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The body is largely made up of water, a medium which is most biologically useful in allowing nutrients and various chemicals to be transported from place to place. Surprisingly, only half of a woman's physical weight is made up of body fluids (generally because they naturally have more fat), while it's close to 60% for males, and 75% for infants. Of that, the sum of the fluids in each cell (intracellular fluids) make up 63% of the total body liquid, the majority of the remaining 37% comes from blood plasma (10%) and interstitial fluids (18% - the fluids between organs, etc.), and the transcellular fluids (5% - between cells) and lymph (4%) make up the rest.

This liquid is quite is quite sophisticated chemically, carrying electrochemical potentials which influence the pH (or acidity versus alkalinity) of the medium, and thus has the potential for becoming too acid or too base (alkaline) in nature, which can greatly impede the efficiency of how biological systems run. Since most of the body is liquid, the pH level (or acid base level) has profound effects of body chemistry, health, and disease. Acid base or pH management regulates breathing, circulation, digestion, elimination, hormonal production, immune defense and inter/intracellular communications. In fact, pH is such an important factor that the body has developed strict accounting procedures to manage pH, removing the normally metabolized developed acids from body systems, without damage to living cells.

The body has 3 major systems which help control pH levels, namely (1) the respiratory system, (2) the chemical and physiological buffering system and (3) the urinary system via the excretion of urine. But it is the urinary system which quantitatively affects the body's ability to regulate and stabilize pH more than any other. A decrease in blood pH immediately accelerates the kidneys' removal of free hydrogen (H+), and therefore acidifies urine. And indeed, by regularly measuring the urinary pH, we can get a very good idea as to the safety of blood pH and the rest of our body pH as well. Notwithstanding these numerous chemical and physiological buffering systems which help keep the pH of our body slightly alkaline (pH= 7.35 to 7.5), the acid buffering capacity of our biochemistry is often overtaxed on a regular basis.

As we grow older, and our diet changes, our chemical and physiological pH buffering mechanisms often fail us, and the body begins to develop an overall acid profile. For most of us, a slightly more acidic pH blood plasma, extra cellular liquids and urine of the body, becomes the 'dangerous norm' rather than the occasional exception. As it is so critically important for our blood plasma to remain slightly alkali, acid potentials (excess H+) must be neutralized and removed from the blood. However, when the buffering systems become overtaxed, acids and

acid forming residuals, instead of being neutralized, are simply relocated within the body and not removed at all, becoming stored within the extra cellular fluids and connective tissue cell, directly compromising cellular integrity.

As we have learned, the kidneys are capable of removing more acid than any other buffering system of the body. But there is a problem. The only way to transport excess acid to the kidneys is through the blood system. However, since the blood is so especially sensitive to pH changes, it is only able to transport a very small amount of acid to the kidneys at any one time. Moreover, a further bottleneck occurs because the kidneys will generally not excrete anything more acid than a pH of 5.4. In order to protect the blood supply, and without other options, the body is then forced to dangerously store any excess toxic corrosive acid wastes with the connective tissue cells of the body. But this is only a short-term solution.

Virtually all cellular functions are sensitive to alterations of the pH balance of their fluids. This is especially true of connective tissue cells. The body's metabolic processed depend on a precisely balanced pH value of 7.34 to 7.40 with the cellular spaces. If it waivers beyond these limits, either higher or lower, certain enzymatic reactions fail to occur, and cellular metabolism becomes difficult to regulate. If the pH deviates too far to the acidic side, cell metabolism will stop, and as connective tissue cells become poisoned in their own toxic wastes, these cells will die. When connective tissue cells die, they close the critical bridges and passageways between the cardiovascular system and the rest of the cells and organs of the body. Such an effect is disastrous! Indeed, when these bridges are closed, nutrients can no longer be supplied, nor can wastes be removed. This causes the 'plumbing to backup on itself', dumping acids back into the bloodstream and other critical organs.

