

Annual Update 2016

Topics

Epigenetics and the Biology of Perception. Identifying the Subconscious meridian.
Synchronising the Vestibular Ocular Reflex to the Gait reflexes.
Synchro Symmetrical Dyskinesia – using bilateral muscle tests to identify non spinal fixations and their treatment.
The 5 R program Remove, Replace, Re-inoculate, Repair and Regeneration.
Commonest food sensitivities.
Natural chemical sensitivities in food – tyramine, solanenes, phytates, isothiocyanates, oxalates, salicylates.
Small Intestinal Bacterial Overgrowth (SIBO) – using Hydrogen, Methane, Hydrogen sulphide and Carbon dioxide as biomarkers.
Testing for Hormone imbalances. The Catecholamine Bell Curve in Anxiety and Depression.
Balancing the steroids. NADP or NADPH.
Toxic metals and Vit D activation.
Detecting radioactive isotopes in our patients.
The best natural Toxic Metal, Chemical and Radiation. chelator

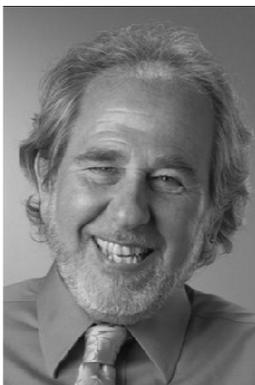
Epigenetics

Simply ingenious

Epigenetics is the science of understanding how perception creates the biology of our bodies.

Epigenetics is mediated by environmental signals through perceptions which in turn can change the read out of our genes. How you see the world selects which genes are going to be activated and modifies the read out to make proteins that best fit the environmental circumstances of the time.

Perception runs our genes, but not all perceptions are true. Misperceptions can miss run our genes. Misperceptions are interpretations of the world that are inaccurate. Inaccurate perceptions will inaccurately run our biology which will lead to dysfunctions and disease which is why thought becomes a prominent contributor to the state of health we express. Perception is the primary mechanism that controls our biology.



**Atoms are made out of energy.
Atoms make molecules.
Molecules are made out of atoms.
Molecules are made out of energy.
Molecules make cells.
Cells are made out of energy.
Cells make humans.
Humans are made out of energy.**

Linear Newtonian Model

Atoms – molecules – chemical compounds – amino acids – single cell structure - small life forms – large life forms – man – evolved brain – consciousness as an epiphenomena of the brain – emotion fluctuations due to changes in neurochemistry.

Newton died in his sleep in London on 20 March 1727 and was buried in Westminster Abbey. Voltaire may have been present at his funeral. A bachelor, he had divested much of his estate to relatives during his last years, and died intestate. After his death, Newton's hair was examined and found to contain mercury, probably resulting from his alchemical pursuits. Mercury poisoning could explain Newton's eccentricity in late life.

**Non linear (Quantum) Model
Consciousness as the ground of
all being – body being an
expression of the mind - split
between higher self and ego –
unconscious emotions cause
changes in neurochemistry –
hormone adaption – gene
expression – changes in cellular
metabolism – disease.**

**The cell nuclei contain
chromosomes.
Chromosomes are made up of
genes.
Genes are made of DNA and
protein.
Cells with another cell DNA
carried its characteristics across.
Thus DNA was found to be the
genetic messenger. (1944)**

**In 1955 the structure of DNA was
discovered by Watson and Crick
to be a two stranded double helix
twisted around and contained
just 4 nucleotide bases
Adenine
Cytosine
Guanine
Thymine**

These nucleotide bases make a code.
The code is to make the proteins of the human body.
Humans are made of over 100,000 different proteins.
Proteins provide for our physical structure, antibodies, hormones, neurotransmitters.
Proteins move by changing shape.

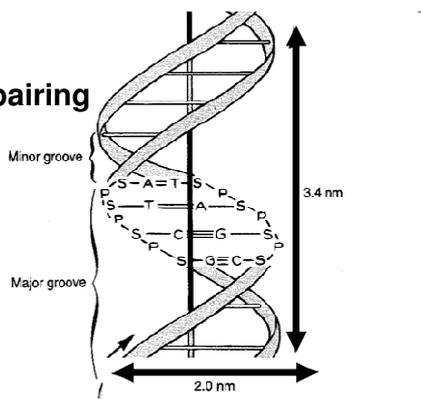
Base pairing

A = T

T = A

C = G

G = C



If DNA double helix split into two each part would reproduce itself if put into a nucleotide soup in a precise formation.

Question – What is it that controls the DNA? Thought by Francis Crick that DNA thus controls itself!

Francis Crick was the first person to propose the Central Dogma. It is the foundation pillar of molecular genetics.

The Central Dogma

The character of an organism was thus thought to be pre-programmed in its DNA.

**Hence the concept of “Genetic Determinism”. (fate is pre-programmed from the moment of conception!)
We would be thus victims of our heredity.**

**The Human Genome project 1987-2001
Thought that for every protein in the human body you need a gene.
There are over 100,000 proteins in the human body and so it was thought there must be over 100,000 genes (+ regulatory DNA genes 20-40,000).**

The results showed that humans only have 25,000 genes, little more than fruit flies. Expectations were that as an organism evolves there would be greater numbers of genes.

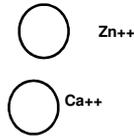
The nucleus was thought to be the brain of the cell. But over 100 years ago experiments were performed which showed that genes did not control life. De-nucleating cells were shown to continue living quite satisfactorily for many months until either injured, starved or toxified. (environmental change)

The question is what is it that controls life if it is not the nucleus (DNA)?

Stem cells have the same DNA but can mature into different kinds of cells depending upon the environment that they are in.

Proteins are linear molecules but when synthesised the protein folds up into complex shapes which is due to a balancing of the positive and negative charges on the amino acids of the protein.

**Amylase
(Calcium dependent)**

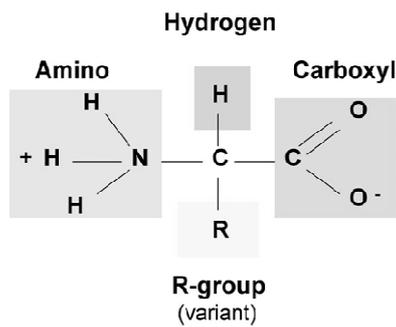


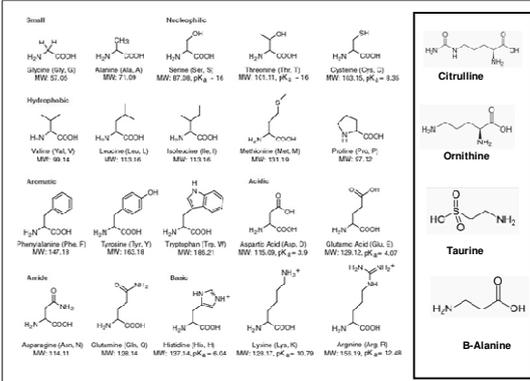
Proteins are made of amino acids

- 1. Build tissues**
- 2. Transport molecules**
- 3. Form antibodies**
- 4. Form enzymes**
- 5. Build chemical messengers i.e. hormones and neurotransmitters**

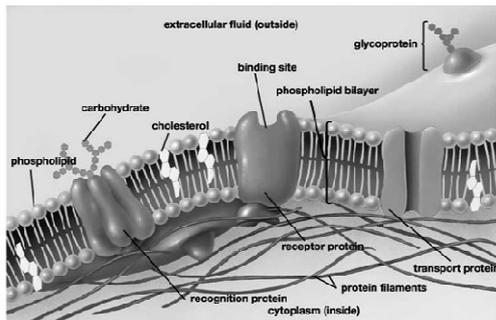
Amino acids are biologically important organic compounds composed of amine (-NH₂) and carboxylic acid (-COOH) functional groups, along with a side-chain specific to each amino acid. The key elements of an amino acid are carbon, hydrogen, oxygen, and nitrogen.

Amino Acid Structure





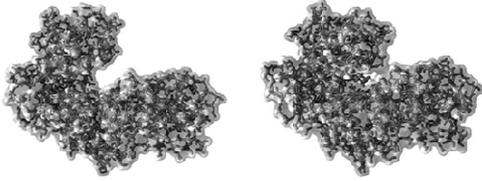
Essential			Nonessential		
Histidine	N	90%, Hydrophobic	Alanine	N	Hydrophobic
Isoleucine	N	Hydrophobic	Arginine	+ve	Hydrophilic
Leucine	N	Hydrophobic	Asparagine	N	Hydrophilic
Lysine	+ve	Hydrophilic	Aspartic acid	-ve	Hydrophilic
Methionine	N	Hydrophobic	Cysteine	N	Hydrophobic
Phenylalanine	N	Hydrophobic	Glutamic acid	-ve	Hydrophilic
Threonine	N	Hydrophilic	Glutamine	N	Hydrophilic
Tryptophan	N	Hydrophobic	Glycine	N	Hydrophobic
Valine	N	Hydrophobic	Ornithine		
Left brain weakness give hydrophilic			Proline	N	Hydrophobic
Right brain weakness give hydrophobic			Selenocysteine		
			Serine	N	Hydrophilic
			Tyrosine	N	Hydrophilic



When a protein changes shape it performs movement i.e. as it changes from Conformation A to Conformation B. This movement is harnessed by the cell to carry out functions such as digestion, respiration, muscle contraction etc.
Compare a human cadaver to a living human. Life is movement.

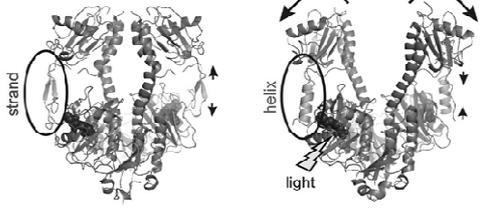
Conformation A Conformation B

Hexokinase undergoes a conformational change on binding glucose (induced fit)



Resting

Active



**What makes a protein change shape is called a signal. A signal may be a particle (drugs, hormones, growth factors etc) or an energy (such as light, sound, EM waves).
Normal shape of a protein is when all the positive and negative charges are balanced.**

These proteins have little clefts on their surfaces that can plug into signals.

So the protein can be like a baseball glove and the signal is like the baseball.

So the signal has to have the precise shape to fit into the glove and the right charge so it can attach.



This changes the charge and thus the protein conformation. So the movement can be used to drive work which creates functions e.g. a digestive enzyme and a food particle. The movement crushes the food particle. If a number of fragments are inserted into the glove then synthesise will occur.

Genes provide the blueprint of the protein but the life of the protein is determined by the signal.

Thus two parts to life – the physical part (protein) and the signal part that controls the movement.

Behaviour is thus dependant on the proteins and the signals.

Disease is a defect in the behaviour of the proteins and the signals.

< 5% is due to defects in the protein from birth defects (but more as we age)

95+% is due to defects in the signal.

Only 3 ways that a signal can cause a dysfunction in the protein mechanism

1. Trauma by affecting the nervous system

2. Interference of the signals by toxicity

3. We send the wrong signal at an inappropriate time by inappropriate behaviours. From the mind.

Mechanics

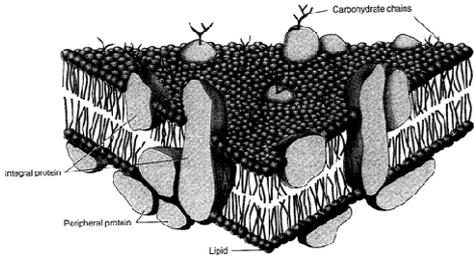
Toxicity

**Toxic metals
Chemicals
Radiation**

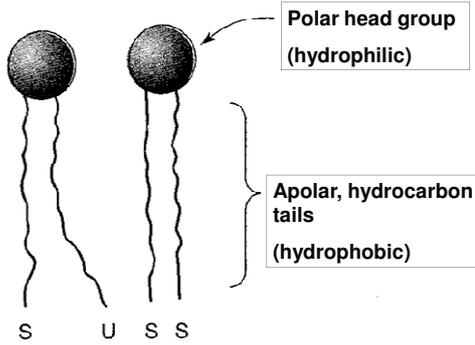
**Wrong signal from the mind
e.g. Anorexia nervosa**

**The proteins are on the inside of
the cell. The signals come from
the environment.
The cell membrane or skin
contains protein receptor sites
many of which pass through the
cell membrane.**

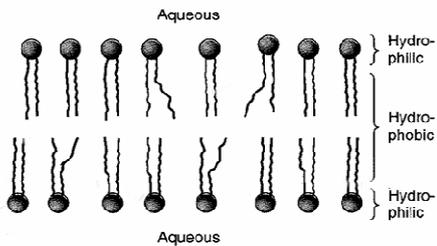
Cell Membranes

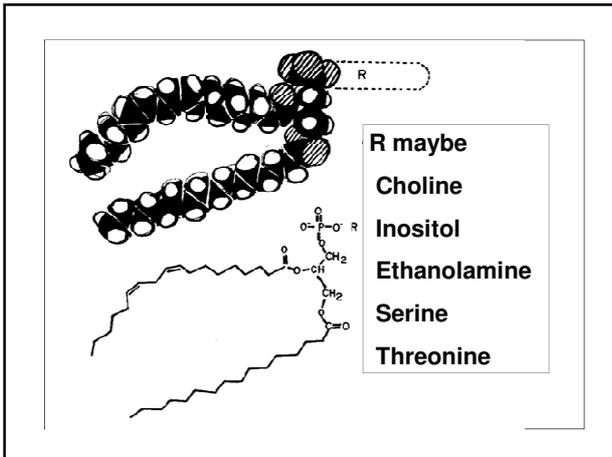


A Phospholipid

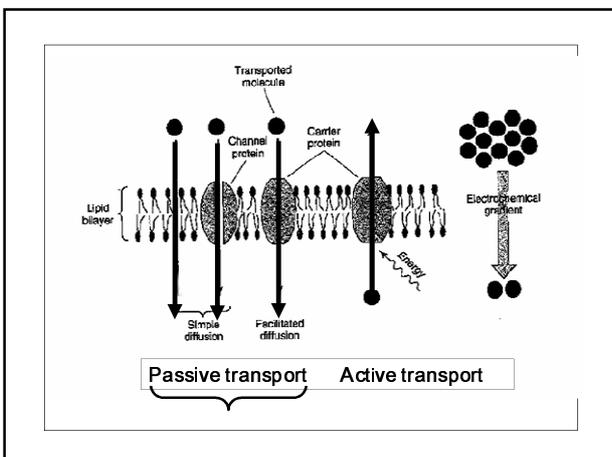


The unsaturated fatty acid tails are kinked and lead to more spacing between the polar heads and hence more movement.





The integral cell membrane proteins act as a conduit to allow nutrients to get into the cell from outside and waste products to be eliminated.



There are two classes of proteins built into the membrane
1. Receptor proteins
2. Effector proteins

Signal Receptor Effector

Signal \Rightarrow Receptor \Rightarrow Effector

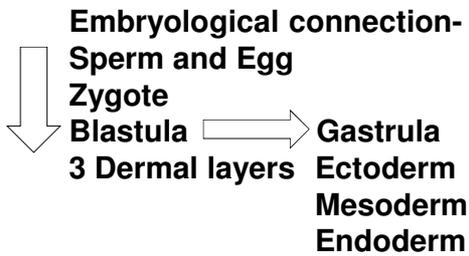
There are thousands of protein receptors built into the cell membranes.

All functions carried out by the human (50 trillion cells) is carried out by each individual cell.

The cell membrane reads the environment because it has receptors.

The human body also has a skin with receptors – big ones such as eyes, ears, nose, taste and small ones such as touch, temperature pain etc. to read the environment and send signals to the brain.

So the skin is really part of our brain.



The receptor and effector proteins represent switches. Some switches will be on and some off at any moment in time. The receptors are awareness of the environment. The effector send a physical signal into the cell to engage physiological mechanisms that are appropriate. i.e. PERCEPTION

Perception controls behaviour. Life is not controlled by DNA. DNA is the blueprint to make the proteins which are controlled and mediated by the signals. What does a cell do if the signal is knocking but the cell does not have the protein? This is when the gene is activated to stimulate the product of the protein.

Genes do not turn on or off on their own but respond to the signals (perception). If the gene is damaged or destroyed it no longer is the blueprint and so the protein is not manufactured and dysfunction occurs (telomeres and telomerase).

50% of chromosomes is DNA but 50% is protein which surrounds the DNA like a sleeve. This protein is called non histone protein of which there are over 1000 and are involved with gene expression. The DNA of the gene is not exposed but covered by the protein. So to read the gene the protein sleeve has to be withdrawn.

If there is no intracellular protein for the effector to effect then the signal sends its message direct to the gene. The signal effect specifically allow the exact protein sleeve to be uncovered as the protein sleeve convolution changes allowing the gene to be exposed and make a RNA copy.

The RNA is a copy of the DNA and travels to the ribosome via the cytoplasm.

Genes control nothing. Genes are responsive to the signals of the environment. **THIS IS THE DEFINITION OF EPIGENETICS.**

A single gene maybe able to thus provide for over 2000 different proteins.

Genetic Potential Is ENDLESS!



