Phonocardiography and Optimising Human Performance

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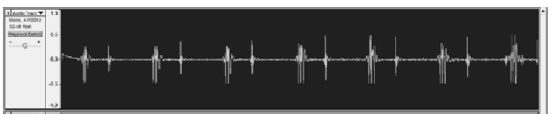
Topics to cover today

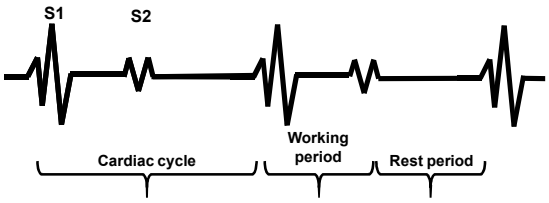
- Phonocardiography review
- Conscious / Subconscious balance
- Genotype and Phenotype meridians
- Eyes into distortion
- ATP and Hypoxia challenges
- Nutrition for energy
- Hypoxia
- Toxicity
- Infection
- Energy requirements in sport

Phonocardiography diagnostic techniques can be performed by using a digital stethoscope but similar results can be achieved by using a standard stethoscope but you just will not be able to see the cardiograph.



RED constitution people tend to have high Homocysteine levels and have APOE4 expressions.
GREEN constitutional people tend to have arteriosclerosis, angina pectoris, intermittent claudication and valvular stenosis.
BLUE constitution people tend to have arrhythmias and cardiac genetic defects and valvular regurgitation.

Normal Heart Sounds



The first sound is 2 to 3 times louder than the second. The period between the second sound and the next first sound is twice as long as the period of time between the first sound and the second. This is normal.

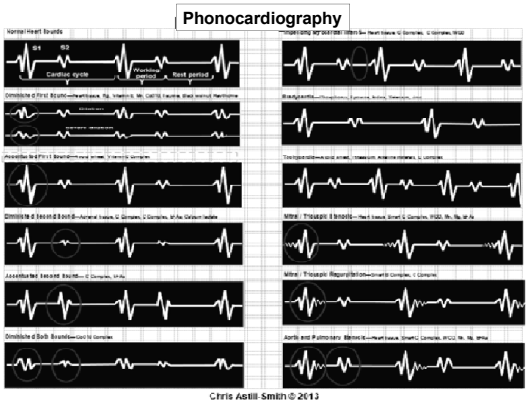
Anything different is abnormal.

Both auricular / ventricular valves must close at the same time. That closure is the first heart sound (LUB).

Pulmonary and aortic valves are closed by the blood pressure pushing back creating the second sound (DUB).

Rest period is longer as this is the period that the ventricles are opening again and should be twice as long as the closing period.

Phonocardiography



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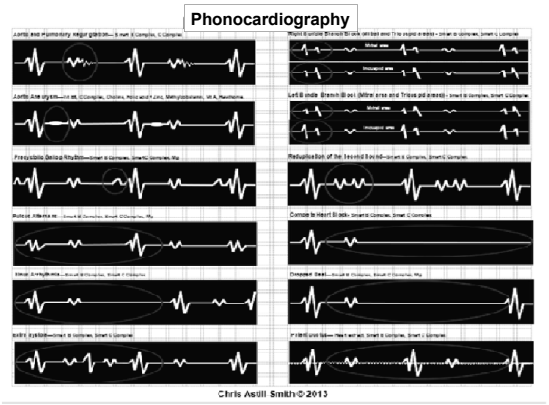
Phonocardiography



Optimising human performace depends upon optimal ATP mitochondrial production requiring

1. **Optimal nutritional**
2. **Optimal oxygen delivery**
3. **Absence of toxins**
4. **Absence of infections**
5. **Positive emotional state**

ENERGY

LIFE and HEALTH ARE DEPENDANT UPON ADEQUATE NUTRITIONAL INTAKE

AMINO ACIDS

1. **BUILD TISSUES**
2. **TRANSPORT MOLECULES**
3. **FORM ANTIBODIES**
4. **FORM ENZYMES**
5. **BUILD CHEMICAL MESSENGERS i.e. HORMONES AND NEUROTRANSMITTERS**

FATTY ACIDS

1. **FORM CELL MEMBRANES**
2. **ARE SOURCES OF ENERGY**
3. **ARE STORES OF ENERGY**
4. **PROTECT ORGANS**
5. **ACT AS ELECTRICAL AND THERMAL INSULATORS**
6. **BUILD STEROID HORMONES**

CARBOHYDRATES

1. Are a source of energy
2. Link with amino acids to form glycoproteins
3.. Link with fatty acids to form glycolipids.

VITAMINS

1. ACT AS CO-ENZYMES IN SPECIFIC ENZYME PATHWAYS
2. ACT AS ANTIOXIDANTS
3. INVOLVED WITH BLOOD CLOTTING
4. PART OF CELL MEMBRANES

Co-Enzymes

Thiamine pyrophosphate
Thiamine triphosphate
FMN – FMN H
FAD - FADH2
NAD – NADH
NADP – NADPH
CoA
Pyridoxal-5-phosphate
H4Folate
Methenyl H4 Folate
Methylene H4 Folate
Methyl H4 Folate
H4 Biopterins
Adenosylcobalamin
Methylcobalamin
Biotin

Vitamin C
Alpha Lipoic acid
SAM
CoQ10

MINERALS ACT TO

1. Supply major elements and trace elements that may be lacking in the diet.
2. Act as catalysts, thus playing a major role in metabolism and cell building.
3. Regulate the permeability of cell membranes.
4. Maintain water balance and osmotic pressure between the inside and outside environment.
5. Influence the contractility of muscles.
6. Regulate the response of nerves to stimuli.

LIFE DEPENDS UPON IONIC BALANCE TO MAINTAIN HOMEOSTASIS

IONIC BALANCE DEPEND UPON ADEQUATE NUTRIENT UPTAKE FROM IONIZED MINERALS

The daily 1500–2000 Calories recommended for a human adult are taken as a combination of oxygen and food molecules, the latter mostly carbohydrates and fats, of which glucose ($C_6H_{12}O_6$) and stearic acid ($C_{57}H_{110}O_6$) are convenient examples.

The food molecules are oxidised to carbon dioxide and water in the mitochondria

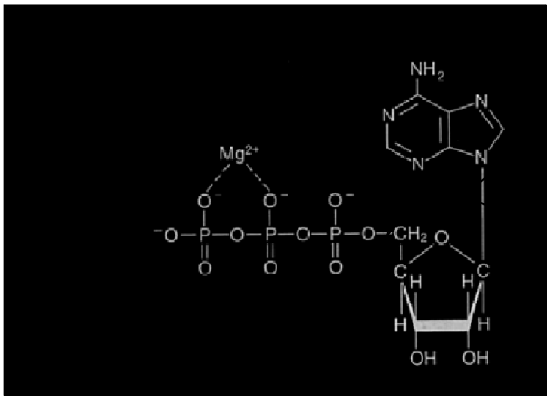
$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$
$C_{57}H_{110}O_6 + 81.5O_2 \rightarrow 57CO_2 + 55H_2O$

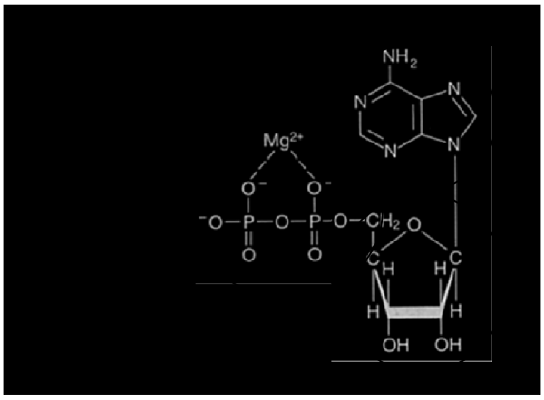
and some of the energy is used to convert ADP into ATP
ADP + HPO_4^{2-} → ATP + H_2O

The rest of the chemical energy in the carbohydrate or fat is converted into heat: the ATP is used as "energy currency", and some of the chemical energy it contains when split and reacted with water, is used for other metabolism.

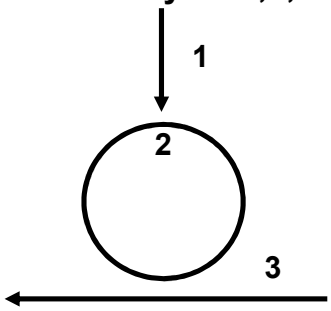
(At each stage of a metabolic pathway, some chemical energy is converted into heat).

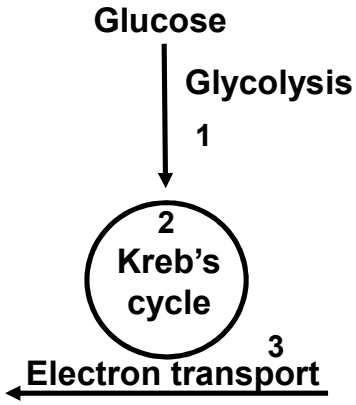
Only a tiny fraction of the original chemical energy is used for work.





Understanding energy production is as easy as 1,2,3



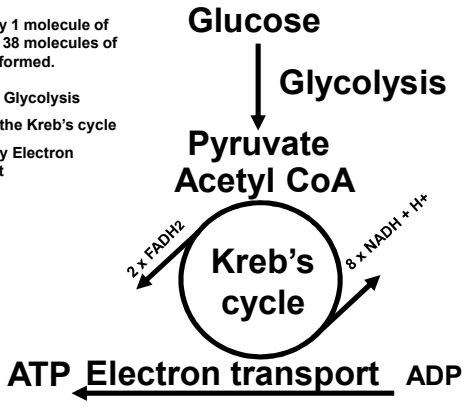


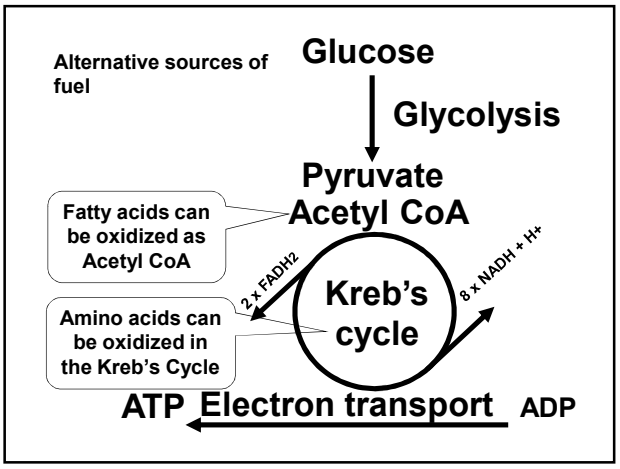
For every 1 molecule of Glucose 38 molecules of ATP are formed.

