

# The pH Nutrition Guide to Acid / Alkaline Balance

by Jack Challem

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Welcome to "The pH Nutrition Guide to Acid / Alkaline Balance" by Jack Challem, the Nutrition Reporter. In this exclusive report, you'll learn one of the most important health secrets found in nutritional science: the pH secret to good health! Here's what's covered:

- How acidic foods strip your body of minerals.
- Why osteoporosis is actually promoted by the consumption of acidic foods.
- How eating lots of potassium-rich fruits creates a chemical buffer against the ravages of acidic foods.
- The important of your potassium-to-sodium ratio, and how the American diet radically imbalances this all-important nutrient ratio.
- Chloride warning: The average American diet has way too much chloride. Here's how it harms your health.
- Why muscle cramps are actually caused primarily by mineral deficiencies (and how to solve the problem without using dangerous prescription medications).
- How the mass consumption of meat and grains causes the body to become overly acidic.
- Which four foods in the average American diet are the most acidic and lead to the greatest loss of bone mineral density and lean muscle mass.
- Why consuming large amounts of dairy products does nothing to prevent osteoporosis.
- The real cause of osteoporosis, and how to reverse the condition through dietary changes.
- Why your diet is far more important to overall pH level than supplements alone.
- What the Hunter-Gatherer diet can teach us about health in the modern world.
- How to accurately test your own pH levels.
- A list of which foods are the most acidic vs. most alkaline.
- Scientific references supporting the information presented here.

# The basic chemistry of pH balance

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Back in high school chemistry, we learned about pH: acids had low numbers, alkaline had high numbers and a pH of 7.0 was neutral. And it all meant absolutely nothing in terms of day-to-day life.

It now turns out that we have a better shot at long-term health if our body's pH is neutral or slightly alkaline. When we tilt toward greater acidity, which can be measured easily, we have a greater risk of developing osteoporosis, weak muscles, heart disease, diabetes, kidney disease, and a host of other health problems.

The solution, according to scientists who have researched "chronic low-grade metabolic acidosis," is eating a diet that yields more alkaline and less acid. Just what kind of diet is that? One that's high in fruits and vegetables. That might not seem like a big surprise, except for a few unexpected twists and turns.

## Acid-yielding foods deplete minerals

If the idea of balancing acid and alkaline foods seems a bit off the wall, it does have a somewhat checkered past. Most people, including physicians, aren't familiar with the dangers of acidosis, except in the most extreme situations. Those include lactic acidosis, from over exercise; ketoacidosis, when diabetes start burning their own fat; and renal acidosis, which can be a sign of kidney failure.

The original scientific research on acid-yielding and alkaline-yielding foods dates back to 1914 and was remarkably accurate, according to Loren Cordain, Ph.D., a professor and researcher in the department of health and exercise science at Colorado State University, Fort Collins. Then, in the 1930s and 1940s, the acid-alkaline concept was hijacked by early health food "nuts." Among them, William Hay, M.D., proposed an almost ritualistic eating habit based on food acidity or alkalinity. Since then, most doctors have viewed any discussion of acid and alkaline diets with a skeptical eye.

But the problem with acid-producing eating habits is very real, contends Cordain, a leading expert on the Paleolithic, or Stone Age diet. "After digestion, all foods report to the kidneys as being either acidic or alkaline," he says. "The kidneys are responsible for fluid balance and maintaining a relatively neutral pH in the body."

That's where things get interesting. When acid-yielding foods lower the body's pH, the kidneys coordinate efforts to buffer that acidity. Bones release calcium and magnesium to reestablish alkalinity, and muscles are broken down to produce ammonia, which is strongly alkaline. By the time the response is all over, your bone minerals and broken down muscle get excreted in urine.

