# Methylation: The Body's Alchemical Wizardry

**DETOXIFICATION, REPAIR, GRACEFUL AGING, WEIGHT LOSS, NEUROTRANSMITTER BALANCE, HEALTHY IMMUNITY, DISEASE PREVENTION, NERVE PROTECTION, AND SO MUCH MORE**

by Dr. Jack Tips (N.D., Ph.D., C.Hom, C.C.N.)

A molecular biologist could write a million pages on methylation and only touch on a small fraction of the subject. Why? Because our bodies conduct over a billion methylation processes per second! Methyl groups are the "on/off" switches of the cells' activities - turn on a genetic expression, turn off an enzyme reaction, turn on serotonin and feel good, turn off inflammation, turn on melatonin and sleep, turn off delusional thoughts, turn on the detoxification of a phenol and avoid food allergies, or turn off the immune system before it damages healthy cells.

Those are some important switches and thus here is a critically important topic for us to discuss because if our patients are short a few methyl groups, their bodies cannot respond to the healing directive of our herbal therapies.

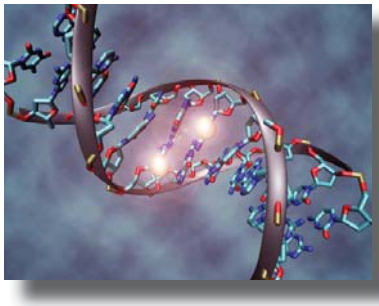
In this Research Report, our purposes are to simplify and understand basic methylation processes, reveal the critical importance of nutritionally supporting the cell's methylation activities, increase our awareness of how the body heals itself, and discover how we as clinicians can better help our patients.

Methylation used to be a "given"—something we did not have to concern ourselves with clinically. In days past, most of our patients had plenty of methyl groups to conduct the body's myriad processes and help receive the healing directives we provide through food and herbal nutrition, remedies, and therapies. But here, in this groundbreaking information, we'll soon see this is no longer the case.

## Are Your Programs Less Effective Than They Used To Be?

Today, clinicians often report that their old tried-and-true therapies don't seem to be working as well as they once did. When we understand that the body uses methyl groups to heal and restore healthy functions, and once we understand that many of our patients are depleted in methyl groups, we come to the realization that supporting methylation is in the same category as providing water to a thirsty, dehydrated person—absolutely essential.

In Research Report #2, *Mitochondrial Dysfunction and the NO/ONOO Cycle*, we learned about a potentially cell-destructive development that can occur in the body's redox[1] processes where a molecule or atom gives up an electron to another element in a normal reductive/oxidizing procedure. The resulting free radical must quickly find an electron donor—an antioxidant such as glutathione (dependent upon methylation)—or else it could initiate a perpetual inflammatory condition (the NO/ONOO[2] cycle) associated with chronic fatigue, fibromyalgia, post-traumatic stress disorder, and multiple chemical sensitivities. Here in this report, we'll look at a beneficial molecule-altering process called *methylation* and gain an even greater degree of mastery in supporting the cell's universe nutritionally.



Methylation is simply the addition of a methyl group ($CH_3$) to another molecule (enzyme, RNA, chromosome (DNA), toxin, protein, etc.) Methylation is mostly the addition of a methyl molecule to something. The removal of a methyl group is called *demethylation*. The adding or subtracting of a methyl group causes profound changes to occur as they activate or deactivate the body's life code and thus affect core life processes. Some people will use the word, *methylation*, to describe either the addition or subtraction of a methyl group from a molecule.

So *methylation* is the body using a specific molecule ($CH_3$), to work countless wonders. In fact, methylation is a process that is

1 **Redox.** Short for Reduction + Oxidation = Redox. Reduction describes the uptake or gain of an electron by a molecule or atom. Oxidation describes the loss of an electron by a molecule or atom. These two terms go together, because in a chemical reaction, one cannot occur without the other; electrons lost by one compound must be gained by another. This is a simplified, working definition for our purposes here.

2 **NO/ONOO** – molecular terminology for Nitric Oxide/Peroxynitrite – an inner cellular process that can, without an antioxidant available, become a perpetual free-radical cascade causing damage and inflammation.

an important dividing line between health and disease. Let's learn a little about this critically important molecule.

In biology and chemistry, human beings are referred to as "carbon-based units of life" and thus we know that Organic Chemistry is a carbon-based science. Our world, our bodies, and thus our lives, are based on the element, carbon—the very backbone of all life on Earth. Carbon is the fourth most abundant element on Earth. Hydrogen is the most abundant element in the universe and it readily reacts with other elements. So two of our most basic, essential, and abundant elements—carbon and hydrogen, easily join together as one carbon and three hydrogen atoms, and together they become a critically important molecule called a "methyl group" ($CH_3$) which can appear in three forms: *anion* with 8 electrons, a *radical* with 7 electrons, and a *cation* with 6 electrons. In these three forms, methyl groups serve billions of chemical functions throughout our bodies.

