

# A Naturopathic Approach to Attention Deficit/Hyperactivity Disorder (ADHD)

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NHAND

November 6, 2021

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# Disclosures

## Born Integrative Medicine Specialists, PLLC

- Co-owner and medical director
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## Allergy Research Group LLC

- Director of product development, Scientific Advisor, Editor-in-chief of Focus Newsletter

## International Medical Wellness Association

- Medical Wellness Advisor
- <https://www.medicalwellnessassociation.com/>

# Goals & Objectives



Understand signs and symptoms of ADHD.



Understand theoretical pathogenesis.



Review of laboratory testing to help elucidate causation and improve strategic treatment interventions.



Be able to implement naturopathic interventions, which are evidence and clinically based, to alleviate symptoms and hopefully cure the patient.

# Subtypes

## Inattentive

- distracted, having poor concentration and organizational skills, etc.

## Hyperactive-impulsive

- interrupting, taking risks, constantly moving, etc.

## Combo

- Most common in children

<https://www.nimh.nih.gov/health/topics/attention-deficit-hyperactivity-disorder-adhd/index.shtml>

<https://www.healthline.com/health/adhd/three-types-adhd#type-3>







# Diagnostic Criteria

1. Must show at least 6 of 9 major symptoms for a specific type of ADHD.
2. Be present in more than one setting (e.g., school and home).
3. Persist for at least six months.
4. Be present before the age of 12 years.
5. Impair function in academic, social, or occupational activities.
6. Be excessive for the developmental level of the child.
7. Not be caused by other mental disorders.

American Psychiatric Association. Attention-deficit/hyperactivity disorder. In: Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, American Psychiatric Association, Arlington, VA 2013. p.59.

# Attention-Deficit/Hyperactivity Disorder: Screening and Evaluation

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## Clinical Question

What are the best screening tools for the evaluation and diagnosis of attention-deficit/hyperactivity disorder (ADHD)?

## Evidence-Based Answer

The Conners Abbreviated Symptom Questionnaire has the best combination of positive and negative likelihood ratios (eTable A). (Strength of Recommendation [SOR]: B, based on a meta-analysis of observational studies.) The Vanderbilt ADHD Diagnostic Teacher and Parent Rating Scales also have moderate sensitivity and specificity in elementary school-aged children. (SOR: B, based on a single cohort study.)

## Evidence Summary

A 2016 meta-analysis of 25 cross-sectional, cohort, and case-control studies evaluated the accuracy of the Child Behavior Checklist–Attention Problem Scale (CBCL-AP) and three versions of the Conners Rating Scales–Revised (CRS-R) for diagnosing ADHD in children and adolescents three to 18 years of age.<sup>1</sup> Patients had all three types of ADHD: predominantly hyperactive/impulsive, predominantly inattentive, and combined. In addition to the CBCL-AP (14 studies) and the three versions of the CRS-R, the Conners Parent Rating Scale–Revised short form (four studies), the Conners Teacher Rating Scale–Revised short form (five studies), and the Conners Abbreviated Symptom Questionnaire (five studies) were evaluated. The reference standard was a clinical examination performed by a qualified professional using diagnostic criteria from the *Diagnostic and Statistical Manual of Mental Disorders* (DSM),

3rd or 4th ed., and corresponding diagnosis codes from the *International Classification of Diseases*, 9th or 10th revision. All scales had moderate sensitivity, specificity, and positive and negative likelihood ratios for diagnosing AD/HD. The Conners Abbreviated Symptom Questionnaire may be the most effective diagnostic tool for ADHD because of its brevity and high diagnostic accuracy, and the CBCL-AP could be used for more comprehensive assessments.

A 2013 cohort study compared the Vanderbilt ADHD Diagnostic Parent/Teacher Rating Scales with a structured diagnostic psychiatric interview using DSM-IV criteria.<sup>2,3</sup> Participants were selected from a random sample of elementary school students in urban, suburban, and rural school districts in Oklahoma. The Vanderbilt parent and teacher scales were moderately sensitive and specific for diagnosing AD/HD.