30,000 Genes in the Human Genome.
<https://www.genome.gov/11006943>

N^X or $30,000^2 =$ A big number

“environmental information can modify the readout of each gene so as to create more than 30,000 variations from each blueprint.”

- Bruce Lipton, PhD

$30,000^{30,000} =$ INFINITY!

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Epigenetics is controlled by environmental signals and is mediated by the switches on the cell surface known as perception. Now how you perceive the world selects which genes are going to be activated. Misperceptions could miss run our genes. But not all of our perceptions are true.

Inaccurate perceptions will inaccurately run our biology leading to dysfunction and disease. Thought is a prominent contributor to our state of health.

Three types of Perception

- 1. Beneficial substances like nutrients the cells move towards the stimulus leading to growth.**
- 2. Response to toxins makes cells move away from the stimulus and the cell receptors shut down.**

3. No response at all – no growth or withdrawal – elevator music. So two main cellular reactions to perception – growth or protection. They cannot be in both states at the same time. Love is the ultimate growth responder. Fear is the ultimate protective responder.

Perception of the world is mediated through the HPA axis. Upregulated during stress and downregulated during growth. The adrenals send out stress hormones which shut down frontal cortex and viscera but stimulate blood to the arms and leg muscles and the subconscious brain.

This protective response also downregulates the immune system. Cortisol is used to prevent organ rejection following transplants. We all harbour most infectious diseases within us but our immune system is active and prevents proliferation of the opportunistic pathogens.

Stress response activates the subconscious nervous system – hind brain reflex mechanisms, and inhibits the conscious thinking nervous system.

The stress mechanism is designed to be used for short periods of time, not longterm.

Three sources of Perception
1. Instincts inborn responses to stimulates e.g Flexor withdrawal response.
2. Acquired – built in by repetition in the subconscious mind like walking and driving.
3. The conscious mind – the creative mind.

Diagnostic Entry Points
Body Type Acetates
Meridian points – Biophoton acetates
Hormones
Therapy localisation
Biomarkers
Weak muscle(s)
Eyes into Distorsion
Food allergens
Phonocardiograph

The 5 R Program

1. Remove – Allergens, Toxins, Infections
2. Replace – Nutrients, Digestive enzymes
3. Re-inoculate - Probiotics
4. Repair – High or Low
5. Regeneration – High or Low

335nm ISOTOPE ACETATE Challenge for radioactive element	RADIOACTIVE ISOTOPES Place acetate over specific elements e.g. Copper	380nm POLYMORPHISMS Challenge for SNIPs. Check for appropriate Co-enzyme	390nm LOW HORMONES Challenge for strengthening against specific hormones	HIGH HORMONES Challenge for weakening against specific hormones
400nm PORPHYRINS Challenge for porphyrins that weaken. Challenge for nutrients and Lutein	385nm LOW REPAIR Challenge for nutrients	HIGH REPAIR Indicates inflammation. Challenge for Allergy Infection Toxin Hypoxia EPAs	375nm LOW REGENERATION Indicates Toxic metals. Challenge for chelators	HIGH REGENERATION May indicate neoplasm. Challenge with Nagalase

Synchronising the Vestibular Ocular Reflex to the Gait Reflexes

The vestibulo-ocular reflex (VOR) is a reflex eye movement that elicits eye movement by stimulating the vestibular system.

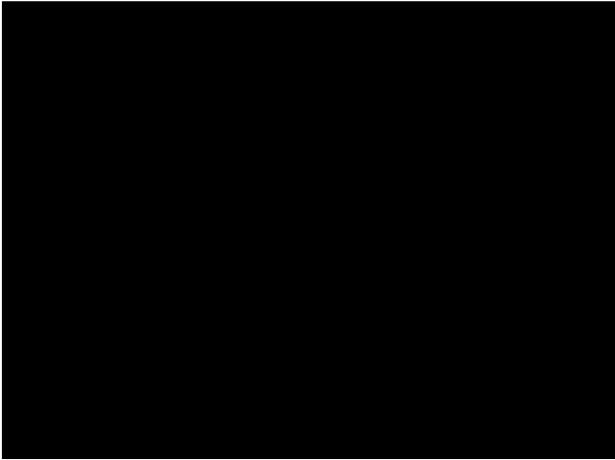
This reflex functions to stabilize images on the retinas (in yoked vision) during head movement by producing eye movements in the direction opposite to head movement, thus preserving the image on the centre of the visual field(s).

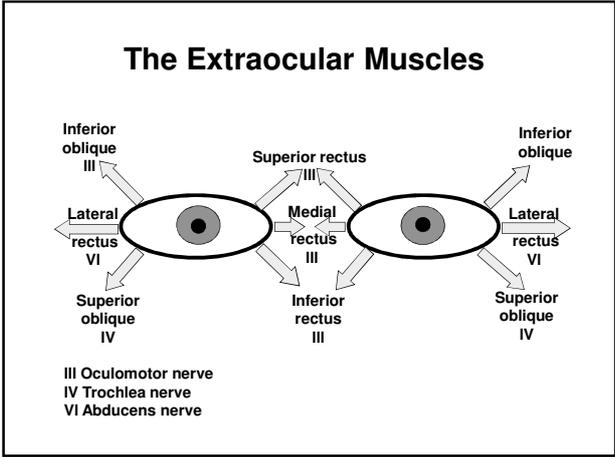
For example, when the head moves to the right, the eyes move to the left, and vice versa. Since slight head movement is present all the time, the VOR is very important for stabilizing vision:

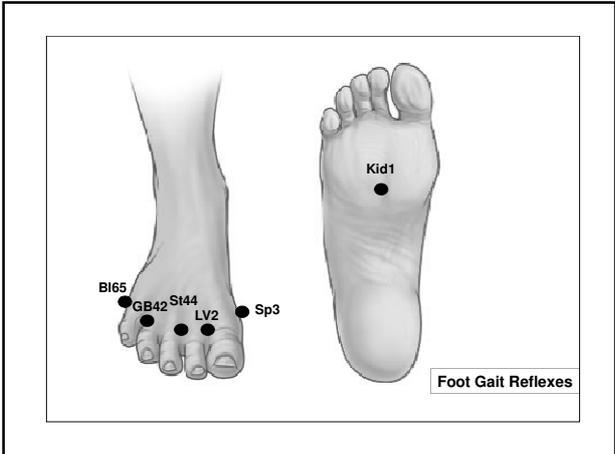
patients whose VOR is impaired find it difficult to read using print, because they cannot stabilize the eyes during small head tremours, and also because damage to the VOR can cause vestibular nystagmus.

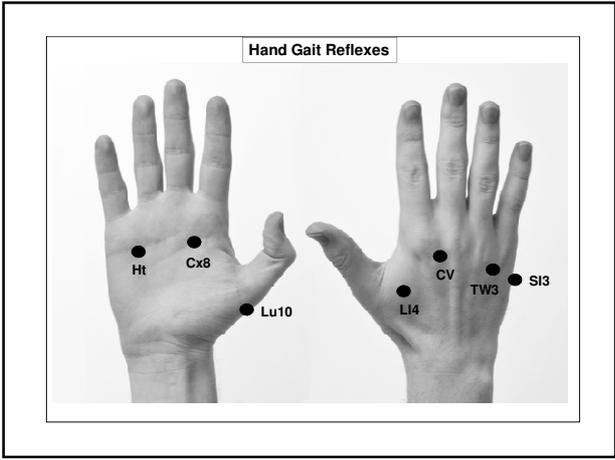
The VOR has both rotational and translational aspects. When the head rotates about any axis (horizontal, vertical, or torsional) distant visual images are stabilized by rotating the eyes about the same axis, but in the opposite direction.

When the head translates, for example during walking, the visual fixation point is maintained by rotating gaze direction in the opposite direction, by an amount that depends on distance.









Intestinal Gas

**Intestinal gas is either
Hydrogen
Carbon dioxide
Hydrogen sulphide
Methane**

Most Common Food Allergens
Cereals and product cereals –
Gluten, Gliadin, Yeast
Crustaceans and Derivatives
Eggs and Egg products
Fish and Fish products
Peanuts
Soy and derivatives
Milk and Milk products
Nuts and Nut derivatives
Celery and derivatives
Mustard and products
Sesame seeds and derivatives
Sulfur dioxide and Sulfates
Lupin and derivatives
Shellfish and derivatives
Chocolate
Tea
Coffee

Most Common Toxic Metal Foods
Potatoes and other root crops
Rice
Chicken and battery eggs
Garlic
Onions
Tomatoes
Fruit juices in cardboard
containers
High fructose corn syrup
Fish and Shellfish

Gliadins, which are a component of gluten, are essential for giving bread the ability to rise properly during baking. Gliadins and glutenins are the two main components of the gluten fraction of the wheat seed.

Gliadin is the water-soluble component of gluten, while glutenin is insoluble. Gliadin can cross the intestinal epithelium. Breast milk of healthy human mothers who eat gluten-containing foods presents high levels of non-degraded gliadin.

**Small Intestinal Bacterial
Overgrowth (SIBO)**

Taken from Noah Lebowitz
Las Vegas 2016

Small Intestines (SI)

•The SI typically contain less than 1,000 microorganisms per ml

•Most of the microorganisms are gram positive bacteria

•SIBO is classified as having 100,000 to 1,000,000 microorganisms per ml

Altered Numbers

•SIBO is NOT a condition of unique pathogenic microorganisms being where they shouldn't be, BUT rather too many "good" organisms that are typically found in the Small or Large Intestines

Conditions Associated with SIBO

- Abdominal bloating and/or belching after eating
- Abdominal cramps
- Peristaltic sounds after eating
- Vomiting
- Nausea
- Weight loss
- Malabsorption
- Other abdominal issues

Most Common Bacteria

- 141 micro-aerophilic strains identified, the most common being:
 - Streptococcus* 60%, *Escherichia coli* 36%, *Staphylococcus* 13%, *Klebsiella* 11% and others
- 117 anaerobes identified
 - Bacteroides* 39%, *Lactobacillus* 25%,
Clostridium 20% and others

Symptoms Vary by Overgrowth

- All SIBO cases are different.
- Increased fermentation instead of absorption occurs
- Depending on which Bacteria is predominant, symptoms will vary
- Studies have shown fat malabsorption, bloating and diarrhea, or mucosal damage
 - Dependent on which bacteria are elevated

SIBO Testing

- Gold Standard: Aspiration
- Positive if >100,000 bacteria/ml

SIBO Testing

- Hydrogen Breath Test (HBT)
- Increased Hydrogen in those with SIBO
- Positive if it rises > 12ppm
- Sensitivity of 40% and Specificity at 80%
- Debate on Lactulose vs Glucose
- Costs approx. \$150
- 84% of those with SIBO have positive Lactulose HBT while 20% of population with SIBO had positive HBT

Prevalence

- Widely debated
- Many Asymptomatic
- Approximately 15% of elderly and 5% of non-hospitalized healthy young adults have SIBO
- Increased in those with GI complaints

SIBO Correlations

- In one study 78% of those with Irritable Bowel Syndrome (IBS) had a positive HBT
- Studies show 43% of Diabetics with Diarrhea had a positive HBT, with 75% improving with antibiotic treatment
- Another study showed evaluated 15 un-responsive celiac patients and 66% had SIBO
- All patients responded to antibiotic treatment

AK Testing for SIBO

- Bacteroides Fragilis, Clostridium Botulinum, Clostridium Difficile, Clostridium Perfringens, Clostridium Septicum, Clostridium Tetani, Clostridium Welchii, Enterococcus Faecalis, Streptococcus Faecalis, Enterococcus Faecium, Escherichia Coli, Group A Streptococcus, Group B Streptococcus, Klebsiella Pneumoniae, Staphylococcus Aureus, Staphylococcus Epidermitis, Staphylococcus Saprophyticus, Streptococcus Agalactiae, Streptococcus Lactis, Streptococcus Mitis, Streptococcus Mutans, Streptococcus Pneumoniae, Streptococcus Pyogenes, Streptococcus Salivarius, and Streptococcus Viridians*

Treatment

- Antimicrobials**
- Betaine HCl**
- Digestive enzymes**
- Psyllium**
- Colon cleanse**

Conclusion

- When testing for SIBO it should be evaluated using the external oblique muscle
- Without testing with the external oblique one will miss most, if not all, positive SIBO tests.

**Natural Chemicals
from Foods**

Isothiocyanates are derived from the hydrolysis (breakdown) of glucosinolates—sulfur-containing compounds found in cruciferous vegetables. ¹

**Brussels sprouts, Broccoli,
Cabbage, Kale, Watercress,
Garden cress, Mustard greens,
Turnip, Kohlrabi, Horseradish,
Cauliflower, Pak choi, Spinach**

**Metabolised by Glutathione and
Mercapturic acid (NAC). ¹**

**Challenge with Isothiocyanate
vial from strength for weakening.
Test foods
Use NAC to detoxify**

Solanines

Solanine is a glycoalkaloid poison found in species of the nightshade family (Solanaceae). It can occur naturally in any part of the plant, including the leaves, fruit, and tubers.

Solanum glycoalkaloids can inhibit *acetylcholinesterase* (thus making muscles go stiff), disrupt cell membranes, and cause birth defects. One study suggests that the toxic mechanism of solanine is caused by the chemical's interaction with mitochondrial membranes.

**Potatoes especially if green
Tomatoes
Green peppers
Aubergines (egg plants)
Tobacco
Paprika
Goji berries
Ashwagandha**

The following foods contain solanine, but are not a part of the nightshade family, including:

- Blueberries
- Apples
- Cherries
- Sugar beets
- Huckleberries
- Okra
- Artichokes

Ascorbyl Palmitate (it's potatoes)
Yeast (Most yeast contains potato, both baking yeast and beer yeast.)

- Cellulose
- Dextrins
- Dextrose (can be potatoes, check your salt and baking powder ingredients)

Lactic acid (generally made from fermented corn or potatoes)

- Magnesium Stearate
- Maltodextrin / Maltrin (can be derived from potato or corn)
- Starch

Boiling potatoes reduces the α -chaconine and α -solanine levels by only 3.5% and 1.2%, respectively; the corresponding loss during microwaving is 15%.

Deep-frying at 150 °C (302 °F) does not result in any measurable change; significant degradation starts at ~170 °C (338 °F), and deep-frying at 210 °C (410 °F) for 10 min causes a loss of ~40%. Freeze-drying or dehydration has little effect.

**Challenge with Solanene vial from strength for weakening
Test foods
Use Lemon balm, Potassium ascorbate to detoxify**

Phytates

Phytic acid, also called phytate in its salt form, is another anti-nutrient. Phytic acid is the main phosphorus store of many plants. Phytates actually bind to the magnesium, calcium, zinc and iron in the intestines and take them OUT of the body. Can be removed by sprouting, fermenting and soaking.

**Challenge with Phytic acid vial from strength for weakening
Test foods
Avoid
Supplement Ca, Mg, Zn, Fe if deficient**

Tyramine

As food ages, tyramine levels increase, so people who need to limit tyramine intake should not eat aged and fermented foods. Aged cheeses such as blue, cheddar, Swiss, Gorgonzola, Gouda, Parmesan, Romano, feta and Brie should not be consumed due to their high tyramine content.

Aged, dried, fermented and pickled meats such as bacon, sausage, liverwurst, pepperoni, salami, ham, hot dogs and corned beef must also be avoided.

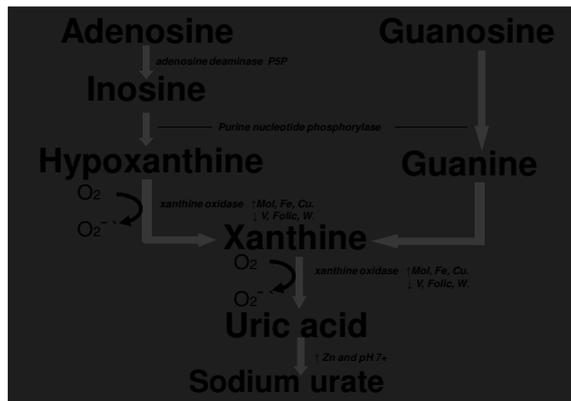
Homemade yeast breads, sourdough bread and yeast extracts contain high levels of tyramine. When limiting tyramine intake, read the nutrition labels, as many convenience foods may contain yeast extract or marmite, another tyramine-rich ingredient.

Avoid over ripe and dried fruits as well as fermented vegetables like kimchee and sauerkraut. Fermented soy bean or bean curd and tofu are also considered high in tyramine.

Soy sauce, Thai and Vietnamese fish sauce contain high levels of tyramine and should be avoided. Do not drink tap beer, unpasteurized beer or ale, and check with your physician before you consume red or white wine, since tyramine content can vary among different types.

Challenge with Tyramine from strength to weakening
Test foods
Detoxify with Vitamin C, yarrow, Lemon balm

Uric acid



Constant aching, stress, and tenderness in the worst way. Inability to bend, loss of flexibility. Hardness and swelling at the big toe or fingers, wrists ankles and even the knees. Burning sensations and redness around the infected areas. Constant pain.