Now you might ask, "Why do we need to talk about a molecule whose atoms are abundantly everywhere? Like a fish in the ocean seeking water, our bodies live in a world of the elements that make methyl groups—carbon and hydrogen. Further, oxygen is the third most abundant element and that's great for breathing and redox reactions such as making the energy of life--ATP[3] which also involves methyl groups. [Helium is the second most abundant just to ensure some levity in our lives.] So one might think that methylation is a "given," a *no-problemo* basis of life, something we don't have to worry about. But *au contraire*, my friends; methyl groups are something we must understand to help our patients with their most dire concerns.

The fact is, we can and do run short of methyl groups. Further, they decline with age and thus supplementing methyl donors is an "anti-aging" therapy that can prevent cognitive decline[4]. When our bodies have a dearth of methyl groups, there are dire consequences such as cancer, autism, diabetes, chronic fatigue, Alzheimer's, multiple sclerosis, autoimmune diseases, and well actually—most all diseases and severe metabolic dysfunctions, with a few exceptions for "over-methylation" conditions.

Here are a few conditions that medical science teaches are associated with "Under Methylation:"

## Under-Methylation

| |
|---|
| Addictive Tendencies |
| Aggravate on high doses of B-12/Folate (though much needed) |
| Allergic skin disorders (Eczema, Hives, Contact Dermatitis) |
| Allergies, seasonal, airborne |
| Aging |
| Anorexia |
| Anxiety |
| Asthma |
| Autism (45% are under-methylators) |
| Autoimmune disorders (Mitochondrial Diseases) |
| Bipolar disorder |
| Bulimia |
| Chronic Degenerative Diseases (Mitochondrial Diseases) |
| Chronic Fatigue |
| Colds, Flu – frequent |
| Competitive, overly |
| Delusions, Delusional thinking |
| Depression |
| Detoxification, poor |
| Headaches, frequent |
| Heat intolerance |
| Hyperactivity, ADD, ADHD |
| Hyperchlorhydria (excessive stomach acid) |
| Insomnia |
| Joint pain |
| Joint swelling |
| Joint stiffness |
| Lacrimation, eyes water excessively |
| Libido, excessive |
| Muscle pains |
| Nausea, unexplained |
| Neurotransmitters, low (serotonin, dopamine, melatonin, norepinephrine) |
| Neurotransmitter, high (histamine) |
| Obesity |
| Obsessive Compulsive Disorder |
| Oppositional Defiant Disorder |
| Pain, hypersensitive |
| Perspiration, excessive |
| Phobias |
| Psychosis |
| Puritis, itching |
| Rhinitis, vasomotor |
| Salivation, excessive |
| SAMe, do well on SAMe supplementation |
| Schizophrenia |

People can also be and become "over-methylators" or have localized over-methylation excitatory processes, so like all things in health, the key is: balance in all things. A percentage of over-methylation activities seem to be the body's overreaction to a *lack* of methyl groups where the genes overcompensate in a particular area. Statistically, our population is 49% under-methylators, 14% have over-methylation issues, and the remaining 37% are doing okay at the present time.

## Over-Methylation

**Often a sub-set of Under-Methylation conditions**

| |
|---|
| Anxiety, Panic Attacks, non-internal, easily observed by others |
| Chemical Sensitivities (mostly under-methylation) |
| Despair, some depressions |
| Food sensitivities |
| Decreased Neurotransmitter--histamine |
| Eyes, dry |
| Hallucinations, visual and auditory |
| Hyperactivity (mostly under-methylation) |
| Learning disabilities |
| Libido, low |
| Motivation, low |
| Neurotransmitters, high (serotonin, dopamine, norepinephrine) |

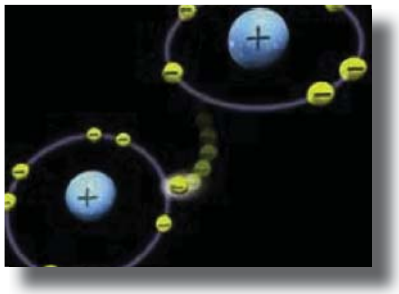
3 **ATP** – Adenosine TriPhosphate, the chemical energy of life, manufactured in the cell's mitochondria and used for every metabolic process.

4 American Journal of Clinical Nutrition, Vol. 71, No. 2, 614S-620s, February 2000, B vitamins, homocysteine, and neurocognitive function in the elderly, Selhub, Bagley, Miller & Rosenberg, Jean Mayer US Department of Agriculture Human Nutrition Research Center on Aging at Tufts University, Boston, and the University of California at Davis.

| |
|---|
| Neurotransmitters, low (histamine) |
| Obsessive, but not compulsive |
| Nervous |
| Paranoia |
| Religiosity, overly religious expressions |
| Restless legs |
| SAMe supplementation aggravates |
| Schizophrenia (also under-methylation) |
| Self-Injury Disorders |
| Spacey |

## Intermediate Metabolites

As you can tell from the lists, under-methylation is the big concern, especially since methyl groups decline with the aging processes. The fact that a few people are over-methylators means that supplementation must be balanced to accommodate the seven billion biochemically unique individuals in the world. One of the reasons that over-methylators react to foods and excessive B-Vitamin supplementation is due to intermediate metabolites (transitional molecules) that activate unwanted metabolic pathways. A well-balanced methylation product often contains ingredients such as herbs, pyridoxine alpha-ketogluterate (helps prevent glutamine from becoming glutamate), magnesium (helps remove ammonia), and amino acids (helps the body avoid ammonia and hydrogen sulfide) so that methylation processes occur without intermediate metabolites causing problems.