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## References

1. Chang LY, Wang MY, Tsai PS. Diagnostic accuracy of rating scales for attention-deficit/hyperactivity disorder: a meta-analysis. *Pediatrics*. 2016;137(3):e2015249.
2. Bard DE, Wolraich ML, Nease B, Doffing M, Beck L. The psychometric properties of the Vanderbilt attention-deficit hyperactivity disorder diagnostic parent rating scale in a community population. *J Dev Behav Pediatr*. 2013;34(2):72–82.
3. Wolraich ML, Bard DE, Nease B, Doffing M, Beck L. The psychometric properties of the Vanderbilt attention-deficit hyperactivity disorder diagnostic teacher rating scale in a community population. *J Dev Behav Pediatr*. 2013;34(2):83–93. ■

Additional content at <https://www.aafp.org/afp/2019/0601/p712.html>.





# Epidemiology

Estimated pooled prevalence (1,023,071 subjects) of ADHD was 7.2%.

- Thomas R, et al. Prevalence of attention-deficit/hyperactivity disorder: a systematic review and meta-analysis. *Pediatrics*. 2015;135(4):e994.

2015-16 National Health Interview Survey (NHIS), the weighted prevalence of a parent-reported diagnosis of ADHD among children aged 4 to 17 years of age in the US was 10%.

- Xu G, et al. Twenty-Year Trends in Diagnosed Attention-Deficit/Hyperactivity Disorder Among US Children and Adolescents, 1997-2016. *JAMA Netw Open*. 2018;1(4):e181471. Epub 2018 Aug 3.

Male to female ratio 4:1 for the predominantly hyperactive type and 2:1 for the predominantly inattentive type.

- Agency for Healthcare Research and Quality. Diagnosis of Attention-Deficit/Hyperactivity Disorder. *Clinical Focus*. Rockville, MD, October 1999. [www.ahrq.gov/clinic/tp/adhdtp.htm](http://www.ahrq.gov/clinic/tp/adhdtp.htm) (Accessed on October 25, 2011).

# Statistics

The estimated number of children ever diagnosed with ADHD, according to a national 2016 parent survey, is 6.1 million (9.4%).

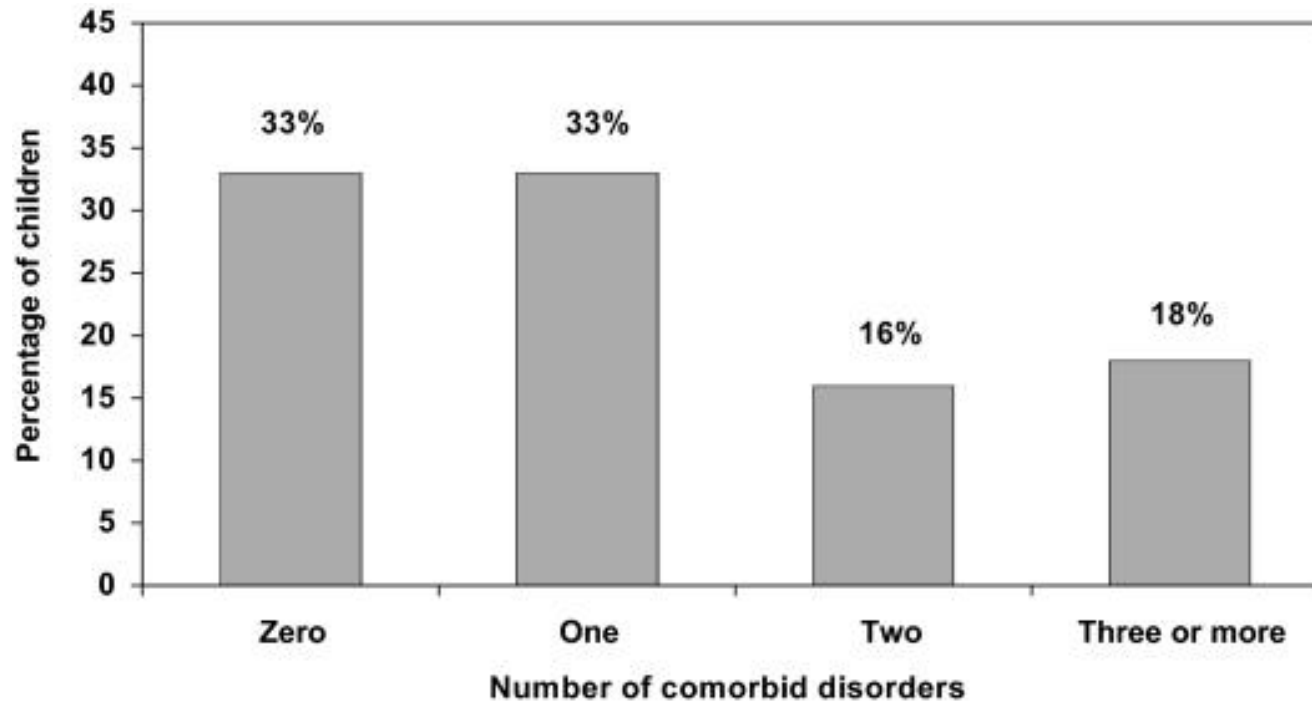
- 388,000 children aged 2–5 years.
- 4 million aged 6–11 years.
- 3 million aged 12–17 years.

