

## ACID & ALKALINE

The Arm & Hammer symbol on a box of baking soda is as comforting and familiar as old shoes. Baking soda (also known as bicarbonate of soda or sodium bicarbonate) doesn't just take stains off china, deodorize refrigerators, and cause dough to rise. It also quenches the 'fire of heartburn,' because it neutralizes stomach acid, right?

I'm beginning to learn it does a lot more than that. It may turn out to be a tool for building health even in people who never heard of 'acid indigestion.'

Most of us are not aware that *we make our own sodium bicarbonate*. We do so because our organism continually engages in a survival game called "Acid-Base Balance"--not only in the stomach but throughout our system. Pure water has a perfect balance of acid and alkaline elements, hence it is neutral. In biochemical shorthand, it has a pH of 7.0. (The term "pH" stands for "potency of hydrogen," because how acidic a solution is depends on how strong its concentration of hydrogen ions is.) The pH of solutions extends from 0 to 14. As solutions become increasingly acidic, the pH numbers go backwards from neutral 7 to zero. E.g., a corrosive solution of hydrochloric acid (HCl) can have a pH as low as 1. As solutions become increasingly alkaline, their pH rises from 7 to 14; an ammonia solution may have a pH of 11.

Every watery part of the human system has its prescribed pH. Blood in arteries must maintain a pH of 7.4. The lowest blood pH at which we can survive a few hours is about 7.0, the upper limit around 8.0. Fluids inside our cells allow more leeway, usually ranging between 6.0 and 7.4. But there's not a lot of scope for big swings towards the acid or alkaline ends of the pH scale: extreme acidosis or alkalosis can quickly bring on the Final Solution!

### The Breath of Life

The body invokes wondrous mechanisms to maintain the pH in its various fluid compartments. The lungs

participate in a major way. Each time we breathe out, we get rid of carbon dioxide. We need to do this because CO<sub>2</sub> formed in the body from metabolized foods becomes an *acid*--carbonic acid. As a matter of fact, the respiratory center in the brain responds directly to the pH of circulating fluids. When these are too acidic, *we breathe more rapidly*. This gets rid of more CO<sub>2</sub> and keeps too much carbonic acid from forming.

A person can bring on *respiratory acidosis* simply by holding their breath! Eventually they pass out, at which point breathing resumes and CO<sub>2</sub> is expelled once more!

On the other hand, a person can hyperventilate, that is, breathe so rapidly--for example because of an hysterical emotional outburst--that their blood becomes too *low* in CO<sub>2</sub>. The resulting overalkalinity may send muscles into spasm. Having the person breathe into and out of a large paper bag (not plastic!) for a few minutes reintroduces their own CO<sub>2</sub> into their respiratory system. Presto--more carbonic acid is made and blood pH goes down to normal!

### Exiting in Style

The renal system is the other great player in the Acid-Alkaline marathon. The natural processes of the body--food metabolism, energy production, mus-

cular contractions, etc--all produce acidic wastes. Eventually, the ions that make bodily fluids too acid (or sometimes too alkaline) are linked neatly to neutralizing ones in the kidneys and flushed out in the urine.

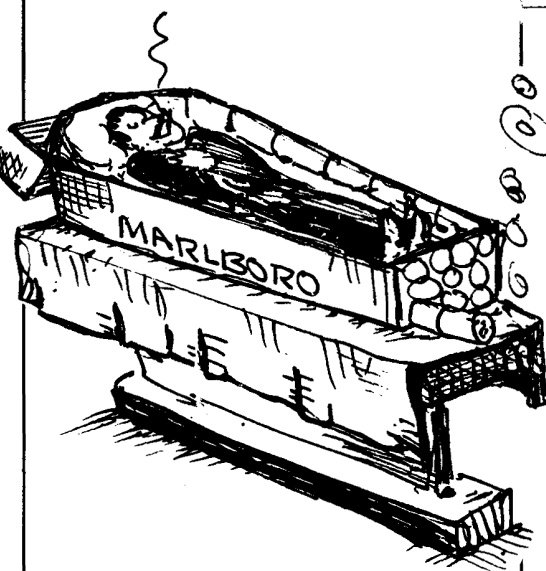
### The Buffers

To make it possible for the lungs and kidneys to do their great balancing act, the body has created a number of acid-base buffering systems. *The bicarbonate buffer system is a major one.*\* It supplies buffering molecules for bodily fluids, outside as well as inside each cell. In sodium-rich extracellular fluids such as blood and lymph, sodium bicarbonate predominates. Inside the cells, bicarbonates of potassium and magnesium prevail.

