Nutritional Therapy and Eastern Nutrition year 1

Lecture 1

First year lectures
Western Nutrition

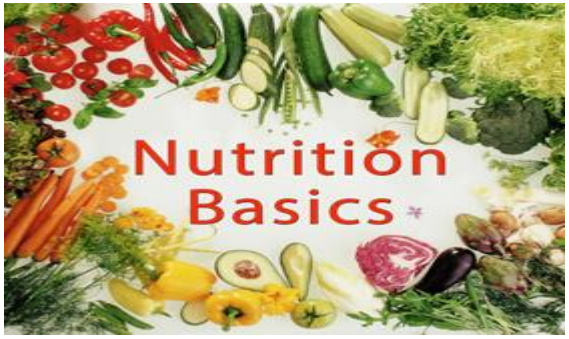
- Lecture 1: carbohydrates, fats and proteins, vitamins and minerals
- Lecture 2: evolution of human nutrition, history of nutritional medicine, effects of food processing, nutrition through life stages, various diets
- Lecture 3: biochemistry, SNP's, the stress response, importance of digestion, taking a case history, working with clients

Second year lectures
Eastern Nutrition and Naturopathy

- Detoxification
- Naturopathic philosophy and nutrition
- Unani diet and nutrition
- Ayurveda, Chinese and Tibetan approaches to diet and nutrition
- Working with clients

Diploma Unani Tibb

- First year: Nutrition Advisor: FNTP
- Second year: Nutritional Therapist: FNTP and Associate Naturopath: SoN
- Third year: diploma in Unani Tibb: AUTAM + opportunity to be Registered Naturopath ND with SoN.



Objectives

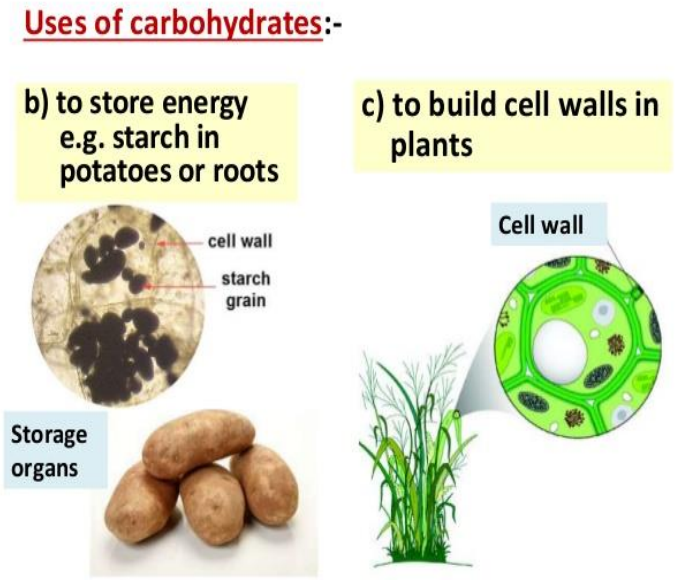
- To cover the content in Units 2-6
- To have an understanding of the macro nutrients: Carbohydrates, Proteins and Fats
- To have an understanding of the micronutrients: Vitamins and Minerals
- To be able to work through a simple case history and advise on bulk nutrient balance

Carbohydrates

Carbohydrates

Can be sub divided as follows:

- Monosaccharides
- Disaccharides
- Oligosaccharides
- Polysaccharides

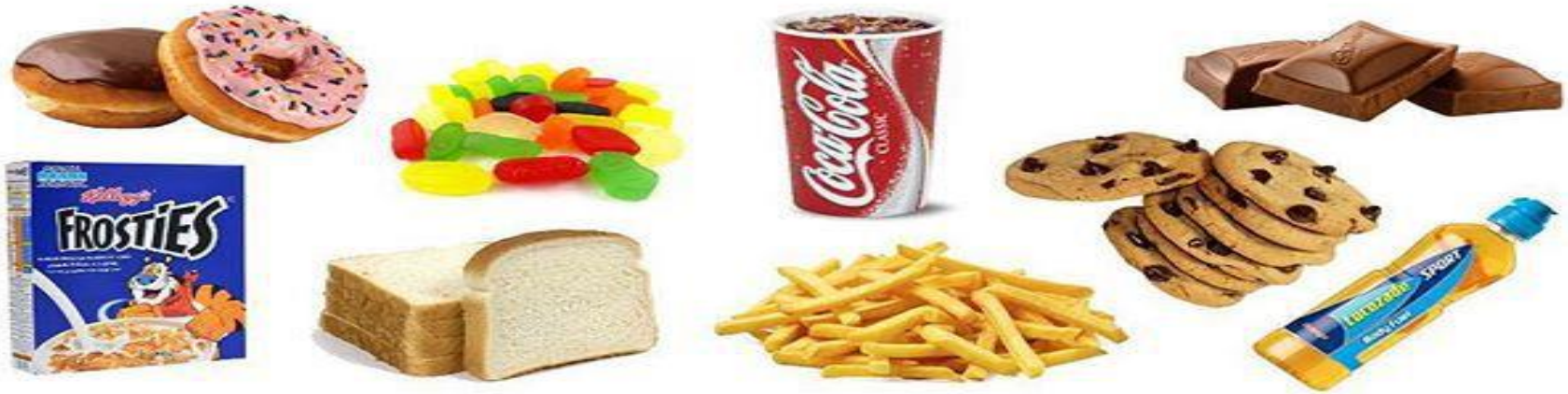


- *Above is determined by chain length.*

Carbohydrates

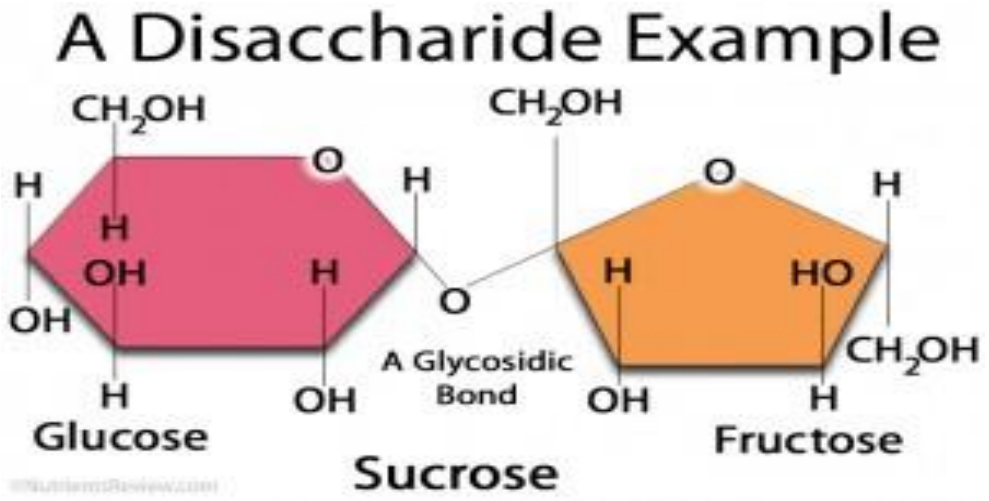
✔ COMPLEX CARBS

✘ SIMPLE CARBS



Carbohydrates

- Disaccharides:
  - Sucrose
  - Lactose
  - Maltose

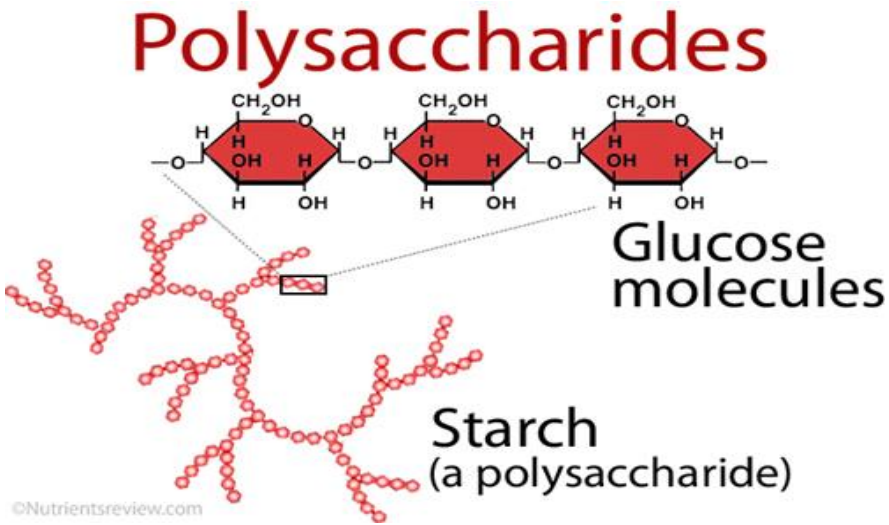


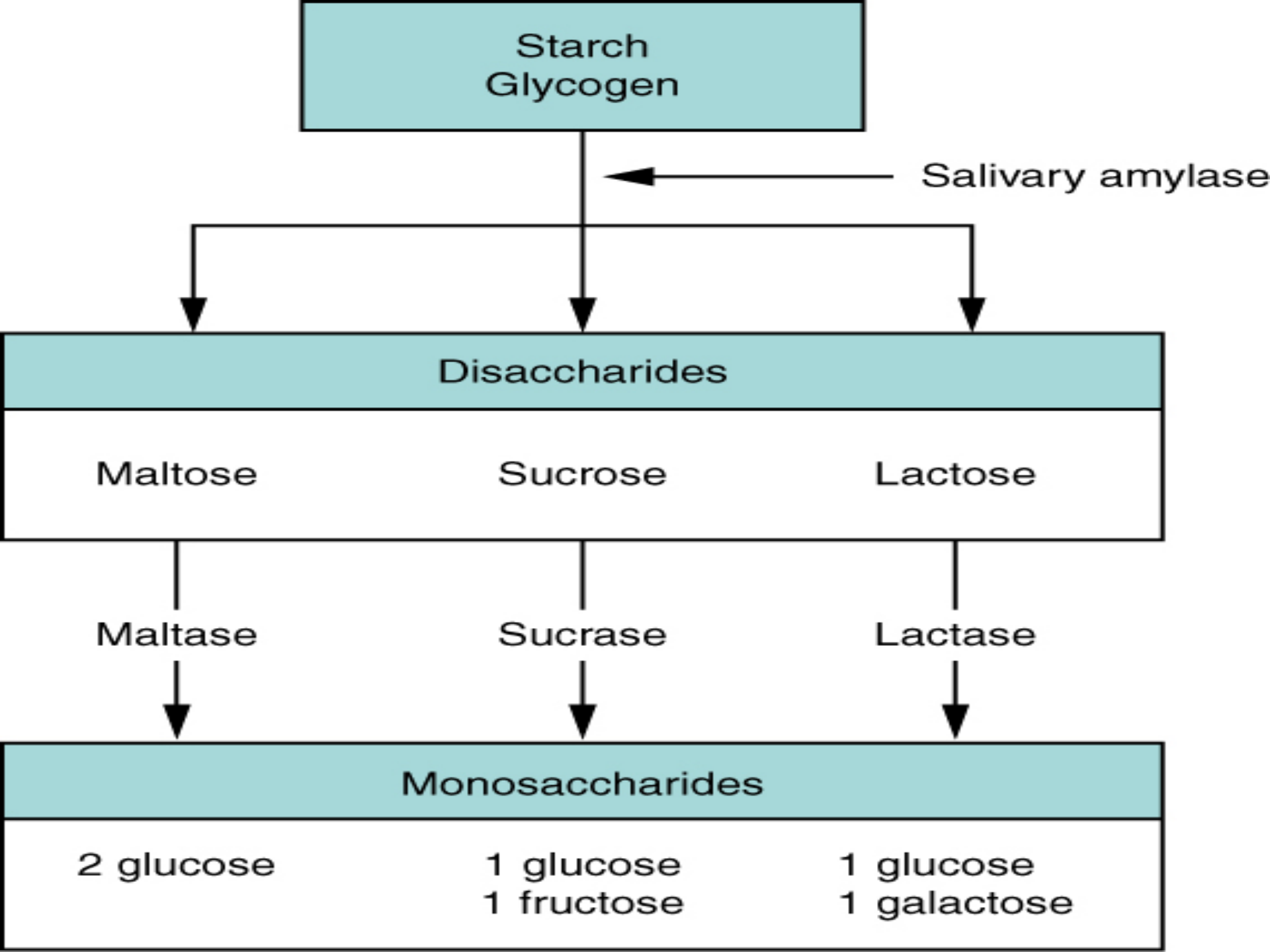
These are simple sugars linked together by a ***glycosidic bond*** e.g. two sugar units linked together to make up cane or beet sugar (glucose+fructose=sucrose)

Carbohydrates

Polysaccharides:

- Two categories:
  - Starch polysaccharides
  - Non starch polysaccharides (dietary fibre).

