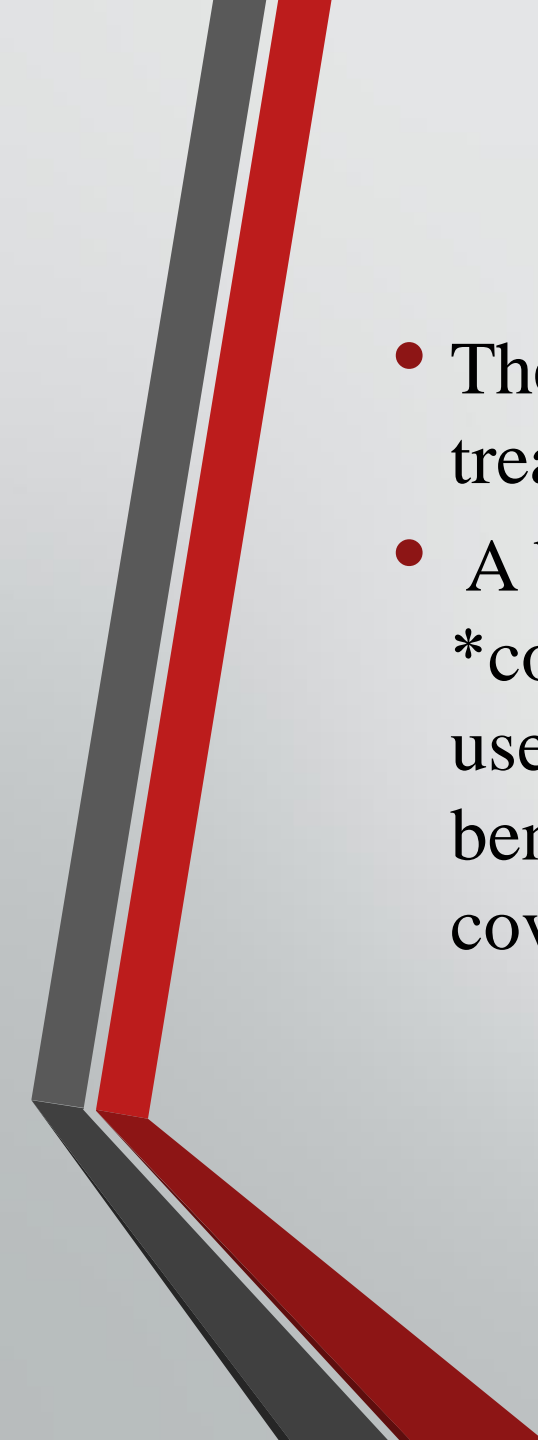
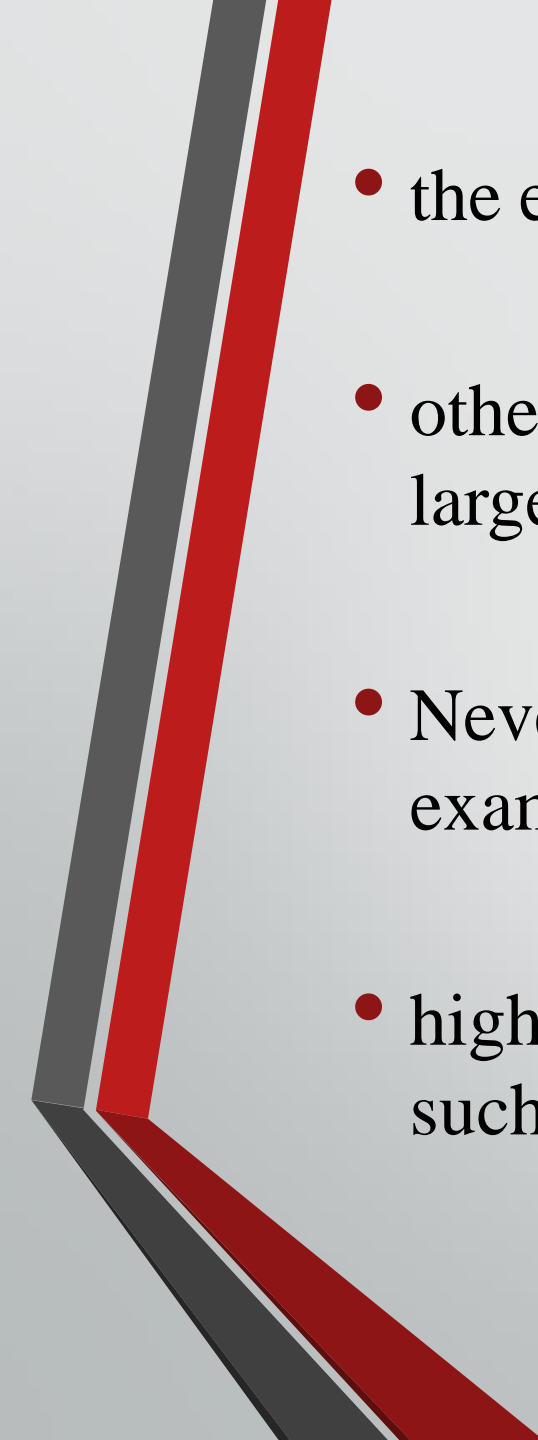



The role of supplements and vitamins in the treatment of developmental disorders in children and adolescents



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- The term “alternative” implies substitution for proven standard treatment.
 - A better name for most alternative treatments would be
*complementary treatments *because they can theoretically be used in combination with standard treatments , either to enhance benefit of the standard treatment or to address a problem not covered by the standard treatment.

- 
- the evidence base for most such treatments is rather thin.
 - others have multiple placebo-controlled trials showing medium to large effects, often for only a small subgroup.
 - Nevertheless, impatient rejection of such treatments without examining the evidence is as unscientific as uncritical acceptance.
 - high proportion Probably between 50% and 75% of patients use such treatments on their own, without professional guidance.