Like fish out of water, how do human beings run short of methyl groups to serve the body's life processes? You might recall from our first Research Report, "*Inflammation, Free Radicals & Mitochondrial Dysfunction*" that "*Energy is Everything*." If the mitochondria do not make enough ATP (Adenosine TriPhosphate), then there is not enough energy to accommodate methylation and its myriad processes. Proper ATP energy production depends upon: 1) nutrition, 2) oxygen, 3) non-inflamed cell membranes, and 4) sufficient antioxidants to protect the mitochondrial mDNA from damage that results from a lack of cellular energy—the very energy that's needed for methylation performance. Further, if there is not enough nutrition to support methylation such as B vitamins (B-12, Folic Acid, and others), and their mineral synergists (zinc, selenium, molybdenum, magnesium), there can be a critical shortage of methyl groups to serve the trillions of life processes everyday.

So I hope that got your attention, because it is here with methyl groups that we hold a profound nutritional key to helping patients' bodies prevent and correct disease processes (depression, anxiety), as well as maintain health. Let's take a few minutes to learn about methylation and its impact as a dividing line between health and disease. Please know that the methylation subject is an entire treasure trove of information about cellular health, and that we're simply going to examine a few jewels to exemplify its importance.

## Methyl groups:

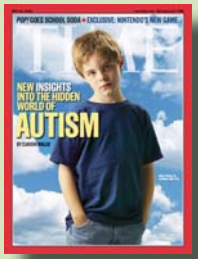
- Turn genes (genetic expressions) on and off.
- Protect telomeres – reduce aging processes
- Support neurotransmitter processes – prevent depression, anxiety and facilitate proper brain function
- Detoxify dangerous chemicals and heavy metals – prevent cell damage and disease, makes glutathione (the body's most important detoxifier)
- Prevent hormone imbalances – that can cause cancer, weight gain, fibrous tissue, endocrine confusion
- Turn the stress response on and off – and if left on, then disease results such as obesity and Syndrome X
- Repair cellular communication processes – a facet of auto-immune diseases
- Weight Loss – helps solve hormone resistance and toxic hormonal activity
- Mitochondrial protection – protects the mitochondrial production of ATP by synthesizing glutathione

Of that list, let's discuss a few key concepts in this report.

## Genes On. Genes Off. Methylation Flips The Gene Switch.

Don't we all wish we could simply turn good health on, and turn diseases off? In a loose sense that's really what happens. To turn on good health and turn off disease requires well functioning cells, and methylation is a primary catalyst to elicit good health and prevent disease expressions.

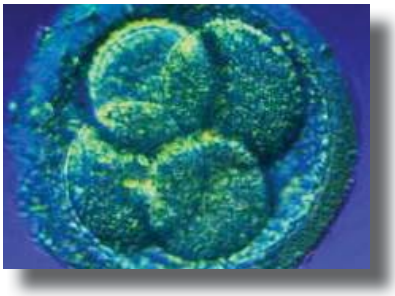
Within the human genome are all the expressions of health and disease. Why would we have expressions for diseases? Because, from the body's innate "*survival of the species*" perspective, it's better




### Autism

The brain is constantly striking a balance between too much and too little neuron activity. In Autism, a gene called Npas4 generates a protein that keeps neurons from becoming overexcited. If this process is inhibited by a lack of methyl groups, then the neurons can become too jumpy and rearrange chromosomes and a variation that often occurs is a significant part of the autism process. This is an example of reduced methylation causing an excitatory process which then hogs methyl groups and becomes a localized overmethylation response to an underlying undermethylation condition. Methylation is an important key to helping the brain overcome autism.

to have a disease than to be dead, so disease expressions are choices: either errant, selected, or acquired. A chronic disease is simply the: 1) best the body can do with what it has to work with under the circumstances, 2) inability of the body to overcome the nine paradigms of disease [discussed in Research Report #2] all of which require ATP and methyl groups, or 3) direct effect of something that manipulated the DNA such as pesticides[5] and toxic chemicals[6] that damage DNA and thus can cause leukemia, cancers, and auto-immune diseases. [Note: We discussed in Research Report #5, *Ionizing Radiation*, how radiations damage DNA.]



Before we were born, in fact when we were just a single cell called a *zygote*, methylation was there to help determine and express our life experience as a female or a male; and if female, then methylation deactivated one of the X chromosome's so there would not be genetic conflict resulting in abnormal processes. Methylation governs "cell differentiation" which is for example, how some cells become a kidney nephron whereas other cells become a brain synapse or a nose hair.