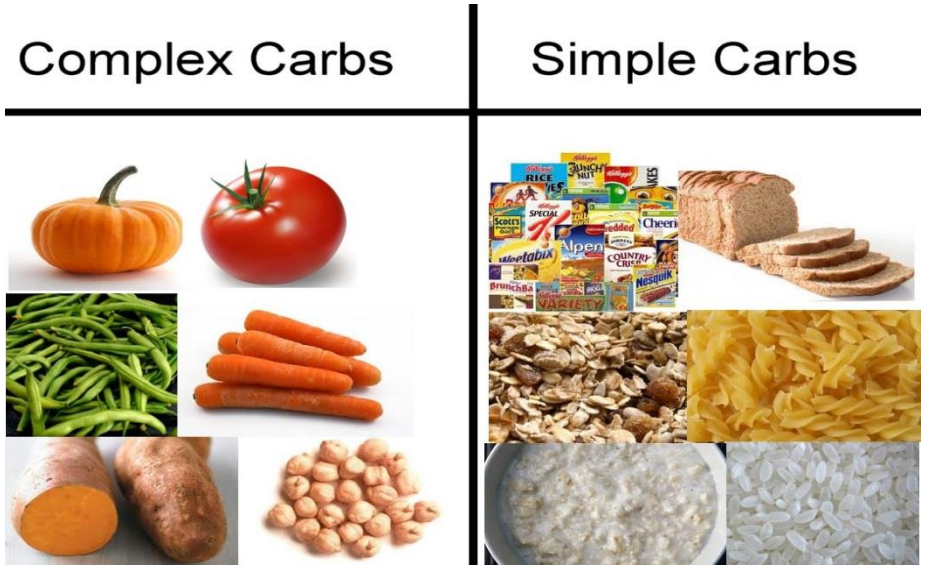



Starch
Glycogen
Salivary amylase
Disaccharides
Maltose
Sucrose
Lactose
Maltase
Sucrase
Lactase
Monosaccharides
2 glucose
1 glucose
1 fructose
1 glucose
1 galactose

Carbohydrates

- Simple: turned into glucose quickly

- Complex: polysaccharides (starch) containing a proportion of fibre



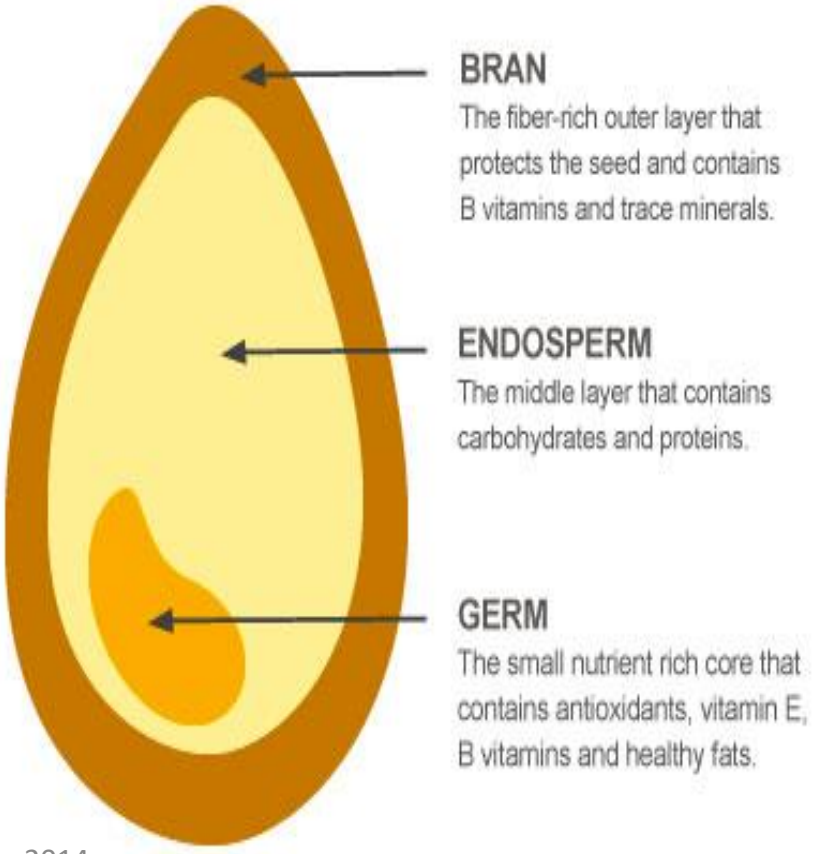
Carbohydrates

Refining of grains:

Loss of nutrients

Turned into glucose quicker

Nutrient debts



Carbohydrates

Nutrient debts:

- Sugar satisfies appetite
- Sugar contains no protein, fat, vitamins, minerals or fibre
- Sugar is empty calories
- Hunger satisfied but need for nutrients is still owing.

Western refined foods			Unrefined traditional foods		
Food	Glycemic index	Glycemic load	Food	Glycemic index	Glycemic load
Glucose	97	96.8	Parsnips	97	19.5
Rice Krispie cereal	88	77.3	Baked potato	85	18.4
Cornflakes	84	72.7	Boiled millet	71	16.8
Lifesavers	70	67.9	Boiled broad beans	79	15.5
Rice cakes	82	66.9	Boiled couscous	65	15.1
Table sugar (sucrose)	65	64.9	Boiled sweet potato	54	13.1
Shredded wheat cereal	69	57.0	Boiled brown rice	55	12.6
Graham crackers	74	56.8	Banana	53	12.1
Grapenuts cereal	67	54.3	Boiled yam	51	11.5
Cheerio cereal	74	54.2	Boiled garbanzo beans	33	9.0
Rye crispbread	65	53.4	Pineapple	66	8.2
Vanilla wafers	77	49.7	Grapes	43	7.7
Corn chips	73	46.3	Kiwi fruit	52	7.4
Mars bar	68	42.2	Carrots	71	7.2
Stone wheat thins	67	41.9	Boiled peas	48	6.8
Shortbread cookies	64	41.9	Boiled beets	64	6.3
Granola bar	61	39.3	Boiled kidney beans	27	6.2
Angel food cake	67	38.7	Apple	39	6.0
Bagel	72	38.4	Boiled lentils	29	5.8
Doughnuts	76	37.8	Pear	36	5.4
White bread	70	34.7	Watermelon	72	5.2
Waffles	76	34.2	Orange	43	5.1
All bran cereal	42	32.5	Cherries	22	3.7
Whole wheat bread	69	31.8	Peach	28	3.1
Fructose	23	22.9	Peanuts	14	2.6

The glycemic reference is glucose with a glycemic index of 100 (Foster-Powell and Miller, 1995).

Wheat Processing

Calculation of percentage losses in processing whole wheat (minerals-all amounts given are shown in mg):

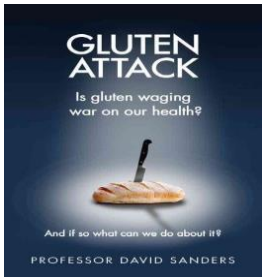
FOOD	Dry Wt (g)	Na	K	Ca	Mg	Fe	Zn	Cu	Mn	P
Wholemeal wheat flour	100	3	395	44	140	4.5	3.4	0.52	3.61	372
White wheat bread flour	100	3	151	163	36	2.4	1.0	0.21	0.81	140
Percentage loss %	-	0	62	-268	74	46.2	69.0	60.0	77.42	62.50

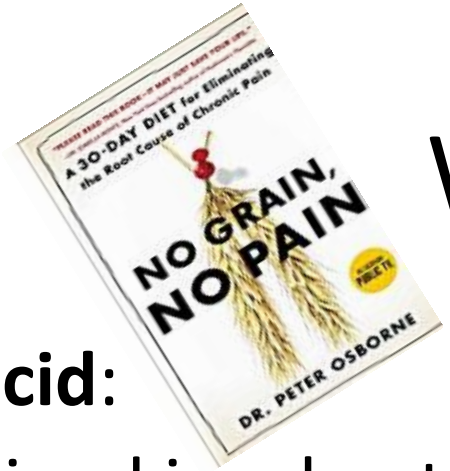
Wheat Processing

% loss in processing wheat

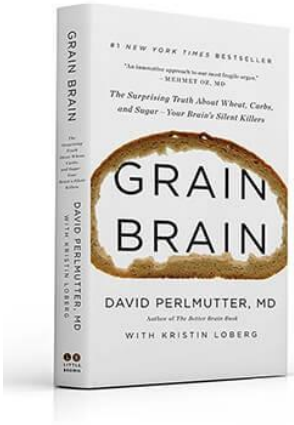
FOOD	DRY WT	Protein (g)	Fat (g)	Carbohydrate (g)	Dietary fibre (g)	Energy (kcal)
Wheat flour wholemeal	100	14.77	2.56	74.32	10.00	360.53
Wheat flour-white bread making	100	13.37	1.63	87.57	4.30	396.58
Process loss %	-	9.45	36.36	-17.84	56.98	-10.00

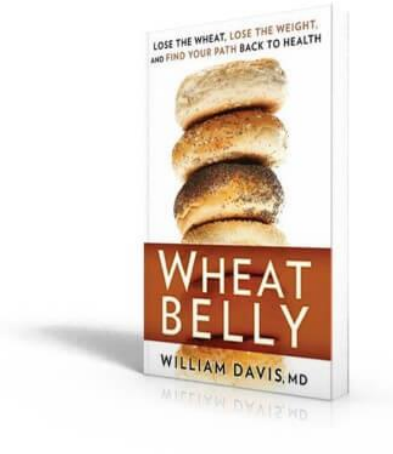
- The fat component included valuable omega 6 essential fatty acids which have been reduced by 36%
- Dietary fibre has been reduced by 57%





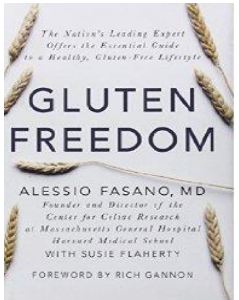
Wheat





Phytic acid:

- Contained in wheat bran
- Hinders absorption of calcium, iron, zinc magnesium, copper and niacin
- Chorley Heath method of bread making does not break phytic acid down
- Vitamin C reduces effects of phytic acid on iron
- Probiotic bacteria help produce phytase, which helps to break down phytic acid



Carbohydrates

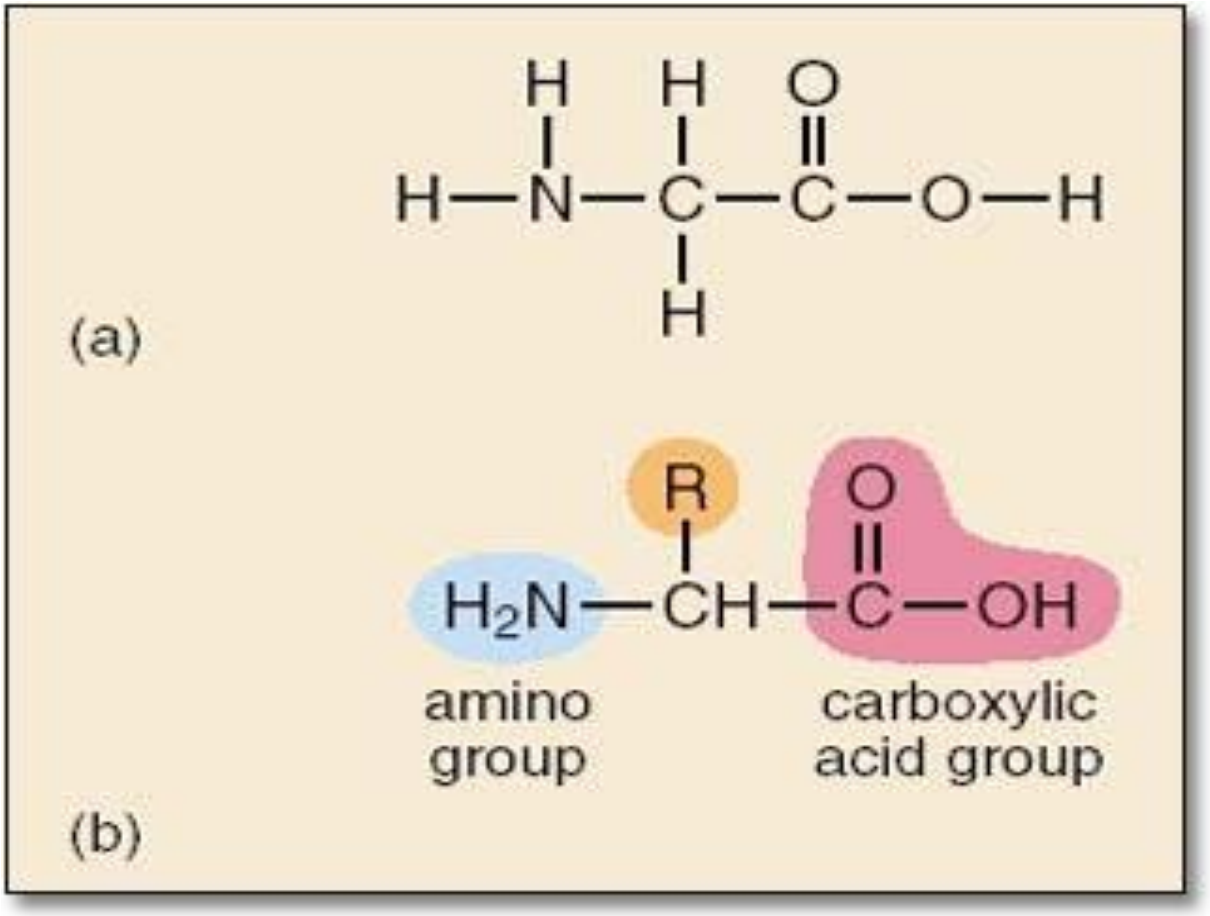
- Fibre lowers blood fats
- Sugar and refined carbohydrates disturb insulin mechanism
- Many illnesses can be linked to or exacerbated by disturbances to insulin

