Addressing ADHD Naturally

Kathi Kemper, MD, MPH
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- I do not intend to discuss an unapproved/investigative use of a commercial product/device in my presentation.
- I am an AUTHOR of:
  - HarperQuill, “The Holistic Pediatrician”
  - AAP, “Mental Health Naturally”
  - XLibris, “Addressing ADD Naturally”
  - Two Harbors, “Authentic Healing”
Rationale

- ADHD is the 2\textsuperscript{nd} most common pediatric mental health diagnosis (after anxiety)
- Over 1/3 families use natural products or mind-body approaches to ADHD and \textbf{fewer than half} mention this to their physician.
- Moreover, few pediatricians are trained to answer families’ questions about these therapies. Don’t ask, don’t tell is common.
- Impaired relationship, misattribution of benefits/side effects, lack of attention to healthy lifestyle?
Objectives

By the end of this session, participants will be able to

- Counsel patients on dietary modifications and supplements to improve attentiveness
- Use effective behavioral strategies and provide advice about behavior management and neurofeedback
- Use and recommend evidence-based resources (See AAP Section on Integrative Medicine, SOIM; join the listserv – tsalus@aap.org)
Case

You are referred an 11 year old boy by a family nurse practitioner for management of ADHD because he did not respond to methylphenidate.

The mother says she stopped giving the medication after two weeks, because she didn’t like the idea of “drugging him up.” Instead, she has been giving him ginseng and ginkgo.

She doesn’t know if he’s any better, but “at least it’s natural”.
Attention Deficit Hyperactivity Disorder AD(H)D: criteria

- Core symptoms of:
  - Impulsivity (or Hyperactivity)
  - Inattention

- Impairing home, school, social and self-concept (at least 2 settings)

- By age 6 years

- Chronic condition (at least 6 months)

- NOT due to another condition

- Use standard screen, Vanderbilt
  
  [Website Link]
Epidemiology:

- Prevalence: 4-11% in US
- Boys: Girls, 3:1
- Etiology: multifactorial
  - Genetic – family history of ADHD, alcoholism, sociopathy, LD, mood and anxiety disorders
  - Medical (maternal smoking and alcohol use during pregnancy; gestational diabetes; head injury; seizures; CNS infection; OSAS), and
  - Environmental risks (lead, CO, Cd, TV) and protective factors (high IQ, supportive, structured family environment)
  - Cultural – much lower prevalence estimates in Europe and Japan than US; most restless Europeans moved to North America
- many unknowns
Psychostimulants – 1970-2012

Thanks to Sandy Newmark, MD from UCSF Osher Ctr. for this slide, used with permission for this and other slides from him.
Why the Explosion in the Diagnosis of ADHD?

Possible Explanations

1. There are **the same number of children with ADHD** but we are better at finding and helping them.

2. We have **loosened the definition** so more people are being diagnosed and treated.

3. We are actually **misdiagnosing** and treating many people who don’t have ADHD, even by a loosened definition.

4. There are now **more people who actually have ADHD**

Thanks to Sandy Newmark, MD from UCSF Osher Ctr. for this slide
Born in the Wrong Month?

- **Diagnosed with ADHD**: 10% of Kindergarteners born in August (youngest in class) 4.5% born in September (oldest in class)

- **Treated with Psychostimulants**: 8.3% of those born in August, as 3.5% born in September

**900,000 Incorrect Diagnoses?**

*Journal of Health Economics 2010*

Thanks to Sandy Newmark, MD from UCSF Osher Ctr. for this slide
Age in Class and ADHD - Iceland

Younger Children in each class had higher likelihood ADHD diagnosis

Youngest third of class 50% more likely than those in the oldest third to be prescribed stimulants between 7 and 14

*Pediatrics* 2012

Thanks to Sandy Newmark, MD from UCSF Osher Ctr. for this slide
Delayed development?