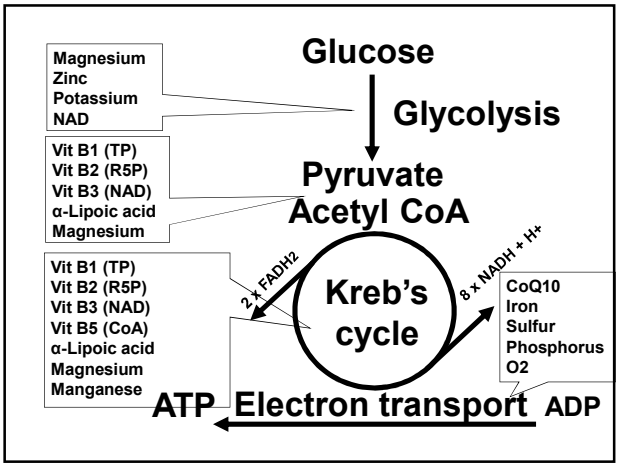
8 ATP by Glycolysis

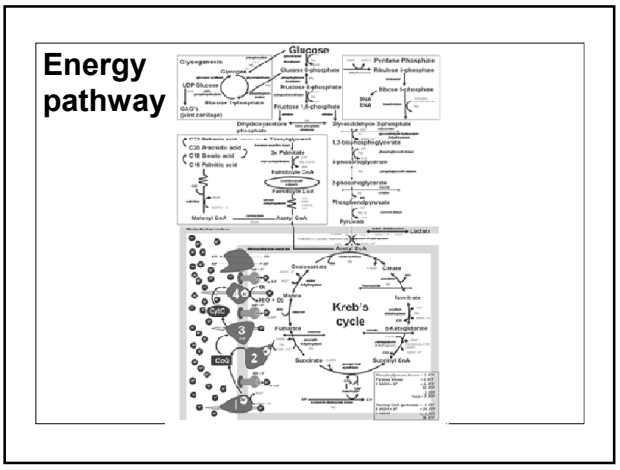
2 ATP in the Kreb's cycle

28 ATP by Electron transport

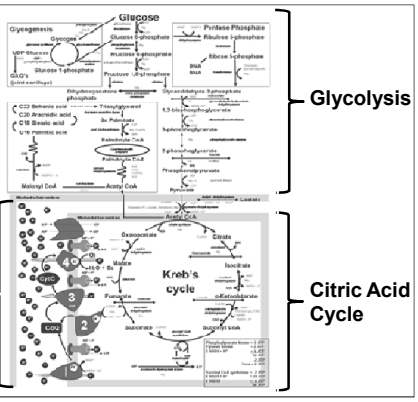



Alternative sources of fuel
Glucose
Glycolysis
Pyruvate
Acetyl CoA
Fatty acids can be oxidized as Acetyl CoA
Amino acids can be oxidized in the Kreb's Cycle
2 x FADH2
Kreb's cycle
8 x NADH + H+
ATP
Electron transport
ADP

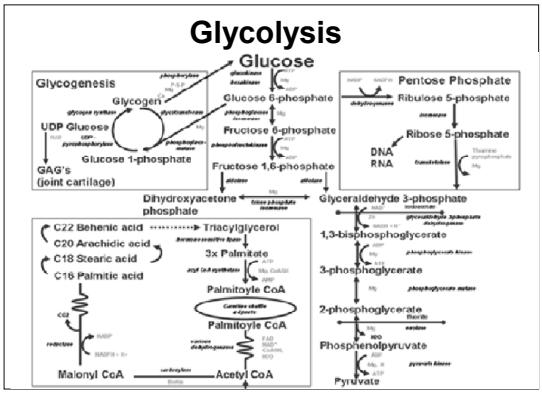

Magnesium
Zinc
Potassium
NAD
Glucose
Glycolysis
Vit B1 (TP)
Vit B2 (R5P)
Vit B3 (NAD)
α-Lipoic acid
Magnesium
Pyruvate
Acetyl CoA
Vit B1 (TP)
Vit B2 (R5P)
Vit B3 (NAD)
Vit B5 (CoA)
α-Lipoic acid
Magnesium
Manganese
2 x FADH2
Kreb's cycle
8 x NADH + H+
CoQ10
Iron
Sulfur
Phosphorus
O2
ATP
Electron transport
ADP


Energy pathway
Glucose
Kreb's cycle

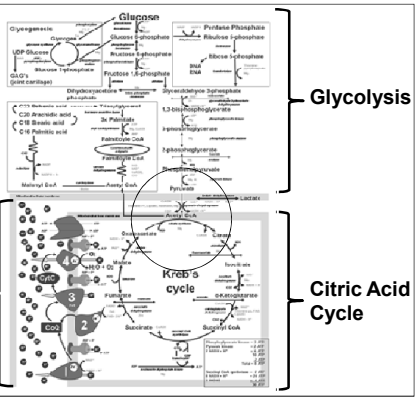
Energy pathway

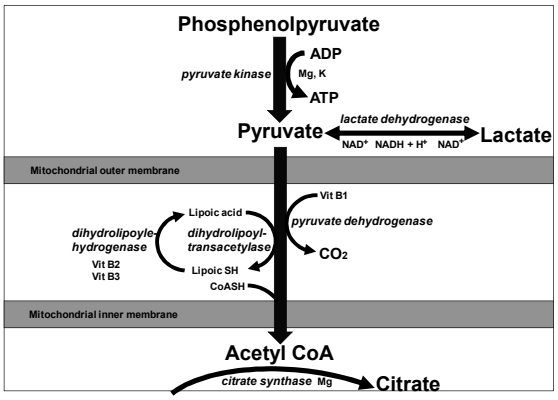


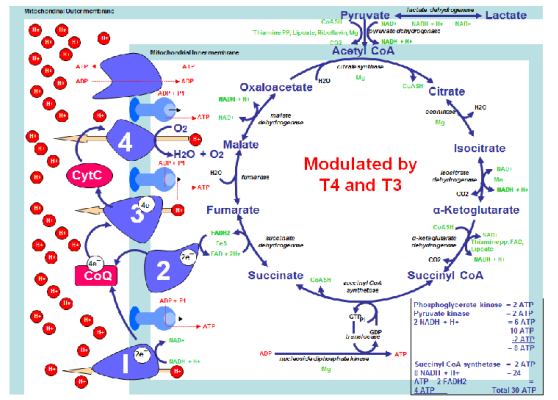
Glycolysis

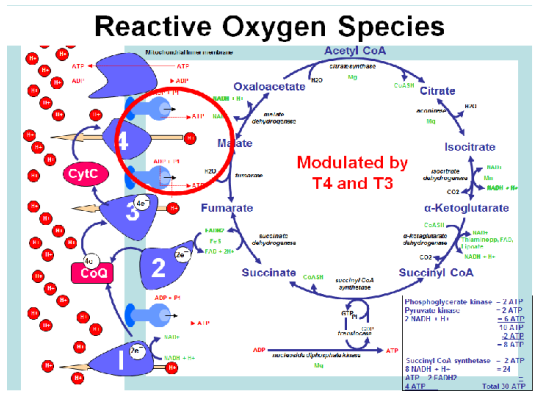


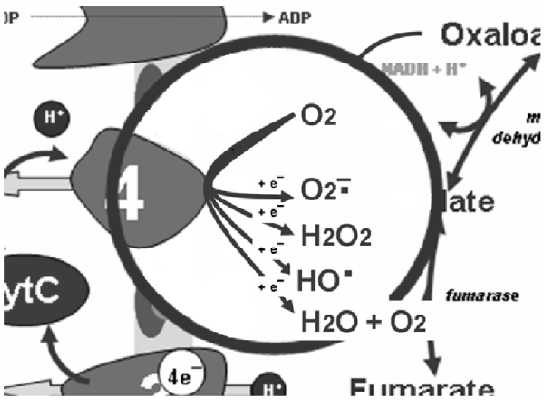
Energy pathway




Phosphenolpyruvate
pyruvate kinase
ADP
Mg, K
ATP
Pyruvate
lactate dehydrogenase
NAD+ NADH + H+ NAD+
Lactate
Mitochondrial outer membrane
Vit B1
Lipoic acid
dihydrolipoyle-hydrogenase
dihydrolipoyl-transacetylase
pyruvate dehydrogenase
CO2
Vit B2
Vit B3
Lipoic SH
CoASH
Mitochondrial inner membrane
Acetyl CoA
citrate synthase Mg
Citrate


Pyruvate
Lactate
Acetyl CoA
Oxaloacetate
Citrate
Isocitrate
Malate
Fumarate
α-Ketoglutarate
Succinate
Succinyl CoA
Modulated by
T4 and T3
CytC
CoQ
O2
H2O + O2


Reactive Oxygen Species
Acetyl CoA
Oxaloacetate
Citrate
Isocitrate
Malate
Fumarate
α-Ketoglutarate
Succinate
Succinyl CoA
Modulated by
T4 and T3
CytC
CoQ



HYPOXIA

The 10 most common medical symptoms

Fatigue
Back ache
Colds
Respiratory
Abdominal pains
Anxiety / Depression
Memory loss / Vision dysfunction
Arthritis
Skin
Chest pains

The 10 most common diseases/causes of death in 2012 per 100,000 population in the UK were:

1. **Coronary ischaemic heart disease**
2. **Cerebrovascular disease**
3. **Malignant neoplasm of trachea**
4. **Pneumonia**
4. **Diseases of pulmonary circulation**
6. **Bronchitis, emphysema and COPD**
7. **Malignant neoplasm of breast**
8. **Chronic liver disease and cirrhosis**
9. **Diabetes mellitus**
10. **Hypertensive disease**

Hypoxia is a condition in which the body or a region of the body is deprived of adequate oxygen supply.

Hypoxia may be classified as either *generalized*, affecting the whole body, or *local*, affecting a region of the body.

Symptoms
Gradual onset - Light-headedness
Numbness / tingling of extremities,
Nausea and anorexia.
Tiredness
Visual deterioration
Memory loss
Feeling the cold
Degenerative changes

Symptoms
Rapid onset - ataxia, confusion / disorientation / hallucinations / behavioural change, severe headaches / reduced level of consciousness, papilloedema, breathlessness, pallor, tachycardia and pulmonary hypertension.

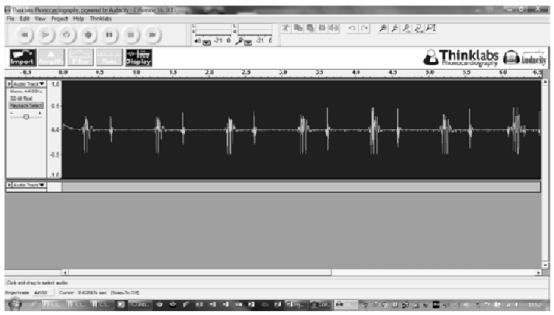
If hypoxia is very severe, a tissue may eventually gangrene. Extreme pain may also be felt at or around the site. Eventually leading to the late signs cyanosis, bradycardia / cor pulmonale and hypotension followed by death.