Danielson ML, Bitsko RH, Ghandour RM, Holbrook JR, Kogan MD, Blumberg SJ. Prevalence of parent-reported ADHD diagnosis and associated treatment among U.S. children and adolescents, 2016. *Journal of Clinical Child and Adolescent Psychology*. 2018, 47:2, 199-212.

A white circular button with red text that reads: "ask me about my attention deficit disorder or pie or my cat. a dog. i have a bike. do you like tv? i saw a rock. hi." The button is set against a light beige background with a large, light blue circular arc on the right side of the slide.



# Frequent Comorbidities



## Primary or Secondary

### Oppositional defiant disorder (ODD)

- persistent pattern of anger, irritability, arguing, defiance or vindictiveness toward parent and other authority figures.

### Conduct disorder

- repetitive and persistent behavioral and emotional problems; great difficulty following rules, respecting the rights of others, showing empathy, and behaving in a socially acceptable way

### Depression

### Anxiety

### Learning disabilities

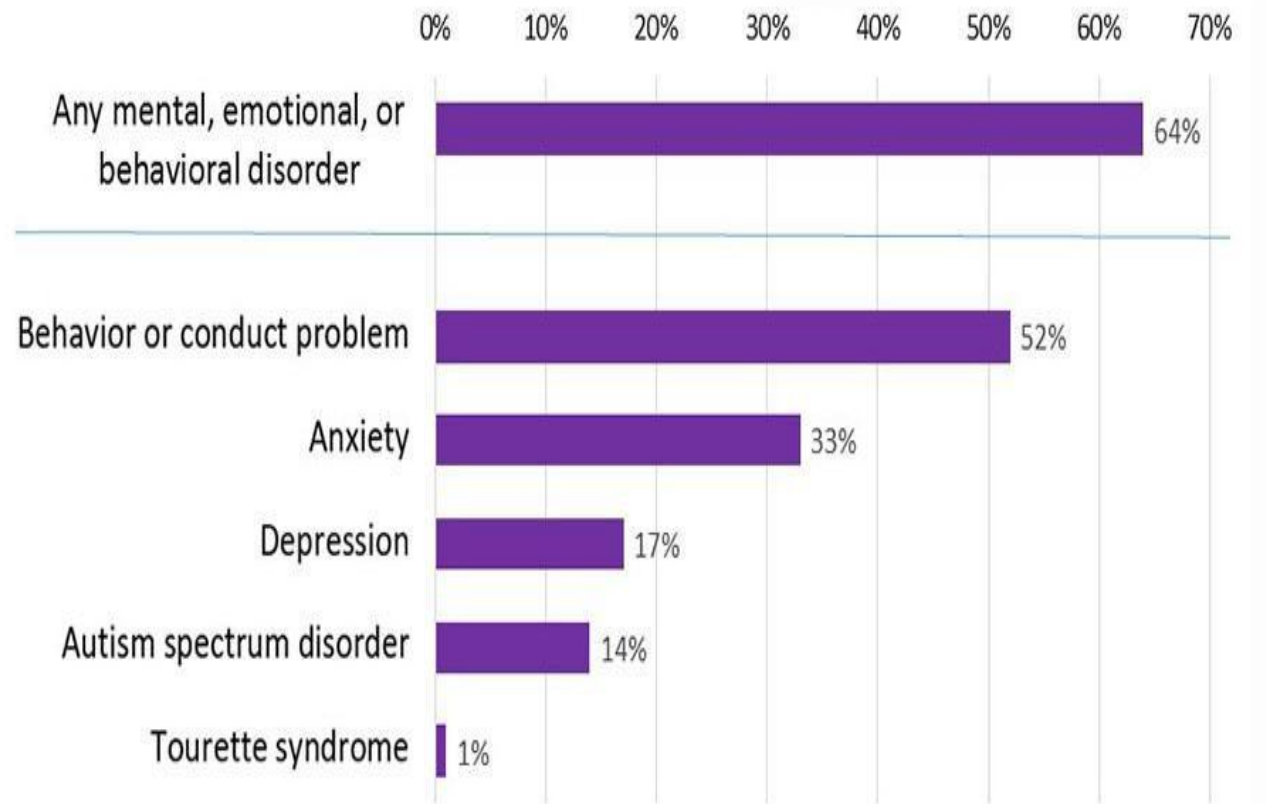
Larson K, et al. Patterns of comorbidity, functioning, and service use for US children with ADHD, 2007. *Pediatrics*. 2011;127(3):462. Epub 2011 Feb 7.