- 446 kids with and without ADHD scanned repeatedly over years
- ADHD kids lag 3 yrs in cortical growth
- ADHD: motor cortex matures earlier; executive function in frontal cortex; coordination and other cerebellar functions, delayed
- Functional connectivity differences in ACC, caudate
- Brain imaging not clinical tool
- No evidence of abnormality, only delay

Shaw P. National Academy of Science, 2007
Toxins in Umbilical Cord Blood

- 10 newborns – an average 200 industrial chemicals and pollutants
- 287 chemicals detected, **217 are toxic to the brain and nervous system**, 208 cause birth defects or abnormal development in animal tests

**Environmental Working Group 2005**

Thanks to Sandy Newmark, MD from UCSF Osher Ctr. for this slide
Neurotoxicants

- Neurotoxicant chemicals:
  - Mn, fluoride; chlorpyrifos and DDT (pesticides), tetrachloroethylene (solvents), polybrominated diphenyl esters (2014)

- Maternal use of acetaminophen! (Odds ratio 1.4); dose response found, after controlling for maternal infection, inflammation, mental health
Organochlorines and Child Development

- Dichlorodiphenyl dichloroethylene (p,p'DDE) in umbilical cord blood.
- High levels = worse mental and psychomotor development.
- The higher the level, the worse the child's development at 13 months old.

PEDIATRICS Vol. 111 No. 5 May 2003

Thanks to Sandy Newmark, MD from UCSF Osher Ctr. for this slide
Pesticides and ADHD

- **Trichlorophenols.** TCP. Children with any detectable urinary 2,4,6-TCP had a higher risk of ADHD compared to children with undetectable levels (OR 1.77, 95% CI 1.18 to 2.66) (Xu X. *Occupational Environmental Med*, 2010)

- **Organophosphate** exposure measured by DAP in urine. “In utero DAPs and, to a lesser extent, postnatal DAPs were associated adversely with attention as assessed by maternal report, psychometrician observation, and direct assessment. These associations were somewhat stronger at 5 years than at 3.5 years and were stronger in boys.” (Marks AR. *Environ Health Perspect* 2010)
Pesticides and ADHD

- 1139 children 8 to 15 years “children with higher urinary levels of organophosphate metabolites were more likely to meet the diagnostic criteria for ADHD”

- For the most-commonly detected DMAP metabolite, dimethyl thiophosphate, children with levels higher than the median of detectable concentrations had twice the odds of ADHD

Pediatrics, June 2010

Thanks to Sandy Newmark, MD from UCSF Osher Ctr. for this slide
Pesticides, continued

- Cross-sectional NHANES data from 1139 children, 119 with ADHD by diagnostic interview. Measured urinary **dimethyl alkylphosphate (DMAP)** concentrations.

- A 10-fold increase in DMAP concentration was associated with an adjusted odds ratio of 1.55 (95% confidence interval: 1.14-2.10). For dimethyl thiophosphate, children with levels higher than the median of detectable concentrations had **twice** the odds of ADHD (adjusted odds ratio: 1.93 [95% confidence interval: 1.23-3.02]), compared with children with undetectable levels.

  Bouchard MF. *Pediatrics*, 2010

  MANY MORE STUDIES EMERGING ON THIS!
Does Eating **Organic** Help?

- Children who ate organic fruits and vegetables had $1/5^{th}$ the level of organophosphate pesticide metabolites in their urine.

- Children can “reduce exposure levels from ‘uncertain’ to ‘negligible’ risk”

- **Environmental Heath Perspectives**
  2003

Thanks to Sandy Newmark, MD from UCSF Osher Ctr. for this slide.
Electronics and ADHD - 6 Hours/Day!

- TV – 4 hours 29 minutes
- Computer – 1 hour 13 minutes
- Video games – 49 minutes

Thanks to Sandy Newmark, MD from UCSF Osher Ctr. for this slide
TV and Attention

- TV viewing accounted for a significant portion of the variation in ratings of ADHD symptoms (Miller CJ, 2007)

- Frequent television viewing associated with subsequent attention and school problems (Johnson JG, 2007)

- Japanese cohort study: “Daily TV exposure at age 18 months was associated with hyperactivity-inattention and prosocial behavior at age 30 months” (Cheng S. J Epidemiol, 2010)
Treatment
Placebo

- Placebo effects well documented in psychiatry
- Parents and teachers tend to evaluate kids more positively if they think they are medicated
- Parents and teachers tend to attribute positive changes to medications even when no meds are given
- Ethical issues

Waschbusch, DA J Dev Behav Pediatr 2009
Usual vs. Integrative Approach

**Treatment as Usual (TAU)**
- Diagnose, using standard scale
- Rule out anemia, vision, hearing probs.
- Start stimulants
- Monitor sleep and growth
- Revise or refill as needed

