

# DIETARY AND COMPLIMENTARY AND ALTERNATIVE MEDICINE INTERVENTIONS FOR ADHD

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# Sources of Information

- Bader, A. & Adesman, A. “Complementary and Alternative Medicine for ADHD” in Barkley, R.A. (2015). *Attention deficit hyperactivity disorder: A Handbook for Diagnosis and Treatment 4<sup>th</sup> ed.* New York: Guilford Press.
- Hurt, E.I. & Arnold, L E. “Dietary Management of ADHD” in Barkley, R.A. (2015). *Attention deficit hyperactivity disorder: A Handbook for Diagnosis and Treatment 4<sup>th</sup> ed.* New York: The Guilford Press. Pp. 630-640.
- Barkley, R.A. (201`5). *Attention deficit hyperactivity disorder: A Handbook for Diagnosis and Treatment 4<sup>th</sup> ed.* New York: The Guilford Press.

Disclaimer

“Fools rush in where  
angels fear to tread”

Alexander Pope

An Essay on Criticism 1711

Disclaimer

Not An Expert in  
“Psychonutrition” But I am old  
enough to have read Linus  
Paulings Book on Vitamin C

# CRITERIA FOR EVALUATING IF A TREATMENT IS WORTH TRYING

- SECS
  - Safe
  - Easy
  - Cheap
  - Sensible
  
- RUDE
  - Risky
  - Unrealistic
  - Difficult
  - Expensive

# CRITERIA FOR EVALUATING IF A TREATMENT IS WORTH TRYING (Fred's get real additions)

- Overall health benefits
- Temperament of Child
  - Will they do it
  - Is it worth the hassle
- Weigh Risks and Benefits
  - Short term and long term
- Does it drain too much energy from the necessary battles
- Does it pass the 2 X 4 (wow) test or at least I'm pretty sure I see a difference.

# Dietary Eliminations

Eliminate following- Dairy products, gluten, citrus fruits, corn and products that contain corn, and all processed food.

Make appropriate substitutions: Soy products, rice products, brown rice, buckwheat, and potatoes

# Dietary Eliminations

Elimination diet should be followed for two weeks. If no benefits after a month stop.

If behavior improves then add restricted foods back one by one.

Long term eliminate only foods that cause behavior worsening



# Dietary Eliminations

Meta analyses:

6 studies. Medium effect size 0.58 without outlier. When removed, 0.29.

5 studies. Effect size . 21

# Restrict of Artificial Food Coloring and Preservatives

Studies with ADHD children yielded mixed results with some showing small to medium effect sizes and others showing no affect.

Two additional studies reported more severe ADHD symptoms when challenged with a mix of food coloring and preservatives.

Effects were noticed in all children, even those without diagnosed mental health problems

# Restrict of Artificial Food Coloring and Preservatives

Artificial food colors banned in Britain. Other restriction research shows no effect of sugar restricted diets on cognitive functioning or ADHD symptoms.

Increase in inattentiveness in the morning if children had not eaten breakfast, which was made worse by a sugar drink but reduced with whole grain cereal and milk.

# Nutritional Supplements

## Macronutrients

Essential Fatty Acids- people cannot synthesize them.  
Lower in those with ADHD & level correlates with  
Severity.

Meta Analyses- Efficacy

Small but significant effect (.16 to .31)

In medication responders no boost. In  
incomplete responders significant improvement.

Safety- side effects = to placebo

# Recommendations- EFA's

Elizabeth Hurt PHD & Eugene Arnold MD MEd

Probably not needed- 3 oily wild ocean fish servings per wk

Between 1 and 2 gms (at least ½ gram of EPA) appears to be effective and safe.

Adequate intake of vitamins C and E (antioxidants) PUFA's prone to oxidation.

Mercury free (USP or refined).

Takes three months to get results.

# Recommendations- EFA's

Elizabeth Hurt PHD & Eugene Arnold MD MEd

May not provide additional benefit to excellent stimulant responders. ? max benefit at reduced dose.

If PUFA alone not helpful add small amount of GLA by buying combination or with small amount of evening primrose oil.

Fred's addition – place to start if parents are hesitant to use stimulants.

# Amino Acids

Children with ADHD have lower levels of Amino Acids

Show Nitrogen Wasting- suggesting poor use of protein

Short term benefit from supplementation. 2 mos.  
Later no benefit

# Amino Acids

Not recommended- “risk of toxic catabolic products”

Recommended- Diet with adequate protein

Personal Anecdote



# Glyconutritional Supplementation

Saccharides derived from vegetables necessary for cell communication

2 open trials

Significant improvement in ADHD symptoms and oppositional behavior maintained for six weeks.

Not recommended

No controlled studies. No safety data.