Long term, excess acidity leads to thinner bones and lower muscle mass, points out Anthony Sebastian, M.D., of the University of California, San Francisco. These problems are compounded by normal aging, which increases acidosis, bone loss, and muscle wasting. Along the way, calcium and magnesium losses can equate to deficiencies, with many ramifications. Both

minerals play essential roles in bone formation and normal heart rhythm. Low magnesium levels can cause muscle cramps, arrhythmias, and anxiety.

## The four cases of dietary acidosis

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Sebastian, regarded at the top researcher in the field of diet-related acidosis, admits that some of the science, at first glance, appears counter-intuitive. For example, acidic and alkaline foods don't usually translate into acid- and alkaline-yielding foods. The distinction is subtle but significant. An acid-yielding food is one that creates a lower, or more acidic, pH. Citrus fruits and tomatoes are acidic, but they have a net alkaline yield once their constituents get to the kidneys.

So if acid foods don't necessarily make for an acid pH, what then happens? Sebastian points to four big issues.

- First, fruits and vegetables are rich in potassium salts, a natural buffer. Eating few of these foods deprives us of potassium, a mineral that protects against hypertension and stroke. According to Cordain's research, humans evolved eating a 10:1 ratio of potassium to sodium, and he regards this ratio as our biological baseline. Today, because of heavily salted processed and fast foods, combined with a low intake of fruits and vegetables, the ratio is now 3:1 in favor of sodium. That reversal, he says, wreaks havoc with pH and our dependency on potassium.
- Second, there has also been a similar reversal in the consumption of naturally occurring bicarbonate (such as potassium bicarbonate) in foods and added chloride (mostly in the form of sodium chloride, or table salt). Bicarbonate is alkaline, whereas chloride is acid-yielding. Chloride also constricts blood vessels, and narrowed blood vessels reduce circulation, Sebastian says. Because the whole body depends on healthy circulation, vasoconstriction contributes to heart disease, stroke, dementia, and probably every other degenerative disease.
- Third, eating large amounts of animal protein (including meat, fowl, and seafood) releases sulfuric acid through the metabolism of sulfur-containing amino acids, also contributing to greater acidity. This acidic shift can be offset with greater consumption of fruits and vegetables (rich in potassium bicarbonate), but again, most Americans eat these foods sparingly.
- Fourth, grains, such as wheat, rye, and corn, have a net acid-yielding effect, regardless of whether they are in the form of white bread, breakfast cereal, pasta or whole grains. "Grains are the most frequently consumed plant food in the United States," says Sebastian, and account for 65 percent of the plant foods eaten by Americans. "In addition to their acid yield, grains displace more nutritious fruits and vegetables," he adds.

"The real problem is one of alkaline deficiency, more than one of too much acid," says Sebastian. People eat plenty of acid-yielding animal protein, dairy products, and grains. The missing piece is an appreciable amount of fruits and vegetables, to produce an alkaline yield. Study after study has shown that most Americans -- 68 to 91 percent -- don't eat the five recommended daily servings of fruits and vegetables.

# pH, acidosis and osteoporosis

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The strongest evidence in support of maintaining an acid-alkaline balance relates to osteoporosis. "Consider that Americans consume more calcium-rich dairy foods than almost every other nation, and we have one of the highest rates of osteoporosis," says Cordain. "There's a disconnect here. Dairy may be rich in calcium, but most dairy foods also produce an acid yield."

Susan Brown, Ph.D., who heads the nonprofit Osteoporosis Education Project in East Syracuse, N.Y., frames the acid-alkaline issue as one of mineral adequacy and depletion. "It's a little like over-farming and depleting mineral levels in soil," she says. "If we eat foods that create an acidic pH in the body, we will deplete our bones of minerals and our muscles of protein."

Brown described a client named Janet whose doctor diagnosed her at age 52 with osteopenia, a demineralizing of bone that often foreshadows osteoporosis. At 55, Janet began following Brown's recommendations for eating more fruits and vegetables, taking supplements, and exercising. Three years later, Janet was clearly building bone mass in her spine and hip, even while going through menopause.

