

Perinatal Depression: The Nutrition Connection

Perinatal Mental Health Matters:
Thinking Outside the Box
Friday 3 July 2009

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DipION mBANT

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SUSANNAH LAWSON

**Optimum
Nutrition
Before, During
and After
Pregnancy**

Achieve optimum
wellbeing for you
and your baby

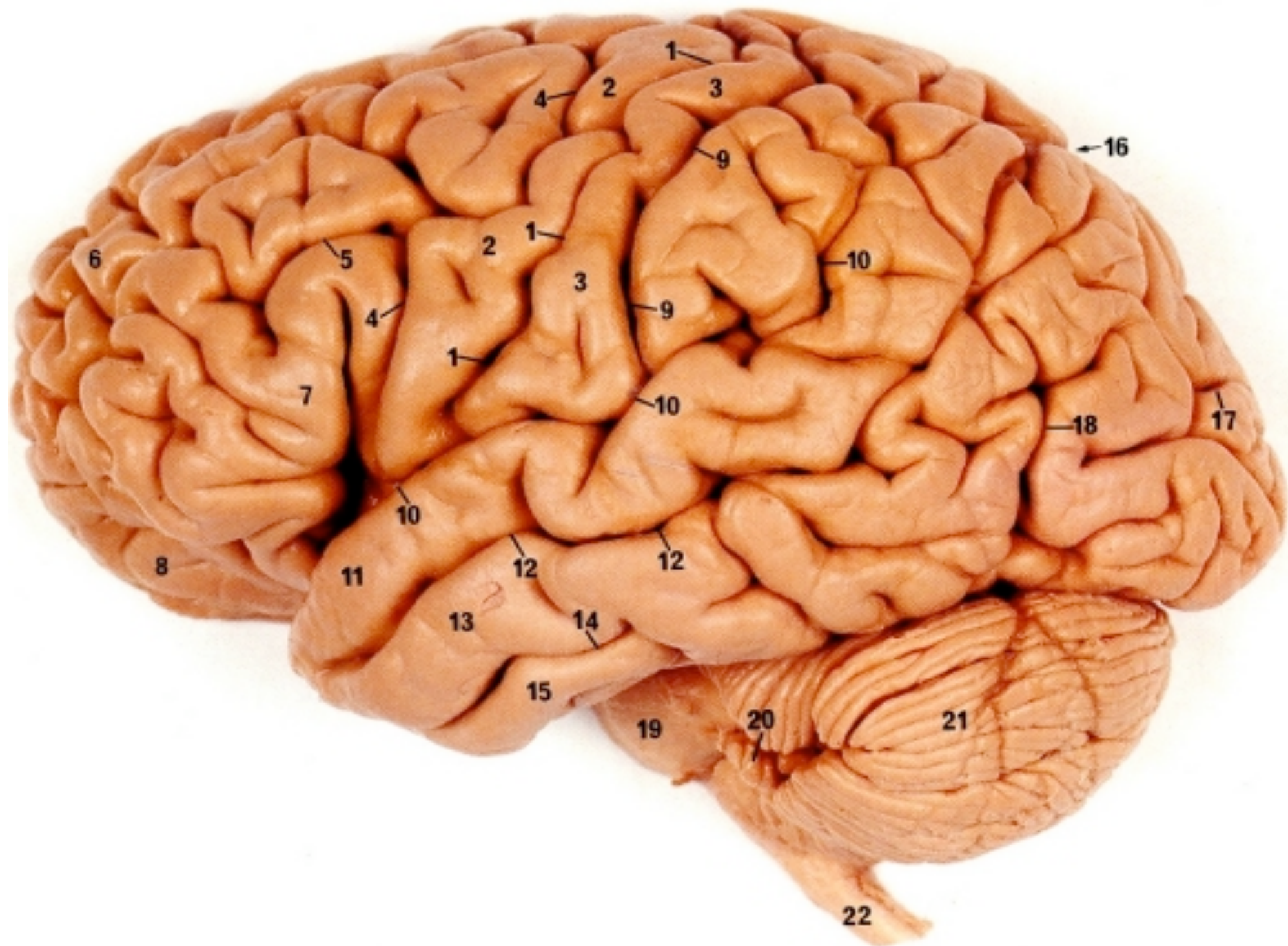


OVERVIEW

- Why nutrition is important.
- The mental health connection.
- Specific nutrients and their link to perinatal depression.
- Other potential nutritional factors.
- Recommendations.

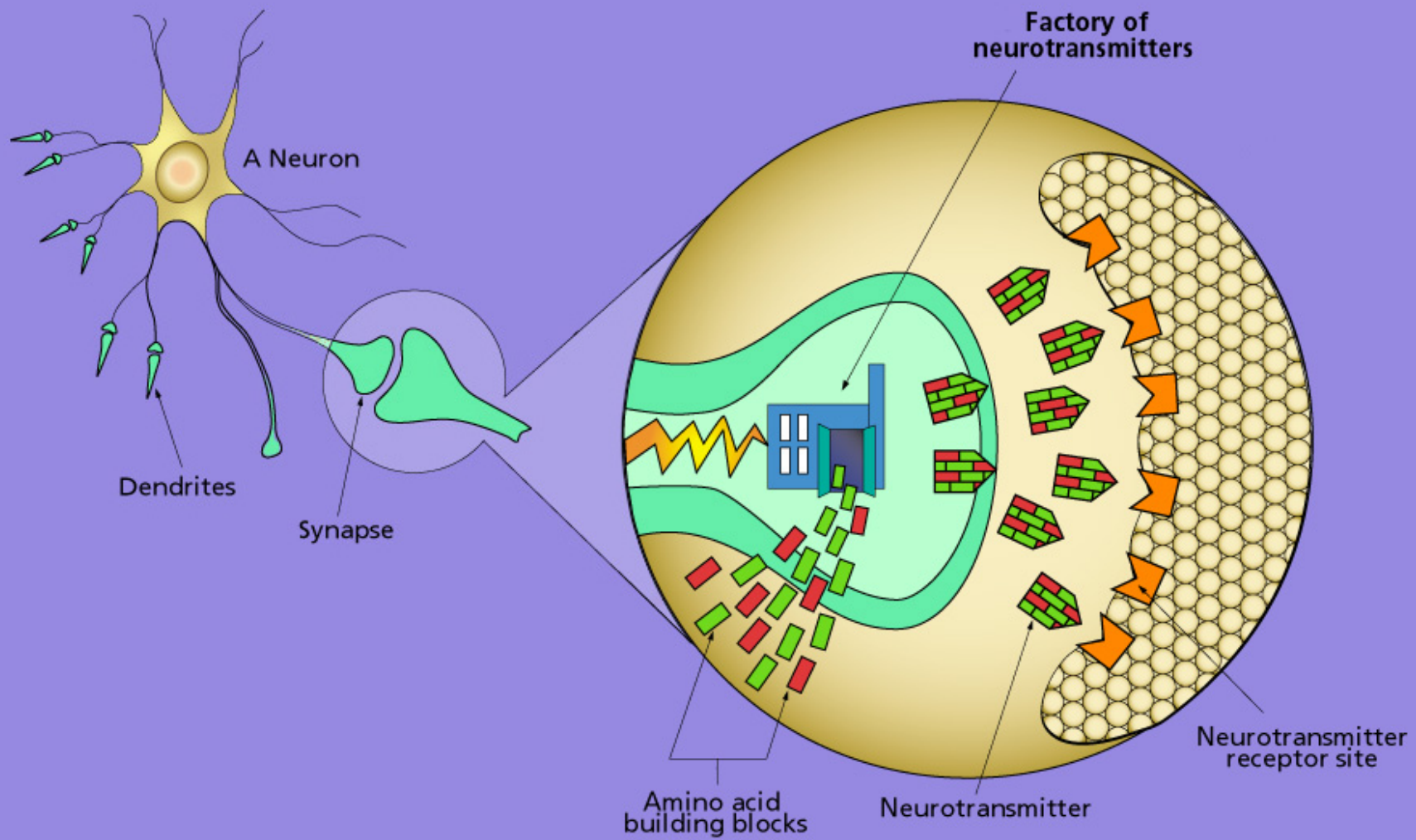
Why Does Nutrition Matter?

- Every part of your body is made from nutrients – from the hairs on your head to the skin on your toes.
- Your organs and body tissues are made of protein.
- Vitamins and minerals act as co-factors in enzyme reactions, which drive every function in the body.
- The vital process of methylation requires nutrients.
- The body is constantly replenishing – bones take 7 years to renew, and your gut lining takes just 4 days.



Your Brain is 60% Fat

- During pregnancy, a mother transfers DHA to her baby to support optimal neurological development.
- As adults, the omega 3 fat EPA is important for brain function.
- Every brain cell membrane, including neurons, is made of fats.



