

A microscopic cross-section of a plant stem, likely a dicot, stained with blue and purple dyes. The image shows the vascular bundles arranged in a ring, with the xylem on the inner side and the phloem on the outer side. The staining highlights the cellular structure and the arrangement of the vascular tissues.

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**GIVE
YOURSELF
A FIGHTING
CHANCE**

Give Yourself a Fighting Chance

As a practicing physician for over 39 years, I have witnessed some very significant and alarming changes in the health of people, not only in North America but throughout the entire world.

I believe the best way for me to demonstrate what I have witnessed is with the comparison of the medical history of a male born in 1938 and a male born in 1978, some 40 years later.

In 1938, the world was still using ice for home refrigeration. This also was a time when food consisted of fresh vegetables grown in home gardens or by local farmers. There were no “fast food” restaurants and processed food was minimal. Meat was obtained locally not shipped from thousands of miles away and hormones were non-existent. Milk was not pasteurized so the nutritional value was excellent. Cancer, diabetes, obesity, high blood pressure, Alzheimer’s, parkinsons, and heart attacks, all familiar to us today, were either of low incidence or non-existent.

The incident of illness was significantly less and doctor visits were for lacerations, fractures or serious illnesses. The body was able to overcome illness more quickly in those days. The one major problem was infection. We did not have the antibiotics that we have today to conquer the serious life-threatening problems such as pneumonia or septicemia. Yet, the incidence of pneumonia or septicemia was actually less than today.

Now lets compare the young man born in 1978, some 40 years later, who has experienced many more problems. The incidence of type 2 diabetes is occurring at very young ages and at a much greater frequency than ever before. High blood pressure is also increasing at younger ages, along with increased weight and cholesterol problems. Autopsies performed on youngsters killed in traumatic events as well as deaths secondary to disease, reveal significant arteriosclerosis in elementary school ages.

Though the statistics seem bleak, there is good news. I urge you to keep reading as there is something we can do to help ourselves and our loved ones overcome the health challenges we currently face today.

The human body has a God given intrinsic drive to recover from trauma and disease. Two examples – a patient comes into my office with a fractured (broken) arm and I place the arm in an immobilizer or cast. Am I responsible for the healing or does the body do the actual healing? The second example is of the patient who has undergone surgery where sutures have been placed to approximate the tissue (skin) together. The sutures provide the environment but the body does the healing. Notice that I use the word healing. The body does not cure the fracture or the wound. The body heals them. As the physician, I created the environment in both of these examples for the body to heal. The intrinsic mechanism within each of us directs and accomplishes

the healing. Why is it then that we find some people who do not heal from the fracture or do not heal from the wound? As I pondered that question over the years I found myself searching to find the answer. My goal was to find the best way to complete the missing ingredients, if you will, so that I could further embellish the body's intrinsic drive to recover from trauma and disease.

Since the intrinsic drive of the human body is to maintain balance. When balance is attained, we experience normal function as well as the ability to prevent or quickly recover from adversities. When the body is not in balance, the opposite is true and we experience symptoms of adversities or disease.

Medical science has taught us to think macroscopically or to believe that disease resides and comes from organ abnormalities. In truth, all organs are made up of tissue and tissue is comprised of individual cells. Our metabolic bodily functions occur in our cells and when cellular dysfunction occurs we have the beginning of imbalance or a disruption in the harmony of our functions. If our body is unable to correct by repair, regeneration or removal of this cellular dysfunction, we experience the beginning of disease.

There are four stages to the progression or development of dysfunction or disease. This is called the **Cell Theory of Disease**.