# ADHD Children & Other Disorders

National 2016 parent survey showed 6/10 children with ADHD had at least one other mental, emotional, or behavioral disorder.

- 5/10 children with ADHD had a behavior or conduct problem.
- 3/10 children with ADHD had anxiety.

CDC. Data and Statistics About ADHD. Sept 4, 2020.  
<https://www.cdc.gov/ncbddd/adhd/data.html#:~:text=The%20estimated%20number%20of%20children,children%20aged%206%E2%80%9311%20years.>





# Pathophysiology & Genetics

- Imbalance of catecholamine metabolism in the cerebral cortex
- Genetic basis of ADHD
  - Monozygotic twins 92% concordance, 33% in dizygotic twins
  - Dopamine D2, D4, and D5 receptor genes (*DRD2*, *DRD4*, and *DRD5*)
  - Serotonin transporter genes (*SLC6A3* and *SLC6A4*)
  - Serotonin 1B receptor gene (*HTR1B*)
  - Dopamine beta-hydroxylase gene (*DBH*)
  - Synaptosome associated protein 25 kDa (*SNAP25*)
  - Glutamate receptors, metabotropic (*GRM1*, *GRM5*, *GRM7*, *GRM8*)
- 76% Heritability

Franke B, et al. The genetics of attention deficit/hyperactivity disorder in adults, a review. *Mol Psychiatry*. 2012 Oct;17(10):960-87. Epub 2011 Nov 22.

Pliszka S, et al. Practice parameter for the assessment and treatment of children and adolescents with attention-deficit/hyperactivity disorder. *J Am Acad Child Adolesc Psychiatry*. 2007;46(7):894.

Goodman R & Stevenson J. A twin study of hyperactivity--II. The aetiological role of genes, family relationships and perinatal adversity. *J Child Psychol Psychiatry*. 1989;30(5):691.

Elia J, et al. Rare structural variants found in attention-deficit hyperactivity disorder are preferentially associated with neurodevelopmental genes. *ol Psychiatry*. 2010;15(6):637. Epub 2009 Jun 23.

# Risk Factors



Blood relatives,  
such as a parent  
or sibling, with  
ADHD or  
another mental  
health disorder



Exposure to  
environmental  
toxins —  
such as lead;  
acetaminophen.