How Neurotransmitters Work

TRYPTOPHAN

PHENYLALANINE



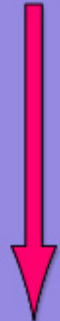
5-HTP



SEROTONIN



TYROSINE



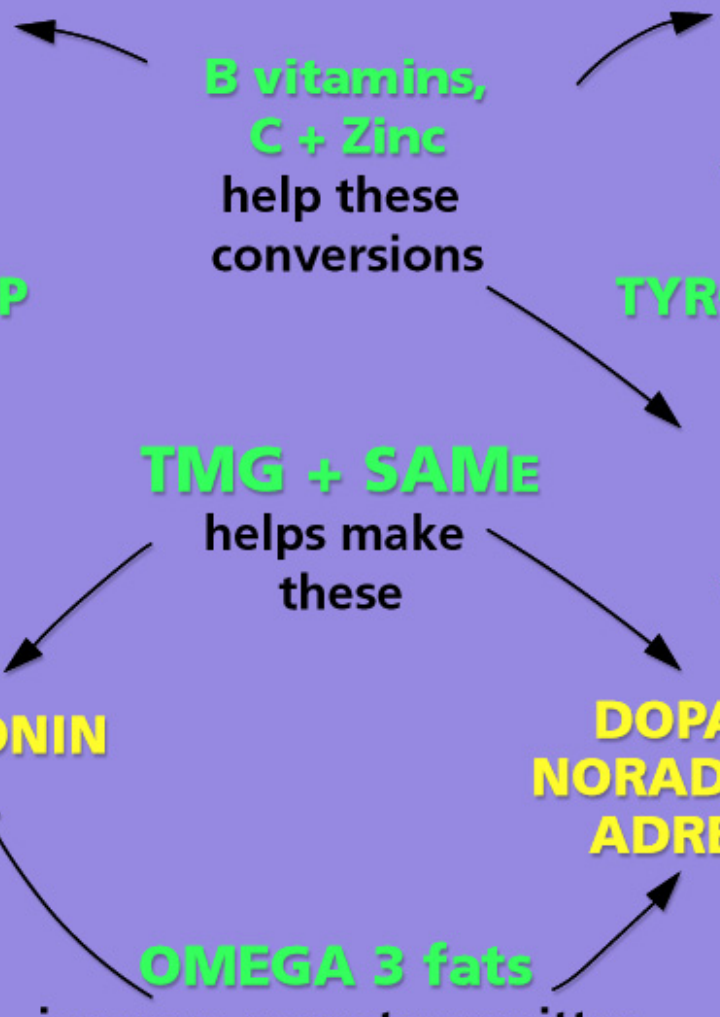
**DOPAMINE
NORADRENALIN
ADRENALIN**

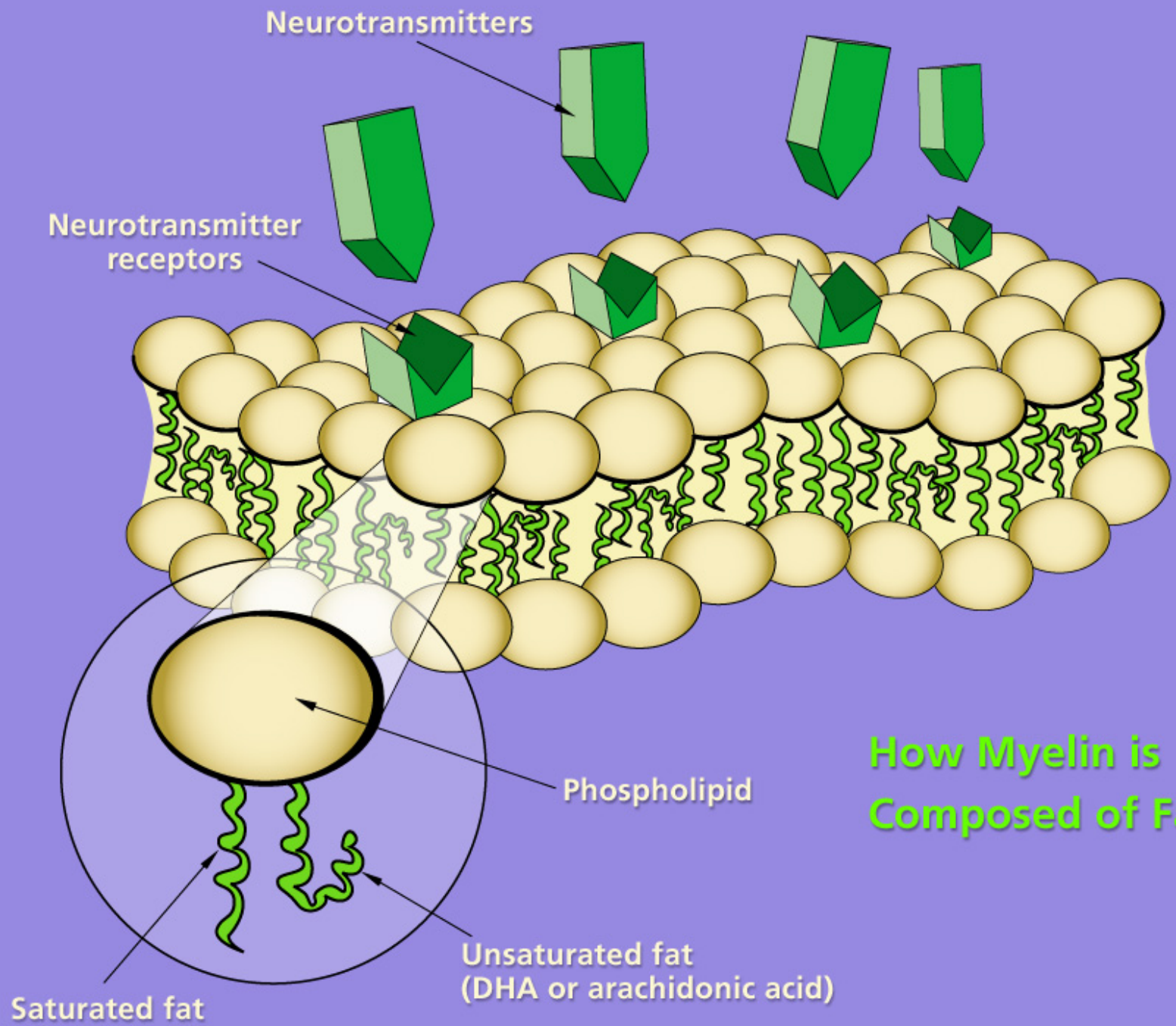
**B vitamins,
C + Zinc
help these
conversions**

TMG + SAME
helps make
these

OMEGA 3 fats
improve neurotransmitter
reception

Mood Enhancing Nutrients





How Myelin is Composed of Fats

Nutrients and Perinatal Depression: the Link

- Essential fats
- Phospholipids
- Amino acids
- Zinc
- Iron
- B vitamins
- Vitamin D

Omega 3 Fats

Omega 3 Intake Reduces Perinatal Depression

Women consuming three or more servings of fish (estimated to provide 1.5g or more of omega 3 fish oils) were much less likely to become depressed in the third trimester.

J Golding, C Steer, P Emmett, JM Davis & JR Hibbeln, High levels of depressive symptoms in pregnancy with low Omega-3 fatty acid intake from fish, *Epidemiology* (2009) 20;3,

Eating Fish Reduces Depression

Study of 11,721 British pregnant women found that those who consumed fish two to three times a week were half as likely to suffer depression during the third trimester and for eight months after giving birth, compared to those who consumed the lowest intakes.

Annual Meeting of the American Psychiatric Association,

San Francisco, 20 May 2003

National Consumption Influences Risk

Risk of postnatal depression is 50-fold greater in countries with little seafood consumption compared to those with the greatest intake.

SJ Otto, AC Houwelingen, M Antal et al, Maternal and neonatal essential fatty acid status in phospholipids: an international comparative study, *European Journal of Clinical Nutrition* (1997) 51:232-242

Fish Oil Improves Response

A randomised control trial among pregnant women with depression found those having 3.5g of fish oil a day reported 62% clinical response rate compared with 27% for those taking a placebo, and scored significantly lower on the Edinburgh Postnatal Depression and Hamilton Rating scales.

KP Su et al, Omega-3 fatty acids for major depressive disorder during pregnancy: results from a randomised, double-blind, placebo-controlled trial, *Journal of Clinical Psychiatry* (2008) 69(4):633-4.

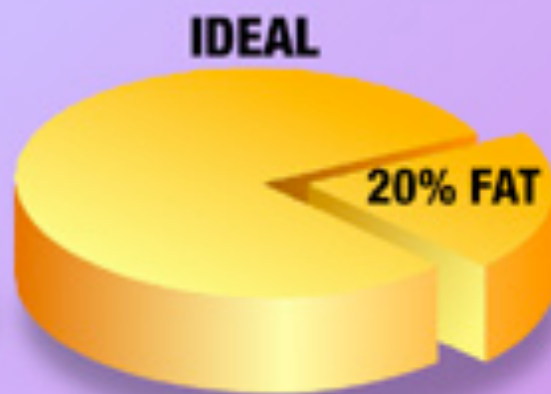
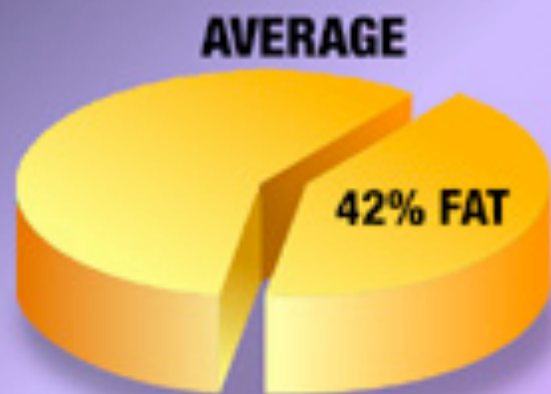
A Safer More Effective Treatment?

Omega 3 supplements reverse depression more effectively than anti-depressant drugs, when decreases in depression rating scores are compared.