1st Stage: On average we have 60 to 75 trillion cells, and it is in those cells that our bodily functions or needs are actually accomplished. The organs are all designed to provide the nutrients to the cells so that the cell can in turn provide life to the body. When all of the cells are healthy and contributing to the human organism we are in balance and cellular dysfunction/disease are absent. In the first stage of disease a percentage of the cells become unhealthy or dysfunctional. This can occur anywhere in the body and because this magnificent machine functions so well, the body compensates for these poorly functioning or abnormal cells and you the macro-organism (the body) does not experience symptoms. **Therefore, you have no idea that you are experiencing the beginning of disease.**

2nd Stage: The percentage of cells that are dysfunctional increases and the body continues to compensate by handling the required daily requirements of life so again you have no symptoms. As this stage progresses your body struggles to maintain balance or harmony. Finally, the metabolic load becomes so much that you are made aware of the developing problems by the appearance of symptoms. **These first symptoms could be generalized, such as decreased energy, declining appetite or increased appetite, weight loss or gain, headaches, etc. This occurs at the end of the 2nd stage.**

3rd Stage: This stage of cellular dysfunction is the critical stage. Why? Because you still have enough normal functioning cells at work and the dysfunctional cells can, for the most part, repair and regenerate themselves so that you can heal from the cellular dysfunction. The prominence of cellular dysfunction in an organ or organ system, will determine your symptoms and result in a diagnosis. The major point here is

that you can heal from this cellular dysfunction *if you will create the environment necessary for your cells to repair and regenerate themselves*. Just like our analogy of the fractured arm, the body can and will heal given the correct environment. Remember, the body has the intrinsic drive to achieve balance, overcome dysfunction and attain wellness.

4th Stage: It is unfortunate that the 4th stage is where modern medicine has focused. Pharmaceuticals are designed to ameliorate symptoms and keep you functioning until you die with and from your disease. After 17 years practicing medicine, I realized that I had become, like most westernized physicians, a disease manager. I diagnosed my patient's illness, placed them on medication and monitored their progress. Never did I experience a patient with diabetes, high blood pressure or arthritis coming back to my office and pronouncing that they were healed from their disease by the medicine I prescribed.

This is no longer true! Healing is a common occurrence once we have created the environment for cellular protection and repair.

We cannot blame today's modern physician as our training is funded by the pharmaceutical industry as is our research and the majority of that research and training is focused on the 4th stage of disease. We call preventative medicine that which involves studies, exams, x-rays and blood tests though it is nothing more than early detection and treatment. **This early detection has nothing to do** with preventing the cellular dysfunction we are focused on in early treatment.

Prevention is creating the environment for cellular protection and cellular repair before stage 3 and stage 4 occur. **Of note, is the fact that even in stage 3 and 4, you can heal and recover from cellular dysfunction. Avoiding stage 3 and 4 altogether takes commitment to lifestyle and providing your cells with the proper healing environment. That is prevention!!**

Therefore, to remain in balance or in a healthy state, our focus must be on the task of supporting our systems that protect our cells from dysfunction and repair or removal of injured cells. The questions that should come to mind, once we are aware that cellular dysfunction leads to imbalance and disease are: how does the cell protect itself? *What process, inside the cell, allows for repair and regeneration (I like to refer to this as the first step in healing)? If the cell is unable to recover from injury, mutation, cancer, bacterial or viral change, what process is in place to remove that cell before further dysfunction is created by this abnormal cell?*

How do our cells protect themselves?

With a small protein molecule named Glutathione (GSH). This molecule is called a tri-peptide because it is composed of three amino acids – cysteine, glycine and glutamic acid. GSH is also known as a thiol because its electron-donating capacity

is linked to the sulfa group. It is the ability of this molecule to donate an electron of hydrogen that provides for its bioactivity. It actually functions as a non-enzymatic reducing agent. Glutathione is so important that it is found in almost every living cell – plant, animal and human.

Medical research has determined that less than 70% of the reduced (active) form of glutathione in the cell will result in cellular dysfunction, and a disease state will follow. It has been documented that those people who are HIV positive can delay or prevent the ARC (AIDS related complex) from occurring by maintaining high levels of intracellular GSH (reduced form).

The cell synthesizes or produces its own glutathione dependent on the needs of that particular cell. The substrates or building blocks, when adequately present inside the cell, allows the cell to maintain production of GSH at a rate that will exceed the required 70% active form. The amino acid that is the “rate limiting” amino acid is cysteine. It is far more difficult for the body to obtain sufficient cysteine than either glutamic acid or glycine. In fact, those people in their late 50’s or early 60’s have a slowly declining production rate of this important molecule.