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- Therefore, it behooves the practitioner to know enough about them and their varying evidence bases to advise and guide the families about likelihood of benefit, possible risks, and risk–benefit ratio

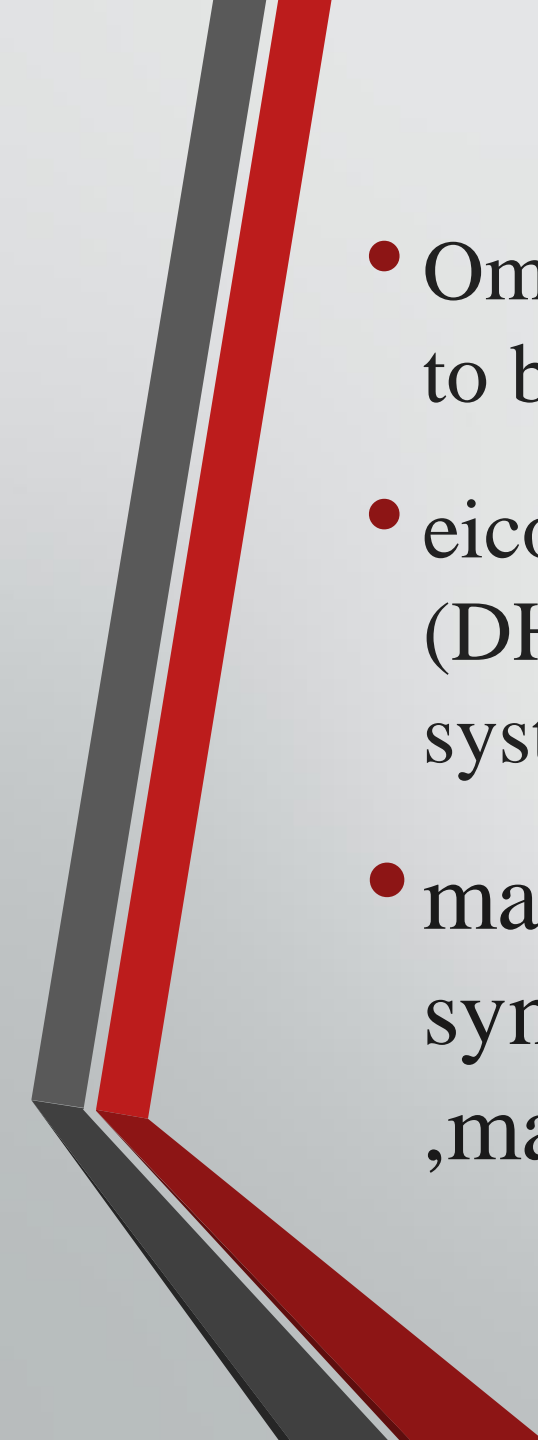
- The following points may be useful in guiding families:

Risky treatments need controlled convincing evidence. Difficult or expensive treatments risk diverting family emotional and financial resources from better proven treatments

- 2. Look for controlled trials in well-characterized samples, not anecdotes or testimonials. A major flaw in many published alternative/complementary treatment studies is lack of diagnostic rigor, second only to lack of controls.
- 3. Herbs are crude drugs (if they work) and can have interactions with other drugs,
- 4. Remember that delay of proven treatment is a risk, varying in seriousness with the urgency of the presenting clinical picture.
- 5. Rather than merely advising against an unproven treatment, it is more useful to discuss what is known about it and help the family reach a considered decision
- 6. When any treatment (including standard treatments) is tried, it is important to document the effect.

omega3

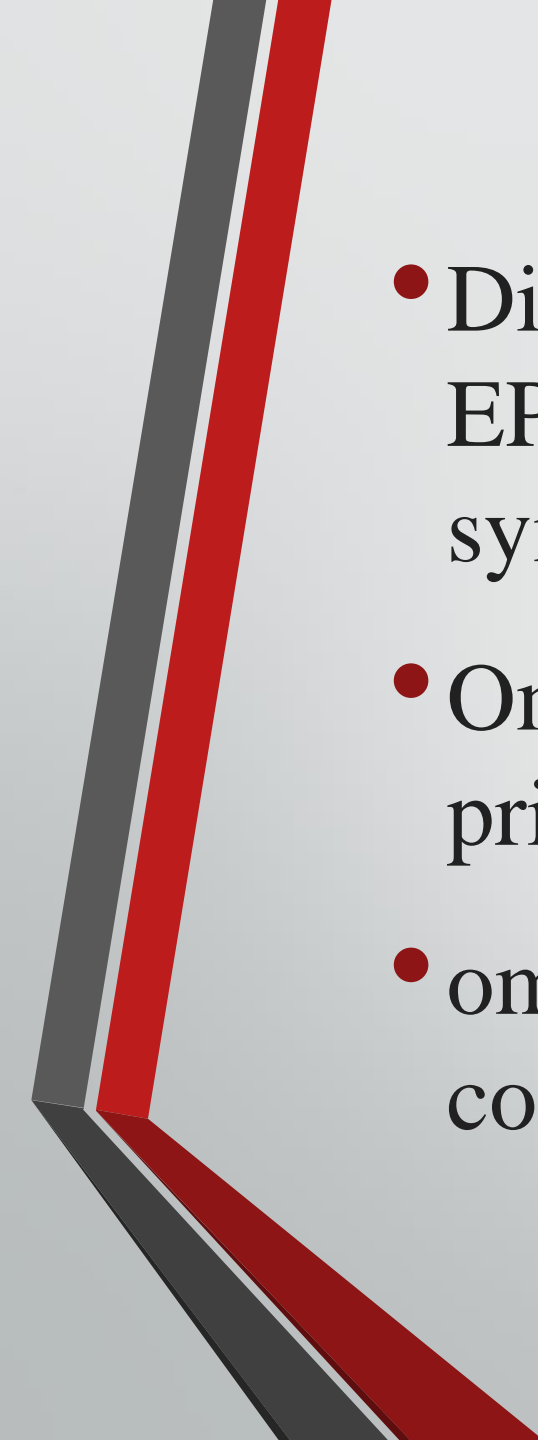


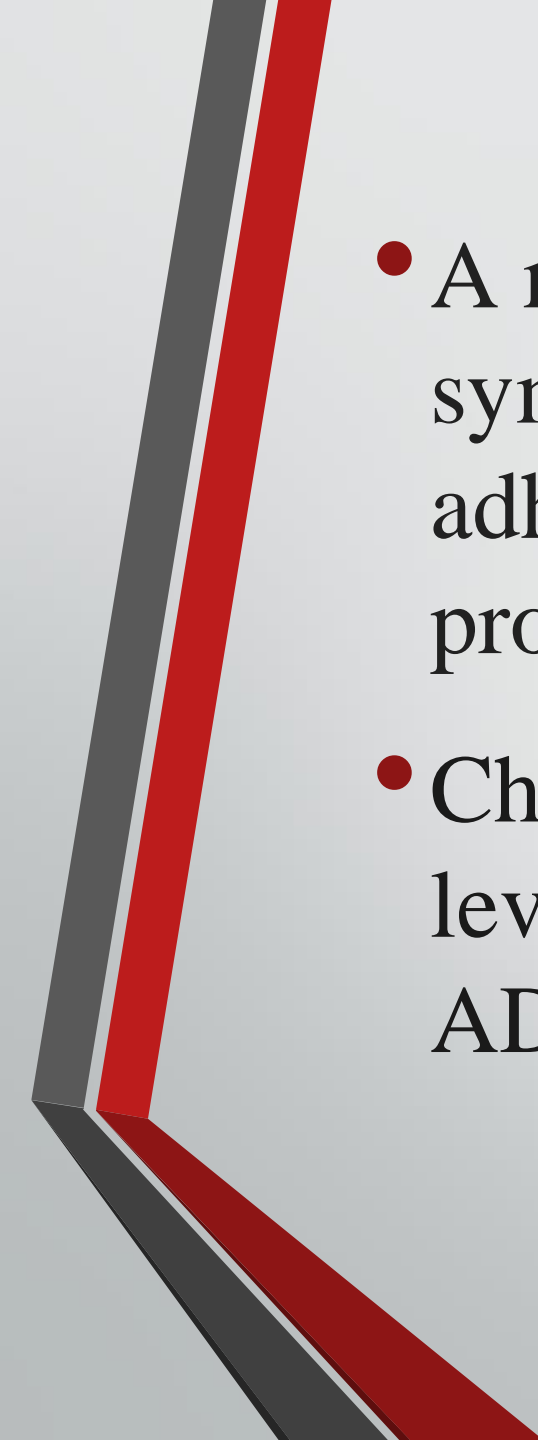
- 
- Omega-3 fatty acids are dietary essentials, and are critical to brain development and function.
 - eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) also play an important role in the central nervous system.
 - may affect cell membrane composition at neuron synapses and interfere with signal transduction ,may also affect monoamine oxidase.



