ADHD, environment, lifestyle: A primer on the latest findings in complementary, alternative, lifestyle, and technology-related effects and treatments for ADHD

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CHADD ADHD General Session
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“lifestyle” is a complicated inter-related concoction today

Dietary interventions
• Single nutrient supplements
• Multi-nutrient supplements
• Restriction and elimination diets

Diet and ADHD: Basic concepts
• The brain is mostly fat
  – Value of more long chain fatty acids may or may not depend on deficiency
• Brain signaling requires adequate balance of micronutrients—zinc, iron, and others
  – Value of these likely depends on deficiency
• Hard to establish effects in ADHD but they are now demonstrated
• Effects are fairly small on average suggesting variation in response—some kids large response, some little response

DISCLOSURES
• Royalties from Guilford Press
  – Getting Ahead of ADHD (2017)
    • Source of some material today’s talk
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Today’s outline
• Diet
• Exercise
• Stress and Trauma
• Technology
• New tech-based treatments: update
• Synergy/conclusions

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Fatty acid supplementation results: real but small effects

-0.5
-0.4
-0.3
-0.2
-0.1
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
95% Confidence interval
How many studies

Gillies et al 2012 (5)
Block et al 2011 (10)
Sonuga Barke et al 2013 (11)
Hawkey & Nigg 2012 (16)

Data from Stevenson et al (2014)

Artificial food colors results

-0.5
-0.4
-0.3
-0.2
-0.1
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
95% Confidence interval

Data from Stevenson et al (2014)

Effect of food additives on hyperactivity in 8 yr olds is moderated by histamine degradation gene (HNMT Thr105Ile and HNMT T939C). On the left (Thr105Ile), note that when the T allele is present, the food additive challenge has no effect. When the T allele is absent, the food additives cause more hyperactivity than the placebo. (H3 receptors in the brain may be the mechanism.) Source: Stevenson et al., 2010, Am J Psychiatry, 167, 1108-1115, © American Psychiatric Association

Elimination diet % responders (Controlled trials in red)

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<th>Source</th>
<th>Criterion</th>
<th>N</th>
<th>Rate (%)</th>
<th>LL(%)</th>
<th>UL(%)</th>
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<td>49</td>
<td>24.5%</td>
<td>14.5%</td>
<td>38.3%</td>
</tr>
<tr>
<td>Pooled Weighted average controlled trials</td>
<td>Various</td>
<td>135</td>
<td>26.4%</td>
<td>20.0%</td>
<td>34.1%</td>
</tr>
</tbody>
</table>

Source: Nigg et al 2012; Nigg & Holton 2014

What is in a broad-spectrum micronutrient formula?

- Vitamin A, C, D, E, B6, B12
- Minerals: Calcium, Iron, Phosphorus, Zinc, Magnesium, Chromium, Molybdenum, Potassium, Selenum, Copper, Manganese, Vanadium, Iodine, Nickel, Lithium
- Amino acids: di-Phenylalanine, acetyl-L-carnitine, methionine, N-acetyl cysteine
- Herbs: Ginkgo biloba, Ginkgo biloba
- Alpha-lipoic acid
Conclusions on Diet

- Some dietary interventions have promise as ancillary treatment
- Effects too small to be stand alone for most kids
- May benefit only a minority of ADHD
- May benefit more on mood/irritability, secondarily inattention

Action Plan: Food

- Evaluate how much effort you can do—start easy
  - **Low level:**
    - Shop outside aisles (fresh, less processed)
    - Supplement w oily fish (salmon, mackerel, sardines, herring)
    - OR fish oil supplements (1000 mg EHA/DPA)
    - OR algae-based omega 3 supplements
  - Eliminate caffeine (e.g., sports drinks) for children

- **Mid and moderate level**
  - Check blood levels iron, vitamin D, omega3
  - Eliminate 6 allergenic foods on trial basis
  - Eliminate added sugar (e.g., boxed, canned foods)
  - Provide only healthy food choices (re-stock)

- **Ambitious (cost more, may need dietician consult)**
  - Eliminate food additives, eat organic/fresh
  - Restriction /elimination diet (get clinical supervision, behavioral counseling plan)

Exercise: what we now know

- Acute exercise improves attention, learning—even after 20 minutes in typically developing individuals
- Sustained exercise reverses epigenetic harms of stress and trauma in animals
- Sustained fitness improves brain growth, connections, efficiently even after a few weeks
- Effects in animals are most clear in brain areas and skills related to learning, attention: suggesting promise for ADHD recovery
- But studies of ADHD are too limited to give clear answer on ADHD per se
- Exact type of exercise? Maybe benefit from complex motivating real-world and aerobic context (e.g., basketball, karate, dance) or motivation/fun (training for an event)
Exercise: Action plan

- Take hope: even biological effects may change
- No down side: exercise improves health, mood
- Goal
  - 1 hr. per day
  - moderate-to-vigorous
  - at least 15” blocks
  - Doesn’t have to be a sport, can be free play too
  - Vary the activity
- Experiment to find an exercise option that “works” for your child and family and is fun
- Accept what is realistic: some is better than none!

