

Sunday 3rd July 2016



Film 7

The Seven Ages of Man

William Shakespeare's *As You Like It*, spoken by the melancholy Jaques. The speech compares the world to a stage and life to a play, and catalogues the seven stages of a man's life: infant, school-boy, lover, soldier, justice, pantaloon, and second childhood, "sans teeth, sans eyes, sans taste, sans everything". Shakespeare means that the world is nothing but a theatrical stage where we humans are actors. From our birth we enter the stage and keep on acting true to our age, until old age when we act the last scene. It is one of Shakespeare's most frequently-quoted passages. The full passage is:

*All the world's a stage,
And all the men and women merely players;
They have their exits and their entrances;
And one man in his time plays many parts,
His acts being seven ages. At first the infant,
Mewling and puking in the nurse's arms;
Then the whining school-boy, with his satchel
And shining morning face, creeping like snail
Unwillingly to school. And then the lover,
Sighing like furnace, with a woeful ballad
Made to his mistress' eyebrow. Then a soldier,
Full of strange oaths, and bearded like the pard,
Jealous in honour, sudden and quick in quarrel,
Seeking the bubble reputation*

*Even in the cannon's mouth. And then the justice,
In fair round belly with good capon lin'd,
With eyes severe and beard of formal cut,
Full of wise saws and modern instances;
And so he plays his part. The sixth age shifts
Into the lean and slipper'd pantaloon,
With spectacles on nose and pouch on side;
His youthful hose, well sav'd, a world too wide
For his shrunk shank; and his big manly voice,
Turning again toward childish treble, pipes
And whistles in his sound. Last scene of all,
That ends this strange eventful history,
Is second childishness and mere oblivion;
Sans teeth, sans eyes, sans taste, sans
everything."*

Infancy 0-1 year
 Childhood 1-12 years
The Lover GJF 12-18 years
The Soldier 18-25 years
The Justice 25-65 years
 Preconception GJF
 Prenatal GJF
 Lactating mother GJF
 Menopause GJF
The Pantaloon 65-?
Second childhood ?-?

The Infant: In this stage he is dependent on others and needs to be constantly attended to.



**The School boy -
Childhood:** It is in this stage that he begins to go to school. He is reluctant to leave the protected environment of his home as he is still not confident enough to exercise his own discretion.



The Lover: In this stage, comparable to modern day adolescence, he is always remorseful due to some reason or other, especially the loss of love. He tries to express feelings through song or some other cultural activity.

The Soldier: comparable to modern day young adult, that he thinks less of himself and begins to think more of others. He is very easily aroused and is hot headed. He is always working towards making a reputation for himself and gaining recognition, however short lived it may be, even at the cost of his own life.

The Justice: In this stage, comparable to modern day adult, he has acquired wisdom through the many experiences he has had in life. He has reached a stage where he has gained prosperity and social status. He becomes very attentive of his looks and begins to enjoy the finer things of life.

The Pantaloon - Old age: He begins to lose his charm — both physical and mental. He begins to become the brunt of others' jokes. He loses his firmness and assertiveness, and shrinks in stature and personality.

Second Childhood - Mental dementia and death: He loses his status and he becomes a non-entity. He becomes dependent on others like a child and is in need of constant support before finally dying.

The Seven ages of Man from Shakespeare's As You Like It. Commissioned by British Telecom and placed near the Mermaid Theatre, London.



Infancy

0-1 year

Nutritional requirements for infants and toddlers

Recommended Dietary Allowances by Age

Age	Calcium mg/day	Magnesium mg/day	Phosphorus mg/day	Iron mg/day	Vit D IU/day	Vit K mcg/day
0-6 months	400	40	300	6	300	5
6 to 12 months	600	60	500	10	400	10
1 to 3 years	800	80	800	10	400	15

Sleepy baby

A newborn baby that is excessively sleepy and poor at latching on and feeding can be born to mother's prescribed drugs through the labour, especially Pethedin. Pethedin passes through the cord into the baby through the labour. Check for chemical toxicity and prescribe NAC to mother and baby.

1. Colic is caused by spasm of the smooth muscle of the intestines and causes a great deal of distress to the baby.

Colic can be caused by imbalance in the calcium / magnesium ratio in the baby.

A high level of calcium compared to magnesium is passed to the baby through the milk of a mother drinking large quantities of hard water either in hard water areas or mineral water with a high calcium to magnesium ratio.

2. Potassium deficiency causes the contractions of the intestinal muscles to slow, without which the food cannot be digested and absorbed properly, resulting in diarrhoea or constipation.

Test for Potassium and Pantothenic acid or CoA factors.

3. Intestinal movements also slow down when the diet becomes deficient in protein, or some of the B vitamins, particularly B1, B5. Undigested food may stay in the intestines for hours or days, stagnating and creating stagnant gas.

Providing the missing nutrients usually increases the motility and relieves the symptoms.

Liquid Vitamins and Colloidal Mineral supplements work best with children

4. Check for probiotics. Babies gut is usually inoculated during birth itself and in cases of caesarean birth this may not happen. Also if the mother or baby has been prescribed antibiotics, the normal flora and fauna of the gut may be killed off.

Predominant probiotics in infancy
Lactobacillus brevis
Bifidobacterium breve
Bifidobacterium infantis
Bifidobacterium longus



5. Check baby for tolerance to mothers milk.

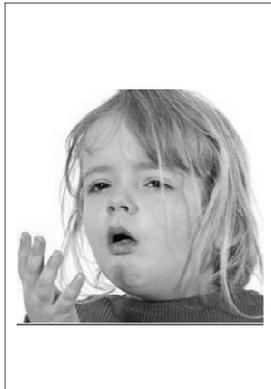
Milk may contain contaminants through the diet or mobilisation of mothers fat.



6. Check for allergy to foods mother is eating which are passing into the milk i.e. wheat, or cows milk proteins.

Remove allergen from mothers diet.

7. Check child for infection. i.e. bacteria, virus, fungus or parasite and treat accordingly.



- Immune WHY 600**
- Colloidal silver**
- Colloidal Zinc**
- Vitamin C**
- Smart Vitamin D3 (Vitamin K2)**
- Echinacea**

Childhood

1-13 years

- 1. During this time nutrition plays a critical role in promoting optimal growth and development, strengthening the immune system and enhancing social and cognitive ability**
- 2. During the first years of life the infant's weight should triple, and length should increase by 50%**

3. By the time a child is 5 the brain will have reached 90% of its adult weight.

4. Major requirements for toddlers age 1-3

The major requirements for toddlers from one year to three

Calories: about 1300
Protein: 16 grams
Vitamin A: 400ug RE
Vitamin C: 40 mg
Thiamin: 0.7 mg
Riboflavin: 0.8 mg
Niacin: 9 mg
Vitamin B6: 1.0 mg
Folate: 50 ug
Calcium: 800mg

Specific Nutrient Deficiencies to Test for in infants and children

1. Calcium, Phosphorus and Vitamin D. Very low Calcium can contribute to rickets in infants and children. Only generally occurs on very restrictive diets.

Maintain adequate Calcium during childhood is necessary for the development of a maximal peak bone mass. This decreases the incidence of osteoporosis later on in life.

Vitamin D may need to be supplemented alongside Calcium for a maximal response.
Bioavailability of Calcium from human milk is greater than formula feed.

2. Iron Deficiency especially in breast fed babies whose mothers are iron deficient.

3. Vitamin K. There is postnatal decline of Vitamin K dependent coagulation factors. Lack of Vitamin K occurs in Hemorrhagic disease of the newborn.

**4. Essential fatty acids
DHA is essential for proper
development of the brain and
retina in the infant**

**5. Zinc for growth and repair and
appetite**

**6. Folic acid (stunted growth test
epiphyseal plate of knee)**

**Epigenetics Children's formula
in children age 1-8**

**Omega 3 or DHA or EPO or
Phospholipid essential in all
children**

**Conditions necessitating extra
nutritional intervention**

Attention Deficit Hyperactivity Disorder in children



This is the most common behavioural disorder in children Characterised by attention deficit, impulsivity and sometimes over activity (hyperactivity), mood swings, temper tantrums, disorganisation, inability to cope with stress or stay focussed.

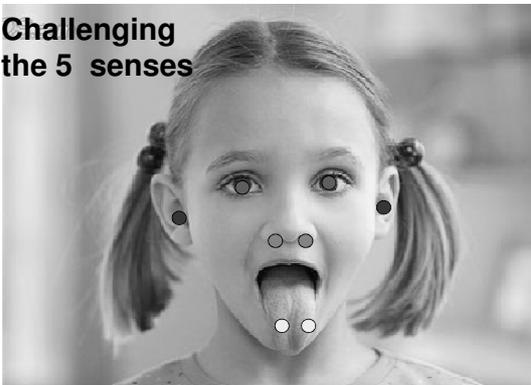
Causative factors include, genetic factors, adverse responses to food additives, intolerances to foods, sensitivities to environmental chemicals, moulds and fungi and exposures to neurodevelopmental toxins such as heavy metals and organo-chlorine pollutants

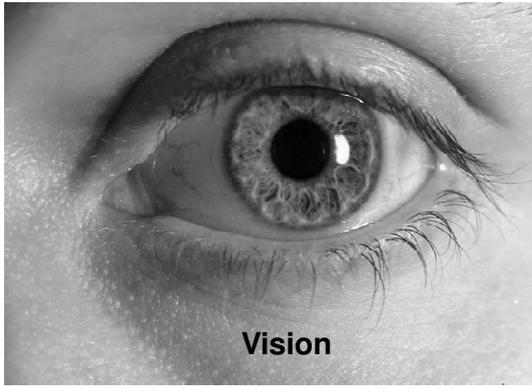
Thyroid dysfunction also common.

Nutrient deficiencies are common, particularly P5P, Magnesium, Zinc, Omega 3 / DHA fatty acids, Flavonoids and the essential Phospholipids

Treat with relevant supplementation, dietary modification, detoxification, correction of intestinal dysbiosis Cranial and Emotional work

Challenging the 5 senses





Vision



Hearing



Smell



Taste



seleneriverpress

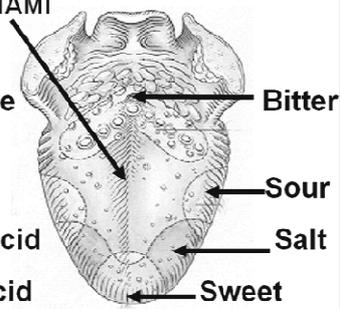
UMAMI

Cystathione

**Argino
succinate**

Glutamic acid

Aspartic acid



Bitter

Sour

Salt

Sweet

Challenge for 5 Senses Input

- 1. Challenge each of the 5 senses right to left and then left to right.**
- 2. Maintain positive TL and treat with Miron light in umbilicus for 1 minute.**
- 3. Re-challenge remaining 4 senses etc.**

**The Lover
13-18 years**

Menstrual period dysfunctions

- Dysmenorrhea**
- Low progesterone or High estrogens**
- P-5-P**
- Colloidal Zinc**
- Evening primrose oil**
- Colloidal Magnesium (for uterine cramps)**

**Heavy periods
Usually a vascular collagen
weakness**

**Colloidal Iron
P-5-P
Collagen formula
Smart C (for bioflavonoids)**

**Nutrition in early teens
(13-18years)**

**1. Adolescence is a period of
intense physical, psychological
and cognitive development.**

2. Puberty, age 10-12 for girls and 12-14 for boys is an intense growth period increasing height and weight. Protein, calorie and nutrient requirements increase.



3. The body mass doubles and nutritional demands increase.

4. At puberty the skeleton is only half its adult mass and bone is constantly being formed and reabsorbed, hence the importance of Calcium. 99% of total body calcium is found in the skeleton. 50% of serum calcium is ionised. Calcium absorption is passive, Vit D independent or active Vit D dependent.

**Recommended intake of 1200-1500 mg/day achieve optimal peak bone mass.
The efficiency of calcium absorption is increased in puberty and the majority of bone formation occurs during this period. Probably due to higher anabolic steroid levels.**

Preoccupation of girls with being thin and hence cutting down on all milk products decreases dietary intake. Also teenagers that drink massive amounts of cola containing large amounts of phosphorus may be deficient as the Phosphorus displaces Calcium.

**5. Rapid growth of body mass and rise in haemoglobin concentration require more iron
6. Omega 3 oils
7. Nutritional requirements increase when teenage diets can become very poor, either through fast foods, convenience foods or diets especially in girls.**

Nutritional Requirements at Puberty in Females

1. Bone Calcium reaches a maximum in females shortly before menarch.

At that time bone deposition rate is 5x that of adult.

There is a decline in bone Ca deposition rate after menarch.

2. Increased nutrients are required by the pituitary, ovaries and adrenal glands.

3. Omega 3 and / or EPO improves dysmenorrhea in adolescents when taken for more than 3 months

**For normal
growth and
development**

**Epigenetics Multiple in children
aged 13-18 years**

**Nutrient Phase 1&2 if too many
chemicals in the diet**

**Omega 3 or DHA or EPO or
Phospholipid essential in all
children**

Exam Support Formula

High Omega 3 intake for at least 3 months prior to exams.