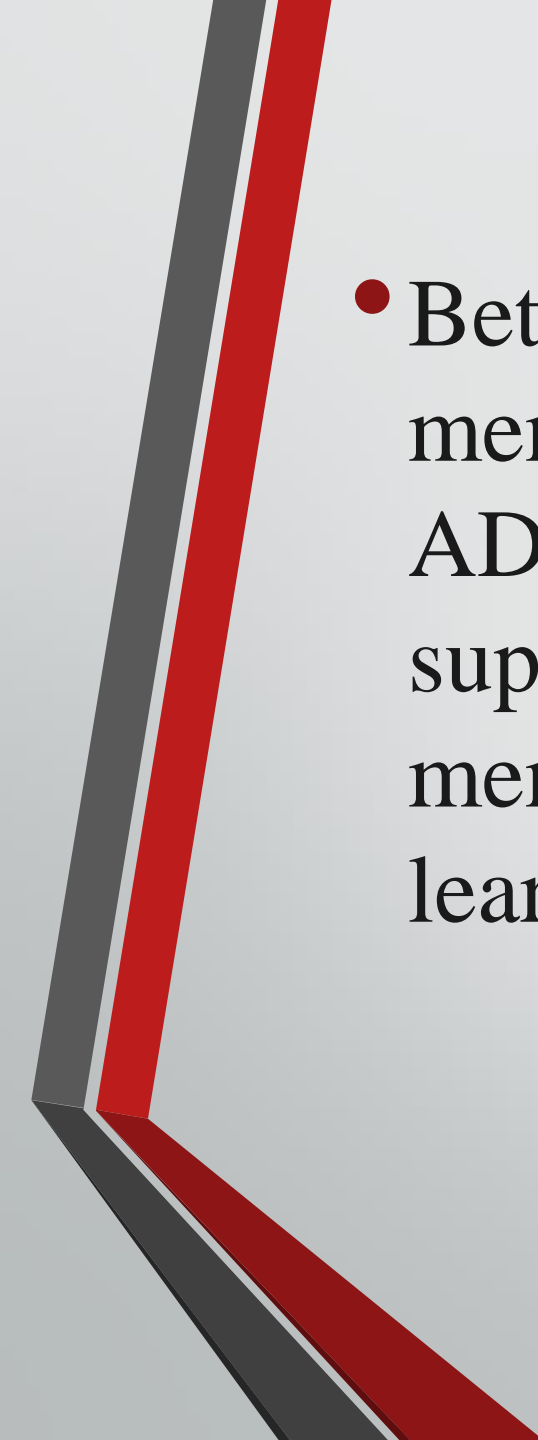
- ADHD

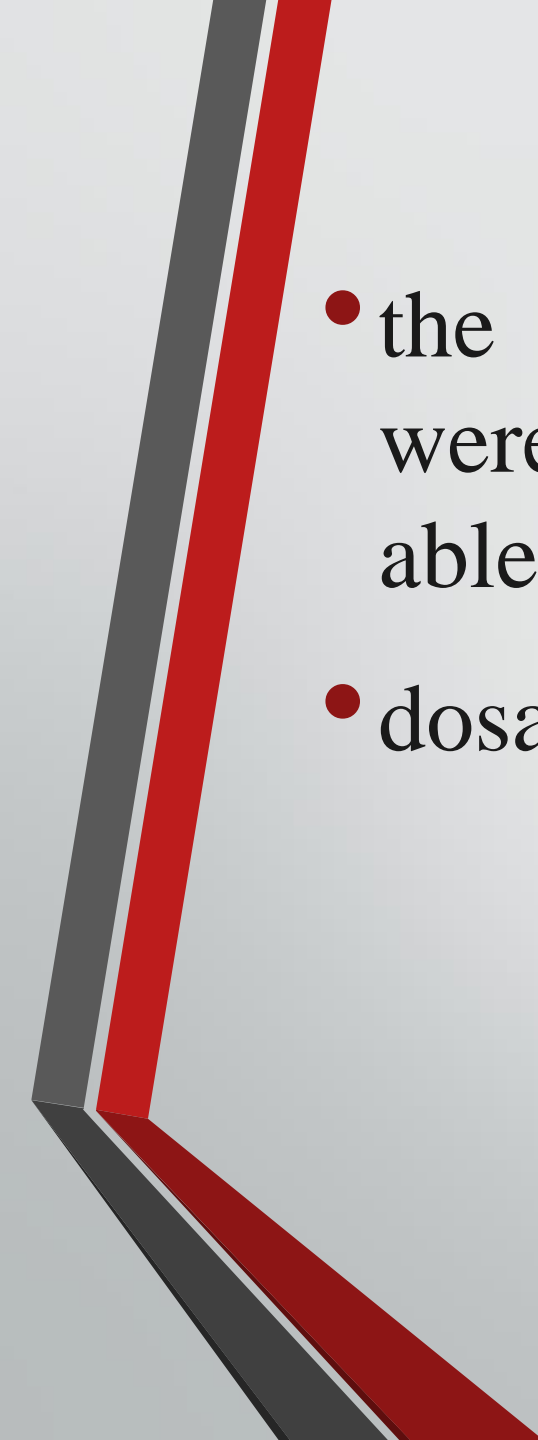
- Increasing evidence suggests that a relative lack of omega-3 may contribute to many psychiatric and neurodevelopmental disorders such as ADHD, dyslexia, developmental coordination disorder (DCD) and autism.
- Children diagnosed with ADHD have lower blood levels of omega-3s. Low omega-3s in children with ADHD may be genetic.