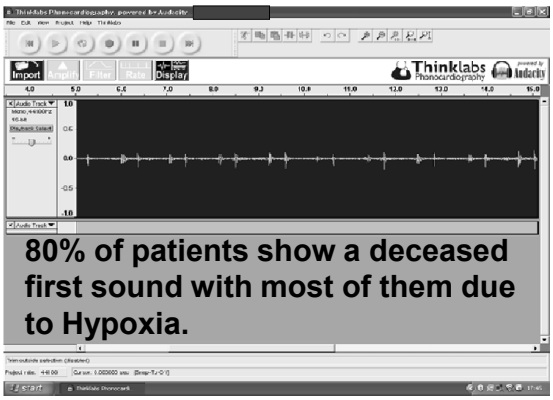
Because haemoglobin is a darker red when it is not bound to oxygen (deoxyhaemoglobin), as opposed to the rich red colour that it has when bound to oxygen (oxyhaemoglobin), when seen through the skin it has an increased tendency to reflect blue light back to the eye.

Hypoxia can result from a failure at any stage in the delivery of oxygen to cells. This can include decreased partial pressures of oxygen, problems with diffusion of oxygen in the lungs, insufficient available haemoglobin, problems with blood flow to the end tissue, and problems with breathing rhythm.

Functional Testing for Hypoxia

Phonocardiography





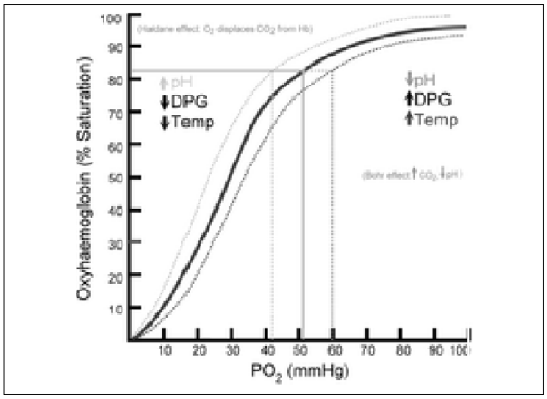
80% of patients show a deceased first sound with most of them due to Hypoxia.

Oxygen saturation is a term referring to the concentration of oxygen in the blood. The human body requires and regulates a very precise and specific balance of oxygen in the blood. Normal blood oxygen levels in humans are considered 95-100 percent. If the level is below 90 percent, it is considered hypoxia.

Blood oxygen levels below 80 percent may compromise organ function, such as the brain and heart, and should be promptly addressed. Continued low oxygen levels may lead to respiratory or cardiac arrest.

In medicine, oxygen saturation (SO_2), commonly referred to as "sats", measures the percentage of hemoglobin binding sites in the bloodstream occupied by oxygen. At low partial pressures of oxygen, most hemoglobin is deoxygenated.

At around 90% (the value varies according to the clinical context) oxygen saturation increases according to an oxygen-hemoglobin dissociation curve and approaches 100% at partial oxygen pressures of >10 kPa.



A pulse oximeter relies on the light absorption characteristics of saturated hemoglobin to give an indication of oxygen saturation.

Functional Biochemistry Testing
i) All muscles weak on testing
ii) Single muscle weakens on repeated muscle testing (aerobic challenge)
iii) Positive eyes into distortion up and down
iv) Weak muscle strengthens to Oxygen
v) Strong muscle weakens to CO_2 and / or Xanthine oxidase

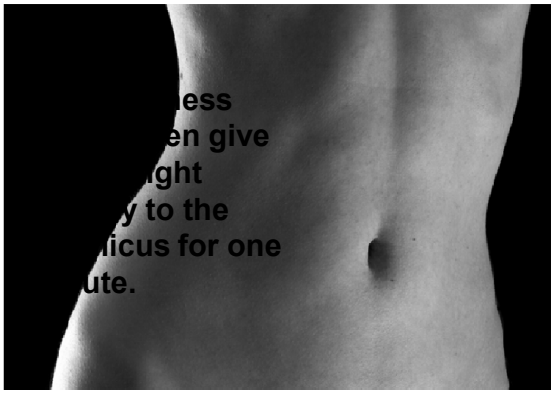
How to start examining a patient

Balancing the Conscious to the Subconscious

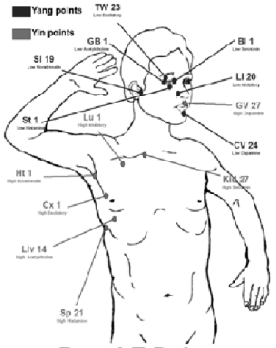
1. **Therapy localise the Conscious ESR on the frontal bones.**
2. **Then Therapy localise the Subconscious ESR on the greater wings of the sphenoid bone.**

Or

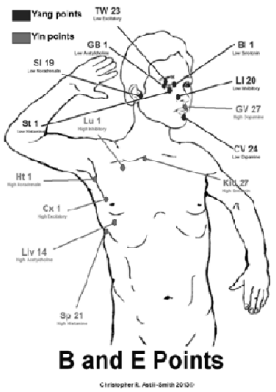
1. **Therapy localise the Subconscious ESR on the greater wings of the sphenoid bone.**
2. **Then Therapy localise the Conscious ESR on the frontal bones.**



Challenge for YANG and YIN positive B& E Points.
There will always be at least one of each.

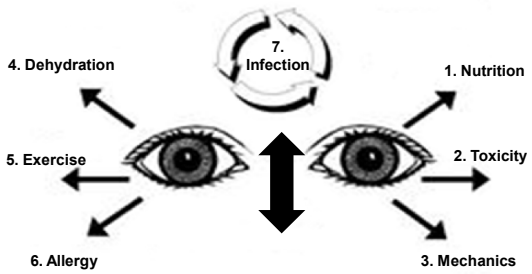


Cross Therapy Localise to find which one negates the other. The one that negates the other is the genotype. The other is the phenotype.



The genotype of a person is the inherited instructions it carries within its genetic code.
The phenotype is the composite of an person's observable characteristics such as biochemical or physiological properties resulting from the expression of the genes as well as the influence of environmental factors and the interactions between the two.

Eyes into Distortion (EID)

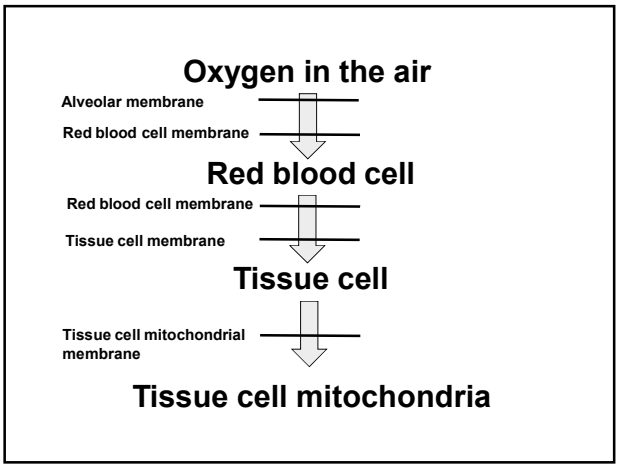


8. Hypoxia

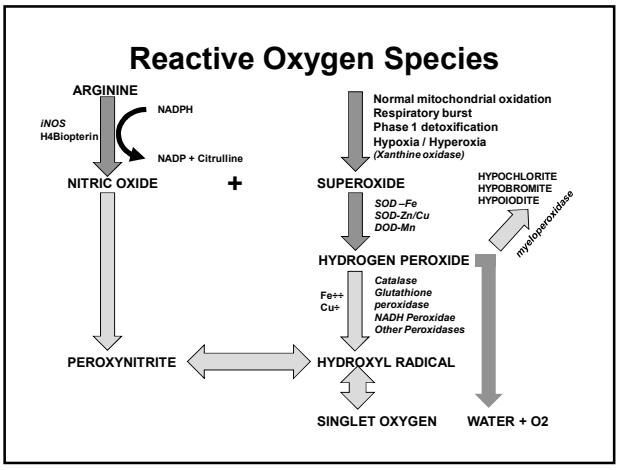
Patient Protocol for Hypoxia

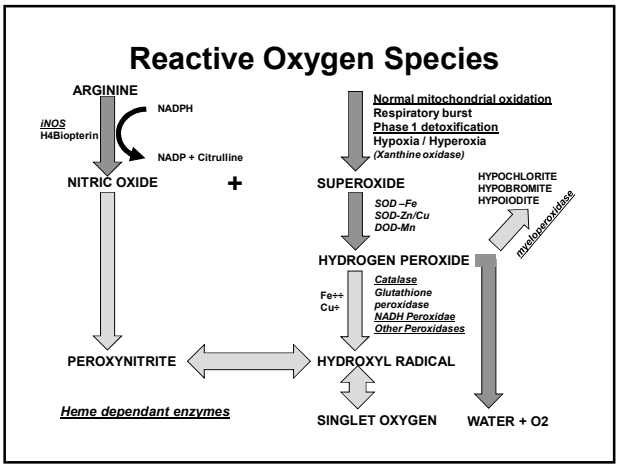
From weakness patient strengthens to HYPOXIC eye position
Confirm using OXYGEN vial to strengthen
Challenge using following vials

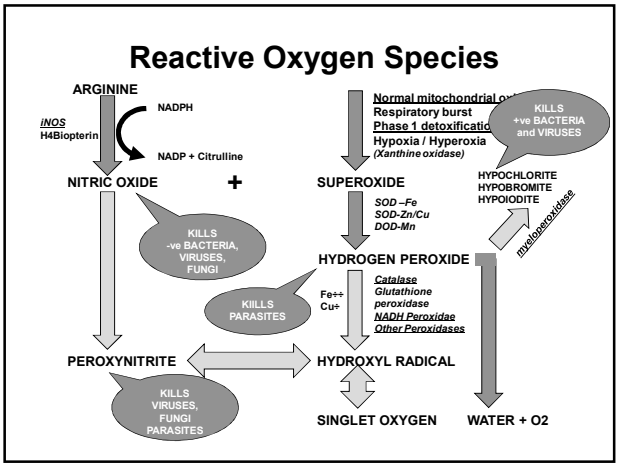
PHOSPHOLIPIDS	HEMOGLOBIN	Co-ENZYME Q10
EPO, BSO , Borage	ALA	Co-Q10 in oil
Black cumin	PBG	
Flax , Chia	UPG III	
Grape seed	CPG III	
Hazelnut, Hemp	PP IX	
Macademia		
Olive, Coconut		
Peanut		
Pumpkin		
Super Omega 3		
Walnut		
WGO		



Reactive Oxygen Species







Oxygen transport

Oxygen into the Lungs
By volume, dry air contains
78.09% nitrogen
20.95%oxygen
0.93% argon
0.039% carbon dioxide
and small amounts of other gases.
Air also contains a variable amount of water vapor, on average around 1%.