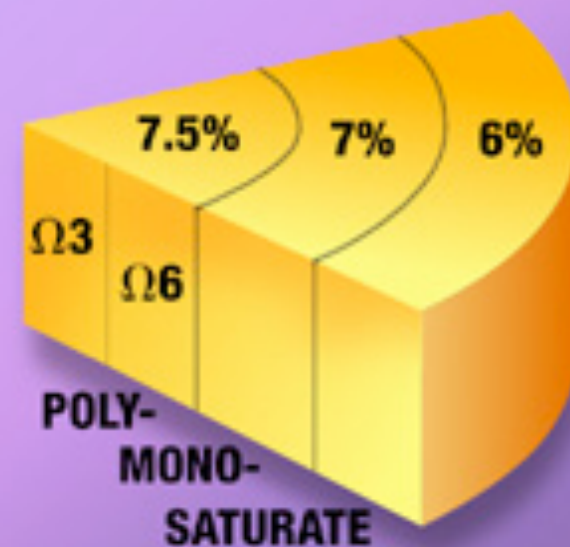
P Lin and K Su, A meta-analytic review of double-blind, placebo-controlled trials of antidepressant efficacy of omega-3 fatty acids, *Journal of Clinical Psychiatry* (2007) 68(7):1056-61.

Common Signs of EFA Deficiency

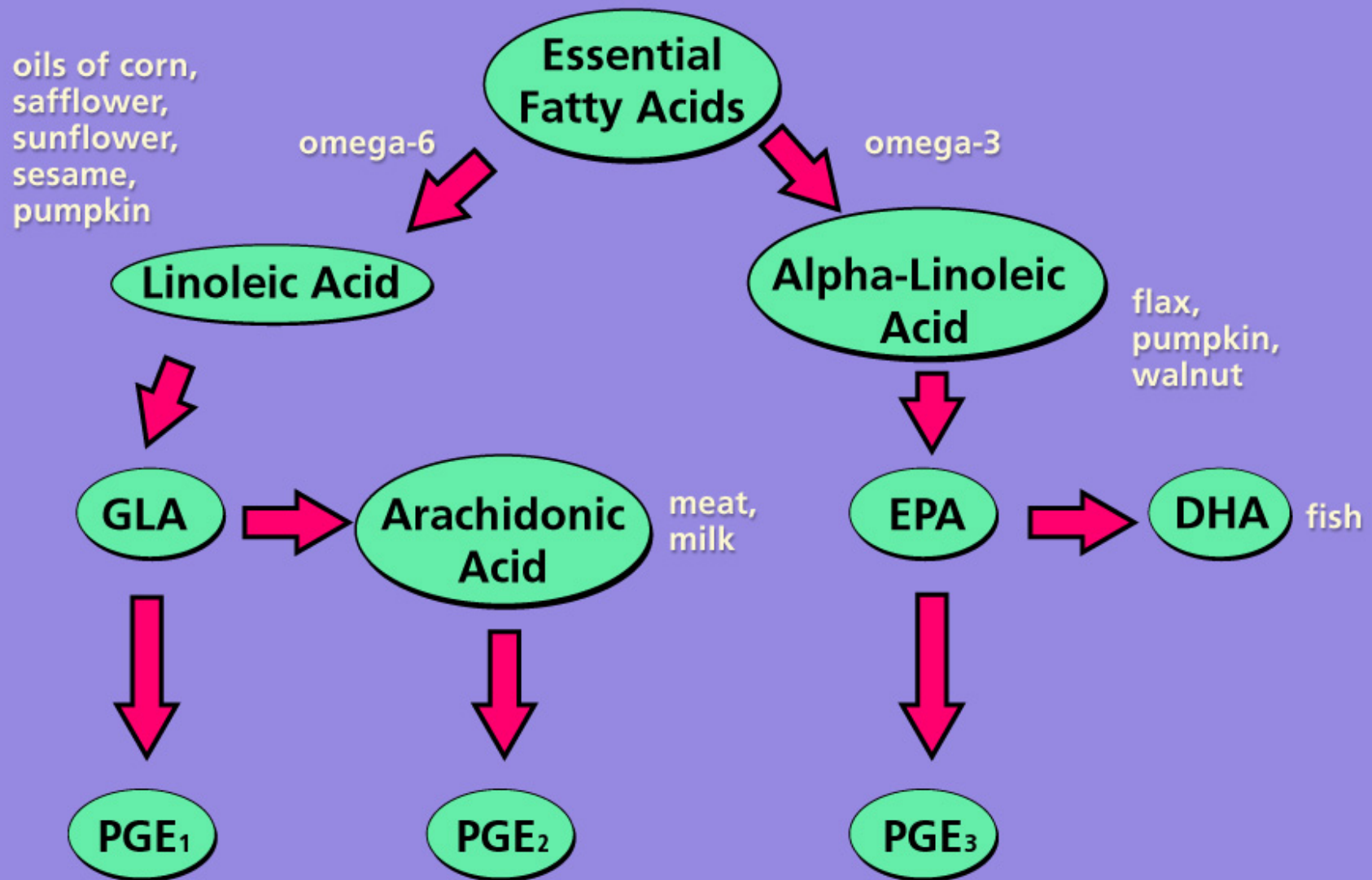
- Depression
- Dry or rough skin
- Dry hair, loss of hair or dandruff
- Eczema, asthma or joint aches
- Excessive thirst
- Excessive urination
- PMS or breast pain
- Dyslexia or learning difficulties



**FAT INTAKES AS
% OF TOTAL CALORIES**



**IDEAL BREAKDOWN
OF FAT INTAKE**



The Brain's Essential Fats

Omega 3 and Mercury Content of Fish

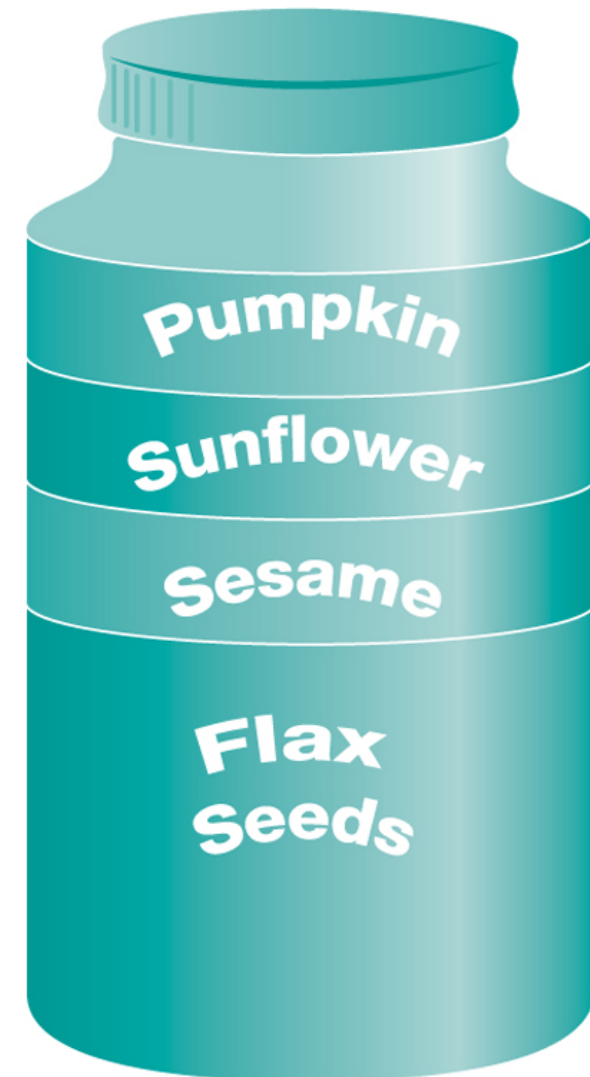
FISH Source: FSA 2004	Omega 3 g/ 100g	Mercury mg/kg	Ω3/mercury ratio
canned tuna	0.37	0.19	1.95
trout	1.15	0.06	19.17
herring	1.31	0.04	32.75
fresh tuna	1.50	0.40	3.75
canned/smoked salmon	1.54	0.04	38.50
canned sardines	1.57	0.04	39.25
fresh mackerel	1.93	0.73	2.64
fresh salmon	2.70	0.05	54.1
swordfish	2??	1.40	1.43??
marlin	2??	1.10	1.83??