1 week before exam onset aerobic exercise 1-2 X per day 15 minutes each.

3 days before exams and during exam period care with diet.

No refined sugars.

Protein, usually boiled egg and fruit and whole-wheat toast for breakfast.

Fruit juice and handful of nuts and raisins mid morning .

Protein and whole-wheat bread and 1 pint water for lunch, handful nuts and raisins mid afternoon and nutritious evening meal.

Before exam morning or afternoon, cycle, walk or run to school. (stimulates acetylcholine)

Guaranteed Grade A at "A" level

**Take 3x Omega 3
Take 2x Cognitive Support
Take 2x Thiamine pyrophosphate
Take 2x CoA factors
Take Phosphatidylcholine (or
Phospholipid Soy, Sunflower or
Rapeseed)**

The Soldier

18-25 years

**Essential nutrients to support
the modern soldier
Epigenetics Multiple Vitamin and
Mineral
Omega 3
NAC for the boozy nights
Colloidal zinc**

Optimal eating

- a) eat to the level of comfort
- b) incorporate the 6 tastes
 - Sweet – sugar, honey, milk
 - Salt – salt
 - Sour – lemon, yogurt, vinegar
 - Bitter – Lemon rind, bitter green, turmeric, fenugreek
 - Pungent – onions, garlic, ginger, radishes
 - Astringent – beans, lentils

Recommended Daily Allowances
In 1941 RDA's were developed with the goal of reducing the incidence of nutritional deficiency diseases within the general population, such as scurvy, pellagra and beriberi.

They were intended

- 1. As guidelines for the prevention of nutritional deficiencies.**
- 2. To be related to the nutrient status of population groups, not individuals.**

Since at least 1951 critics of the RDA's have asserted that the RDA's lack the ability to recommend levels of nutrients sufficient to maintain health for a person seeking a healthy life span that is associated with a morbidity free existence.

Studies that have been used to determine the level of a nutrient that is sufficient to prevent a nutritional deficiency is typically conducted for only 6-9 months, about 1% of the average person's lifetime. This suggests that the minimalist dietary standards are based -

On data incapable of suggesting levels of nutrients essential to prevent many conditions and diseases associated with morbidity.

The 10th edition of the RDA's in 1989 recommends higher levels for smokers, heavy alcohol users and dieters.

Recommended Optimal Nutrient Intakes

***Cheraskin and Ringsdorf* investigated the health of 13,500 subjects through an evaluation of each person's health status. Each subject in the study completed the following test or procedure -**

- 1. The 195 item Cornell Medical Index Health Questionnaire.**
- 2. Physical and anthropometric measurements.**
- 3. Dental examination.**
- 4. Eye examination.**
- 5. Cardiac tests including ECG.**
- 6. Glucose tolerance test**
- 7. Panel of 50 blood chemistries.**
- 8. Study of each patient's diet.**

The hypothesis of the study concluded that relatively symptomless and disease free individuals are healthier than those with clinical symptoms and signs and that this difference was due to the intake of nutrients from the diet and / or dietary supplementation.

RDAs and optimal nutritional intake levels.
Details in Laminate

The Justice
25-65 years

Thinking about starting a family

Even just thinking about getting pregnant
Multiple Vitamin / Mineral
Folates
P-5-P
DHA
Choline

**Preconception
Nutrition**

Good nutrition is essential to prepare the woman's body for pregnancy to enable her to provide adequate nutrients for the developing baby.

Begin lifestyle changes / supplementation 3 months to 1 year before conception.

Zinc deficiency can cause miscarriage, foetal growth retardation, stillbirth and congenital handicap. An important component of collagen it is necessary to promote the health and elasticity of the skin and connective tissue to safeguard against premature rupture of the membranes.

**Zinc taste test
Colloidal zinc
Zinc ascorbate
Zinc citrate
Zinc picolinate
Zinc sulphate
Triple zinc**

Oysters 80mg per 12 oysters eaten

Calcium. Inadequate intake of calcium by the mother results in Calcium being taken from the mothers bones, increasing the risk of osteoporosis of the mother

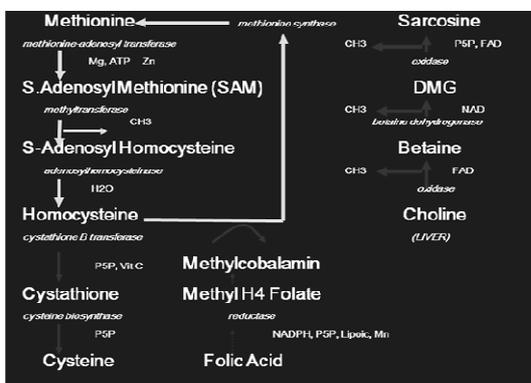
**Calcium liquid,
Calcium Citrate
Calcium Magnesium Citrate**

**Folic Acid. It is very sensitive and easily destroyed by light and cooking so usually need to supplement.
Folic acid is used with B12 to produce DNA and RNA.
RDA folic acid = 400 mcg/day to prevent neural tube defects.**

Including spinabifida and anencephaly. Folic acid is used with B12 to produce DNA and RNA. All nutrients involved in the degradation of homocysteine, including Folic acid, P-5-P and B12 have a relation to negative pregnancy outcomes, probably related to their impact on methylation.

Increased homocysteine levels implicated in neural tube defects, spontaneous abortion and placental abruption. Also in pre-term delivery and low birth weight.

The foetus, the neonate and the pregnant woman all have increased requirement for folic acid and vitamin B12 and are more likely to suffer deficiencies of these vitamins.



Derangement of methionine to homocysteine metabolism could be the underlying mechanism of neural tube defects and may be the mechanism of prevention observed with folic acid supplementation.

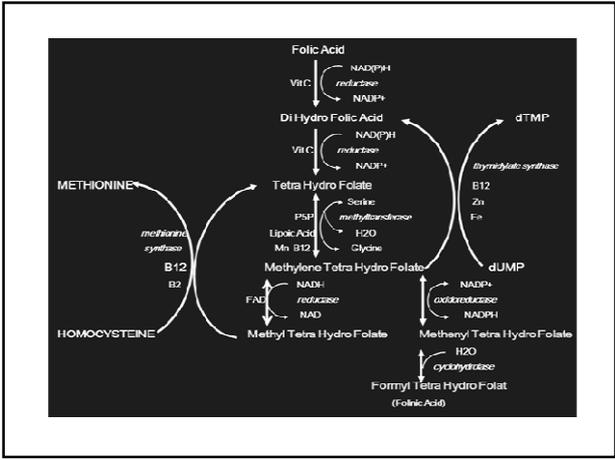
Derangement of methionine – homocysteine metabolism is found in 20% of cases with neural tube defects, recurrent miscarriage and placental abruption.

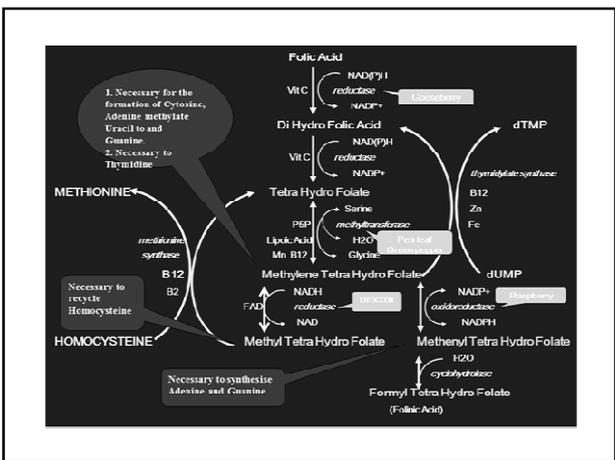
Homocysteine itself may be toxic to the embryo or may be an indicator of reduced availability of SAM for methylation of DNA.

A gene has been identified responsible for the increased incidence of NTD. The gene is 3x more prevalent in women with NTD infants. It regulates the activity of methyl H4 Folate reductase, the enzyme responsible for converting methylene H4 Folate to methyl H4 Folate -

- the form of folic acid involved in the remethylation of homocysteine to methionine. These women may have adequate dietary intakes of folates but improper conversion needed for homocysteine disposition.

Patients with the genetic polymorphism where there is congenital deficiency of the enzyme Methylene tetrahydrofolate reductase, which is needed for the formation of 5MTHF have reduced levels of methionine and SAM in the CSF and show demyelination in the brain and degeneration of the spinal cord.





Methylene tetrahydrofolate is the active form of folate to prevent neural tube defects

Folinic acid (Methenyl H4 folate) is more stable than folic acid and has a longer half life in the body. Folinic acid also readily crosses the blood brain barrier and is slowly cleared, compared to folic acid which is poorly transported into the brain and once in the CNS is rapidly cleared.

Vitamin B12. Low plasma levels of B12 have been shown to increase risk of NTD. Methylcobalamine is needed in the remethylation of homocysteine. Decreased adenysylcobalamine results in increased amounts of methlmalonyl CoA and general increase in glycine levels.

Methionine. Adequate methionine seems to exert a protective effect if there is folic acid deficiency. Lack of folic acid and methionine can result in foetal underdevelopment.

Phosphatidylcholine acts as a precursor to acetylcholine and choline.

The availability of choline and its metabolites is critical for optimal brain and nerve development and function.

Choline is also involved in the regeneration of methionine from homocysteine.

Taurine - Optimise dietary levels of protein and the nutrients required for its synthesis from cysteine and methionine (B6). There is virtually no taurine in plants and vegetables so supplementation may be necessary pre-conceptually.

During neonatal period total body levels and brain taurine reach a peak.

Deficiency can be associated with mental retardation.

CoQ10 - Plasma CoQ10 levels rise throughout pregnancy from week 18 and reach a high of about 50% above normal levels by week 36. Studies show that women with threatened abortion and spontaneous abortion have lower levels of CoQ10 than those with normal pregnancies.

Vitamin A has been shown to be teratogenic in pregnancy especially when taken in the first 2 months of pregnancy. The liver tetra hydro folate regulates liver folate metabolism and is suppressed in cases of high Vit A.

There is a higher incidence of birth defects in cases of high Vitamin A intake.

Beta carotene, the precursor to Vitamin A is not teratogenic.

**Mercury
Toxicity**

**Advise against mercury filling removal during pregnancy and ensure complete removal at least 3 months prior to conception
Mercury vapour is highly lipid soluble and enters from the oral mucosa.**

**Mercury traverses cell membranes including the blood brain barrier and the placental barrier. It is also found in breast milk.
Mercury concentrations have been found in the kidney, liver, GI tract, jaw and choroids plexus in the brain.**

Also found in all, areas of the brain involved in memory function (the medullary basal nucleus, amygdala and hippocampus). It can also be taken up by the retina of the eye and alter colour perception.

Starting with Mum

**Prenatal Nutrition
Choline
Folates
Vitamin B12
Iron
DHA**

**Vitamin D3
Multiple Vitamin / Mineral**

Infertility – inability to conceive after 1 year of intercourse without contraception
25% of couples will experience infertility
1/3 = male factors
1/3 = female factors
1/3 = combined factors
Infertility increases with age

Factors that reduce fertility in Males and Females
• Alcohol
• Caffeine - up to 300mg caffeine per day can reduce fertility by 27%. Caffeine also impedes the bodies ability to absorb iron and calcium
• Artificial Sweeteners

No hope if you drink alcohol, smoke,

drink coffee and take artificial sweeteners!

- Cigarettes-contributes to atresia in females and decreased sperm production in males
- Recreational Drugs
- Some prescription drugs
- Herbicides and Pesticides
- Mobile phones

Female Infertility

- Poor diet and nutrition
- Endometriosis
- XS athletic activity
- Too little or too much weight
- Past surgery and scarring
- Infections especially sexually transmitted diseases
- Atkins diet

Poor diet and nutrition

B3, B5, B12, Folic Acid, Mg
metabolise cholesterol which is a precursor to hormones.
Nutrients for pituitary function i.e. EFA, Vit A, C, E, Zn, Mg, Mn.
Oral contraceptives decrease Zn levels if taken over long periods.

Too much athletic activity

- Results in
 - ..Amenorrhea, not enough hormone produced for ovulation
- No cholesterol precursor

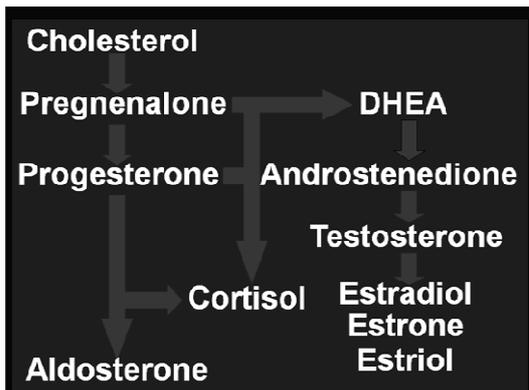
Endometriosis

- Check patient for toxin involvement and removal contributing to the endometriosis.
- 16 Hydroxyestrone – Methylating nutrients – Mg, Zn, P5P, B12, Folate, Betaine, DMG, Iodine.