For example, the senior citizen who is already experiencing a decline in intracellular glutathione, who is placed on medication (whether prescription or over-the-counter) for their symptoms. Medication is considered a xenobiotic, which is any foreign substance, not synthesized by the body. These xenobiotics must be broken down and excreted from our cells and hence from the body. If this does not occur, we become toxic over time. Then, add our western lifestyle with the carbonated drinks, fast foods, alcohol, tobacco, drugs, excess coffee and pasteurization, and we have a body that is over utilizing intracellular glutathione. This intracellular glutathione must be replaced.

In support of this function of detoxification we find that the largest concentration of glutathione occurs in the liver. The liver can export glutathione to other areas of the body. The second largest concentration occurs in the epithelial lining fluid of the lungs. This is our major cellular defense where air contamination is concerned.

Glutathione is called the master, intracellular antioxidant. Another major role of GSH is to capture the free radicals that are created when the immune system responds to attack. Monoclonal expansion is expansion of our cellular defenses when we suffer an attack against our cells. Free radical production is rapidly increased with cell division and this desire of our immune system to respond to this danger is greatly inhibited unless adequate amounts of glutathione are present.

Another very important role for intracellular glutathione is that of cellular protection against radiation. A recent research article published in the journal *Radiology* states that “radiation from a single whole-body scan is equal to that from 100 mammograms and is similar to that received by survivors of the atomic bombings of Hiroshima and Nagasaki, Japan – about 1 ½ miles from the explosions – according to radiation biolo-

gist, David J. Brenner of Columbia University. The radiation from one scan is enough to produce a tumor in one out of 1200 people, and for those who have annual scans the risk increases to one tumor in every 50 people. With inadequate intracellular GSH the risk is greatly increased. The results are self evident in our increasing cancer incident reports.

Detoxification, immune response, antioxidant requirements and protection from radiation caused cellular disease – what more can be said concerning the absolute requirement for maintaining GSH at 80 to 90% active form per cell?

For cellular repair and regeneration we also depend on the organelles, where our metabolic processes occur to receive protection by the neutralization of free radicals. These free radicals are actually produced by our cellular functions. About 2 to 5% actually escape the normal mechanisms for capture. This is where GSH comes to our rescue. Before the instability of the free radical can stabilize itself by damaging the organelles in the cell, glutathione provides a stabilizing hydrogen ion and prevents cellular damage.

The final responsibility of GSH is as a participant in apoptosis. Apoptosis is the programmed cell death that is set into motion when the cell steps out of normal service to the body. Glutathione is necessary for cellular protection, repair and the very cornerstone for cellular healing. Remember, cellular healing means tissue healing and tissue healing means normal organ function that translates into balance, harmony and health.

Where does GSH come from?

GSH is synthesized or made inside the cells of the body. The amino acids that make up GSH must be available for GSH production. The amino acid called cysteine is the most difficult for humans to obtain. Therefore, cysteine is called the “rate limiting” amino acid for GSH production.

GSH is homeostatically controlled, both outside and inside the cell. Enzyme systems synthesize it, utilize it, and then regenerate it to keep adequate levels available at all times.

Why is GSH so important to/for our body?

Very simple, GSH depletion leads to cell death! Cell death leads to tissue death. We have trillions of cells in our bodies. We have a tremendous ability to compensate for the loss of cells. The problem arises as to the rate of cell death, the replacement of those cells and the health of the cell with less than normal amounts of intracellular GSH.

How does GSH function in our body?

GSH exists in two forms, the active or reduced form (GSH) and the used/now inactive oxidized form (GSSG). The GSH/GSSG ratio may be a sensitive indicator of oxidative stress. The reducing power of GSH is a measure of its free-radical scavenging capacity. Reducing power is also the KEY to the multiple actions of GSH at the molecular, cellular, and tissue levels. It is the reducing power of GSH that creates its effectiveness as a systemic antitoxin. The active form of GSH inside the cells is usually around 90% with the oxidized or inactive form rarely exceeding 10%. It is when reduced GSH levels fall and the inactive or oxidized levels rise that the protective capability and therefore the health of the cell declines. Once the GSH/GSSG ratios change significantly, the cell is vulnerable to attack both from internal processes and external dangers, i.e. toxic challenge and microbial attack, just to identify a few.