At sea level the partial pressure of oxygen (pO2) in the lungs = 21% of atmospheric pressure 760mm Hg = 160mm Hg.
At 16000ft with atmospheric pressure at 400mm Hg pO2 = 82mm Hg

Henry's Law of Solution states that the quantity of a gas going into simple solution at constant temperature is proportional to the pressure. The solubilities of oxygen, carbon dioxide and nitrogen are in the ratio of 2:50:1

Movement of gases is always from the region of high tension to a region of low tension.
Oxygen will thus pass from the lung alveoli to the blood and then to the tissues.
CO_2 tension is higher in the blood so passes from the blood to the alveoli.

Oxygen is transported in the blood in 2 ways

1. **Dissolved in the plasma = 0.3 volume %. Small but important in determining the oxygen tension gradient from the plasma to the tissues.**
2. **Combined with haemoglobin in the red cell.**

Almost all the oxygen in the blood is bound to hemoglobin, so interfering with this carrier molecule limits oxygen delivery to the periphery.

Hemoglobin increases the oxygen-carrying capacity of blood by about 40-fold,

with the ability of hemoglobin to carry oxygen influenced by the partial pressure of oxygen in the environment, a relationship described in the oxygen–haemoglobin dissociation curve. When the ability of hemoglobin to carry oxygen is interfered with, a hypoxic state can result.

At tensions above 100mm Hg the haemoglobin is fully saturated with oxygen and the dissociation curve is plotted as a percentage saturation against tension.

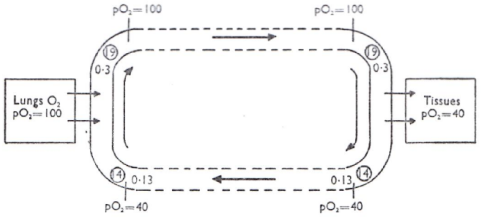
The Bohr Effect
In addition to tension and haemoglobin content, the oxygen content of the blood depends upon the CO_2 being carried simultaneously. An increase in pCO_2 from the normal value of 40mm Hg shifts the oxygen dissociation curve thus less oxygen is carried at a given tension.

Markers for Hypoxia

Strong muscle weakens to

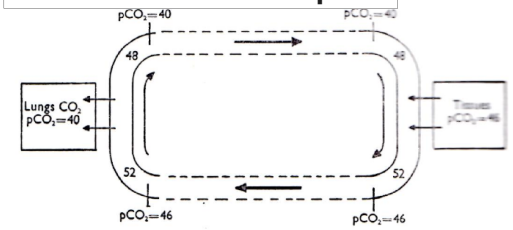
CO2
and / or
Xanthine oxidase

Oxygen transport



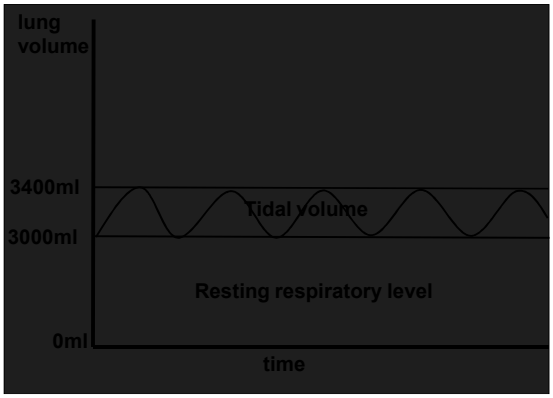
Blood leaves the lungs at an oxygen tension of 100mm Hg and returns at 40mm Hg.

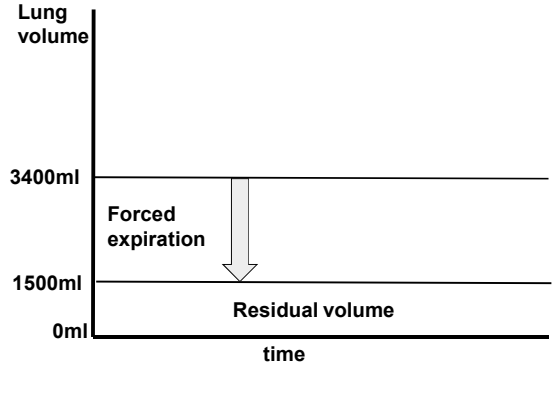
Carbon dioxide transport

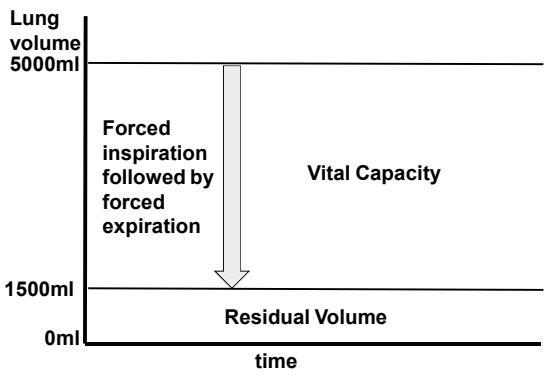


Only 4ml% is gives off in the passage through the lungs which equals the amount taken up by the tissues.

Mechanics of Breathing

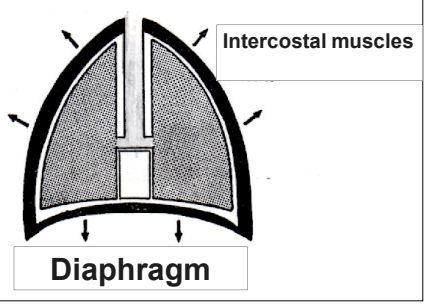






Tidal volume = 400ml
Only 250ml of this air reaches the alveoli, the last 150ml remains in the bronchial tubes and is called dead space air.

Chief muscles of breathing are the Diaphragm and the Intercostals.



Inspiration is an active process of depressing the diaphragm down wards and contracting the intercostal muscles \ moving the chest wall upwards and outwards.

Expiration is brought about by passive elastic recoil of the lungs and relaxation of the inspiratory muscles.

Mechanical Faults

1. **Cranial**
2. **Cervical spine**
3. **Thoracic spine**
4. **Diaphragm**
5. **M/S joint**
6. **Sternoclavicular joint**
7. **Acromioclavicular joint**
8. **Ribs**
9. **Lumbar spine**

Oxygen into the Blood

The alveoli are located in the respiratory zone of the lungs, at the distal termination of the alveolar ducts and atria. These air sacs are the forming and termination point of the respiratory tract. They provide total surface area of about 100 $m^{2.}$

The alveoli consist of an epithelial layer and extracellular matrix surrounded by capillaries. The alveoli contain some collagen and elastin fibres. The elastic fibres allow the alveoli to stretch as they are filled with air during inhalation. They then spring back during exhalation in order to expel the carbon dioxide-rich air.

There are three major cell types in the alveolar wall
1. Type I (Squamous Alveolar) cells that form the structure of an alveolar wall

2. Type II (Great Alveolar) cells that secrete pulmonary surfactant to lower the surface tension of water and allows the membrane to separate, therefore increasing its capability to exchange gases.

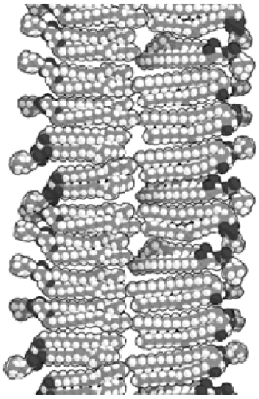
3. Macrophages that destroy foreign material, such as bacteria.

Re-inflation of the alveoli following exhalation is made easier by pulmonary surfactant, which is a phospholipid and protein mixture that reduces surface tension in the thin fluid coating within all alveoli. The fluid coating is produced by the body in order to facilitate the transfer of gases between blood and alveolar air.

Plasma membranes consist of both lipids and proteins. The fundamental structure of the membrane is the phospholipid bilayer, which forms a stable barrier between two aqueous compartments. In the case of the plasma membrane, these compartments are the inside and the outside of the cell.

Plasma membranes of human cells contain four major phospholipids
1. Phosphatidylcholine,
2. Phosphatidylethanolamine
3. Phosphatidylserine,
4. Sphingomyelin
which together account for more than half of the lipid in most membranes.

These phospholipids in human red blood cells are asymmetrically distributed between the two halves of the membrane bilayer.



The outer leaflet consists mainly of phosphatidylcholine, sphingomyelin and glycolipids

Where as phosphatidylethanolamine and phosphatidylserine are the predominant phospholipids of the inner leaflet.

A fifth phospholipid, phosphatidylinositol, is also localized to the inner half of the plasma membrane.

Although phosphatidylinositol is a quantitatively minor membrane component, it plays an important role in cell signalling.

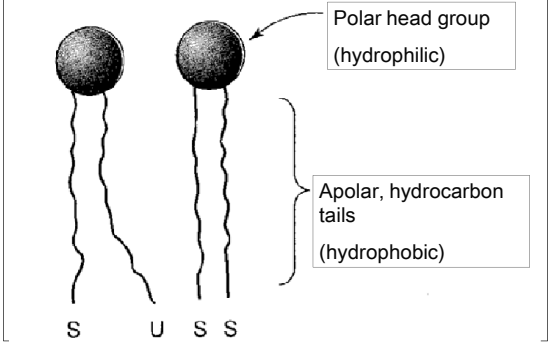
The head groups of both phosphatidylserine and phosphatidylinositol are negatively charged, so their predominance in the inner leaflet results in a net negative charge on the cytosolic face of the plasma membrane.

In addition to the phospholipids, the plasma membranes of animal cellscontain glycolipids and cholesterol. The glycolipids are found exclusively in the outer leaflet of the plasma membrane, with their carbohydrate portions exposed on the cell surface.

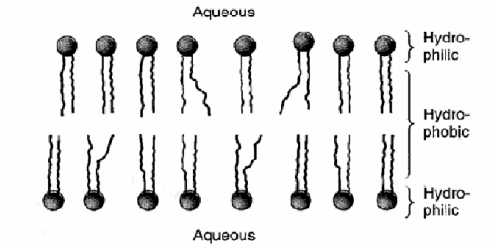
They are relatively minor membrane components, constituting only about 2% of the lipids of most plasma membranes.
Cholesterol is a major membrane constituent of human cells, being present in about the same molar amounts as the phospholipids.