Too much or too little weight

- 12% infertility due to weight problems.
- If underweight there is not enough fatty acids and essential nutrients to make hormones- need to supplement with Omega 3 and Prenatal nutrients.

- If overweight, often has associated hypoglycaemia and hypoadrenia –adrenal hormones interfere with conception
- Check out thyroid function. Main cause is Iodine or Selenium deficiency.



Relaxing on holiday-often when couples conceive

Past Surgery and Scarring
Past uterine or ovarian surgery
with resultant scarring preventing
implantation.

Test for Vit C

Magnesium

Vitamin E

Silica

Infections

Test for parasites,
especially toxoplasmosis.
(Usually responds well to
Black walnut), and treat
with relevant antiparasitic.

i.e. Wormwood, Cloves, Black
walnut, AP formula, Artemesia
annua.

Test for Bacteria and treat with
relevant antibacterial i.e. Smart
Vitamin D3, Colloidal silver,
Goldenseal etc

Test for virus ant treat with
relevant antiviral i.e. Smart Vitamin
D3, Colloidal silver, Echinacea,
Immune WHY 600

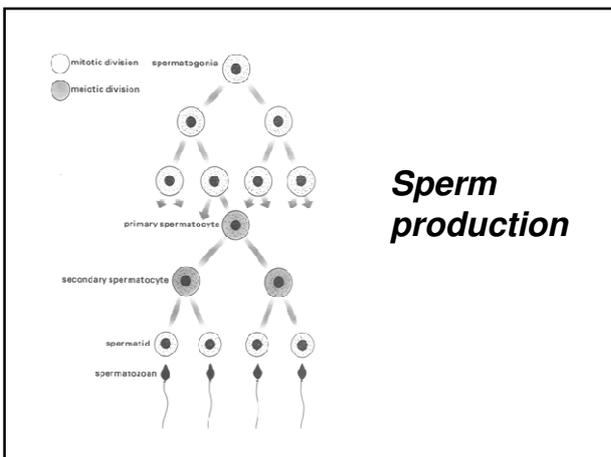
Test for Toxic Metals and Radiation and chelate with Ornithine, Phospholipid, Vitamin C

Test for chemicals and treat with chemical chelator i.e. NAC, Taurine + Colloidal Silver, Vitamin C, Yarrow, Lemon balm

Allow at least 3 months in female infertility to attain a normal level of hormones for conception.

Male Infertility

Sperm production requires Vit A, C, E, Folic acid and Zinc in conjunction with testosterone



Nutrient content of sperm includes Ca, Mg, Zn, Inositol and B12
Deficiency of Vit E causes degeneration of testicles.
It also acts as an antioxidant and has been shown to inhibit free radical damage to sensitive cell membranes.

It improves sperm mobility and enhances the ability of the sperm to penetrate the egg.

Vit E combined with Selenium supplementation shows the most significant increase in sperm motility.

Deficiency of B12. If an aging stomach lining fails to produce enough intrinsic factor a B12 deficiency results causing anaemia. Eventually can cause infertility in males and females. In one study, infertility caused by pernicious anaemia was reversed by Vit B12 administration.

In another study 375 men with low sperm counts were given methylcobalamin, more than half responded with increased sperm production. B12 is important in cellular replication, especially for the synthesis of DNA and RNA.

Deficiency of Zinc results in immovable, useless sperm and low sperm count. Zn is needed by the testes, seminal vesicles and prostate. Zn levels in the seminal vesicles is directly related to the sperm motility. The sperm are too weak to penetrate the egg.

Dietary Zn restriction reduces both sperm count and seminal plasma volume. Zn supplementation increases plasma testosterone. Each ejaculation corresponds to loss of 1mg Zn.

Zinc is a good indicator of fertility. The Zn concentration in semen corresponds to the number of sperm in fertile men. In rats Mn deficiency causes loss of semen. Deficiency of Selenium also shown to cause infertility.

**Co Q 10 is concentrated in the mitochondria and is involved in the energy production of the sperm.
Also acts as an antioxidant, preventing lipid peroxidation of sperm cell membranes.**

**Vitamin C helps with sperm agglutination problems.
Antibodies to sperm create this agglutination and Vit C decreases agglutination.
Vit C also shown to reduce sperm abnormalities and increase viability, motility, maturity and total sperm count.**

Vitamin C also helps protect sperm over free radical damage. In one study 30 infertile but otherwise healthy men were given 1gm Vit C and all their wives became pregnant compared to another control group given a placebo, none of which became pregnant.

Antioxidants-Polyunsaturated fatty acids and phospholipids are key constituents in the sperm cell membrane and highly susceptible to oxidative damage.

Sperm produce controlled concentrations of ROS, such as superoxide, H₂O₂ and NO which are needed for fertilization. However large concentrations of these free radicals can directly damage sperm cells.

Deficiency of some amino acids reduces sperm count.

L- Arginine is important for sperm mobility as it is a precursor in the synthesis of polyamines and as a precursor to nitric oxide. The polyamines putrescine and spermidine are organic components important to sperm movement.

Nitric Oxide within spermatozoa also appears to be necessary for adequate sperm mobility. Pathospermia (abnormal sperm) can be caused by abnormal Arginine metabolism. L- Arginine is also a testosterone precursor.

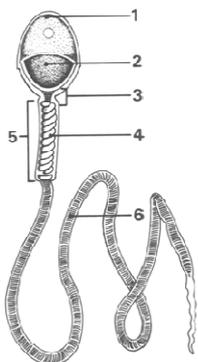
L-Carnitine contributes directly to sperm mobility and may be involved in the successful maturation of sperm. The main function of carnitine in the epididymus is to provide an energetic substrate for sperm.

Important because epididymal sperm use fatty acid metabolism as their main source of energy metabolism and tend to concentrate carnitine while it is in the epididymis, as carnitine is necessary for transport of fatty acids into the mitochondria.

Low levels of carnitine reduce fatty acid concentrations within the mitochondria, leading to decreased energy production and potential alterations in sperm motility.

Glutathione is vital to sperm antioxidant defences and increases sperm motility. Selenium and glutathione are essential to the formation of phospholipid hydroperoxide glutathione peroxidase, an enzyme present in spermatids.

It becomes a structural protein comprising over 50% of the mitochondrial capsule in the mid piece of the mature sperm. Deficiency of either glutathione or selenium can lead to instability of the mid piece, resulting in defective motility.



- 1. Head**
- 2. Neck**
- 3. Joins 4 to the body 5**
- 4. Mitochondria**
- 5. Body**
- 6. Tail**

Declining sperm counts linked with the action of xenoestrogens found particularly in organochlorine pesticides. Found particularly in male foetuses when mother was exposed to high levels of organochlorine pesticides over long periods.

Exogenous estrogens inhibit the development of Sertoli cells, which determine the lifelong capacity for sperm production.

Danish study showed organic farmers had higher sperm counts than those using pesticides. Generally there is a declining sperm count. Sperm count per ml is about half of that in 1940.

Alcohol is a reproductive tract toxin; consumed in a large enough quantity over a long enough period of time can cause infertility. It is at least partially reversible if males infertile from drinking avoid drinking it for a *moderate* period of time.

Smokers show increased cadmium levels in seminal fluid. Cigarette smokers have higher levels of circulating estradiol, and decreased LH, FSH and prolactin, all of which can impact spermatogenesis. Smokers with low prolactin levels demonstrate defects in sperm motility.



Nicotine can alter the hypothalamic-pituitary axis, affecting growth hormone, cortisol, vasopressin and oxytocin release, which then inhibits LH and prolactin. Smoking has also been shown to result in oxidative damage of DNA.

Damage to guanine part of DNA is 50% higher in smokers. The concentration of alpha tocopherol decreases by a third in the seminal plasma of smokers. Smoking and low antioxidant levels increase oxidative damage to sperm DNA.

As with females, test for infections

-

Chlamydia can reside in the epididymis and vas deferens affecting sperm development and fertility.

28-71% of infertile men have evidence of chlamydial infection.

• Test for heavy metals.

Lead can cause a significant decrease in male fertility.

Mercury has also been shown to decrease sperm quality and sperm production.

• Recent study shows mobile phones can reduce male fertility by one third. Researchers have found that radiation emitted from mobile phone use affects swimming mobility of sperm and sperm count.

**Presumably the same applies to females.
People tend to keep mobile phones in their pockets.**

Allow 3 months for any nutritional supplementation and dietary / lifestyle changes to provide the nutrients necessary to make healthy, viable sperm as spermatogenesis takes 74 days.

Age and fertility

Table 1. Infertility Increases With Age
Percentage of married women who are infertile by age group.

Age Group (years)	Percent Infertile	Percent chance of remaining childless ^a
20 - 24	7	6
25 - 29	9	9
30 - 34	15	15
35 - 39	22	30
40 - 44	29	64

Adapted from Menken J, Tausell J, Larsen U. Age and infertility. *Science*. 1986;231:1389.
* Historical data based upon the age at which a woman marries.

In the Female

- Fertility decreases with age, particularly after 35.
- Female is born with 1-million+ eggs. At puberty 300,000 eggs left.
- 300 will be ovulated during entire reproductive period of life, the rest undergo atresia (degeneration).

Table 2. Risk of Chromosomal Abnormality in Newborns by Maternal Age

Maternal Age (years)	Risk for Down Syndrome	Total Risk for Chromosomal Abnormalities
20	1/1,667	1/526
25	1/1,250	1/476
30	1/952	1/385
35	1/378	1/192
40	1/106	1/66
41	1/82	1/53
42	1/63	1/42
43	1/49	1/33
44	1/38	1/26
45	1/30	1/21
46	1/23	1/16
47	1/18	1/13
48	1/14	1/10
49	1/11	1/8

Source: *Maternal Fetal Medicine: Practice and Principles*. Cressy and Resnick, eds. W.B. Saunders, Philadelphia, PA. 1994:71. Reproduced with permission.

Degeneration of eggs

Smoking accelerates atresia and facilitates early menopause. Eggs in ovaries also age increasing possibility of genetic abnormalities. e.g. Downs syndrome.

Also when eggs from older women are fertilised the embryos are less likely to develop.

Women over 40 are at increased risk of miscarriage.

Table 3. Risk of Miscarriage (Spontaneous Abortion) with Increased Age

<i>Maternal Age (years)</i>	<i>Spontaneous Abortion (%)</i>
15-19	10
20-24	10
25-29	10
30-34	12
35-39	18
40-44	34
≥45	53

Adapted from P.R. Gindoff and R. Jewelewicz: Reproductive potential in the older woman. *Fertility and Sterility*, 46:989;1986.

Check for genetic markers and supplement accordingly

A>C	A>G	A>T	A>U
C>A	C>G	C>T	C>U
G>A	G>C	G>T	G>U
T>A	T>C	T>G	T>U
U>A	U>C	U>G	U>T

**In the Male
No maximum
age that a male
can father a
child e.g. Charlie
Chaplin at 82
years.**

**Nutrition
During
Pregnancy**

Recommended Daily Allowances

Female RDA (by age)	15-18	19-24	25-50	51+	Pregnant
Calories	2200	2200	2200	1900	+300
Protein	44	46	50	50	60
Vitamin E	9	8	9	8	10
Vitamin K	55	60	65	65	65
Vitamin C	60	60	60	60	70
Thiamin	1.1	1.1	1.1	1.0	1.5
Riboflavin	1.3	1.3	1.3	1.2	1.6
Niacin	15	15	15	13	17
Vitamin B6	1.5	1.6	1.6	1.5	2.2
Folate	180	180	180	180	400
Vitamin B12	2.0	2.0	2.0	2.0	2.2
Iron	15	15	15	10	30
Zinc	12	12	12	12	15
Selenium	50	55	55	55	65

Deficiency

• Multiple ways nutritional deficiency can occur

a) Primary intake deficiency

b) Secondary embryonic and foetal nutritional deficiencies caused by

Genetics

Maternal disease

Toxic Insults

Physiological stressors triggering acute maternal response

**All these can be significant contributors to the occurrence of birth defects
Improving the nutritional status of the mother can reduce frequency and severity of pregnancy complications.**

**• 50% human conceptions are lost before or during implantation
•15-20% of implanted pregnancies are lost before delivery
•3% of completed pregnancies result in a child with 1 or more congenital defects-causative factors can be identified for only 60% of these.**

**- Genetic defects 28%
- Multi-factorial Inheritance 23%
- Uterine factors 3%
- Twinning and specific toxicants 3%**

Intrauterine growth retardation (IUGR) is a marker for pregnancy complications

Risk factors for IUGR

- **Smoking**
- **Low maternal calorie intake**
- **Hypertension**
- ***Multiple pregnancies***

Mechanisms underlying the development of essential nutrient deficiencies

1. Inadequate dietary intake of essential nutrient

**2. Adequate dietary intake
although deficiency still occurs
due to**

- **Genetic Factors creating a
higher than normal
requirement for a nutrient eg
Acrodermatitis Enteropathica
require a large amount of Zn.
Because of a genetic defect in
Zn absorption**

**Menke's disease where
individuals suffer from Cu
deficiency due to
intracellular trafficking of Cu.**

**Gene Abnormalities
e.g. gene polymorphisms
associated with folate metabolism
can increase the risk of genetic
abnormalities**

3. Nutritional interactions can result in conditioned deficiencies eg dietary binding factors, such as fibre and phytate, can form a complex in the gut with essential minerals that limit their absorption. Zn deficiency results in individuals who consume phytate rich foods

Jack and the phytate beanstalk

4) Mineral to mineral interactions. If one mineral is involved in the metabolism of another, a deficiency of one may influence the other. Alterations in Fe metabolism are often observed in individuals with Cu deficiency.

