Excitotoxins

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Definition

Excitotoxins are agents that can excite nerves cells potentially to death if their levels are not properly regulated.

- Vital role in causing inflammation, stimming, and neurological damage.
- Usually amino acids, over 70 identified.(Blaycock)
- May explain effect of Feingold Diet (53% improvement : AR Institute)

Importance of dealing with excitotoxins

- Yasko and Gordon 2004, suggest that it is best to start in autism treatment by dealing with excitotoxins first, to reduce the neurological damage being done. This is of course followed with dealing with other issues familiar to those using the DAN and Pfeiffer approach. They claim that including work on excitotoxin avoidance helps to improve success rates and regard it as vital.

History of excitotoxins

- In 1997, Dr Russell Blaycock outlined the ways that neurological damage could be done in his book on excitotoxins. (foundation member of the DAN group in 1994) He described how and why glutamate, aspartamine and related compounds had been proven beyond reasonable doubt, to excite neurons to death when not properly regulated.
- Before that, the Feingold diet had been used for ADD ADHD, and still is useful .

Sources of excitotoxins

- Many foods and some supplements contain excitotoxins
- MSG, glutamic acid, glutamine, aspartate, aspartamine, Nutrasweet, cysteine and homocysteine are included. Mercury and Aluminum can also trigger glutamine release.
- Glutamine is often used in supplements to help promote Gut health.

Sources of Excitotoxins

- Glutamate and Aspartate, are naturally found in protein rich foods, including in high levels in wheat gluten and milk casein.
- They are both common food additives as MSG and Nutrasweet.
- L cysteine is an other powerful excitotoxin.
- Free glutamate is far more toxic because it is absorbed quickly and attain high concentration in the blood (soups, sauces, gravies). Whole tomato is safer than pureed.
- Many food colours and preservatives (P Taubert)

Sources of Excitotoxins:

- The immature and developing brain is well recognised as being 4x more sensitive to the toxic effects of the excitatory amino acids than the mature brain. (important in learning)
- Since 1948, MSG in foods doubled each decade.
- By 1972, 262,000 tonnes added to foods
- 800 million pounds of aspartamine since first introduced, ? Effects on foetus.
- What role in endocrine and mood disorders?

Protection from Excitotoxins:

- Knowledge and minimization
- Nutrients that can block Glutamatergic Neurons: Magnesium

  Coenzyme Q 10

  Niacinamide

  Methyl B12

  Phosphatidyl Serine

  Picnogenol

  Acetyl l carnitine

  Antioxidants (glutathione, a-lipoeic, AED)

Glutamate - roles

- Glutamate is the main excitatory neurotransmitter in the body, critical for ;

  learning

  short and long term memory

  precursor to GABA, via GAD

  is the most important nuerotransmitter in the hypothalamus

  when attaching to receptors,opens Ca channels, and if unchecked,triggers cascade of reactions,including free radical generation, eicosanoid production, and lipid peroxidation.

  if unchecked, can lead to cell death

Glutamate Excess

- High glutamate is associated with excessive stimulation (stims), increased association with stroke, epilepsy, and possibly with intelligence.
- Excess levels have been implicated in a large number of neurodegenerative disorders, including Alzheimer's, Parkinson's, Huntington's chorea, M.S.,ALS and ASD.
- Also learning disorders, migraines.

Glutamic Acid Decarboxylase

- Glutamate is converted to GABA by glutamic acid decarboxylase (GAD), and in Autism Spectrum Disorder (ASD), the normal negative feedback conversion of glutamate to GABA, is disrupted. As a result, excess glutamate results in overstimulation (stims) and low GABA results in lack of speech.