- 
- Dietary supplementation with fish oils (providing EPA and DHA) appears to alleviate ADHD-related symptoms in at least some children.
 - Omega-3 is not supported by current evidence as a primary treatment for ADHD or related conditions.
 - omega-3 fatty acids offer a promising complementary approach to standard treatments.

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- A recent rct showed a substantial reduction in adhd symptoms in children with the inattentive type of adhd and in children with adhd and comorbid problems.
 - Children diagnosed with ADHD have lower blood levels of omega-3s. Low omega-3s in children with ADHD may be genetic

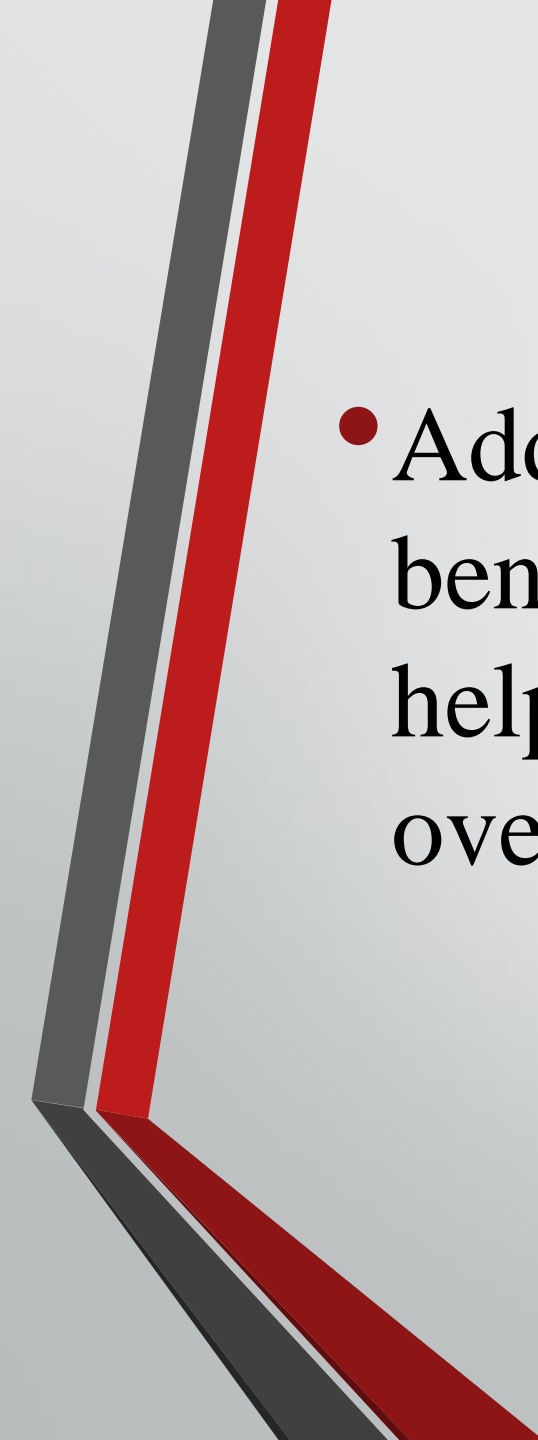
- supplementing the diet with omega-3s consistently lessens hyperactivity, as evaluated by parents and teachers(<https://www.journals.elsevier.com/clinical-psychology-review>)
- Less inattention, less hyperactivity, less disobedience, less hostility — and better spelling, too.
- (<https://www.psychologytoday.com/au/blog/integrative-mental-health-care/201804/omega-3-essential-fatty-acids-adhd>)


- 
- Better memory, better learning, improved working memory. Studying 95 children diagnosed with ADHD, German researchers found that supplementing with omega-3s improved “working memory” — the short-term recall that is key to learning.

- 
- the children taking the supplement slept better, were less fatigued during the day, and were better able to cooperate with others. israel)
 - dosage ranges: 500mg to 4g/day

ASD

Children with autism struggle to get enough nutrition because they often have feeding problems, which involve aversion to certain foods, strong preferences for very few foods, and rituals or repetitive behaviors around food or mealtimes.

- 
- Adding omega-3 fatty acids may confer some benefits specifically for children with autism, helping to improve memory, attention, and overall physical health.


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- supplementation of omega 3 fatty acids may improve hyperactivity, lethargy, and stereotypy in ASD patients.