Purine high foods

Red meats which come from cows or sheep and include steak, chops, corned beef and larger pieces of meat usually roasted in the oven. Game. Meat extracts (e.g Oxo, Bovril). Gravy. Brains, kidneys, liver & heart (offal), sweetbreads. Shellfish such as , mussels, oysters and sea eggs. Anchovies, herrings, mackerel, sardines. Peas and beans. Alcohol. especially beer and wine.

Challenge with Uric acid vial from strength to weakening.

Test foods

Avoid positive ones

Treat with Sodium bicarbonate.

Zinc

Salicylate Foods

**Aspirin can trigger symptoms in some people with urticaria, but whether foods naturally high in salicylate can do the same is very unclear.
Most people with asthma or who are allergic to aspirin are able to eat foods rich in salicylate without a problem.
This may be because aspirin contains an added acetyl group, while naturally occurring salicylates are mostly non-acetylated.**

**Cold & flu remedies
Medicines used for pain from headache, periods, sinus
Some antacids
Drugs used for inflammatory bowel disease
Many complementary and alternative medicines, especially those used for Pain and joint problems
Teething gels.**

Foods containing high levels of salicylate include tea (except fruit and camomile tea), coffee, dried herbs and spices, black pepper, sharp green apples, cherries, strawberries, dried fruit, tomatoes (fresh, puree and ketchup), fruit juices, cider, wine, peppermints and liquorice.

Phenols such as salicylates are detoxified by sulfation. Without normal levels of sulfates in the body the *Phenol-Sulfotransferase-P enzyme* cannot function optimally. So, there are two problems with PST deficiency: low sulfate levels and low enzyme levels.

Dr. Rosemary Waring's research shows that the lack of sulfate is the primary problem in 73% of these children (another study found low levels in 92%), but all of those Waring checked had a low PST level too. Similar sulfate deficiencies have been reported in people with migraine, rheumatoid arthritis, jaundice, and other allergic conditions all of which are anecdotally reported as common in the families of people with autism. Adequate sulfoxidation requires adequate supplies of B-vitamins, especially vitamin B6. The PST enzymes are inhibited or overloaded by chocolate, bananas, orange juice, vanillin, and food colorants such as tartrazine. Removal of these from the diet and supplementation of sulfates may well relieve all these symptoms. The lack of sulfation could well be due to the largely carbohydrate diet of most of these children. It is likely a combination of all these things. In any case, toxic compounds of these aforementioned chemicals can build to dangerous levels. A high value for the TIAG (?) as well as a high reading for DHPPA (rather HPHPA-a phenolic metabolite of tyrosine) both indicate a PST problem.

**Challenge with Salicylic acid vial
from strength to weakening
Test foods and medicines
Detoxify with Sulfur, Methionine,
Cysteine, Taurine, NAC**

**Monosodium glutamate
MSG**

**Monosodium glutamate (MSG,
also known as sodium
glutamate) is the sodium salt of
glutamic acid, one of the most
abundant naturally
occurring non-essential amino
acids. Monosodium glutamate is
found naturally in seaweed,
tomatoes, cheese and other
foods.**

Autolyzed yeast - which contains free glutamate
 Other menu items that contain soy sauce, natural flavors, autolyzed yeast or hydrolyzed protein which can contain up to 20% free glutamic acid - the active part of MSG.
 Hamburger Helper Microwave Singles® (targeted towards children)
 Doritos®
 Campbell's® soups - all of them - based on their commitment to add "umami" (read - MSG)
 Pringles® (the flavored varieties)
 Lipton® Noodles and Sauce
 Lipton® Instant soup mix
 Unilever or Knorr® products - often used in homemade Veggie dips.
 Kraft® products nearly all contain some free glutamate
 Cup-a-soup® or Cup-o-Noodles®
 Planters® salted nuts - most of them
 Accent® - this is nearly pure MSG
 Bragg® Liquid Aminos - sold at Whole Foods
 Tangle extract (seaweed extract) - found in sushi rolls (even at Whole Foods)
 Fish extract - made from decomposed fish protein - used now in Japanese sushi dishes.
 Sausages - most supermarkets add MSG to theirs
 Processed cheese spread
 Marmite®
 Supermarket poultry or turkeys that are injected or "self-basting"
 Restaurant gravy from food service cans
 Bouillon - any kind
 Instant soup mixes
 Many salad dressings
 Most salty, powdered dry food mixes - read labels
 Flavoured potato crisps
 Monopotassium glutamate
 Glutamic acid
 Gelatin

Gelatin
 Hydrolyzed vegetable protein, like canned tuna and even hot dogs)
 Hydrolyzed plant protein, like canned tuna and even hot dogs)
 Sodium caseinate
 Textured protein
 Beet juice - It is used as a coloring, but MSG is manufactured from beets and the extract may contain free glutamic acid - Yo Baby - organic baby yogurt has just changed the formula to include beet extract
 Yeast extract
 Yeast food or nutrient
 Soy protein isolate
 Soy sauce
 Worcestershire sauce
 Kombu extract
 Dry milk and whey powder
 "Natural flavours" - may contain up to 20% MSG
 Carrageenan
 Dough conditioners
 Malted barley
 Malted barley flour - found in many supermarket breads and all-purpose flours
 Body builder drink powders containing protein
 Parmesan cheese - naturally high in free glutamate
 Over-ripe tomatoes - naturally high in free glutamate
 Mushrooms - naturally high in free glutamate
 Medications in getcaps - contain free glutamic acid in the gelatin
 Cosmetics and shampoos - some now contain glutamic acid
 Fresh produce sprayed with Auxigro in the field. (Yes the EPA approved this. It appalled us too.)

Challenge with MSG vial from strength to weakening
Test foods
Avoid foods
Detoxify with NAC (mother's little helper)
Yarrow

Histamine

Natural sources of Histamine

Prickly pear Stinging nettle
Cabbage Milk thistle
Shepherds purse
Celendine
Melon
Sunflower

Histamine is contained in
Bass, Beer, Chicken, Cocoa,
Chocolate, Cod, Crab, Haddock,
Ham, Lobster, Milk (cow and
goat), Mutton, Oyster, Salmon,
Scallop, Shrimp, Trout, Tuna,
Turkey, Yeast.

**Challenge with Histamine vial
from strength to weakness
Test foods
Detoxify with Vitamin C, Mg, Zn,
Vitamin E, Bioflavonoids
(Hesperidin)**

Oxalates

**Very high -
Avocados, Dates, Grapefruit,
Kiwi, Oranges, Raspberries,
Canned and dried pineapple,
Dried figs, Bamboo shoots,
Beets, Fava beans, Okra, Olives,
Parsip, Kidney beans, Rhubarb,
Spinach, Tomato sauce, Raw
carrots, Soy beans, Brussel
sprouts, Potatoes, Brown rice,**

**Very high -
Couscous, Tahini, Pasta, Veggie
burgers, All nuts,
Carrot juice, Hot chocolate,
Lemonade, Rice milk, Soy milk,
Tea, Clam chowder, Miso soup,
Lentil soup**

**High – Tangerines, Figs, Dried
prunes, Celery, Collards, Whole
wheat, White rice**

**Challenge with Calcium oxalate
vial from strength to weakness.
Test foods
Detoxify with P-5-P, Magnesium,
EFAs**

Theobromine

Theobromine, is a bitter alkaloid of the cacao plant. It is found in chocolate, as well as in a number of other foods, including the leaves of the tea plant, and the kola (or cola) nut. It is a xanthine alkaloid, which also include the similar compounds theophylline and caffeine.

Cocoa powder can vary in the amount of theobromine, from 2% theobromine, up to higher levels around 10%. There are usually higher concentrations in dark than in milk chocolate.

Even without dietary intake, theobromine may occur in the body as it is a product of the human metabolism of caffeine, which is metabolised in the liver into 12% theobromine, 4% theophylline, and 84% paraxanthine.

In the liver, theobromine is metabolized into xanthine and subsequently into methyluric acid. As with caffeine, theobromine can cause sleeplessness, tremors, restlessness, anxiety, as well as contribute to increased production of urine. Additional side effects include loss of appetite, nausea, vomiting, and withdrawal headaches.

Animals that metabolize theobromine (found in chocolate) more slowly, such as dogs can succumb to theobromine poisoning from as little as 50 grams.. The same risk is reported for cats as well, although cats are less likely to ingest sweet food, with most cats having no sweet taste receptors.

**Challenge with Theobromine vial
from strength to weakness.
Test foods
Detoxify with Vitamin C, NAC,
Lemon balm, Yarrow**

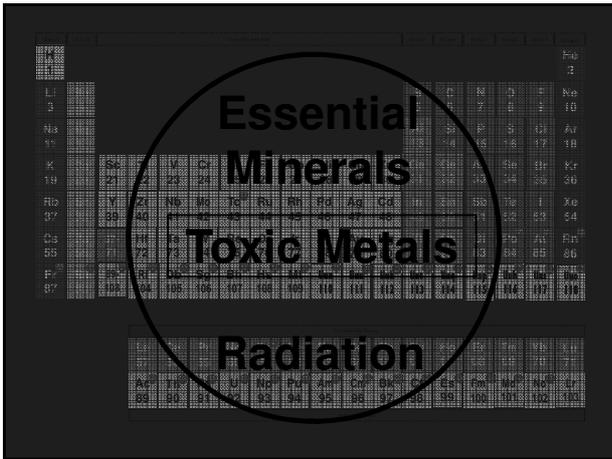
**Synchro Symmetrical Dyskinesia
(New Fixations and their Effects)**

Scott Walker ICAK-USA Las Vegas 2016

Traditional Fixations

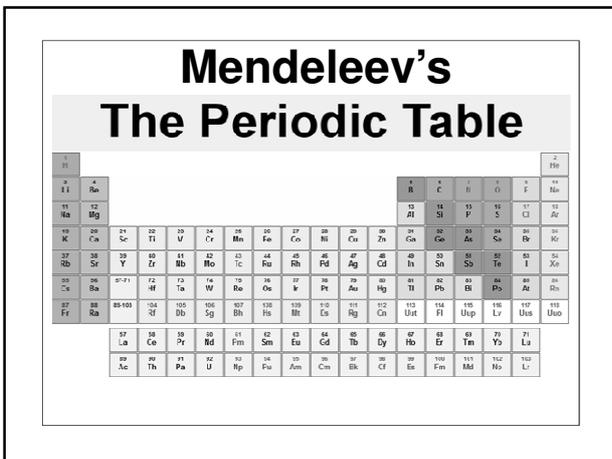


Bilateral Muscles	Fixations
deltoid	C6 - T1
popliteus	C3 - C6
teres major	Mid Dorsals
lower trapezius	T11 - L2
psoas	Occiput
gluteus maximus	C1 - C3
neck extensors	Sacral



Essential minerals
 Spectroscopic emission strengthens
 Spectroscopic absorption weakens

Toxic minerals
 Spectroscopic emission weakens
 Spectroscopic absorption strengthens



1834 – 1907 was a Russian chemist and inventor. He formulated the Periodic Law, created a farsighted version of the periodic table of elements, and used it to correct the properties of some already discovered elements and also to predict the properties of eight elements yet to be discovered.

Dmitri Ivanovich Mendeleev

Essential minerals

Boron
Calcium
Copper ↑↓
Chromium ↑↓
Iodine
Iron ↑↓
Magnesium
Manganese ↑↓
Molybdenum
Platinum
Potassium
Selenium
Silica
Silver
Sulphur
Zinc

Toxic minerals

Aluminium
Antimony
Arsenic*
Beryllium*
Bismuth
Bromine
Cadmium*
Caesium
Chlorine
Cobalt
Fluorine
Lead
Lithium
Mercury
Nickel*
Palladium
Promethium*
Radium
Radon
Thallium
Thorium
Uranium
Known to be *
Carcinogenic

Toxic Metals

The periodic table below highlights several toxic metals with circles around their symbols: Al, Si, Ni, Cu, Ag, Cd, In, Sn, Sb, Pb, Bi, Po, At, and Rn. The table includes the Lanthanide and Actinide series at the bottom.

Toxic Metals & Chronic Diseases

- Toxicity underlying all modern chronic diseases
- Alzheimer's, asthma, chronic fatigue syndrome, syndrome x, multiple chemical sensitivities, allergies, ankylosing spondylitis, arthritis, dermatitis, psoriasis

Toxic Metals & Chronic Diseases

Body systems affected:

- Neurological
- Immune disorders
- Mental conditions
- Allergic conditions
- Cancer

Toxic Metals & Chronic Diseases

- Chronic inflammation
- Heart and circulation
- Reproductive difficulties
- Tinnitus and hearing
- Diabetes

Toxic Metals

- Toxic insults on body behind the rise of MCDs
- The symptoms depend on the nature of the toxin and the individual genotype
- In time overwhelm the body's detoxification system

Toxic metals

- Quantity of toxins may be small but damage is enormous
- "Symptoms produced are out of proportion to the amount of toxin released and can be anywhere or in any system of the body" Dr Weston Price

Toxic metals

- Symptoms are a result of the types, concentration & duration of exposure
- Event can be a trigger. The reserves of the body have been reduced, gradual build up

Toxic metals

- Recovery time is proportional to length of time of exposure to toxins as well as genetic make-up and mental attitude
- “a toxin is anything that acts as a poison and can cause allergy”

Toxic metals

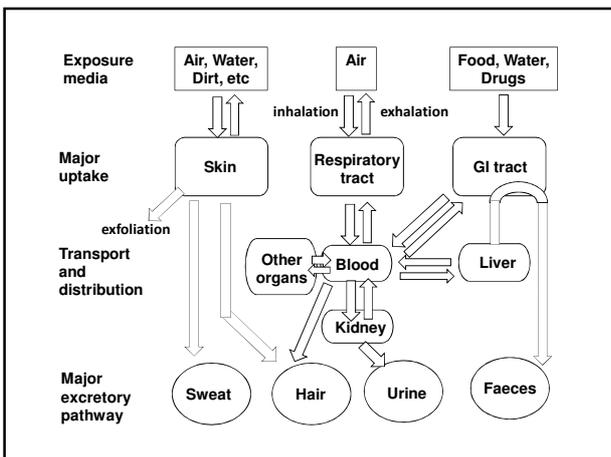
- Poison is dose dependant. Slow and shut down body functions. Interfere with feedback mechanisms, corrupt messenger molecules, stop oxygen utilisation

Toxic metals

- Allergy or sensitivity – not dose dependant. Triggers the immune system into a reaction.
- Most patients have both
- Poor nutrition reduces effectiveness of body to deal with toxins

Toxic metals

- Candice Pert – mental state has a direct effect on physical workings of the body. Lowers the resistance to infection and toxin.
- Lowers immune system. Weakened by toxins>infections



How Toxic metals affect the body

- Target specific biochemical processes (enzymes)
- Disrupt the co-factors for enzymes particularly when the toxic metal is similar physical and chemical properties to the essential metal – e.g. Hg and Zn in carbonic anhydrase

How Toxic metals affect the body

- Disrupt cell membranes
- e.g. Lead interferes with the calcium dependent release of neurotransmitters
- Lead disrupts the activation of Vitamin D to its hydroxylated forms

Lead, calcium and iron (and cadmium and iron) interfere with the GI homeostasis mechanism.

Vitamin C reduces the absorption of lead and cadmium because of an increased absorption of ferrous iron.

Meridian VEP Spray

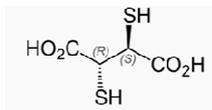
- Collection of organic aromatherapy oils for each meridian
- Work on emotional centre of brain
- Associated emotional state with each meridian

Anecdotal observed benefits from chelation of toxic metals:

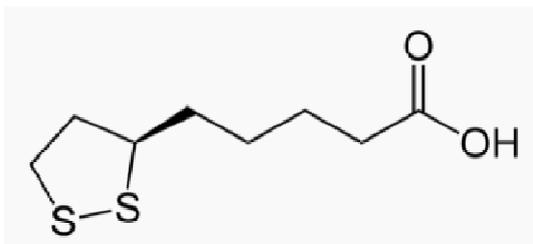
- Reduction of liver-produced cholesterol.
- Lowered insulin requirements in diabetics.
- Reduced high blood pressure.
- Normalization of cardiac arrhythmias.
- Relief from leg-muscle cramps.
- Reduction in allergic symptoms.
- Normalized weight.
- Improved psychological and emotional status.
- Enhanced sensory input: better sight, hearing and taste.
- Reversal of impotence.
- Cold extremities warmed.

Chelation therapy is a medical procedure that involves the administration of chelating agents to remove heavy metals (As, Cd, Hg, Pb) from the body.

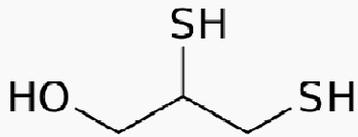
Dimercaptosuccinic acid (DMSA)



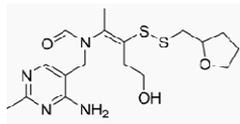
Alpha lipoic acid (ALA)



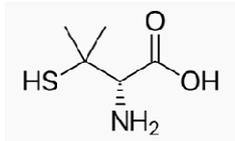
Dimercaprol (British anti-Lewisite; BAL) designed specifically to chelate As



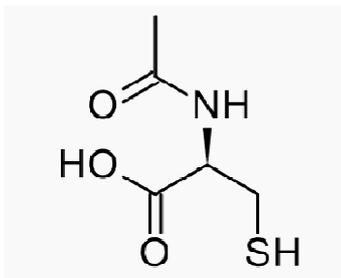
Thiamine tetrahydrofurfuryl disulfide (TTFD).