# Nutritional Supplements

## Micronutrients

### Vitamin Supplements

#### RDA/RDI Supplementation

Some studies mild deficiencies in ADHD children-  
no studies with RDA/RDI Supplements- ADHD  
2 placebo controlled studies classroom sample-  
improvement in nonverbal cognitive skills, con-  
centration, and fidgeting  
1 study- 7 month placebo controlled study  
typically developing 11-13 y/o- no difference

# Vitamin Supplements

## Recommendations

RDA/RDI Supplementation

Meets SECS criteria But not a stand alone treatment

# Vitamin Supplements

## Mega doses

3 controlled studies- no benefit over 2 weeks or 6 months

Not Recommended- Does not meet SECS criteria

Lack of evidence

Safety concerns

# Vitamin Supplements

## “Possible Compromise”

“Mixture of multiple vitamins and minerals in amounts larger than RDA/RDI amounts but within limits considered safe by published standards”.

Recent placebo controlled RCT Study-of adults improvement of ADHD symptoms on self and observer rating scales

Before recommending more study needed.

# Nutritional Supplements

## Micronutrients

### Mineral Supplements

Some studies mild deficiencies in ADHD children- iron, magnesium, & zinc

# Iron Supplementation

## 2 studies

17 non anemic school age ADHD children- 30 days iron supplementation 5mg/kg/day improved ADHD symptoms

12 week placebo controlled study with 23 ADHD borderline iron deficient 5-8 yo's. Decreased ADHD symptoms

# Iron Supplementation Recommendations

Use iron supplements in ADHD children who have documented insufficiency/deficiency where it would be standard treatment.

Because iron can be suboptimal without frank anemia, Ferritin may need to be checked. If ferritin is normal, advisable to check C-Reactive Protein and/or transferrin receptor. ?



# Magnesium Supplementation

3 open label studies in Europe- 1 to 6 mos. Reduction in ADHD symptoms

Children with ADHD and magnesium deficiency-open label wt control group- sign reduction in symptoms

Poland- 116 children with ADHD- 94% deficient

U. S. sample 70 children wt ADHD none deficient

# Magnesium Supplementation Recommendations

RCT studies needed

Animal studies- U shaped behavioral response  
and magnesium supplementation level

Magnesium supplementation (over RDA) only for  
those with deficiencies. Increasing over that may  
result in behavior worsening.

# Zinc Supplementation

Zinc necessary for melatonin production, fatty acid absorption, and regulates dopamine production

Children with ADHD zinc serum level negatively correlated with inattention.

Two Turkish studies- improvement in ADHD symptoms relative to placebo

# Zinc Supplementation

Zinc + MPH significantly better than Zinc + Placebo-reducing ADHD symptoms

American study did not replicate results

Recommendation

Zinc supplementation over RDA only for those with documented deficiencies.

# Nutritional Supplements

## Metabolites

### Carnitine

Dutch Crossover Study-24 school age boys- Parent report- 13 responders. Teacher report- 12 responders. Means not given.

112 children dxed wt ADHD. No significant improvement compared to placebo. Inattentive subtype showed significant.

# Nutritional Supplements

## Metabolites

### Carnitine

Recommended only for inattentive presentation.

4-month trial needed. 1.5 gms 2 x daily. If benefit may be able to reduce.

Side effect- fishy breath

Documented heart benefits

# Nutritional Supplements

## Metabolites

### Dimethylaminoethanol

Previously Marketed as drug for hyperactivity.  
Withdrawn when efficacy data required.

Metaanalysis- Inconsistent results- some  
DMAE +, some Placebo +, some no effect

# Nutritional Supplements

## Metabolites

### Dimethylaminoethanol

Best study- compared DMAE to MPH and placebo

DMAE reduced ADHD symptoms (.1 to .6)

MPH reduced ADHD symptoms (.8-1.3)



# Nutritional Supplements

## Metabolites

### Dimethylaminoethanol

Passes SECS for children with mild symptoms of ADHD

Who have not responded to medication

Whose parents don't want them to take medication

Combination with Medication not studied

# Nutritional Supplements

## Metabolites

### Dimethylaminoethanol

Recommended dosage- 250-500 mg 2-3 times a day.