Meanwhile, Sebastian acknowledges that he may have only scratched the surface when it comes to the health problems related to mild life-long acidosis. He says low-grade acidosis increases insulin resistance, the hallmark of both prediabetes and full-blown type-2 diabetes. It increases the risk of kidney stones and kidney failure. And one study suggests that it might even alter gene activity and raise the risk of breast cancer. He admits that no one yet knows all the consequences of a fundamental shift in the body's acid-alkaline balance, but he suspects it's far reaching.

## Can supplements help?

Millions of women dutifully take calcium supplements to help maintain their bone mass and reduce their chances of developing severe osteoporosis with age. But do supplements have any real benefit in alkalizing the body?

Brown does see a benefit from supplements, but she says it's important to stem calcium and magnesium losses from acid-yielding eating habits. "Acid-alkaline balance is overwhelmingly a food issue," she emphasizes. "Your pH is really a sign of how your body is managing your mineral reserves."

Potassium has turned out to be a crucial mineral for maintaining bone. High-potassium diets -- that is, those rich in fruits and vegetables -- slow bone loss, mainly by promoting alkalinity. So do supplements, such as potassium citrate and bicarbonate. While potassium citrate is commonly sold, the bicarbonate form is available only on prescription. Still, it's hard for supplements to compete with the potassium in foods. A handful of raisins, two dates, or a small banana each provides more than 300 mg of potassium.

If you take supplements, opt for the citrate form, such as calcium citrate and magnesium citrate. (Potassium supplements must by law be under 99 mg because of a risk of arrhythmias at high doses.) Fumarate, aspartate, and succinate forms of minerals also have an alkalizing effect, and all get Brown's blessing. In one study, Sebastian found that potassium citrate supplements

protected against calcium losses, even when people ate a high salt diet. Buffered vitamin C, which is ascorbic acid formulated with the carbonate forms of calcium, magnesium, and potassium, might also have a slight alkalizing effect.

Some supplements, such as coral calcium, have been promoted as a way to restore an alkaline pH. But coral calcium is largely calcium carbonate, which is far less expensive as a generic supplement. It's also not as well absorbed as the citrate form.

## What should you eat for proper pH levels?

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Nutritional recommendations are as varied as political and religious beliefs and, sometimes, held to just as stridently. Cordain tries to rise about the controversies by looking to our biological and genetic heritage.

He points out that people, until relatively recently, were hunter-gatherers whose diets consisted of a combination of lean animal foods (including fish) and uncultivated vegetables and fruits. Based on his analyses of the diets of 229 pre-modern cultures, Cordain has calculated that the "average" ancient diet consisted of 55 percent animal foods and 45 percent plant foods. The animal foods included healthy fats as well as protein, and the plant foods consisted of leaves, stalks, fruit, seeds, tubers, and roots. Grains and cow's milk didn't enter the picture until about 7,000 to 10,000 years ago, too short a time for genetic adaptation.

Cordain's recommendations, found in *The Paleo Diet* and *The Paleo Diet for Athletes* include too many veggies to be a knockoff of the Atkins' high-protein diet. (Eating very lean meats, he adds, reduces saturated fats amount to only 10 percent of calories.) Nor do you have to be a vegetarian to gain the alkalizing benefits of fruits and vegetables. "It takes about 35 percent of total calories as fruits and veggies to produce a net alkaline load," he explains. "What's so hard about one-third of your plate being veggies?"

Still, if you have visions of veggies coming out of your ears, the answer is really simple. Cordain, Sebastian, and Brown suggest cutting back on breads, pastas, and other grain-based foods, as well as "high-glycemic" foods such as potatoes. They're all nutrient-poor foods, compared with protein and veggies.

"It's all another scientific justification for what your mother always told you," notes Brown. "Eat your fruits and veggies."