When buffer systems fail, either acidosis or alkalosis can develop, although alkalosis is the less common condition. Medical manuals devote considerable space to the causes and treatments of both, giving full recognition to their life-threatening aspects. For example, severe bouts of diarrhea can lead to depletion of sodium bicarbonate in gastrointestinal fluid. The rapid shift to acidosis can be fatal, especially in babies. Intravenous administration of sodium bicarbonate is standard treatment for this and many other kinds of metabolic acidosis.

\*A buffer solution contains two or more chemicals which neutralize any strong acids or bases (alkaline substances) that enter the solution. A typical bicarbonate buffer system contains sodium bicarbonate plus carbonic acid. If a powerful acid such as HCl is added, the buffers act on it to create a neutral salt (NaCl), plus more carbonic acid. The latter is a weak acid; the pH of the solution, which would have plunged downward because of HCl, is lowered only slightly instead.

Similarly, if a caustic base such as lye (sodium hydroxide) were added to the original solution, lye would be transformed by the buffers into bicarbonate and water. Instead of a highly alkaline solution, the pH of the fluid would be only a little higher than before lye was introduced.



**B**ut what of less dramatic shifts towards the acid side, or of chronic ones, that go undetected? Could they be playing fast and loose with our health? William H. Philpott, M.D. thinks so. Exploring this concept as a physician and psychiatrist, he has a theory and treatment strategy that make good sense. In **BRAIN ALLERGIES: THE PSYCHONUTRIENT CONNECTION**, written with Dwight Kalita, Ph.D. (Keats Publishing, 1980, update 1987. New Canaan, CT 06840, \$12.95 plus shipping), he tells how common stresses on one digestive organ in particular--the pancreas--can start a chain reaction affecting body and brain.

**T**he pancreas, of course, secretes the hormone insulin directly into the blood. It also secretes the major digestive enzymes as well as *sodium bicarbonate* into the intestines. Digestive breakdown of proteins from food is initiated in the stomach when the enzyme pepsin is activated by the stomach's hydrochloric acid. When enough HCl is secreted to do the job, the pH of gastric juice may plummet down to 1 or 2--actually a very corrosive fluid!--but the healthy stomach safeguards itself by means of special coatings.



**T**he rest of the digestive tract is another matter. Starting with the duodenum and moving all the way down to the final exit, *an alkaline environment (around pH 8) is required*. HCl would tear the gut to shreds. Sodium bicarbonate to the rescue! The pancreas, reacting to the signal that highly acidic boluses of food are leaving the stomach, secretes fire-quenching amounts of bicarbonate into the next stop, the duodenum. As digestion continues, the pancreas makes enough to keep the entire gut bathed in slightly alkaline fluid.

**I**nterestingly, while the stomach needs a strongly acidic environment for digestion to take place, *the rest of the digestive tract requires an alkaline one*. Truth is, digestive enzymes in it are *inactivated* unless the intestinal milieu has a pH around 8. Thus, besides protecting the gut from the stomach's HCl, bicarbonate made by the pancreas **ACTUALLY MAKES DIGESTION AND ABSORPTION POSSIBLE**.

## A Theory About the Origin of Disease

**A**ll of this is standard information in any physiology text. Where Dr. Philpott cuts through new territory is his belief that the first pancreatic function to go awry is *bicarbonate secretion*. Moreover, it doesn't take massive insults to the organ for this to happen. He says tests show that plain, everyday stresses, such as environmental toxins, foods to which one is allergic, drugs, alcohol, chronic overeating, and nutrient deficiencies, can interfere with the pancreas' ability to make bicarbonate.

**N**ow, Dr. Philpott says, the chain reaction begins! To start with, *digestion suffers*. Without copious bicarbonate coursing through the intestines, the *alkaline environment turns acidic*. As digestive enzymes stop working, poorly digested protein fragments may slip through intestinal walls and enter the bloodstream. There, they can provoke inflammatory responses throughout the body, *including the brain*.