Less side effect- sleep delay, appetite suppression, evening rebound

# PRIOR TO INITIATION OF TREATMENT

- Comprehensive Physical Evaluation by Family Physician

Blood Count and Evaluation of Specific Electrolytes, Vitamins and Minerals to Assess for Deficiencies

Particularly if child is dark-skinned or spends a lot of time in the sun, especially presenting in late fall or winter, check Vitamin D

Children in rapid growth periods (preschool and adolescence) may outgrow their iron stores  
Most common mineral deficiency

- Dietary History Evaluation

When indicated or if child lives in areas of endemic deficiencies a more thorough mineral screening should be completed

# RULES AND FACTS OF DIETARY MANAGEMENT

- Only change one thing at a time and log results carefully

If desired effect not attained in expected time frame  
try a different treatment

- Expected times vary by treatment

Examples:

Dietary Eliminations – a few weeks

PUFAs – three months

Carnitine – four months

## RULES AND FACTS CONTINUED:

- No dietary plans work as fast as stimulation medication
- Multiple treatment interventions are not recommended

One plan may interfere with another

Parents may not have time, energy and focus to carry all out well resulting in none having an adequate trial\*\*\*

- No systematic studies evaluating dietary combination plans
- Reasonable restriction of sugar and RDI/RDA supplementation are recommended but are not stand-alone treatments

## RISKS OF DIETARY PLAN OVER STANDARD PLAN

- The risk of delaying evidence-based treatments should be considered if dietary plan replaces a standard treatment

Many dietary plans require several months to determine whether intervention is successful

Parents should consider whether child is in need of a standard treatment plan which has the potential for a faster response

Diverting family resources (time, effort, money) to a treatment plan that is not effective is a risk that should be considered

## RISKS OF DIETARY PLAN OVER STANDARD TREATMENT

Stop treatments that are not effective after a reasonable trial and try a different dietary treatment, non-ingestible alternative treatment or evidence-based treatment (FDA approved medication and behavior therapy)

These risks particularly salient for elimination diets which require considerable effort and organization



**COMPLIMENTARY  
& ALTERNATIVE MEDICINE  
INTERVENTIONS (CAMS)  
FOR ADHD**

# ABOUT CAMs

- Used alongside or as alternatives to standard remedies
- Popular with parents of ADHD children and adult patients with ADHD
- Up to 64% or more individuals with ADHD have tried one form or another

# MIND-BODY THERAPIES

- Yoga
  - 2 studies may be added benefit to medication
  - 1 study more effective than aerobic exercise
  - Parents of ADHD who participated with child reduced stress & were better able to manage ADHD child
- Tai chi
  - “Researchers found it can reduce hyperactivity and anxiety in adolescents with ADHD

# MIND-BODY THERAPIES

- Massage-Most studies with adolescents
  - Improved mood, classroom behavior, improved attention-results predicted to be temporary
- Craniosacral therapy-light touch.
  - No studies with ADHD
  - 2012 review- effective reducing pain & improving well being

# MIND-BODY THERAPIES

- Meditation
  - Researchers recommend- Start with yoga breathing. Present sequences of images with CD.
  - 2010 Review-four studies- one of four studies showed positive results. Conclusion- did not reduce core symptoms

# MIND-BODY THERAPIES

- Mindfulness Meditation
  - “awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally” (Jon Kabat-Zinn)
  - Moderate effect sizes for physical difficulties (.42) i.e. chronic pain and improving immune response and emotional/mood difficulties (.50)
  - Zolowska-feasability study + results

# MIND-BODY THERAPIES

## Mindfulness-cont

- Meta-Analyses of 2 studies-ADHD
  - 8 week 12 hr group training based on MBCT & MBSR with 10 Adolescents
  - 8 week 12 hr group training based on MBCT & MBSR with 18 Children and their parents with waiting list control
  - Blinded measures no effect overall. Some S's as high as .77

# MIND-BODY THERAPIES

- Mindfulness Meditation-Update (Mitchell, J. T. et al. (2014))
  - ADHD symptoms, related functional impairment, and emotional dysregulation was generally supported relative to wait list control with “large” effect sizes. (Clinician ratings and self ratings) (no changes in medication level,
  - Larger randomized clinical trial is warranted.



# MIND-BODY THERAPIES

## Mindfulness- cont

- Changes in brain functioning and structure
  - Changes in EEG activity
  - Increased size of posterior cingulate cortex, left temporo-parietal junction, 2 areas of cerebellum (Britta Holzell)

# MIND-BODY THERAPIES

- Homeopathy
  - like cures like- Treatment of a disease should with a substance that causes symptoms in healthy people.
  - Meta Analysis-not effective
  - Wikopedia- not any more effective than placebo for any condition

# Chiropractic Interventions

- Chiropractic manipulation
  - Some + studies but limited by sample size research conducted by chiropractors who performed treatment
- Neuro Emotional Technique I controlled study).
  - Standard Therapy (ST),
  - NET+ST
  - Sham NET + ST.
  - Improvement on parent ratings, not on teacher ratings.