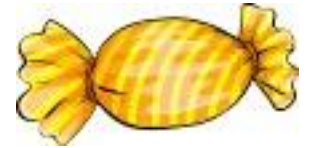
Maternal drug  
use, alcohol use  
or smoking  
during pregnancy



Premature  
birth



Head  
injuries



Food additives,  
artificial colors,  
refined sugar  
and food  
sensitivities

Barrett J.. Diet & Nutrition: Hyperactive Ingredients? Environ Health Perspect. 2007 Dec; 115(12): A578.  
Narad ME, et al. Secondary Attention-Deficit/Hyperactivity Disorder in Children and Adolescents 5 to 10  
Years After Traumatic Brain Injury. JAMA Pediatr. 2018;172(5):437.

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# Adult ADHD

- US 4% 18-44 y/o

Kessler RC, et al. The prevalence and correlates of adult ADHD in the United States: results from the National Comorbidity Survey Replication. Am J Psychiatry. 2006;163(4):716.

- Americas, Europe and Middle East, World Health Organization survey 3.4% of 18-44 y/o
- Comorbidities
  - Mood d/o
  - Anxiety d/o
  - Substance abuse
  - Intermittent explosive d/o
- More ADHD sx, higher association with more comorbid d/o

Fayyad J, et al. Cross-national prevalence and correlates of adult attention-deficit hyperactivity disorder. Br J Psychiatry. 2007;190:402.

# Conventional Treatments



## Behavioral (parent-child)

- ❖ Modifications in the physical and social environment that are designed to change behavior using rewards and nonpunitive consequences.

## School-based interventions

- ❖ Tutoring, classroom modifications, etc.

## Social skills training

## Psychotherapy interventions (child)

- ❖ Directed toward the child (rather than the parent or environment) and designed to change the child's emotional status or thought patterns.

Subcommittee on Attention-Deficit/Hyperactivity Disorder, Steering Committee on Quality Improvement and Management, et al. ADHD: clinical practice guideline for the diagnosis, evaluation, and treatment of attention-deficit/hyperactivity disorder in children and adolescents. *Pediatrics*. 2011;128(5):1007. Epub 2011 Oct 16.

Hoza B. Peer functioning in children with ADHD. *Ambul Pediatr*. 2007;7(1 Suppl):101.



# Pharmacotherapy

Short and Intermediate-acting stimulants

- Methylphenidate, amphetamine

Long-acting stimulants

- Methylphenidate ER

Combo

- Methylphenidate XR, SR

Selective norepinephrine reuptake inhibitor (SNRI)

- Atomoxetine

Alpha-2 adrenergic agonists

- Guanfacine ER



# Contraindications to Stimulants

- Symptomatic CVD
- Moderate to severe hypertension
- Hyperthyroidism
- Known hypersensitivity or idiosyncrasy to sympathomimetic amines
- Motor tics or Tourette syndrome
- Glaucoma
- Agitated states
- Anxiety
- History of drug abuse
- Concurrent use or use within 14 days of the administration of MOA inhibitors

Kaplan G, Newcorn JH. Pharmacotherapy for child and adolescent attention-deficit hyperactivity disorder. *Pediatr Clin North Am.* 2011;58(1):99.





# Common Side Effects

- ↓ Appetite
- Poor growth
- Dizziness
- Insomnia
- Nightmares
- Mood lability
- Rebound
- Tics
- Psychosis
- Anxiety
- Suicidal ideation

Krull K, et al. Attention deficit hyperactivity disorder in children and adolescents: Treatment with medications: Monitoring response and adverse effects. UpToDate This topic last updated: Oct 09, 2019, accessed 10/10/19.



