Welcome to today's Insight / APSAD webinar.

We'll be starting a little after 10am (QLD time).

- Use the chat icon for all questions and comments – *select All panelists and attendees.*
- If you are experiencing other problems or require further technical assistance call Zoom on **1800 768 027.**
- A pdf version of today's presentation will be available soon in the chat window.
- A recording of this webinar will be available on our YouTube channel in the coming weeks.

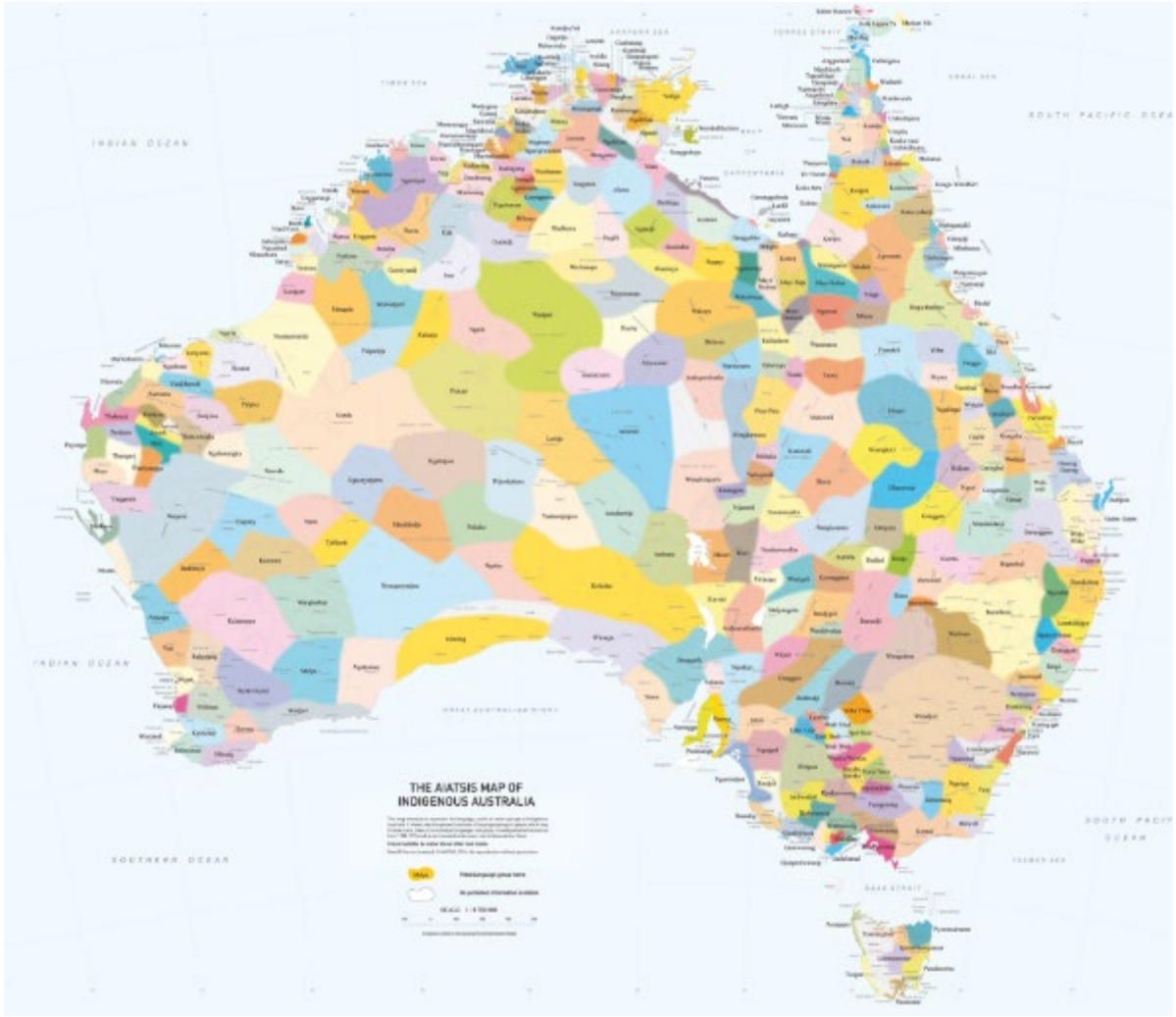
insight
Centre for alcohol and other drug training and workforce development

APSAD
The Australasian Professional Society on Alcohol and other Drugs

APSAD2021
BRISBANE | 7-10 NOVEMBER 2021

Reminder – APSAD Conference 2021 in Brisbane, Nov 7-10.

For more information head to www.apsadconference2021.com.au



We acknowledge the Traditional Owners of the land on which this event takes place and pay respect to Elders past and present.

This map attempts to represent the language, social or nation groups of Aboriginal Australia. It shows only the general locations of larger groupings of people which may include clans, dialects or individual languages in a group. It used published resources from 1988-1994 and is not intended to be exact, nor the boundaries fixed. It is not suitable for native title or other land claims. David R Horton (creator), © AIATSIS, 1996. No reproduction without permission. To purchase a print version visit: www.aiatsis.ashop.com.au/

