-caking agents, flavor enhancers, emulsifiers, moisture binders, bactericidal agents, and stabilizing agents in all kinds of processed foods. Just based on product labels of 2,394 top-selling grocery products in the US, 10 years ago researchers found that almost half of them contained phosphorus additives. They were especially common in chicken nuggets (92 percent); processed meats (65 percent); baked goods, dry food, bread and pancake mixes (70 percent); processed cheeses, dry cereals, diet and regular colas, soups (54 percent); yogurt (51 percent); and prepared frozen foods (72 percent). ([J Ren Nur 2013 Jul;23\(4\):265-70.e2](#)) ([J Ren Nur 2007 Sep;17\(5\):350-4](#))

## Organic vs. Inorganic

Researchers have also found that the source of phosphorus makes a huge difference in its health effects.

Organic phosphorus, naturally found in meat, poultry, eggs, seafood, dairy foods, nuts, seeds, beans, and whole grains, has an absorption rate of only around 50 percent. This is most likely due to the fact that nature has a way of balancing the various components in complex foods, making them conducive to good health.

On the other hand, inorganic phosphorus additives have an

absorption rate of more than 90 percent ([Adv Chronic Kidney Dis 2013 Mar;20\(2\):150-6](#))

## How Do You Balance Out Phosphorus Levels?

To reduce your intake of phosphorus and balance out levels in your body, you have to be a detective and read food labels. As I mentioned earlier, this can be an exercise in frustration since manufacturers are required to list only the presence of phosphorus, not the amount. Not to mention, phosphorus shows up in some unusual places. For example, while regular old-fashioned oats are naturally high in phosphorus, instant oatmeal contains even more of it. And many premixed pouches contain phosphorus, but some of the more popular unsweetened mixes that require you to add your own sweetener don't.

With that said, I can at least give you a partial list of some forms of phosphorus you might find listed on food/drink labels, so that you know what to look for: sodium phosphate, calcium phosphate, dicalcium phosphate, tricalcium phosphate, pyrophosphate, sodium pyrophosphate, sodium aluminum phosphate, phosphoric acid, tetrasodium phosphate, sodium tripolyphosphate, and hexametaphosphate.

You will always find phosphorus in sodas, so avoid them like the plague. Also stay away from premade drinks such as flavored waters, fruit drinks, and bottled coffee beverages.

Second, make sure you're getting calcium in your daily multi-vitamin/mineral supplement. To a degree, calcium naturally balances

phosphorus. However, reducing dietary phosphorus is still necessary since even high doses of calcium aren't sufficient to counteract the effects of excess phosphorus.

Third, minimize your consumption of fast food and processed/junk food. As you've probably heard in the past, for the most healthful foods, shop the perimeter of the grocery store (the outside aisles). It would be difficult for any age group to routinely exceed the recommended daily amount of phosphorus from eating fresh, natural, unprocessed foods. Leafy vegetables like kale and turnip and beet greens, as well as fruits, milk, and hard (not processed) cheese actually have higher and safer calcium/phosphorus ratios.

You can see a detailed breakdown of phosphorus-rich fast food options here: [case.edu/med/ccrhd/phosfoods](http://case.edu/med/ccrhd/phosfoods). If you're stuck having to eat fast food, at least you'll know the better options.

Finally, until there's a real push to reduce inorganic phosphorus additives in our foods, my last recommendation is to take supplemental niacinamide.

Also known as vitamin B3 and nicotinamide, niacinamide has been shown to lower serum phosphate by inhibiting its absorption in the intestine. Aspirin also lowers levels, but based on the research, I question whether the dangers of chronic aspirin use outweigh the overall benefits. (*Clin J Am Soc Nephrol* 2008 Jul;3(4):1131-8)

I've written extensively about niacinamide and the amazing work of Dr. William Kaufman in the 1930s. Dr. Kaufman showed that higher doses of niacinamide (note:

not niacin) could alleviate many of the health complaints commonly associated with aging. These include arthritis, muscle atrophy, fatigue, loss of balance, cardiovascular disease, and depression.

Since that time, new research has shown that niacinamide enhances the activity of specific genes associated with cellular life extension and helps silence "aging genes." And it has been found to be more effective for treating arthritis than NSAIDs, as well as one way to help prevent/reverse problems such as Alzheimer's, diabetes, and cancer.

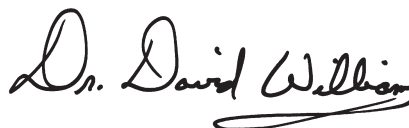
I'm not sure why niacinamide hasn't been recognized as the powerful anti-aging nutrient that it is. It's probably because it can't be patented and is one of the least expensive vitamins available.

I strongly suggest taking 1,000-1,500 mg of niacinamide spread out in multiple doses throughout the day. You can find 500 mg tablets practically everywhere. Shop price on this nutrient, not labels. Regardless of the cost, they're all pretty much the same.

If niacinamide's phosphorus-lowering ability isn't enough to persuade you to use it every day, then please take the time to read my past newsletter articles about Dr. Kaufman's work. You can also find some information on my website, [drwilliams.com](http://drwilliams.com). I think you'll agree that it's truly phenomenal.

\* \* \* \* \*

Until next month,



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