As more and more acid is accumulated, and storage capacity is exhausted, the body slowly begins to 'stew' in it's own poisonous wastes. Without warning, acid wastes begin to silently corrode the veins and arteries, destroying cell walls, and then entire organs. The damage caused is compounded daily, becoming more aggressive and deadly over time. Indeed, an acid pH is so corrosively and insidiously destructive that it's considered the seed bed of most, if not all, degenerative diseases, including: stroke, heart attack, and other cardiovascular diseases, diabetes and obesity, cancer, immune deficiencies and neurological dysfunctions such as MS and MD.. Thus the imbalance of the body pH causing toxic waste, or acidosis, is the real killer, the silent killer, because it's the progenitor, the beginning, of so many deadly diseases!

How to Understand pH

The key to understanding pH is simple: pH, or the degree of acidity and alkalinity of a solution,

is measured on a (logarithmic) scale of 1 to 14. Anything with a pH value of less than 7.0 is considered acid or acidic. The lower the number of pH, the greater the acidity. The higher the number of pH, the greater the degree of alkalinity or baseness. Therefore, vinegar with a pH of 3.0 is more acidic than seawater with a pH of 8.0. Oven cleaner with a pH of 13.0 is more alkaline or base than the water in the Great Salt Lake which has a pH of 10.0. Neutral solutions have a pH of 7.0 (-log 10 minus 7). The body prefers the slightly alkaline solution of 7.4 and if it drops below this for any length of time, it will suffer from a score of degenerative diseases. The lower limit of blood pH at which a person can live more than a few hours is about 6.8, and the upper limit is about 8.0.

What actually is being measured here is the amount of free hydrogen ions (H+) in solution; free H+ combines with certain heavy metals to form acids. Therefore, acidic solutions have greater free H+ concentration potentials than those that are base or alkaline. Alkaline solutions have less free H+ concentrations potential but greater OH- concentration potentials which combine with metals to form bases or alkalines.

WHAT'S NORMAL

There are a number of body systems which all have their own specifically preferred pH. Over all, the body internal chemical environment changes from a weak acid to a weak base within a 24 hour period, usually being more acid at dawn and most base at sunset. These physiological changes occur on a sine curve during this period. The slightly acid time period (early morning): pH< 7.0) is optimal for the activity of the sympathetic nerves, hormones, and neurotransmitters such as adrenaline, thyroxine, histamine, acetylcholine, and other biogenic amines. In this pH, the acid mesenchymal connective tissue substance (stored acidic wastes) is dissolved by the hyaluronidase into liquid form and thereinafter excreted from the body as wastes.

BLOOD pH

The bloodstream is the most critically buffered system of the entire body, far more sensitive than any other. Arterial and venous blood must maintain a slightly alkaline pH; arterial blood: pH=7.41 and venous blood pH=7.36. Because the normal pH of arterial blood is 7.41, a person is considered to have acidosis when the pH of the blood falls below this value and to have alkalosis when the pH rises above 7.41. The lower limit of blood pH at which a person can live more than a few hours is about 6.8 and the upper limit is about 8.0.

INTERSTITIAL FLUIDS AND CONNECTIVE TISSUE pH

A normal pH in these areas is 7.34 and 7.40, a slightly more acid profile, because the body cells dump as much free hydrogen (H+) as possible, buffering the blood as much as possible.

However, pH in these areas can dangerously drop to concentrations of pH = 5.0.

URINE pH

In a pH balances body, urine is slightly acid in the morning, (pH = 6.5 to 7.0), generally becoming more alkaline (pH = 7.5 to 8.0) by evening in healthy people. This corresponds to a balanced pH value of blood (pH=7.4) and shows that the kidneys need not eliminate an excess of acid or base in it's fluids, and can handle normal imbalances or excesses quite easily and safely.

Outside this range implies that cells are being burdened with caustic (corrosive and burning; destructive to tissue) pH fluids within and without their surroundings. Long term experience outside this range is dangerous and will begin to corrode the body, and most importantly the tissues of the cardiovascular system. However, the pH of the urine can range from and extremely unhealthy low of 4.5 to a high of 8.5, which it tolerates a little easier, depending on the acid base status of the extracellular fluids. Generally, when the urine pH is 6.0 and below for extended periods of time, it is an indication that the body's fluids elsewhere are too acid, and it is working overtime to rid itself of an acid medium. Thus, when the urine pH is normal, then the blood pH is normal, but when the urine pH is overly acid, blood pH is likely below 7.35 which is dangerously acidic for the blood.