## Put Me In, Coach!

In the very beginning, cells replicate rapidly and they all want to join the team of life as a body. Under the guidance of life's Innate Vitality[7] (the body's optimal blueprint), methyl groups become the "coaches" that help decide which cell plays what position. Throughout our lives, these methyl coaches tell our cells' DNA to keep working their specific jobs—they activate certain genetic traits and suppress other traits. Just think what would happen if our pancreas' beta cells decided that they were tired of making insulin and decided to express another facet of their genetic pattern—say that they decided to filter urea out of the blood. What would happen? We would become diabetic and die from a lack of glucose induction into cells for energy; but hey, the blood would be free of urea. So our methyl groups keep every cell doing its correct job for the good of the whole.

## Allergy Insight

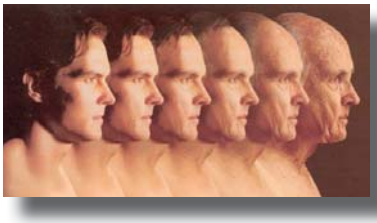
Further, methylation establishes how foods and the environment will manipulate a person's genome (allergies, diseases), and this is how people get over or outgrow food and airborne allergies. For example, when a methyl group deactivates the genes that call for an immunological response to gluten, then the person is no longer so sensitive to that molecule and the immune system can relax and work on other projects.

If the Innate Vitality allows an unwanted gene expression such as "react to gluten," then the key to changing that is to instruct the body to place a methyl group on the "react to gluten" gene. Such an instruction can come, for example, from numerous healing modalities such as systemic herbology, classical homeopathy, acupuncture, and others. For any healing modality to be truly healing, it must whisper kind instructions to the body's Innate Vitality. Thus methylation holds a much more important therapeutic role than desensitization therapies (allergy shots designed to exhaust the immune system) or avoidance practices, neither of which address the "cause." So in a powerful and profound way, methylation exerts a primary influence over a person's quality of life, and methylation is the body's "implementator." Methyl groups are based on nutrition.

What does it mean, genetically, if you run a little short of methyl groups? As explained in our allergy example above, we found that there is a cellular, genetic methylation process. It's called *DNA Methylation*. Methyl groups attach to our chromosomes and deactivate certain sequences so we don't express them. This includes disease processes, viral genes and other deleterious elements (miasms[8]) that may be introduced to our genomes. They prevent the expression of chronic degenerative diseases. Further they control what is actively expressed such as how vigilant our immune systems are. Methyl groups are essential molecules that regulate and repair our DNA so we do not express diseases and defects, and do express optimal health and adaptability. Now that's one important molecule! Having adequate methyl groups keeps the cellular processes running correctly and when we run a little short, symptoms quickly appear.

## Aging & Methylation

Cellularly, aging is all about telomeres[9], those stacks of chromosomes on the ends of your DNA strands. Formerly called "Junk DNA" by the scientists who, at that time, hadn't yet figured out how vitally import all of Nature's components are (including tonsils, appendixes, adenoids, gall bladders, ovaries, prostates, etc.), telomeres hold the DNA strands together so they don't unravel. When DNA unravels, the cell can no longer reproduce healthy offspring. Such a condition can result in aberrant cell activities such as cancer, cell



5 **Epidemiology**, Volume 10, Issue 5, 1999. -- Risk of Childhood Leukemia Associated with Exposure to Pesticides and with Gene Polymorphisms

6 **Nat Rev Cancer**. 2004 Aug;4(8):630-7. Chemical-induced DNA damage and human cancer risk.

7 **Innate Vitality** – the body's core vitality, the self-regulatory mechanism, cellular intelligence, the Élan Vital, the Vital Force, the body's metabolic and healing processes.

8 **Miasm** – inherited, innate, constitutional predispositions to acquire and express disease conditions.

9 **Telomeres** are the physical ends of linear eukaryotic chromosomes. They are specialized nucleoprotein complexes that have important functions, primarily in the protection, replication, and stabilization of the chromosome ends. In most organisms studied, telomeres contain lengthy stretches of tandemly repeated simple DNA sequences composed of a G-rich strand and a C-rich strand (called terminal repeats).

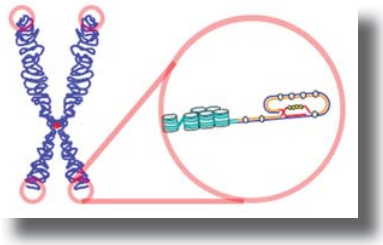
death, and loss of function due to aging.

Every time the cell divides to create progeny and perpetuate our lives, telomeres can be lost. Methylation is the process that: 1) extends cell life, 2) replaces telomeres via the enzyme, telomerase, so the cell doesn't age so quickly by losing *telomeric* chromosomes.

Dr. Daniel Pompa, a staunch proponent of Systemic's products, teaches that when the zygote starts replication, it has 15,000 telomeres on the DNA strands. By the time a person is born, 5000 of them have been used up in cellular mitosis and cell differentiation processes that create the body. Then another large block of telomeres are used in infancy during the rapid growth and development phase. From this point forward, some people will spend their telomeres faster than others. Some will have the nutritional intake to provide their cells with energy and nutrients they require[10], some won't. Some will encounter environmental factors that damage DNA at a rate higher than others. But this is assured, as methylation declines, telomeric integrity declines and the body ages more rapidly and expresses aging diseases.