Another interaction occurs when elements share a common transport site or ligand. Because of their similar physiochemical properties
Zn-Cu react
Fe-Mn react
Cd-Zn react
Zn-Vit A reactions.

These reactions can occur at multiple sites, including the gut, within the blood pool and within the placenta.
Metal-metal interactions can significantly influence the transport of metals into the developing foetus.

Importantly, metal-to-metal interactions can occur between essential and nonessential metals.
e.g. Exposure to high levels of Cadmium can result in secondary Zn deficiency which can be teratogenic.

4. Effect of drugs or chemicals on the metabolism of the nutrient

- a) Chelating drugs i.e. Chelation of Cu by D-Penicillamine
Chelation of Zn by EDTA**

Both these result in foetal mineral deficiencies.

- b) Drugs or chemical nutrients that influence the metabolism of a nutrient.**

For example a decreased absorption of some nutrients results from drug induced reduction in transit time. Also diuretics increase the urinary loss of some nutrients.

- 5) Acute maternal response to drugs and toxicants, physical stimuli and some diseases metabolising greater amounts of nutrients than normal.
e.g. Increased need for Folic and Ascorbic acid in response to the oxidative damage of smoking.**

**Essential
Micronutrient
Deficiencies and
Pregnancy**

Zinc
Severe Zn Deficiency during pregnancy is teratogenic. Typical malformations associated with severe Zn deficiency include cleft lip and palate, brain and eye malformations, and numerous abnormalities of the heart lung and urino-genital systems.

Biochemical and functional abnormalities can occur as a result of Zn deficiency. In animal models even transitory deficiencies (5-6 days) in Zn can be teratogenic and preconception Zn deficiency can adversely affect embryonic developments can drop in the plasma by more than 50% in 24hrs after Zn deficiency occurs.

The rapid effect on the developing foetus suggest a lack of substantial Zn stores in the embryo and foetus.

**Hypo-zincaemia can be a complication of disease states including
Diabetes
Hypertension
AIDs
Alcoholism**

**Physiological changes can exist for weeks or months in the mother due to toxicants including maternal tissue damage.
There are associated inflammatory responses. This stimulates a protein, metallothionein to be produced which binds to Zn.**

The function of this protein is to protect against metal toxicity. There is a resultant HYPOZINCAEMIA and reduced Zn transport to the foetus.

Long-term ingestion of Zn should be monitored as it can induce secondary Cu deficiency

Placental Zinc

A healthy placenta is the richest known source of Zn, containing between 300-600 mg depending on its size. In the animal kingdom and in some societies the placenta is eaten, valued for its high nutrient content. Eating the placenta immediately restores postpartum Zn levels.

Copper

A deficit of Cu during pregnancy can result in early embryonic death and gross structural abnormalities including skeletal, pulmonary and cardiovascular defects.

Biochemical, neurological and immunological abnormalities can occur.

Human infants with Menkes syndrome, an X-linked defect in the copper transporter ATP7A are characterized by hypothermia, neuronal degeneration, and abnormalities in hair, skin and connective tissues, bone fractures and widespread vascular abnormalities.

Iron
Maternal Iron deficiency has been shown to affect cognition, behaviour and motor development.

Selenium
Low blood selenium concentration correlates with increased risk of spontaneous abortion.
Also involved in oxidative defence system, cell signalling and regulation of cell growth.

Selenium is required for sperm motility.
Selenium is involved with the conversion of thyroxin (T4) to T3 intra-cellularly.
Selenium has a role in viral suppression, AIDS and is also implicated in delaying the aging process.

Vitamins
• Folic Acid deficiencies and neural tube defects-expand
• Carotenoids decrease in response to toxicants including maternal tissue damage.
• Choline important in hippocampal connections.

Dr. Williams, in collaboration with Dr. Warren H. Meck, associate professor in the Department of Experimental Psychology, opted to build an improved cholinergic system by adding choline to the diet when the cholinergic cells are being formed and making the synaptic connections in the brain. Cholinergic cells are special because they need choline to make acetylcholine but cholinergic cells, like all cells, also require choline to maintain their cell membranes. So, Dr. Williams supplemented pregnant rats with choline in their drinking water. This task taps into working and reference memories. "Amazingly enough, the rats which had pre-natal or post-natal or both pre- and post-natal supplementation of choline made fewer mistakes on the first day of training and the choline animals continually perform better than control rats even as adults," said Dr. Williams. In fact, rats which had both pre- and post-natal supplementation of choline demonstrated the greatest amount of permanent improvement in their memory capacity and precision. "Since those experiments were completed, the sensitive periods for choline administration have been determined to be prior to birth on days 12 to 17 in development and also days 15 and 30 after birth," said Dr. Williams. The former period occurs when all the cholinergic neurons in the basal forebrain form. The latter period also seems to be highly significant because it is when these developing rats are being weaned and synaptic connections are being made in the hippocampus and cortex that are critical in visuospatial learning and memory.

P-5-P Important to maintain adequate amounts of P5P to keep levels of Homocysteine low- decrease miscarriage etc

Hypervitaminosis A is teratogenic, resulting in craniofacial, limb, neural tube, heart and uro-genital system defects

EFA

**Omega 3 and Omega 6 required for optimal growth and development
Omega 3 especially DHA is decreased in pre-term infants. These babies cannot synthesise DHA from alpha linolenic acid in sufficient amounts to ensure adequate amounts to the brain and retina.**

Increased visual acuity and better problem solving ability in infants supplemented with DHA. DHA is essential for the proper development of the brain and retina in the foetus and infant, RBC levels DHA of infants born to mothers supplemented with DHA were 35% higher and blood plasma levels 45% higher.

Omega 3 supplementation has been shown to reduce the levels of preclampsia along with magnesium

All Nutrients associated with normal homocysteine production and re-methylation as pre-conceptually.

- Magnesium**
- Zinc**
- P5P**
- Methylcobalamin**
- MethylH4Folate**
- Betaine**

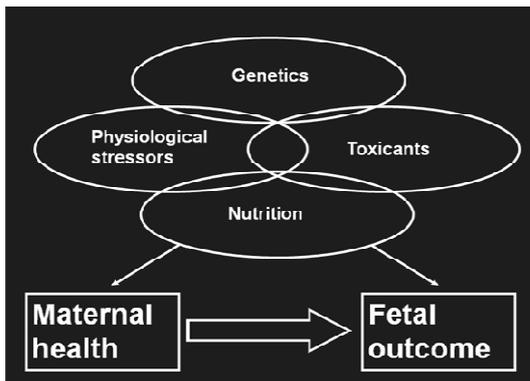
Genetic Consequences of Nutritional Deficiencies during pregnancy

1. Folic Acid deficiency can lead to neural tube defects
2. Maternal exposure to nutritional insults can have persistent effects on offspring eg decreased Zn can result in persistent effects on immune system function in the offspring even after Zn repletion.

3. Poor Iron intake during early development can result in persistent changes in dopamine metabolism, myelin composition, brain iron concentrations and behavioural disturbances
4. Perinatal Copper deficiency affects Moro reflex despite Copper repletion.

This suggests maternal nutrition influences the programming of certain foetal genes. Micronutrient deficiencies significantly effect the intrauterine environment and can influence the risk for certain diseases such as diabetes, hypertension and coronary heart disease.

**Maternal and environmental
interactive effects that can
influence the developing
conceptus**



**Morning
Sickness**

Low stomach acid (hypochlorhydria) causes the morning nausea and sickness often associated with pregnancy

Morning sickness is not all it seems

By Mark Henderson and Alexandra Freen

MORNING sickness is not nearly as bad as pregnant women think, according to new research from Canada. The findings suggest that while up to 80 per cent of pregnant women suffer from sickness many are nowhere near as ill as they feel: the impact of the nausea depends largely on mental outlook. That means doctors should make sure that their patients are offered counselling and psychological support as well as anti-nausea drugs. Toronto University scientists say their findings came after research published this year purporting to show that concentration and memory loss during pregnancy and immediately after childbirth, commonly referred to as "postnatal brain", are also not nearly as bad as women think.

That study, by psychologists from the University of Sunderland, suggested that women's perception of their condition was unduly affected by expectations of what was supposed to happen in pregnancy. While there is no suggestion that morning sickness is all or even mainly in the mind those women who considered themselves to have the most serious symptoms were not always the ones who were worst affected. Variations in physical symptoms explained only about 4 per cent of the variations in how ill the women felt. The remainder a probably owing to other factors, such as depression or family support. An estimated 80 per cent of pregnant women experience some form of morning sickness. Almost half of working women said that their effectiveness at work was affected by the condition, and a quarter took time off because of it.

The Times
4/9/03



Preggie Pops Naturally flavoured lollipops made especially to overcome morning sickness in pregnancy.

**Morning sickness
P-5-P
Ginger**

**Stretch marks
Rub into abdominal skin
Vitamin E and Vitamin D cream
2x day**

**Pre-Eclampsia
Omega 3 oils shown to reduce
levels of preclampsia.**

**Pre-eclampsia is often thought to
be a Magnesium deficiency but
Vitamin E and Selenium status
should also be assessed for.**

Pre-Labour
Raspberry leaf tea
can be taken from
30 weeks.

Labour
1. Zinc required for the
production of prostaglandins
and hormones essential to
initiate labour
2. Zinc promotes elasticity of the
perineum during labour and
birth. If perineal area is able to
stretch readily tearing and
episiotomies less likely.

3. Zinc deficient women tend to
have longer labours and require
more medical intervention
4. Zinc deficiency is linked to
weakening of the uterine muscle
tissue effecting the efficiency of
labour contractions.

5. Zinc packs into placenta at the end of pregnancy and copper levels rise
6. Following birth Zinc levels fall with expulsion of the placenta and Copper levels remain high, thought to be a factor in postnatal depression.

Test for specific type of Zinc i.e.
Colloidal Zinc
Zinc Ascorbate
Zinc Citrate
Zinc Picolinate
Triple Zinc

Magnesium is required for smooth muscle contraction of the uterus
Test for Colloidal Magnesium or Magnesium citrate.

P-5-P and L-Tyrosine can be given on tongue while SI 19 points tapped with concurrent uterine therapy localisation to decrease the pain of contractions



Post-Natal Depression

Post-Natal Depression Occurs usually 40-48 hours after birth or when the milk comes in.

Test mother for Magnesium deficiency following massive loss due to smooth muscle contraction through the labour.

Test mother for Zinc deficiency as there is high zinc loss on expulsion of the placenta.

Also Omega 3 fatty acids.

Cranial osteopathy

Predominant probiotics in treating depression states

- B. Bifidum**
- B. Lactis**
- L. Acidophilus**
- L. Breve**
- L. Casei**
- L. Salivarius**
- L. Lactis**

Lactation

Suckling

1. Suckling initiates afferent impulses that travel by sensory neurones from the areola to the hypothalamus. Here they stimulate magnocellular neurones that stimulate the posterior pituitary to release oxytocin. The oxytocin causes contraction of the myoepithelial cells and release of milk.

2. Human milk has high lactose content, providing 40% of the calories available to the infant. This is because the infants brain is large and requires glucose as a metabolic substrate and lactose is broken down to glucose and galactose prior to intestinal absorption.

Also lactose secretion obligates the secretion of a large amount of water due to osmosis supplying the infant's water requirements.

3. As lactose is only synthesised from glucose, maternal glucose utilisation is increased by 30% in fully lactating women.

Macronutrient Composition of Human Milk

Human vs. Bovine Milk Composition

Component	Human Milk	Bovine Milk
Carbohydrates		
Lactose	7.3 g/dl	4.0 g/dl
Oligosaccharides	1.2 g/dl	0.1 g/dl
Proteins		
Casens	0.2 g/dl	2.7 g/dl
α-Lactalbumin	0.2 g/dl	0.1 g/dl
Lactoferrin	0.2 g/dl	Trace
Secretory IgA	0.2 g/dl	0.003 g/dl
B-Lactoglobulin	None	0.36 g/dl
Milk Lipids		
Triglycerides	4.0 %	4.0 %
Phospholipids	0.04 %	0.04 %
Minerals		
Sodium	5.0 mM	15 mM
Potassium	15.0 mM	45 mM
Chloride	15.0 mM	35 mM
Calcium	8.0 mM	30 mM
Magnesium	1.4 mM	4.0 mM

1. The oligosacharrhides are complex sugars, which include glucose, galactose, fucose, N acetylglucosamine, N acetylgalactosamine, N acetylneuraminic acid, mannose and sialic acid.