Carbohydrates

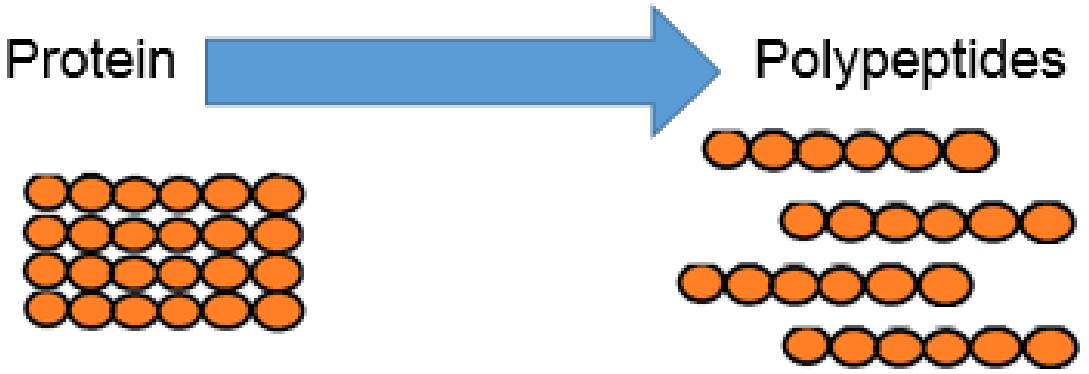
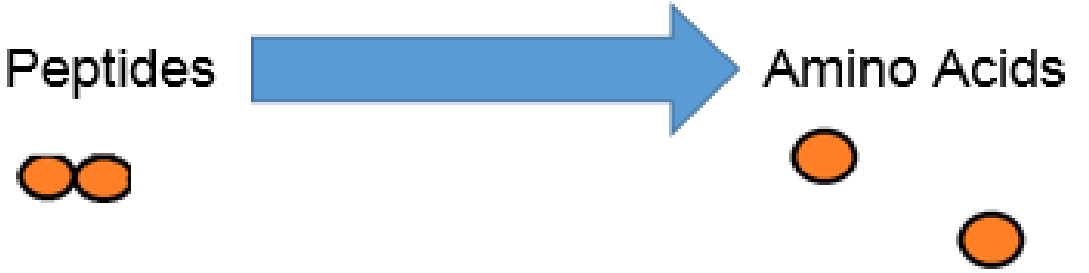
Simple carbohydrate consumption can lead to disturbances in blood sugar levels

Proteins

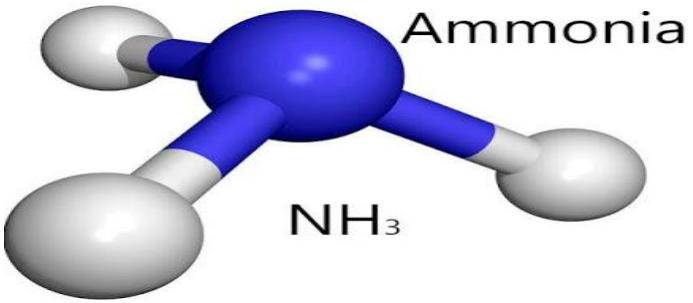
Chemistry of proteins



PROTEIN DIGESTION PROCESS

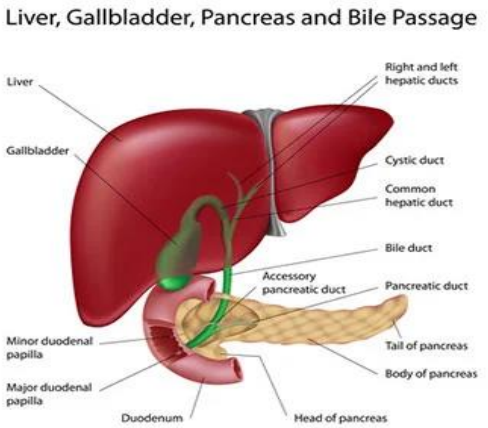
DIGESTION SITE	*ENZYME*	*PROCESS*
STOMACH	**Pepsin**	
DUODENUM	**Trypsin (by Pancreas)**	
SMALL INTESTINE	**Erepsin**	

Protein

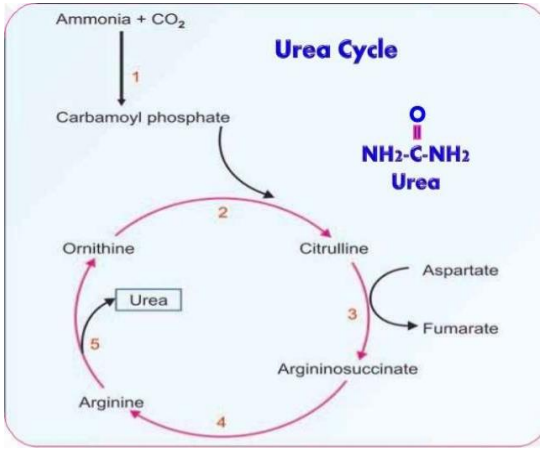


Breakdown of protein:

- Nitrogen released as ammonia (very toxic)
- Amino Acids converted to ammonia, CO2 and water
- Detoxification of ammonia essential
- Converted to UREA



Proteins



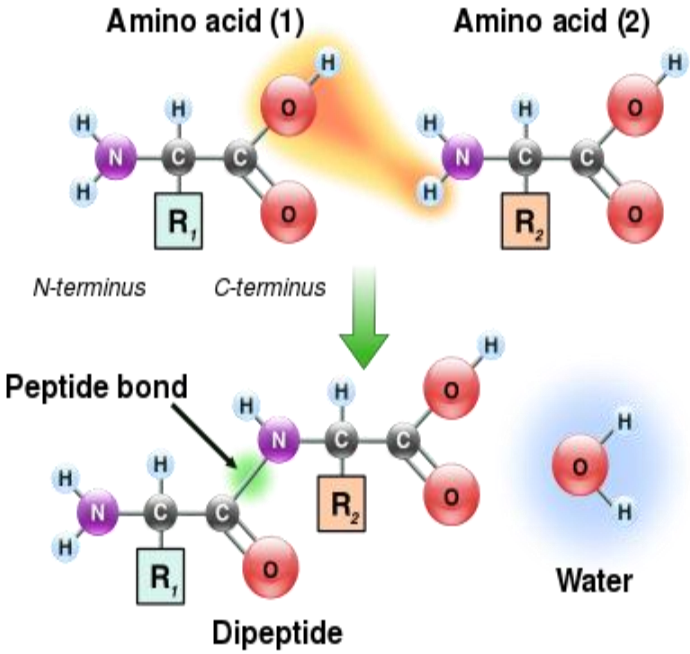
Urea cycle

- Urea synthesised in the liver
- Energy consuming process
- 1 molecule of urea for every 3 molecules of ATP
- Increased protein intake= reduced energy production

Amino Acids

Amino acids can be

- Essential
- Conditionally essential
- Non essential



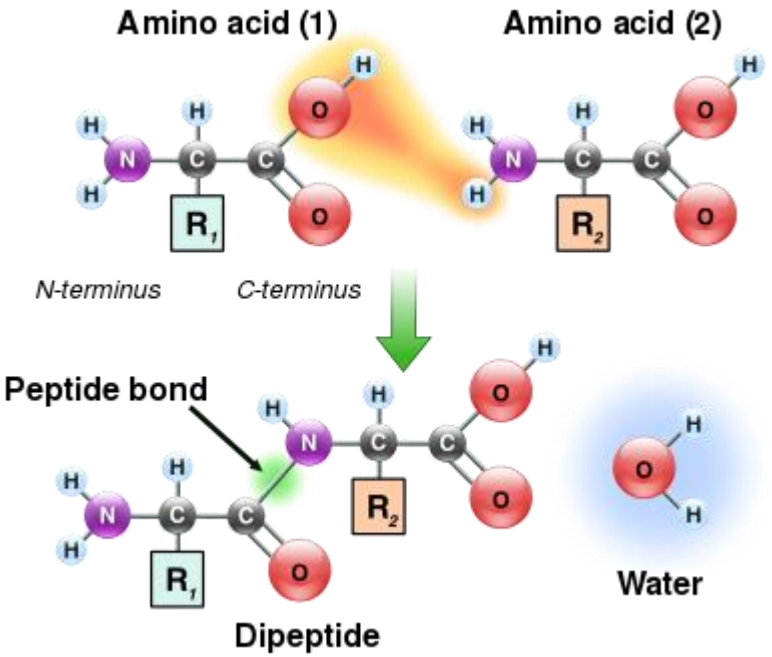
Essential Amino Acids

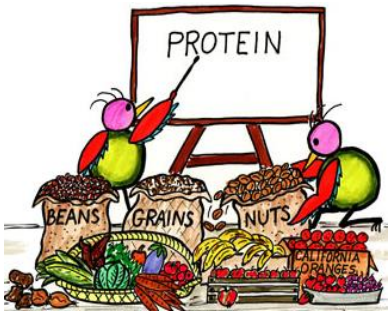
- Tryptophan
- Threonine
- Phenylalanine
- Methionine
- Leucine
- Lysine
- Isoleucine
- Valine
- Histidine (infants)

Proteins

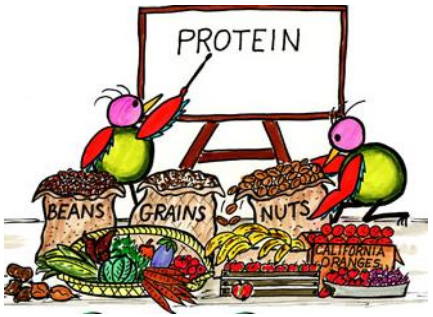
Conditionally essential amino acids:

- **Arginine**
- Glutamine
- Glycine
- Taurine
- **Cysteine**
- **Tyrosine**
- **Histidine** (in adults)
- Serine
- Proline





Proteins in Foods



The protein score

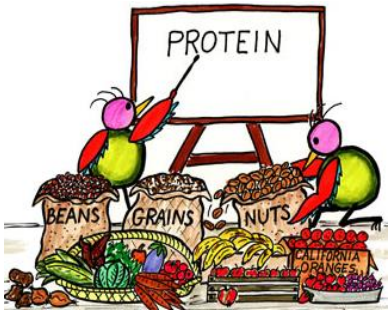
- The concept of first and second class proteins
- Limited amino acid *(the amino acid that is most deficient relative to an ideal standard composition)*

Limited amino acids in foods

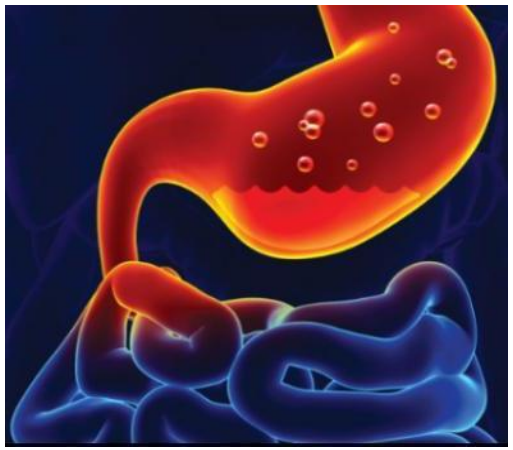
Food	Ile	Leu	Lys	Met	Phe	Thr	Trp	Val	Cys & Met	Tyr	score
FAO	270	306	270	144	180	180	90	270	270	280	100
Salmon	329	529	607	180	258	299	**71***	360	251	221	79
White Rice	250	538	**240***	135	317	260	84	375	240	260	89
Whole Wheat	227	450	**172***	109	298	180	76	298	278	204	64
White Flour	265	481	**133***	111	326	188	77	299	287	177	49
Sesame	300	500	**159***	181	460	182	93	261	**317**	244	59
Lager	92*	156	219	62	125	156	375	156	188	156	34
Potato	262	387	357	101	274	244	92	327	**182***	193	67
Kidney Bean	260	481	450	71	331	252	59	291	**122***	161	45
Sweetcorn	229	792	168	120	320	229	**40***	305	221	244	44
Egg	351	518	391	198	320	320	112	427	310	249	100

Complementary Proteins

- Grains have lysine as limiting amino acid
- Pulses are high in lysine
- Combination of grains and pulses create a better protein score
- Methionine often deficient in grain/pulse combinations



Gluten and Dairy



Protein digestion

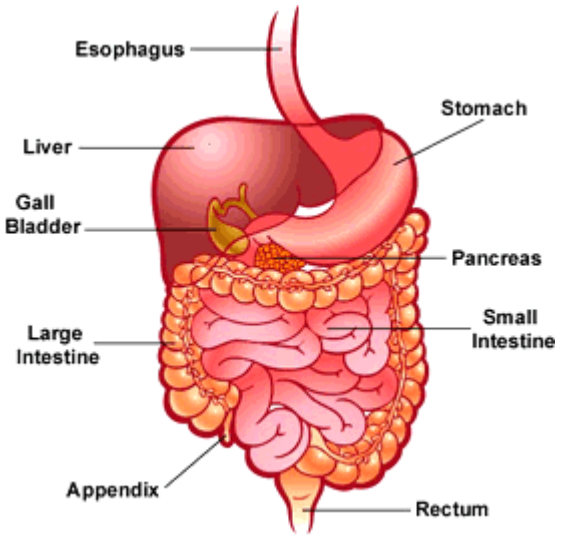
Low stomach acid

- Very common
- Symptoms similar to high stomach acid
- Leads to dysbiosis
- Stomach acid depletes as we age
- Stomach acid reduces under stress