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APSAD

STRESS, NUTRITION AND NEUROSCIENCE

THEIR RELATIONSHIP, AND ROLE IN THE TREATMENT OF BEHAVIORAL ADDICTION

Australian & New Zealand Addiction Conference

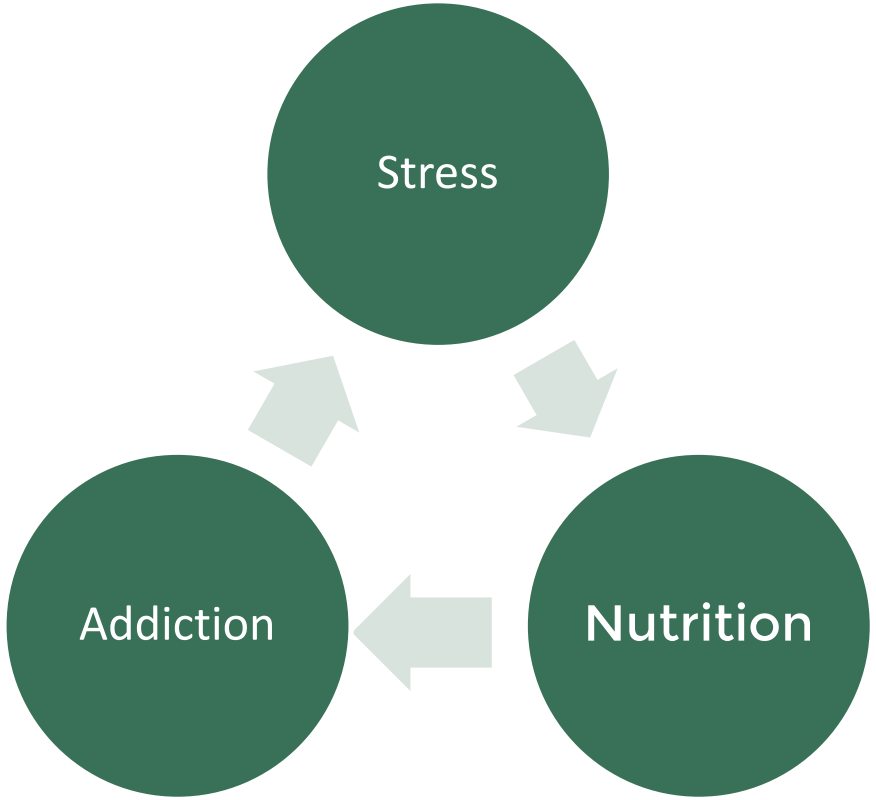
June 8, 2021

Lisa Cutforth

Clinical Nutritionist

MY ROLE AS CLINICAL NUTRITIONIST

THE RELATIONSHIP BETWEEN NUTRITION STATUS, STRESS AND ADDICTION

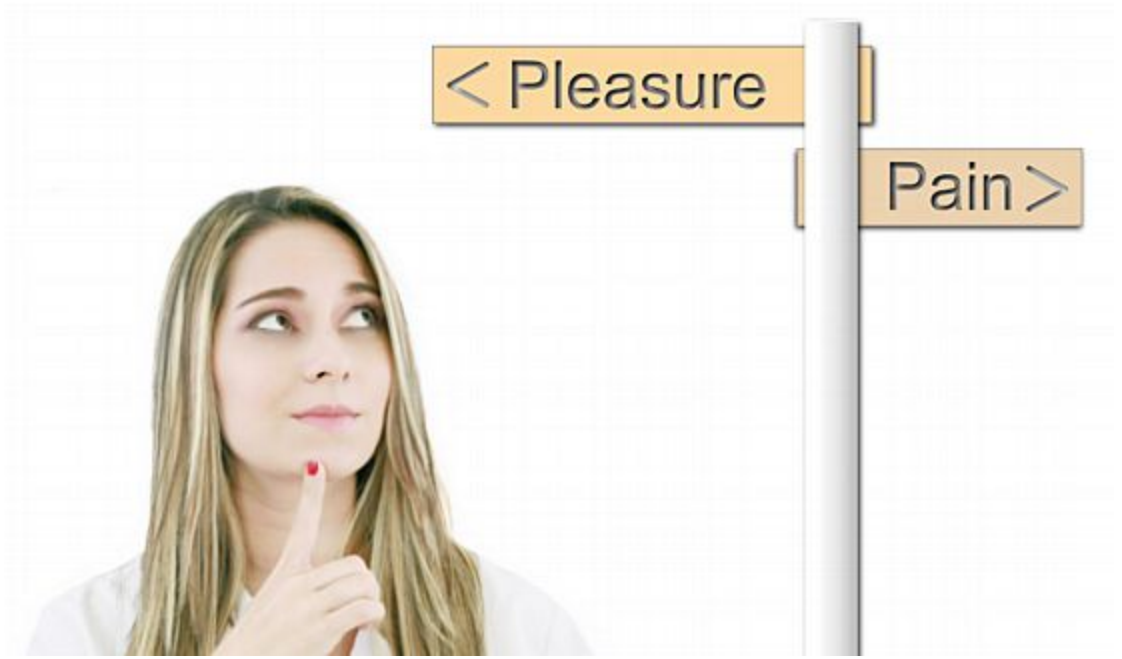


There are critical relationships between neuroscience, nutrition, stress and addiction

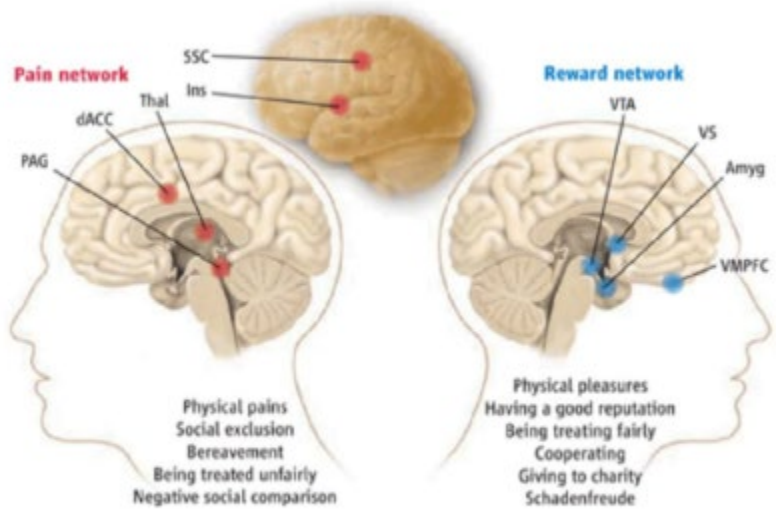
1. Stress affects mood, decisions, behaviour, and how we experience life, it also affects our nutrition status directly and indirectly
2. Without good nutrition and key essential nutrients people can't be well, mentally or physically
3. Stressed, malnourished people don't feel well and aren't able to make the best decisions