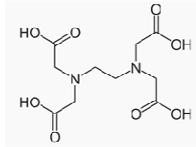
Penicillamine



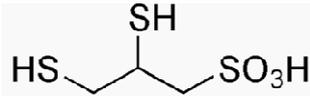
N. Acetylcysteine (NAC)

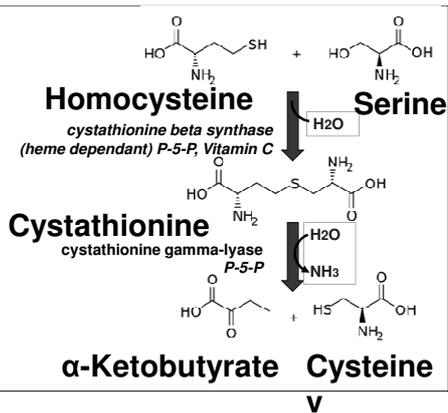


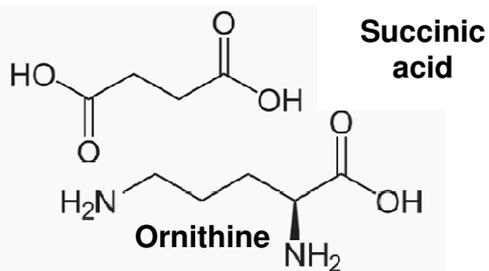
Ethylenediaminetetraacetic acid (EDTA)



2,3-Dimercaptopropanesulfonic acid (DMPS)







Ornithine succinate's usefulness arises because of its role as a ligand and chelating agent, i.e., its ability to "sequester" metal ions such as Cd, Hg. After being bound metal ions remain in solution but exhibit diminished reactivity and flush through the kidneys.

Lead inhibits

1. Glycine to ALA
2. ALA to PBG
3. Protoporphyrin IX to Heme

Mercury inhibits

1. HMB to UPG
2. CPG to PPG
3. Protoporphyrin IX to Heme

Cadmium inhibits

1. HMB to UPG
2. Protoporphyrin IX to Heme

Fluorine inhibits

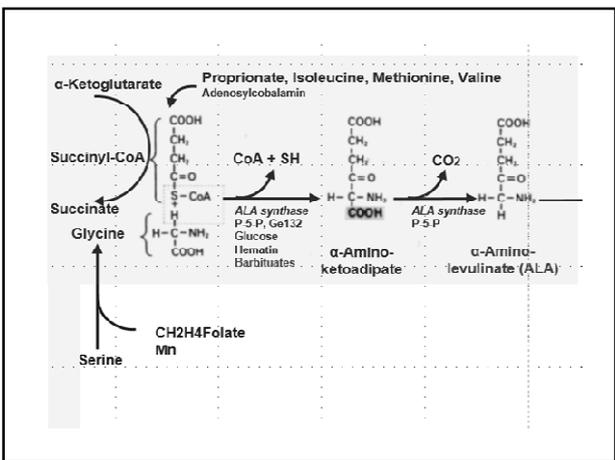
1. PBG to Protoporphyrin IX

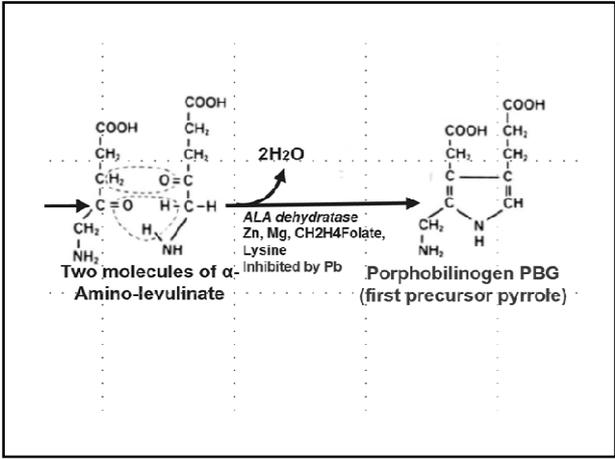
Porphyrin and Heme Synthesis

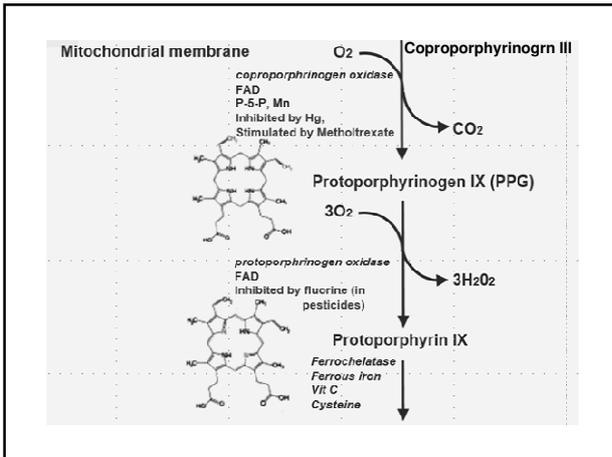
The diagram illustrates the metabolic pathway from glycine to heme. Key steps include:

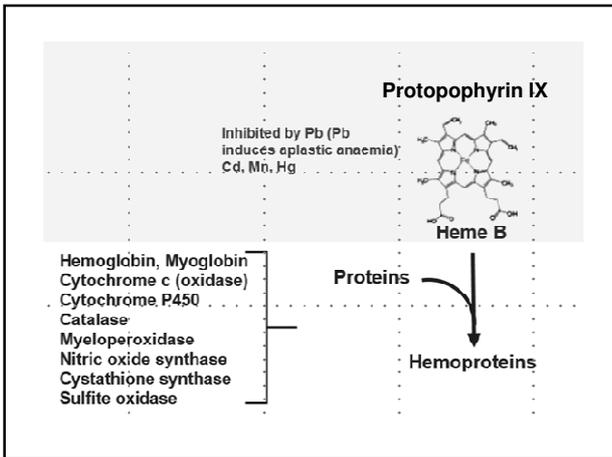
- Glycine + Succinyl-CoA → ALA (ALA synthase, P-S-P, Ge132, Glucose, Isoniazid, Barbiturates)
- ALA → Porphobilinogen (ALA synthase, P-S-P)
- Porphobilinogen → Hydroxymethylbilan → Uroporphyrinogen III
- Uroporphyrinogen III → Coproporphyrinogen III
- Coproporphyrinogen III → Protoporphyrin IX
- Protoporphyrin IX + Fe²⁺ → Heme

 Inhibitors and cofactors are indicated: Lead (Pb) inhibits the first step; Mercury (Hg) and Cadmium (Cd) inhibit the conversion of HMB to UPG; Fluorine (F) inhibits the conversion of PBG to Protoporphyrin IX. Cofactors include Methylcobalamin (MeCbl), Adenosine (Ado), and Photosensibilizer (P).









Heme dependant enzymes

Hemoglobin – Carries Oxygen in red blood cells

Myoglobin – Stores Oxygen in muscle fibres

Catalase - Reduces H₂O₂ to water

Cyclo-oxygenase – Synthesizes PgE1, PgE2 and PgE3

Cystathionine synthase – Converts Homocysteine to Cysteine

Cytochrome C – Transfers electrons from Complex III to Complex IV

Cytochrome C oxidase – Transfers electrons in Complex IV to Oxygen

Cytochrome p450 - Detoxifies endogenous and exogenous chemicals

Myeloperoxidase – Synthesises Hypochlorite from H₂O₂

Nitric oxide synthase – Synthesises Nitric oxide from Arginine

Peroxisomes – Reduce H₂O₂ to water

Sulfite oxidase – Synthesises Sulfate from Cysteine sulphite

9

F

Fluorine

Fluorine (F) 9

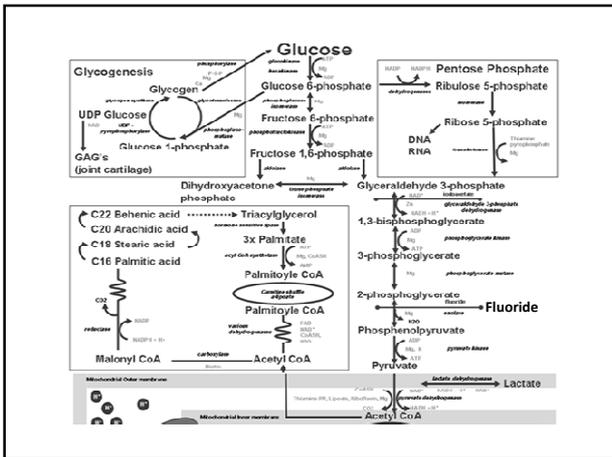
- Halogen family
- Chemically very similar to iodine
- Displaces iodine in thyroid gland
- Added to drinking water 1ppm
- Foods, medications, chemicals
- Accumulates in body

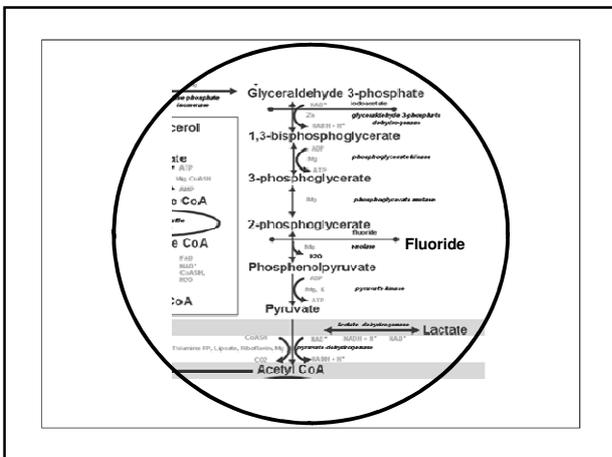
Fluorine (F) 9

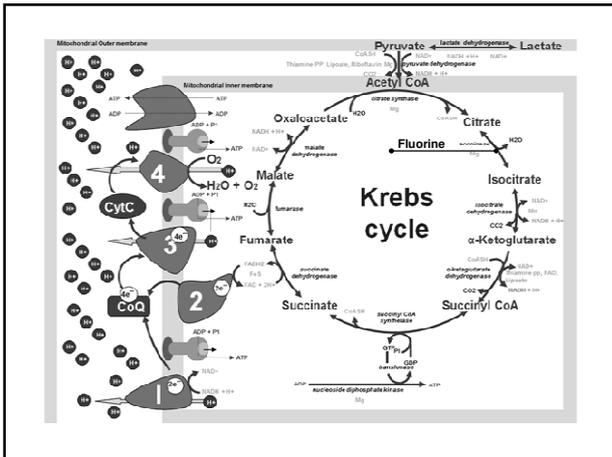
- Slows down the production of T3 and T4 by interfering with the enzymes
- Inhibits the secretion of TSH
- Competes with TSH for receptor sites on the thyroid gland

Fluorine (F) 9 - Sources

- Drinking water
- Toothpaste. Higher in Sensodyne toothpaste
- Tea – accumulates more fluoride that any other edible plant
- Fluoride pesticides
- Soft/carbonated drinks
- Medication eg SSRI Prozac







Biomarker for Fluoride toxicity and maybe requirement. The teeth require calcium hydroxyfluoroapatite for their enamel.

Products
Calcium fluoride 100ml
Calcium phosphate 100ml

Fluoride catalyzes the diffusion of calcium and phosphate into the tooth surface, which in turn remineralizes the crystalline structures in a dental cavity. The remineralized tooth surfaces contain fluoridated hydroxyapatite and fluorapatite.





Aluminium (Al) 13

- Most widely distributed metal on the planet
- Cookware, soft drink cans, foil, deodorant
- Processed and frozen food packaging

Aluminium (Al) 13

- Antacids, aspirin, vaccine, flour, table salt
- Accumulates in kidney, liver, lungs, thyroid where it competes with calcium for absorption and can affect skeletal mineralisation
- Targets CNS. Brain disease.

Aluminium (Al) 13

- **Linked to degenerative brain diseases such as Alzheimer's**
- **Accumulates with age leading to elderly cognitive impairment**
- **Autopsy study found elderly to have 20+ times more than middle aged group**

Aluminium (Al) 13

- **Agency for Toxic Substances and Disease states Al is one of the metals to affect neurological system**
- **Mining, factory, welding. Vapours in a super absorption state – to blood, bones, brain**

Aluminium

Salt in tap water as a deflocculant and softener.
Antacid, Anti-inflammatory, antidiarrhoeal medication.
Aluminium silicates in medications.
All foods wrapped with aluminium foil. Oxo cubes.
Insides of milk and fruit juice cartons.
Aluminium take-away cartons.
Aluminium food, soft drinks and beer cans.
Squeazy tubes such as tomato paste.
Baking powder, Self raising flour, Salt and certain food additives.
Naturally high levels in Tea, spearmint and peppermint teas, tea bags, instant coffee, Spinach and Potatoes.
Processed cheese.
Deodorants, antiperspirants, skin lotions, make-ups, douches, toothpaste.
Saucepans, frying pans, kettles, baking sheets.

Antacids containing Aluminium

Aluminium combines with phosphorus and calcium preventing optimal absorption. Aluminium can be absorbed into bones leading to osteomalacia.

Look also for other sources of aluminium such as cans and pans.



Chlorine (Cl) 17 - Sources

- **Water purification, swimming pools, disinfectants and bleach**
- **Depletes P-5-P, inhibits pathway to make P-5-P**
- **Paper production, paints, plastics and solvents**
- **Most cancer patients weaken to Chlorine.**

28

Ni

Nickel

Nickel (Ni) 28

- Dental metal in crowns, bridges, dentures, inlays, implants
- Metals in combination in dental alloys
- Used to be gold, silver, platinum, palladium, copper
- Now nickel, chrome - cheaper

Nickel (Ni) 28

- Faraday's law – dissimilar metals corrode when in contact
- Different alloys in mouth – different dentists and times
- Same alloy – different amounts of each metal, not evenly mixed

Nickel (Ni) 28

- Orthodontics may contain Ni
- In contact with saliva, acidic fluids and temperature change – the UK Bristol Dental Hospital warns of corrosion and ingestion

Nickel (Ni) 28

- NY University School of Medicine found increased risk of lung cancer, CV, neurological problems, development in children, high Bp
- Free radicals lead to oxidative damage

Nickel (Ni) 28

- Damages kidney and liver
- University of California have linked Ni to breast cancer. Binds to oestrogen receptors
- Can damage reproductive health, infertility, miscarriage, birth defects, nervous system defects

Nickel (Ni) 28

- Jewellery – nickel plating gives a shiny look
- Silver and gold contain varying amounts of nickel
- Study in Saudi Arabia “Ni induced cytotoxicity, oxidative stress and apoptosis negated by antioxidant curcumin”

Nickel

Sunflower seeds, Licorice, Hydrogenated oils, Peanut butter, Vegetable shortenings. Rolled oats. 7% Stainless steel. Watch straps and glasses frames. Non silver or gold jewellery such as earrings. Dental fillings and retainers. Cooking utensils and cappucino machines. Nickel / cadmium batteries. Cosmetics and permanent waves. Tobacco smoke, industrial exposure and ceramics. Superphosphate fertilizers.



Symptoms of Arsenic Poisoning

- **Initial – headaches, confusion, severe diarrhea, drowsiness**
- **Convulsions and fingernail pigmentation (leukonychia striata – Mees' lines)**
- **Acute – diarrhea, vomiting, vomiting blood,**

Symptoms of Arsenic Poisoning

- **Blood in the urine, cramping muscles, hair loss, stomach pain and more convulsions**
- **Final result is coma and death**
- **The acute minimal lethal dose in adults is between 70 to 200mg or 1 mg/kg/day**

Symptoms of Arsenic Poisoning

- **Inorganic arsenites (arsenic III) in drinking water have a much higher acute toxicity than organic arsenates (arsenic(V))**
- **Chronic arsenic poisoning results from drinking contaminated well water over a long period of time**

Symptoms of Arsenic Poisoning

- Many aquifers contain high concentrations of arsenic salts

Sources of Arsenic

- In Asia it is still a popular pesticide. Inorganic rice particularly brown
- Rice is susceptible to accumulation of As from the soil
- Found in commercially grown chicken due to the feed

Sources of Arsenic

- Feed additives roxarsone and nitarsone which are used to control the parasitic infection coccidiosis and to increase weight and skin colouring of the poultry
- In 2015 high levels found in 83 Californian wines

Sources of Arsenic

- **Seafood.** The current biological exposure index for U.S. workers of 35 ug/L total urinary arsenic may easily be exceeded by a healthy person eating a seafood meal

Sources of Arsenic

- **Drinking water.** Varying amounts can be present in water
- **Occurs naturally at low levels in many groundwater sources as a result from leaching from certain types of sedentary rock**
- **In certain areas background**

Sources of Arsenic

- **levels are higher because of the type of rock through which the raw water passes**
- **In 2004 based on WHO advice the EU tightened limit to 10ug/L, 5 times lower than previous standard**

Inorganic arsenic trioxide found in ground water particularly affects voltage-gated potassium channels, disrupting cellular electrolytic function resulting in neurological disturbances -

cardiovascular episodes such as prolonged QT interval, neutropenia, high blood pressure, central nervous system dysfunction, anemia, and death.