Digestion

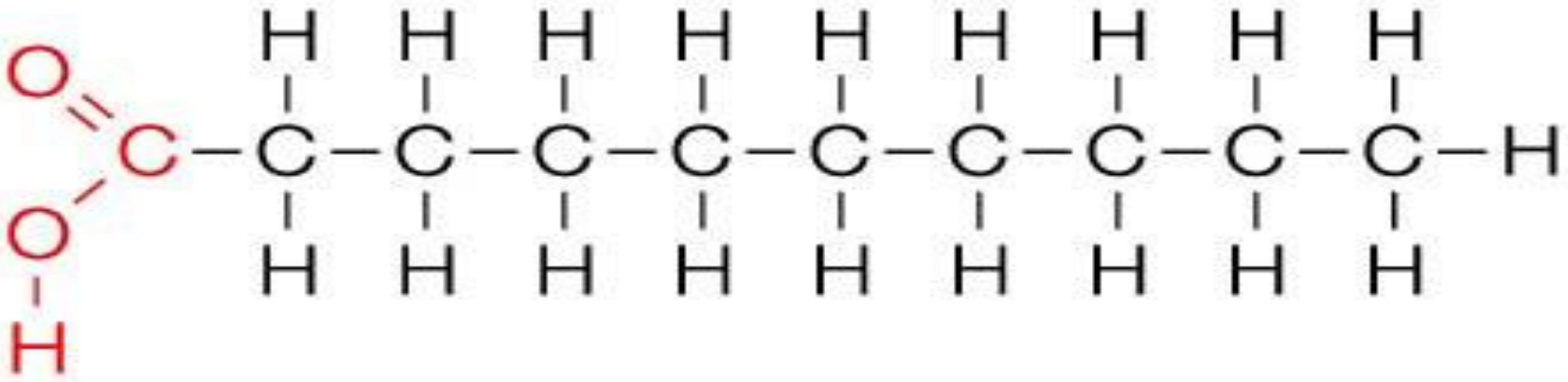
Lack of hydrochloric acid leads to many diseases:

- Asthma
- IBS (constipation, diarrhoea, bloating, wind)
- Osteoporosis
- Iron deficiency
- Adult acne
- Candida
- Food allergies

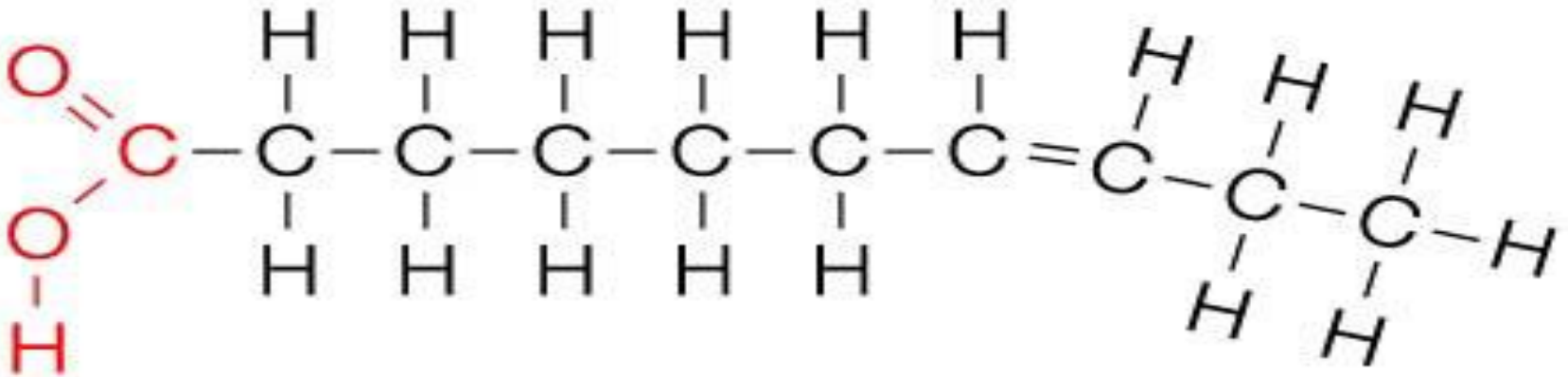


Fats

Saturated



Unsaturated



Essential Fatty Acids

Omega 6

Deficiency signs

- Eczema like skin eruptions
- Loss of hair
- Liver and kidney degeneration
- Excessive water loss via skin with thirst
- Drying up of glands

Essential Fatty Acids

Omega 6

Deficiency signs

- Susceptible to infections/low immunity
- Failure of wound healing
- Male sterility
- Miscarriage in females
- Arthritis like conditions
- Heart and circulatory problems
- Growth retardation
- Tender breasts

Essential Fatty acids breakdown

Saturated fats
Damaged fats
High cholesterol
Aging
Alcohol
Chemical carcinogens
Radiation
Imbalanced insulin

OMEGA 6
Linoleic Acid

Delta 6 desaturase

Insulin
Magnesium, zinc, B6, vitamin C and E

Gamma Linolenic acid

Delta 5 Desaturase

Zinc B6

Arachidonic acid

Di homo gamma linolenic acid

Wheat

Cyclo oxygenase
COX

Cyclo oxygenase
COX

Prostaglandin 1

Prostaglandin 2

Essential Fatty Acids

Omega 6 Considerations

Is the patient:

- Magnesium deficient?
- Deficient in Vitamin B6?
- Eating saturated fats in large amounts?
- Insulin deficient/imbalanced?
- Suffering from excess cholesterol

Essential Fatty Acids

Omega 6

Considerations

Does the patient:

- Diet contain processed fats that contain trans fatty acids?
- Smoke or come into contact with other chemical carcinogens?
- Drink alcohol regularly
- Consuming enough antioxidants to counteract aging, radiation or toxin damage?

Essential Fatty Acids

OMEGA 3

Sources of ALA:

- Flax oil (50%)
- Hemp seed oil (20%)
- Pumpkin seeds oil (0-15%)
- Canola oil (up to 10%)
- Walnut oil (3-11%)

Essential Fatty Acids

Functions

Omega 3

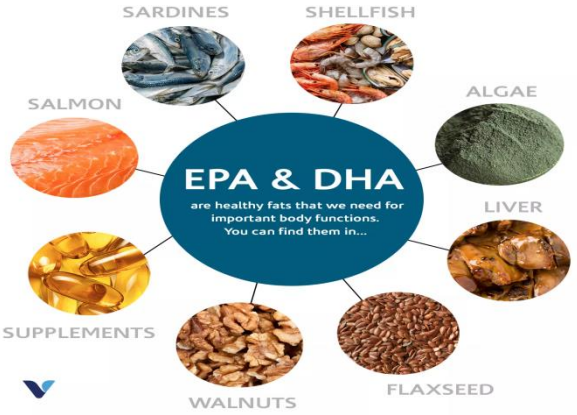
- Reduces inflammation
- Reduces water retention
- Reduces platelet stickiness
- Reduces blood pressure
- Reduces pain and swelling in artl
- Can reverse PMS in some cases
- Required for brain development

Essential Fatty Acids

Omega 3

Sources of EPA and DHA:

- Oily fish-salmon, herrings, mackerel, sardines, pilchards, trout
- Land animals-testes, eyeball, adrenal glands
- Antarctic Krill
- Algae



Essential Fatty Acids

Omega 3
Deficiency signs

- Growth retardation
- Weakness
- Impairment of vision and learning ability
- Motor incoordination
- Tingling sensations in arms and legs
- Behavioural changes
- Mental health issues
- Excessive thirst

Essential Fatty Acids

Omega 3
Deficiency symptoms

- High triglycerides
- Hypertension
- Sticky platelets
- Tissue inflammation
- Oedema
- Dry skin
- Mental deterioration
- Low metabolic rate
- Immune dysfunction

Essential Fatty acids breakdown

Saturated fats
Damaged fats
High cholesterol
Aging
Alcohol
Chemical carcinogens
Radiation
Imbalanced insulin

OMEGA 6 Linoleic Acid

Delta 6 desaturase

OMEGA 3 Alpha Linolenic acid

Insulin
Magnesium, zinc, B6, vitamin C and E

Gamma Linolenic acid

Delta 5 Desaturase

Zinc B6

Arachidonic acid

EPA

DHA

Di homo gamma linolenic acid

Wheat

Cyclo oxygenase COX

Cyclo oxygenase COX

Cyclo oxygenase COX

Prostaglandin 1

Prostaglandin 2

Prostaglandin 3

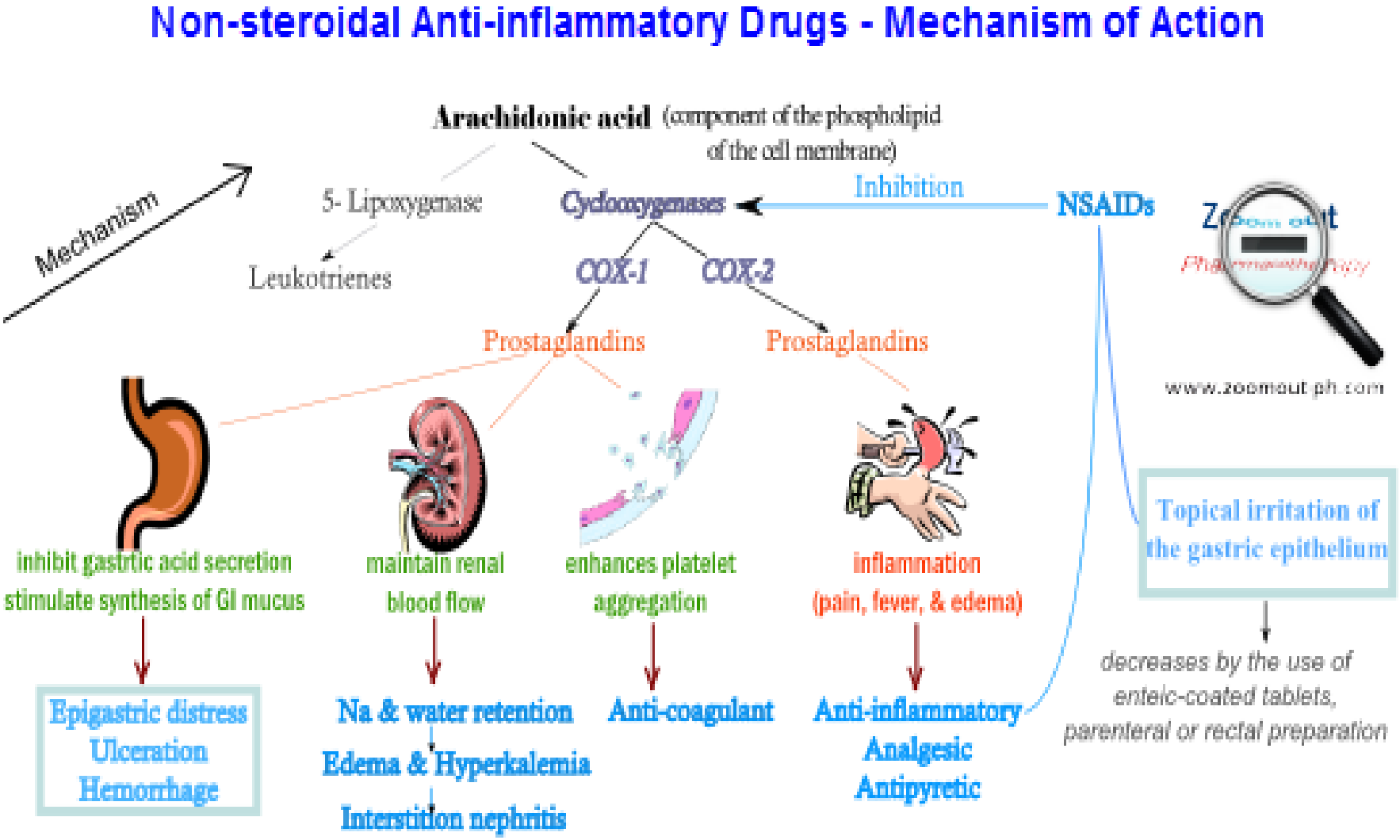
Insulin And Delta 5&6 Desaturase

- Insulin aggravates delta 5 desaturase and increases AA
- High insulin increases delta 5 desaturase (and inhibits delta 6 desaturase) resulting in increased PGE2
- Omega 3 demands attention of desaturase enzymes at expense of omega 6

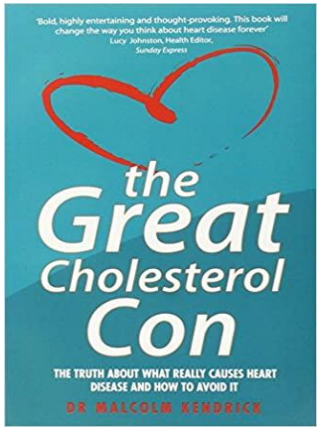
Arachidonic Acid

- NSAID's suppress COX function of forming prostaglandins
- Arachidonic acid broken down into:
  - Prostaglandin 2 (PGE2) pro inflammatory
  - Prostacyclin 2 (PGI2) anti inflammatory

NSAID's

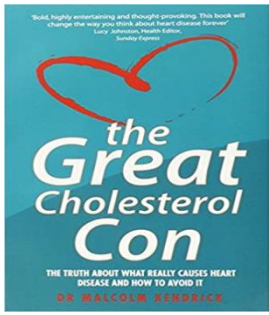


Cholesterol



- Essential for life
- Compensates for changes in membrane fluidity
- Steroid hormones made from cholesterol (female infertility could be as a result of low cholesterol)
- Adrenal hormones made from cholesterol
- Vitamin D made from cholesterol
- Important for metabolism of vitamin A, E and K
- Bile acids derived from cholesterol

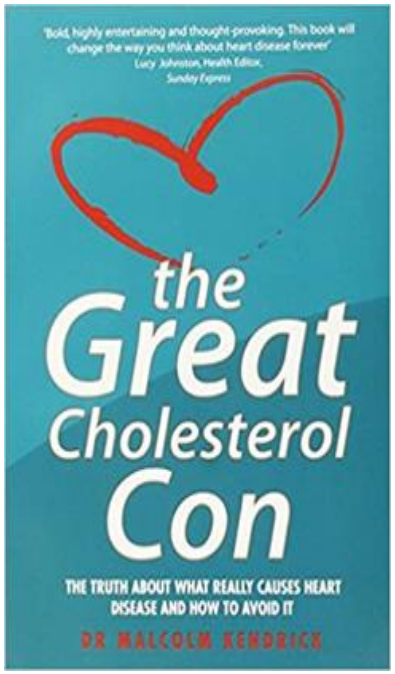
Cholesterol



- Secreted by glands in skin, covers and protects our skin against dehydration, cracking and effects of sun, wind and water
- Placenta produces cholesterol from which it manufactures progesterone to maintain the pregnancy
- Also produced by cells, liver, intestines, adrenal and sex glands
- Also see Statin Nation documentary http://statinnation.com/?ss_source=sscampaigns&ss_campaign_id=5eafc1363a641471976283ca&ss_email_id=5eaffe658264e96994d85c62&ss_campaign_name=FREE+to+Watch%2C+Share+the+Link&ss_campaign_sent_date=2020-05-04T11%3A37%3A44Z

Cholesterol

- Reduction helped by:
  - Plant sterols
  - Phosphatidyl Choline
  - Dietary fibre
  - Essential fatty acids
  - Reduction of stress
  - Vitamin B3, Vitamin C,
  - Calcium, chromium, copper, zinc
  - water



Cholesterol

Why is it raised?