**A** natural peptide hormone, *kinin*, evokes many of these reactions. He says kinin-induced reactions in the brain alone have been clinically observed to fall into classic diagnostic categories of schizophrenia, psychotic depression, hallucinations, and a host of other mental illnesses.

**N**ormally these explosive substances are kept in check by pancreatic digestive enzymes. When the enzymes fail, kinin is free to light 'prairie fires' throughout the body and brain. Allergic swelling takes place in targeted tissues. The edema often brings with it a lowered oxygen level that can injure the cells and tissues and set them up for invasions by viruses or bacteria. At the very least, inflammatory reactions create discomfort, oftentimes pain, and play havoc with normal functioning. *Nutrient requirements of the tissues under attack go skyhigh*.



**A**nother consequence: Philpott says when protein in foods is poorly digested we may suffer from *chronic amino acid deficiency*, no matter how much protein we're eating. Amino acids from proteins build tissues and form hormones, nucleic acids, enzymes, antibodies, neurotransmitters, etc. "An amino-acid deficiency is a very serious problem because the central nervous system, as well as many other biochemical systems within the human body, malfunction...[they are] the very building blocks of life."

**M**ore trouble: Loss of digestive enzyme activity means *fats* are poorly digested and metabolized. It also means **POOR ABSORPTION OF VITAMINS AND MINERALS**. Since all nutrients have to be on hand to keep our immune system in good order, their loss makes us even more susceptible to allergic reactions, tissue damage, and viral, fungal, or bacterial invasions.

Philpott says all of the above constitute a standing invitation to the major diseases, including some of the mental ones.

**T**o turn the chain reaction off, *everything possible should be done to restore the pancreas' ability to pour out bicarbonate*. For many, that may mean reversing the conditions which weakened it in the first place. Philpott says it's important to identify his patients' hidden allergies to environmental substances and foods. Avoidance of these allergens and toxins often starts the recovery ball rolling. He also uses vaccines made from the patient's own microorganism population in order to vaccinate the individual against further infections. Complete nutritional supplements are a third measure he find to be basic to the healing strategy.

## A Personal Adventure

**D**r. Philpott sees seriously ill patients and he makes it clear his methods are not to be looked upon as self-help recipes! Nevertheless, he describes a relatively simple means he and other physicians sometimes employ to overcome "metabolic acidosis." Yes, plain old baking soda! Better yet, a mixture of two parts baking soda and one part potassium bicarbonate, referred to as "alkaline salts." Improvising on information in his "Appendix for Physicians" in **BRAIN ALLERGIES**, I began an experimental regimen.

(Note: None of the following is to be construed as advice to the lovelorn, but only as "One Nutritionist's Odyssey in Acid-Alkali Land.")

About 30-45 minutes after meals, I stir 1/4 to 1/2 teaspoon of alkaline salts into a glass of water and use it to swallow tablets of pancreatic digestive enzymes. (The time interval keeps any neutralizing of stomach HCl to a minimum. Like many folks, instead of too much I make too little stomach acid!)

I finally found potassium bicarbonate powder in a neighborhood drug store. (It is not a prescription item.) I measure one-third of a cup, add two-thirds of a cup Arm & Hammer bicarbonate of soda, stir it all in a blender to get the lumps out, and store it in a covered glass jar. Pancreatic tablets containing enzymes to digest protein, fat and carbohydrate are available as non-prescription items from health food stores and catalogs. Vegetarians can substitute tablets containing bromelain and papain. I sometimes take both kinds, if I've eaten too grandly.

My rationale for doing this lies in inherited tendencies to allergies and digestive problems. These I've largely managed through the years by using dietary common sense and supplements, but I was curious to see if there would be improvement. Here's what I've observed in the four months since I began using the alkaline salts. (I had been taking pancreatic enzymes routinely for years, also nonprescription betaine HCl tablets with meals to augment inadequate stomach acid. I continued with the betaine HCl and increased the pancreatic enzymes.)

(1) My appetite has regulated itself in a surprising way. I wasn't expecting this. My usual cravings for sweets and other no-no's are much reduced, and I can go hours between meals without wanting anything but fruit. This is a big change for me!