These can act as growth factors for lactobacillus, which populates the GI tract of the breast-fed infant and as protective factors against bacteria. Fucose, galactose, mannose, galactosamine, glucosamine and sialic acid also binds B12 making it more bio available.

2. A histidine rich glycoprotein has been found in colostrum and breast milk that binds copper and zinc.

3. Human milk proteins include casein. This is low compared to other mammals due to slow growth of human infant. The casein is also bound to calcium and phosphate. Other proteins are alpha lactoalbumin, which synthesises lactose and lactoferrin.

This is a Fe binding protein found in colostrums and milk. As Fe is needed for bacteria to multiply, and lactoferrin binds to the Fe, it is therefore considered to have antibacterial properties. It protects against E Coli, Klebsiella, Pseudomonas and Listeria.

Lactoferrin is increased in colostrum and in mastitis. Other proteins are immunoglobulin IgA, lysosome, lipases, and growth factors.

4. Milk Lipids constitute about 4% of human milk. Most of these are triglycerides. 20% of these are derived from medium chain fatty acids made in the mammary gland and 80% are derived from plasma. Milk also contains phospholipids and cholesterol in small amounts

Minerals.

Milk contains small quantities of sodium, potassium, chloride, calcium and magnesium.

Milk contains predominantly Omega 6 fatty acids but ideally should contain equal Omega 3 and 6 fatty acids.

5. Amino Acids Human milk has high cysteine: methionine ratio and some taurine. Cows milk has low cysteine to methionine ratio and no taurine.

The human infant's liver and brain have low levels of cystathionase, the enzyme converting methionine to cysteine (the foetus and pre-term infant are completely lacking this enzyme).

Taurine is made from cysteine (by cysteinesulfonic acid decarboxylase enzyme). Cysteine is needed for CNS development. Taurine is needed for the infant for brain development and function, retinal development and function and conjugation of bile salts.

Also human milk is low in phenylalanine and tyrosine. Infants have limited ability to metabolise these, which can build up and cause PKU (Phenylalanine ketone urea)

6. Cholesterol is needed by the infant in challenging the development of cholesterol metabolising enzymes. It contributes to synthesis of nerve tissue and bile salts.

7. Check B12 deficiency in breast fed babies of strict vegetarian and vegan mothers

**Contaminants
in Human Milk**

1. Most lipophilic and hydrophilic compounds will pass from the mother into the milk
2. Many antibiotics, anticoagulants, anti-thyroid drugs, alcohol, nicotine and caffeine are transferred to the milk.

3. Many environmental contaminants which are stored in the body adipose tissue of the mother are mobilized during lactation and end up in the milk (such as pesticides, industrial contaminants like PCB's and radiation and many known carcinogens).

Need to test for baby weakening to mother's milk with surrogate and supplement if required the mother accordingly.

Mastitis

**1. Symptoms include fever, and painful red lumps in the breast.
2. Bacteria, viruses, parasites, fungi, radiation, chemicals or heavy metals can cause this. The infections can be systemic focalising in the milk duct creating a blockage, or passed by the mouth from baby to mother during suckling.**

**Treat with anti bacterial i.e. Colloidal silver, Goldenseal, antiviral i.e. Immune WHY 600, Echinacea
Digestive enzymes
Probiotics**

Radiations, chemicals or metals may be due to environmental exposure or mobilization from adipose tissue.

**Treat with Ornithine, Taurine (+silver), NAC, Vitamin C, Phospholipid or similar detox remedy.
(Lemon balm, Yarrow,)**

It is important that the infant continues to suckle to maintain milk production and continuous flow to drain the toxin.

Engorgement

Wrap chilled cabbage leaves around the affected breast.

Cracked Nipples
Rub Vitamin E over nipple,
making sure to clean it off before
feeding.

Check for fungal infections
locally and prescribe tested
antifungal herb applied locally.

**Increasing Milk
Production**

- 1. Increase infant suckling**
- 2. Increase water intake**
- 3. Take herbal galatagogue, such as Star anise, Chaste berry, Fenugreek, Milk Thistle Seed, Nettle Leaf, Raspberry leaf tea**
- 4. Black cumin seed oil**
- 5. Avoid large amounts of sage and parsley which may decrease milk flow**

**Raynauds Phenomena
(Blanching of the nipple)**

May occur in fingers, nipple or both. Occurs as a response to a drop in temperature. Occurs after feeding is over. After baby detaches, the nipple turns white and burns. It may then throb as the blood returns. This may last minutes or hours

Prescribe P-5-P, Vitamin B3, Vitamin E, EFAs, Selenium (for T3)

4. Toxins

Reactive oxygen species (free radicals) damage is the ultimate mediator of aging.

They are generated by

- a) normal oxidative processes**
- b) infections**
- c) environmental pollutants**
- d) hypoxia**

**The Generation of
Reactive Oxygen Species**

Hart and Setlow in the 1970's exposed DNA of various animals to UV light in order to fuse adjacent molecules of DNA. The length of time of DNA repair. The rate of self repair increased with the overall life expectancy of the animal, i.e. elephants time was shorter than mice.

Humans were found to have the fastest genetic repair rate known.

Later Schneider at the National Institutes for Aging verified that older cells repair themselves much less efficiently than do younger ones.

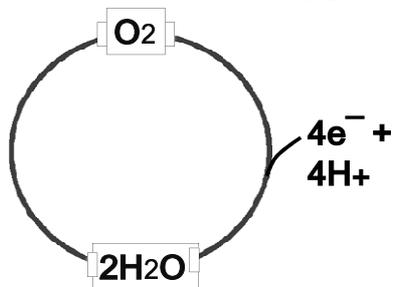
The overall conclusion is that aging results from the inability of DNA to keep up with the constant oxidative damage being inflicted on it millions of times per year.

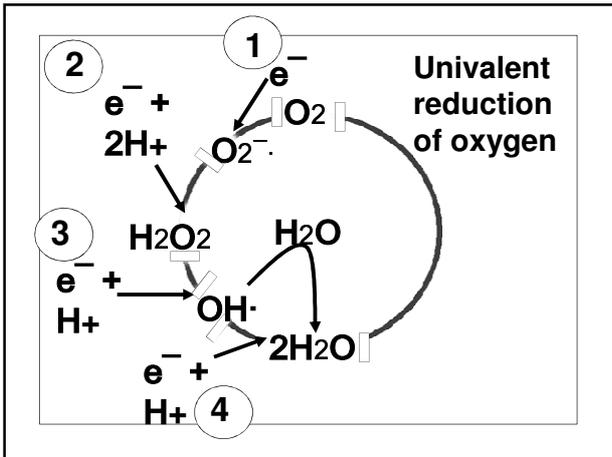
(Damage to the Book of Life)

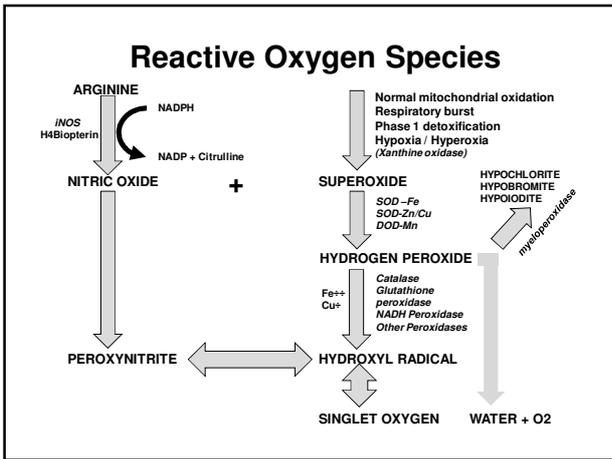
In the reduction of molecular oxygen at Complex IV 4 electrons are required.

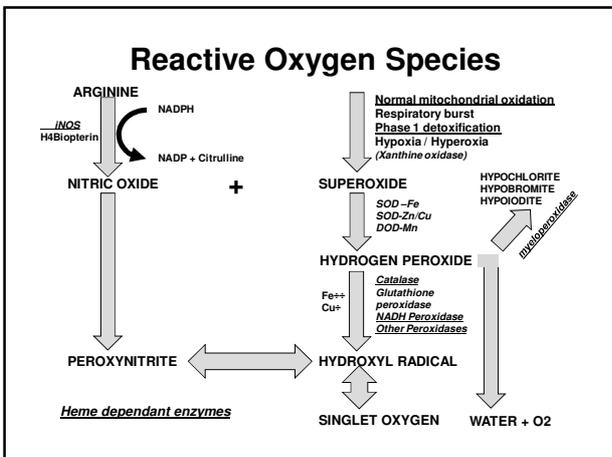
However, certain reactions permit this reduction to take place by a series of univalent reductions each of which requires a single electron.

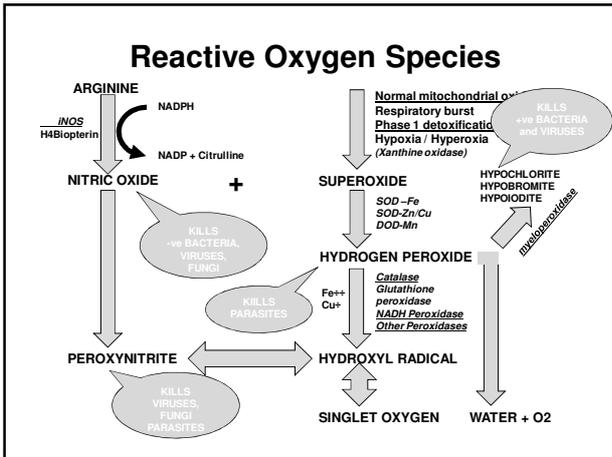
Normal $4 e^-$ reduction of oxygen











REACTIVE OXYGEN SPECIES (ROS) Challenges

1. SUPEROXIDE ANION	= SUPEROXIDE + NADPH + Fe
2. HYDROGEN PEROXIDE	= H ₂ O ₂
3. Glutathione Peroxidase	= Glutathione Peroxidase
NADH Peroxidase	= NADH Peroxidase
Peroxidase	= Peroxidase
Catalase	= Catalase
4. Hypochlorite anion	= H ₂ O ₂ + KCl or MgCl ₂
Hypobromite anion	= H ₂ O ₂ + KBr or MgBr ₂
Hypoiodite anion	= H ₂ O ₂ + KI or Mgl ₂
5. HYDROXYL RADICAL	= SUPEROXIDE + NADPH + Fe + H ₂ O ₂
6. NITRIC OXIDE	= NITRIC OXIDE (NADH + Fe)
7. PEROXYNITRITE	= NITRIC OXIDE + SUPEROXIDE +
8. SINGLET OXYGEN	= H ₂ O ₂ + HYPOCHLORITE

Antioxidants and enzymatic metabolism

Ultimate challenge for ROS

1. NF Kappa B

2. Cross check against

- Vitamin A
- Carotenoids
- alpha Lipoic acid
- Vitamin C
- Vitamin E
- CoQ10
- Selenium

Anti aging products

- 1. Epigenetics Multi or Nutrient Phase 1&2**
- 2. Phospholipid –Soy Lecithin, Sunflower Lecithin, Rapeseed Lecithin**
- 3. Cream**

Bone density

One out of every 2 people over the age of 70 years will suffer from a bone fracture as a result of osteoporosis with one in 5 diagnoses being in men.

Simple steps, starting young, would put all these percentages close to zero.

Women over 50 are more likely to get osteoporosis than breast cancer, heart disease and ovarian cancer combined.

In the case of hip fractures, one third die of complications within a year and for another third the rate of death remains higher than otherwise expected for years after a hip fracture, even in patients who seem to have made a full recovery.

Almost all of these cases could have been prevented.

Osteoporosis means “porous bones” (bones with holes) so brittle that they can fracture from the force than nothing more than a sneeze.

Osteomalacia means “soft bones”.

Osteopenia means low bone mass.

Most people don't pay any attention to their skeletons unless they break a bone. (There are 206 bones in the human body).

Bone is a living, growing and constantly changing tissue.

**Bone contains both organic and inorganic material. The principal proteins of bone are:-
Collagen Type 1 is the major protein comprising 90-95% of the organic material.
Collagen Type V is present in small amounts.
Other non-collagen proteins.**

**The inorganic or mineral component is mainly hydroxyapatite ($\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$) along with Sodium, Magnesium, Carbonate and Fluoride.
Approximately 99% of the body's calcium is contained in bone.**

Hydroxyapatite confers on bone the strength and resilience required by its physiological roles.

The dynamic structure of bone undergoes continuing cycles of remodelling, consisting of resorption followed by deposition of new bone tissue.

This remodelling permits bone to adapt to both physical (e.g. increases in weight bearing) and hormonal signals.

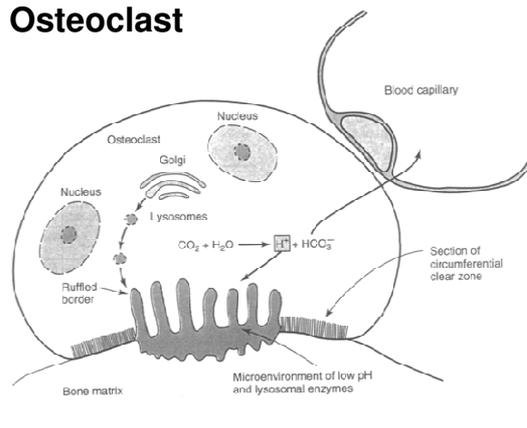
The major cell types involved with bone resorption are the osteoclasts.