**Integrative Care**
- Identify goals, strengths, resources, lifestyle
- Assess of attention, impulsivity, hyperactivity with standard scale
- Identify specific target behavior (SMART plan)
- Brainstorm behavioral, lifestyle, natural and medical treatment options; focus on fundamentals
- Prioritize plan, anticipate difficulties
- Monitor
- Revise, follow-up
- Advocate for policy changes
Assessment

- History (age of onset); other conditions
- Family History
- Diet: allergies, sensitivities, artificial colors/flavors/sweeteners?
- Activity (sports), sleep; TV, nature
- Stress management; Social and Organizational skills; Managing Misbehaviors
- Interview: mood, trauma, anxiety
- Standardized: Vanderbilt; vision, hearing, PE (allergies, rashes, heart murmurs, neurologic)
- Lab studies: freeT4, ferritin, Vit D; consider lead level
- ALL CURRENT TREATMENTS and others tried
Standard (TAU) challenges

- Making a diagnosis; what if they don’t meet criteria?
- Mastering medications, side effects etc.
- Managing resistance to treatment/referral
Medication Challenges

- Poor response
  - Poor response in 35% (no behavioral improvement) to 1st drug; 2/3 of non-responders can respond to subsequent tries
  - Side effects >50%: nausea, weight loss, insomnia, tics, irritability, “not himself”; arrhythmias (rare), liver dysfunction
  - Increase in calls to Poison Control Centers
  - Failure to take them; stigma; dependence
  - Lack of attention to other aspects of lifestyle that improve overall health and esteem
  - Long-term, no impact!

- Parents seek other options (30% - 40%)
- Mis-use? (increasing use in college students before exams)

Chan E. J Dev Beh Ped, 2003
Psychopharm Bull 2008; 41:37-47
Setlick, J Pediatrics 2009; 124: 875-80
An Integrative Approach to ADHD

It is important to see the whole child, with his or her unique combination of strengths and weaknesses, in the context of family, friends, school, and community, and not just a set of symptoms to fix.

Sometimes a change in the home environment, school or teacher is more important than any medicine, nutritional supplement or herb.

Thanks to Sandy Newmark, MD from UCSF Osher Ctr. for this slide
Strengths-based approach

- Build on strengths: great for sales, entertainment, the arts
  - Creativity, imagination, innovation
  - Energy, exuberance, enthusiasm
  - Desire to please; Sociability
  - Flexible; notices subtle details in environment

- NOT a character flaw or willfully bad

- Improvement in specific skills (attention, diligence, self-discipline) is possible
Healthy Habits, Healthy Habitat
5 Fundamentals: 5Fs

1. **Fitness and Sleep**: more exercise, more sleep (sleep hygiene)

2. **Food** – “Eat food. Mostly plants. Not too much.” Consider supplements to avoid deficiencies (iron, zn, D, folate) and meet unique metabolic or drug-induced needs.

3. **Friendship with self**: emotional, mental, spiritual attention, frustration, and stress management

4. **Fellowship with others** – participate; develop social skills; taking turns

5. **Fields/Environment**: More nature; mindful music; Less TV and toxins
Glycemic Index – eat LOW

- 52 Adolescents had High or Low Glycemic Index breakfast, or No breakfast
- 30 and 120 Minutes Cognitive testing
- Low GI Breakfast:
  - Better Executive function
  - Better Working memory
  - Better Attention

*British Journal of Nutrition, 2012*
Food, not “edible food-like substances”

- Eat **breakfast**; keep the brain supplied with fuel
- Avoid **artificial colors, flavors, sweeteners, preservatives**, e.g., benzoate (Stevens LJ. *Clinical Pediatrics*, 2011; McCann D. *Lancet*, 2007; Bateman B. *Arch Dis Child*, 2004; Boris M. *Ann Allergy*, 1994)
- It’s **not** the **sugar**, it’s the other stuff
- See Center for Science in the Public Interest

[http://www.cspinet.org/new/200806022.html](http://www.cspinet.org/new/200806022.html)
Dietary Controversies

- 12 negative RCTs of sugar
- Food allergies/sensitivities?
- Next....
- Supplements – megavitamins bad; magnesium, zinc, iron may be helpful. Follows...
Effect of a Restricted Elimination Diet on the Behavior of Children with ADHD: (INCA Study) a Randomized Controlled Trial – Lancet, Feb 2011