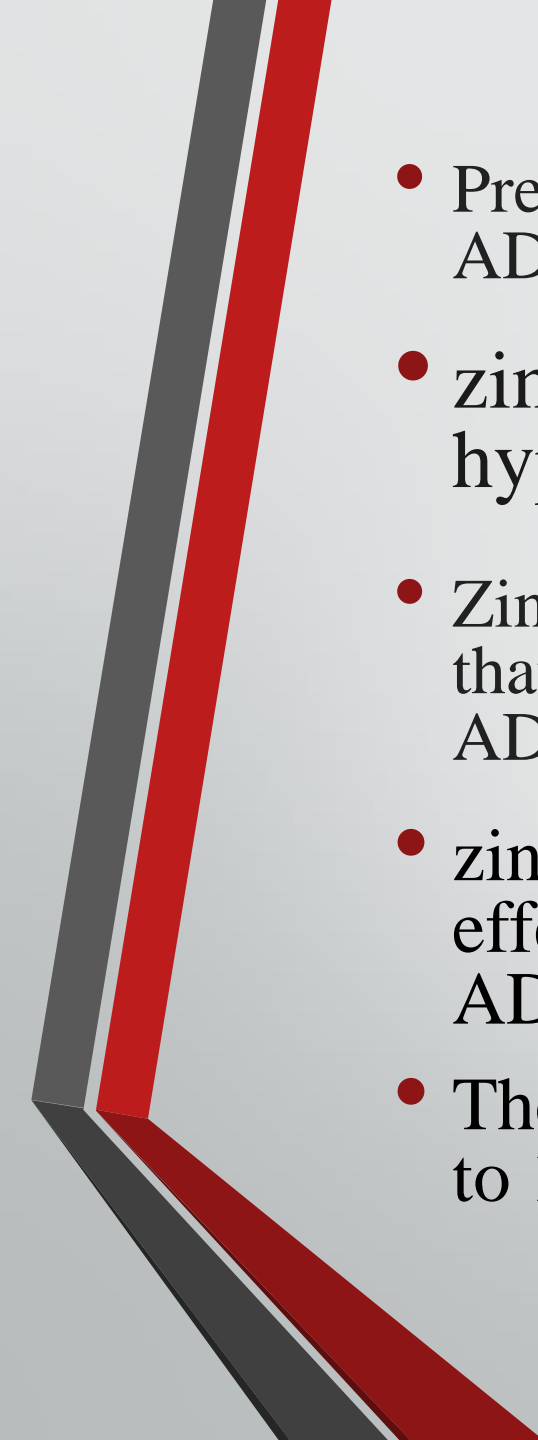
zinc



zinc

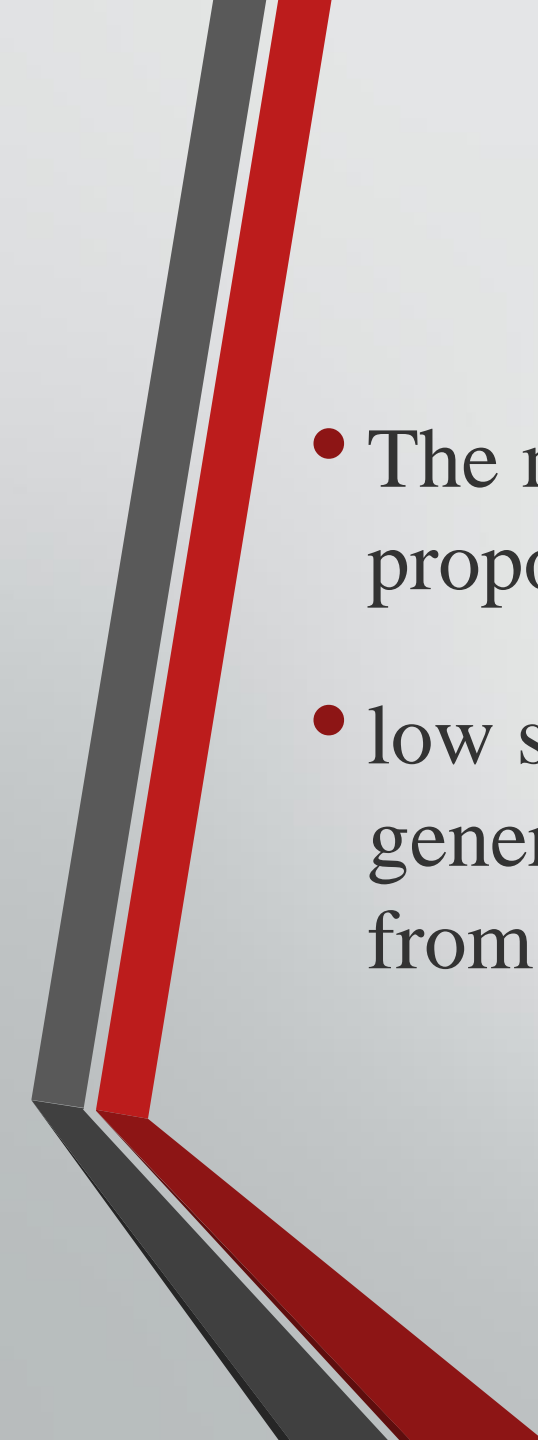
- Zinc is an essential cofactor of more than 100 enzymes
- It is an important factor in the metabolism of neurotransmitters, prostaglandins, and for maintaining brain structure and function.

- 
- Dopamine is one of the most important factors in the pathophysiology of hyperactivity disorder, and the hormone melatonin has an important role in the regulation of dopamine. Because zinc is necessary in the metabolism of melatonin

- 
- Preliminary investigations in humans show that many children with ADHD have lower zinc concentration in relation to healthy children.
 - zinc deficiencies were found to be correlated with hyperactivity, inattention and impulsivity.
 - Zinc concentration can only point to some other factors (malnutrition) that can lead to ADHD, but is not a factor that has a causative role in ADHD
 - zinc sulfate as a supplement to methylphenidate showed beneficial effects of zinc supplementation in the treatment of children with ADHD.
 - The dose of zinc sulfate used was 55 mg/day, which is equivalent to 15 mg zinc.