# 2016 Treatment Stats

**3 in 4**

3 in 4 children  
receive  
treatment

**62%**

were taking  
medication

Ages 2–5: 18%  
Ages 6–11: 69%  
Ages 12–17: 62%

**47%**

received behavioral  
treatment

Ages 2–5: 60%  
Ages 6–11: 51%  
Ages 12–17: 42%

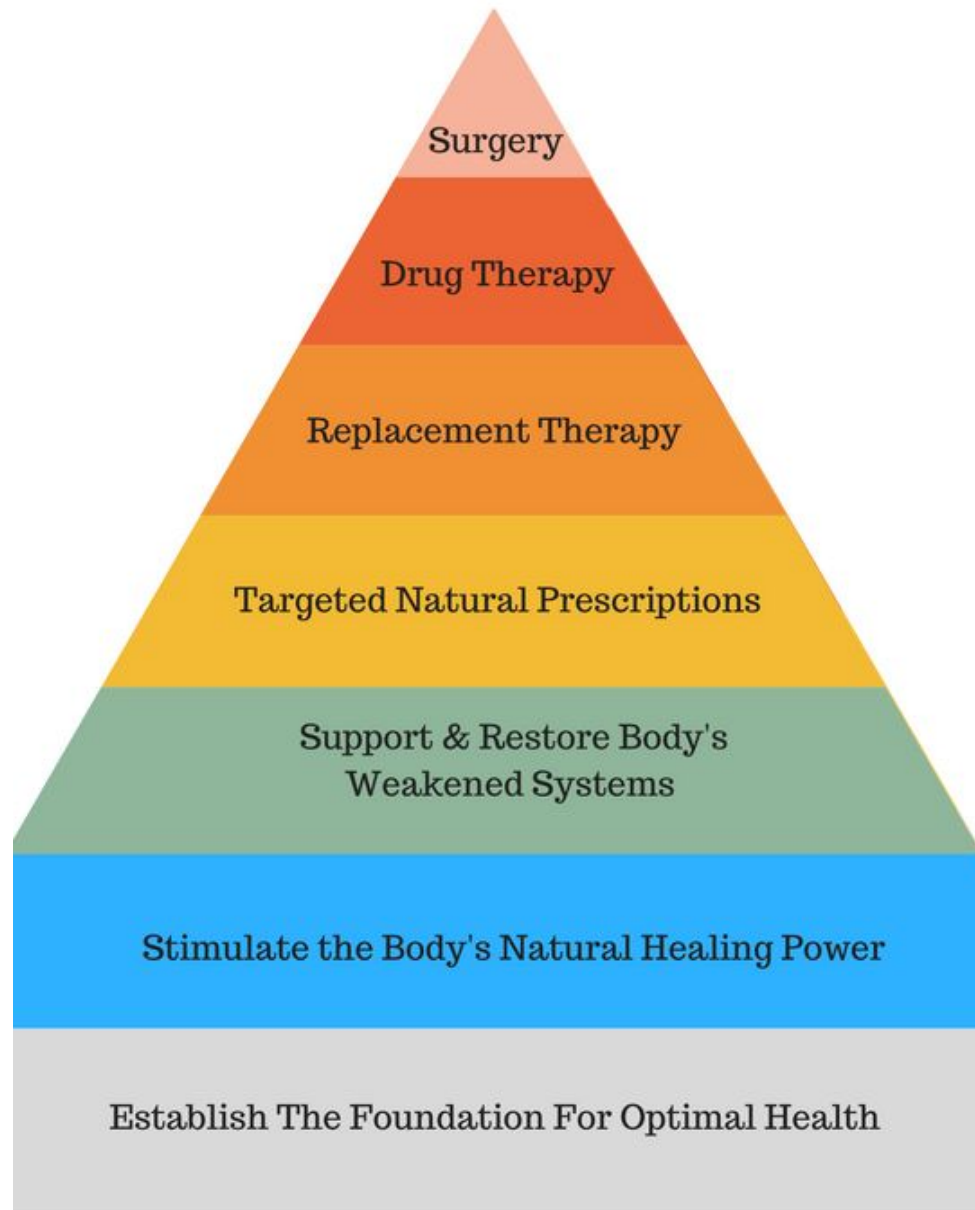
**77%**

Altogether receiving  
treatment.

~30% were treated with medication alone.  
~15% received behavioral treatment alone.  
~32% children with ADHD received both  
medication treatment and behavioral  
treatment.