Osteoblasts are involved with the deposition of bone.

Osteoclasts are multinucleated cells derived from pluripotent hemopoietic stem cells.

Osteoclasts possess an apical membrane domain exhibiting a ruffled border that plays a key role in bone resorption.

Osteoclast



A proton-translocating ATPase expels protons across the ruffled border into the resorption area, which is the microenvironment of low pH. This lowers the local pH to 4 or less, thus increasing the solubility of hydroxyapatite and allowing demineralization to occur.

Lysosomal acid proteases are released that digest the now accessible matrix proteins.

Osteoblasts – mononuclear cells derived from pluripotent mesenchymal precursors – synthesize most of the proteins found in bone as well as various growth factors and cytokines. They are responsible for the deposition of new bone matrix (osteoid) and its subsequent mineralization.

Osteoblasts control mineralization by regulating the passage of calcium and phosphate ions across their surface membranes (which contain alkaline phosphatase, a zinc dependant enzyme, used to generate phosphate ions from organic phosphates).

Several factors have been implicated in the mechanisms involved in mineralization.

Alkaline phosphatase contributes to mineralization but in itself is not sufficient.

Small vesicles (matrix vesicles) containing calcium and phosphate have been described at sites of mineralization, but their role is not clear.

Table 10.1 The principal proteins found in bone.

Proteins	Comments
Collagens	
Collagen type I	Approximately 90% of total bone protein. Composed of two $\alpha 1(I)$ and one $\alpha 2(I)$ chains.
Collagen type V	Minor component.
Noncollagen proteins	
Plasma proteins	Mixture of various plasma proteins.
Proteoglycans	
CS-PG I (biglycan)	Contains two GAG chains; found in other tissues.
CS-PG II (decorin)	Contains one GAG chain; found in other tissues.
CS-PG III	Bone-specific.
Bone SPARC-protein (osteonectin)	Not bone-specific.
Osteocalcin (bone Gla protein)	Contains γ -carboxyglutamate residues that bind to hydroxyapatite. Bone-specific.
Osteopontin	Not bone-specific. Glycosylated and phosphorylated.
Bone sialoprotein	Bone-specific. Heavily glycosylated, and sulfated on tyrosine.
Bone morphogenetic proteins (BMPs)	A family (eight or more) of secreted proteins with a variety of actions on bone; many induce ectopic bone growth.

Stimulated by copper dependant IGF-1

Type 1 Collagen appears to be necessary, with mineralization being first evident in the gaps between successive molecules.

Acidic phospho-proteins, such as bone sialoprotein (BSP) acting as sites of nucleation. These proteins contain motifs that bind calcium and may provide an initial scaffold for mineralization.

The skeleton is made up of two sorts of bone. About 80% is cortical (compact) bone which is hard, dense and stiff. It makes up the outer shell of most bones including the long bones of the arms and legs. It is designed to stand load bearing stresses.

Spongy trabecular bone is found inside the cortical castings, in the vertebrae, at the ends of the long bones and in parts of the pelvic bones.

It is estimated that approximately 4% of cortical (compact) bone is renewed annually in the typically healthy adult, whereas approximately 20% of trabecular bone is replaced.

Throughout childhood and into young adulthood, bone formation outpaces resorption, so that you get taller as your bones get longer and your bones also get wider and denser.

However the homeostasis between osteoblasts and osteoclasts becomes uncoupled around the age of 35 years and bone breakdown then outpaces bone formation ultimately leading to osteoporosis.

Osteoporosis is divided into two categories:-

Basically a nutritional deficiency

Type 1. which is postmenopausal osteoporosis, mainly affecting women between 50-65 years and usually involves trabecular bone more than cortical bone.
It is probably due to accelerated loss of bone mass.

Anabolic hormonal age decrease leading to a collagen, elastin deficiency

Type 2, which is age associated which typically involves loss of cortical bone equal to that of trabecular.
It is due to increased bone loss and slowed bone growth.

Osteoporosis known to be caused by medication (e.g. steroids) or disease is known as secondary osteoporosis.

Osteomalacia or soft bones, known as rickets in children, occurs when minerals fail to crystalize on the bone matrix properly (often due to a lack of Vit D which is required to utilize phosphorus, calcium, magnesium, Vit A and Vit E).

Osteomalacia is a lack of calcium and phosphorus forming into bone. It can be a precursor to osteoporosis.

Osteoporosis involves lack of other minerals in addition to a decrease in bone matrix.

Osteopenia is low bone mass and low density but not sufficient to lead to fractures.

It is a direct precursor to osteoporosis.

For healthy bones, both bone mass and bone density are key.

Signs of osteoporosis onset Pain on weight bearing, Kyphosis (Dowager's hump), Nocturnal leg and foot cramps, Extreme fatigue, Excess dental plaque, Peridontal disease, Loss of teeth, Brittle or soft fingernails, Premature hair greying, Heart palpitations.

The breakdown of bone takes place relatively quickly and the better part of each 120 day remodeling cycle is devoted to synthesizing new bone (synthesizing bone matrix proteins in addition to assembling the minerals that crystallize on it).

Four Phases of Bone Development

- 1. Bone building**
- 2. Plateau phase**
- 3. Resorption outpaces formation leading to bone loss**
- 4. Slow formation and deposition**

Phase 1. Half of all bone is made during the teen years. At skeletal maturity the bones will continue to increase in bone mass as long as formation stays ahead of resorption.

At Tufts Aging Centre a group of young women runners were compared with that of women who did no regular exercise. Even though they were 20% lighter than the non-runners, the runners still had stronger leg bones.

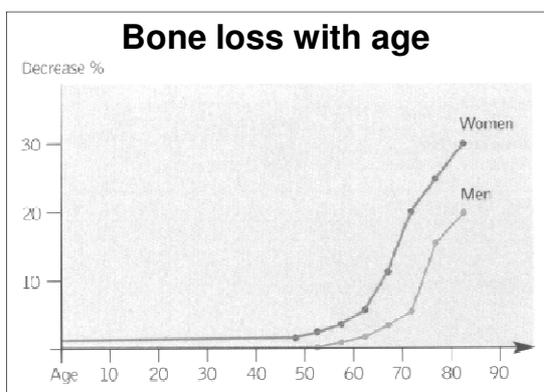
Research also showed that the runner's forearm bones were also denser, despite the fact that these bones are non-weight bearing. Somehow the whole skeleton shared the message to deposit more calcium into the bone tissue probably via the hormonal system triggered by gravity.

By aged 20 years 90% of bone mass is set and peak bone density is by mid to late 20's.

Phase 2. Plateau phase lasts for about 10 years!

Phase 3. By the age of 35 years there is a slow decline in bone mass. 0.5 to 1% per year. Resorption proceeds faster than deposition.

Post-menopausal women experience a sharp increase in bone loss for the first 5-10 years after menopause increasing to 3-5% loss each year thought to be due to a combination of lower progesterone and estrogen levels.



Women who have undergone surgical menopause (loss of ovaries) lose twice as much bone as other women at menopause because even post-menopausal the ovaries continue to produce a small amount of estrogens and other hormones.

Interestingly, women who have a partial hysterectomy and keep their ovaries also lose bone at an accelerated rate (though not as quickly as women with no ovaries) thought probably due to the uterus making Vit D.

**Rapid bone loss may begin several years pre-menopause especially in the spine and other trabecular bones.
Over a third of women pre-menopausal lose bone faster than even the expected rate of loss.
The rate of hip fractures rises dramatically for women in their early 40's.**

There is an accelerated loss of bone in men also but not until around 60-65 probably connected to the decrease in testosterone levels.

Men rarely lose as much bone mass as women do in menopause but still lose 1% of bone mass per year.

**Phase 4. Eventually the rate of bone loss in women slows again to about 1% a year throughout the rest of their lives, putting men and women on an equal footing by that point.
But by then rate of bone formation is also slowing down.**

By this age less calcium is being absorbed and less Vitamin D synthesized. Many older people do not eat optimal diets due to dental problems or living on their own.

Over an average lifetime, a woman loses 30-40% of her total bone mass and a man about 20-30%.

By aged 80, many women have lost two thirds of their skeleton. Because trabecular bone is softer to begin with, most bone loss begins there.

Loss in the spine begins as early as in the 20's. The denser cortical does not usually start to decrease until after 50. Thus, overall more trabecular bone is lost than cortical.

In the 10 years post-menopausal, when most bone is lost, women lose about 10% of their cortical mass and 25% of their trabecular bone mass before the rate of loss slows down and they end up with a lifetime decrease of about 35% cortical bone and 50% trabecular.

It is the dramatic decrease in trabecular bone (predominantly in the spine) that causes women to shrink – losing up to 6 inches of height by the time they are 80.

Men lose about 25% of the total of both kinds of bone over their lifetimes.

After bone loss starts (35 years), each decade increases the risk of fracture about one and a half times.

The younger the onset of bone loss, the higher the risk of fractures later in life.

Its never too late to start a bone density program.

Most important for both sexes, is the fact that the best way to avoid low bone density is to reach the point when the body naturally starts to lose bone mass with the healthiest, densest bones possible. You can do this only while young.

Genetics is important in determining peak bone density. One study of identical twins ages 6-14 showed that the twin given 1,800mg calcium a day up to puberty had bones 5% more dense than the other twin given 900mg a day. The 5% increase translates into a 40% drop in the risk of fractures in later life.

Gender

Women are at higher risk than men as their peak bone mass is not as high and that bone loss generally starts earlier in women than men because of menopause.

Age

The older a person is, the more likely they are to have lost bone. The biggest age related jump in risk for women remains menopause.

Body size and frame

Small boned and thin increases the risk of low bone density and osteoporosis. The body makes and stores estrogens in the body fat. Heavier women have higher estrogen levels after menopause. The less people weight, generally the less they eat.

Ethnicity

Caucasians and Asians tend to have higher risks as they have smaller frames than Africans, Hispanics and Polynesians. Modern research indicates that Afro-Americans now have equal risks to Caucasians.

Family history

Family history genetically increases the risk of lowering bone density especially if a mother, father, sibling, grandparent suffered from osteoporosis (or lost height, Dowager's hump, fractures).

Diet and Exercise History

Under-nutrition in childhood and teenage may lead to lower than optimal bone density. Little weight bearing physical exercise also leads to decreased bone density due to lack of muscle / bone stimulation.

Medications

The following medications can cause rapid bone loss.

1. Steroids inhibit Calcium absorption and uptake into bone (decreased bone formation) and increase Calcium excretion.

2. Thyroxin

Thyroid hormones optimize blood calcium levels and aids bone formation and remodeling. However excess thyroid hormones speeds up bone breakdown especially synthetic thyroxin.

3. 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.

H3 blockers to inhibit HCl stomach production can lead to the non ionization of food minerals, again leading to low calcium / magnesium uptake.

Chemotherapy

Chemotherapy drugs can be toxic to bone. Most patients are also inactive and poor appetites.

Diuretics

Used to treat hypertension, edema, congestive heart failure etc increase urinary output of minerals especially calcium.

Anticonvulsants

Anticonvulsants like phenytoin and barbituates taken to prevent seizures and epilepsy can damage bone density over time.

Antibiotics Long term antibiotic therapy like tetracyclin and frequent usage increases calcium excretion. They may also decrease intestinal absorption.

Other drugs that can interfere with bone remodeling –

**Cholestyramine,
Cyclosporin A
Gonadotrophin-releasing hormone
Methotrexate, Anticoagulants
Lithium, Benzodiazepines,
Warfarin**

Medical conditions Anorexia increases the risk of low bone density regardless of age. It leads to amenorrhea indicating low estrogen, and low protein and mineral intake.

High blood sugar inhibits the absorption of calcium and in the long term increases the risk of osteoporosis probably due to the relationship of insulin to bone breakdown. Diabetics generally have a 10% lower bone density.

Endocrine disorders
Cushing's syndrome
Hyperparathyroidism
Hyperthyroidism
Thyrotoxicosis

Bed rest and tube or IV feeding will lead to excess bone loss. Complete inactivity over time doubles calcium excretion.

Bone Booster
After bed rest of a week or more, taking 2000mg of calcium citrate a day for 7x as long as you were in bed.

Pregnancy During pregnancy insufficient dietary intake will lead to removal from the mother's bone. Multiple pregnancies, twins and older age pregnancy increases the risk to bone loss.

Breast feeding

If the calcium in breast milk is not optimal mother's bone calcium will be mobilized. Some studies have shown as high as 5% bone loss during lactation. Special protection needed with young mothers and older mothers.

Soft drinks (sodas)

Soda drinks are high in phosphorus (as phosphates) which lower blood calcium levels creating the mobilization of calcium from bone. Taking extra calcium supplements does not restore the imbalance.

Caffeinated sodas are doubly damaging.

Phosphorus also binds with magnesium, manganese, zinc and copper.

Seltzers contain no phosphorus and so are a better soft drink to consume.