- 100 children – 50 on restrictive diet – 50 controls 5 weeks
- Restricted diet (few foods) Rice, meat, vegetables, pears, water as basic diet
- After 5 weeks 64% of children had 40% improvement on ADHD rating Scales
- Assessor blinded, but parents and teachers not
INCA Study – Phase 2

- Double Blind Placebo Controlled Trial of those who responded to elimination diet in Phase I
  - Children were given challenge foods and relapse of ADHD sx occurred in 19 of 30 children.
  - Evaluators, patients and family were blinded as to which foods were being challenged.
Appleton Central HS

- Charter School for kids “struggling in conventional settings
- Removed vending machines selling candy, soda, and chips.
- “Natural Ovens” began a healthful meal program for breakfast and lunch
- Serving salad bars, fresh fruits, whole grain breads and cereals, vegetables, meats, etc.
Appleton Central HS

- Very Striking Improvements
  - Better academic performance
  - Fewer Behavior problems
  - Less fighting
  - Less drug use

www.totalhealthandwellness.net/news/docs/AppletonStudy.pdf
ADHD and Food Sensitivity

- 19 children responded favorably to a multiple food elimination diet.
- 16 completed a DBPC Food Challenge.
- Symptoms improved significantly on days given placebo rather than foods they were sensitive to (P=0.003)

Boris M. Annals of Allergy, 1994
ADHD and Food Allergy

- Egger 62/76 children treated with an Oligoantigenic diet improved.
  - 28/62 who improved completed a DBPCFT - foods thought to provoke symptoms were reintroduced. Symptoms worse on active foods than placebo. 48 foods were incriminated.
  - Artificial colors and preservatives were the most common provoking substances.

- Pelsser (Impact of Nutrition on Children with ADHD – Netherlands, Belgium)
  - RCT of elimination diet X 5 weeks, followed by DBX-food challenge in 100 4-8 yo with ADHD
  - 78% responded to elimination diet P<0.0001; relapse in 63% of responders with DB challenge

Egger J. Lancet. 1985
Pelsser LM. Lancet, 2011
Artificial Colors, Flavors, and Preservatives

- 153 3 year olds & 144 8/9 year olds
- Given Sodium Benzoate and an artificial color and additive mixture or placebo
- Artificial colours or a sodium benzoate preservative (or both) in the diet result in increased hyperactivity in 3-year-old and 8/9-year-old children in the general population.

Lancet 2007
In Europe, Dyed Foods Get Warning Label

- Products with Yellow 5, Red 40, Other Dyes “May Have an Adverse Effect on Activity and Attention in Children”

July 20, 2010
Dietary Trial

1. Avoid artificials
2. Eat regular meals and snacks
3. Remove potentially sensitive food(s) for 2 weeks; NOT FOREVER
4. Challenge eliminated foods one at a time
5. Keep diary
6. Must be highly motivated and nutrition educated
7. Consider NUTRITION CONSULT.
ADHD Supplements?

- Correct deficits
  - Iron
  - Zinc
  - Magnesium

- Omega 3 fatty acids

- NOTE: Most MV contain very little of these three. Diet is best source.
Iron in ADHD

- Iron plays a key role in dopamine metabolism;
- Ferritin levels inversely related to ADHD hyperactivity scores (Calarge C. J Child Adolesc Psychopharm, 2010; Oner, 2008); 84% of ADHD pts had abnormally low ferritin levels (Konofal et al, Arch. Pediatr. Adolesc. Med. 2004)
- Iron improved Connor’s ratings even if initial Hgb and Hct are normal (Sever, 1997; Pediatric Neurology, 2008)
- Iron treatment for ADHD reduced ADHD rating scale and CGI at 12 weeks (Konofal, 2008)

CHECK FERRITIN AND CORRECT!
Zinc in ADHD

- Zinc levels predict stimulant response (Arnold, 1990)
- Serum zinc levels low in ADHD (Bekaroglu, 1996)
- Zinc effective as supplement to stimulant (Akhondzadeh, 2004)
- Zinc effective in reducing hyperactive and impulsive behavior (Bilici, 2005)
- MOST EFFECTIVE IN DEFICIENT POPULATIONS, ie. NOT most US kids; worth trying in picky eaters who are non-respondents to stimulants; MAY Help decrease necessary dose of stimulants.
Zinc in ADHD

- RCT of Zinc supplements for 209 7th graders
- Dose: 0, 10 or 20 mg Zinc 5x/wk for 10 Weeks
- Statistical improvement in 20mg group (no improvement with lower doses)

  Study presented at Experimental Biology meeting April 4, 2005 at San Diego, CA by J Penland.