**Comment:** Alkaline salts, orally or intravenously, are being used successfully, by clinicians, along with massive doses of non-acidic vitamin C (vitamin C buffered with calcium, magnesium, and potassium) to relieve symptoms of withdrawal from addictive substances, whether these be cocaine, heroin, alcohol, nicotine, or caffeine. They also are used for withdrawal from "addictive" foods--repeatedly eaten foods to which a person has a hidden allergy. The habitual intake masks allergic symptoms. "Withdrawing" from

the food provokes real discomfort, relieved only by eating the food again. You chocolate-freaks out there know what I mean! The same for pizza- and ice-cream-lovers---the list goes on. The bicarbonate salts definitely tempered my cravings. Foodwise, will power has never been my strong point!

(2) As a result, my weight is staying lower than it has for years. I'm pleased with my trimly zoftig look--nice for grandmothers!

(3) Digestion and elimination have clearly improved.

(4) I can eat beans without regret.

(5) So far, allergies are quiescent this spring, usually a vulnerable time.



(6) My muscles don't get as sore as they used to after workouts.

**Comment:** Exercise physiologists have learned that giving athletes a drink spiked with about two teaspoons of baking soda about an hour before an event improves athletic performance. During exertion, a natural acidic waste product--lactic acid--builds up in muscles faster than the body can get rid of it. Lactic acid makes muscles weary and achy. By giving nature's buffer system a helping hand, the bicarbonate drink speeds up removal of lactic acid and other acidic products.

Buffered vitamin C powder, stirred into juice or water before and after exercise (with or without bicarbonate salts) also helps with muscular aches and pains. I use it often.

(7) I'm sleeping more deeply and having more vivid dreams than I've had for years.

**Comment:** Maybe this has something to do with better nutrient absorption. For example, medical studies show that taking small amounts of alkaline salts reduces the amount of calcium the subjects lose in their urine. When you eat protein, it metabolizes into acidic wastes. A high protein intake may result in more acids being formed than can be neutralized, so the acids latch on to calcium as a neutralizing agent when they exit in the urine. The bicarbonate salts may be helping to keep my calcium levels higher. That could be one reason I'm sleeping better.

It's also possible my improved digestion is providing me with a better supply of amino acids. Maybe they're helping my brain to make more of the neurotransmitters that improve the quality of sleep and dreams. I think I'm noticing on a small scale the kind of improvement in wellbeing that Philpott describes in his psychiatric patients after they've been on his treatment regimen.

## Balancing Our Foods

Long before modern science invented pH meters, ancient wisdom had it that health depended on equilibrium in the body's acid and alkaline elements. A thread of this is found in Eastern concepts of yin yang. Centuries of human experience have gone into nonWestern dietary approaches to achieving healthy balance. In his comprehensive booklet, ACID & ALKALINE, Herman Aihara integrates Eastern dietary philosophy with modern biochemistry. (Ask for it at health food stores, or order from George Ohsawa Macrobiotic Foundation, 1511 Robinson St., Oroville, CA 95965, \$5.95 plus postage.)

An acid or alkaline classification doesn't depend on the pH of the food as it is eaten, but rather on its acid-forming or alkaline-forming qualities *after* it has been digested and metabolized. For instance, even though the pH of an orange would be acidic, after we eat it the acids are oxidized, while its alkaline elements (mainly potassium, sodium, calcium, and magnesium) remain to serve as neutralizers of bodily acids. Therefore an orange (like most fruits, vegetables, and beans) is an alkaline-forming food!

Fish, meat, eggs, and grains, on the other hand, are high in sulfur and phosphorus--elements which produce acids after the foods are digested. That's why it's helpful to eat plenty of vegetables to balance these acid-forming foods!

Sugar and soft drinks are classified as acid-forming by Aihara. They not only lack alkaline-forming minerals, they deplete the body's store, since minerals are used to neutralize the acids created by sugar and soda pop.

Sea vegetables, cherished by most island and coastal peoples, are the most alkaline-forming foods known because of their very high content of calcium, sodium, magnesium, potassium, and iron. Aihara suggests their use freely for individuals who suffer from digestive problems and acidic conditions.

In other words, there are many roads leading to health. Faithful adherence to foods that perform a valuable acid-alkaline balancing function is, in the long run, a wiser way to go than ingesting alkaline salts after meals! But we're dealing with the human condition, not saintliness. When dietary indiscretions occur, it's nice to know we have a remedy on hand.