There are two major functions of GSH, as an antioxidant and a systemic protectant. These functions are identified as important for:

- (a) Antioxidant protection within the cell, especially in the nucleus where DNA and RNA must be protected
- (b) As a protectant from toxic materials, especially the liver and lung. The liver must break down and conjugate toxic compounds preparing them for excretion/discharge from the body. The first two phases of this conjugation or preparation depends on GSH for its completion. In the lung, where the second highest concentration of GSH exists, we are continually under siege from inhaled toxic material. It is in the epithelial lining fluid that GSH waits to actually capture these cell damaging free radicals, before tissue damage occurs and disease ensues. The renal kidney function also needs protection from free radical and toxic challenge. The heart, which has multiple times the mitochondria in each cell producing the energy needed for the continued contraction of that muscle, produces multiple times the free radicals and therefore each free radical must be stabilized by GSH.
- (c) The Immune System: GSH also plays a major role in the rapid monoclonal expansion/response of our immune system. When a microbial invader presents itself the immune response gears up for the attack and defense of our cells. Whenever rapid cellular replication occurs the energy produced for this replication has, as a byproduct, large numbers of free radicals produced. If these free radicals are not neutralized then damage occurs and the cell is unable to respond to the demands for replication. This especially involves the lymphocytic, NK (natural killer) cell component of our defense system.

GSH is very important in the antigen presenting cells needed for the modulation of Th-1 or helper cells. These cells are extremely important in our defense against viral and cellular cancer changes.

Antioxidant protection within the cell, both in the cytosol and in the nucleus. GSH is called the “master antioxidant” and is produced within the cell. The ROS or reactive oxygen species are collectively called free radicals. These ROS are highly reactive substances and if not neutralized will damage or destroy key cellular components such as the cell wall or membrane, DNA or RNA in milliseconds. These ROS are generated in the mitochondria, which are located inside each cell. These mitochondria are the batteries that provide the power/energy for the cells to operate. ROS or oxyradicals can also come from environmental chemicals or pollutants, food, impure water as well as radiation of various types. Another major function of GSH is to recycle other antioxidants such as vitamin C, a water phase antioxidant, and vitamin E a lipid phase antioxidant. This reduces these antioxidants so they can go back to capture other free radicals.

How does GSH help the body prevent disease?

The cellular level of GSH changes as you go through the day. Stress, microbial attack, cellular cancer change, cellular degenerative change, traumatic change, exercise change, changes of aging, lack of nutritional support and lack of supplementation all effect the homeostatic control mechanism that has the responsibility to maintain effective levels of intracellular GSH.

When the level of GSH declines or the GSH/GSSG ratio changes the cell involved begins to experience damage. Depending on the type of cell involved dictates the type of tissue involved which dictates the organ system involved. Depending on which organ system that suffers will dictate the disease process or type of diseases that then may occur.

Where the cell is involved with oxidative damage you will see these oxidative related diseases: accelerated aging, cell destruction, compromised immune response, cancer, arteriosclerosis, coronary artery disease, Parkinson’s disease, diabetes, cataract formation, macular degeneration, Emphysema/COPD, allergy/asthma, stroke and Alzheimer’s to list only a few.

We discussed the importance of GSH in relation to our immune response. Every day research is uncovering more intricate details of how GSH functions in this very sophisticated integrated response and defense system. It is so very important for each of us to have an immune response that is capable 100%. We are under attack at all times, day and night and it does not take much to alter that response just a few percentage points and then the result can be disastrous.

Some of the immune system related diseases are: viral infections, i.e. sudden acute respiratory syndrome (SARS), hepatitis, HIV/AIDS, herpes, common cold, bacterial super infections, the autoimmune diseases and cancer, just to name a few of the diseases.