SOURCE: Nigg (2017); Getting Ahead of ADHD; slide © Joel T Nigg, 2018; https://joelniggphd.com/

Negative Stress/ Trauma “triple threat” in ADHD

- More likely to experience stressful and traumatic event (THOUGH MOST DO NOT)
  - Judgement, social skills, impulsivity
- More likely to develop PTSD when exposed
  - ADHD thus has above chance overlap with PTSD
  - Less prepared to cope
    - Less emotion regulation skills
    - Less social support

Stress Management: Stress and Trauma Definitions

- Positive stress
  - Challenge but I think I can meet it
- Negative stress
  - Daily hassles
- Major negative events
- Traumatogenic context /expressed emotion/
- Frank emotional trauma
  - Fear of serious injury or death (need not be “realistic”)
  - Seeing someone severely injured or killed
  - Unforgettable blow to understanding of self or loved ones
- Effects on inflammation, HPA axis, brain development, epigenetic changes

With fitness: Enhanced brain development schematic

Pre fitness: Enhanced brain development schematic

Image: https://www.slideshare.net/insidethebrain/brain-motion

Image: http://additu.de/webinars


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Game plan for stress and trauma
- Recognize the potential (clinicians, families)
- Build social support (mentor, friend, church)
- Reframing, coping, resilience
- Exercise
- Reduce high intensity communication in home
- Manage personal trauma/stress history
- Trauma specific counseling—correct assessment

Game plan for technology
- Teach your child safe internet and social media use
- Monitor use and content (disengagement=risk factor, can be non-judgmental)
  - Redirect if signs of aggression/depression/irritability
  - Limit before bed use (blue light)
- Negotiate limited hours
  - Leave time for exercise, social activity, study, sleep
  - Recognize for some gamers it is their social world
- Identify addictive like behavior and seek counseling

Social media, gaming, internet and ADHD
- What we know
  - Link of violent media/gaming content to aggression
- What emerges on preliminary evidence
  - “Excess use” social media linked to negative mood, depression
  - Global use linked to inattention but small effect and weak studies
  - Internet—risks of impulsivity, social need, vulnerability—parental monitoring is key
- Latest developments: Gaming disorder-WHO and DSM

Computerized cognitive training
Theory and History
Types
Controversy

Computerized Cognitive Training Results on ADHD total symptoms
Data from Cortese & European ADHD Guidelines Group (2015) / Am Acad Child Adolesc Psychiatry

Early life restraint stress induced changes in gene expression in the brain. Exercise fully reversed these effects.
Neurofeedback/biofeedback

Neurofeedback results

Future direction: Non-invasive direct brain stimulation

Interim summary on new treatments

• Computerized cognitive training—not yet ready
  – But more complex, emotionally engaging tools may yet prove beneficial
• Neurofeedback—still not proven.
  – But new trials are in the works with refined methods. Stay tuned
• Direct brain stimulation: avoid for children for now.
  – But exciting long term prospects. May help adults with depression.

Goal: Virtuous Synergy

Size of effects (d)

ES = 0.1: Total TV and video effects on attention/ADHD symptoms
ES = 0.3: omega 3 supplementation ADHD (Hawkey & Nigg 2012); food additives ADHD
ES = 0.5: lead level and ADHD (Goodland et al 2013); second hand smoke and cancer
ES = 0.5: Violent video/Tv and child aggressive behavior (Anderson, 2004)
ES = 0.6: ADHD—aerobic exercise (Vysniauske et al 2016) ~ USA girls’ height from age 14-18
ES = 0.85: smoking and lung cancer
ES = 1.0: ADHD-medication benefit ~ USA girls’ height from age 13-18

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Schematic illustration of group difference and overlap effect size 0.7

Ranges of Test Scores in Formative Assessment Experiments

What you can do: key areas of effective lifestyle for ADHD

- Exercise—daily for child
- Sleep—address sleep issues
- Diet/supplementation
- Technology—harms and potential benefits
- Stress/adversity—manage family stress

The decision tree will vary for each of you based on urgency, resources, preferences

- Sleep
- Diet
- Exercise
- Stress reduction

Self Help

Professional

- Counseling
- Behavior plan
- Medication

- Re-evaluate
- Add a piece
- Reduce a piece

Calibrate

Summary and Conclusions

- Balancing mainstream professional and “alternative” lifestyle steps makes sense in light of emerging science
- Individualized, personalized approach needed: Create a plan that works for your family
- If your at home plan doesn’t work, get a pro to troubleshoot

The decision tree will vary for each of you based on urgency, resources, preferences

Self Help

Professional

- Medication
- Behavior plan
- School plan

- Re-evaluate
- Add a piece
- Reduce a piece

Calibrate

Decision Flow chart can be used

- Consider level of urgency/severity
- Secondary symptoms
- Your resources, capacity
- Then sequence, blend of
  - Standard treatments (medication, behavioral guidance, tutoring)
  - Complementary/alternative steps, often at home