Doc Wheelwright made a formula to address the telomeric conservation process. It's the BioCommand Formula: #5 (Stabilizer). More about this formula is in the book, *A New Dimension In Herbal Healing*[11], at www.apple-a-day-press.com. Doc's approach was through cellular identity factors. Here is an excerpt:

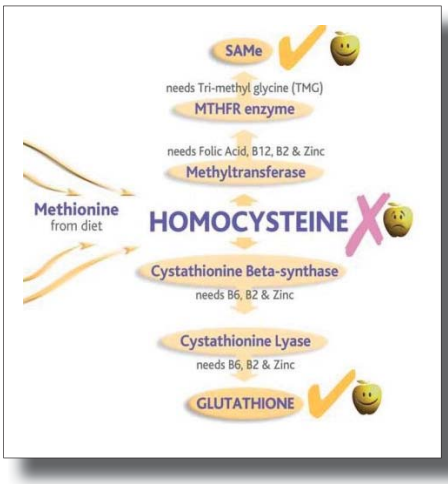
*Wheelwright incorporated cellular identity factors into his herbal research because the cellular identity factors are the blueprints of healthy tissue structure and function. When there is degeneration of a tissue, it cannot function properly. When the cellular identity is lost, the tissue no longer has the blueprint to rebuild its integrity, despite the cleansing and building of the tissue, as well as the resulting improvement in circulation. Wheelwright saw cellular identity as a missing component in nutritional healing because the general trend in human nutrition over the past hundred years had drifted away from sources of these types of nutrients so that the raw materials were no longer abundant for the body's use in maintaining tissue integrity.*



*Beyond providing vitamins, minerals, enzymes, amino acids and other nutrients for the body to use, the cellular identity factors are food-based life-elements that support the very integrity of a tissue. They are the first organic structures that arise with a determinant or intelligence as opposed to inorganic compounds that do not express life. Many instances of people's symptoms are based on tissue weakness or an organ that is not functioning properly. Often, the tissue has lost its cellular identity and it is not producing new cells of high integrity. Thus it can only function in a state of weakness and it is lacking the inherent blueprint to repair itself properly. Its cells are producing a poor quality of collagen, lacking structure, and exhibiting weakened function.The basic blueprint, the nucleoproteins and enzymators, can be supplied nutritionally through cellular identity factors.*

Today, Doc Wheelwright's grandson, molecular biologist, Dr. Shayne Morris, has designed a nutritional formula, MoRS (Methylation Donor) to directly support the cells' methylation processes.

## Mood (Depression), Neurotransmitters, & Methylation




Neurotransmitters are basically amino acids that have a methyl group attached. Let's understand the methylation cycle that is so fundamental to our life processes.

Methionine is an amino acid found in all protein foods. Notice the "meth" part of methionine because it refers to its methyl group. Methionine grabs a packet of energy called ATP and a molecule of magnesium and becomes SAM (S-Adenosyl Methionine). As SAM, the methyl group hitches a ride all around the body making over 400 known chemical reactions occur when and where they needed.

***Methionine + ATP + Mg = SAM***

When SAM delivers a methyl group where needed, it becomes reduced to an amino acid called *homocysteine*.

***SAM – CH3 = Homocysteine***

When homocysteine meets up with another methyl group, it receives it and transforms itself back into SAM.

***Homocysteine + CH3 = Methionine (SAM)***

If homocysteine does not find a methyl group, it becomes a dangerous molecule associated with cardiovascular disease and degenerative conditions. One pathway for homocysteine to gain a methyl group is from vitamins B-12, Folate, B-6, and choline; as well as trimethylglycine (TMG). Note: The familiar supplement, SAMe, is the form of SAM that can be absorbed nutritionally, and it can help with depression, but it does not help lower homocysteine, thus it's only a band-aid helper and does not address the *cause*.The cause is mostly nutritional and B-12/folate supplementation is more effective, often with results in 60 days. Both the safe, nutritional SAMe as well as dangerous anti-depressant drugs are only "cover ups" to the real solution of reestablishing the body's methylation.

This is why the formula DB[12] (Digestives + Vit B12) is so important.

10 Read: *The Pro-Vita! Plan for Optimal Nutrition*. Available at www.apple-a-day-press.com
11 *A New Dimension in Herbal Healing*. Available at www.apple-a-day-press.com


Not just because it has B-12, folate, and choline; but because it improves the stomach's parietal cell's ability to synthesize *intrinsic factor*[12] and absorb vitamin B-12 from food and bacteria. The DB[12] formula addresses the starting gate of the methylation pipeline.