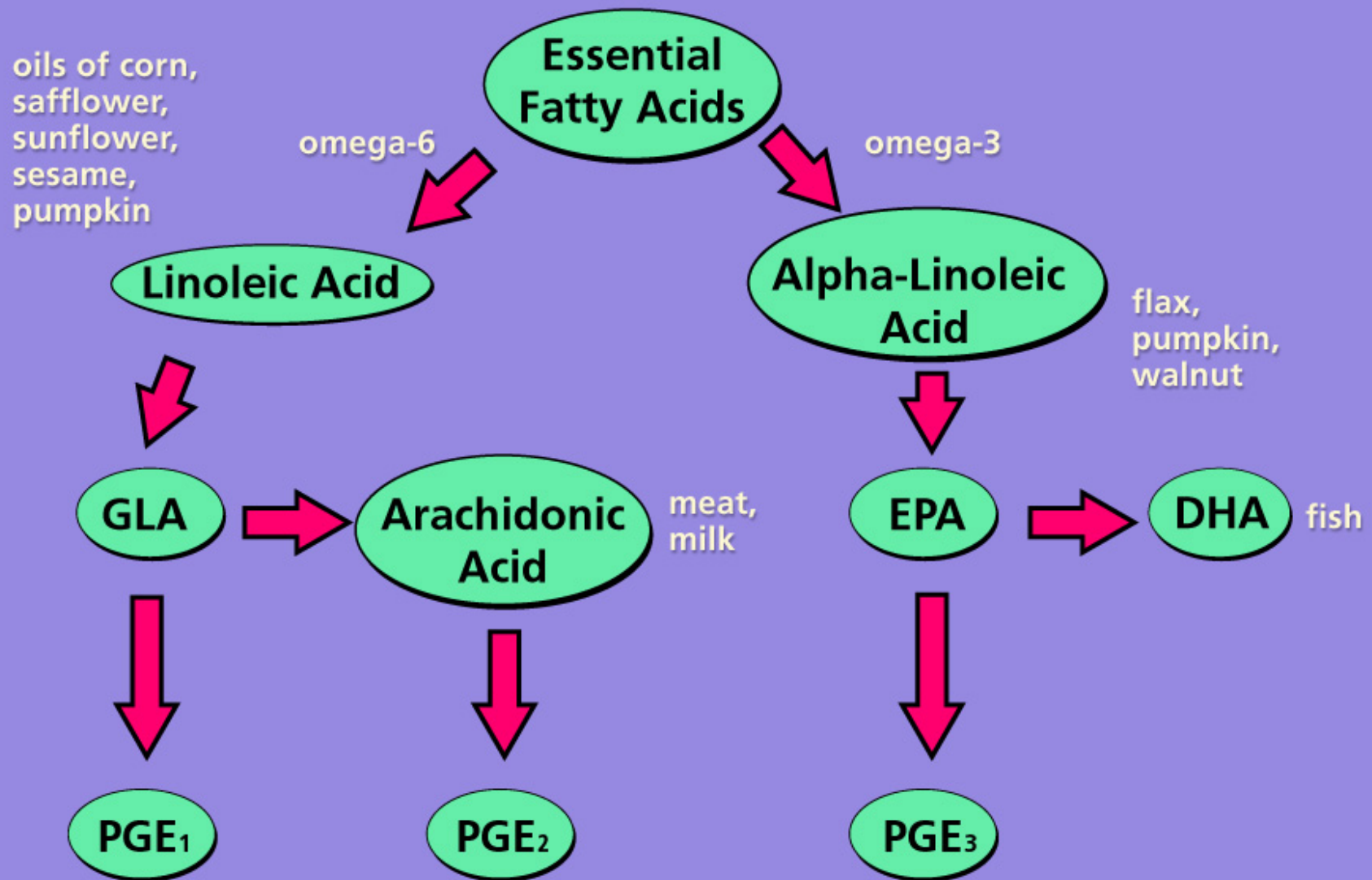
Oily Fish Recommendations

- American Psychiatric Association (APC) recommends we consume 2 portions of oily fish per week to avoid depression.
- APC also recommends additional omega 3 supplementation in the presence of emotional disorders.
- UK Food Standards Agency recommends pregnant women limit oily fish consumption to no more than 2 portions a week.

Vegetarian Sources of Omega 3

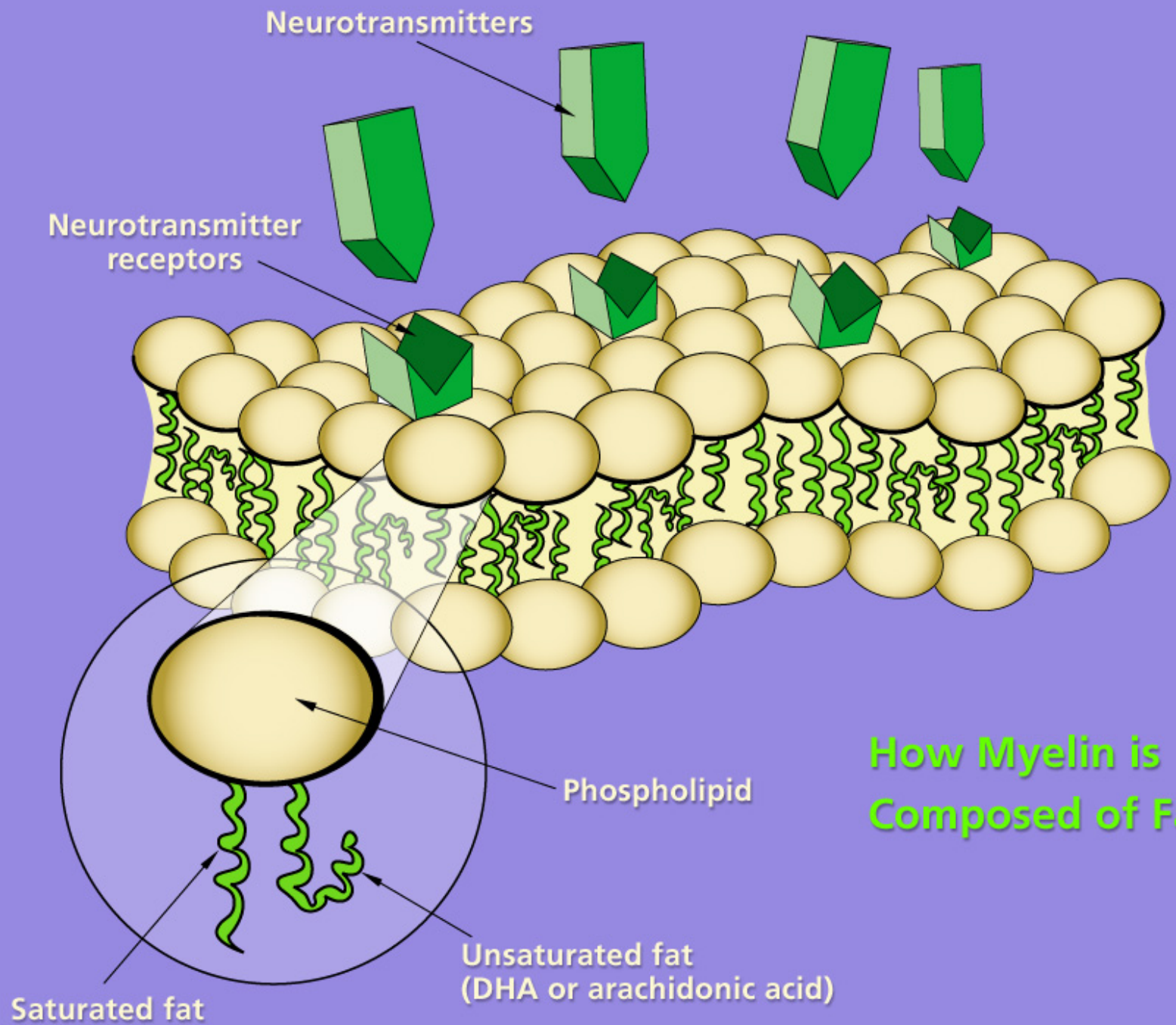
- Flaxseeds
- Pumpkin seeds
- Walnuts
- Algae
- Flaxseed oil





The Brain's Essential Fats

Phospholipids



How Myelin is
Composed of Fats

Key Players in the Brain

- Make up 60% of the brain by weight.
- Every neuron wrapped in a myelin sheath made of phospholipids.
- Location of receptor sites - how the brain 'listens' to neurotransmitters.
- Key for mood, memory and mental performance.

Influence on Mood

- A Finnish Study found women with the lowest DHA phospholipid plasma levels experienced greater depressive symptoms, as measured on the EPDS.
- A number of studies have found a decreased omega 3 content in the phospholipids of depressed patients.
- EPA content is negatively correlated with the severity of depression, while arachidonic acid (a pro-inflammatory omega 6 fat) levels are positively correlated.