- Liver function
- Thyroid function
- Stress
- Dehydration

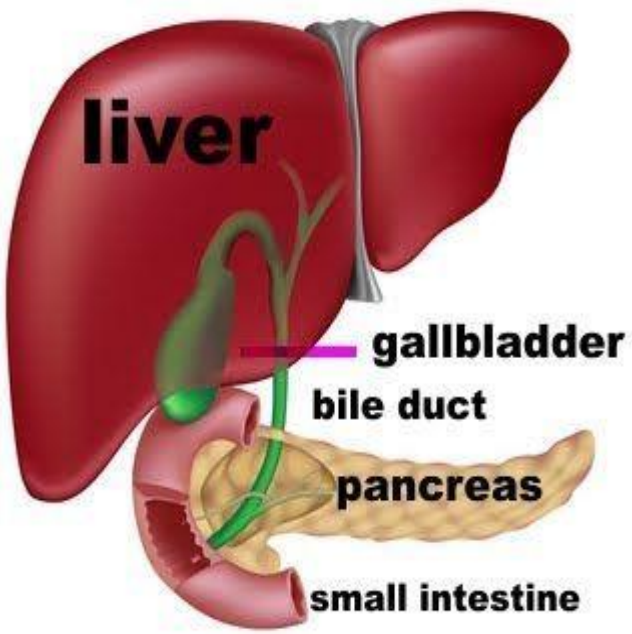
Cholesterol

- Reduction helped by:
  - Plant sterols
  - Red rice yeast
  - Phosphatidyl Choline
  - Dietary fibre
  - Essential fatty acids
  - Reduction of stress
  - Vitamin B3, Vitamin C,
  - Calcium, chromium, copper, zinc
  - Water

Cholesterol ring

Digestion of Fats
Malabsorption

- Diarrhoea/loose bowels (also check gluten)
- Weight loss
- Nausea
- Fatigue
- Abdominal pain-especially gall bladder area
- Bloating
- Anemia
- Foul smelling stools
- Oily stools/floating stools
- Undigested food in stools



Essential Fatty Acids and Light

- Inuit: very little light: increased omega 3
- UK: more light: naturally omega 6
- Mediterranean: most light near equator: omega 9 (not essential)

Case Study 1

- Symptoms: fatigue, constipation, Male 28
- Diet:
  - Breakfast: glass of milk
  - Lunch: scrambled eggs, or chicken nuggets or turkey burger and salad leaves
  - Evening: lamb curry, chicken stew, (no rice)

Why do you think he has these symptoms?

What dietary changes would you make?

Calcium and Magnesium

Calcium

Metabolism

- Parathyroid hormone
- Calcitriol
- Calcitonin

Functions of Calcium

98% calcium is in bone and teeth

2% has remaining roles:

- Secretion of hormones
- Activates insulin, calcitonin and thyroid hormone release
- Blood clotting
- Cell membrane permeability
- Takes nutrients into the cells

Functions of Calcium

- Maintenance of electrolyte, blood acid and alkaline balance
- Muscle contraction
- Nerve transmission
- Regulation of cell division
- Regulation of heart beat

Calcium

Requirements (estimated)

- Adult men and women 700-1000mg daily
- Adults > 50 years 1200mg
- Teenagers 800-1000mg daily
- Infants (1-8 years) 500-525mg daily
- Pregnant and lactating women-minimum 1200mg daily

British Dietetic Association

Group	**Age** (years)	**Calcium** (mg) per day
Infants	Under 1	525
Children	1-3 4-6 7-10	350 450 550
Adolescents	11-18	800 (girls) 1000 (boys)
Adults	19+	700
Breastfeeding mums		1250
Women past the menopause		1200
Coeliac Disease	Adults	at least 1000
Osteoporosis	Adults	1000
Inflamatory Bowel disease	Adults	1000
	Post menopausal women and Men over 55 years	1200

Calcium

Daily losses of calcium

- Sweat <20mg
- Faeces 80-120mg
- Urine 40-200mg

Sources of Calcium

- Lambsquaters 1 cup=400mg
- Broccoli 1 cup=200mg
- Mustard greens 1 cup=310mg
- ½ pint milk=300mg
- Sesame seeds 1 cup=1000mg

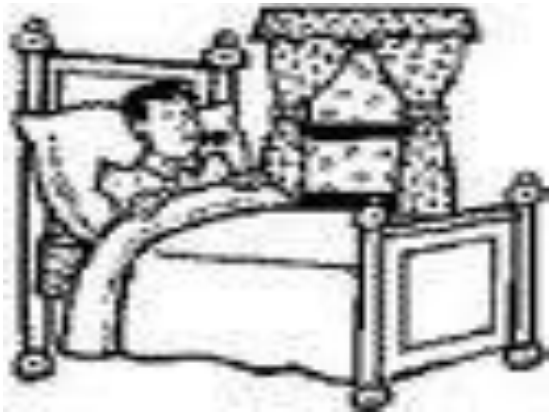
Calcium needs magnesium for utilisation

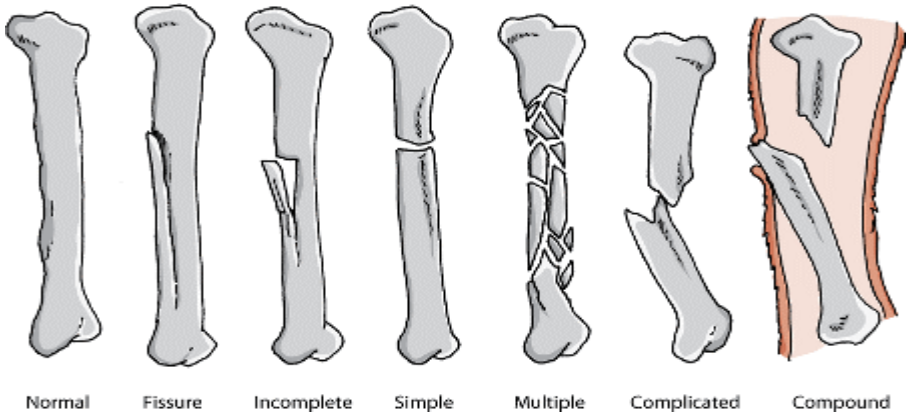
Sources of Calcium

- Almonds
- Buckwheat
- Egg yolk
- Turnips
- Sardines
- Molasses
- Green leafy vegetables

Calcium

Factors increasing demand





Calcium

Factors affecting demand

- Caffeine
- High protein and sugar diets
- High sodium
- Lack of exercise
- Aging
- Excess intake of fat
- Hypothyroidism
- High phosphate intake
- High blood pressure