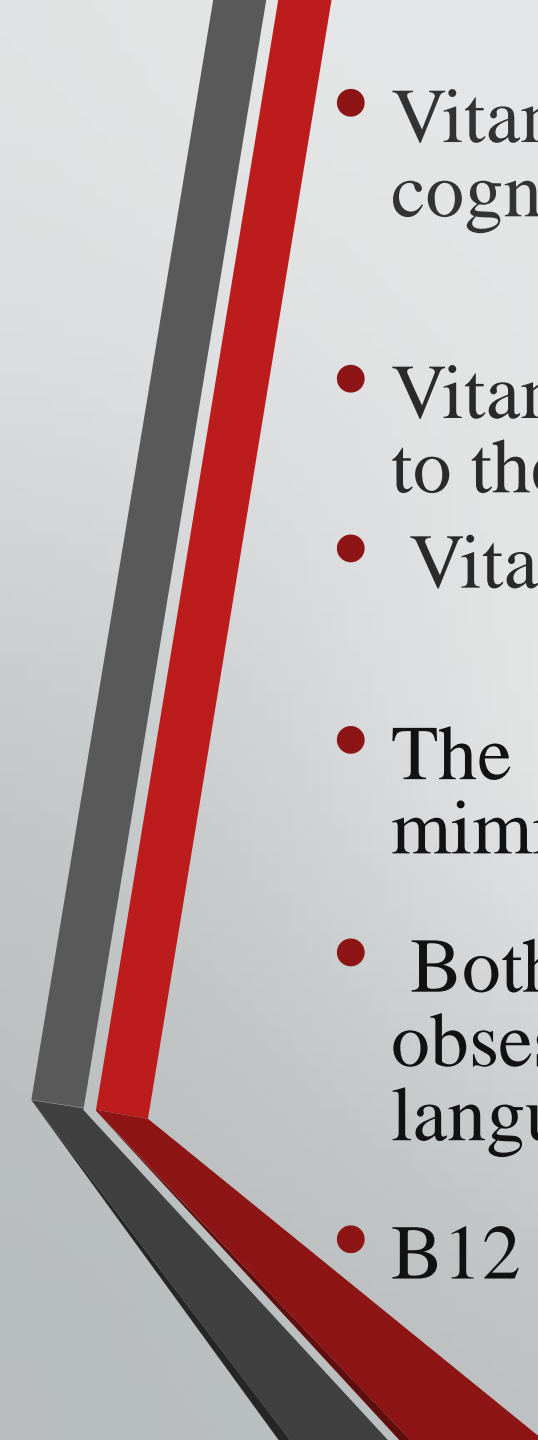
iron

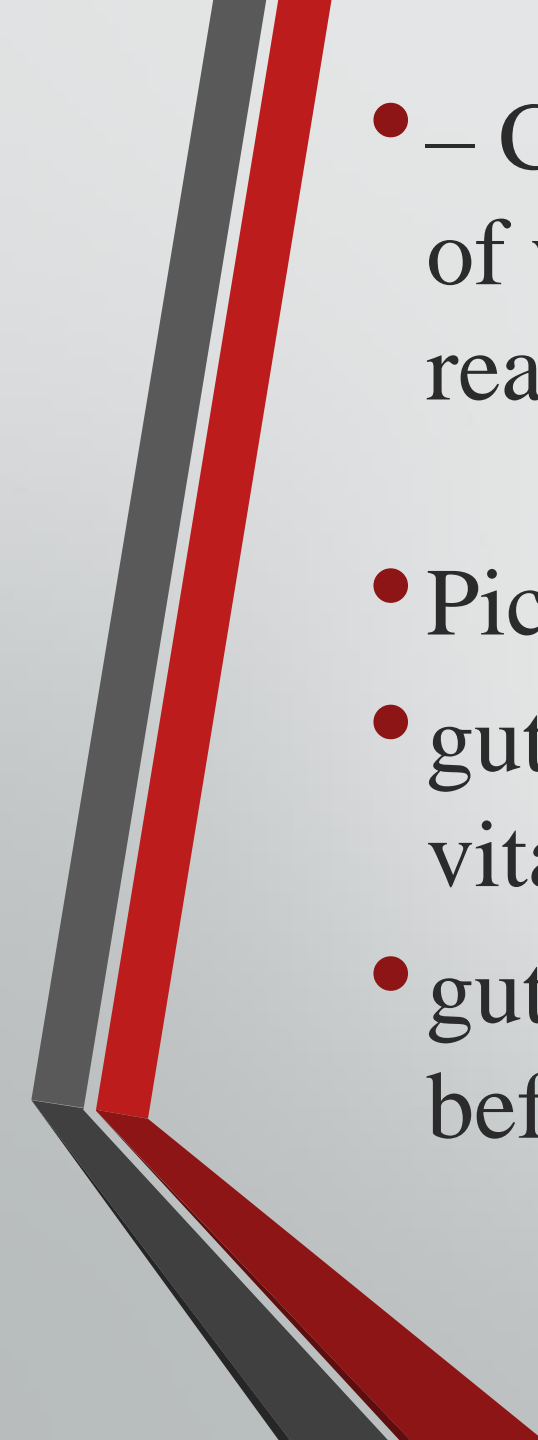


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- The mean serum ferritin levels were lower in a high proportion of the children with ADHD
 - low serum ferritin levels were correlated with more severe general ADHD symptoms, ADHD children may benefit from iron supplementation

vita-mine B groups

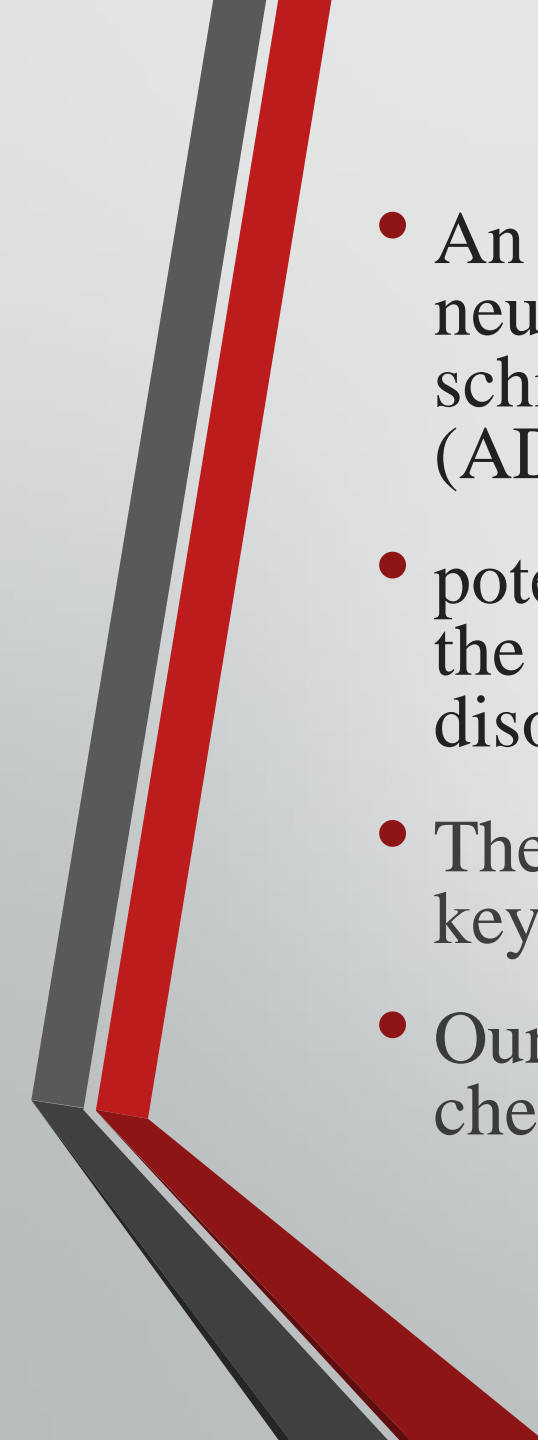



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- Vitamin B12 is of great importance for brain development and cognitive function, in other words, the ability to think.
 - Vitamin B12 level in ASD is significantly deficiency compared to the
 - Vitamin B12 level of normal subjects
 - The signs and symptoms of pediatric B12 deficiency frequently mimic those of autism spectrum disorders.
 - Both autistic and brain-injured B12- deficient children have obsessive-compulsive behaviors and difficulty with speech, language, writing, and comprehension.
 - B12 deficiency can also cause aloofness and withdrawal