Tobacco plants essentially take up arsenic naturally present in the soil. Also, in the past, the potential for elevated arsenic exposure was much greater when tobacco plants used to be treated with lead arsenate insecticide.

With the enzyme inhibited, the energy system of the cell is disrupted resulting in a cellular apoptosis episode. Biochemically, arsenic prevents the use of thiamine resulting in a clinical picture resembling thiamine deficiency.

By competing with phosphate it uncouples oxidative phosphorylation, thus inhibiting energy-linked reduction of NAD⁺, mitochondrial respiration, and ATP synthesis.

Poisoning with arsenic can raise lactate levels and lead to lactic acidosis.

Chronic exposure is related to vitamin A deficiency which is related to heart disease and night blindness.

As & Cardiovascular disease

- **Vascular endothelial dysfunction as it inactivates nitric oxide synthase, leading to a reduction in the generation and bioavailability of nitric oxide, causing vasodilation problems**
- **Induces high oxidative stress affects the function of CVS**

As & Cardiovascular disease

- **Induce atherosclerosis by increasing the platelet aggregation and reducing fibrinolysis**
- **Can cause arrhythmia by accelerating the cellular calcium overload**

As & Cardiovascular disease

- **Low potassium levels in the cells increases the risk of experiencing a life-threatening heart rhythm problem from arsenic trioxide**

As & Inflammation

- **As in cells stimulates the production of hydrogen peroxide (H₂O₂)**
- **When H₂O₂ reacts with certain metals like iron and copper it produces the highly reactive hydroxyl radical**

As & Inflammation

- **Chronic exposure upregulates the expression of tumour necrosis factor- α , interleukin-1, vascular cell adhesion molecule and vascular endothelial growth factor – all of which induce CV pathogenesis**

Chelation

Dimercaprol and dimercaptosuccinic acid are chelating agents that sequester the arsenic away from blood proteins and are used in treating acute arsenic poisoning. The most important side effect is hypertension.

Nutrition

Supplemental potassium decreases the risk of experiencing a life-threatening heart rhythm problem from arsenic trioxide.

A-Lipoic acid is the principle natural chelator.

Taurine + Colloidal silver, silica, ornithine, sulphur, selenium





Cadmium (Cd) 48

- **Exposure through plant derived food, phosphate fertilisers, batteries**
- **Component of cigarettes – every cigarette involves 1.4 mcg reducing antioxidant activity**
- **Can increase the thickness of the basal membrane of capillaries, reducing circulation**

Cadmium (Cd) 48

- Sources – Liver, Kidney, Shellfish, Agriculture sludge used as a fertilizer

Cadmium (Cd) 48

- In women disrupts uterine circulation leading to premature birth or foetal deformities, size
- US EPA – impact – reproductive, pulmonary, kidneys, eyes, brain, prostate, testosterone, bone and dopaminergic in young

Cadmium (Cd) 48

- Hypertension
- Reduces glutathione peroxidase, SOD and Catalase.
- Affects the mitochondria at Complex IV.
- Lung and prostate cancer and sarcomas.

Cadmium (Cd) 48

- **Carcinogen and linked to pancreatic cancer**
- **Detrimental effect on CNS Decreased attention & memory. Induces neuron cell death**
- **Induces calcium excretion especially when Vitamin D levels are low.**

Toxic metals disrupt the thyroid

- **Cadmium blocks the action of selenium and zinc and depletes levels in the body. So with cadmium toxicity supplement with zinc, selenium and cobalt (Vitamin B12)**
- **These are required for conversion of T4 to T3**
- **Lead suppresses conversion of T4 to T3**

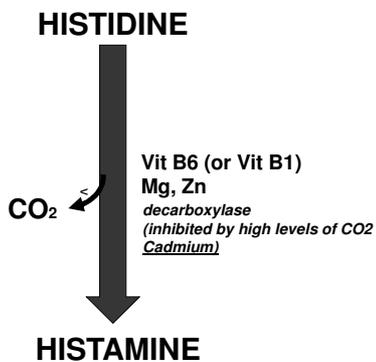
Cadmium inhibits decarboxylase enzymes
e.g. Histamine decarboxylase
L.DOPA decarboxylase
Tryptamine decarboxylase

Cadmium inhibits the secretion of gastrin.

Gastrin is a peptide hormone that stimulates secretion of gastric acid (HCl) by the parietal cells of the stomach and aids in gastric motility.

It is released by G cells in the pyloric antrum of the stomach, duodenum, and the pancreas.

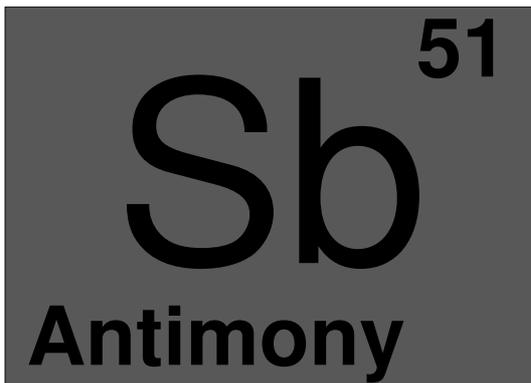
It mediates the release of histamine which in turn stimulates the parietal cells to secrete H⁺ ions.



Cadmium and enzymes

- Cadmium inhibits decarboxylase enzymes (P5P)
- L. DOPA to Dopamine
- 5HTP to Serotonin
- Histidine to Histamine





Antimony (Sb) 51

- Naturally occur as ore deposit or as a white powder
- Mica – mineral powder foundation and make up
- Flame retardant – toys, car seat covers, kids' clothing, uniform for fire fighters
- Brake pads on heavy vehicles

Antimony (Sb) 51

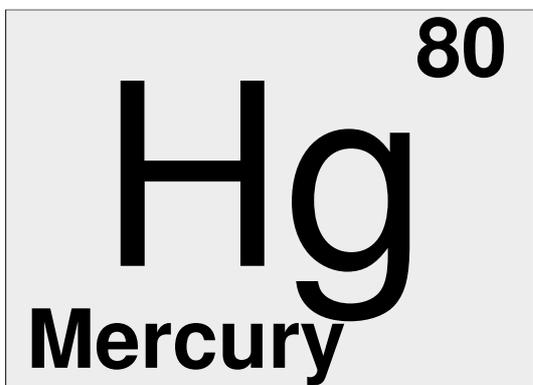


- EPA and EU have standards for drinking water. But in UK need to be careful of drinking juice concentrates. Discovered levels exceeding tap water requirements

Antimony (Sb) 51

- Mail online 2010. "Fruit juice cancer warning as scientists discover harmful chemical in 16 drinks"
- Sb can leak from plastic bottles into water. California law 2009 test for Sb in water





Mercury spectroscopy

absorption



emission



Mercury (Hg) 80

- Only liquid metal at room temperature. Emits very toxic fumes
- Accumulates in fish, particularly large fish like tuna
- Inoculation with vaccines
- Dental amalgams



Mercury (Hg) 80

- Amalgams in the mouth with other dental metals react and cause up to 10 times more mercury to be released
- An alloy on top of an amalgam drives the Hg through the nerves of teeth directly to brain

Mercury (Hg) 80 - Neurological

- Vapour emitted during the life of the amalgam. Goes into the lungs and deposited in brain and vital organs
- In Multiple Sclerosis and Parkinson's, high levels found in CSF

Mercury (Hg) 80 - Neurological

- Autism Research Institute convinced that mercury is the prime cause
- Prof Boyd Haley shown that autistic children lack the mechanism for excreting Hg
- Vaccines deliver a dose 64 times

Mercury (Hg) 80 - Neurological

- Greater than the adult allowed exposure
- Hg from mother's amalgams passing through the umbilical cord
- Hg in breast milk

Mercury (Hg) 80 – Learning

- Hg stored in the foetus and concentrated in mother’s milk
- If mother drinks alcohol the amount of mercury deposited in the foetus increases
- Reduces intelligence, learning ability and risk of hyperactivity

Mercury (Hg) 80 – Alzheimer’s

- High levels found in brains of Alzheimer’s patients
- Rats and monkeys given same amount of Hg show same changes in brain
- Remedy Acetyl-L-carnitine. Made from methionine. Hg depletes methionine in body

Mercury (Hg) 80 – Alzheimer’s

- APOE4 – 2 arginine molecules instead of cysteine. Cysteine gives protection against Hg
- Prof Boyd Haley “Mercury poisoning bears all the diagnostic hallmarks of Alzheimer’s disease”

Mercury (Hg) – Mental conditions

- Psychosis discovered in children of 12 years – selenium remedy
- Anxiety and depression
- Obsessive compulsive behaviour
- Memory loss
- Decreased self confidence

Mercury (Hg) – Mental conditions

- Inability to comprehend or accept new ideas
- Sleep disturbances
- Eye problems
- tremor

Mercury (Hg) 80 – Dentists

- In tests dentists who worked with Hg compared to those who did not
- Reduced hand co-ordination
- Reduced concentration
- Reduced memory
- Reduced intelligence

Mercury (Hg) 80 – The Gut

- Hg lodges in the gut
- Alters gut bacteria because Hg is so toxic only certain bacteria can survive
- Leads to growth of unwanted organisms causing gut inflammation and leaky gut

Mercury (Hg) 80 – The Gut

- Food leaks out and reacts with the immune system causing multiple allergies
- This increases body's acidity which reduces the resistance to Hg overall. Reduced nutrition.
- Vicious circle leading to MCDs

Mercury (Hg) 80 – The Gut

- Hg causes the bacteria in the gut to become antibiotic resistant
- These pass on the resistance not only to their offspring but to other species of bacteria
- Antibiotic resistant bacteria is an ever increasing problem

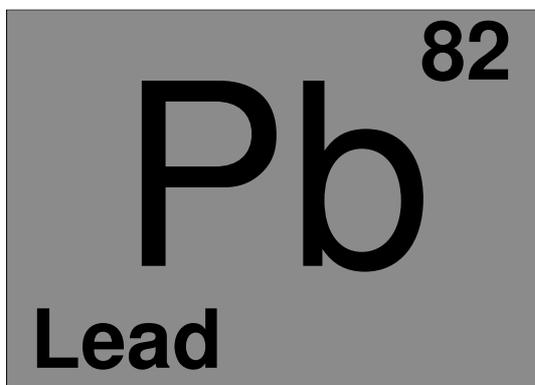
Toxic metals disrupt the thyroid

- Mercury – reduces production of T4 and inhibits conversion of T4 to T3
- Selenium antagonist and selenium is required by enzyme that converts T4 to T3

Mercury

Dental amalgams. Vaccines
High fructose corn syrup
Sanitary towels, Cotton balls and buds, Dental floss,
Toothpicks, Paints, Explosives, Batteries,
Mercurial diuretics, Fungicides, Laxatives containing
camomel, Hemorrhoid suppositories,
Fluorescent lamps, Cosmetics, Hair dyes. Fibreglass,
Manufacture and delivery of petroleum. Sewage
sludge.
Methylmercury chlorine bleaches. Fabric softeners,
Polishes, wood preservers, Latex, Solvents, Plastics,
Inks used by printers and tattooists, some Paints
Salt, Fish from contaminated water such as tuna





Lead spectroscopy

absorption



emission



Lead (Pb) 82

- Lead based paint banned – older buildings
- Banned form petrol but still in aviation fuel
- Soil contaminant as will not decay, not biodegradable. Root crops in particular. Chickens.



Lead (Pb) 82

- One study looked at accumulation in bones and noted higher concentrations in elderly linked to cognitive decline
- Associated with learning difficulties in children, lower IQ, hearing loss

Lead (Pb) 82

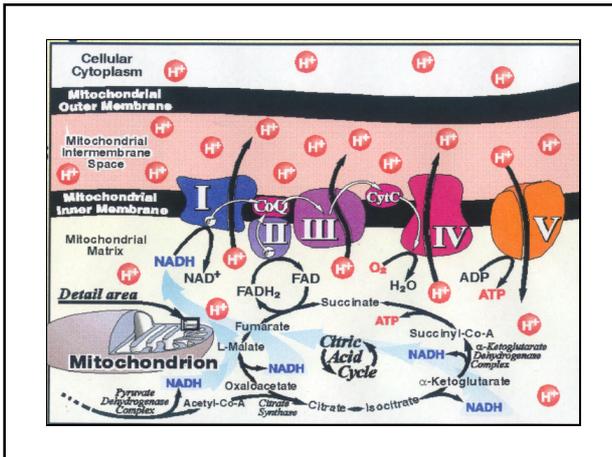
- Pb interacts with glutathione, glutathione peroxidase and selenium so blocking our antioxidant defence mechanism
- Blocks the porphyrin pathway so inhibiting production of heme
- Lead suppresses conversion of T4 to T3

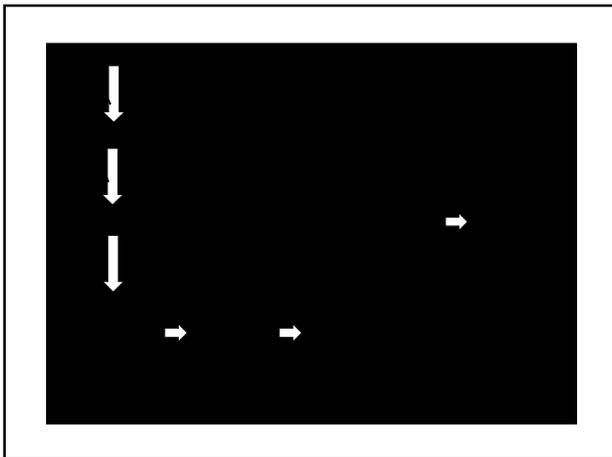
Lead (Pb) 82

- Causes spasm in smooth muscles of digestive system leading to abdominal pain
- Causes hyper tension
- Renal impairment
- Changes in cell membrane of red blood cells leading to hemolysis

Lead (Pb) 82

- Cysteine maybe good chelator along with selenium, turmeric.





Lead inhibits Glycine to ALA, ALA to PPG, Protoporphyrin IX to Heme

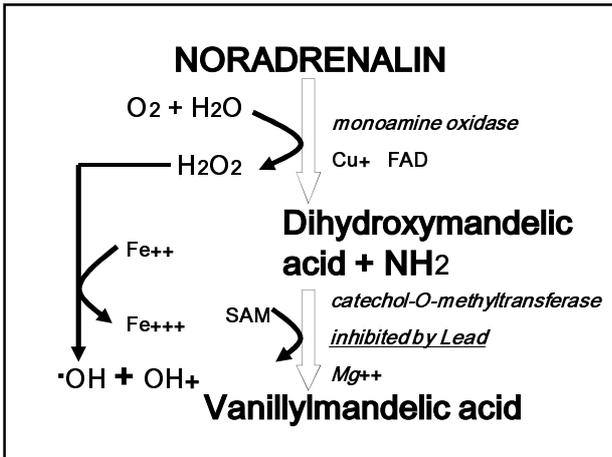
Mercury inhibits HMB to UPG, CPG to PPG, Protoporphyrin XI to Heme

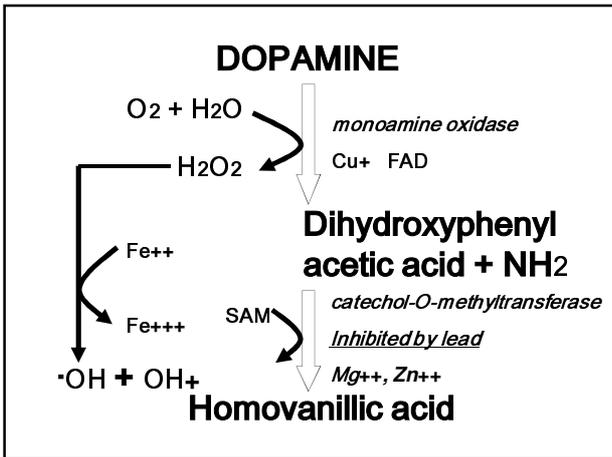
Cadmium inhibits HMB to UPG, Protoporphyrin XI to Heme

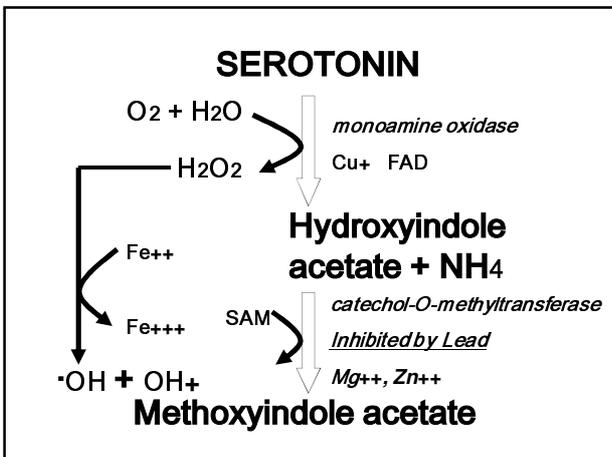
Fluorine inhibits PBG to Protoporphyrin XI