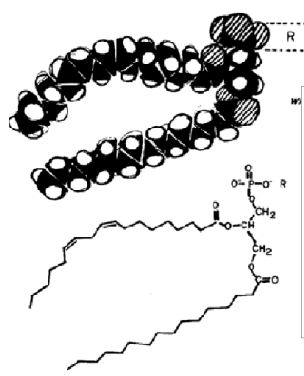
Phospholipids

A Phospholipid



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





R maybe

Choline

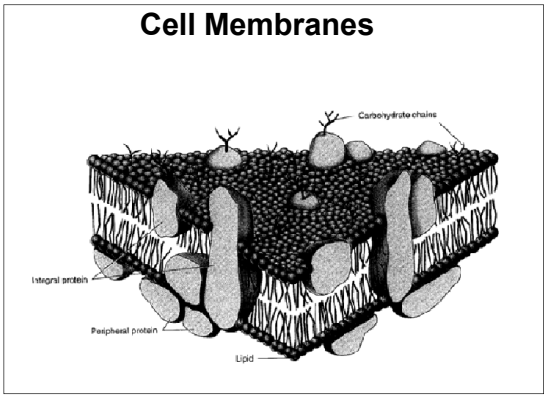
Inositol

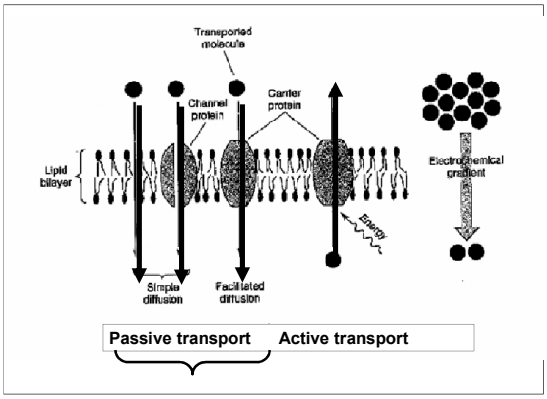
Ethanolamine

Serine

Sphingomyelin

Cell Membranes





Key nutrients for synthesising the phospholipids

Acetyl CoA (Vit B5, Magnesium, P5P)
NAD, NADPH (Vit B3 complex)
Mg, Zn, SAM (Mg, P-5-P, Folates, B12)
Choline
Serine
Inositol
Saturated fatty acids C16-18
Unsaturated fatty acids C18-24
Lecithin

Lecithin is a generic term to designate any group of yellow-brownish fatty substances occurring in animal and plant tissues composed of phosphoric acid, choline, fatty acids, glycerol, glycolipids,triglycerides, andphospholipids (e.g.,phosphatidylcholine,phosphatidylethanolamine, and phosphatidylinositol).

Soybean-derived Lecithin dietary supplements are composed of 19-21% Phosphatidylcholine, 8-20% Phosphatidylethanolamine, 20-21% Inositol phosphatides, 33-35% Soybean oil, 2-5% Sterols, 5% Carbohydrates/free, 1% Moisture, and 5-11% Other phosphatides.[

Lecithin is only found natural in natural fats, and is not found in processed foods. Foods containing lecithin include: chia seeds, butter, eggs, soy, pumpkin seeds and beef. Lecithin helps break up fats (emulsifier), and helps the body to absorb and use vitamins and calcium.

Hemoglobin saturation
The quantity of oxygen carried by the saturated blood will depend upon the haemoglobin content of the red cells. With a normal haemoglobin of 14.5gm/100ml blood 20ml of oxygen will combine with the haemoglobin in every 100ml of blood (20 volume %).

The amount carried when fully saturated is called the oxygen capacity.

Hemoglobin is also found outside red blood cells in the A9 dopaminergic neurons in the substantianigra, macrophages, alveolar cells, and mesangial cells in the kidney. In these tissues, hemoglobin has a non-oxygen-carrying function as an antioxidant and a regulator of iron metabolism.

Anemias

Anaemia is a decrease in number of red blood cells or less than the normal quantity of hemoglobin in the blood. Anaemia may also be diagnosed where there is decreased oxygen-binding ability of each hemoglobin molecule due to deformity or lack in numerical development as in some other types of hemoglobin deficiency.

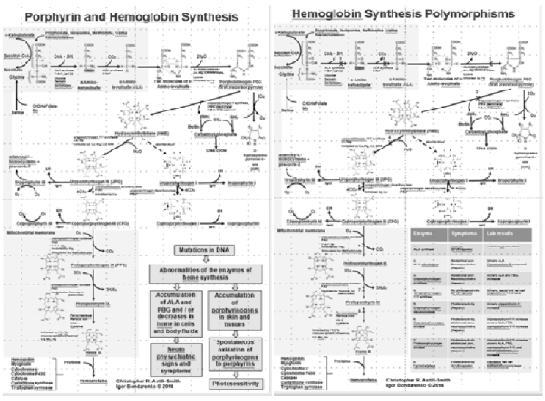
1. Red cell aplasia
2. Aplastic anaemia
3. Microcytic anaemia – Iron deficiency
4. Macrocytic anaemia's –
Vitamin B12
Folic acid
5. Hemolytic anaemia
6. Blood loss
7. Fluid overload

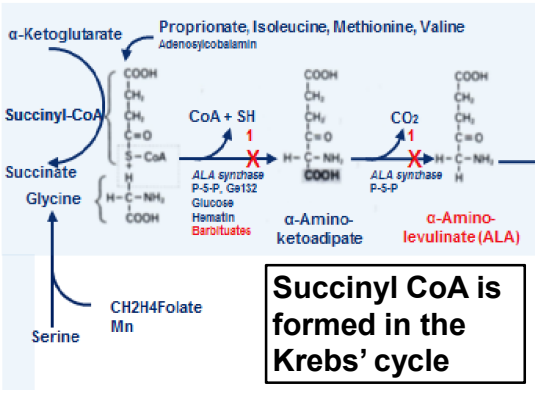
Iron deficiency maybe due to
1. **Diet**
2. **Malabsorption**
3. **Parasites**
4. **Haemorrhage**

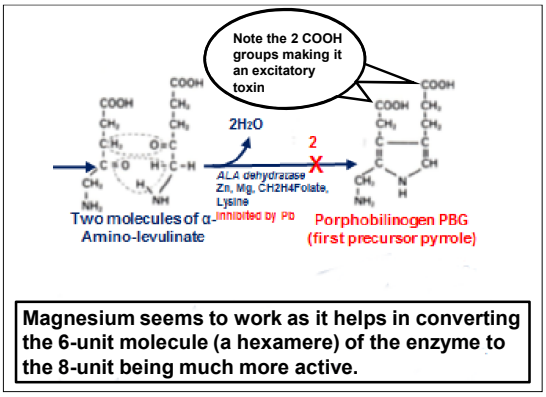
Supplement with
Ferrous phosphate RED body types
Ferrous Chloride GREEN body types
Ferrous sulphate BLUE body types

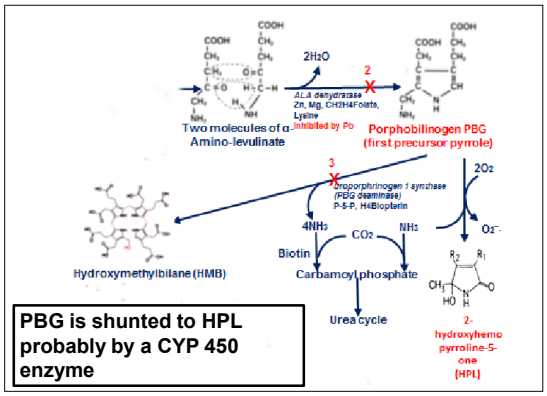
Hemoglobin and Myoglobin contain heme, a cyclic tetrapyrrole consisting of 4 molecules of pyrrole. One atom of ferrous iron resides at the centre.

Heme-dependent enzymes
Catalase
Various peroxidases
i-Nitric Oxide Synthase
Myeloperoxidase
Cystathione synthase
Cytochrome p450
Cytochromes for energy production
Sulfite oxidase
Thyroperoxidase

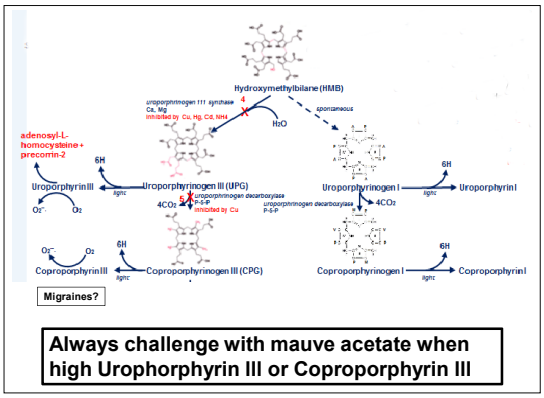

Porphyrin and Hemoglobin Synthesis
Hemoglobin Synthesis Polymorphisms


α-Ketoglutarate
Proprionate, Isoleucine, Methionine, Valine
Adenosylcobalamin
Succinyl-CoA
Succinate
Glycine
CoA + SH
1
ALA synthase
P-5-P, Gli32
Glucose
Hematin
Barbituates
α-Amino-
ketoadipate
CO2
1
ALA synthase
P-5-P
α-Amino-
levulinate (ALA)
Serine
CH2H4Folate
Mn
Succinyl CoA is formed in the Krebs' cycle

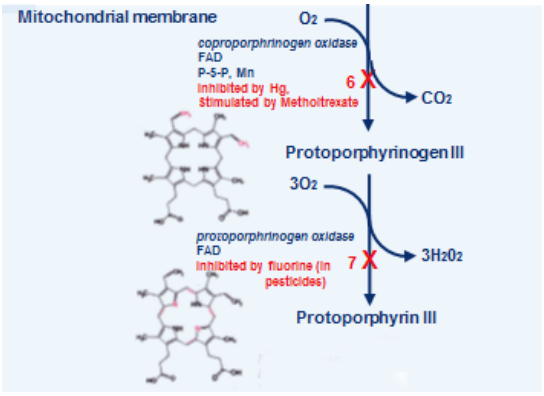

Note the 2 COOH groups making it an excitatory toxin
2H2O
2
ALA dehydratase
Zn, Mg, CH2H4Folate,
Lysine
Inhibited by Pb
Two molecules of α-Amino-levulinate
Porphobilinogen PBG
(first precursor pyrrole)
Magnesium seems to work as it helps in converting the 6-unit molecule (a hexamere) of the enzyme to the 8-unit being much more active.

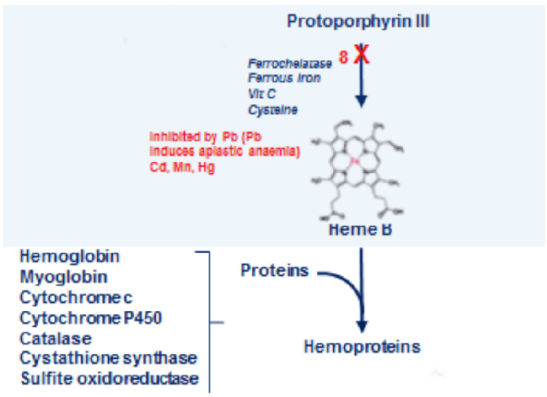


PBG is shunted to HPL probably by a CYP 450 enzyme



Always challenge with mauve acetate when high Urophorphyrin III or Coproporphyrin III





Hemoglobin is composed of heme with one Fe2+ and a globin protein composed of an alpha chain of 141 amino acids and one beta chain of 145 amino acids.