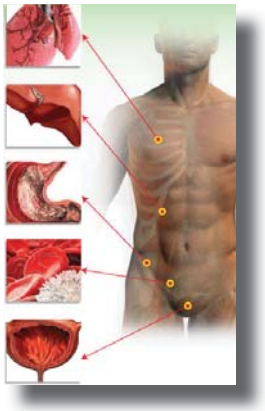
So what if there are not enough nutrients for all the homocysteine to be converted back to SAM? Sure the body gets big globs of homocysteine associated with cardiovascular disease, but if homocysteine is not converted back to SAM, then there is a shortage of SAM, and that means there is a shortage of methyl groups to make neurotransmitters. This shortage of methyl groups in the brain is the "chemical imbalance" aspect of depression. Chemical imbalance is only one facet of depression, but it's the one honed in upon by a host of dangerous drugs that cover up the underlying methylation issue. Even worse, the detoxification of those drugs by the liver requires both methyl groups and ATP, further depleting the body of its corrective resources[13]. Other facets of depression include ATP production and the enteric nervous system (gastro-intestinal tract[14]) that can cause chronic inflammation in the brain.

The specific neurotransmitters and brain processes that are vulnerable to under-methylation (or in the case of anxious depression—over-methylation reactions that can be predicated genetically, or due to a general lack of methyl groups that support neurotransmitter uptake), determines the type of depression and its severity. People who eat refined sugar and drink excessive alcohol are more prone to depression because the abuse of those substances impacts the brain's chemistry and inflammatory processes creating weaknesses in certain neurotransmitter pathways that become even more susceptible to methylation imbalances. Fundamentally, depression and anxiety expressions are simple nutritional deficiencies, not drug deficiencies.

## Detoxification and Methylation

Detoxification is the body's great alchemical[15] transmutation process. Methylation helps convert dangerous molecules to ones that the liver, gall bladder, and kidneys can eliminate. The liposome organelle in the cells can take a molecule of mercury or lead and change it to less offensive molecules[16] that can be more easily eliminated. The same holds true for arsenic[17] and hundreds of other chemicals.

One of the key detoxification pathways is the creation of the body's premier free-radical-quenching molecule, *glutathione*. This is the story of how methylation, or the lack thereof, involves autism, chronic fatigue syndrome, and hundreds of other ailments, provided the patient does not have rare genetic polymorphisms. When rare genetic polymorphisms are present, methylation still holds a critical key to DNA and RNA repair, and the deactivation of errant genetic expressions.



**Glutathione** is a tri-peptide assembled from the amino acids cysteine, L-glutamic acid, glycine plus a glutamate molecule. It is a potent detoxifier and antioxidant that protects the cells and the liver from reactive oxygen species (free radical and peroxide damage.) Without glutathione, the cells die because they destroy themselves, or establish errant cellular activities that result in cell-death, or worse, abnormal cell proliferations.

The cell's ability to produce its own glutathione is critically important. You can think of glutathione as what the cells use to protect themselves from the effects of toxins, as well as from the creation of life energy processes that occur at the body's atomic level. Thus, glutathione could be likened to the lead rods that keep a nuclear reactor from running out of control, melting down, and destroying life. Glutathione, along with super oxide dismutase and catalase, protects the mitochondrial mDNA from damage thus preserving the integrity of the cell's life energy production.

Further glutathione protects the cells' RNA and DNA, and helps facilitate the necessary life processes of *transcription*[18]. Its biological activity is that it donates a free proton (proton donor) as well as donates electrons, which at the atomic level, is what makes glutathione serve the body as its perfect antioxidant protector and facilitator of its cellular machinery. It is also the premier detoxification molecule that facilitates the protean tearing down and rearrangement of toxins so they can be excreted.

What this means is that cells make glutathione IF they have available nutrients (peptides), methyl groups and ATP. Glutathione then protects the cells and facilitates proper function.

People with low glutathione levels suffer from more rapid aging, cellular damage, liver damage, thus their life processes get choked down with toxins. Inevitably, a lack of methyl groups and low ATP result in low glutathione production and a person becomes a "pathological detoxifier[19]" where their cells choke on metabolic wastes. [In Research Report #4, *The Pulse of Life*, we discussed how poor lactic acid removal from heart cells results in mitochondrial

12 **Intrinsic factor** – a glycoprotein produced by the parietal cells of the stomach. It is necessary for the absorption of vitamin $B_{12}$ later on in the terminal ileum. In humans, the GIF gene encodes the gastric intrinsic factor proteins.

13 McKinnon RA, McManus ME. Localization of cytochromes P450 in human tissues: Implications for chemical toxicity. Pathology. 1996;28:148-155.

14 J Med Microbiol. 2005 Oct;54(Pt 10):987-91. Differences between the gut microflora of children with autistic spectrum disorders and that of healthy children. Parracho HM, Bingham MO, Gibson GR, McCartney AL.

15 **Alchemy** – 1) The medieval forerunner of chemistry, based on the supposed transformation of matter, esp. that of base metals into gold, 2) A process by which paradoxical results are achieved or incompatible elements combined with no obvious rational explanation.

16 Biophysical Journal, Volume 85, Issue 2, 1233-1247, 8/2003 Atomic Force Microscopy and Light Scattering of Small Unilamellar Actin-Containing Liposomes; Palmer, Wingert, Nickels,Department of Chemical and Biomolecular Engineering, Center for Molecularly Engineered Materials, University of Notre Dame

17 International Journal of Hygiene and Environmental Health, Volume 205, Issue 6, 2002, Pages 505-508 Arsenic methylation is a process of detoxification through accelerated excretion. Gebel, Medical Institute of General Hygiene and Environmental Health, University of Goettingen, Germany

18 **Transcription** – the process of creating a complementary RNA copy of a DNA sequence so that the cell can implement the DNA code. It is the first step of gene expression. If the transcription results in a protein, it is called "messenger RNA."