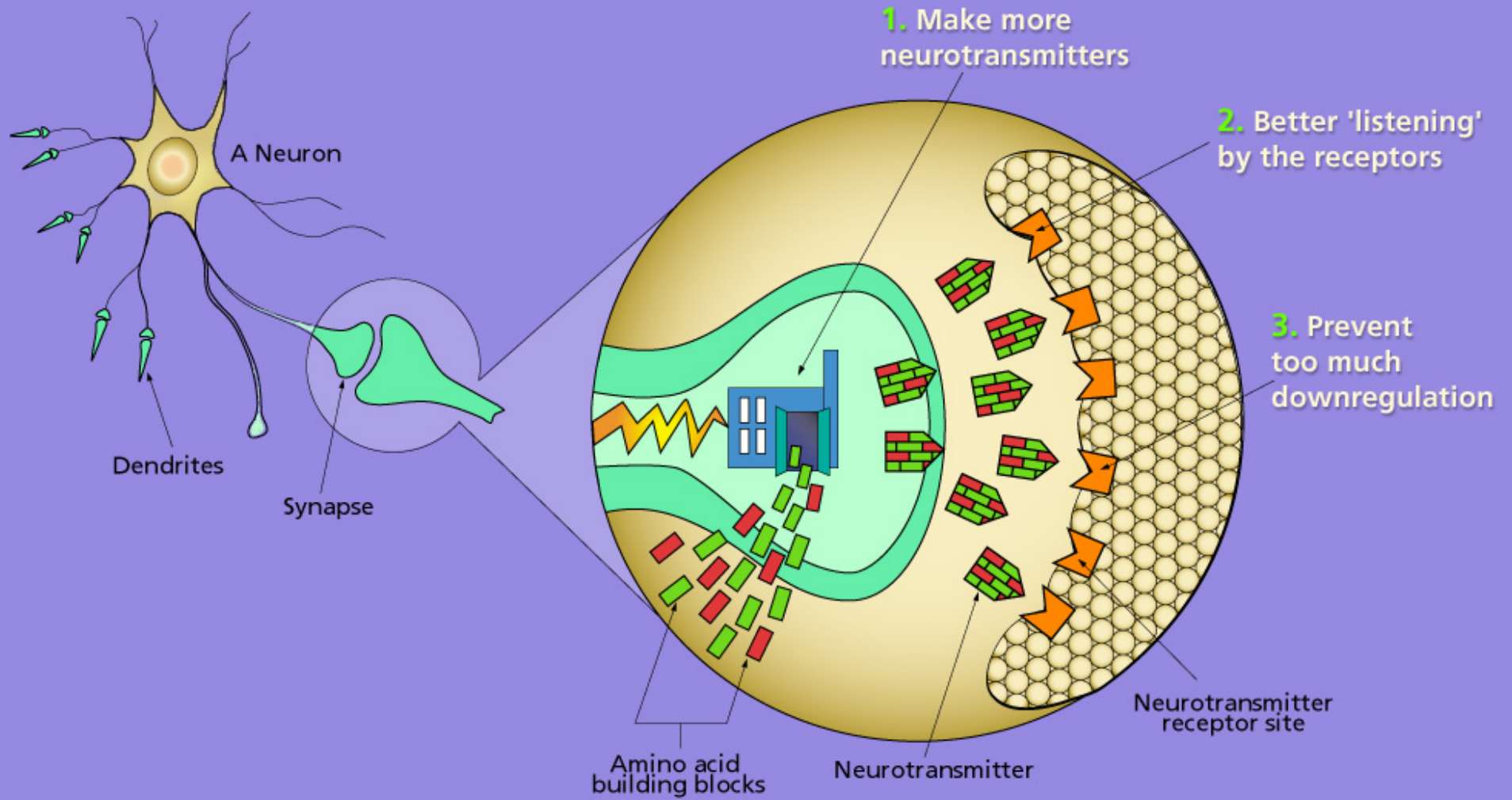
SJ Otto, AC Houwelingen, M Antal et al, Maternal and neonatal essential fatty acid status in phospholipids: an international comparative study, *European Journal of Clinical Nutrition* (1997), 51:232-242

PB Adams, S Lawson, A Sanigorski, AJ Sinclair, Arachidonic acid to eicosapentaenoic acid ratios in blood correlated positively with clinical symptoms of depression, *Lipids* (1996), 31(supp)S157-S161

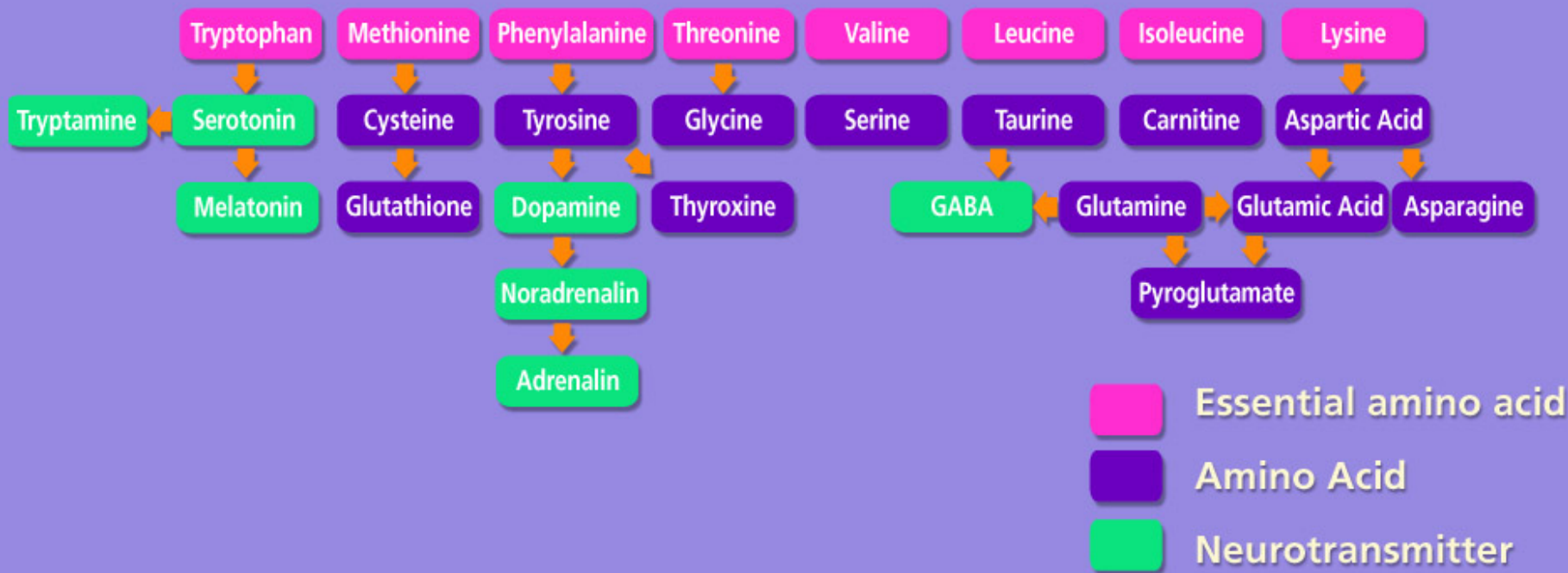
Sources of Phospholipids

- Fish, especially sardines
- Eggs
- Organ meats
- Soya
- Nuts
- Lecithin

Amino Acids



Three Ways to Improve Neurotransmission



Family Tree of Key Neurotransmitters

Protein: the Body's Building Blocks

- The human body is 25% protein.
- In pregnancy, the UK recommended intake for protein goes up by 13% – from 45g a day (or 15% of total calories) to around 51g.
- 22 amino acids – the building blocks of protein.
- 8 of which we must get from diet.

Tryptophan Deficiency Triggers Depression

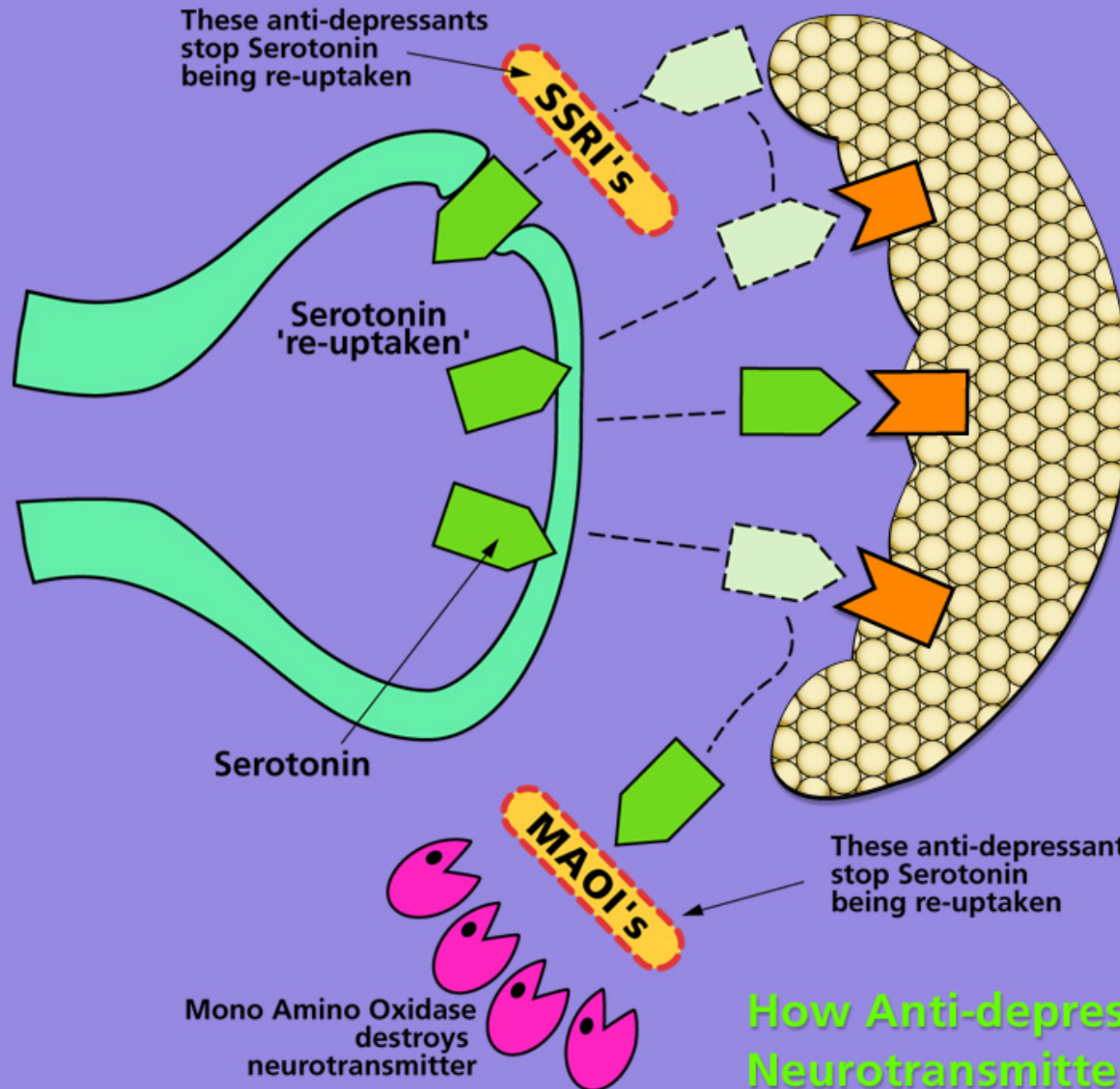
A study at Oxford University gave a group of women a tryptophan-deficient diet. Within 8 hours, most started to feel depressed. When tryptophan was added back into their diet, without their knowledge, their mood improved.