Alpha chain	Beta chain
Phenylalanine 6	Phenylalanine 8
Lysine 11	Lysine 9
Threonine 9	Threonine 6
Valine 11	Valine 18
Methionine 2	Methionine 1
Leucine 17	Leucine 18

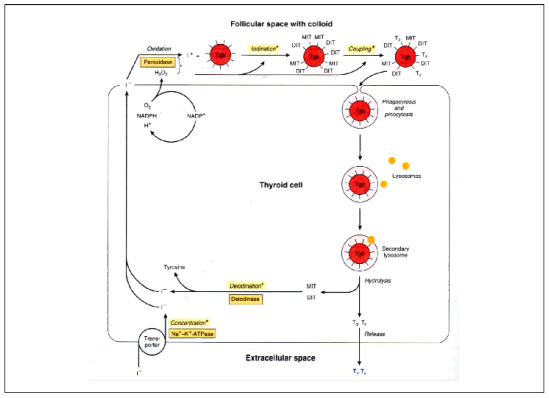
Myoglobin in muscle cells stores oxygen in the resting state as oxymyoglobin and on exercise releases oxygen.

It is composed of the same amino acids as in hemoglobin

Oxygen (O2) nitric oxide (NO), carbon monoxide (CO) and hydrogen sulfide (H2S) bind to the iron atom in heme proteins. Once bound to the prosthetic heme groups, these molecules can modulate the activity/function of those hemeproteins, affording signal transduction.

Myeloperoxidase (MPO) is a peroxidase enzyme and is most abundantly expressed in neutrophil granulocytes. MPO has a heme pigment, which causes its green colour in secretions rich in neutrophils, such as pus and some forms of mucus.

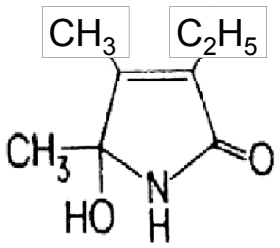
Thyroidperoxidase or thyroperoxidase (TPO) is an enzyme expressed mainly in the thyroid that liberates iodine for addition onto tyrosine residues on thyroglobulin for the production of thyroxine (T_4)or triiodothyronine (T_3), the thyroid hormones.



Pyroluria is known by many different names including Pyrrole Disorder, Kryptopyrrole, Kryptopyrroluria, Pyrroluria, Pyrolle Disorder, Mauve Factor and Hemepyrrole. Pyroluria can best be described as the abnormal synthesis and metabolism of the oxygen carrying molecule haemoglobin.

As with all cells there are waste or by-products produced and the by-product of haemoglobin is a metabolite called hydroxyhemopyrrolin-2-one (HPL) also known as Pyrrole. The metabolite was originally thought to be a Kryptopyrrole but further studies have proven this not to be the case.

The Mauve Factor

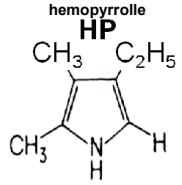


OHHPL (hydroxyhemopyrrolin-2-one)

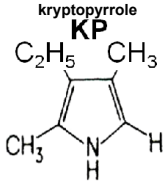
OHHPL (Mauve Factor)

- **In human urine, blood and CSF**
- **Mistakenly identified as kryptopyrrole, a persistent erroneous term**
- **Chemically similar to kryptopyrrole, which can be used for OHHPL assay**

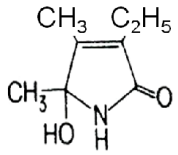
hemopyrrolle
HP



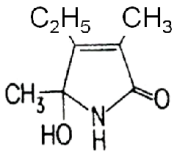
kryptopyrrole
KP



hydroxyhemopyrrolin-2-one
OHHPL



hydroxykryptopyrrole lactame
OHKPL



Mauve history

- **Discovered in urine in 1957**
- **Named for lilac-coloured appearance on paper chromatograms developed with Erhlich's reagent**
- **Labile and elusive**
- **Abram Hoffer is the father of Mauve**

High-Mauve and behaviour

- **Down syndrome 70%**
- **Schizophrenia 40-70%**
- **Autism 50%**
- **ADHD 30%**
- **Alcoholism 20-80%**

Pfeiffer correlates

- Nail spots
- Stretch marks
- Pale skin
- Poor tanning
- Knees and joints
- Constipation
- Dream recall
- Morning nausea
- Light and sound
- Odour intolerance
- Migraines
- Stitch-in-side

Walsh

- Low stress tolerance
- Anxious, overly pessimistic
- Explosive anger
- Hyperactivity

Kruesi

- Social withdrawal
- Emotionally labile
- Loss of appetite
- Easily fatigued

- Abnormal fat distribution
- Irritable bowel
- Delayed puberty
- Irregular periods
- Overcrowded teeth
- Joint pains
- Reading difficulties
- Motion sickness
- Auditory processing disorder
- Memory loss
- Insomnia

- Sugar craving
- Poor morning appetite
- Frequent infections
- Allergies
- Impotence
- Sweet breath and body odour
- Paranoia
- Seizure
- Intolerance to bright light

Igor Bondarenko PhD
"It may well be a P450 enzyme that oxidises hemopyrrole and kryptopyrrole.
2-hydroxyhemopyrrolene-2-one is either an intense chelator of Vit B6 and zinc, or it facilitates their urinary excretion, or both".

Igor Bondarenko PhD
"Interestingly, PBG is broken down by a deaminase, and the release of ammonia from it may presume more P-5-P for utilising the formed ammonia in,
for example, glutamine synthetase-catalysed reaction".

Pyroluria and Gluten Sensitivity
It is not uncommon for those with this condition to have gluten and casein sensitivity. This condition is more prevalent in many of the same populations that we see increased prevalence of gluten sensitivity. It can cause wide ranging symptoms.

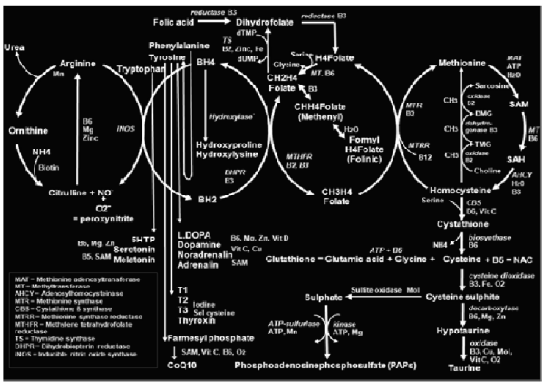
Vitamin B12
1. Hydroxycobalamin
2. Adenosylcobalamin
3. Methylcobalamin
Vitamin B_{12} is a water soluble vitamin with a key role in the normal functioning of the brain and nervous system, and for the formation and maturation of red blood cells.

It is normally involved in the metabolism of every cell of the human body, especially affecting DNA synthesis and regulation, but also fatty acid synthesis (especially odd chain fatty acids) and energy production.

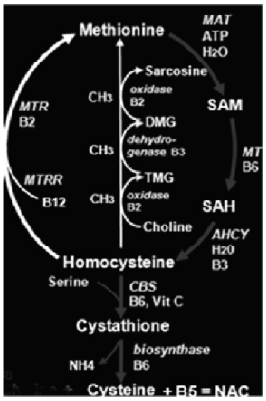
Only bacteria have the enzymes required for its synthesis, although many foods are a natural source of B_{12} because of bacterial symbiosis and usually produce hydroxocobalamin), but conversion between different forms of the vitamin can be accomplished in the human body.

Vitamin B_{12} was discovered from its relationship to the disease pernicious anemia, which is an autoimmune disease in which parietal cells of the stomach responsible for secreting intrinsic factor are destroyed, the same cells responsible for secreting acid in the stomach.

Intrinsic factor is crucial for the normal absorption of B_{12}, so a lack of intrinsic factor, as seen in pernicious anemia, causes a vitamin B_{12} deficiency. Many other subtler kinds of vitamin B_{12} deficiency and their biochemical effects have since been elucidated.



Methionine synthase, **is a methyltransferase enzyme, which uses the MeB_{12} to catalyze the conversion of the homocysteine back into methionine. This functionality is lost in vitamin B_{12} deficiency, and can be measured clinically as an increased Homocysteine level.**



Myelin damage resulting from B_{12} deficiency, even in the presence of adequate folate and methionine, is more specifically and clearly a vitamin deficiency problem. It has been connected to B_{12} most directly by reactions related to *MUT*, which is required to convert methylmalonyl coenzyme A into succinyl CoA.

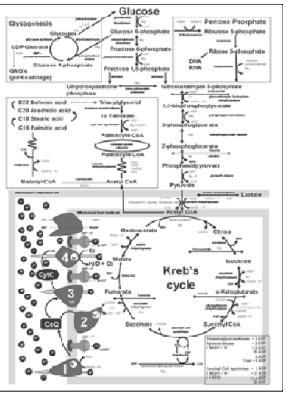
Failure of this second reaction to occur results in elevated levels of MMA, a myelin destabilizer. Excessive MMA will prevent normal fatty acid synthesis, or it will be incorporated into fatty acid itself rather than normal malonic acid.

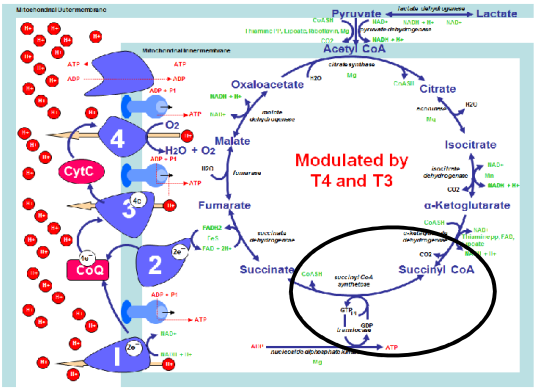
If this abnormal fatty acid subsequently is incorporated into myelin, the resulting myelin will be too fragile, and demyelination will occur.

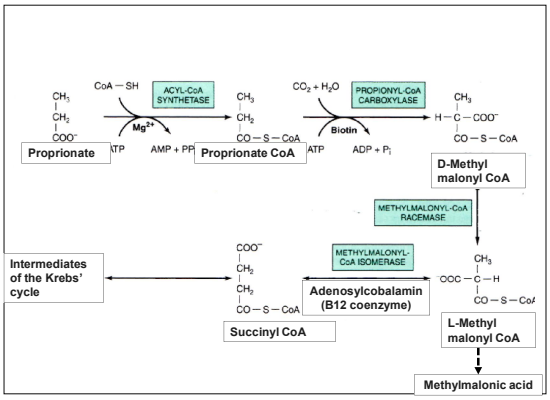
Methylmalonyl CoA is formed as an intermediate in the catabolism of valine and by the carboxylation of proprionyl CoA arising in the catabolism of isoleucine, cholesterol and odd numbered fatty acids or directly from proprionate a major product of microbial fermentation in the rumen.