- RCT of zinc + amphetamine treatment. Zinc alone ineffective, but supplements reduced dose of amph necessary to benefit kids behavior by 37%

  Arnold LD. J Child Adolesc Psychopharm, 2011

CONSIDER based on dietary history (beef, pork, lamb, dark meat of poultry, nuts, whole grains, legumes, fish; get handout from Medline Plus)
Magnesium for ADHD

- French study evaluated Mg and B6
  - 30 / 52 hyperactive children had low ERC-Mg values
  - Open label supplementation with 100 mg daily of Mg and B6 for 3-24 weeks
  - “In all patients, symptoms of hyperexcitability (physical aggressivity, instability, scholar attention, hypertony, spasm, myoclony) were reduced after 1 to 6 months treatment. Other family members shared similar symptoms, had low ERC-Mg values, and also responded clinically to increased Mg(2+)/vitamin B6 intakes. “
- MORE STUDIES NEEDED; May help anxiety, constipation

Mousain-Bosc M, Am J Clin Nutr, 2004
Mousain-Bosc, Magnes Res, 2006
Huss M. Lipids Health Dis, 2010 (also used PUFA)
Treating adults with MVMM

- RCT study by Rucklidge and colleagues (2014 *Prog Neuropsychopharm Biol Psychiatry*)
  - 80 adults with ADHD
  - 8 weeks treatment with MVMM
  - Baseline deficiencies only in vitamin D (27%); lab values not associated with symptom levels
  - Yet, 61% improved symptoms with supplements
### Supplement Facts

<table>
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<tr>
<th>Amount Per Tablet</th>
<th>(% Tablet)</th>
<th>(1 Tablet)</th>
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<tr>
<td>Calories</td>
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<tr>
<td>Total Carbohydrate</td>
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<td></td>
</tr>
<tr>
<td>Sugars</td>
<td>&lt;1 g</td>
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<tr>
<td>Vitamin A (3.500 IU)</td>
<td>70%</td>
<td>70%</td>
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<tr>
<td>Vitamin C (60 mg)</td>
<td>75%</td>
<td>100%</td>
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<td>Vitamin D (400 IU)</td>
<td>50%</td>
<td>100%</td>
</tr>
<tr>
<td>Vitamin E (30 IU)</td>
<td>150%</td>
<td>100%</td>
</tr>
<tr>
<td>Vitamin K (10 mcg)</td>
<td>*</td>
<td>13%</td>
</tr>
<tr>
<td>Thiamin (1.5 mg)</td>
<td>107%</td>
<td>100%</td>
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<tr>
<td>Riboflavin (1.7 mg)</td>
<td>106%</td>
<td>100%</td>
</tr>
<tr>
<td>Niacin (20 mg)</td>
<td>111%</td>
<td>100%</td>
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<tr>
<td>Vitamin B₆ (2 mg)</td>
<td>143%</td>
<td>100%</td>
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<tr>
<td>Folic Acid (400 mcg)</td>
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<td>100%</td>
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<tr>
<td>Vitamin B₁₂ (6 mcg)</td>
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<td>100%</td>
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<tr>
<td>Biotin (45 mcg)</td>
<td>15%</td>
<td>15%</td>
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<tr>
<td>Pantothenic Acid (10 mg)</td>
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<td>100%</td>
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<tr>
<td>Calcium (108 mg)</td>
<td>7%</td>
<td>11%</td>
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<tr>
<td>Iron (18 mg)</td>
<td>90%</td>
<td>100%</td>
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<tr>
<td>Phosphorus (50 mg)</td>
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<td>5%</td>
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<tr>
<td>Iodine (150 mcg)</td>
<td>107%</td>
<td>100%</td>
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<tr>
<td>Magnesium (40 mg)</td>
<td>10%</td>
<td>10%</td>
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<tr>
<td>Zinc (15 mg)</td>
<td>94%</td>
<td>100%</td>
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<tr>
<td>Copper (2 mg)</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Manganese (1 mg)</td>
<td>*</td>
<td>50%</td>
</tr>
<tr>
<td>Chromium (20 mcg)</td>
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<td>17%</td>
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<tr>
<td>Molybdenum (20 mcg)</td>
<td>*</td>
<td>27%</td>
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</table>

### Centrum Kids®

#### No omega-3s

Contains dairy, corn, soy, and wheat; BHT Blue 2 Red 40 Yellow 6 Aspartame Carageenan Guar gum

Read labels!
- No omega 3’s
- No dairy or wheat
- Contains soy, sugar, mannitol, fructose, aspartame
  - Blue#2
  - Red #40
  - Yellow #6
Center for Science in the Public Interest

“In general, it's best to avoid the following ingredients.