Functional Test

Weak muscle strengthens to bone meal.

Strong muscle weakens to phosphorus?

High protein diets increase calcium loss. This is probably due to creating a more acidic environment requiring calcium to buffer and also high phosphate (added phosphates) intake.

1gm protein = 1mg of Calcium

Alcohol

Excess may interfere with calcium absorption and thus with bone growth in youngsters. Excess alcohol lowers bone density and increases the risk of fractures. Moderate alcohol consumption increases bone density possibly due to estrogen effect.

Caffeine

Caffeine is a diuretic leading to increased urinary calcium and other mineral excretion.

One average cup of coffee requires an extra 40mg calcium replacement. The older you get the more calcium each cup of coffee leaches out.

Diet soft drinks (sodas) have higher levels of caffeine than regular ones. Look for other sources of caffeine in medicines and diet aids.

Ideally to protect bone density no more than one caffeinated coffee per day.

Smoking

Smoking decreases oxygen availability and generates reactive oxygen species. It also partially blocks estrogen (also increases its metabolism).

Smoking women have menopause on average 2 years prematurely.

Smokers also tend to drink more caffeine and alcohol and poorer diets.

Smokers bone density is on average 15-30% lower than non-smokers.

Up to 20% of all hip fractures are attributed to cigarette smoking.

Salt

Excess salt increases calcium loss in some sensitive people. Probably when over 2000mg per day intake.

Beyond this level every 500mg (about the amount in a can of soup) reduces 10mg of calcium.

Sugar

Sugar may have an influence on calcium absorption. It has been shown to decrease phosphorus and to increase cortisol blood levels.

Toxic metals

- 1. Lead interferes with progesterone leading to decrease in osteoblastic activity.**
- 2. Cadmium increases the rate of calcium excretion. High cadmium in cigarette smoke.**

3. Tin is deposited into bone interfering with normal remodeling. The higher the tin the greater the need for zinc and copper to chelate. Tin inhibits HCl stomach secretion leading to insufficient mineral absorption. (Generally there is lower tin intake these days and also lower stomach cancer!)

PRINCIPLES OF A BONE-HEALTHY DIET

- Maintain a diet low in saturated fat.
- Cut back on animal protein. Aim for no more than 4 ounces of meat a day (a piece about the size of a deck of cards).
- Focus your menus on vegetables, fruits, beans and legumes, and whole grains.
- Get at least five servings a day of a variety of vegetables and fruits.
- Eat at least one green leafy vegetable every day.
- Have at least one serving of beans or legumes each day.
- Learn which foods are high in calcium, and include several servings every day.
- Add soy products and other sources of phytoestrogens into your diet.
- Limit the amount of soda you drink to no more than one a day.
- Limit caffeine to no more than one cup of coffee a day.
- Keep salt within the guidelines set out by the AHA: 2,000 mg a day or less.
- Drink no more than one alcoholic beverage a day.

HOW MUCH CALCIUM DO YOU NEED?

Infants up to 6 months	400 mg a day
Infants 6 months-1 year	600 mg a day
Children 1-5	800 mg a day
Children 6-10	800-1,200 mg a day
Teenagers and young adults (11-24)	1,200-1,500 mg a day
Women over 25 but not menopausal	1,000 mg a day
Pregnant and breast-feeding women	1,200-1,500 mg a day
Women after menopause, taking estrogen	1,000 mg a day
Women after menopause <i>not</i> taking estrogen	1,500 mg a day
Men 25-65	1,000 mg a day
Men over 65	1,500 mg a day

Types of Calcium Supplements

1. Calcium citrate
2. Calcium Magnesium citrate
3. Liquid Calcium
4. Calcium phosphate
5. Calcium Fluoride

Oxalates and Phytates

Oxalate foods – asparagus, spinach, parsley, chives, green beans, sorrel, rhubarb, swiss chard, summer squash.

Phytate foods – oats, wheat-bran, dried beans, dried peas

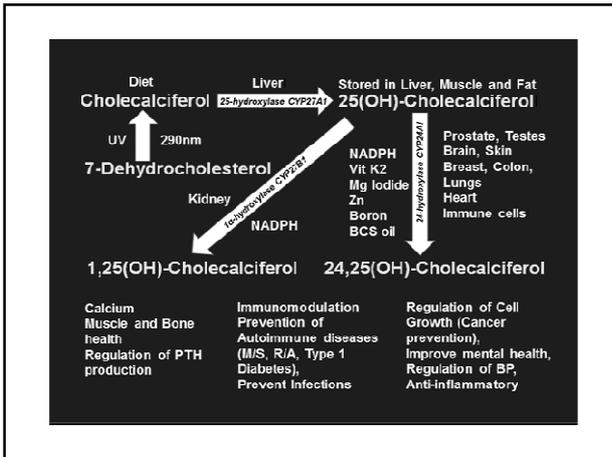
Calcium can interfere with iron absorption so supplement at different times.

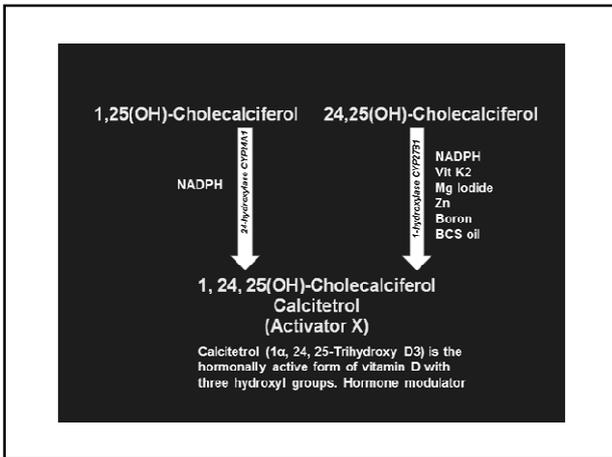
Calcium can interfere with the following medications –

- Thyroxin**
- Some antibiotics**
- Anticonvulsants**
- Corticosteroids**

Other important bone building nutrients:-

Vitamin D





- **Good for a patient who sweats around the head but not much about the rest of the body.**
- **Maybe indicated in osseous type pains.**

Other nutrients to consider

Vitamin K2

Attracts calcium to bones.
Activates osteocalcin – a bone matrix protein second after collagen.
Commonly deficient in osteoporosis.

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.

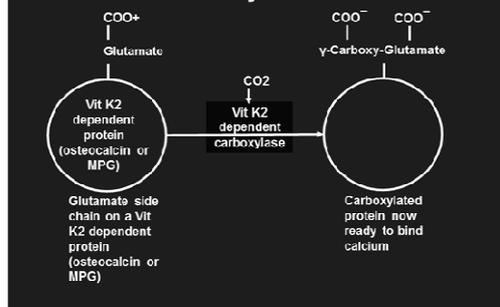


MK7 -By bacterial fermentation in the colon by B. Subtilis.

Phylloquinone (K1)

(fat soluble from plant tissue)

Gamma - carboxylation



Synthesis destroyed by taking antibiotics.

Must not be taken if on anticoagulants.

May act in preventing fractures post-menopausal as an alternative to HRT.

RDA 50-300mcg

Other nutrients to consider

Magnesium RDA 400mg

Boron RDA 2mg

Manganese RDA 2mg

Selenium RDA 200mcg

Silicon no RDA 1-2mg

Other nutrients to consider

**Pyridoxal-5-phosphate
Aids progesterone synthesis
Metabolises homocysteine**

RDA 1-25mg

**Methylcobalamin
Recycles homocysteine**

RDA 1mg

Other nutrients to consider

Vitamin C

Formation and repair of cartilage and collagen in bone

Increases calcium absorption

RDA 1000mg

Other nutrients to consider

Zinc

Is used in the creation of osteoblasts and osteoclasts and in bone proteins.

It assists in tissue repair and aids Vitamin D to function.

Aids in progesterone synthesis.

Other nutrients to consider

Copper Slows bone breakdown and assists in repair. Important component of IGF-1.

The total body copper content is 75-150 mg.

Highest copper concentrations are found in the liver, brain, heart and kidneys.

Many factors are involved with the regulation of bone metabolism, some stimulating or inhibiting osteoblasts and others stimulating or inhibiting osteoclasts.

Factors stimulating Osteoblasts

- 1. Parathyroid hormone**
- 2. 1,25-Dihydroxycholecalciferol**
- 3. T3 and T4**
- 4. hGF and IGF-1**
- 5. PgE2**
- 6. TGF- β**
- 7. Progesterone, DHEA, Testosterone**

Factors inhibiting Osteoblasts

- 1. Corticosteroids**

Factors stimulating Osteoclasts

- 1. Parathyroid hormone**
- 2. 1,25-Dihydroxycholecalciferol**
- 3. IL-1 and IL-6**
- 4. TNF**
- 5. TGF- α**

Factors inhibiting Osteoclasts

- 1. Calcitonin**
- 2. Estrogens by inhibiting IL-6 production. Ipriflavone, DHEA?**
- 3. TGF- β**
- 4. IFN- α**
- 5. PgE2**

Plasma calcium exists in 3 forms

- 1. Complexed with organic acids e.g. citrate, phosphate**
- 2. Protein bound primarily with albumin**
- 3. Ionized at 1.1-1.3 mmol/l is the most biologically active.**

Parathyroid hormone (PTH) increases when plasma Ca^{++} levels decrease via the stimulation of the conversion of pro-PTH to PTH. Vitamin D acts to decrease this conversion. PTH synthesis is increased in prolonged hypocalcaemia or Vitamin D deficiency.

Calcitonin
Limits the release of calcium from bones into the blood thus slowing down bone breakdown. Estrogen stimulates its natural production from the thyroid gland. Extracted from salmon.

MENOPAUSE

High Prolactin with hot flushes
Consider P-5-P
Colloidal Zinc
Colloidal Magnesium
Chasteberry

Fibroids High 4 Methoxyestradiol
and 4 or 16 Methoxyestrone
Consider P-5-P
Colloidal Zinc
Colloidal Magnesium
Colloidal Selenium – Glutathione
Sulphur
Acetylation
Glucuronidation

The
Pantaloon
65-? years

As men age their testes get smaller and softer and sperm morphology (shape) and motility decline.

Test with different forms of Zinc.

Colloidal zinc

Zinc ascorbate

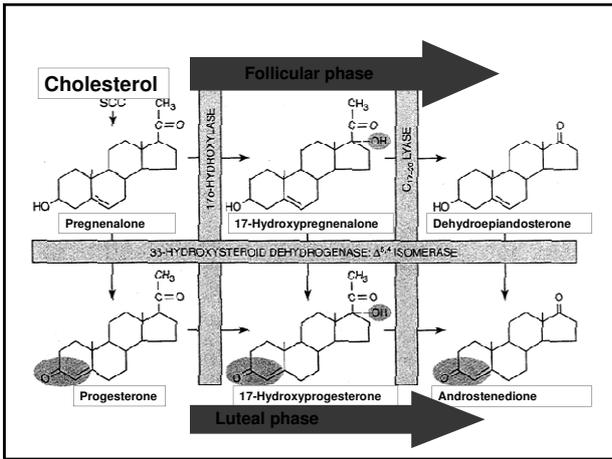
Zinc citrate

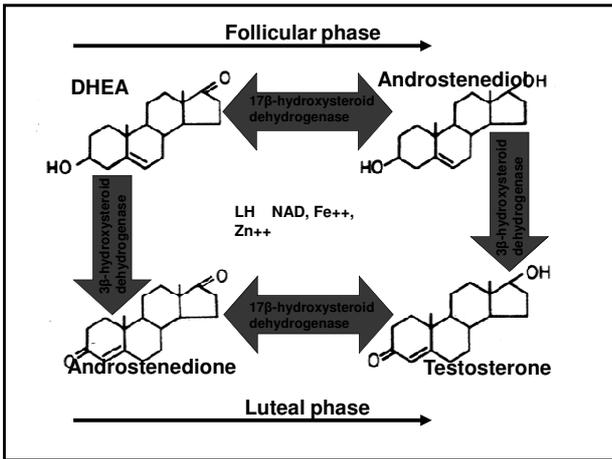
Zinc picolinate

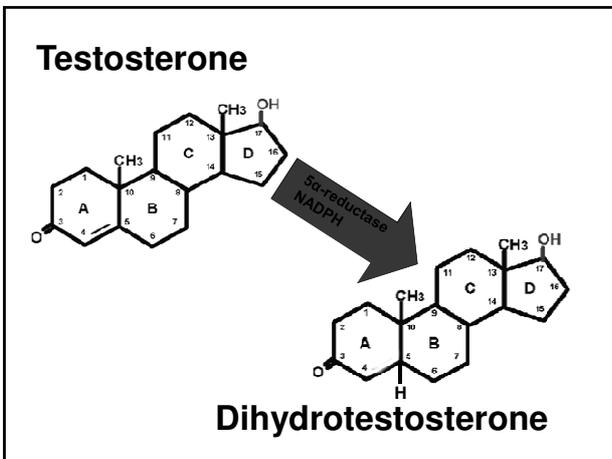
Triple zinc

Problems with libido or erections can be due to toxicity i.e. heavy metals or testosterone deficiency

**The synthesis of the
ANDROGENS
(testosterone)**







Prescribe, Adrenal Support or individual nutrient in pathway

P-5-P

Colloidal Zinc

Colloidal Magnesium

Ornithine



**Dr
George
Goodheart**



There are four factors that influence aging

- 1. Premature cognitive commitments**
- 2. Exercise**
- 3. Nutrition**
- 4. Toxins**

**1. Premature
cognitive
commitments**

We become committed to a certain reality of aging. People grow old and die because they see others grow old and die.