Recovery is made more probable with the right support tools and treatment

KEY ORGANISING PRINCIPLE OF THE BRAIN



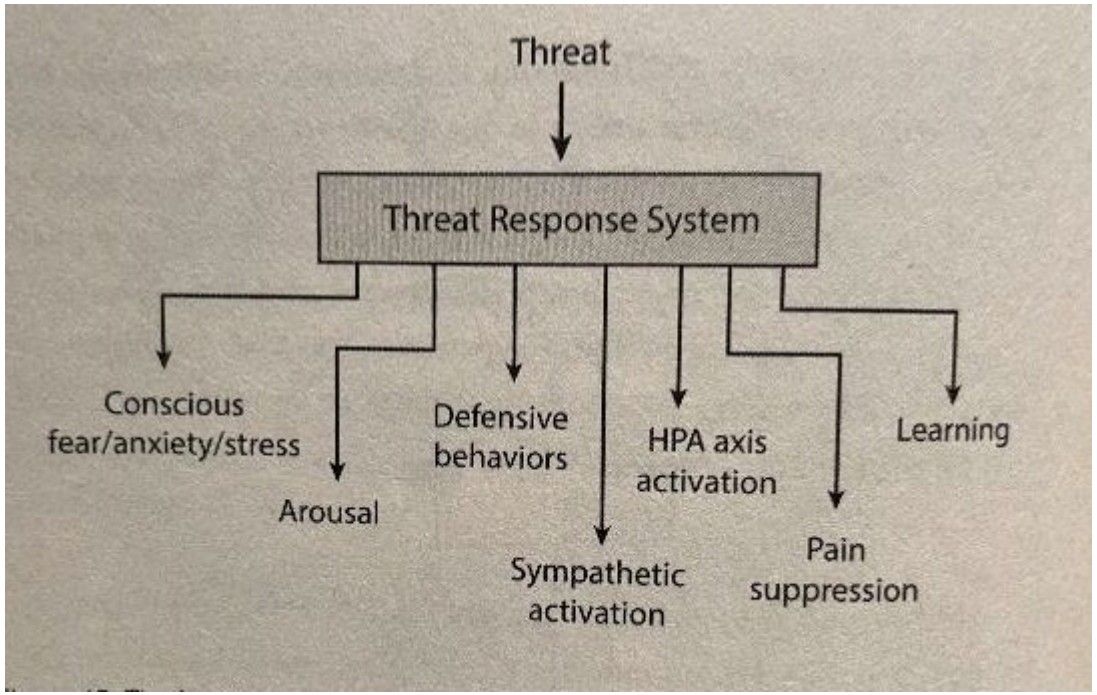
PAIN AND REWARD NETWORKS



Pain and Reward Networks

Anticipation | Belonging | Sensation

Functions of the threat response system

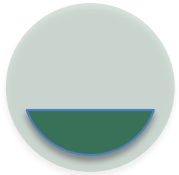


Ref: Holford

Stress impacts the brain

1. Cognitive
2. Emotional
3. Behavioural
4. Relational

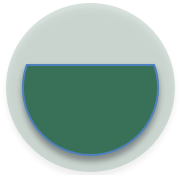
THREE STAGES OF STRESS- physiological



STAGE 1

The initial response

Increase in cortisol and DHEA

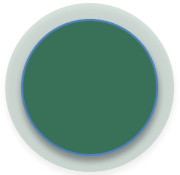


STAGE 2

Adaptation

Increase in cortisol and DHEA starts to fall

Thyroxine levels fall, low TSH and low T3



STAGE 3

Exhaustion

Both Cortisol and DHEA low

Stress changes our biology and psychology and behaviour

Stress Warning Signs and Symptoms	
Cognitive Symptoms	**Emotional Symptoms**
• Memory problems • Inability to concentrate • Poor judgment • Seeing only the negative • Anxious or racing thoughts • Constant worrying	• Moodiness • Irritability or short temper • Agitation, inability to relax • Feeling overwhelmed • Sense of loneliness and isolation • Depression or general unhappiness
Physical Symptoms	**Behavioral Symptoms**
• Aches and pains • Diarrhea or constipation • Nausea, dizziness • Chest pain, rapid heartbeat • Loss of sex drive • Frequent colds	• Eating more or less • Sleeping too much or too little • Isolating yourself from others • Procrastinating or neglecting responsibilities • Using alcohol, cigarettes, or drugs to relax • Nervous habits (e.g. nail biting, pacing)

TRIGGERS FOR DEPENDENCY AND ADDICTION

Previous Trauma, Chronic Stress

Maladaptive coping in the face of stress

Biological, Biochemical imbalance

Genetic factors

ACE TEST

Adverse childhood experiences (ACEs) are stressful or traumatic events, including abuse and neglect.
4 or more ace score example

- 460% more likely to experience depression
- 1,220% more likely to attempt suicide
- Early initiation of alcohol use
- Higher risk of mental and substance use disorders as an older adult
- Adoption of health risk behaviours
- Greater risk of disease

Ref: Felitti, 2002 **The Relation Between Adverse Childhood Experiences and Adult Health**
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6220625/

The catecholamine nutrient pathway

(made by adrenals)

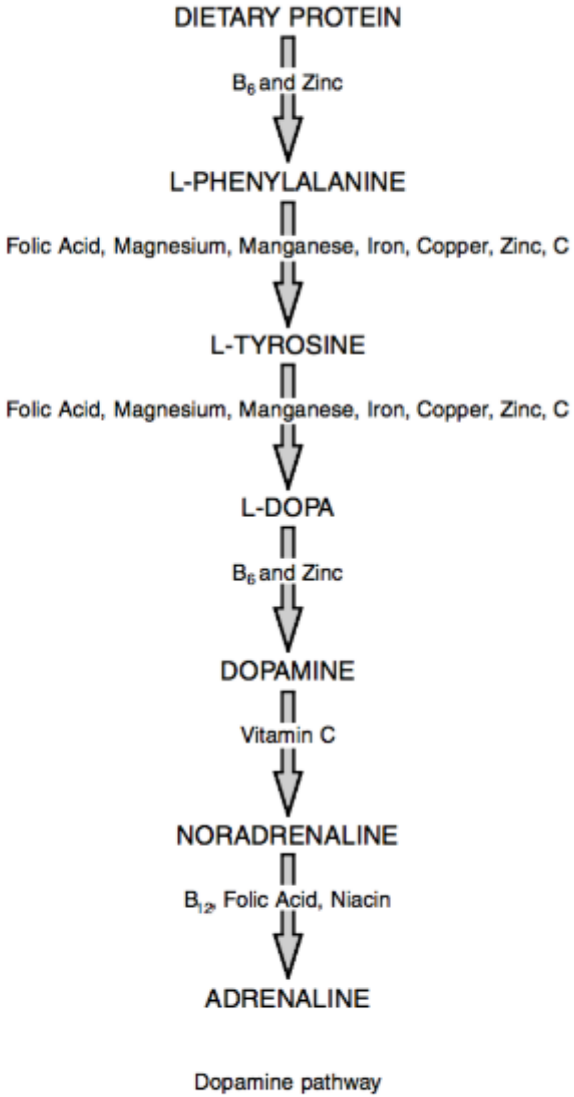


Figure 2 The catecholamine pathway

Ref: Holford

BY THE WAY, THAT'S THE PATHWAY TO RESPOND TO STRESS

Adrenaline made and secreted by your adrenals…

It's easy to see the increased nutrient need of stress in this light

And it's easy to see how our mood is affected by poor nutrient status, if it affects our ability to make neurotransmitters

The reinforcing nature of DOPAMINE

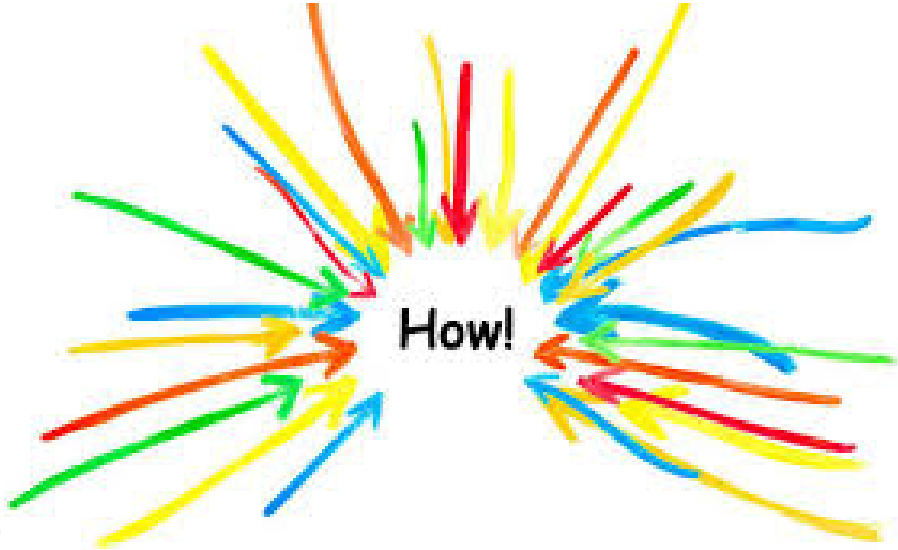
- A stressed brain prone to impulsivity, and also arousing or hedonic rewards to soothe comfort and distract itself from pain.
- Dopamine levels associated with addictive behaviours and symptoms.
- When dopamine reaches very high levels in the ventral striatum (in the brain), it reinforces behaviours so strongly that they can take priority over natural constructive behaviours.
- This is the essence of addiction… essentially it develops from an exaggerated version of the same reinforcement process that occurs in everyday life, that might help you create a habit.