In my own situation, I wasn't aware of a so-called acidic condition. My everyday diet is rich in alkaline-forming foods. Yet the interesting corrections I'm experiencing on the alkaline salts regimen suggest my pancreas was by no means operating on all cylinders! Will it recover its ability to produce enough bicarbonate and digestive enzymes on its own? I don't know. After a few months, I plan to do further self-guinea pigging by cutting down on the bicarbonates and digestive enzymes and observing the result. I don't plan to settle for anything less than feeling good, so if it turns out that I have to depend on small doses of alkaline salts and digestive enzymes for the rest of my life, I'll just shrug and say I'm glad at least baking soda is cheap!

**A word of caution:** Sodium is a vital nutrient but too much salt (sodium chloride) can send blood pressure soaring in salt-sensitive persons. A half-teaspoon of baking soda provides close to 500 milligrams of sodium, or about 1500 mg a day if taken after each meal. Clearly, that's too much for persons restricted to 250 to 2000 mg a day from all sources. The mixture that I use of two parts sodium bicarbonate to one of potassium bicarbonate reduces the sodium content in a half-teaspoon to 300 mg, for a total of 900 mg. I usually take only half that dose, or 1/4 teaspoon, three times a day, providing 450 mg of sodium. That seems relatively modest, since I generally keep salt intake otherwise low. \*\*



## MAKING MIRACLES:

### *An Exploration into the Dynamics of Self-Healing*

Psychologist Paul C. Roud has written about 11 human beings who fought incurable illnesses and won. After describing the medical course of each disease, he has the survivors tell their stories in their own words. These interviews, some of them a series over a ten-year period with the same person, are absolutely fascinating. This book is not about nutrition--although some of the individuals talk about switching to good nutrition to clean up their acts--but about everyday attitudes that got them out of the Valley of the Shadow. **MAKING MIRACLES** (1990, Warner Books, N.Y.) had me laughing and crying at the same time. It's an exuberant learning experience. Read it and pass it on to a friend who's having health problems. Bernie Siegel, M.D., author of **LOVE, MEDICINE & MIRACLES**, who wrote the introduction, says it's a great book. I say so, too. □□

From **ESQUIRE's** Dubious Achievements Awards for 1989:

*A man was admitted to a Connecticut hospital, where a two-foot-long piece of solid oat bran was removed from his small intestine.*

From Erma Bombeck's column in **THE TRIBUNE**, January 9, 1990:

*...Food today is like a highway under construction: You travel at your own risk. Add some oats, take out the salt, lower the fat, compress the nutrients, spray for disease, inject for longevity, corral the calories, remove the seeds, alter the color, and slap a label on it to let people know what it is supposed to be. Dispensing food is a matter of keeping it alive long enough to execute it....*

## THEY'RE CATCHING UP!

The *New York Times* of February 7 wrote that the National Cancer Institute, in a new multi-million-dollar research program on foods that have healing qualities, will be trying in the next year to identify specific cancer-fighting compounds in members of the garlic family, the parsley family, citrus fruits, licorice extract, and flax--"all of which are thought to inhibit cancer."

Flaxseed and flaxseed oil, as **Felix Letter** readers know, are superior sources of essential omega-3 fatty acids. Issue 43 described the impressive results in human volunteers and farm animals of Paul Stitt's pioneer work with flaxmeal. The *N.Y. Times* article quotes Stitt, and describes a study at the University of Toronto where flaxseed oil was shown to lower cholesterol and produce a 50 percent reduction in pre-cancerous cells in laboratory animals.

If you haven't done so yet, try stirring a few teaspoons of flaxmeal into fruit juice, or sprinkling it on your cereal. Wonderful stuff, truly. ○○○



**THE OMEGA-3 PHENOMENON** by Donald O. Rudin, M.D. & Clara Felix with Constance Schrader (Rawson Assoc./Macmillan, 1987) is available in hardback from the publisher for \$16.95 plus approx. 10% shipping, plus state tax if applicable. Phone Macmillan Publishing Co.'s order desk at (609)461-6500, or write them at Front & Brown Sts., Riverside, NJ 08075, if you can't get the book locally.

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The *Felix Letter*, published independently by Clara Felix, is supported by subscription only. Sample issue and descriptive list of issues \$1. Subscriptions \$10 a year (six issues). Canada & Mexico \$12, U.S. cash or money order.