CDC. Data and Statistics About ADHD. Sept 4, 2020.  
<https://www.cdc.gov/ncbddd/adhd/data.html#:~:text=The%20estimated%20number%20of%20children,children%20aged%206%E2%80%9311%20years.>

# Naturopathic Therapeutic Order



## Naturopathic Approach

- ✓ Environment
- ✓ Diet
- ✓ GI Microbiome
- ✓ Nutrients
  - Zinc 15 mg 1-2 times/day, balance with Copper (15:1 or 10:1)
  - Magnesium: 6 mg/kg of body weight and to bowel tolerance
  - Iron: RDA + 5-10 mg elemental until iron stores replete and ferritin around 75 ng/ml
- ✓ Constitutional Homeopathy
- ✓ EFA's
  - ✓ 1-3 grams daily
- ✓ Botanicals
- ✓ GABA & L-Theanine




# Diet

- ✓ Look to adequate nutritional intake—eat the rainbow.
  - Healthy protein (1.8 gram/kg), vitamins and minerals; stabilize glucose.
- ✓ Removal and avoidance of potential food allergies, intolerances and sensitivities.
- ✓ Avoidance of food additives, artificial colors, refined sugar.





# Dietary Sensitivities and ADHD Symptoms: Thirty-five Years of Research

Clinical Pediatrics  
50(4) 279–293  
© The Author(s) 2011  
Reprints and permission: <http://www.sagepub.com/journalsPermissions.nav>  
DOI: 10.1177/0009922810384728  
<http://clp.sagepub.com>  


Laura J. Stevens, MS<sup>1</sup>, Thomas Kuczek, PhD<sup>1</sup>,  
John R. Burgess, PhD<sup>1</sup>, Elizabeth Hurt, PhD<sup>2</sup>,  
and L. Eugene Arnold, MD<sup>2</sup>

## Abstract

Artificial food colors (AFCs) have not been established as the main cause of attention-deficit hyperactivity disorder (ADHD), but accumulated evidence suggests that a subgroup shows significant symptom improvement when consuming an AFC-free diet and reacts with ADHD-type symptoms on challenge with AFCs. Of children with suspected sensitivities, 65% to 89% reacted when challenged with at least 100 mg of AFC. Oligoantigenic diet studies suggested that some children in addition to being sensitive to AFCs are also sensitive to common nonsalicylate foods (milk, chocolate, soy, eggs, wheat, corn, legumes) as well as salicylate-containing grapes, tomatoes, and orange. Some studies found “cosensitivity” to be more the rule than the exception. Recently, 2 large studies demonstrated behavioral sensitivity to AFCs and benzoate in children both with and without ADHD. A trial elimination diet is appropriate for children who have not responded satisfactorily to conventional treatment or whose parents wish to pursue a dietary investigation.

# Food additives and hyperactive behaviour in 3-year-old and 8/9-year-old children in the community: a randomised, double-blinded, placebo-controlled trial

Donna McCann, Angelina Barrett, Alison Cooper, Debbie Crumpler, Lindy Dalen, Kate Grimshaw, Elizabeth Kitchin, Kris Lok, Lucy Porteous, Emily Prince, Edmund Sonuga-Barke, John O Warner, Jim Stevenson

## Summary

**Background** We undertook a randomised, double-blinded, placebo-controlled, crossover trial to test whether intake of artificial food colour and additives (AFCA) affected childhood behaviour.

**Methods** 153 3-year-old and 144 8/9-year-old children were included in the study. The challenge drink contained sodium benzoate and one of two AFCA mixes (A or B) or a placebo mix. The main outcome measure was a global hyperactivity aggregate (GHA), based on aggregated z-scores of observed behaviours and ratings by teachers and parents, plus, for 8/9-year-old children, a computerised test of attention. This clinical trial is registered with Current Controlled Trials (registration number ISRCTN74481308). Analysis was per protocol.

**Findings** 16 3-year-old children and 14 8/9-year-old children did not complete the study, for reasons unrelated to childhood behaviour. Mix A had a significantly adverse effect compared with placebo in GHA for all 3-year-old children (effect size 0.20 [95% CI 0.01–0.39],  $p=0.044$ ) but not mix B versus placebo. This result persisted when analysis was restricted to 3-year-old children who consumed more than 85% of juice and had no missing data (0.32 [0.05–0.60],  $p=0.02$ ). 8/9-year-old children showed a significantly adverse effect when given mix A (0.12 [0.02–0.23],  $p=0.023$ ) or mix B (0.17 [0.07–0.28],  $p=0.001$ ) when analysis was restricted to those children consuming at least 85% of drinks with no missing data.