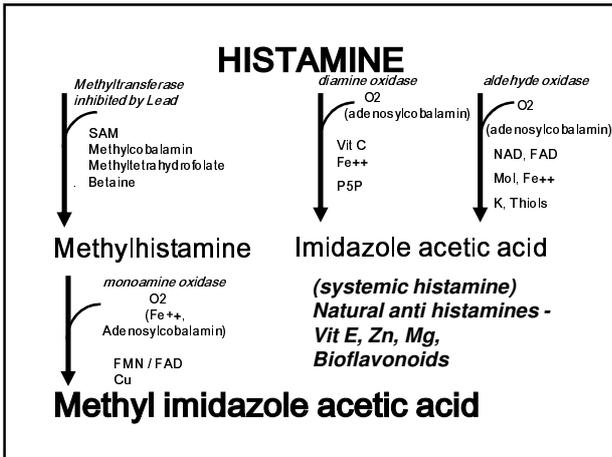
Porphyrin and Hemoglobin Synthesis

Inhibition of Glycine to ALA
Inhibition of ALA to PPG
Inhibition of HMB to UPG
Inhibition of CPG to PPG
Inhibition of HMB to UPG
Inhibition of Protoporphyrin XI to Heme
Inhibition of PBG to Protoporphyrin XI





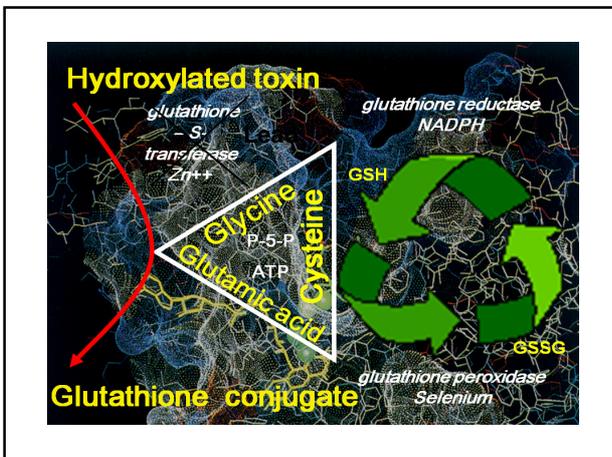


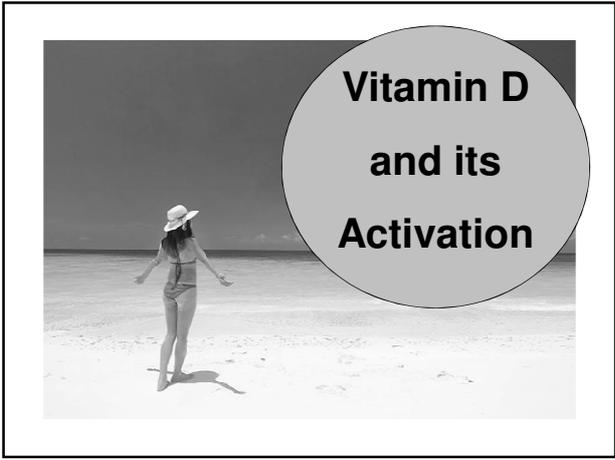


Glutathione conjugation (cysteine, glycine and glutamic acid) is catalyzed by glutathione-S-transferase.

This enzyme is present mostly in the cell cytosol.

This enzyme is inhibited by Lead





Health claim opens door for vitamin D immune products for children

By Elliot Bear 05-Sep-2015 Post a comment
Last updated on 05-Sep-2015 at 14:49 GMT

There are already claims substantiated around bone health, which are more or less known by consumers – but the immunity part is not really known, for children or adults. [VitaminDCharisAJA](#)

Related tags: vit-d-nutrition, health claim, europa, vitamin d, immune system, children, law, infants, commission, europe, supplements, nutrition, vitamins, immunity, nutrients

New health claims for vitamin D's immune-system benefits for children have been passed into EU law, creating new opportunities for promoting vitamin D consumption according to VAB-nutrition.

First hard evidence vitamin D reduces asthma attacks: Cochrane review

By Annie-Rose Harrison-Dunn Post a comment
05-Sep-2016
Last updated on 04-Sep-2016 at 12:19 GMT

"To our knowledge this is the first hard evidence showing that a micronutrient can reduce risk of asthma attacks," says researcher. [6350ckk3ia0201](#)

Related tags: Asthma attacks, Vitamin D, Supplements, Asthma, Medication Review, Research, Deficiency, Children, Adults, Respiratory, Infections, Pharmaceutical, Medical, Hospital, Lung, Public health, Cochrane, Vitamins

Taking vitamin D supplements alongside standard asthma medication reduces severe asthma attacks, a Cochrane review of nine studies has concluded.

BHF call for more vitamin D research to back heart health benefits

By Shane Stirling
07-Apr-2016
Last updated on 07-Apr-2016 at 17:23 GMT



BHF: "A much bigger study over a longer period of time is now needed to determine whether these changes in children translate into long-term health benefits and longer lives for the children and their parents."

Related tags: Heart health, Cardiovascular, Vitamin D, Supplementation, Food supplements, Bone health, NICE, Immune, Calcium

The British Heart Foundation (BHF) says recently published data linking vitamin D food supplements and heart health is encouraging but calls for more research before giving its full support.

Low vitamin D levels associated with higher cancer risk, study warns

By Viki Lili
08-Apr-2016
Last updated on 08-Apr-2016 at 13:00 GMT



Findings from this analysis could help to shape national guidelines by placing vitamin D status as a key prevention tool.

Related tags: Lappe, Grassroots, Vitamin D, Cancer, Cohort, 25-hydroxyvitamin D, Cardiovascular

Lower levels of vitamin D have been linked with a higher risk of cancer, researchers have found.

Low vitamin D during pregnancy linked with learning disabilities: Study

By Viki Lili
24-Aug-2016
Last updated on 24-Aug-2016 at 18:20 GMT



The research team highlighted a lack of sunlight in the UK during the first three months of the year as the most plausible explanation for their findings.

Related tags: Vitamin D, United Kingdom, Children, Pregnancy, Sunlight, Folate, Food, Supplements, Season, Foetus, NICE

Lower levels of vitamin D in pregnant women could be associated with certain learning disabilities in children, as a British study highlights seasonal variations as a factor in brain development.

Writing in the *American Journal of Epidemiology*, the research team found that 8.9% of children conceived between January and March had learning disabilities. This compared to 7.6% of children conceived between July and September.

Annual viral outbreaks & fluctuations in vitamin D could explain seasonal association of celiac disease

By Elizabeth Crawford  23-Aug-2016 Post a comment
Last updated on 23-Aug-2016 at 16:59 GMT



Related tags: Celiac disease, Vitamin D, Flu

Epidemics of seasonal viral infections, such as the flu, or seasonal fluctuations in mothers' vitamin D levels, could explain why celiac disease is strongly associated with children's season of birth and shed light on what triggers the autoimmune disorder, suggests new research published in the Archives of Disease in Childhood.

Vitamin D pills improve insulin measures in healthy adults: RCT

By Steffen Daniels  13-Aug-2016



Related tags: Vitamin D, Insulin resistance, Blood glucose, Supplementation

Supplements of vitamin D may improve fasting glucose levels and insulin resistance in healthy Japanese adults, says a new study.



Data from a double-blind, randomized, placebo-controlled trial indicated that long-term supplementation with 400 IU of vitamin D per day was associated with 3.0 mg/dL decreases in mean glucose concentrations, while no changes were observed in the placebo group.

Targeted intervention boosts Irish athletes' vitamin D levels

By Elliot Beer  22-Aug-2016 Post a comment
Last updated on 22-Aug-2016 at 14:14 GMT



The Dublin Institute of Technology has helped cut deficiency rates according to a new study.

Related tags: Vitamin D, Athletes

Targeted vitamin D supplementation of elite Irish athletes, prompted by research showing high deficiency levels five years ago, has helped cut deficiency rates according to a new study.

A study of Irish athletes in 2010¹ showed 55% of subjects had vitamin D insufficiency or deficiency – a common problem in Ireland due to its northerly latitude and climate. In the wake of the above, the Irish Institute of Sport instituted a new vitamin D monitoring and supplementation regime, providing supplements to athletes with the advice of the vitamin manufactured by the body when exposed to sunlight.

Source: The Latest Comments

Is vitamin D deficiency highly prevalent among elite athletes?

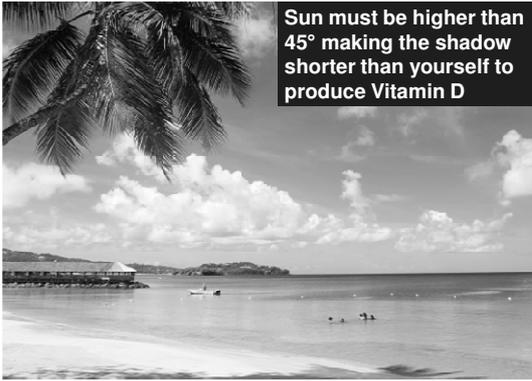
By Stephen Daniels MD
15-Aug-2016

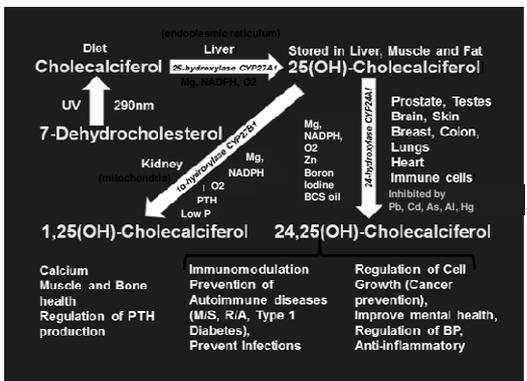


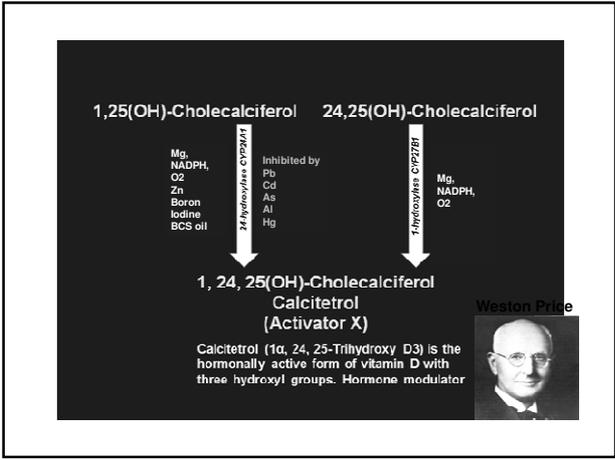
© Stock Peter Bernik
Rommel Laga, Netherlands Olympic Committee. Elite athletes, Vitamin D, Athletes, Insufficiency, Deficiency, Supplementation

Almost 70% of elite Dutch athletes may be vitamin D insufficient or deficient, says a new study from the Netherlands Olympic Committee and DSM.

SPORTSnutrition
November 2016 | Health | Endurance
While the study was limited to highly trained Dutch athletes, the findings are in line with earlier studies from the UK and USA which found that only 40 to 65% of the athletes have adequate levels of 25-hydroxyvitamin D (25(OH)D), the non-active 'storage' form of the vitamin in the body.







Applied Kinesiology Challenges From a weakness for strengthening

1. Challenge with Cholecalciferol
2. Challenge with 25 (OH) Vit D3
3. Challenge with 1.25 (OH) Vit D3
4. Challenge with 24.25 (OH) Vit D3
5. Challenge with 1.24.25 (OH) Vit D3

Precursor, where applicable will weaken a strong muscle if enzyme inhibited.

1. Cholecalciferol give Cholecalciferol in oil such as Hempseed
2. 25 (OH) Cholecalciferol give Cholecalciferol in Black cumin seed oil
3. 1.25 (OH) Cholecalciferol give Cholecalciferol in Black cumin seed oil

4. 24.25 (OH) Cholecalciferol give Cholecalciferol in Black cumin seed oil

5. 1.24.25 (OH) Cholecalciferol give Cholecalciferol in Black cumin seed oil + Vitamin K2

Consider probiotics to regenerate enzymes

Calcified deposits
Maybe due to high
1,25 OH Cholecalciferol
especially when exposed to a lot
of sunshine

Think EFAs, Magnesium, Toxic
metals

Lead inhibits

- 1. Glycine to ALA
- 2. ALA to PPG
- 3. Protoporphyrin IX to Heme

Mercury inhibits

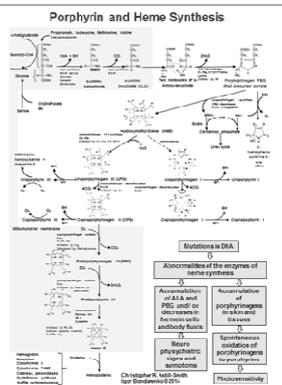
- 1. HMB to UPG
- 2. CPG to PPG
- 3. Protoporphyrin IX to Heme

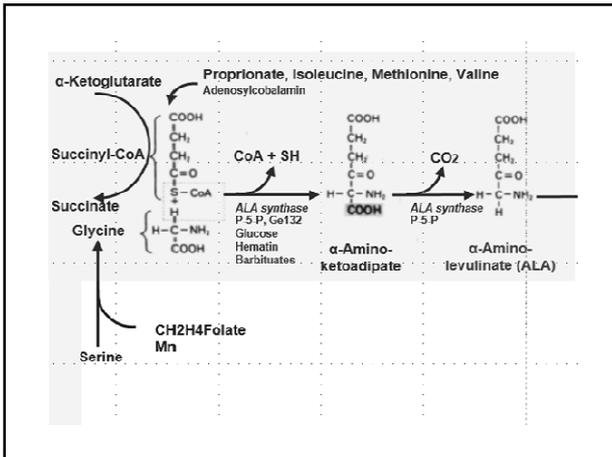
Cadmium inhibits

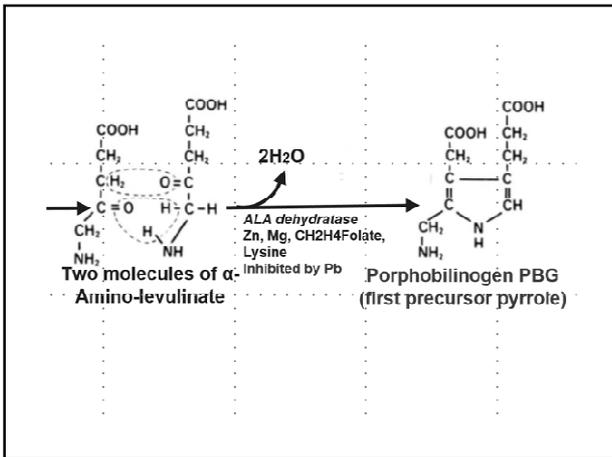
- 1. HMB to UPG
- 2. Protoporphyrin IX to Heme

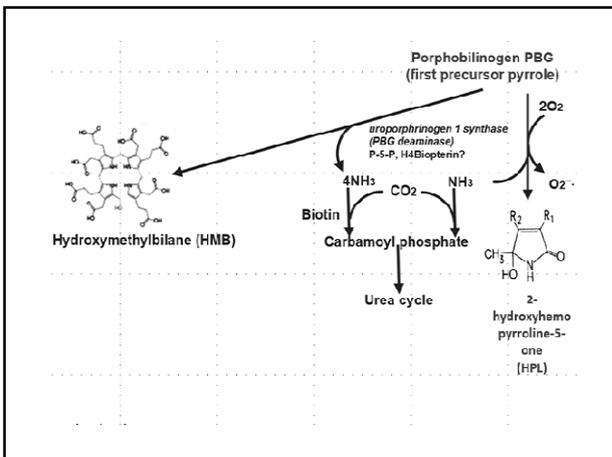
Fluorine inhibits

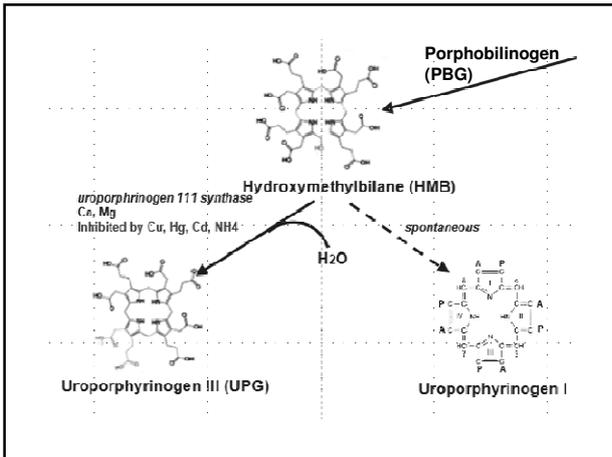
- 1. Protoporphyrinogen IX to Protoporphyrin IX