19 **Pathological Detoxifier** – the liver's Phase I detox processes are more active than its Phase Two processes resulting in a build up of intermediate toxins that can damage the liver and contribute to diseases.

damage and heart attacks. The references to the other Research Reports are so you can understand the intricate and interrelated processes that herald the amazing breakthroughs clinicians are finding with the inner cellular formulas: ROX, EPIC, HQ, MoRS, DV3, plus ATP and Cell Membrane support.] Again, low glutathione production results in low energy, toxicity, cellular damage, and disease.

## Stress and Methyl Groups

Stress is a major issue regarding methyl groups because it requires a massive amount of methyl groups to turn it on and, most importantly, to turn it off. First, let's acknowledge that stress is an important, and even healthy, aspect of life. A little stress keeps the mainsprings of human health and human progress wound up like a precision watch. It is an energizer and motivator.

Too much stress becomes a killer. "Too much" means either excessive stress all at one time, or prolonged stress where the body dwells in its stress response too long. The stress response activates the adrenaline and cortisol hormonal cascades. The downside of stress is that it gobbles up methyl groups. In fact, stress is the number one cause of methyl group depletion. Here is a very brief list (just enough to make our point) of conditions associated with intense or prolonged stress:

- Agitation, inability to relax
- Alcohol, cigarettes, or drugs, use to relax
- Anxious or racing thoughts
- Autoimmune diseases
- Chest pain, rapid heartbeat
- Colds, frequent
- Concentration, poor
- Depression or general unhappiness
- Diarrhea or constipation
- Digestive problems
- Eating more or less
- Feeling overwhelmed
- Heart disease
- Irritability or short temper
- Isolating yourself from others
- Judgment, poor
- Loneliness
- Memory problems
- Moodiness
- Nausea, dizziness
- Nervous habits (e.g. nail biting, pacing, talking too long on webinars)
- Obesity
- Pain, aches of any kind
- Pessimistic
- Procrastinating, neglecting responsibilities
- Sex drive, low
- Skin conditions, eczema
- Sleep problems
- Sleeping too much or too little
- Worry, constant

These symptoms are more than simple expressions of temporary stress. They are symptoms of stress causing methyl group depletion and the body staying in the adrenaline/cortisol metabolic processes to the detriment of its regular, healthy metabolic processes. Thus there is a cascade: stress depletes methyl groups, and depleted methyl groups underlie a host of symptoms and disease. If there are not enough remaining methyl groups to turn off the stress response, the person continues living in a stress response even after the stressful time has passed.

When people use coffee or other stimulants (sugar, ADHD amphetamines, etc.) to energize their body functions, or use alcohol or drugs to unwind, they are actually getting caught in a stimulation/sedate pattern of forcing tissue functions despite the body's inability to perform. This further depletes methyl groups and soon the person will experience more severe symptoms such as chronic fatigue syndrome, adrenal burn out, and fibromyalgia, and risk losing methyl groups that were inactivating certain genetic expressions and helping with gene transcriptions. The effect can be a thousand different symptoms depending upon the individual's genetic operative instructions.

Today, we live in a very stressful world. Because we live in the middle of it all, we often forget just how stressful it is – the pursuit of money, raising children, multitasking, traffic, it all adds up, but it's the silent stressors such as ionizing and non-ionizing radiation, pesticides and chemical additives in food, air and water pollution that contribute and cause the body to stay in a prolonged stress response.

Having adequate methyl donors is a nutritional issue, and many people find that they need to supplement to boost their body's access to methyl groups. This is the purpose for the MoRS formula.

## Autoimmune Diseases and Methylation

An autoimmune process occurs when the body's own immune system errantly attacks healthy cells. Why would this happen? Let's find out.

First, maybe those so-called "healthy" cells are not really so healthy. Maybe their cell membranes are inflamed. Maybe their membranes are damaged by free radicals. Maybe those cells have pesticides locked inside. Maybe those cells have damaged chromosomes from airport scanners and cell phones. If the cell is damaged, it can become aberrant and such cells are slated for *apoptosis* (self-imposed destruction), or destruction by the immune system.

Of 155,000 scholarly articles on methylation and autoimmune diseases[20], the majority cite the lack of methylation to maintain the DNA integrity. Methylation is the process whereby DNA is

20 DNA Methylation in the Pathogenesis of Systemic Lupus Erythematosus. Amr H. Sawalha1 and Bruce Richardson *Department of Medicine, University of Michigan, Ann Arbor, Michigan,US Department of Veterans Affairs Medical Center, Ann Arbor, Michigan, USA*

repaired, and it's the process where unwanted gene expressions are deactivated.