In our environment, especially over the last 10 years, the prevalence of environmental toxins has finally been recognized. Recognized not only as secondary to toxins in our air but also in the food we eat and in the liquid we drink. When you breathe, eat or drink you are exposed to disease providing toxins. In fact, current research is identifying and relating intracellular toxic burden with disease, disease that often times cannot be helped by mainstream medicine are being successfully treated by enhancing the body's ability to convert the damaging chemical substances into harmless conjugates that the body can eliminate. Once this burden is removed from the cell, a normal function many times can be restored.

Toxic related diseases: Emphysema, liver disease, liver cancer (which many times is a natural progression of compromised liver cells), bladder cancer, kidney and liver failure, colon inflammation and colon cancer and multiple environmental illnesses.

Known toxins include cigarette smoke, carcinogens, auto exhaust, drug usage (both medicinal drugs as well as street drugs), chemotherapy and radiation treatments.

Finally, but not inclusively, some of the radiation related diseases are: skin cancer, DNA damage, eye damage, sunburn and many skin related disorders.

What causes a decline in levels of GSH?

Dietary intake of GSH rich foods is minimal at best. Those people who do not eat live fruits and vegetables but the typical American or western diet, will not increase their GSH levels. Then, as the aging process progresses there is a slow decline in the cellular synthesis of GSH. The GSH "pool" is not infinite and if not replaced or maintained, will result in levels of GSH that cannot carry the burden or responsibility of GSH function.

Exercise causes a decline in intracellular GSH as the GSH is utilized in mitigating the enormous production of free radicals occurring with the exercise process. The free radicals of energy production are increased, respiratory rate is increased so the epithelial lining fluid (ELF) pool of GSH is challenged. The utilization of calories for energy also obligates the GSH pool.

How can I increase my levels of intracellular GSH?

The first step is to evaluate your lifestyle. Are you a smoker? Do you live with significant stress? Does your diet provide live enzymatically rich fruits and vegetables? Do you supplement with a full spectrum of minerals, vitamins, essential fatty acids and the extracellular antioxidants? This being the foundation of your daily existence you then need to provide the GSH substrates that have been proven to increase the intracellular production or synthesis of GSH. Do not take the free amino acid cysteine as that is not delivered to the cell wall where it can be utilized in GSH synthesis.

Also, do not waste your money taking GSH. GSH as a tripeptide does not traverse the stomach and intestinal tract in large enough amounts to influence the synthesis of GSH in beneficial amounts. Systemic availability of oral GSH is negligible in man, and because there is no evidence for transport of GSH into cells GSH must be synthesized intracellularly. The NAC (N-Acetylcystine) can be used intravenously to increase GSH but only for a few days as the byproduct of this method of delivery actually produces toxins.

Therefore, the proven, non-toxic and safe method to increase intracellular GSH is by utilizing the substrates which produced the glu-cys residues in sufficient amounts to be impactful. What takes place is the cystine in GSH (which is two cysteines linked by a double sulfa bond) released during digestion in the gastrointestinal tract is more stable than the free cysteine, because the disulfide bond is pepsin and trypsin resistant and therefore these enzymes are unable to break down this amino acid during the digestive process. This then allows the cysteine to be delivered to the cell where it is then utilized in the synthesis of GSH.

Why is GSH the Secret of Great Health?

Anyone who desires to function at maximum capacity and to protect him or herself against disease needs to incorporate precursors for the production of glutathione such as high grade undenatured whey protein isolate compositions such as GSH Complex® into their daily routine.

There are no guarantees concerning our health just as there are no guarantees concerning our finances, but each one of us makes plans to meet our financial responsibilities, and when things change we adapt and change. If you have a health adversity you will require changes in your lifestyle and in the amounts of intracellular GSH. The same process applies to stress, infection, exercise and aging. Your body is dynamic and you need to recognize that nutritional demands change with your daily environment and circumstances.

Do not allow your body, the most sophisticated, integrated and magnificent machine, to fail because you do not provide it with what it needs...the right substrates!!

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