The collective mindset of what aging is supposed to be creates our perspective of what being old is and we become this accepting its biological expression.

Experiment using 100 70 year olds who were put into a time frame of 30 years previously. Told to be the person they were then and were provided with the props of the era.

10 days later collective changes were observed, all senses were heightened and there was a reversal of the aging process by several years.

Sensory experience is programmed into the CNS and subsequent perceptions reinforce what we now hold to be true.

e.g. of elephant on chain tether, fish divided in tank and cats brought up with horizontal and vertical lines.

The CNS takes in 1 billionth of stimuli that are available to it, but it only takes in those stimuli that reinforces what it thinks exists. Our sensory experience edits out everything that we don't think exists and brings in everything we think exists.

Reality = Infinite possibilities coexisting at any one time.
We can reinterpret reality because we are not the thought but the thinker of the thought.

We have choice and to change things we should.
a) Recognise our precognitive commitments
b) Change ourselves which changes society which ultimately produces a change in collective consciousness.

Awareness is a field of energy and information. It is the mind's faculty for having thought before thought is actually present. Retaining awareness is the mark of non aging. Giving it up in favour of habits, rituals, rigid beliefs and outworn behaviour is the mark of aging. Life is awareness in action.

There is an assumption that growing old is something that happens to people. Now we are seeing that growing old is something that social conditioning taught our bodies to do. If aging is something that is happening to you, then basically you are a victim.

But if aging is something you learnt, you are in a position to unlearn the behaviour that is making you age, adopt new beliefs and be guided into new opportunities.

Our inherited expectation that the body must wear out over time, coupled with deep beliefs that we are fated to suffer, grow old and die, creates the biological phenomenon we call aging.

“People grow old and die because they see others grow old and die” - Shankara
“Belief creates biology” – Norman Cousins.

The three Ages of Man

- 1. *Chronological age* – how old you are by the calendar.**
- 2. *Biological age* – how old your body is in terms of critical life signs and cellular processes.**
- 3. *Psychological age* – how old you feel you are.**

After decades of intense investigation, there is no adequate theory of human aging. Even our attempts to explain how animals age have resulted in more than 300 separate theories, many of them contradictory.

Negative factors that accelerate aging.

- 1. Depression**
- 2. Lack of regular daily routine**
- 3. Lack of regular work routine**
- 4. Job dissatisfaction** Highest risk of heart attack
- 5. Inability to express emotions**

Positive factors that retard aging

- 1. Happy marriage or satisfying long term relationship**
- 2. Job satisfaction** Lowest risk of heart attack
- 3. Feeling of personal happiness**
- 4. Regular daily routine**
- 5. Regular work routine**

Larry Scherwitz taped conversation of 600 men, a third who were suffering from heart disease, the rest of whom were healthy. Listened to the tapes he counted how often each man used the words “I”, “Me” and “Mine”. He found the men who used the first person pronoun most often had the highest risk of heart trouble.

Flanders Dunbar’s 1957 study on fit and healthy pre-centenarians

- 1. Responding creatively to change (the most important finding)**
- 2. Freedom from anxiety**
- 3. The continued ability to create and invent**
- 4. High levels of adaptive energy**
- 5. A capacity to integrate new things into one’s existence**
- 6. Wanting to stay alive**

George Vaillant 1944 took 185 young men and monitored their health for 40 years. He found that even if someone appeared perfectly healthy in youth, he was very likely to die prematurely if he reacted poorly to stress, fell prey to depression or was psychologically unstable.

Of the men who had the best mental health, only 2 became chronically ill or died by aged 53. Of the 48 men with the poorest mental health however, 18 – almost 10x as many – were chronically ill or died by age by that age. He concluded that early aging was retarded by good mental health.

The most formative years for establishing these conditions were between 21 and 46, because those are the years when a person generally succeeds or fails in establishing a secure sense of self, regardless of even the most terrible childhood traumas and abuse.

Once the seed is planted, the results of mental health show up physically in one's 50's. Late middle age is the perilous decade because it is then that premature heart attacks, hypertension and many types of cancer first show up in great number.

Vaillant found that the aging process is learnt. People with good health teach their bodies to age well, depressed, insecure and unhappy people teach their bodies to age badly.

Stress did not make people sick, giving up their inner adaptability to stress does.

The greatest threat to life and health is having nothing to live for.

Bernice Neugarten in 1973 life satisfaction in people 80-100 yrs

- 1. Take pleasure from daily activities.**
- 2. Regards their life as meaningful**
- 3. Feels they have achieved their major goals.**
- 4. Holds a positive self image**
- 5. Is optimistic**

King Solomon said

**“Gladness of heart is life to a man,
Joy is what gives him length of days”.**

Belloc and Breslow followed the aging patterns by lifestyle questionnaires of 7000 people. After 5½ years, 371 had died. By looking back at the original responses, researchers discovered that the most important distinguishing features of those who survived was not their income, physical condition or genetic inheritance, but a handful of extremely simple lifestyle habits.

- 1. Sleeping 7-8 hours per night.**
- 2. Eating breakfast every day.**
- 3. Not eating between meals.**
- 4. Normal weight (<5% - >20%).**
- 5. Regular physical activity.**
- 6. Moderate alcohol drinking – no more than 2 drinks per day.**
- 7. Never smoking cigarettes.**

Belloc found by analysing the results that a 45 year old man who observed from 0 – 3 healthy habits could expect on average to live another 21.6 years.

Someone who followed 6 or 7 good habits could expect to live 33 more years.

The cumulative results were not quite as dramatic for women.

Walter Boritz – coined the term “disuse syndrome” - when a person decides to give up physical activity, he essentially invites his entire physiology to atrophy. As a result a constellation of problems appear.



- 1. Heart, arteries and other parts of CVS become more vulnerable.**
- 2. Muscle and skeleton become more fragile.**
- 3. Obesity becomes a high risk**
- 4. Depression sets in**
- 5. Signs of premature aging indicate that the body is biologically older than its calendar years.**

Half senile cases result from

- 1. Malnutrition (especially B12)**
- 2. Side effects of drugs**
- 3. Smoking**
- 4. Alcohol abuse**
- 5. Dehydration**
- 6. Depression**
- 7. Inactivity**
- 8. Hypothyroidism**

In place of the belief that your body decays with time, nurture the belief that your body is new at every moment.

In place of the belief that your body is a mindless machine, nurture the belief that your body is infused with the deep intelligence of life, whose sole purpose is to sustain you.

What makes us old isn't the stress so much as it is the perception of stress.



2. Exercise

Exercise should be

- a) Enjoyable**
- b) Regular**
- c) Cause no strain on your physiology**

Age should not be considered a deterrent to exercise. Many of the biological and psychological processes of aging may be due to inactivity. Exercise may modify the aging process.

Saltin asked 5 men, ranging in condition from extremely fit to sedentary, to remain lying in bed for 24 hours a day for 3 weeks. At the end of that time all the subjects suffered a decrease in aerobic capacity that was equal to 20 years of aging.

When each subject was allowed to stand up out of bed for 5 minutes per day, almost the entire loss of function was prevented. They did not have to move around or in anyway use their muscles, just the exposure to gravity.

Evans and Rosenburg in 1965 from Tufts University found all 10 biomarkers of aging were improved by exercise regardless of age.

- | | |
|-----------------------------------|--------------------|
| 1. Muscle mass | 2. Strength |
| 3. Basal met rate | 4. Body fat |
| 5. Aerobic capacity | 6. BP |
| 7. Blood sugar tolerance | |
| 8. Cholesterol / HDL ratio | |
| 9. Bone density | |
| 10. Body temperature | |

Ideal exercises are

**Swimming
Brisk walking
Yoga**

Jogging can cause problems with women.

The optimal exercise program involves 30 minutes 3x week.

By 2030 20% of the population will be over 70 years. Regular exercise has been shown to increase maximum oxygen uptake, cardiac output, stroke volume, myocardial vascularization, capillary density in skeletal muscle, exercise endurance, metabolism, -----

HDL cholesterol, muscle strength, endorphin release, fibre sprouting, glucose tolerance, bone density, strength of ligaments, tendons and joints.

Physical activity lowers heart rate, blood pressure, lactate production and platelet aggregation.

3. Nutrition

Lifespan has been extended by decreased nutritional intake. Rat and mice models indicate extended life span with 50% calorie intake.

Is calories and not nutrients.
Framingham Heart Study showed increased health benefits with reduced body weight.

However statistical analysis by the National Institutes on aging has shown that overweight individuals survive longer. This “gain as you age” advice is only for those who are strictly healthy and does not apply to diabetics, hypertensives and CV disease individuals.

Early primate studies suggest that calorie restriction can retard some of the decline in metabolic processes associated with aging, most notably insulin resistance.

**Calorie restricted humans have lower body temperatures and insulin levels and high levels of DHEA.
Examining participant data from the Baltimore Longitudinal Study of aging found that men in half of the above study population lived longer than men in the other half.**

How does calorie restriction work

- 1. Reduces free radical and glycation reactions**
- 2. Retards aging in the CNS, reproductive and hormonal system**

Downside

Reduced ability to deal with hypothermia due to lower fat content.

Poor wound healing response.

**Second
Childhood**

?-?

Evidence for Reduced Nutrient levels in older age

- **Reference Nutrient Intakes (RNI's) for the over 65's and over 85's and percentage of individuals in the UK receiving less than the RNI's in Non Institutionalised Individuals.**
- **Finch et al., 1998**

NUTRIENT	RNI	65 and over	85 and over
Vitamin A	730mcg	84%	82%
E. Carotene	930mcg	38%	36%
Thiamine	0.8mg	16.0%	21%
Riboflavin	1.2mg	36%	37%
Niacin	1.4mg	2%	7.5%
Pantothenic	6mg	84%	90.5%
Pyridoxine	1.1mg	26%	38%
Biotin	50mcg	95%	98%
Folic Acid	230mcg	38%	50%
B12	1.5mcg	3%	3.5%
Vitamin C	40mg	34%	47%
Vitamin D	10mcg	97%	98%
Vitamin E	15mg	95%	97%
Calcium	700mc	45%	53%
Magnesium	285mg	88%	91%
Potassium	3500mg	91%	98%
Iron	8.7mg	49%	45%
Zinc	8.2mg	61.0%	58%
Iodine	140mcg	46%	47%
Copper	1.2mg	88%	90%
Selenium	68mcg	NS	NS

Diet for Dementia (M. Morris combination of Mediterranean diet and the DASH diet)

1. **4 / 5 Leafy green vegetables**
2. **Orange / Red fruit and vegetables**
3. **Berries**
4. **Nuts especially almonds and walnuts**
5. **Beans and pulses**

- 6. Olive oil or rapeseed +pumpkin seed oil
- 7. Fish - oily
- 8. Skinless chicken (but no B12!)
- 9. Whole grains – use Kamut wheat, gluten sensitivity?
- 10. Red wine – resveratrol and other polyphenolics.

Summary of Nutrients to Consider for Managing Memory Loss and Dementia

- 1. Energy production
- 2. Mitochondria regeneration
- 3. Hypoxia
- 4. Antioxidants
- 5. Detoxification
- 6. Acetylcholine synthesis

- 1. Energy production
- B Complex
- Smart Magnesium
- alpha Lipoic Acid
- Smart Thinking Oil (DHA)

2. Mitochondrial regeneration
Smart Zinc for DNA polymerase
CoQ10
Smart Turmeric
Vitamin B12
Folates
Vitamin B6 (P-5-P)
Vitamin C
Smart Thinking Oil (DHA)
Coconut oil

2. Mitochondrial regeneration
Smart Vitamin D3
Alpha Lipoic Acid + AcetylCarnitine

3. Hypoxia
Smart Thinking Oil (DHA)
Vitamin B12 (Adenosylcobalamin)
Smart Magnesium
Smart Zinc
Biotin
CH₂H₄Folate / H₄Biopterin
Vitamin B6 (P-5-P)
Vitamin C
Iron

4. Antioxidant Support

Smart Turmeric

Cloves / Cinnamon

Smart Vitamin E

Reduced Glutathione

Lutein

Ginkgo biloba

Lemon balm

Rosemary

Green tea

5. Detoxification

Smart Turmeric

Coriander

Yarrow

Lemon balm

NAC

Black walnut tincture

Smart Probiotics

6. Acetylcholine Synthesis

Smart Magnesium

B Complex

Choline or Phosphatidylcholine

Vitamin B1 (Thiamine PP)

Manganese

Smart Zinc

Bruce Ames Formula
Acetyl-L Carnitine 400mg
+
α-Lipoic acid 100mg