RECOVERY= MORE EFFECTIVE WAYS TO COPE

Better ways to recover from and process stress and pain

1. Support self regulation –
   (neuroscience, psychology foundational)
2. Support biochemistry (nutritional)

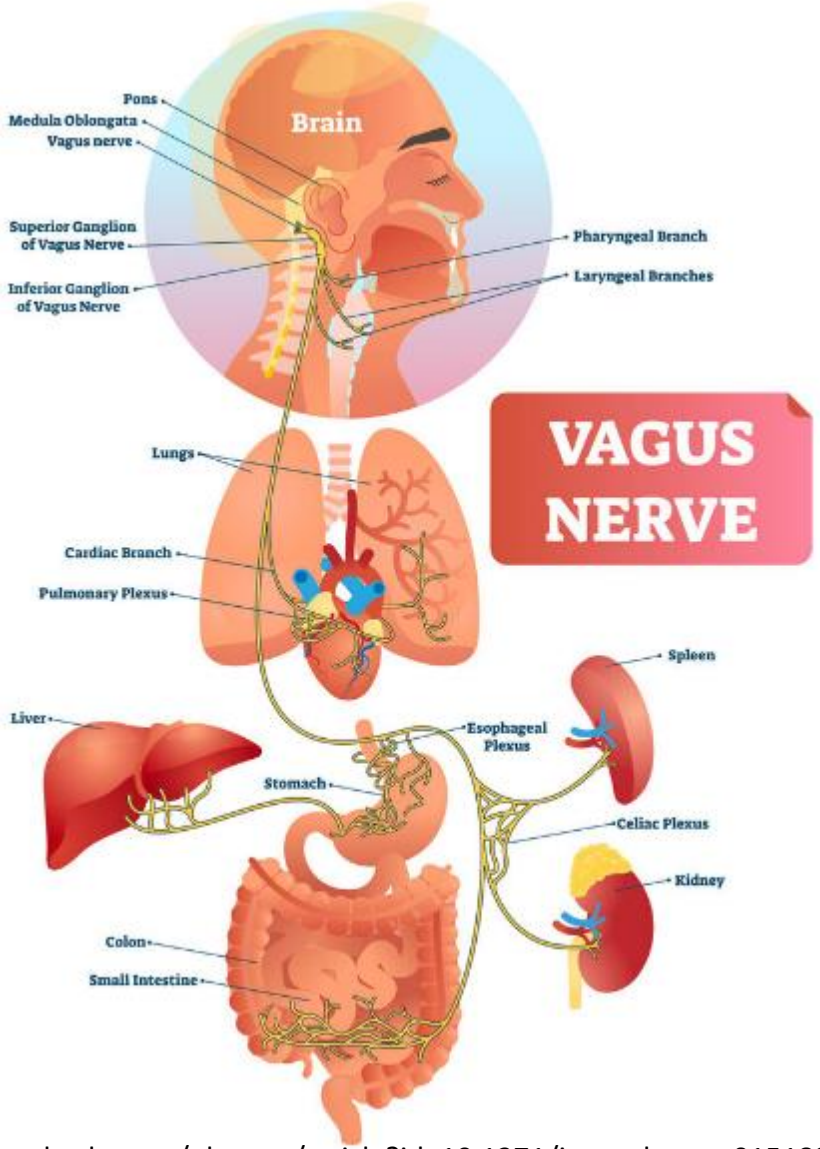
(Multidisciplinary care at Banyans to include psych and medical support)



“VAGUSSTOFF” - THE TRANQUILISER

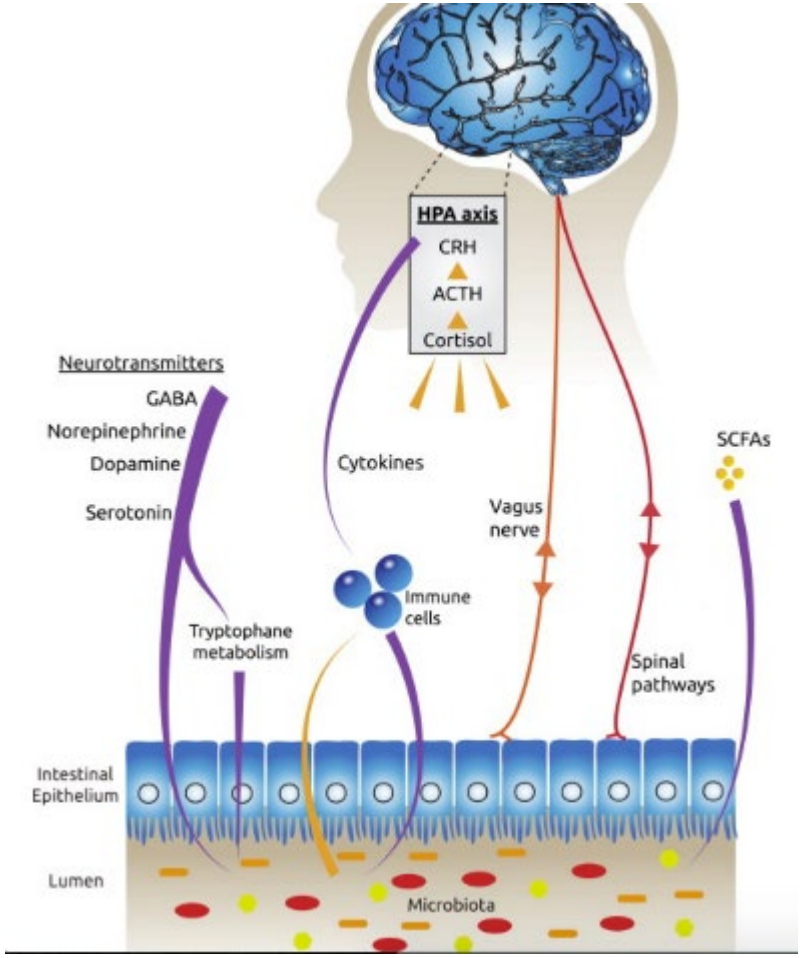
Neuroscience tool: You can consciously tap the power of your vagus nerve to release acetylcholine –through “self regulation“ breathing.

- The vagus nerve sends the brain feedback from abdominal cavity and regulates ANS including mood, digestion and stress
- Stimulating the vagus nerve causes a reduction in heart rate by triggering the release acetylcholine (Vagus Substance - Otto Loewi)
- Acetylcholine (neurotransmitter) is literally a tranquillizer that you can self administer by simply **taking a few deep breaths with long exhales**
- Interestingly acetylcholine also plays a role in the onset of satiety



https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0151882

GUT BRAIN:
MOOD AND PSYCH LINK



The gut produces 60-90 percent of neurotransmitters

NUTRITION AND MENTAL HEALTH

Nutrition often neglected or an after thought, but

1. Poor nutrition status can contribute to mental health issues
2. People with mental health issues often eat less well
3. People with addictions usually don’t eat well or have good nutrition status
4. Alcohol, medications, drugs can negatively impact on gut health and nutrition status
5. Stress compromises digestion, as blood is diverted away from the digestive system during fight or flight response and stress also usually changes eating behaviour and preferences.