KA Smith et al, Relapse of depression after rapid depletion of tryptophan, *Lancet* (1997) 349:915-19.

5-HTP v SSRI

A double-blind trial headed by Dr Poldinger at the Basel University of Psychiatry gave 34 depressed patients 300mg of 5-HTP and 29 patients the SSRI fluvoxamine. At the end of the six weeks, both groups of patients experienced a significant improvement in their depression, however those on 5-HTP had had a greater improvement in each of the four criteria assessed – depression, anxiety, insomnia and physical symptoms – as well as the patients own self-assessment.

Ref: Poldinger, et al, A functional-dimensional approach to depression: serotonin deficiency and target syndrome in a comparison of 5-hydroxytryptophan and fluvoxamine. *Psychopathology* (1991) 24, 53-81



How Anti-depressants Keep Neurotransmitters in Circulation

TRYPTOPHAN

PHENYLALANINE



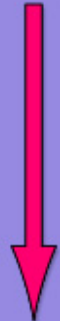
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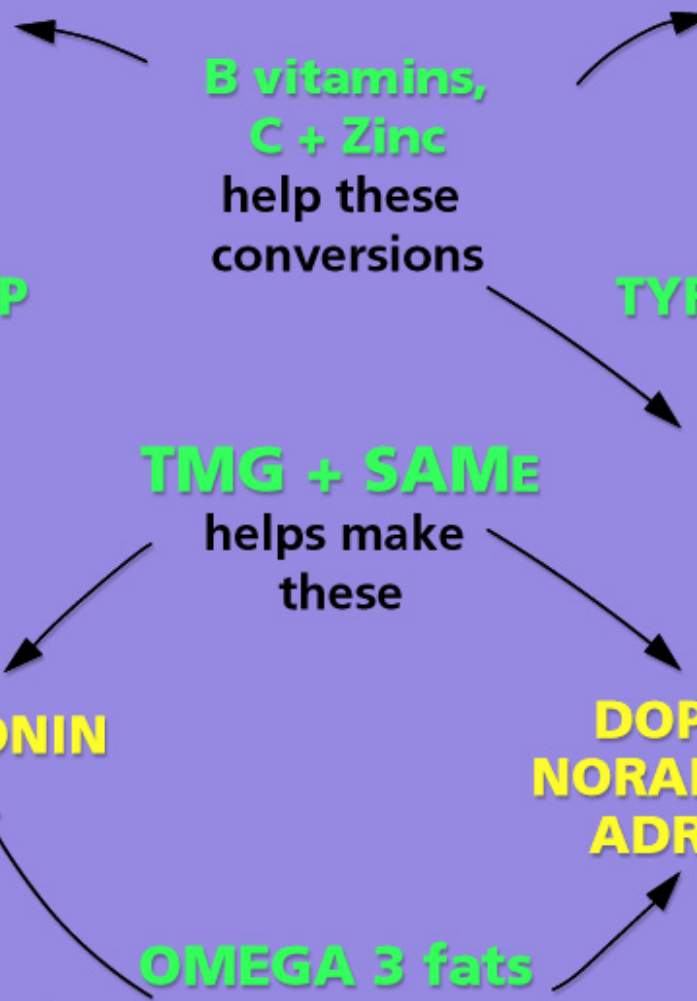
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improve neurotransmitter
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Mood Enhancing Nutrients



Serotonin Promoters

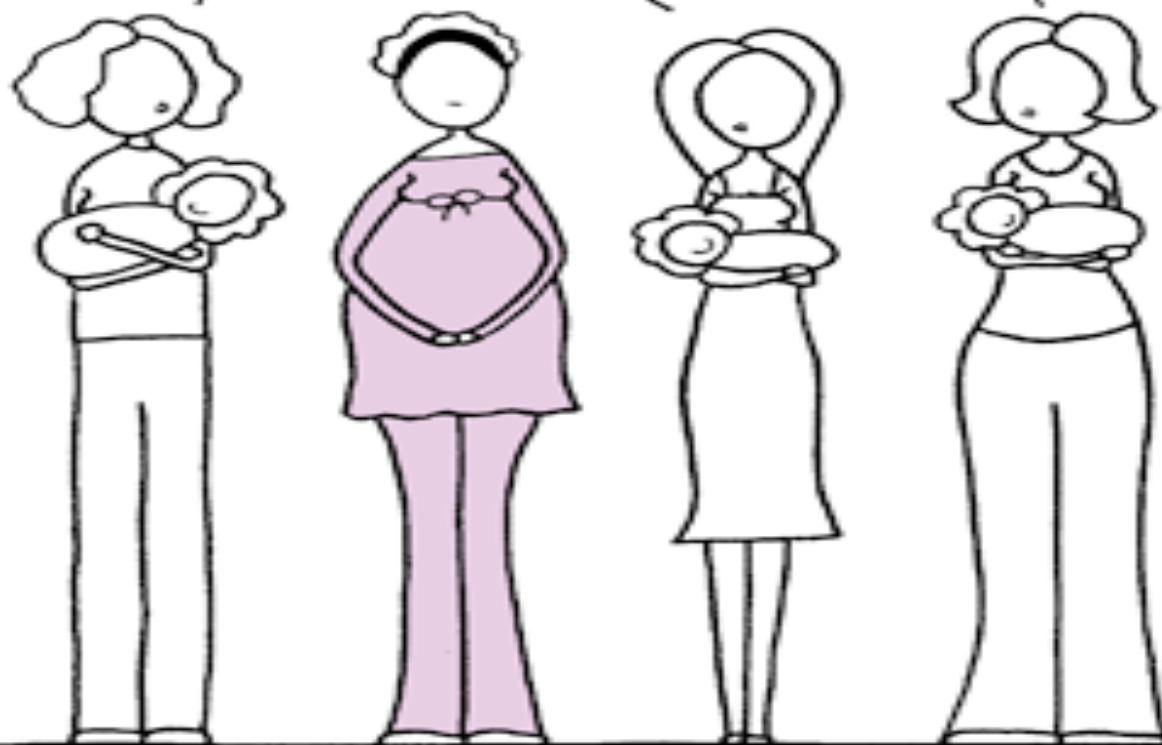
- Sunlight/ full spectrum light
- Exercise
- Carbohydrate
- 5-HTP (150-300mg)
- Co-factor nutrients (eg B3, B6, folate, C, zinc, magnesium)
- S-AdoMet, TMG, folate, B12
- Omega 3 (EPA)

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OH,
THE
PAIN.

THE
PAINFUL
PAIN.

DON'T EVEN
GET ME
STARTED
ON THE PAIN.



POST-PARTUM OPPRESSION.

Zinc

Zinc: Vital Support

- A co-factor for more than 100 different enzyme reactions in the body.
- Implicated in mental health.
- Can activate the production of Brain Derived Neurotrophic Factor (BDNF) which helps ward off depression.
- Pyroluria is a condition where too much zinc is excreted from the body. It is an underlying biochemical imbalance linked to depression and other mental health conditions.
- In the last few weeks of pregnancy, a mother will transfer a reserve of zinc to her baby, believed perhaps to help prime its immune system for life outside the womb.

Zinc Status in Pregnancy

- A 2006 Polish study found a correlation between zinc levels and severity of depressive symptoms in mothers before and 3 and 30 days after delivery.
- A smaller study, also in 2006, found that zinc levels were low immediately after birth.

J Wójcik et al, Antepartum/postpartum depressive symptoms and serum zinc and magnesium levels, *Pharmacological Reports* (2006) 58(4):571-6

Zinc: Deficiency Signs

- Depression
- White spots on two or more finger nails
- Stretchmarks
- Reduced immunity
- Acne and greasy skin
- Reduced appetite
- Poor sense of taste or smell

Food Sources of Zinc

- Oysters
- Red meat
- Fish
- Pumpkin seeds
- Ginger
- Nuts
- Wholegrains
- Eggs

Zinc and B6

- Biochemically, zinc often works in partnership with B6.
- *“We have never seen post-natal depression or psychosis in any of our patients treated with zinc and B6.”*

Dr Carl Pfeiffer, world authority on treating mental health problems with nutrition

Iron

Iron, Anaemia and Depression

- WHO estimates 24% of pregnant women in Europe are anaemic.
- An American study measuring hemoglobin levels in mothers during the month after giving birth found those with the lowest levels scored highest on depressive symptom scores.
- A 2005 study showed that iron-deficient pregnant women who received supplements (125mg daily) recorded a 25% improvement in depression and stress scales, compared to those taking a placebo.