Calcium

Factors affecting absorption

Magnesium

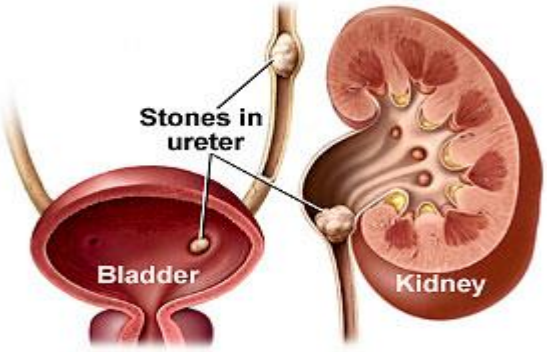
Hydrochloric acid

Vitamin C & D

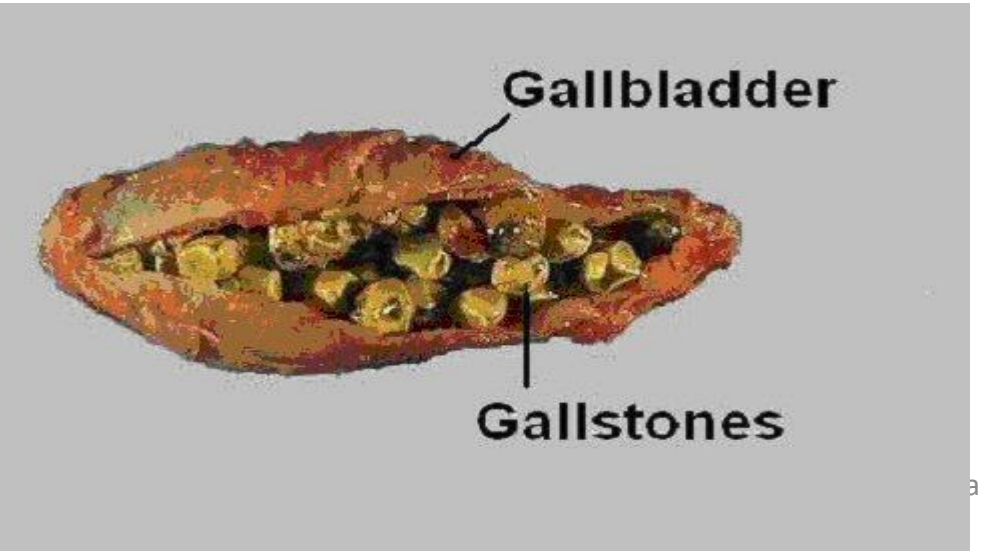
Apple juice

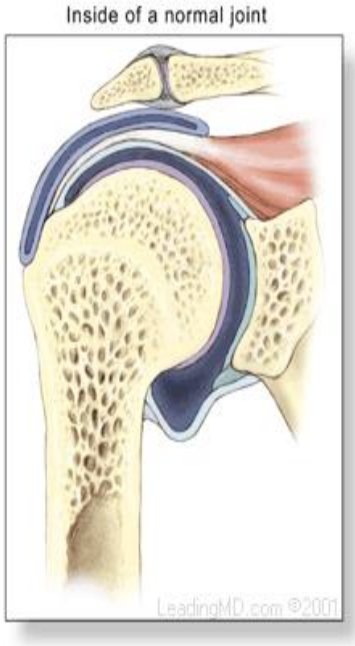
TB Miasm

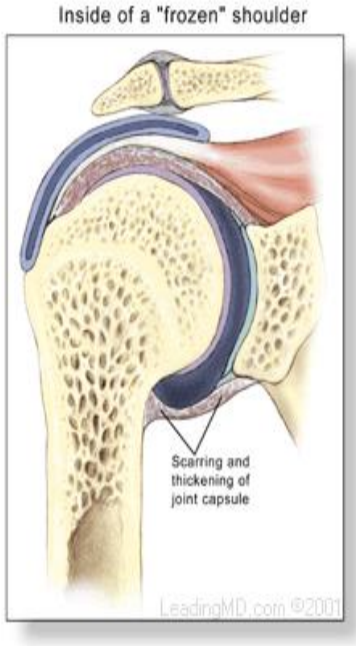
Calcium



- Negative calcium balance
- Calcium mishandling
- Calcium dumping







Sodium Calcium ring

Magnesium

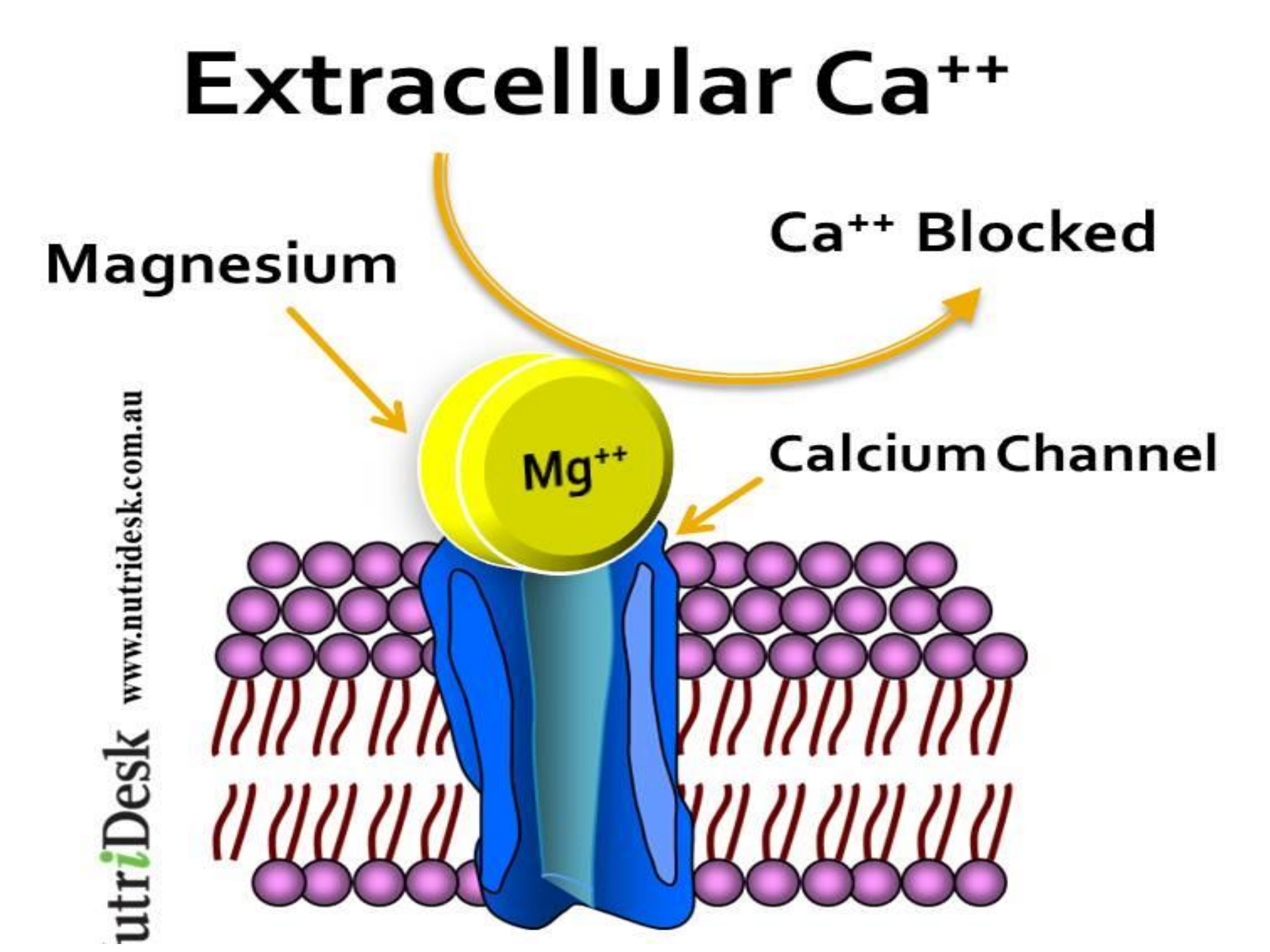
Functions

- Muscle relaxation
- Co factor in ATP production
- Regulates intracellular calcium, sodium and potassium ions
- Delta 6 desaturase enzyme (breaks down EFA's)
- Enzyme co factor in over 300 different processes

Magnesium

Functions

- Improves insulin resistance
- DNA replication
- Regulation of body temperature
- Lecithin production
- Maintenance of heart muscle


Extracellular Ca++
Magnesium
Ca++ Blocked
Mg++
Calcium Channel
www.nutridesk.com.au
utriDesk

Magnesium

Requirements

- Infants < 12 months 30mg
- Children < 8 years 130mg
- Teenagers 360-410mg
- Adults 350-420mg
- Pregnancy 350-400mg
- Lactation 310-360mg

Sources of Magnesium

- Whole grains
- Leafy green vegetables
- Nuts and seeds
- Legumes
- Seafood
- Cocoa

Magnesium

Factors increasing demand

- Low stomach acid
- Athletes
- Arthritis
- Chronic alcoholism
- Chronic fatigue
- Coffee
- Diabetic acidosis

Magnesium

Factors affecting demand

- Diarrhoea
- Diabetes type 2
- Eclampsia
- Epilepsy
- Heart failure
- High fat and sugar intake
- Pregnancy

Magnesium

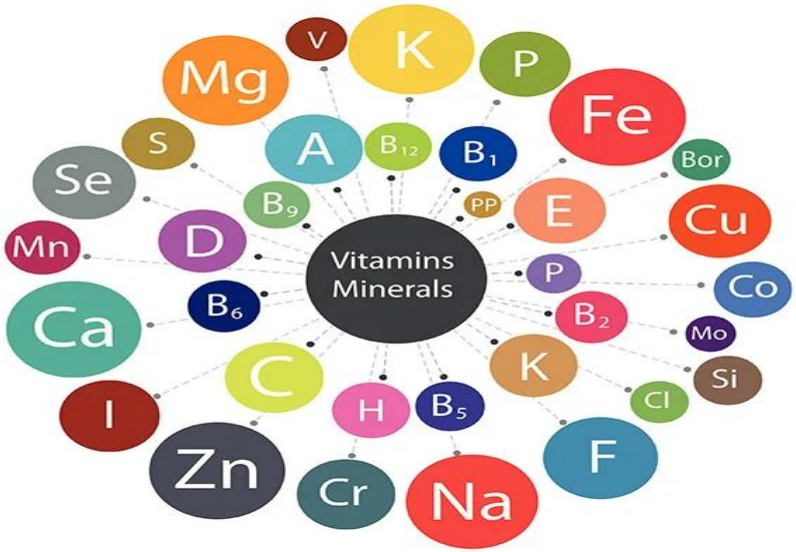
- Milling of wheat causes losses of 90%
- 90% of population at risk of magnesium deficiency

Magnesium deficiency

- Addiction
- Agitation
- Anxiety
- Behavioural disturbances
- Calcification of arteries
- Chronic fatigue
- Insomnia
- Irritability
- hyperactivity

Magnesium deficiency

- Neurotic behaviour
- Palpitations
- Hypertension
- Poor appetite
- PMT
- Osteoporosis
- Depression
- Inability to concentrate



Microminerals

Microminerals

Iron

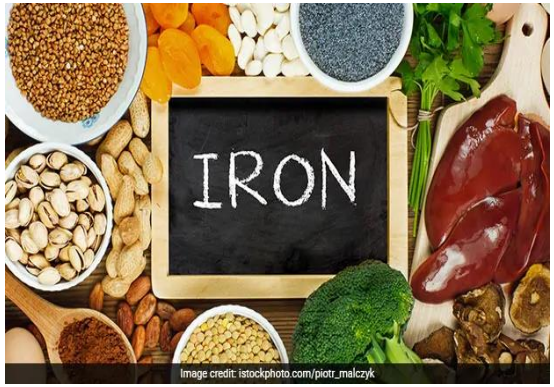
- Ferrous and ferric forms available from diet
- Stomach acid required for absorption
- Haem and non-haem forms from meat and fish more readily absorbed
- Vegetarian diets can be lacking
- Vitamin C aids absorption

Iron deficiency

- Sore tongue
- Fatigue
- Weakness
- Pallor
- Anaemia
- Dizziness
- Hair loss
- Brittle or ridged nails
- ADHD

Functions of Iron

- Oxygen transport-iron is part of the haemoglobin molecule that carries oxygen in the blood
- Cellular energy production-iron is part of the electron transport chain which produces ATP
- As part of the cytochrome P450 enzymes of phase 1 liver detoxification



Iron absorption

- Increased by acid foods, animal protein, vitamin C, glucose
- Requires copper and B12 for utilisation
- Decreased by phytic acid, phosphate, egg protein, manganese, zinc, nickel, chromium, copper, calcium, magnesium, cadmium, and vegetarian diets

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Sugars Increase Non-Heme Iron Bioavailability in Human Epithelial Intestina

Tatiana Chri

James F. Co

Author inf

This article

Evidence that simple sugars such as glucose and fructose affect iron bioavailability first arose in the 1960s from work showing that sugars were able to chelate inorganic iron and form stable, low molecular weig adily abso iven that wor hile at th pub impl

In conclusion, we have shown that fructose and HFCS-55 increase iron bioavailability in human intestinal epithelial cells and, furthermore, that fructose increases iron-induced hepatic ferritin levels. Given that substantial amounts of these carbohydrates are present in the modern diet, and also their use in experimental models, these effects may be important in the context of iron homeostasis. Further studies are warranted to examine if these in vitro effects translate into (patho)physiologically relevant changes in animal and human iron status.

Abstract

Previous st
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relevant. In this study we measured the effects of sugars on non-heme iron bioavailability in human

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d J Gastroenterol. 2007]

common iron salts and
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nnic acid on iron
easurec [Br J Nutr. 2009]

d obesity: The state of
Rev Clin Lab Sci. 2016]

oferritin-bound iron in
[Int J Vitam Nutr Res. 2007]

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PLoS One

ACTA BIOMEDICA
Official Journal of the Society of Medicine and Natural Sciences of Parma and Centre on health systems' organization, quality and sustainability, Parma, Italy

Acta Biomed. 2017; 88(1): 112–118.
doi: 10.23750/abm.v88i1.6049

PMCID: PMC6166192
PMID: 28467345

Iron deficiency anemia and glucose metabolism

Ashraf T Soliman,[1] Vincenzo De

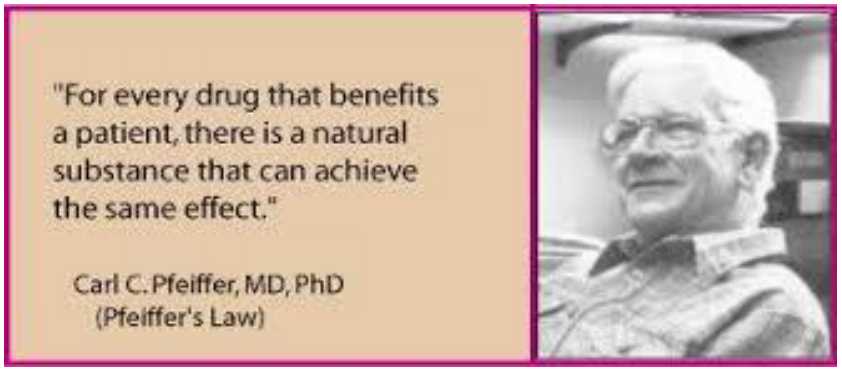
Abstract

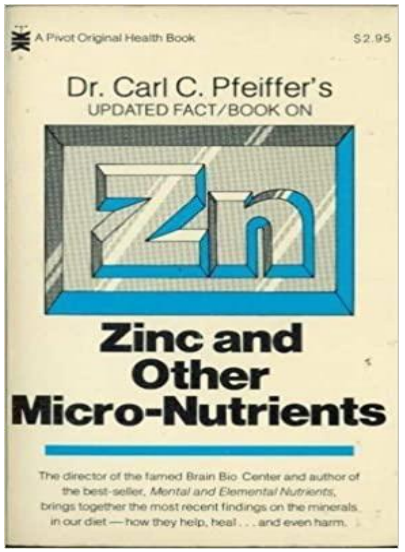
Iron deficiency anemia (IDA)
countries with major consequ
at all stages of the life cycle, b
be more common in diabetic p
can impair glucose homeostas
predispose to more complications in diabetic patients. On the other hand diabetes and its complications are associated with anemia and its correction improves diabetes control and may prevent or delay the occurrence of complications. Physicians treating this form of anemia should be aware of its negative effect

IDA appears to be more common in diabetic patients compared to non-diabetic population. Iron deficiency (ID) and IDA can impair glucose homeostasis in animals and human and may negatively affect glycemic control and predispose to more complications in diabetic patients. On the other hand diabetes and its complications are associated with anemia and its correction improves diabetes control and may prevent or delay the occurrence of complications.