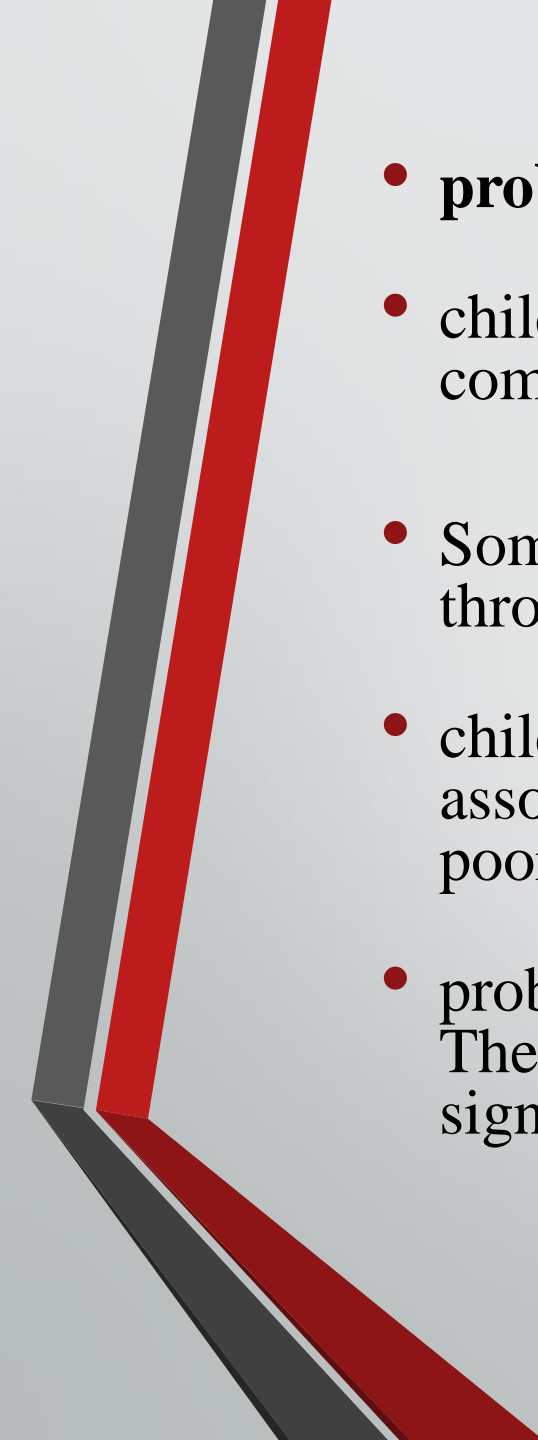
- 
- – Children with autism may well need higher doses of vitamin B than healthy typical peers, for many reasons:
 - Picky diets that lack vitamins,
 - gut inflammation that impedes absorption of B vitamins,
 - gut microbial infections that eat up B vitamins before your child can absorb them.

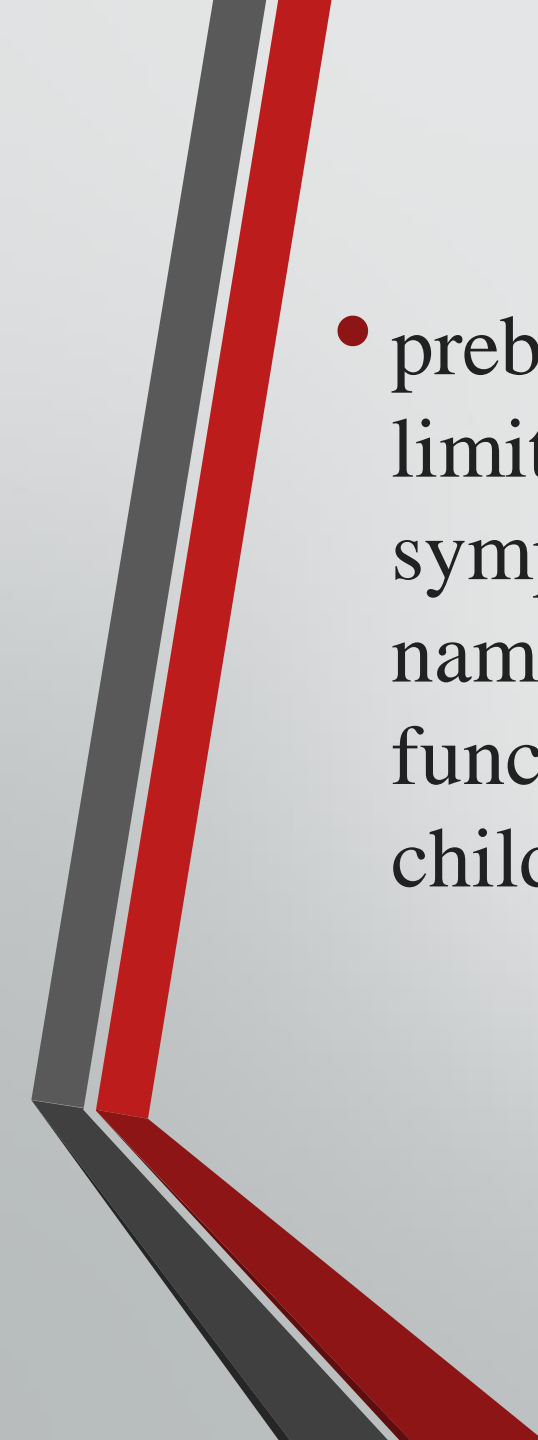
prebiotics and probiotics



- 
- An association between gut-microbiota and several neuropsychiatric conditions including autism, depression, anxiety, schizophrenia, and attention-deficit/hyperactivity disorder (ADHD) has been observed
 - potential mechanisms by which the gut microbiota may regulate the brain-gut axis and influence behavior and neurodevelopmental disorders
 - The microbiota-gut-brain axis has been recently recognized as a key modulator of neuropsychiatric health
 - Our gut is connected to the brain through a variety of nerves and chemical messengers, like hormones and neurotransmitters.

- 
- Those messages that pass between the gut and brain can be affected by the bacteria in the gut, meaning our gut bacteria can have a positive OR negative effect on the brain

- 
- **probiotics and autism**
 - children with autism are 4 times more likely to report GI symptoms when compared to children without autism
 - Some research indicates microbes in the gut could be connected to autism, through the gut-brain axis
 - children with autism, we often see changes in behavior, speech, and sleep associated with the function of the gut-brain axis being compromised due to poor gut health.
 - probiotics in alleviating the GI or behavioral symptoms in children with ASD. The available double-blind, randomized, placebo-controlled trials found no significant difference in GI symptoms and behavior.

- 
- prebiotics and probiotics have demonstrated an overall limited efficacy in the management of GI or behavioral symptoms in children with ASD. probiotics (recently named “psychobiotics”) may modulate brain activity and function, possibly improving the behavioral profiles of children with Autism Spectrum Disorder (ASD).