## How to test your own pH

You can test your own pH simply and inexpensively. All you need are some pH test strips. Tear off two three-inch strips. As you as you awaken, before you drink or eat anything, put some saliva on the test strip. Compare the color to a pH color chart that comes with the test strips. Next, measure the pH of your *second* urination of the morning. To do this, urinate on the strip or collect the urine in a plastic or glass (not paper) cup and dip the test strip. Again, compare the color to the pH color chart.

Decker Weiss, N.M.D., of Scottsdale, Arizona, recommends doing the saliva and urine tests for

10 mornings in a row. "Ignore the top three and bottom three tests because they're extremes. Average the remaining four to determine your pH," he says. Weiss aims for a pH of 6.8 to 7 in his heart patients, and 7.2 to 7.4 in his osteoporosis patients. You can retest a few weeks after changing your eating habits.

You can order the test strips from [www.alkalineforlife.com](http://www.alkalineforlife.com) or by calling 888.206.7119. One roll, which is good for a few dozen tests, is \$13.95.

## The pH of common substances

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14.0 Sodium Hydroxide: Alkaline

13.0 Lye

11.0 Ammonia

10.5 Milk of Magnesia

8.3 Baking Soda

7.4 Human Blood

7.0 Pure Water: Neutral

6.6 Milk: Acid

4.5 Tomatoes

4.0 Wine and Beer

3.0 Apples

2.2 Vinegar

2.0 Lemon Juice

1.0 Battery Acid

0.0 Hydrochloric acid

### **Acid-Yielding Foods**

Spaghetti

Corn flakes

White rice

Rye bread

White bread

Whole milk

Lentils

Beef

Pork

### **Very Acid-Yielding Foods**

Parmesan cheese

Processed (soft) cheeses

Hard cheeses

Gouda cheese

Cottage cheese

Brown rice

Rolled oats

Whole wheat bread

Peanuts  
Walnuts  
Salami  
Luncheon meat, canned  
Liver sausage  
Chicken  
Cod  
Herring  
Trout  
Eggs

**Alkaline-Yielding Foods**

Apricots  
Kiwifruit  
Cherries  
Bananas  
Strawberries  
Peaches  
Oranges  
Lemon juice  
Pears  
Pineapple  
Peaches  
Apples  
Watermelon  
Celery  
Carrots  
Zucchini  
Cauliflower  
Broccoli  
Green peppers  
Cucumber  
Tomatoes  
Eggplant  
Lettuce  
Green beans  
Onions  
Mushrooms  
Mineral water

**Very Alkaline-Yielding Foods**

Spinach  
Raisins  
Dates  
Walnuts

Note: All fruits and vegetables are alkaline yielding, unless they have been pickled or marinated.

# Citations

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## About the author

Jack Challem, known as The Nutrition Reporter(tm), is a personal nutrition coach based in Tucson, Arizona. Jack is one of America's most trusted nutrition and health writers, and has written about research on nutrition, vitamins, minerals, and herbs for more than 30 years. He is the author of *The Food-Mood Solution: The Nutrition and Lifestyle Plan to Feel Good Again* (Wiley, 2007), *Feed Your Genes Right* (Wiley, 2005), *The Inflammation Syndrome* (Wiley, 2003) and the lead author of the best-selling *Syndrome X: The Complete Nutritional Program to Prevent and Reverse Insulin Resistance* (Wiley, 2000). His next book, *Stop Prediabetes Now*, will be published in the fall of 2007. He writes *The Nutrition Reporter*(tm) newsletter and contributes regularly to many magazines, including *Alternative Medicine*, *Better Nutrition*, *Body & Soul*, *Experience Life*, and *Let's Live*. Jack's scientific articles have appeared in *Free Radical Biology & Medicine*, *Journal of Orthomolecular Medicine*, *Medical Hypotheses*,

and other journals. In addition, he is a columnist for *Alternative & Complementary Therapies*. Jack is a frequent speaker at nutritional medicine conferences and to consumer health groups. Email him via [www.foodmoodsolution.com](http://www.foodmoodsolution.com)