The case for clinical nutrition and testing

CONSEQUENCES OF NUTRIENT DEPLETION

NUTRIENT	CONSEQUENCES OF DEPLETION
Vitamin B12	Fatigue, weakness, strange sensations in the hands and feet, balance problems, depression, memory loss, swollen tongue
Vitamin B6	Depression, dermatitis, mouth ulcers, sleepiness, nerve damage, anemia (fatigue)
Folate	Anemia (fatigue), birth defects, depression, heart disease risk
Vitamin C	Weakened immune system, poor wound healing, easy bruising
Vitamin D	Bone weakness, bone pain, depression, increased risk of some cancers
Magnesium	Decreased bone density leading to osteoporosis, muscle stiffness and weakness, cramps, anxiety, depression, irregular heartbeat
Iron	Fatigue, breathlessness, irritability, hair loss, weakness, dizziness
Zinc	Impaired immunity, dry skin, acne, loss of taste and smell, diarrhea, mouth ulcers
Co Q 10	Fatigue, impaired memory and concentration, muscle weakness

MEDICATION AND NUTRIENT DEPLETION

NUTRIENT	NUTRIENTS DEPLETED
Contraceptives (birth control pills)	B vitamins, vitamin C, magnesium, selenium, and zinc
Hormone replacement therapy (HRT)	Vitamin B6, vitamin B12, folate and magnesium
Metformin- diabetes	Folate, vitamin B12, Co- Q10
NSAIDS (e.g. aspirin, Ibuprofen, naproxen)	Iron, folate, zinc, vitamin C
Tricyclic antidepressants	Vitamin B2, coQ10
Antacids for indigestion and anti-ulcer drugs	Vitamin B12, folate, vitamin D, magnesium, calcium, iron and zinc (long term risk of osteoporosis)
Benzodiazepines	Biotin, folate, calcium, melatonin, vitamin D & K
SSRI	B vitamins, B6, B12, folic acid, vitamin D, and sodium
Contraceptives (birth control pills)	B vitamins, vitamin C, magnesium, selenium, and zinc

SUBSTANCE ABUSE AND NUTRITIONAL DEPLETION

SUBSTANCE	NUTRIENTS DEPLETED
Smoking	Vitamin C, also robs of antioxidants, often appetite suppressant so less general intake
Alcohol	B6, vitamin A, thiamine, riboflavin and pantothenic acid deficiencies, calcium, magnesium, affects gut health, affects liver
Opiates	Calcium, magnesium, Bs, amino acids

LINK BETWEEN PSYCHIATRIC DISORDERS AND SUBSTANCE ABUSE DISORDERS

The depressive symptoms of one in three adult abusers are severe depression

(Journal of Clinical Psychiatry)

SUITE OF CLINICAL NUTRITION TESTS

A case for testing:

CLINICAL NUTRITION ASSESSMENT AND TESTING AT THE BANYANS

Guests in our Comprehensive Program will have the following assessments:

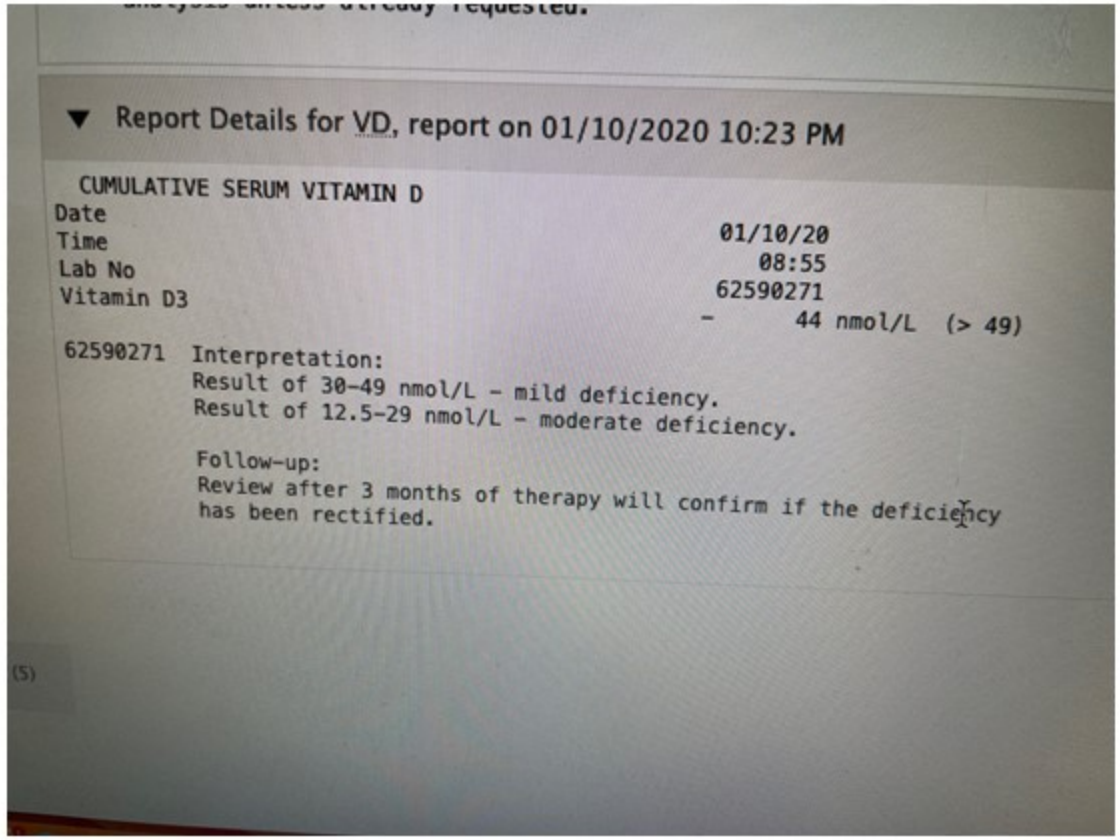
- Anthropometric data
- Biochemical data and medical testing (suite of clinical nutrition test including neurobiogenic amines, organic acid testing, food intolerance testing, liver function, homocysteine, hormones…)
- DNA testing (Diet, Health, Medication)
- Individual and family medical and clinical history
- Dietary evaluation and nutrition related history
- Observation and environment history

PATHOLOGY TESTING

Two key nutrition markers that play an important role in mental health

1. Vitamin D status and implications
2. Homocysteine status and implications

EXAMPLE 1. VITAMIN D



▼ Report Details for VD, report on 01/10/2020 10:23 PM

CUMULATIVE SERUM VITAMIN D

Date		01/10/20
Time		08:55
Lab No		62590271
Vitamin D3	-	44 nmol/L (> 49)

62590271 Interpretation:
Result of 30-49 nmol/L - mild deficiency.
Result of 12.5-29 nmol/L - moderate deficiency.

Follow-up:
Review after 3 months of therapy will confirm if the deficiency has been rectified.