GAD

- GAD requires Zn, Mg and B6 (Dr Rimland's pioneering work was on the use of B6 as part of the DAN treatment)
- High copper inhibits the use of zinc, B6 and magnesium as cofactors. Zn /Cu reversal occurs in 85% of autism.
- Mercury, Aluminium, Cadmium and Antimony also inhibit GAD. This may help to explain why chelation is so effective when used selectively.
- Dr Yasko also speculates that viral infections may affect GAD

GABA

- GABA is an inhibiting or calming neurotransmitter, which dampens the propagation of sounds, so that a distinction can be made between the onset of a sound, and background noise. It is essential for the development of speech. GABA mimicking drugs are also used for epilepsy.
- Copper suppresses GABA, as does anything that inhibits GAD.

Glutamate Breakdown

- Glutamate breakdown requires oxygen and energy (glucose). But glutamate release stimulates insulin release, which reduces blood sugar, slowing glutamate breakdown further. This helps to explain some of the behavior associated with hypoglycaemia. Excess glutamate also depletes glutathione, increasing the risk of oxidative stress and neuronal cell death.

Glutamate Receptors

- Glutamate has 6 different receptors in the brain.
- One is the NMDA receptor, which in the presence of excess glutamate, triggers an inflammatory cascade that results in influx of calcium into cells, increasing further neuronal firing, glutamate release, cytokines, calcium and in a positive feedback loop, results in cell death. Magnesium can modulate this, as can zinc.
- Zinc can however, also activate glutamate release via the non-NMDA receptors.

‘Glutamate Receptors’

- Any of the excitatory amino-acids are able to bind to the glutamate receptors, and include glutamate, aspartate, cysteine and homocysteine. Glutamine will convert to glutamate in the presence of ATP.
- AMPA glutamate receptors may be reduced in autism, possibly as an effect on receptor recycling as a function of glutamate binding, rather than an actual lack of receptors.

Yeast

- Yeasts such as candida, act in several ways to cause brain irritability, producing alcohol and aldehydes as byproducts of fermentation. In addition, it inactivates B6, and reduces absorption of Mg and Zinc. As already discussed, the effects of hypoglycaemia reduce glutamine breakdown, and hypoglycaemia activates the sympathetic nervous system. As refined sugars and starches increase yeast levels and the risk of hypos, they too should be seen as potential excitotoxins. Of interest, B6 is also involved in glycogenolysis, and all decarboxylation reactions require Mg, B6, Zn, C.

Hypoglycaemia

- Activates the sympathetic nervous system
- Symptoms can include:

  acute energy loss, drowsiness, fatigue

  confusion, impaired cognition, dull head

  anxiety, agitation, sweating, shaking

  palpitations, lightheaded, dizziness

  headache, migraine, neck / back muscle pain

  blurred vision, hunger

Hypoglycaemia:

- Decreased cortisol and increased adrenalin, reduced brain glucose, is central to Suzie Schuder's "Trauma Brain Syndrome".
- Low brain glucose increases the drive for carbohydrates, increasing insulin, reducing cortisol, which means less ability to supress brain inflammation and eicosanoid effects.
- Increased oxidative stress and lipid peroxidation (McGuiness)
- Reduced ability to metabolize Glutamate, increased Ca influx.

High Copper:

- Also upregulates the sympathetic nervous system, by facilitating the breakdown of Dopamine to Noradrenalin, by dopamine hydroxylase (12 Cu enzyme)
- Also competitive inhibition of Zn, Mg, B6 , slowing production of Dopamine and Seratonin, increasing disharmony in the balance of neurotransmitters

High Copper:

- Copper levels in the body increase in response to exposure to estogen, and are necessary for growth (angiogenesis)
- Copper also is retained in response to estrogen like substances (xenoestrogens)
- Xenoestrogens include pesticides, herbacides, solvents, pertrochemicals, plastisicers, synthetic hormones (OCP), and hormones in foods.

PST

- Phenol Sulphur Transferase enzyme deficencies are not uncommon. Reduced ability to detox phenolic compounds and sulphur sensitivities more common.
- Symptoms include nightsweats, offensive odour, red face in response to exposures.
- Molybdenum may help.

conclusions:

- It’s a toxic world.
- Reduce exposure to excitotoxins
- Reduce exposure to xenoestrogens
- Whole foods and some nutrients can help

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