- Aspartame, Acesulfame-K, Saccharin, Sucralose
- Food dyes
- Mycoprotein (Quorn-brand meat substitutes)
- Partially hydrogenated oils (trans fat)”

“A recent review of all of the evidence by the scientists who conducted the three positive animal studies urges governments to re-examine their positions on aspartame, and recommends that pregnant women and children not consume aspartame.”

https://www.cspinet.org/reports/chemcuisine.htm?gclid=Cj0KEQiAl5u2BRC6yszC1_75v5wBEiQAD-hdzxWe0aPxCtZr6YXVe6f4ps8YueVB_1BFEvEJsqMo2gaAjfs8P8HAQ
Omega-3’s, ADHD, and LD

- Lower omega-3 FA levels in children with ADHD
- Omega 3’s are important in brain development
- RCT: 92 Swedish children with ADHD; 500 mg daily EPA Supplements “two ADHD subgroups (oppositional and less hyperactive/impulsive children) improved after 15-week EPA treatment”
  
  Gustaffson PA. Acta Paediatr, 2010

- RCT: 41 Children with ADHD and LD given a Omega-3’s vs. placebo for 12 weeks. Significant improvement in ADHD scores for active vs. placebo.

  Progress in Neuro-Psychopharmacology & Biological Psychiatry, 2002
Essential fatty acids for ADHD

- 41 kids, RCT to EPA 186 mg + DHA 480 mg + GLA 96 mg + cis-linoleic acid 864 vs. placebo mg daily for 12 weeks; **EFA lowered Connors scores.**
  - Richardson. 2002.

- Oxford-Durham RCT of fatty acids for 117 children with **developmental coordination disorder**: “significant improvements for active treatment vs placebo were found in reading, spelling, and behavior over 3 months of treatment in parallel groups. After the crossover, similar changes were seen in the placebo-active group.”

- High dose EPA is 40% as effective as stimulants. **SAFE**
  - Richardson. *Pediatrics*, 2005
Flax oil and vitamin C supplements improve ADHD

- 30 kids with ADHD, compared with 30 normal kids in clinic in India
- Supplement with 200 mg ALA + 25 mg Vitamin C twice a day, for 3 months
- All kids had more EFA in RBC cell membranes after 3 months
- ADHD kids had (P<0.01) improvements in total hyperactivity score, self-control, psychosomatic, restlessness, inattention, impulsivity, social problems, learning problems

Joshi K. Prostaglandins Leukot Essent Fatty Acids. 2006
PUFA+Mg+Zn

- German observational study of 812 children with ADHD given omega-3 + Omega-6 + Mg + Zn (ESPRICO™) X 12 weeks.
- Better sleep; fewer emotional problems
- Reduced ADHD on standard scales
- No serious adverse effects; 5% had mild effects/dislike that led to stopping supplement

Huss M. Lipids, Health, Dis, 2010
Vitamin D and ADHD?

- Three datasets including 49 states in 2003 and 2007
- + 9 non US countries
- Inverse relationship between solar intensity and ADHD, with solar intensity explaining 34% - 57% of variance in ADHD rates, even after controlling for LBW, income, and infant mortality
  - Arns, M. *Biol Psychiatry*, 2013
Carnitine (Inattentive type only)

- Amino acid used to ferry fatty acids into mitochondria
- Semi-essential amino acid
- Two positive European studies
- Two negative American studies EXCEPT in inattentive type ADD

Coffee, (green) tea?

- Caffeine (adenosine receptor agonist) is a mild stimulant
- Well-known side effects
- Ability to titrate with home trials on weekend
How much caffeine is there in…?