Zinc

- Approximately 47% of population has a zinc deficiency
- Activates over 200 different enzyme processes





Sources of zinc

- Oysters
- Shell fish
- Red meat
- Ginger root
- *Whole grains*
- *Legumes*
- *Nuts*

Those in italics are less absorbable due to phytic acid

Functions of Zinc

- Blood glucose control
- Energy production
- Required for growth of foetus –low birth weight suggests zinc deficiency
- Mental/emotional well being
- Production of stomach acid
- Sexual function
- DNA synthesis
- Wound healing
- Skin health/acne
- Immune system

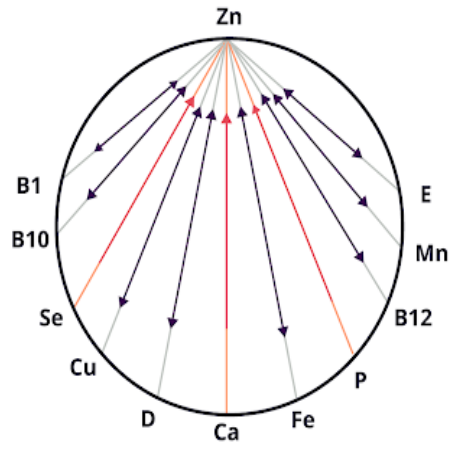
Deficiency of Zinc

- Schizophrenia
- Anorexia nervosa
- Hyperactivity
- Depression
- Dementia
- White marks on nails
- Morning sickness
- Cold extremities
- Blood group A

Zinc

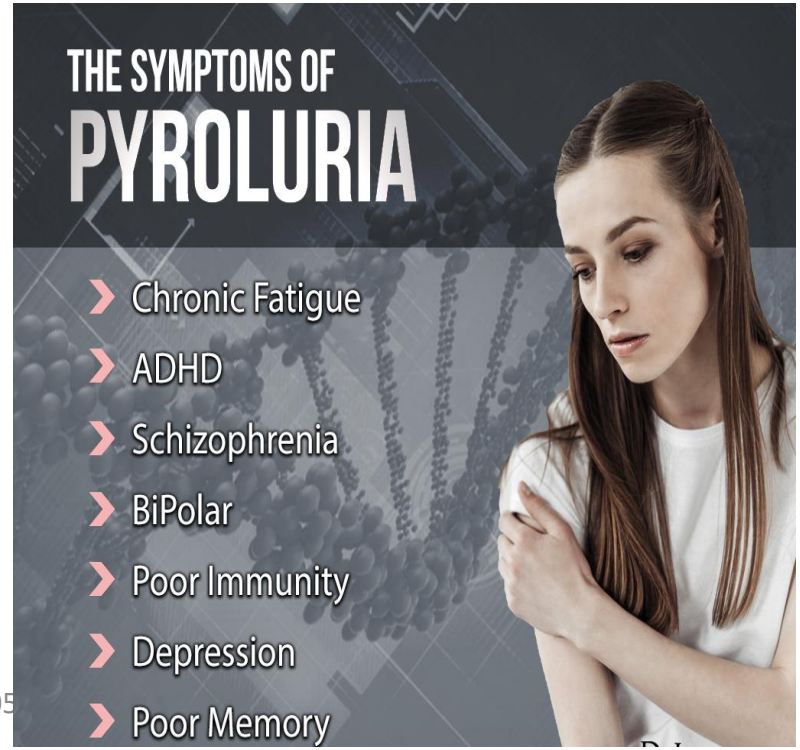
Interactions

- Copper competes with zinc for absorption
- Increased copper is excitatory
- Zinc allows uptake of dopamine
- Phytic acid hinders absorption
- Requires B6 for absorption
- Essential fatty acid absorption interlinked



Zinc and B6

- Pyroluria =excess excretion of B6 and zinc
- Inherited or acquired
- Intolerance to various foods and drugs ‘allergies’
- GI disorders
- Sun sensitivity/rash
- Psychiatric disturbances
- Thyroid disorders
- Immune disorders



Copper

Essential:

- Cytochrome oxidase
- Superoxide dismutase
- Ascorbate oxidase
- For contractions during childbirth

Copper deficiency

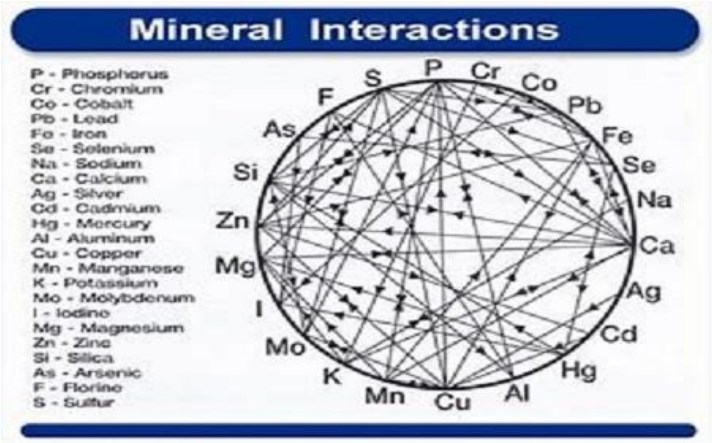
- Neutropenia
- Poor utilisation of iron
- Hypochromic mycrocytic anaemia
- Osteoporosis
- Poor wound healing
- MS
- Irregular heart beat

Copper excess

- Copper is excitatory
- Hyperactivity
- Epilepsy
- Viral infections
- Estrogen/candida imbalances
- Vitamin C deficiency causes copper levels to rise
- Adrenal fatigue
- Contraceptive pill depletes zinc and B6 resulting in increased copper

Copper interactions

- Zinc
- Calcium (elevated levels when copper is elevated)
- Iron
- Molybdenum
- Manganese



- Vitamin C deficiency raises copper levels
- Vitamin B3 deficiency raises copper levels

Sources of Copper

- Vegetarian diet
- Copper water pipes
- Copper cookware
- Contraceptive pill
- Copper IUD

- Fungicides on foods and in swimming pools
- Congenital copper imbalance
- Slow metabolic rate increases copper retention

Manganese

Interactions with zinc and copper

“the Maternal Mineral”

Found in mitochondria

Functions of Manganese

- Energy production
- Glucose metabolism
- Integrity of ligaments and tendons
- Essential for bone development and arterial integrity

Manganese

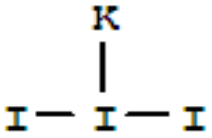
14 women with osteoporosis had levels of manganese 75% lower than age controls

Iodine

- Essential for thyroid function
- Deficiency linked to increased levels of estrogen and cancer

Sources of Iodine

- Sea vegetables
- Kelp
- Seafood/fish
- Iodised salt



I_2 / KI

Molybdenum

Deficiency results in chemical sensitivity

Important for liver detoxification

Chromium

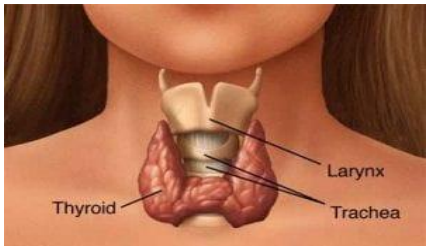
Approximately 56% of population considered to be deficient in chromium

Functions of Chromium

- Part of glucose tolerance factor-helps to maintain blood glucose levels and energy levels
- Potentiates insulin function
- Cholesterol regulation
- Fat, protein and carbohydrate regulation

Selenium

- Considered toxin before essentiality discovered
- 40% deficient in soil



- Essential for thyroid function (T4 to T3 conversion)
- Synergistic nutrients: vitamins B3, C, E, co enzyme Q10, zinc, iodine, cysteine, glutathione, methionine

Functions of Selenium

- Recycling of Vitamin C and E
- Glutathione metabolism
- Inhibits lipid peroxidation
- Maintenance of cellular membranes
- Modulates NFKb activity
- Antioxidant
- Improves sperm motility
- Detoxification of drugs and xenobiotics

Case study 2

- Symptoms: Premenstrual tension (irritability, tender breasts); low energy, eczema, hair loss, frequent infections, excess thirst. Client is 35 year old vegan
  - Breakfast: toast and jam or conflakes and rice milk, coffee
  - Lunch: may miss, slice of pizza with vegan cheese, sandwich with peanut butter; coffee
  - Evening: vegan ready meal with chips, baked potatoes, cola

Why do you think she has these symptoms?

What is contributing to the symptoms?

What dietary changes would you make?

Vitamin A

Forms of vitamin A

- Retinal
- Retinol
- Retinoic acid
- Beta carotene (precursor)

Vitamin A

50% of women unable to convert carotenoids into vitamin A

Research from Newcastle university

Functions of Vitamin A

- Essential for immune function-deficiency linked to autoimmune disease
- Essential for skin integrity-Roaccutane used to acne is a retinoid (derivative of vitamin A)

Vitamin A and Pregnancy

- Fears of toxicity have reduced RDA TO 10,000iu
- High amounts thought to cause birth defects
- Essential for sight of baby-deficiency in mother can cause blindness in baby
- Deficiency can lead to cleft palate and other abnormalities

The B vitamins

- Energy production
- Water soluble
- Can not be stored in the body except for B12

Vitamin B 1 Thiamine

- Sources:
- Brewers yeast
- Wheat germ
- Peanuts
- Sunflower seeds, brazil nuts
- Pork
- Pinenuts

Vitamin B: Thiamine

- Alcohol and coffee inhibit absorption

Thiamine deficiency

- Beriberi: numbness, fatigue, loss of appetite, mood changes, pain in lower limbs, nausea and vomiting
- Korsakoff's psychosis: amnesia, severe memory defects, confusion, mental dysfunction

Thiamine deficiency

- Numbness and tingling in hands and feet
- Burning feet
- Chronic fatigue
- Glaucoma
- Gut disorders
- Hair loss

- Insomnia
- Irritability
- Poor concentration
- Depression

Thiamine deficiency

Non alcoholic psychiatric patients	38%
Geriatric population	33-55%
Alcoholic population	30-80%
AIDS patients	>23%
Pregnancy	25-30%
Gestational diabetes	>50%

Vitamin B 2 Riboflavin

- Sources:
- Brewers yeast
- Offal
- Almonds
- Wheat germ
- Mushrooms
- Wild rice

Riboflavin

Depleted by:

- Coffee
- Alcohol
- Diabetes
- Oral contraceptives
- Smoking
- Stress

- Sugar
- Refined food intake
- B6 overload

Deficiency of Riboflavin

- Alopecia
- Angular cheilitis
- Blurred vision
- Cataracts
- Conjunctivitis
- Dermatitis
- Geographic tongue/sore tongue
- Red lips

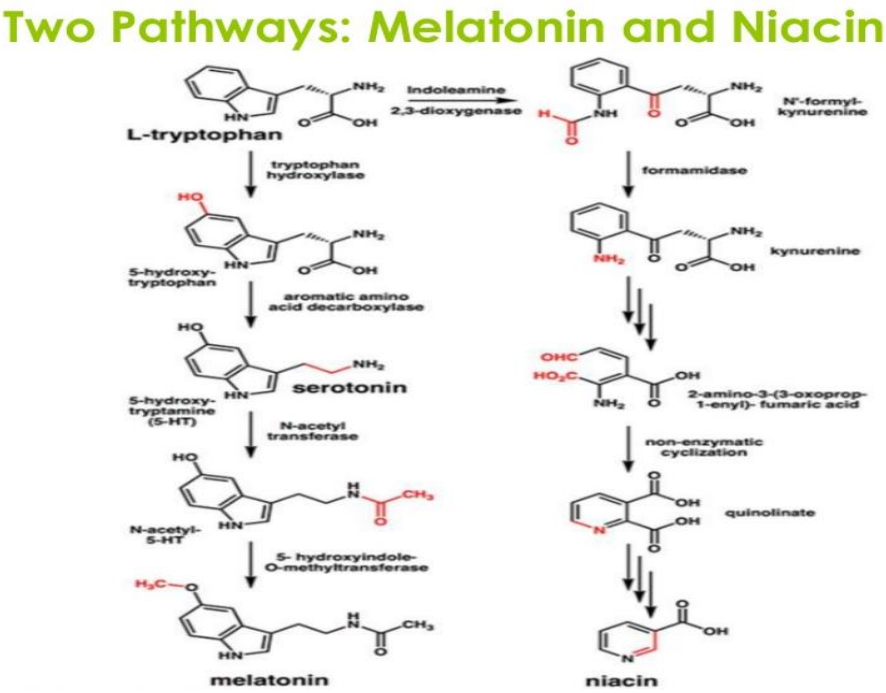
Riboflavin deficiency

Vitamin B3 Niacin

- Sources:
- Brewers yeast
- Rice bran
- Wheat bran
- Peanuts with skin
- Liver
- Chicken
- Turkey
- Salmon
- Sunflower seeds

Niacin

- Nicotinic acid or nicotinamide
- Can be made from tryptophan
- Requires co factors: iron, riboflavin, pyridoxine, NADPH



Functions of Niacin

- Energy production
- Reduces cholesterol levels
- Helps convert tryptophan to serotonin
- Helps with cigarette withdrawal as nicotine works on same receptors as nicotinic acid

Niacin flush

- Helps to detoxify copper and trace elements associated with mental illness
- Improves oxygen supply to the brain

Niacin deficiency

The 3 D's (Pellagra)

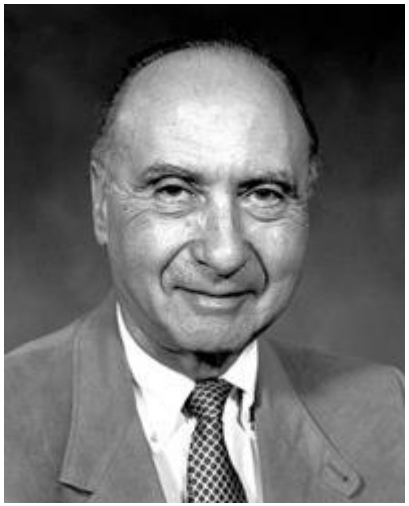
Dermatitis

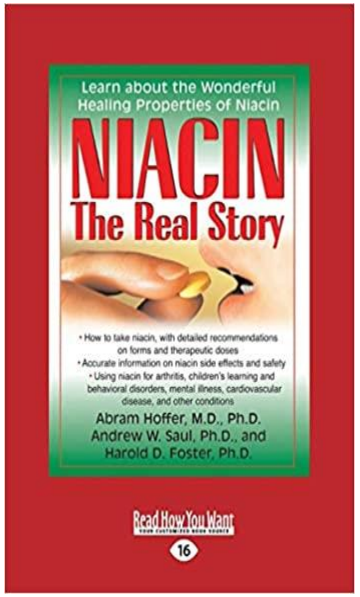
Dementia

Diarrhoea

Niacin and mental illness

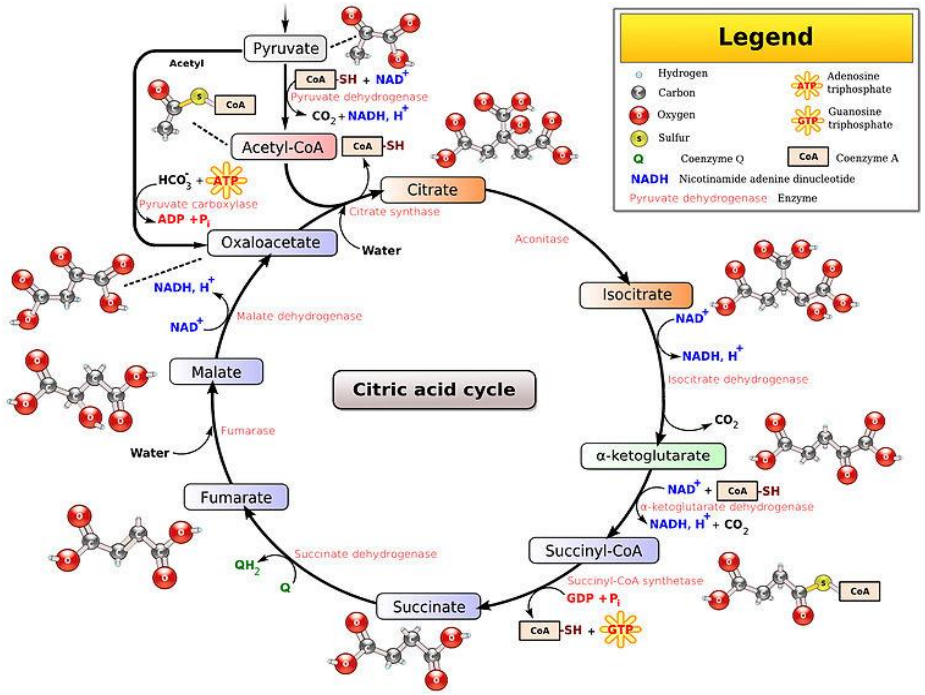
- Large amounts found to control schizophrenia
- Works with B12 and folic acid in keeping adrenaline and noradrenaline in balance
- Niacin, B12 and folic acid help to raise low histamine levels (hallucinations)