EJ Corwin et al, Low hemoglobin level is a risk factor for postpartum depression, *Journal of Nutrition* (2003), 133:4139-4124

JL Beard et al, Maternal Iron Deficiency Anemia Affects Postpartum Emotions and Cognition, *Journal of Nutrition* (2005), 135(2):267-272

Iron: Deficiency Signs

- Anaemia
- Depression
- Fatigue
- Loss of appetite
- Nausea
- Sore tongue
- Pale skin

Food Sources of Iron

- Red meat
- Pumpkin seeds
- Parsley
- Almonds, cashews, Brazils, walnuts
- Prunes
- Egg yolks
- Vitamin C increases absorption

Cautions and Recommendation

- A common side effect of ferrous sulphate supplementation is gastric irritation and constipation.
- Studies have found that high levels of iron supplementation can interfere with zinc absorption.
- Recommend lower dose of more bioavailable form - chelated iron is three times more absorbable than iron sulphate or oxide.
- Ascorbate, citrate and gluconate forms are also better absorbed and tolerated.
- Anaemia can also be caused by B12 or folic acid deficiency.

B Vitamins

Folic Acid and B Vitamin Status – a Possible Link to Depression?

- Studies have found that low folate levels are commonly found in those suffering with depression.
- Increased plasma homocysteine levels are a functional marker of folate deficiency and are another common finding in those with depression.
- A recent study found that homocysteine levels can be higher in pregnant women, especially in the third trimester.

AH Behzadi, AS Behbahani, N Ostovar, Therapeutic effects of folic acid on antepartum and postpartum depression, *Medical Hypotheses* (2008), 71(2):313-4

Reduces Risk of Depression

- A Finnish study divided a group of almost 2700 participants into three groups according to folate intake. Those in the group with with the lowest folate intake were 67% more likely to be depressed than those in the highest intake group.

T Tolmunen et al, Association of dietary folate and depressive symptoms, Journal of Nutrition (2003), 133: 3233-3236

Enhances Medication

- In a study where folic acid is co-administered with SSRI anti-depressant medication (fluoxetine) to depressed women, 94% experienced a therapeutic response v 61% on the anti-depressants alone.
- Further studies show that vitamin B12 can also enhance anti-depressant medication.

A Coppen, J Bailey, Enhancement of the antidepressant action of fluoxetine by folic acid: a randomized, placebo-controlled trial, *Journal of Affective Disorders* (2000), 60:121-30

B2 and B6 Also Play a Role

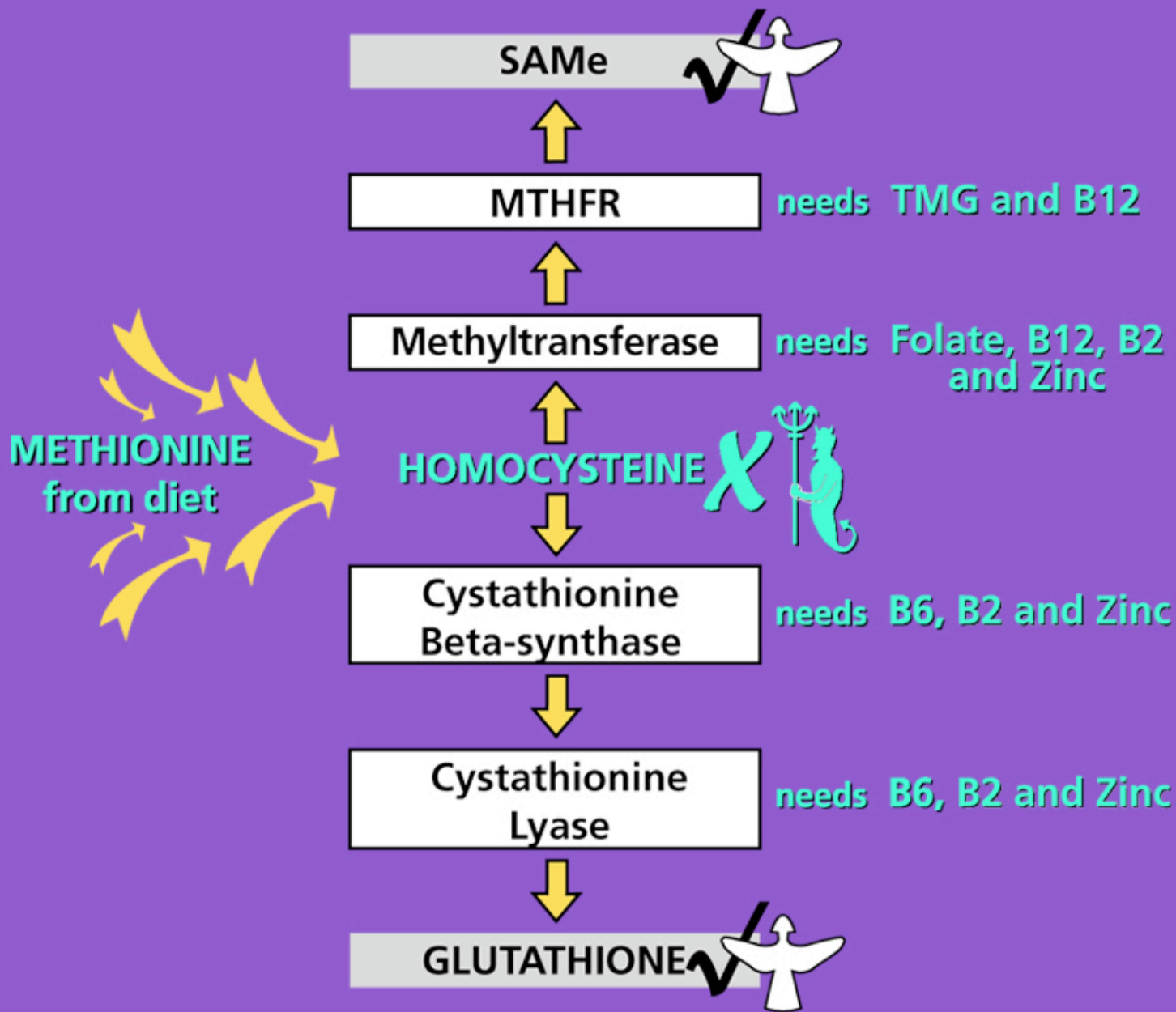
- The Osaka Maternal and Child Health Study by Miyake et al reported a link between B2 intake in the third trimester and decreased risk of post-natal depression.
- Studies have shown a link between low B6 levels and depressive symptoms.

Miyake et al, Dietary folate and vitamin B2 intake and the risk of postpartum depression in Japan: The Osaka Maternal and Child Health Study, *Journal of Affective Disorders* (2006), 96:133-138

AM Hvas, S Juul, P Bech, E Nexø, Vitamin B6 level is associated with symptoms of depression, *Psychotherapy Psychosom* (2003), 73:340-343

Cautions re Single Supplementation

- Supplementing folic acid can mask B12 deficiency.
- Need for B12 increases during pregnancy (RDA 2.6mcg compared to 2.4mcg).
- B12 deficiency in pregnancy linked to birth defects and possibly premature birth.
- B12 deficiency at any time can impact on mental health and neuro-psychiatric conditions.



Homocysteine predicts risk for...

- Depression (5 unit increase doubles risk)
- Pregnancy problems
- Birth defects
- Heart attacks (as good as cholesterol)
- Strokes (better than cholesterol)
- Alzheimer's disease
- Osteoporosis

...and is easily reversible with optimum nutrition

Methylation is involved in:

- Formation of neurotransmitters such as serotonin, adrenalin, acetylcholine etc.
- Formation of hormones such as insulin.
- Formation of haem, as in haemoglobin, hence oxygen transport.
- Formation of clotting factor in the blood.
- Energy production in every cell.
- Synthesis and repair of RNA and DNA, hence all cellular growth.

Steps to Lower Homocysteine

- Eat less fatty meat, more fish and vegetable protein.
- Eat green vegetables.
- Have a clove of garlic a day.
- Cut back on tea and coffee.
- Don't add salt to your food.
- Limit alcohol intake.
- Reduce stress.
- Stop smoking.
- Supplement homocysteine-lowering nutrients.

Homocysteine-Lowering Nutrients

NUTRIENT	GOOD	LOW	HIGH	V. HIGH
	<6	6-9	9-15	Above 15
Folate	200μg	400μg	1200μg	2000μg
B12	10μg	500μg	1000μg	1500μg
B6	25mg	50mg	75mg	100mg
B2	10mg	15mg	20mg	50mg
Zinc	5mg	10mg	15mg	20mg
TMG	500mg	750mg	1–1.5g	3–6g

Vitamin D

Vitamin D

- NICE now recommends pregnant women supplement 10mcg of vitamin D a day, particularly in those women who are at risk.
- Insufficient intake linked to rickets and osteomalacia, increasing risk of osteoporosis.
- Also to type 1 diabetes, some cancers and cardiovascular disease.
- In pregnancy, a deficiency linked to five-fold increased risk of pre-eclampsia, and also increased risk of caesarian section.

Vitamin D and Depression

A randomised double-blind trial published in the *Journal of Internal Medicine* in September 2008 found a correlation between low levels of vitamin D and depression. Supplementation of 20,000-40,000 IU of vitamin D for 12 months significantly improved Beck Depression Inventory scores.