Energy production

1. Glycolysis
2. Krebs' Cycle
3. Electron transport





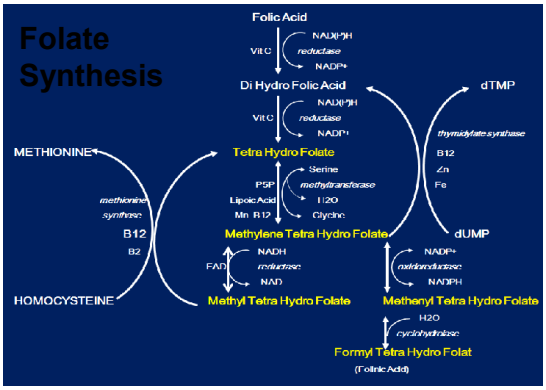


Folate deficiency limits cell division, erythropoiesis, production of red blood cells, is hindered and leads to megaloblastic anemia, which is characterized by large immature red blood cells.

This pathology results from persistently thwarted attempts at normal DNA replication, DNA repair, and cell division, and produces abnormally large red cells called megaloblasts (and hypersegmented neutrophils) with abundant cytoplasm capable of RNA and protein synthesis, but with clumping and fragmentation of nuclear chromatin.

Folic acid is itself not biologically active, but its biological importance is due to tetrahydrofolate and other derivatives after its conversion to dihydrofolic acid in the liver.

H4Folate Tetrahydrofolate
CHH4Folate Methenyl tetrahydro folate
CH2H4Folate Methylene tetrahydro folate
CH3H4Folate Methyl tetrahydro folate



Heart Muscle Function

Cardiac muscle like skeletal is striated but exhibits intrinsic rhythmicity. In cardiac muscle the sarcoplasmic reticulum is less extensive and thus the intracellular supply of Ca^{++} for contraction is less, thus relying upon extracellular Ca^{++} for contraction. If deprived of extracellular Ca^{++} the heart ceases to beat within 1 minute.

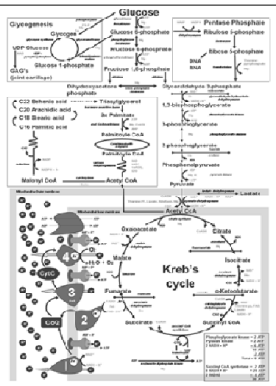
Ca^{++} enters muscle cells through voltage gated Ca^{++} specific channels opening during depolarisation induced by spread of the cardiac action potential and closing when the action potential declines.
Activation of protein kinase enzymes (Mg^{++} dependant) modulate intracellular Ca^{++} entry.

Ca^{++} entry requires optimal cell membrane integrity and the presence of trans fatty acids or oxidised fatty acids will inhibit this. Thus the necessity for good organic cold pressed unsaturated oils such as flax seed etc. Pyridoxal-5-phosphate (Vitamin B6) is important in the stabilization of cell membranes.

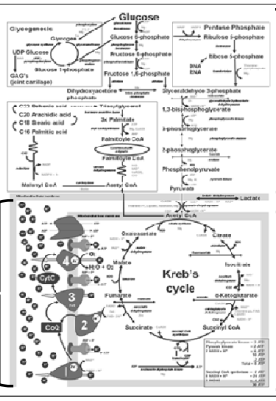
Optimizing Cardiac Function
Magnesium –phosphate, chloride, sulphate, citrate
Calcium – lactate,chloride, sulphate, citrate
Pyridoxal-5-phosphate
Heart tissue extract, Hawthorn
Vitamin E – wheatgerm oil
Vitamin C – SMART C
Essential fatty acids / Lecithin

Oxygen into the Mitochondria and where it Functions

Energy pathway



Energy pathway

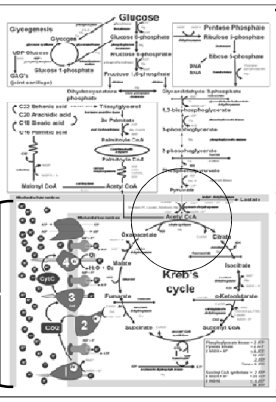


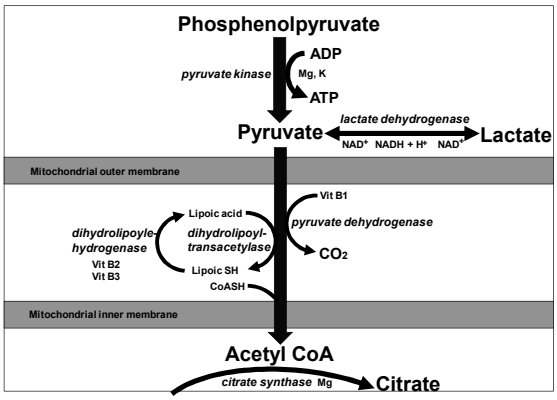
Glycolysis

Electron transport or Oxidative phos-phorylation pathway

Citric Acid Cycle

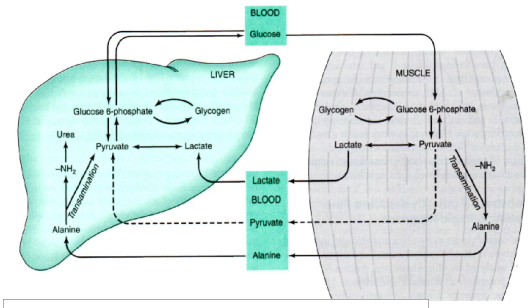
Energy pathway





Lactic acid
Tissues that function under hypoxic conditions produce lactic acid.

D/L Lactic acid – RED body types
L.Lactic acid – GREEN body types
D.Lactic acid- BLUE body types



The Lactic Acid (Cori Cycle)

Under anaerobic conditions NADH cannot be reoxidized through the respiratory chain to oxygen. Pyruvate is reduced by NADH to lactate catalysed by *lactate dehydrogenase*. There are three different specific isoenzymes of *lactate dehydrogenase* that have clinical significance.

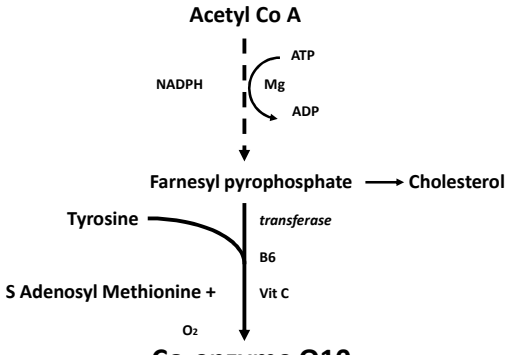
The re-oxidation of NADH via lactate formation allows glycolysis to proceed in the absence of oxygen by regenerating sufficient NAD for anothewr cycle of the reaction catalysed by *glyceraldehyde-3-phosphate dehydrogenase*.

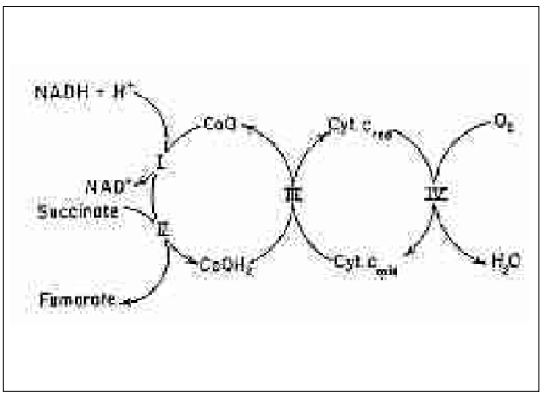
Some tissues derive much of their energy from glycolysis and produce lactate –

Erythrocytes	**Brain**
GI tract	**Renal medulla**
Retina	**Skin**

The liver, kidney and heart usually take up lactate and oxidize it but will produce it under hypoxic conditions

Coenzyme Q10





Coenzyme Q10 (ubiquinone) is a lipid-soluble compound that occurs in all kinds of cell membranes in the human body. It has several biochemical functions:

- **it is indispensable for producing energy in the cells in the form of ATP**
- **it is an essential fat soluble antioxidant**
- **it helps regenerate other antioxidants esp Vit E**
- **it stimulates cell growth and inhibits cell death**

- **It is beneficial for the prevention of cell damage in hypoxia, especially in the cardiac muscle. It has been used for the protection of myocardium in different cardiovascular disorders, such as angina pectoris, hypertension, arrhythmia and congestive heart failure.**

- **It has been proven to have anti-tumour and immune system enhancing properties when tested in animals.**
- **Genetic mutations, ageing, cancer and statin-type drugs can cause a decrease in the levels of coenzyme Q10 in tissues and blood.**

- **Low ratio of coenzyme Q10 to low-density lipoprotein (LDL) cholesterol is a strong indicator of risk of atherosclerosis (clogging of the arteries)**

Best sources mg / Kg
Beef, pork and chicken heart 113+
Beef, pork and chicken liver 50+
Sardines and red flesh fish 50+
Soy, olive, grape seed oils 50+
Peanuts, sesame, pistachio, hazelnuts 20+
Parsley 20+
Avocado 10+

Toxins

Toxins

Toxic metals –
Black walnut
Coriander herb
Coriander spice
Lemon balm
Yarrow
Other spices

Toxins

Chemicals - **Coriander spice**
NAC
Lemon balm
Yarrow
Other spices

Toxins

Radiation - **Coriander spice**
Turmeric
Yarrow

Infectious Diseases

Bacteria – Ginger
Ionic silver
Mannose
Thiamine / Silver

Virus – Astragalus
Echinacea
Selenium

Parasites – AP formula
Cloves
Coriander seed
RED, GREEN, BLUE
Spice mixes

Fungi – Coconut oil
Coriander
Other spices
Pau D'arco
AF Creaqm locally

Probiotics

Bifidobacteria Bifidus
Lactobacillus Acidophilus
Lactobacillus Bulgaricus
Lactobacillus Casei
Lactobacillus Plantarium
Lactobacillus Rhamnosus

Smart Probiotic

Muscle Oxygen Requirements during Exercise

A muscle requires approximately 50x more oxygen per minute when active than when at rest. This is achieved by
1. An increase in lung blood flow and cardiac output from 5 litres per minute to 50 litres per minute. This gives an increase of 6x.