## Methylation and Weight Loss Resistance

This is the topic of our next Research Report, so here's a preview. When pesticides, food additives, and chemicals inflame cell membranes, the hormone messengers are unable to deliver their message and become deactivated so they can't cause trouble. So they become toxic, particularly in an environment that lacks methyl groups. Toxic hormones cause endocrine confusion and can cause other tissues to misbehave and generate fibrous tissues[21]. Both insulin and leptin hormone resistance causes weight gain and the inability to burn fat. Insulin causes food to be stored as fat, and leptin regulates the body's ability to burn fat.

Thus in weight loss resistance, the very same toxins that inflame the cell membranes coupled with the body's own hormones become "obesogens[22]" which are the result of the body's inability to provide methyl groups to serve detoxification. Ultimately excessive weight gain and the inability to lose weight is a cellular issue—one involving inflammation, the cell membrane, anti-oxidants, ATP production, and methylation. Sounds familiar!

## MoRS: Methyl Donor – A Revolutionary Nutritional Breakthrough


The Systemic Formulas MoRS (Methyl Donor) formula heralds a breakthrough in nutritional science. MoRS was developed to improve genome health. When the DNA and RNA communications work optimally, the healthy human genome can be expressed as opposed to an overt or covert disease expression. As a comprehensive methyl donor, MoRS supports trillions of life processes, and often our success in clinical practice is dependent upon our patients' bodies being able to methylate.

Understanding how methylation is involved in so many body processes opens the door to more effective clinical practice. Here are some examples so you can see how MoRS facilitates results.

**Protocols: Methylation is required to:**

- Convert serotonin to melatonin for sleep = DReM (Sleep Aid) + MoRS
- Help the thyroid to make thyroxine = Gf (Thyroid) + MoRS
- Turn off the stress response = Ga (Adrenal) + MoRS
- Make insulin = P (Pancreas) + MoRS
- Support the liver's detox processes = Ls (Liver-s) + MoRS
- Heal inflamed joints = JOT (Joint, Disc, Cartilage) + MoRS
- Facilitate neurotransmitters (depression) = B (Brain) + MoRS
- Cycle the heart's ATP and detox cellular wastes = HQ + MoRS
- Make glutathione to protect and detox every cell = EPIC, ROX, + MoRS
- Correct chronic fatigue = (Detox Protocol, see Research Report #4) + EPIC + ROX +DV3 + MoRS
- Relieve and correct fibromyalgia = EE (Essene Essence) topically + EPIC + ROX +DV3 + MoRS
- Help correct aberrant cellular expressions = OXCC (Cell Cleanser) + #5 (Stabilizer) + MoRS
- Build the immune system = Gt (Thymus) +DV3 + MoRS
- Assimilate vitamin B-12 = DB12 + MoRS
- Manage blood pressure = EVENTA (Super Amino) + MoRS
- Optimize male sexual performance = M+X (Male Extra) + MoRS
- Support nerve transmissions = N (Nerve) + MoRS
- Protect the nerve sheath = LEV (Lecithin) +DV3 + MoRS
- Support neuroendocrine balance = Gb (Pituitary/Pineal) + #1 (Activator) +DV3 + MoRS
- Heal muscle trauma = KYRO (Muscle, Ligament, Tissue) + #6 (Restore) + MoRS
- Correct tinnitus = WO (topically to mastoid) + MoRS
- Eliminate biofilms = MELA (Optimal Terrain Enzymes) + ENZEE (Metabolic Enzymes) + MoRS
- Clean up the extra cellular matrix = CLNZ (Chelator) + REL (Chlorella) + MoRS
- Build bones = Water Tonify + CalMD + MoRS
- Reduce asthma and respiratory allergies = R (Lung) + Metal Sedate + ROX +DV3 + MoRS

Now you can see that the inclusion of MoRS in practically every program adds a boost, and in many cases, it provides exactly what is necessary for rapid and gentle healing. As we all know, we live and die at the cellular level. MoRS is a nutritional boost to every cell's life processes.

**View Webinar:** Methylation: The Cells Alchemy on the Systemic Formulas Knowledge Site: www.systemicformulasmedia.com. (Secret: there's a discount coupon for viewing)

Disclaimer: This Research Report does not propose a method for diagnosing or treating any disease whatsoever—a process exclusive to the practice of medicine by licensed individuals. This information refers only to whole body nutrition to support the body in caring for itself. It features insights from one individual's clinical perspective and does not constitute labeling for any product.

21 Oxford Journals, Life Sciences & Medicine MHR: Basic science of reprod. Medicine Volume 8, Issue 8 Pp. 770-775 Estrogen receptor-α and -β expression in microvascular endothelial cells and smooth muscle cells of myometrium and leiomyoma, Gargett, Bucak, Zaitseva, Bhu, Taylor, Fuller, Rodgers

22 **Obesogen** – a chemical compound that is foreign to the body or an unwanted intermediate metabolite that can disrupt normal development or homeostasis (usually concerning metabolism and use of lipids, or fat) inducing obesity.

***"MoRS (Methyl Donor) is a product that I consider using for every patient. It's a universal advantage to the body's healing processes, and often it is the determining factor in helping patients move to a more optimal level of health."*** – Dr. Jack Tips