(5)

ROLE OF VITAMIN D

Involved in many different pathways that support

1. Immune function
2. Bone health
3. Muscle formation
4. Mental health

NEUROBIOGENIC AMINES TEST

Vitamin D deficiency

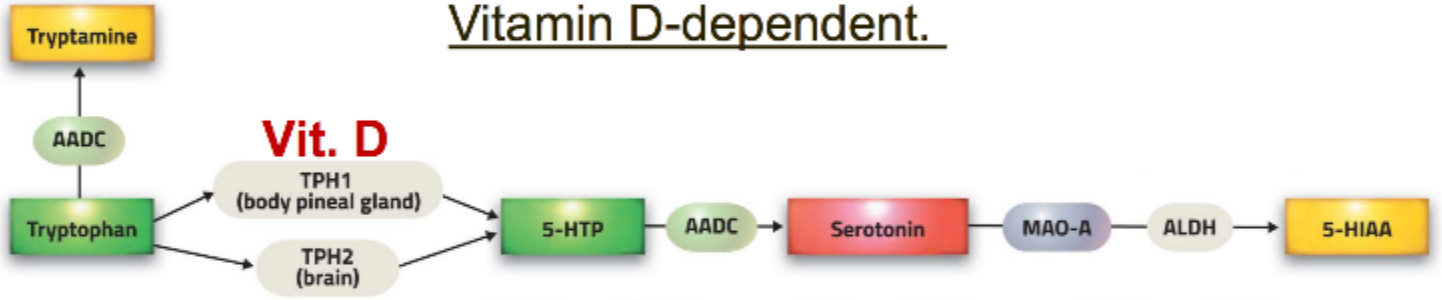
Neuro-Biogenic Amines, Comprehensive; urine 24 hour collection

	RESULT/UNIT Per 24 hours		REFERENCE INTERVAL	PERCENTILE 2.5th 16th 50th 84th 97.5th
Dopamine, free	232	µg	65- 400	
3,4-Dihydroxyphenylacetic acid (DOPAC)	1375	µg	450- 2400	
3-Methoxytyramine (3-MT)	150	nmol	30- 250	
Norepinephrine, free	40	µg	15- 80	
Normetanephrine	260	µg	80- 500	
Epinephrine, free	9.25	µg	1.5- 20	
Metanephrine	122	nmol	35- 220	
Serotonin	43	µg	50- 250	
5-Hydroxyindolacetic acid (5-HIAA)	1300	µg	1000- 9000	
Tryptamine	1.3	µmol	0.2- 1.3	
Glutamate	26	µmol	6- 52	
Gamma-aminobutyrate (GABA)	3.0	µmol	1- 8	
Tyrosine	80	µmol	28- 120	
Tyramine	3.0	µmol	1.5- 7	
Phenethylamine (PEA)	84	µmol	16- 160	
Taurine	750	µmol	220- 1300	
Glycine	1875	µmol	350- 3500	
Histamine	30	µg	6- 60	
Creatinine	180	mg/24 hrs	35- 225	

Treat the cause

↓ Tryptamine may indicate a Tryptophan deficiency.

↑Tryptamine may indicate a vitamin deficiency; TPH is <u>Vitamin D-dependent.</u>



Two important clinical clues may be missed by only looking at Serotonin level. Long-term vitamin D deficiency increases the risk of neurodegenerative disease, cognitive dysfunction, autoimmune conditions and chronic inflammatory conditions.

Reference: Doctors Data

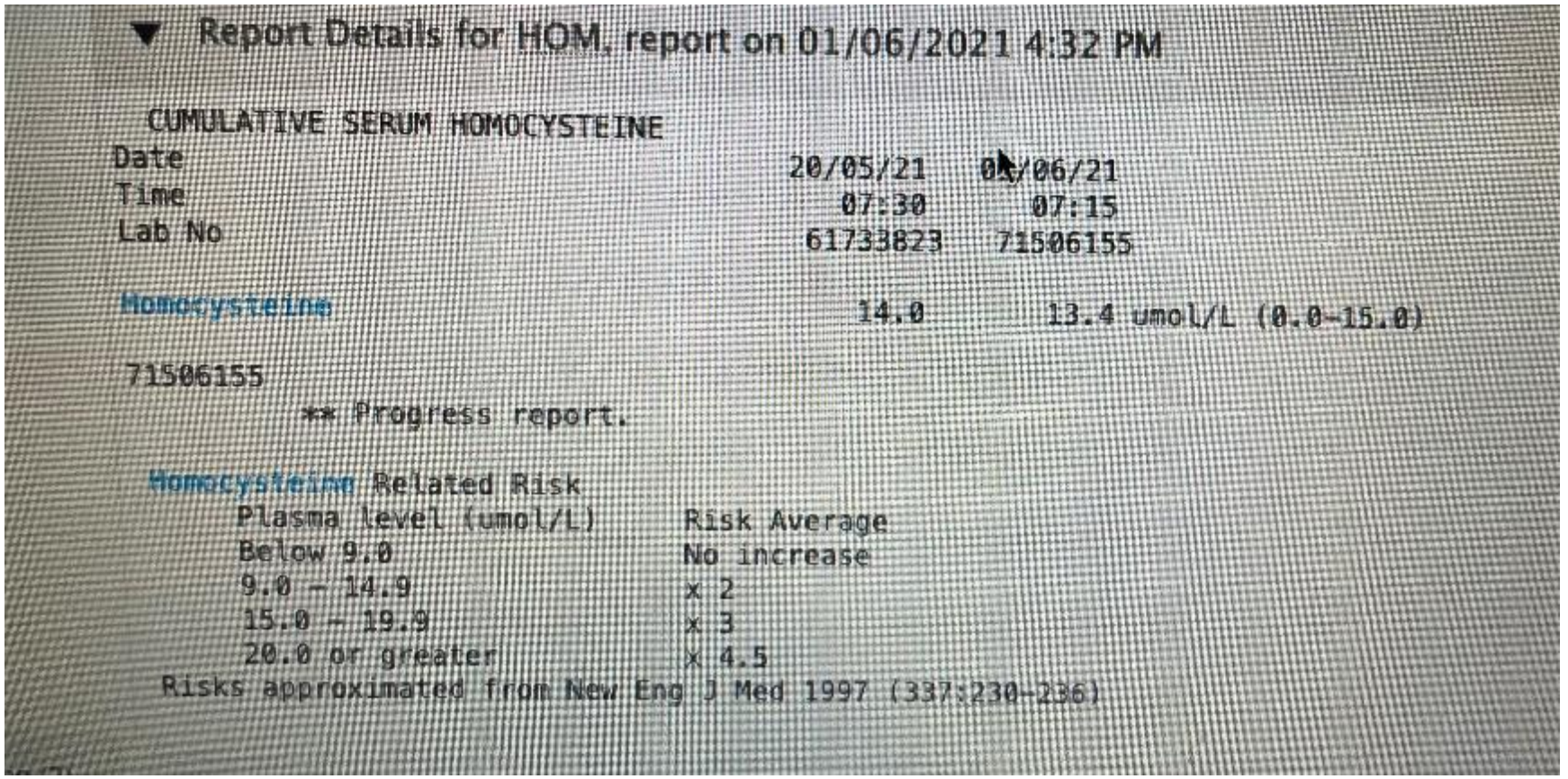
EXAMPLE 2. PATHOLOGY TESTING

Homocysteine (useful early clues about methylation, B12, B9, SAMe, MTHFR status)

Increased plasma homocysteine is a functional marker of both folate and vitamin B12 deficiency. Increased homocysteine levels are found in depressive patients.