Vitamin B5: Pantothenic acid

- Active form Co enzyme A
- Essential for production of energy from carbohydrate, protein and fats



Sources Pantothenic acid

- *Pantos* means everywhere
- Brewers yeast
- Offal
- Mushrooms
- Soybean flour
- Eggs
- lentils

Functions: Pantothenic acid

- Energy production
- Used by adrenal glands-useful for allergies and anxiety
- Antibody production
- Decreases lactic acid accumulation
- Steroid hormone production
- Maintains normal uric acid levels
- Maintenance of Na/K balance

Deficiency Pantothenic acid

- Alopecia
- Abdominal pains
- Burning feet
- Depression
- Dermatitis
- Fatigue
- Fertility disorders
- Hypotension
- Insomnia
- Tender heels

Vitamin B6: Pyridoxine

- Sources
- Brewers yeast
- Sunflower seeds
- Wheat germ
- Tuna
- Liver
- Soybeans

- Lentils and other pulses
- Bananas
- Avocados

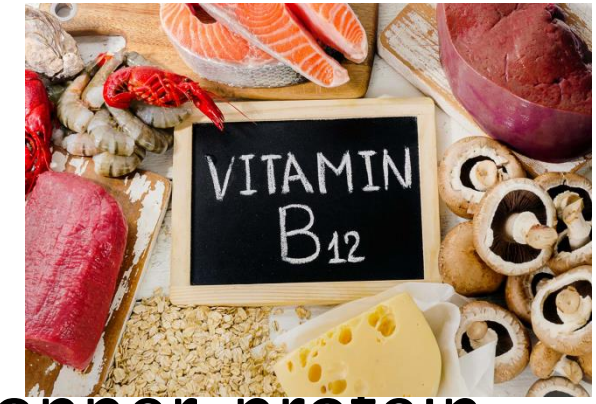
Pyridoxine deficiency

- Required for magnesium and zinc utilisation
- Required in breakdown of EFA's
- Required for neurotransmitter conversion pathways
- Useful to give in broken down form P5P.

Pyridoxine deficiency

- Depression
- PMT
- Dysmenorrhoea
- High homocysteine
- Epilepsy
- Infertility
- Morning sickness
- Schizophrenia
- Sun sensitivity
- Post natal depression

Vitamin B12 Cobalamine

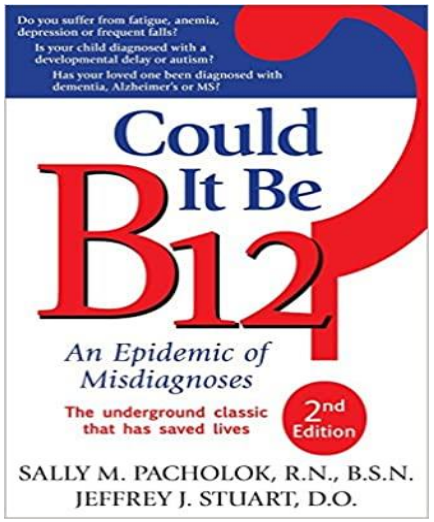


- Vegan diet may be deficient
- Pernicious Anaemia
- Interacts with iron, folic acid, copper, protein, vitamin C and B6 to make red blood cells
- Intrinsic factor in stomach required for absorption
- Stored in liver-deficiency may not show up for 20-30 years

Vitamin B12 deficiency

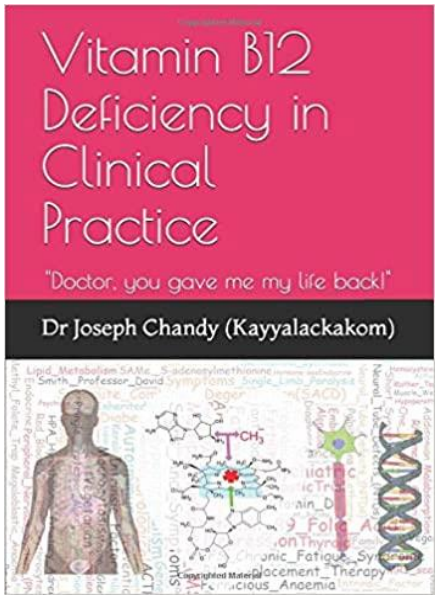
Occurs in stages:

1. Serum concentrations diminish
2. Cell concentrations diminish
3. Biochemical deficiency: less DNA synthesis, raised homocysteine levels
4. Anaemia develops



Vitamin B12 deficiency

- Numbness and tingling in hands and feet
- Fatigue
- Unsteadiness, poor muscular co-ordination
- Moodiness, mental slowness, poor memory
- Confusion, agitation, depression
- Delusions, hallucinations, psychosis
- Reduced glutathione
- Alcohol hinders absorption



Folic Acid

- Works with B12
- High levels of folic acid can mask symptoms of pernicious anaemia
- Deficiency associated with spina bifida
- Many people have MTHFR mutations and can’t break folic acid down

Biotin

- Part of B vitamin group
- Metabolism of fat
- Synthesised by bowel bacteria
- Raw egg white hinders absorption
- Disturbances to gut flora upset synthesis

Biotin deficiency

- Alopecia
- Scaly dermatitis
- Dandruff
- Brittle nails
- Nausea
- Depression
- Muscle pain and weakness

Choline and Inositol

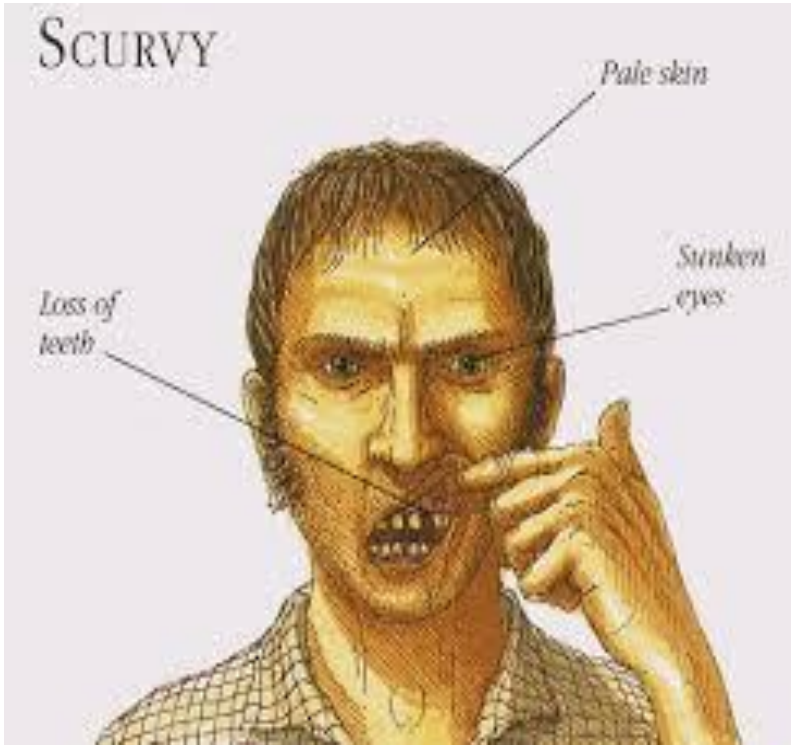
- Choline assists break down of fats
- Works in connection with B5 to form acetylcholine
- Acetylcholine found to be low in dementia
- Inositol transports fat and regulates cholesterol.

Vitamin C Ascorbic Acid

- Water soluble
- Anti oxidant
- Anti histamine
- Used by adrenal glands
- Lost during stress
- Supplements often derived from corn
- Inhibited by coffee
- Binds lead

Vitamin C deficiency

Scurvy




TREATISE
ON THE
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IN THREE PARTS.
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Together with
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By JAMES LIND, M.D.
Phyſician to his Majeſty's Royal Hoſpital at Haſlar near Portſmouth, and Fellow of the Royal College of Phyſicians in Edinburgh.
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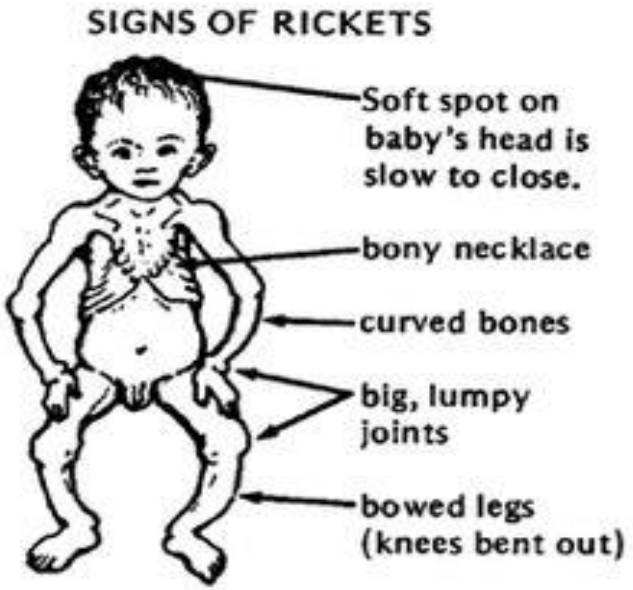
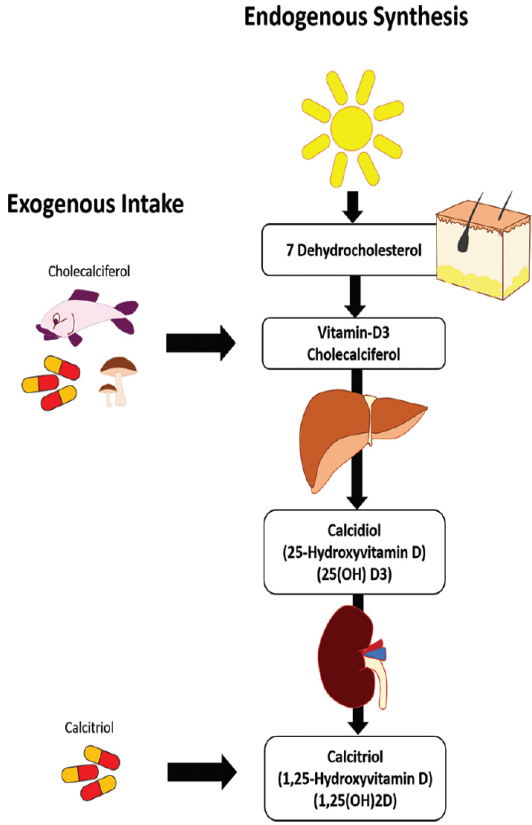
Vitamin D Calciferol

- Sunshine vitamin
- Other sources include fish liver oils, eggs
- Deficiency results in rickets



Vitamin D functions

- Important for immune function
- Works with vitamin A
- Calcium absorption
- Gene expression
- Reduces the risk of pre eclampsia



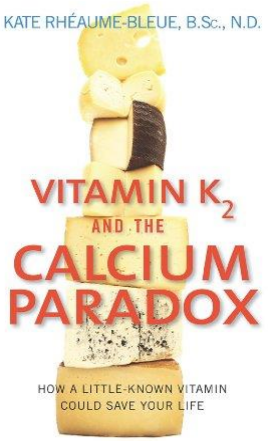
Vitamin D deficiency

- Immune disorders
- Auto immune diseases
- Depression
- 222% greater risk of breast cancer if deficient
- Asthma
- http://www.cityassays.org.uk/Vitamin%20D%20Blood%20Spot.html
- Allergies
- IBD
- MS
- Alzheimer's
- Diabetes

Vitamin E Tocopherol

- Fat soluble
- Anti oxidant
- Anti aging
- Protects cell membranes
- Heart protective
- Protects vitamin A
- Vitamin C can regenerate vitamin E

Vitamin K



- Formation of clotting factors
- Integrity of colonic microflora maintain vitamin K status
- Bacterial manufacture of vitamin K may be as high as 50% of daily needs.
- Helps utilisation and absorption of vitamin D

Any questions?