- **probiotics and ADHD**

- There is a probability that gut-microbiota may contribute to ADHD via bidirectional communication between the gut and brain, a system known as the "gut-brain axis".
- Numerous studies show that probiotic supplementation can have a positive effect on the course of neurodevelopmental disorders, including ADHD




- **probiotics and other psychiatric disorder**

- a total of 23 studies met the meta-analysis criteria. Statistical analysis revealed that there was no significant difference in the symptoms of schizophrenia, stress, and anxiety between probiotic and placebo groups, post-intervention.
- Probiotic administration reduced depressive symptoms among patients with depression in a statistically significant manner

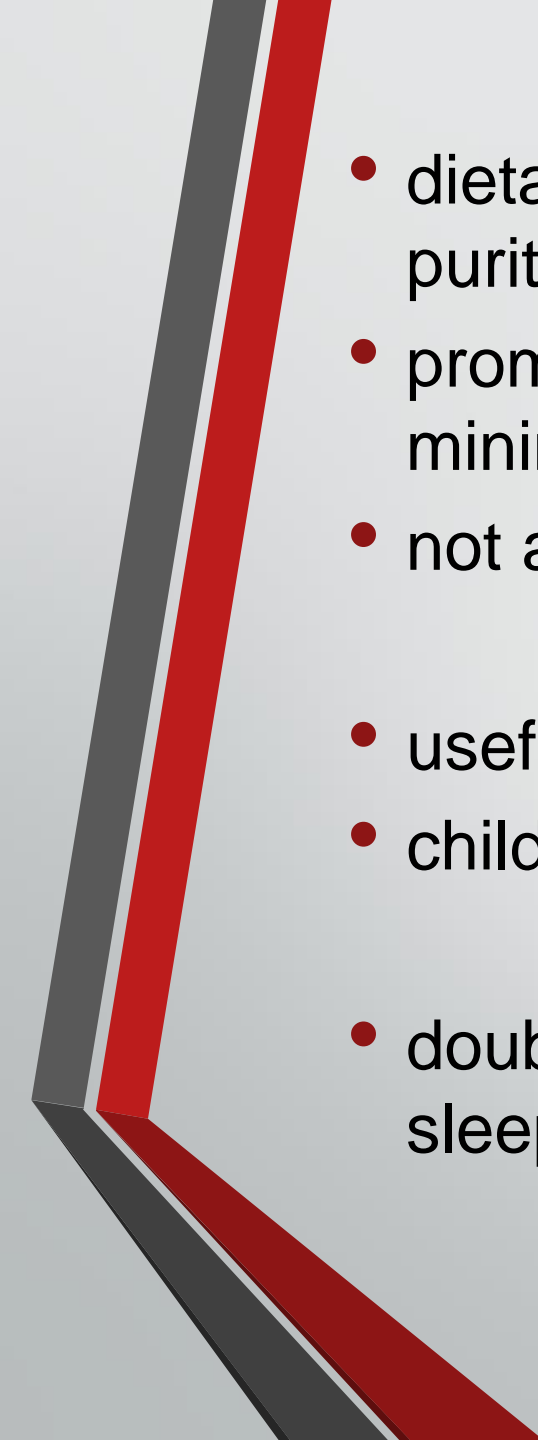
ginkgo biloba:



- 
- active ginkgolides obtained from the nuts and leaves of the oldest deciduous tree in the world
 - increased vasodilation and peripheral blood flow in capillary vessels and end arteries. may have antioxidant action, may increase cholinergic transmission by inhibiting acetylcholinesterase, may have anticonvulsant activity through elevation of GABA levels.

melatonin

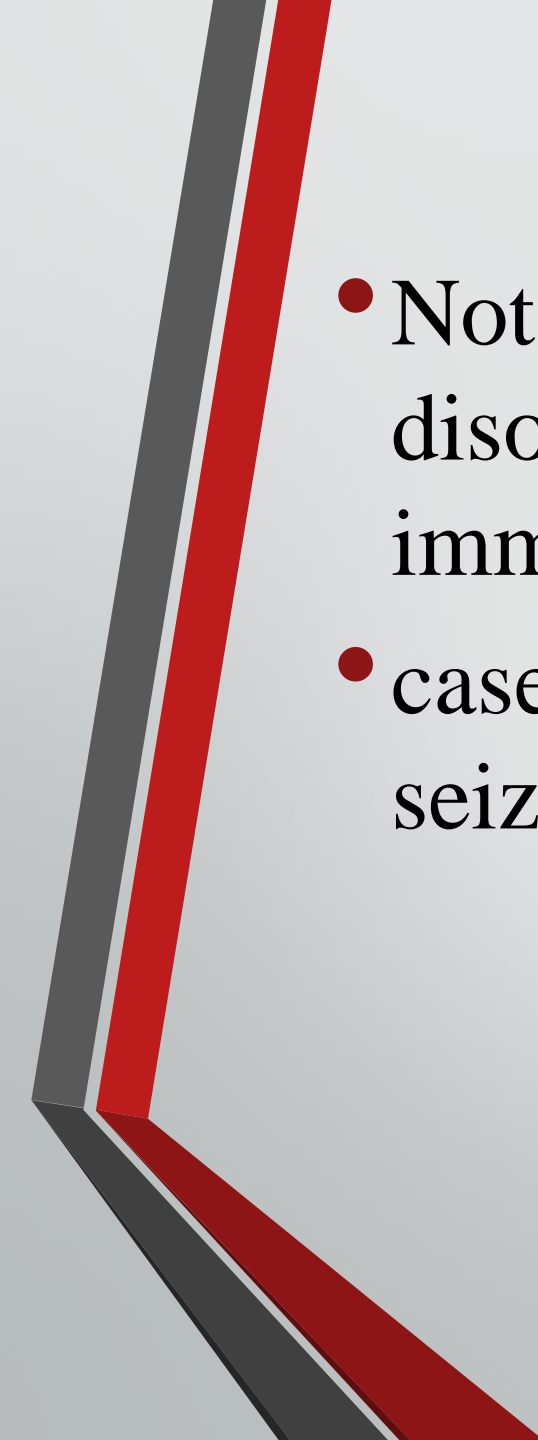


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- dietary supplement, non regulated by FDA with regard to purity, efficacy or safety
 - promoted sleep onset without producing drowsiness and minimized nighttime awakenings
 - not associated with rebound insomnia or withdrawal effects.

 - useful in circadian-based sleep disorder
 - children with chronic idiopathic insomnia

 - double blind studies in children suggest benefit in advancing sleep onset and increasing sleep duration

- may facilitate sleep in children with ADHD on psychostimulants
- early data suggest it may be beneficial in multi-disabled and blind children (with neurological and behavioral dis)
- case reports of improving insomnia, aborting mania, and stabilizing of bipolar disorder
- Dose: 2.5-6mg/d
- plasma peak concentration achieved within 60 min
- adverse effects are rare : abdominal cramps, fatigue, headache, dizziness, increased irritability
- very high dose can exacerbate depression.

- 
- Not recommended in patient with autoimmune disorders since melatonin may play a role in immune function
 - cases of worsening of seizures in children with seizure disorders



- **chelators**

- chelation to rid the body of presumed toxic metals, to somatic treatments. By definition, evidence is either lacking or, less commonly, multiple negative studies are taken to strongly suggest the treatment doesn't work (the use of secretin and facilitated communication are examples of this)