Reference: Treatment of depression: time to consider folic acid and vitamin B12 (Journal of Psychopharmacology, 2005)

HOMOCYSTEINE



▼ Report Details for HOM, report on 01/06/2021 4:32 PM

CUMULATIVE SERUM HOMOCYSTEINE

Date	20/05/21	01/06/21
Time	07:30	07:15
Lab No	61733823	71506155
Homocysteine	14.0	13.4 umol/L (0.0-15.0)

71506155

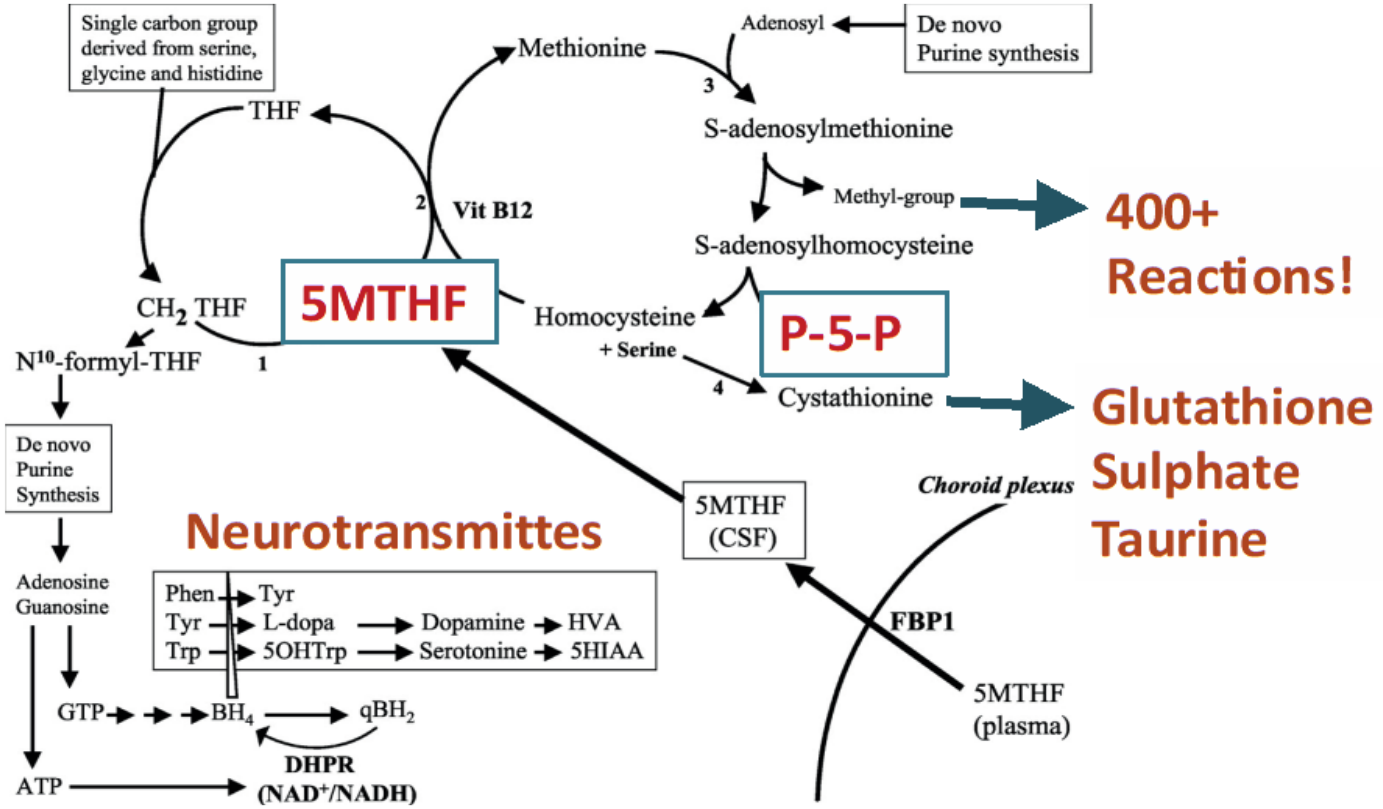
** Progress report.

Homocysteine Related Risk

Plasma level (umol/L)	Risk Average
Below 9.0	No increase
9.0 - 14.9	x 2
15.0 - 19.9	x 3
20.0 or greater	x 4.5

Risks approximated from New Eng J Med 1997 (337:230-236)

The Importance of Methylation



researchnutrition

18/93 Rivergate Place, Murarrie, QLD 4172 Australia
Phone: 1800 110 158 Fax: 1800 887 053
Email: support@researchnutrition.com.au

MTHFR

- MTHFR gene produces an enzyme 5MTHF
- Converts a portion of folate and folic acid (B9) into folinic acid
- Folinic acid is then converted into the active form methylfolate
- Used by our cells to perform the functions mentioned

Homocysteine in health and disease

The Brain:

- The brain has a limited capacity for homocysteine metabolism. Folate plays an important role in the brain so a crucial mechanism is in play to protect the brain from folate deficiency. The level of 5 tetrahydrofolate in the cerebrospinal fluid is 3 times that of the plasma level and there exists an active process to maintain it. Methionine synthase is the only enzyme in the brain (neural tissue) that is capable of converting homocysteine to methionine. Cobalamin is a cofactor (hence essential).
- The brain tissue utilizes three mechanisms to maintain a low level of homocysteine:
- Efficient recycling through cobalamin dependent methionine synthase (given an adequate supply of cobalamine and folate),
- Catabolism through cystathione beta synthase to cystathione a non-noxious product,
- Export to external circulation.

Reference: Homocysteine in health and disease. (Carmel & Jacobsen, 2001, p183)

The direct effect of homocysteine on the nervous system:

"…Homocysteine seems to have an excitatory action on neurons, and this finding may account for neurological symptoms associated with disorders of amino acid metabolism [12].

Some studies also suggest that elevated homocysteine levels may be associated with alterations in mental health such as cognitive impairment, dementia, depression, Alzheimer's and Parkinson's disease [2, 11]."