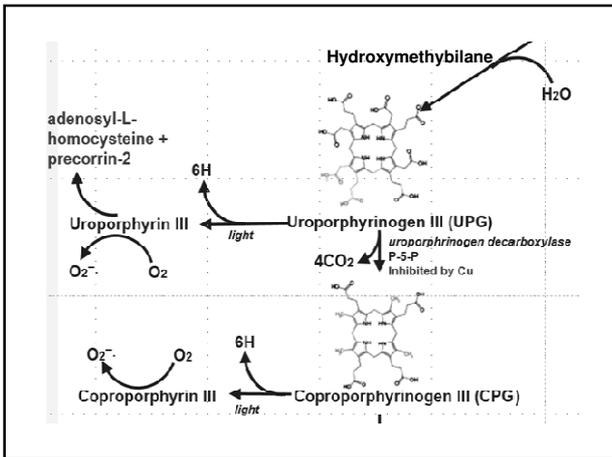


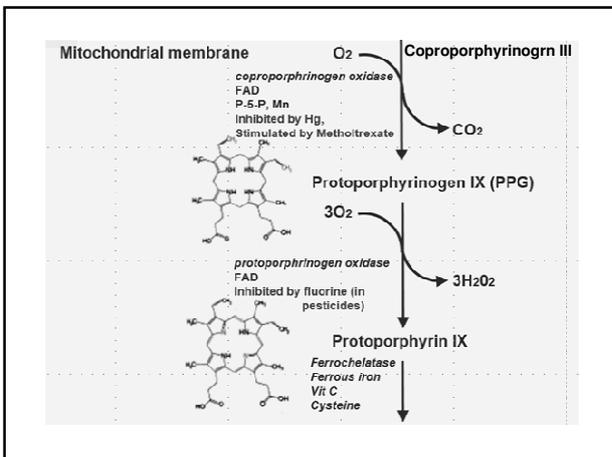


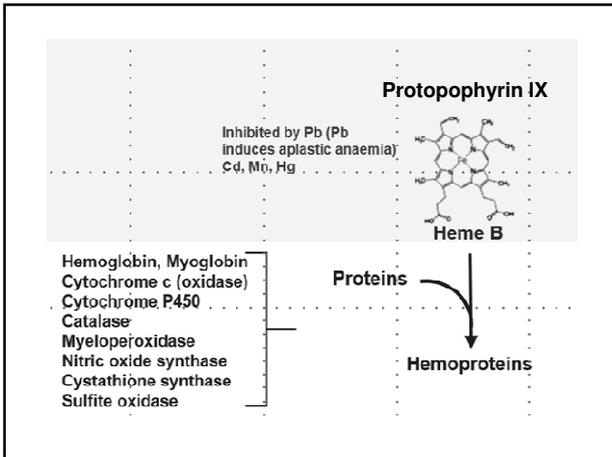






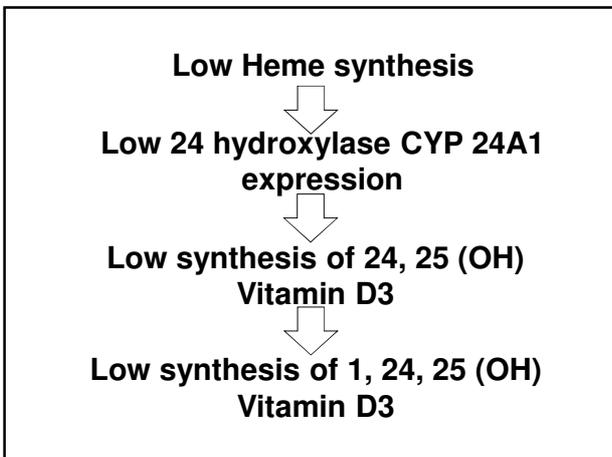






Heme dependant enzymes

- Hemoglobin – Carries Oxygen in red blood cells
- Myoglobin – Stores Oxygen in muscle fibres
- Catalase - Reduces H₂O₂ to water
- Cyclo-oxygenase – Synthesizes PgE1, PgE2 and PgE3
- Cystathionine synthase – Converts Homocysteine to Cysteine
- Cytochrome C – Transfers electrons from Complex III to Complex IV
- Cytochrome C oxidase – Transfers electrons in Complex IV to Oxygen
- Cytochrome p450 - Detoxifies endogenous and exogenous chemicals
- Myeloperoxidase – Synthesises Hypochlorite from H₂O₂
- Nitric oxide synthase – Synthesises Nitric oxide from Arginine
- Peroxidases – Reduce H₂O₂ to water
- Sulfite oxidase – Synthesises Sulfate from Cysteine sulphite



Vitamin D is not really a vitamin since it can be synthesised in the skin but more of a steroid hormone, and under most conditions that is the major source of the vitamin.

Only when sunlight exposure is inadequate is a dietary source required.

In humans, the most important compounds are vitamin D₃ (also known as cholecalciferol) and vitamin D₂ (ergocalciferol)

Its main function is in the regulation of calcium, magnesium, iron, phosphate and zinc absorption and homeostasis, NOT JUST CALCIUM. Most of its actions are mediated by of nuclear receptors that regulate gene expression.

In the liver, cholecalciferol (vitamin D₃) is converted to calcidiol, which is also known as 25-hydroxycholecalciferol, or 25-hydroxyvitamin D₃ — abbreviated.25(OH)D₃. Ergocalciferol (vitamin D₂) is converted in the liver to 25-hydroxyvitamin D₂ — abbreviated 25(OH)D₂.

These two specific vitamin D metabolites are measured in serum to determine a person's vitamin D status.

Part of the Calcidiol (25(OH)D₃) is converted by the kidneys to Calcitriol (1.25(OH)D₃) one of the biologically active form of vitamin D.

Calcitriol (1.25 OH D₃) circulates as a hormone in the blood, regulating the concentration of calcium and phosphate in the bloodstream and promoting the healthy growth and remodeling of bone. Calcitriol (1.25 OH D₃) also affects neuromuscular and immune function.

Sun exposure

- 1. 1 MED (Minimal Erythermal Dose) enough sun time to give a slight pinkness to the skin.**
- 2. Up to 20,000IU often within 30 minutes depending on skin tone.**
- 3. No lotion. SPF 15 blocks 95%, SPF 30 and above blocks 99%.**
- 4. Aim for 20mins of 40% skin exposure per day.**

**September 21st to March 21st no UVA so no Vit D produced. Solely reliant upon summer production and dietary intake.
Vitamin D slowly released from fat stores over the winter.
Sunshine Vitamin D half life is 6 weeks.**



Darker skin. More melanin = less Vitamin D production
Obesity – Vitamin D stored in adipose tissue (up to 40% more Vitamin D required)
Elderly – Partly less sun exposure and reduced skin ability to synthesise Vitamin D.

Optimal levels
2.5 nmol/l = 1ng/ml

<25nmol/L (10ng/ml) Deficient

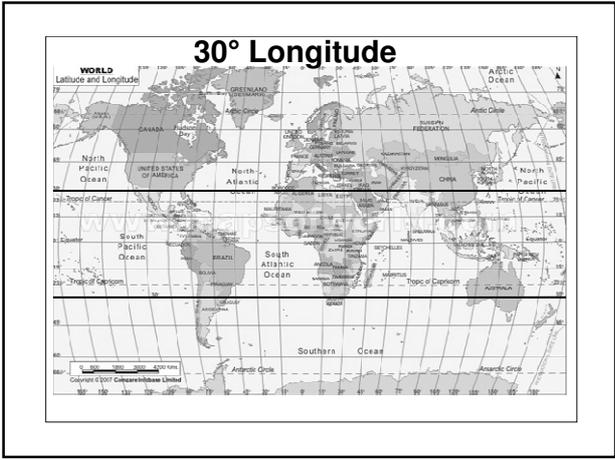
50-87.4 nmol/L (20-35ng/ml) Insufficient

125-250nmol/L (50-100ng/ml)
Optimal

45 year olds across the UK (latitude 52.4°) between 2002-2004 Using <75nmol/L as reference range.

Nearly 90% of subjects deficient in the winter.

60% of subjects deficient all year.



Common Clinical Symptoms
Low back pain
Diffuse body aches and pains
Growing pains
Tender bones on palpation
Shin pain
Depression
Fatigue
Steroid hormone imbalances

How does deficiency cause symptoms.
1. Less calcium absorbed
i) Increased PTH
ii) Release of calcium from bone
iii) Unable to mineralise collagen matrix
iv) Hydrates and expands periosteal coverings

How does deficiency cause symptoms.

2. Central hypersensitivity

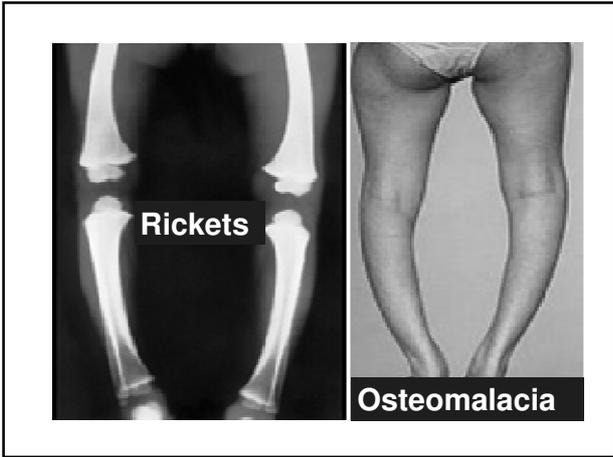
- i) Nociceptors express Vitamin D receptors**
- ii) Deficiency leads to hyper-innervation of skeletal muscle leading to muscle hypersensitivity and pain.**

How does deficiency cause symptoms.

3. Pro-inflammatory state

- i) Deficiency shown to create higher scores on Severity Scale for Somatic Symptoms (SSS)**
- ii) Vitamin D shown to reduce hs-CRP levels**

Rickets, a childhood disease, is characterized by impeded growth and soft, weak, deformed long bones that bend and bow under their weight as children start to walk. This condition is characterized by bow legs, which can be caused by calcium or phosphorus deficiency, as well as a lack of vitamin D.



Osteomalacia is a disease in adults that results from vitamin D deficiency. Characteristics of this disease are softening of the bones, leading to bending of the spine, bowing of the legs, proximal muscle weakness, bone fragility, and increased risk for fractures.

Osteomalacia reduces calcium absorption and increases calcium loss from bone, which increases the risk for bone fractures. Osteomalacia is usually present when 25-hydroxyvitamin D levels are less than about 10 ng/mL. The effects of osteomalacia are thought to contribute to chronic musculoskeletal pain.

Vitamin D toxicity is rare. The threshold for vitamin D toxicity has not been established. Vitamin D toxicity is not caused by sunlight exposure (self regulating), but can be caused by supplementing with very high doses of vitamin D.

In healthy adults, sustained intake of more than 1250 µg/day (50,000 IU) can produce overt toxicity after several months and can increase serum 25-hydroxyvitamin D levels to 150 ng/ml and greater.

Hypercalcemia is a strong indication of vitamin D toxicity, noted with an increase in urination and thirst. If hypercalcemia is not treated, it results in excess deposits of calcium in soft tissues and organs such as the kidneys, liver, and heart, resulting in pain and organ damage. Test with calcium phosphate.

Exposure to sunlight for extended periods of time does not normally cause vitamin D toxicity. Within about 20 minutes of ultraviolet exposure in light-skinned individuals the concentrations of vitamin D precursors produced in the skin reach an equilibrium, and any further vitamin D produced is degraded.

Vitamin D₃ (cholecalciferol) is produced through the action of ultraviolet irradiation (270-300nm) on its precursor 7-dehydrocholesterol. This molecule occurs naturally in the skin of animals and in milk.

Vitamin D₃ can also be made by exposing milk directly to UV (one commercial method).

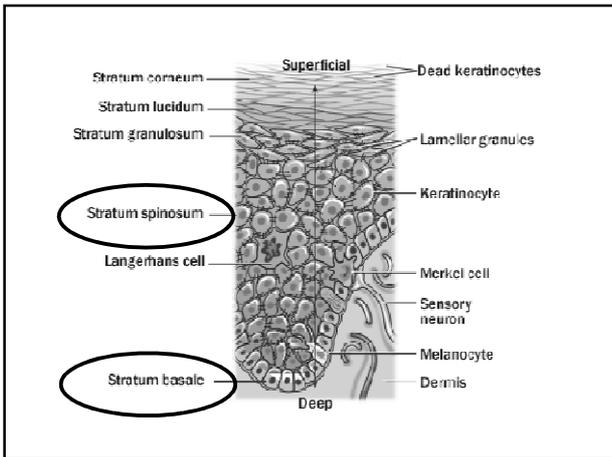
Vitamin D₃ is also found in oily fish, cod liver oil, hempseed oil and coco husks.

Vitamin D₂ is a derivative of ergosterol, which is produced by some kinds higher fungi such as mushrooms. The vitamin ergocalciferol (D₂) is produced from ergosterol, in response to UV irradiation.

The biological fate for producing 25(OH)D from vitamin D₂ is expected to be the same as for 25(OH)D₃, although some controversy exists over whether or not D₂ can fully substitute for vitamin D₃ in the human diet.

Exposure to light through windows is insufficient because glass almost completely blocks UVB light.

In the epidermal strata of the skin, production is greatest in the stratum basal and stratum spinosum.



Osteoclasts reabsorb bone

Stimulated by
Vitamin A
Parathyroid hormone
1,25 OH D3
IL1 and IL6
TNF
TGF- α

Inhibited by
Calcitonin
Estrogens
TGF- β
INF α
PgE2

Osteoblasts form bone.

Stimulated by

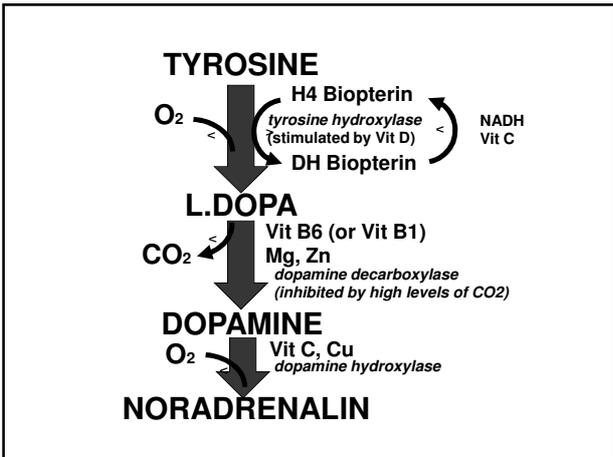
Parathyroid hormone
1,25-OH D3
T3 and T4
hGF and IGF-1
PgE2
TGF- β
Progesterone
DHEA
Testosterone
Dihydrotestosterone in women

Inhibited by

Corticosteroids

Thus, although it may initially appear paradoxical, Vitamin D is also critical for bone remodeling through its role as a potent stimulator of bone resorption. The VDR is known to be involved in cell proliferation and differentiation.

Vitamin D also affects the immune system, and VDRs are expressed in several white blood cells, including monocytes, macrophages and activated T and B cells. Vitamin D increases expression of the *tyrosine hydroxylase* gene in adrenal medullary cells.



It also is involved in the biosynthesis of

1. Neurotrophic factors
2. Synthesis of nitric oxide synthase
3. Increased glutathione levels.

Daily dosage

Age	Minimum	Maximum
0-1 year	5mcg 200IU	25mcg 1000IU
1-18 years	5mcg 200IU	100mcg 4000IU
19-50 years	5mcg 200IU	100mcg 4000IU
51-70 years	10mcg 400IU	100mcg 4000IU
70 + years	15mcg 600IU	100mcg 4000IU
Pregnancy / Lactation	45mcg 600IU	100mcg 4000IU

Hearney and Holick contend the human physiology is fine-tuned to an intake of 4,000–12,000 IU/day from sun exposure with concomitant serum 25-hydroxyvitamin D levels of 40 to 80 ng/ml (100-200 nmol/l) and this is required for optimal health.



(1 ng/ml = 2.5 nmol/l)

A serum 25-hydroxyvitamin D level of 20-50 ng/ml (150 nmol/l) is desirable for bone and overall health.

The risk of cardiovascular disease is lower when vitamin D ranged from 8-24 ng/ml (20 to 60 nmol/l).

Sources

Vitamin D2 – Mushrooms exposed to UV

Alfalfa

Cacao husks

Hemp seed

Vitamin D3 – Fish liver oil

Oily fish

Whole egg

Beef liver

Serum concentration of 25(OH)D is the best indicator of vitamin D status. It reflects vitamin D produced cutaneously and that obtained from food and supplements and has a fairly long circulating half-life of 15 days.

25(OH)D functions as a biomarker of exposure, but it is not clear to what extent 25(OH)D levels also serve as a biomarker of effect (i.e., relating to health status or outcomes).

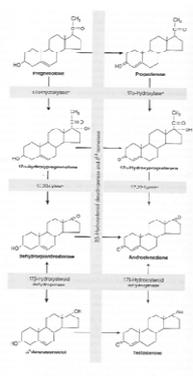
Serum 25(OH)D levels do not indicate the amount of vitamin D stored in body tissues.