R Jorde et al, Effects of vitamin D supplementation on symptoms of depression in overweight and obese subjects: randomised double-blind trial, *Journal of Internal Medicine* (2008), 264(6):599-609

Vitamin D: Deficiency Signs

- Depression
- Joint pain or stiffness
- Backache
- Tooth decay
- Muscle cramps
- Hair loss

Food Sources of Vitamin D

- Herring
- Mackerel
- Salmon
- Oysters
- Cottage cheese
- Eggs
- Butter

Blood Sugar

Glucose for Fuel

- Glucose is a human's preferred fuel source to make energy.
- Breakdown product of carbohydrate – ie grains, fruit and vegetables.
- The brain consumes around 20% of our total energy (despite accounting for only 2% of bodyweight).

Link Between Sugar and Depression

Larry Christensen, doctor of psychology at the University of South Alabama, found that sugar intake had a direct relationship to mood.

L Christensen, Psychological distress and diet – effects of sucrose and caffeine, *Journal of Applied Nutrition* (1998) 40(1):44-50

Poor Glucose Tolerance is Common

Leading blood sugar expert Professor Gerald Reaven from Stanford University estimates that 25% of 'normal' (ie non-obese) people have insulin resistance.

The Insulin Connection

- Insulin is produced in response to an increase in blood sugar levels (ie after eating).
- Insulin required for the transport of the amino acid tryptophan into the brain to make serotonin.
- Theory that postnatal depression may be triggered by sudden fall in insulin levels after giving birth that therefore decreases serotonin production.

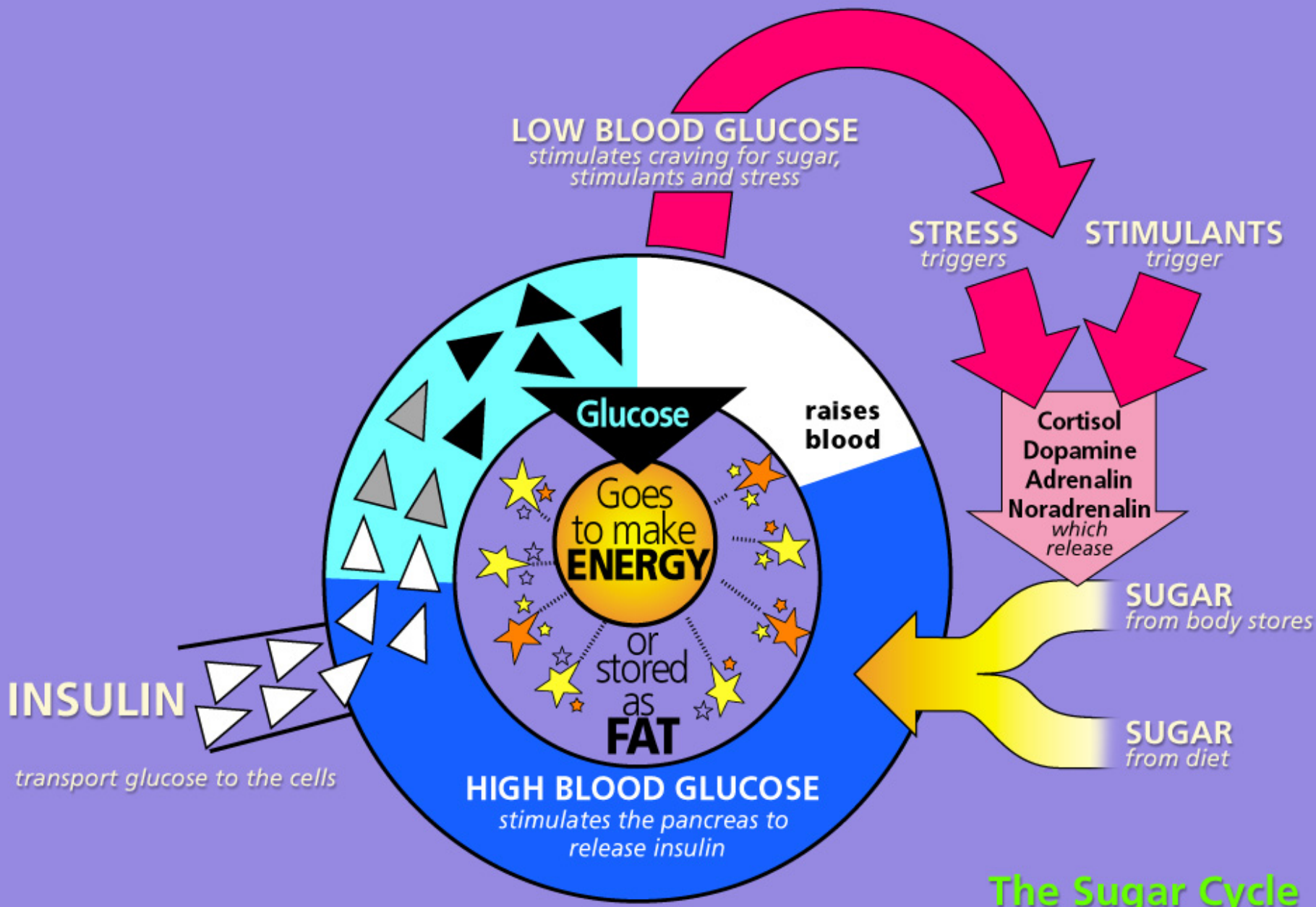
Diabetes and Perinatal Depression

- According to a study of 11,000 American pregnant women and new mothers, those with diabetes (including gestational diabetes) are almost twice as likely to suffer from depression.
- A number of other studies note a link between metabolic syndrome and depression.

KB Kozhimannil, M Pereira & B Harlow, Association between diabetes and perinatal depression among low-income mothers, *JAMA* (2009), 301;8

Dietary Advice Can Help

A study by Crowther et al demonstrated in a large randomised clinical trial that women with gestational diabetes who received individual dietary advice to better balance blood sugar had lower rates of post-natal depression than those who received standard advice.



LOW BLOOD GLUCOSE
*stimulates craving for sugar,
stimulants and stress*

STRESS
triggers

STIMULANTS
trigger

**Cortisol
Dopamine
Adrenalin
Noradrenalin**
which release

SUGAR
from body stores

SUGAR
from diet

**raises
blood**

Glucose

**Goes
to make
ENERGY**

**or
stored
as
FAT**

HIGH BLOOD GLUCOSE
*stimulates the pancreas to
release insulin*

INSULIN
transport glucose to the cells

The Sugar Cycle

Blood Sugar Health Check

- Are you rarely wide awake within 15 minutes of rising?
- Do you need tea, coffee, a cigarette or something sweet to get you going in the morning?
- Do you crave chocolate, sweet foods, bread, cereal or pasta?
- Do you often have energy slumps during the day or after meals?
- Do you often have mood swings or difficulty concentrating?
- Do you get dizzy or irritable if you go six hours without food?
- Do you find you over-react to stress?
- Is your energy now less than it used to be?
- Do you feel too tired to exercise?
- Are you gaining weight, and finding it hard to lose, even though you're not noticeably eating more or exercising less?

How to Balance Blood Sugar

- Eat wholegrain ‘slow-releasing’ carbohydrates.
- Eat protein with every meal and snack.
- Avoid sugar and stimulants.
- Eat regularly.
- Exercise every day.

Recommendations

Nutritional Assessment

- Evaluate diet of pregnant women to ascertain if deficient in protein, essential fats and key vitamins and minerals.
- Questionnaire to identify likelihood of blood sugar imbalances (alongside blood glucose tests).
- Blood tests to measure zinc, iron and vitamin D status.
- Homocysteine test to assess B vitamin status.

Dietary Education

- Guidelines/workshops for midwives and health visitors where required.
- Highlight benefits – to both mother and child – of eating oily fish and other sources of essential fats.
- Practical suggestions for balancing blood sugar.
- Encourage intake of 3 portions of protein a day.
- Practical and inspirational handouts with simple meal and snack suggestions.
- Offer cooking classes to encourage understanding and compliance.

Consider Nutrient Supplementation Before Antidepressants

- Supplement 1000mg daily of Omega 3 fats (EPA/DHA).
- Supplement at least 10mcg of vitamin D a day.
- Supplement homocysteine-lowering nutrients if test reveals level above 6.
- Give more bioavailable forms of iron if supplementation required, to negate usual side effects and reduce risk of depleting zinc.
- Ideally, supplement nutrients in a multi formula rather than singularly.

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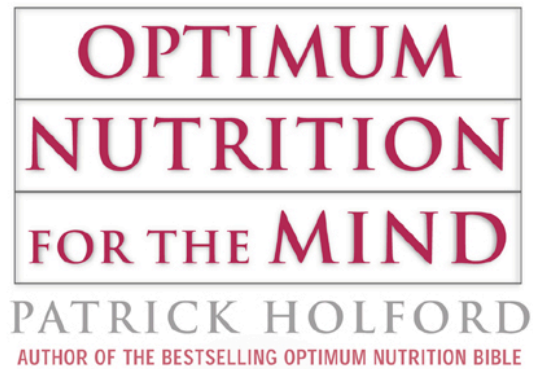
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**Optimum
Nutrition
Before, During
and After
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Achieve optimum
wellbeing for you
and your baby



Mental Health Reference



500 references substantiating the treatment of common mental health problems by correcting the 14 common underlying biochemical imbalances.

Children's Health Reference

Optimum Nutrition
for Your Child

Focuses on child's
mental health and
behaviour

PATRICK HOLFORD
AUTHOR OF THE BRITISH AND NEW OPTIMUM NUTRITION GUIDE

& Deborah Colson

**OPTIMUM
NUTRITION
FOR YOUR CHILD**



How to boost your child's
health, behaviour and IQ