Reference: Role of homocysteine in the development of cardiovascular disease, (Nutrition Journal, 2015)

Relevance today:

- Breaking homocysteine down, and using homocysteine is dependent on
- B12
- B9

DEPRESSION

Body of literature to support importance of Bs role in depressive symptoms and optimizing treatment

FOLATE AND DEPRESSION

If folate deficiency can contribute to depressed mood and folate supplementation is beneficial in patients, a plausible mechanism implicates serotonin. In most,[4–8] but not all,[9,10] studies on patients with neuropsychiatric disorders, folate deficiency was associated with low levels of the serotonin metabolite 5-hydroxyindoleacetic acid (5-HIAA) in the cerebrospinal fluid (CSF). In one study, supplementation with folate restored CSF 5-HIAA levels to normal.[8] **There is also a decrease in serotonin synthesis in patients with 5,10-methylenetetrahydrofolate reductase (MTHFR) deficiency, a disorder of folate metabolism.**[11,12] While the mechanism relating folate deficiency to low serotonin is not known, it may involve S-adenosylmethionine (SAMe). SAMe is a major methyl donor formed from methionine. Folate is involved in a cycle that regenerates methionine from homocysteine after SAMe is demethylated to S-adenosylhomocysteine, with subsequent conversion to homocysteine. **Folate deficiency decreases SAMe in the rat brain.[13] In humans, SAMe is an antidepressant[14,15] and increases CSF 5-HIAA levels.[16] Thus, there is some consistency in what is known about the interrelations of folate, SAMe and depression.**

Reference: Journal of Psychiatry Neuroscience, 2007: Folate and depression—a neglected problem

B9, B12 AND DEPRESSION LINK

- Both low folate and low vitamin B12 status have been found in studies of depressive patients, and an association between depression and low levels of the two vitamins is found in studies of the general population.

- Low folate levels are furthermore linked to a poor response to antidepressants, and treatment with folic acid is shown to improve response to antidepressants.

It is estimated over 35 percent of people with depression are low in folic acid

Reference: Treatment of depression: time to consider folic acid and vitamin B12 (Journal of Psychopharmacology, 2005)

DEPRESSION

Patients with depression were found to consume a poor quality diet which is known to lead to depressive symptoms. Besides low intake of some B vitamins, serum levels of vitamin B12 and folic acid were low, and there were many signs of abdominal obesity in the depression group.

Reference: Kaner et al., 2015. Evaluation of Nutritional Status of Patients with Depression

ALCOHOLISM AND LOW FOLATE

A link between depression and low folate has similarly been found in patients with alcoholism.

Reference: Treatment of depression: time to consider folic acid and vitamin B12 (Journal of Psychopharmacology, 2005)

SIMPLY PUT:

Nutrition Status affects mood and behaviour

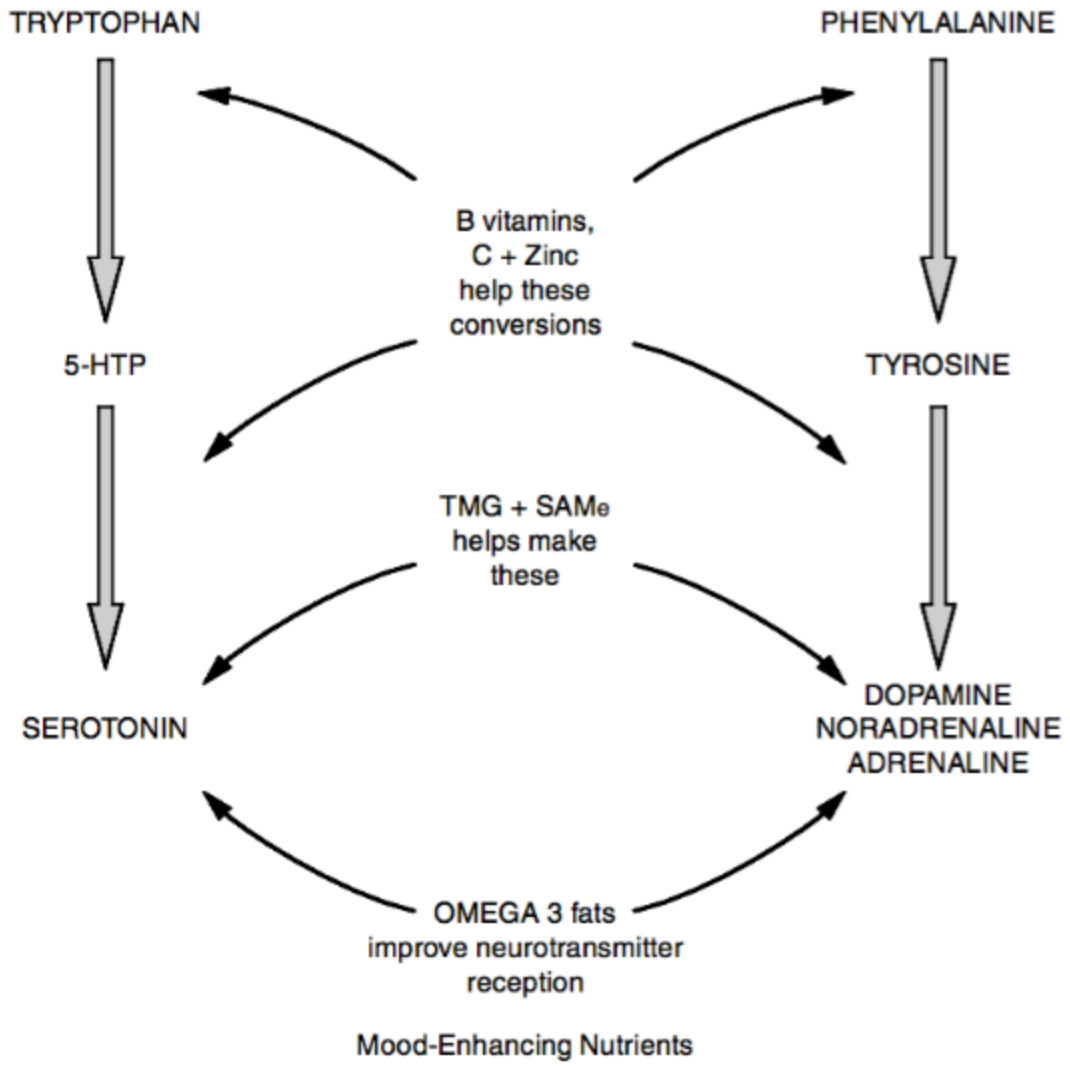


Figure 1 Nutrients that make mood-enhancing neurotransmitters

ASSISTING DETOXIFICATION, RECOVERY AND CRAVINGS

- The right Diet!
- NAC (sometimes glutathione)
- Zinc
- B vitamins
- Vitamin D
- Vitamin A
- Proteins and essential amino acids
- Iron
- Magnesium
- And often key minerals like Chromium, potassium, calcium, manganese
- Amino acids with caution
- Pre and probiotics

Key points, connections and take homes

1. Stress impacts the brain, decision making, and behaviour and that can feed in to addiction/ addictive, dependency behaviours.
2. Neuroscience lends insight into pain and reward networks, maladaptive coping in the face of stress, pain or trauma and using self regulation as a tool to better recover from stress.
3. The key neurotransmitters involved in stress response, addiction and mental health (anxiety and depression) namely serotonin, dopamine, acetylcholine
4. Nutrition's role from a biochemistry perspective and it's involvement in making neurotransmitters which affect mood, and behaviour, today spotlighted 2 markers that affect mental health- depression
5. The gut brain connection, and the importance of gut health from a nutrition and psychology perspective

Contact:

Lisa.c@thebanyans.com.au

Thanks for joining us today!

Join us again next week for

Dr Felicity Jensen
'QScript Learning: Introducing QScript and the new Medicines and Poisons Act (2019)'

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youtube.com/c/InsightQueensland

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