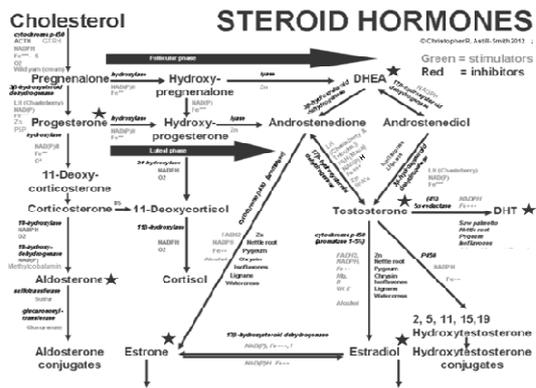
In contrast to 25(OH)D, circulating 1,25(OH)₂D is generally not a good indicator of Vitamin D status because it has a short half-life of 15 hours and serum concentrations are closely regulated by parathyroid hormone, calcium, and phosphate. Levels of 1,25(OH)₂D do not typically decrease until Vitamin D deficiency is severe.

Enzymes that are induced by Vitamin D

**Enzymes that are induced by Vitamin D
Tyrosine hydroxylase
Tryptophan hydroxylase
Cholesterol to pregnenolone
Nitric oxide synthase
Increases Glutathione levels**

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Vitamin D3 – 1.24.25 (OH) Vitamin D3

Stimulates Collagen and Elastin formation by enhancing Progesterone and Estriol (E3).



**VITAMIN K2
MENAQUINONE**

Function of K2

- Regulation of calcium
- Moves calcium into bones
- Removes calcium from arteries
- Fights osteoporosis
- Fights Coronary Heart Disease

K2 dependent enzymes

- K2 activates a protein called **Osteocalcin**, which attracts calcium into bones and teeth
- K2 activates a protein called **matrix gla protein (MGP)** which removes calcium from soft tissue like arteries and veins

K2 dependent enzymes

- K2 is the cofactor for an enzyme called **vitamin K dependent carboxylase**
- This enzyme when activated by K2 alters the structure of **osteocalcin and MGP** to allow those proteins to bind calcium

Menadione (K3)

(water soluble, most potent form but not found naturally)

Menaquinone- 4, 7 (K2)

(fat soluble, from animal tissue and synthesised by intestinal bacteria)

MK4- Synthesized in artery walls, pancreas and testes.

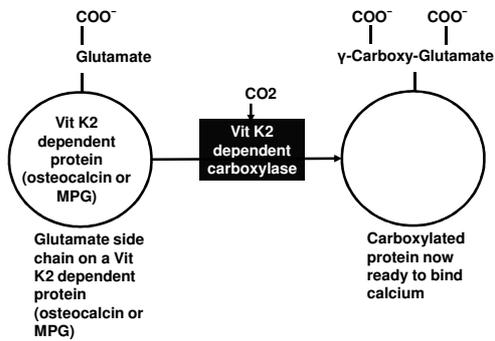


MK7 -By bacterial fermentation in the colon by B. Subtilis.

Phylloquinone (K1)

(fat soluble from plant tissue)

Gamma - carboxylation Ca^{++}



83
Bi
Bismuth

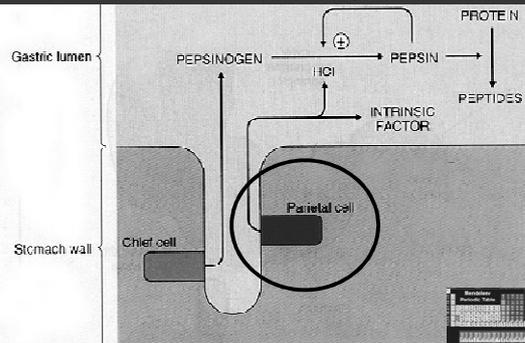
Bismuth (Bi) 83

- Bismuth subsalicylate used in over the counter medication, antacid tablets
- Bismuth oxychloride used in cosmetics, face powder
- Bismuth subgallate – to help flatulence odour

Bismuth (Bi) 83

- **Manufacture of solder, plumbers may be affected by inhaling solder fumes**
- **University of Tübingen in Germany found anaemia, reduced sperm metabolism**

Bismuth inhibits the production of HCl from the parietal cells which alongside secrete intrinsic factor. So bismuth creates B12 deficiency.

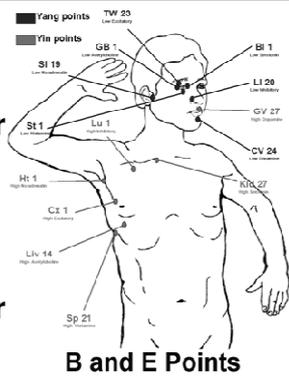


Catecholamine Bell Curve in Anxiety and Depression

Abridged from Andrew Rostenberg, DC
ICAK-USA presentation 2016

Yang points indicate neurotransmitter deficiencies.

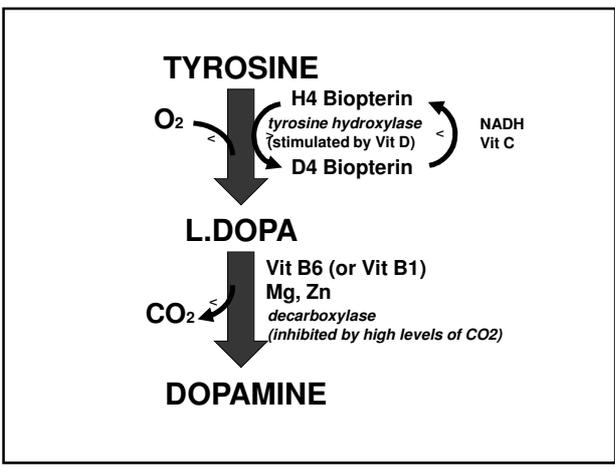
Yin points indicate neurotransmitter excesses

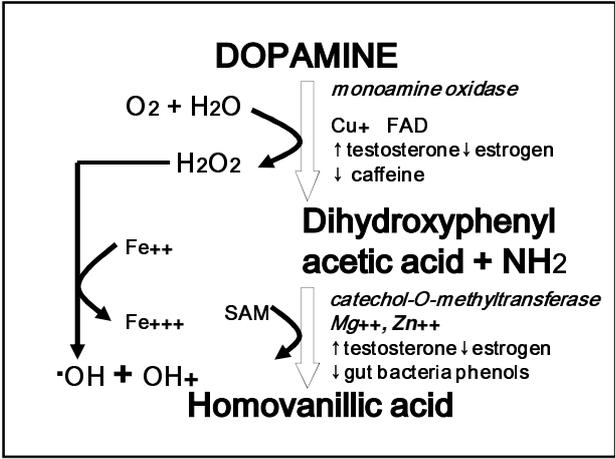


Meridians, Emotions and Neurotransmitters
BI = Shame and Humiliation = Low Serotonin
GB = Guilt and Blame = Low Acetylcholine
LI = Apathy and Despair = Low Inhibitory
CV = Grief and Regret = Low Dopamine
Kid = Fear and Anxiety = High Serotonin
GV = Craving and Desire = High Dopamine
Lung = Anger and Hate = High Inhibitory
Liv = Pride and Scorn = High Acetylcholine
TW = Neutrality and Trust = Low Excitatory
Cx = Courage and Affirmation = High Excitatory
St = Acceptance and Forgiveness = Low Histamine
Sp = Willingness and Optimism = High Histamine
SI = Reason and Understanding = Low Noradrenalin
Ht = Love and Reverence = High Noradrenalin
 (Depressive tendency Anxiety tendency)

**NORADRENALIN
 (NOREPINEPHRINE)**

DOPAMINE





HOMOVANILLIC ACID

*Glutathione (Cysteine,
Glycine, Glutamic acid)*
or
Sulfation (PAPs)
↓ gut bacteria phenols
or
*Glucuronidation (UDP
Gucuronic acid)*
or
Acetylation (Acetyl CoA)

**Conjugates excreted through
the bile or urine**

SEROTONIN

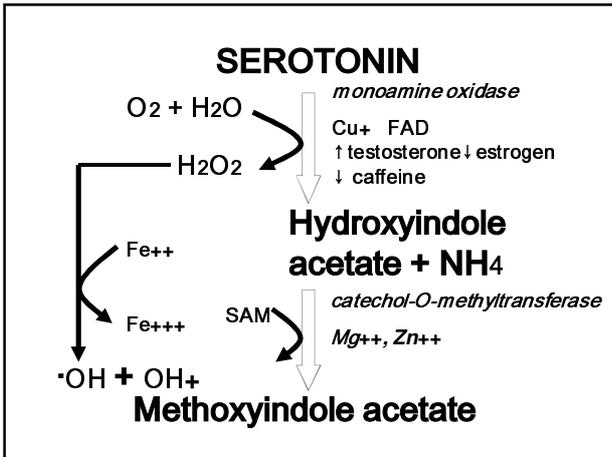
TRYPTOPHAN

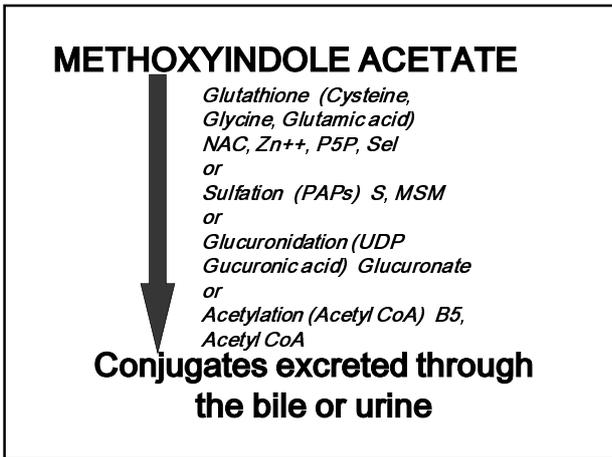
O_2 ↓ $\left(\begin{array}{l} \text{H4 Biopterin} \\ \text{tyrosine hydroxylase} \\ \text{(stimulated by Vit D)} \end{array} \right) \leftarrow \begin{array}{l} \text{NADH} \\ \text{Vit C} \end{array}$
D4 Biopterin

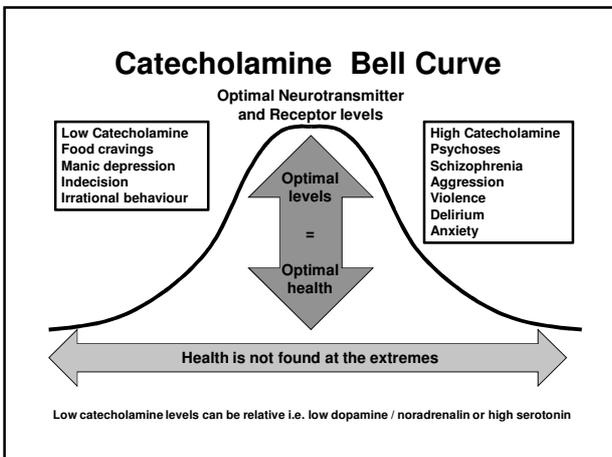
5-Hydroxytryptophan

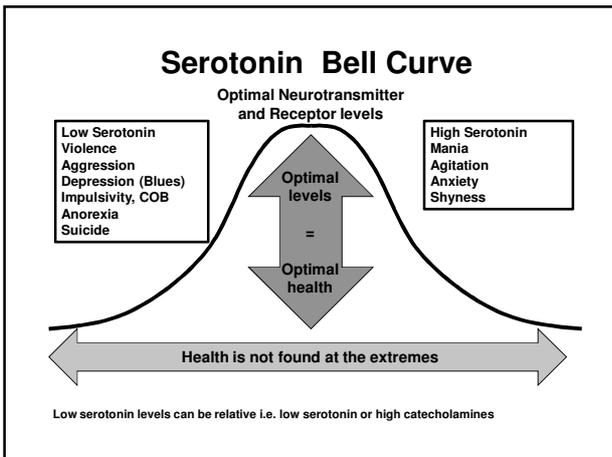
CO_2 ↓ $\left(\begin{array}{l} \text{Vit B6 (or Vit B1)} \\ \text{Mg, Zn} \\ \text{decarboxylase} \\ \text{(inhibited by high levels of } CO_2 \text{)} \end{array} \right)$

SEROTONIN





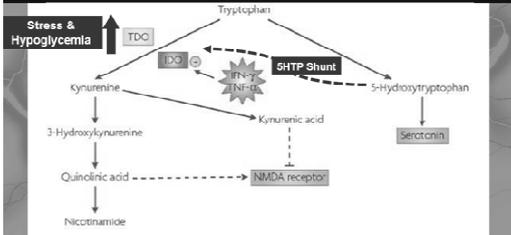




Changes in the microbiota (dysbiosis) were suggested to increase the risk of several psychiatric conditions through neurologic, metabolic, and immunologic pathways...Treatment with a single antibiotic course was associated with higher risk for depression with all antibiotic groups...The risk increased with recurrent antibiotic exposures to 1.40 (95% CI, 1.35-1.46) and 1.56 (95% CI, 1.46-1.65) for 2-5 and > 5 courses of penicillin, respectively... Recurrent antibiotic exposure is associated with increased risk for depression and anxiety but not for psychosis.
J Clin Psychiatry. 2015 Nov;76(11):1522-8. PMID: 26580313 © Rostenberg 2016

Increased intestinal permeability associated with upload of lipopolysaccharides (LPS) translocation induces depressive symptoms. Gut microbiota and probiotics alter behavior and brain neurochemistry... L. farciminis and ML-7 suppressed stress-induced hyperpermeability, endotoxemia and prevented HPA axis stress response and neuroinflammation... Leaky Gut Bacteria Causes Inflammation, Depression
© Rostenberg 2016
Psychoneuroendocrinology. 2012 Nov;37(11):1885-95. PMID: 22541937

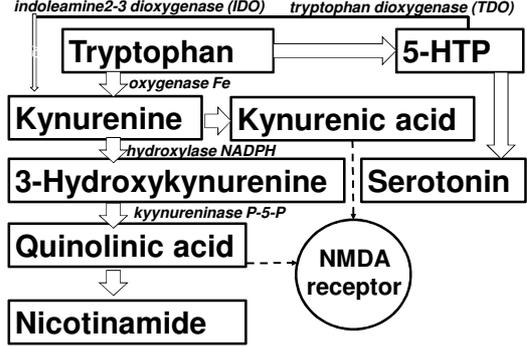
Tryptophan Steal – Shunt Towards B3 Synthesis



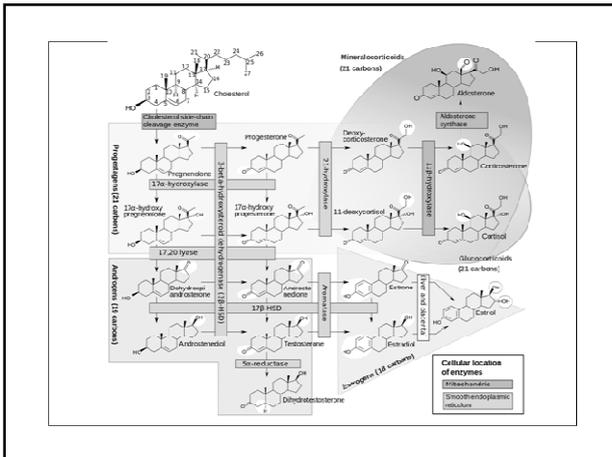
Tryptophan oxidation is catalyzed by tryptophan dioxygenase (TDO), which generates nicotinamide adenine dinucleotide (NAD) (not shown). Tryptophan oxidation can also occur extrahepatically by the enzyme indoleamine 2,3 dioxygenase (IDO)... Although tryptophan degradation by IDO is normally negligible, IDO is highly inducible by pro-inflammatory cytokines, including interferon-gamma (IFN-gamma) and tumour necrosis factor-alpha (TNF-alpha).

Nat Rev Neurosci. 2008 Jan;9(1):46-56. PMID: 18073775

Tryptophan Steal



Steroid Modulation



The 3β-HSD complex is responsible for the conversion of:

- Pregnenolone to progesterone**
- 17α-Hydroxypregnenolone to 17α-hydroxyprogesterone**
- DHEA to androstenedione**
- Androstenediol to testosterone**
- Androstadienol to androstadienone**

Co factors Zn, Fe
Co enzymes NAD(P)
Inhibitors –Cd, Hg, Mn, Lauric acid, Myristic acid, Estradiol, Genistein, Quercetin

**17 β -Hydroxysteroid
dehydrogenases**

**Note that the major reactions
catalysed (e.g., the conversion of
androstenedione to testosterone)
are in fact hydrogenation
(reduction) rather than
dehydrogenation (oxidation)
reactions.**

**Co factors Zn, Fe
Co enzymes NAD(P)H
Inhibitors – Ethanol**

**5-alpha reductase is most known
for converting testosterone, the
male sex hormone, into the more
potent dihydrotestosterone:**

Co factors - Fe
Co enzymes – NAD(P)H
Inhibitors – EFAs esp linolenic,
Zn, Green tea, Riboflavin, Reishi,
Saw palmetto