2. Redistribution of the blood flow to the active muscles. This gives an increase of 3x.
3. More oxygen is extracted from every 100ml of blood passing through the muscle as a result of lowered oxygen tension in the muscles. This gives an increase of 3x.
Total increase is thus 6x3x3=54

ATP in muscle during exercise
Glucose - gluconeogenesis
Creatine phosphate
Muscle glycogen - glycogenolysis
Beta oxidation – burning fats
Amino acids

	Type 1 Slow twitch	Type 2 Fast twitch
Myosin ATPase	Low	High
Energy utilization	Low	High
Mitochondria	Many	Low
Colour	Red	White
Myoglobin	Yes	No
Contraction rate	Slow	Fast
Duration	Prolonged	Short

Anaerobic Sprinter	Aerobic Marathon
Type 2 (glycolytic) fibres are used predominantly	Type 1 (oxidative) fibres are used predominantly
Creatine phosphate is the major energy source during the first 4-5 seconds	ATP is the major energy source throughout
Glucose derived from muscle glycogen and metabolised by anaerobic glycolysis is the major fuel source	Blood glucose and free fatty acids are the major fuel sources
Muscle glycogen is rapidly depleted	Muscle glycogen is slowly depleted

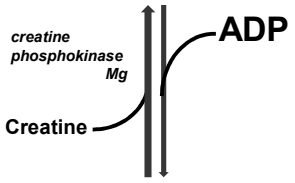
Sources of fuel during exercise

ANAEROBIC	AEROBIC
Type 11 (glycolytic white) fibres are used predominantly	Type 1 (oxidative red) fibres are used predominantly
1-5 seconds Creatine phosphate is the major energy source	First 4 minutes blood glucose 4-18 minutes liver glycogen
5-10 seconds Glucose derived from muscle glycogen is metabolised by anaerobic glycolysis leading to lactic acid formation	18-70 minutes muscle glycogen 70-4000 minutes Adipose tissue triglycerides
Rapid depletion of muscle glycogen	Gradual depletion of muscle glycogen

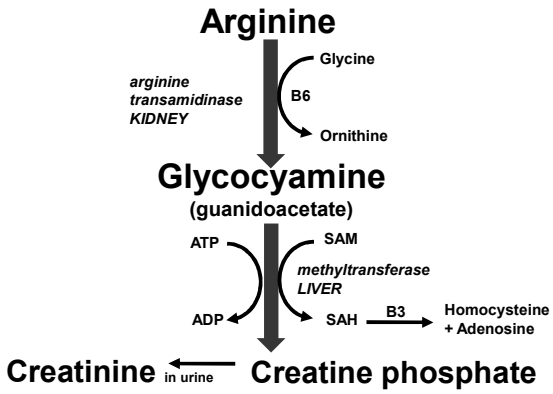
AEROBIC		ANAEROBIC	
GLYCOLYSIS YIELD	ATP	GLYCOLYSIS FROM GLUCOSE	ATP YIELD
Phosphoglycerate kinase	2	Phosphoglycerate kinase	2
Pyruvate kinase	2	Pyruvate kinase	2
Glyceraldehyde 3- phos. Dehydrogenase	6	Minus 2 ATP to activate glycolysis	-2
total	10	Total	2
KREBS CYCLE		GLYCOLYSIS FROM GLYCOGEN	
Succinyl CoA synthetase	2		4
total	2	Minus 2 ATP to activate glycolysis	-2
		Total	2
OXIDATIVE PHOSPHORYLATION		Grand total	4
6 NADH+H+	24		
2 FADH2	4		
total	28		
Grand total	40		
Minus 2 ATP to activate glycolysis	38		

Anaerobic exercise
First fuel source is Creatine phosphate 4-5 seconds

Creatine phosphate (Arginine, Glycine, Methionine ATP)



ATP



Second is anaerobic glycolysis using muscle glycogen

Muscle Glycogen

Adrenalin, B6, Ca, Mg

Glucose-1-phosphate

Mg

Glucose-6-phosphate

Mg, B3, Zn,

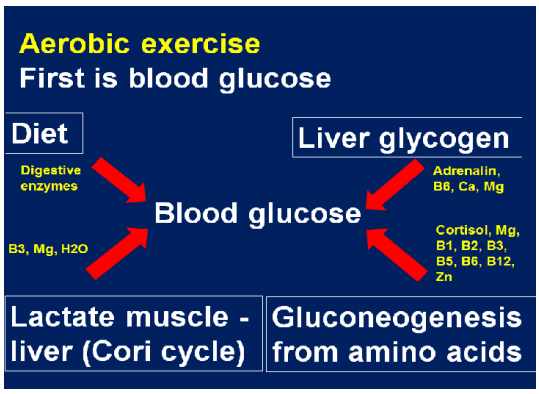
1,3-Bisphosphoglycerate

Mg, K

Phosphenolpyruvate

Protocol for exercise testing
1. Anaerobic challenge contract muscle 2x second 10x. Muscle weakens.
2. Mg-ADP weakens. From weakness challenge
- **Creatine phosphate**
- **1,3-Bisphosphoglycerate**
- **Phosphenolpyruvate**

Aerobic Exercise Fuel
1. Glucose – Blood, Liver Glycogen, Gluconeogenesis (of Amino acids and odd numbered Fatty acids)
2. Muscle Glycogen
3. Fatty acids



Protocol for exercise testing
1. Aerobic challenge contract a strong aerobic muscle 1x second 10x. Muscle weakens.
2. Mg-ADP weakens. From weakness challenge

- **Glucose – Liver glycogen Gluconeogenesis**
- **Muscle glycogen**
- **Acetyl CoA – beta oxidation**

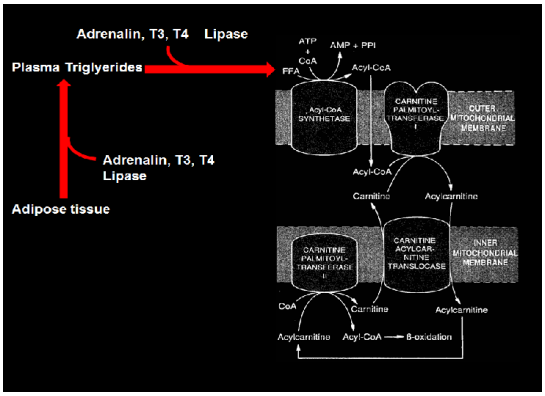
Second is Muscle Glycogen

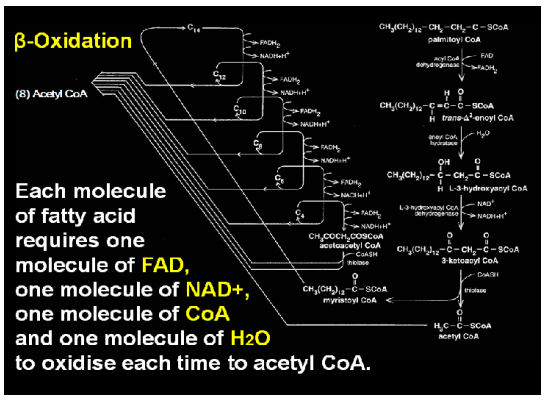
Muscle Glycogen
↓ Adrenalin, B6, Ca, Mg
Glucose-1-phosphate
↓ Mg
Glucose-6-phosphate
↓ Mg, B3, Zn, K
Lactate
↕ B3
Pyruvate

Third is Beta Oxidation
TL Pinch fat
Challenge against

- **T4, T3, Adrenalin**
- **ATP, Mag, CoA**
- **Carnitine**
- **FAD, NAD, H2O**
- **O2 – Iron, B12**
- **Adenosylcobalamin**
- **CO2**

Mg ATP weakens	Glucose	Glycogen	Pyruvic acid	Lactic acid	Acetyl CoA	NADH FADH2	Nutrient
Glycolysis	Weakens		Strengthens				Mg, B1, B2, K
Pyruvate – Acetyl CoA shuttle			Weakens		Strengthens		B1, B2, B3, B5, [illegible] Mg
Krebs cycle						Strengthens (also ETC strengthens)	B1, B2, B3, B5, [illegible] Mg, Mo
Electron Transport							Cu, Mo, Iron (Fe2+)
Glycogenolysis		Strengthens					Biotin, Mg
Liver glycogenolysis	Strengthens	Weakens SM					Adrenalin, B6, Mg, Ca
Muscle glycogenolysis		Weakens SM					Adrenalin, B6, Mg, Ca
Lactate → Pyruvate			Strengthens	Weakens SM			B2, Zn
Cori cycle	Strengthens			Weakens SM			B6, Mg, H2O
Pyruvate carboxylase			Weakens SM				Biotin, Mg,B5, H2O2
Hypoglycaemia (gluconeogenesis)	Strengthens						Lactate, Biotin, B6, B5, Zn, Mg
Gastrocolic reflexes	Strengthens						B12
Respiration (O2) strengthens							B12, Iron, B6





Optimal products
Dosing
Timing

Optimal products
Must remain strong to cross therapy localisation to
1. **CV22**
2. **GV21**
3. **GV28**

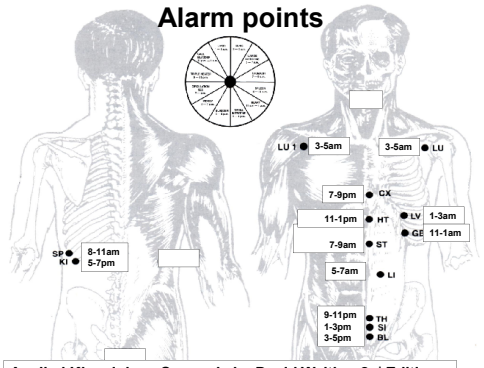
Right brain activity – Humming
Left brain activity - Mathematics

Dosing
Amount of liquid or capsules that strengthen weak muscle(s)

Timing
Cross therapy localise to the alarm points for remaining strong. Those that remain strong are the optimal times of dosing.

Usually St, SI, Cx or TW

Alarm points



Applied Kinesiology Synopsis by David Walther 2nd Edition

Timing
1. Amino acids 15 minutes before breakfast
2. Vitamins and Minerals with meals
3. Fatty acids with evening meal
4. Probiotics, CoQ10, Folic acid last thing at night.
5. Herbs and spices between or before meals.

Patient protocol

1. **Test body type colour**
2. **Cross extensor reflexes**
3. **Conscious / subconscious emotion balance**
4. **Test B&E points**
5. **Assess genotype and phenotype meridians**
6. **Start with phenotype meridian and challenge with EID**

7. Test and treat positive eye positions.
8. Tap B&E point to assess if anything more required
9. Using genotype meridian challenge with EID. Usually hypoxia. If positive challenge against O2. Then Phospholipid, Co-Q10 and Hemoglobin vials.

10. If phospholipid challenge against culinary oils.
11. If Co-enzyme Q10 challenge against oil based Co-Q10.
12. If Hemoglobin challenge
ALA – Adenosylcobalamin, P5P
PBG- CH2H4Folate
UBG III – P5P, H4Biopterin
CPG III – P5P
PP IX-P5P

If only haemoglobin strengthen - Iron, Folate

13 Challenge with MAUVE acetate. Test for Lutein

Products
All products, laminates, test kits, biomarker, DVDs, Online video education available at www.epigenetics-international.com

sales@epigenetics-international.com