<table>
<thead>
<tr>
<th>Food/Beverage</th>
<th>Amount of caffeine</th>
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<tbody>
<tr>
<td>8 ounces brewed coffee</td>
<td>95-200 mg</td>
</tr>
<tr>
<td>8 ounces decaffeinated coffee</td>
<td>2 mg</td>
</tr>
<tr>
<td>Espresso, 1 ounce</td>
<td>47-75 mg</td>
</tr>
<tr>
<td>Instant coffee</td>
<td>27-173 mg</td>
</tr>
<tr>
<td>Black tea 8 ounces</td>
<td>14 – 70 mg</td>
</tr>
<tr>
<td>Green tea 8 ounces</td>
<td>24-45 mg</td>
</tr>
<tr>
<td>White tea, 8 ounces</td>
<td>28 mg</td>
</tr>
<tr>
<td>Iced tea, 8 ounces</td>
<td>11-47 mg</td>
</tr>
</tbody>
</table>

http://www.mayoclinic.org
EEG Neurofeedback

- Children with ADHD:
  - More slow wave (Theta-low arousal)
  - Less Fast Wave (Beta-high arousal) activity
- One study –QEEG had 86% sensitivity 98% specificity
- 2014 NEBA EEG test approved by FDA for diagnosis of ADHD

Thanks to Sandy Newmark, MD from UCSF Osher Ctr. for this slide
Neurofeedback

- RCT comparing school-based neurofeedback to cognitive training (CT) for 104 7-11 year olds with ADHD treated for 40 sessions
- Six month follow up showed faster and more sustained significant improvements on Connor scales for neurofeedback than CT or control; also, had fewer increases in medication dosage than CT or controls
- Expensive, time-consuming

School Interventions

- The right school and the right teacher can make all the difference
- Sometimes 1st grade awful, 2nd grade fine, 3rd grade terrible, etc. etc.
- 504 plan – reasonable classroom modifications
  - Set of books for home
  - Modified homework
  - More time or quiet place for test taking
  - Direct communication of homework assignments

Thanks to Sandy Newmark, MD from UCSF Osher Ctr. for this slide
Tolson School-the Nurtured Heart

- Tolson School, Tucson. “Failing School” 75% of children from low income families.

- Entire school began to apply the Nurtured Heart approach (*Transforming the Difficult Child*)

- Behavioral management system based on highly increased
  - positive feedback
  - clear rules
  - well defined consequences, given without ‘energy’

Thanks to Sandy Newmark, MD from UCSF Osher Ctr. for this slide
Suggested Practice Changes

- Test for **ferritin** in at least 50% of ADHD evaluations
- Take a **dietary history** from at least 80% of your ADHD patients
- Recommend **breakfast** for at least three patients in the first week home
- Recommend **avoiding processed food** with artificials
- Do a trial of **coffee** on the weekend
- Check **EWG website** for Clean 15 and Dirty Dozen
- Ask your staff to print out handouts on commonly used **dietary supplements** from Medline Plus for your patients
- Encourage parents to note the positives about their child
- Read **Transforming the Difficult Child** by Howard Glaser
- Join the AAP SOCIM ([tsalus@aap.org](mailto:tsalus@aap.org) or [www.aap.org/sections](http://www.aap.org/sections)) within the next month
Resources

- On-line course on Herbs and Dietary Supplements
  [http://herbs-supplements.osu.edu](http://herbs-supplements.osu.edu)

Web

- [www.aap.org/sections/CHIM](http://www.aap.org/sections/CHIM)
- [http://www.cspinet.org/](http://www.cspinet.org/) (Ctr Science Public Interest)
- Natural Medicines (fee)
- ConsumerLabs.com (fee)

Books

- Newmark S. *ADHD Without Drugs*
- Culbert and Olness (ed). *Integrative Pediatrics*
Extra slides
Melatonin in ADHD

- RCT in 25 children with ADHD and chronic sleep onset insomnia; melatonin 5 mg daily at 6pm vs. placebo
- Melatonin significantly improved sleep onset; decreased sleep latency and increased total sleep time
- No change in ADHD behavior over 4 weeks, but all kids kept using it for one year

American ginseng and Ginkgo for ADHD

- Open trial among 36 children, 3-17 yo
- *Panax quinquefolium* (200 mg) + *Ginkgo biloba* (50 mg) BID X 4 weeks
- Connors parents scale
  - 2 weeks: 31% improved on anxious/shy; 67% improved on psychosomatic
  - 4 weeks: 74% improved on Conners’ ADHD Index