# MIND-BODY THERAPIES & Chiropractic Interventions

- Conclusions
  - Few studies, low quality of study designs, and some no studies
  - Some publications report positive results
  - Some publications report no significant results
  - More rigorous studies needed

# EXERCISE

- Research
  - In addition to health benefits may affect brain function and structure promoting neural growth and development promoting cognitive and inhibitory control
  - Review of 30 years of studies- modest beneficial effects improving ADHD symptoms. Use as supplement to meds

# EXERCISE

- Research
  - 5 more studies- improvement of behavioral and neuropsych functioning
  - Children- 20 minutes running vs 20 minutes reading quietly did better on reading and math tests whether ADHD or not

# EXERCISE

- John Ratey
  - Recommends exercising in AM at least minimum 30 minutes with heart rate 75% of max- focus lasts 60 to 90 minutes.  
Recommends taking medicine when focusing effects wear off.

## EXERCISE

- John Ratey
  - PE4Life Schools- 45 minutes of aerobic exercises 5 days a week
    - Inner city school discipline probs reduced by 67 %
    - Low income elementary school violence incidents went from 228 to 95 in 1 year



# “GREEN SPACE” THERAPY

- “Green space” - Exposure to natural green grass and tree settings/Outdoor Activities
  - One study- group that walked in park did better than group than group that walked in city on verbal concentration task. Study not fully blinded and did not evaluate impact on ADHD symptoms
  - Sunny regions have lower incidence of ADHD

# ACUPUNCTURE

- Evaluated in over 100 different articles
  - Only three of these involved randomized controlled trials
  - “Limited evidence to support use of acupuncture in people with ADHD” but firm conclusions cannot be drawn because of risk of bias.
  - All studies with children and adolescents, none with adults

# OCCUPATIONAL THERAPY TREATMENTS

- Sensory integration training
  - Evidence of poor quality; findings mixed
  - Not recommended despite popularity with occupational therapists

## Interactive metronome

Few studies-small samples, poor quality designs, unblinded or incompletely blinded assessments or treatment effects among design study flaws- Results of the two studies are contradictory

# CAFFEINE (CAM?)

- No difference in arousal increases with children with ADHD & matched controls
- Review of studies-Children: Caffeine more effective than non treatment controls but not nearly as effective as medication.
- May adversely effect sleep- may exacerbate symptoms
- Some suggest use as adjunct to meds- no convincing evidence to recommend this
- Recommendation- Moderate caffeine intake if taking stimulant medication

# Noninvasive Brain Stimulation

- Transcranial Magnetic Stimulator (TMS)
  - Weak electric current to stimulate specific areas of the brain to increase or repair their functioning
  - Hypothesis- use to stimulate dopamine
  - 2010- safe but no treatment specific benefits for ADHD Symptoms

# Noninvasive Brain Stimulation

- Cranial Electrotherapy Stimulation (CET)
  - small electric currents to stimulate multiple areas of the brain at the same time
  - Some clinical reports of benefit, no controlled study

# ANTHROPOSOPHICAL THERAPY

- Uses natural preparations and special movements to improve and maintain “internal equilibrium” between the “nerve sense system” and the “metabolic-limb system”
  - Treatments- eurhythmy (movement) therapy and art therapy and “medications” from plants, minerals, or animals
  - One open label study- parent questionnaire 2 years later. Overall reduction of ADHD symptoms

# EEG Neurofeedback

- EEG Findings
  - ADHD associated with 32 % increased frontal-central theta band activity (lower arousal)
  - ADHD associated with increased theta to beta band power (lower arousal). Effect size 3.0 in comparison to controls



# EEG Neurofeedback

- EEG Findings- use in diagnosis
  - Early findings- promising 84-95% accuracy rate but 16 to 18 % of those with ADHD being classified as normal
  - Later researchers- 58% accuracy rate
  - 2113 meta analysis- lower effect sizes and inconsistency across studies.
  - Increased theta band activity found with bipolar disorder and substance abuse.
  - Recommendation- do not use stand alone for diagnosis

# EEG Neurofeedback

- Research
  - 4 studies with sham or placebo controls-parents blinded
    - All 4 studies- both groups improved with no differences between groups on ratings and neuropsych tests and eeg activity.

## Conclusions- CAMs

- Most research is inadequate – does not preclude possibility may be effective.
- Dismissive attitude could alienate patients.
- Working with patients – use them as resource
- Be familiar with different treatment options
- Maintain balance of compassion and respect for patients with a healthy skepticism

# FRED'S RECOMMENDATIONS

- Consumers/Parents
  - Maintain healthy skepticism
  - Start with proven treatments and life style changes that promote health, well being, and + relationships that pass SECS test
  - Next go to promising treatments and lifestyle changes that pass SECS test.
  - If necessary try proven treatments that require that are a significant hassle (i.e. elimination diets)