**Interpretation** 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.

McCann D, et al.  
Food additives and hyperactive behaviour in 3-year-old and 8/9-year-old children in the community: a randomised, double-blinded, placebo-controlled trial. *Lancet*. 2007 Nov 3;370(9598):1560-7.



# The Diet Factor in Attention-Deficit/Hyperactivity Disorder

## abstract

This article is intended to provide a comprehensive overview of the role of dietary methods for treatment of children with attention-deficit/hyperactivity disorder (ADHD) when pharmacotherapy has proven unsatisfactory or unacceptable. Results of recent research and controlled studies, based on a PubMed search, are emphasized and compared with earlier reports. The recent increase of interest in this form of therapy for ADHD, and especially in the use of omega supplements, significance of iron deficiency, and the avoidance of the “Western pattern” diet, make the discussion timely.

Diets to reduce symptoms associated with ADHD include sugar-restricted, additive/preservative-free, oligoantigenic/elimination, and fatty acid supplements. Omega-3 supplement is the latest dietary treatment with positive reports of efficacy, and interest in the additive-free diet of the 1970s is occasionally revived. A provocative report draws attention to the ADHD-associated “Western-style” diet, high in fat and refined sugars, and the ADHD-free “healthy” diet, containing fiber, folate, and omega-3 fatty acids.

The literature on diets and ADHD, listed by PubMed, is reviewed with emphasis on recent controlled studies. Recommendations for the use of diets are based on current opinion of published reports and our practice experience. Indications for dietary therapy include medication failure, parental or patient preference, iron deficiency, and, when appropriate, change from an ADHD-linked Western diet to an ADHD-free healthy diet. Foods associated with ADHD to be avoided and those not linked with ADHD and preferred are listed.

In practice, additive-free and oligoantigenic/elimination diets are time-consuming and disruptive to the household; they are indicated only in selected patients. Iron and zinc are supplemented in patients with known deficiencies; they may also enhance the effectiveness of stimulant therapy. In patients failing to respond or with parents opposed to medication, omega-3 supplements may warrant a trial. **A greater attention to the education of parents and children in a healthy dietary pattern, omitting items shown to predispose to ADHD, is perhaps the most promising and practical complementary or alternative treatment of ADHD.** *Pediatrics* 2012;129:330–337

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### KEY WORDS

additive-free, attention, behavior, diet, elimination, iron, ketogenic, oligoantigenic, omega-3, pediatric

### ABBREVIATIONS

ADHD—attention-deficit/hyperactivity disorder  
EFA—essential fatty acids  
EPD—enzyme-potentiated desensitization  
IgG—immunoglobulin G  
LC—long chain  
PUFA—polyunsaturated fatty acids

Dr Millichap reviewed the literature; research appropriate articles; and organized, drafted, and revised the manuscript in its final version. Nurse Practitioner Yee assisted in the selection of references, collected the data for the tables, supplements, read the manuscript, and made revision in its final form.

[www.pediatrics.org/cgi/doi/10.1542/peds.2011-2199](http://www.pediatrics.org/cgi/doi/10.1542/peds.2011-2199)

Accepted for publication Oct 5, 2011

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4202). Copyright © 2012 by the American Academy of Pediatrics

**FINANCIAL DISCLOSURE:** The authors have no financial relationships relevant to this article.



# Elimination Diet

- 2009 trial in the journal European Child and Psychiatry involved 27 children w/ ADHD (mean age of 6.2) randomized to a physician supervised elimination diet or control (no intervention).
- After 9 weeks, the children on the elimination diet no longer met the DSM-IV criteria for ADHD.
- Comorbid symptoms of oppositional defiant disorder also showed a significantly greater decrease in the intervention group than it did in the control



Conclusion: "A strictly supervised elimination diet may be a valuable instrument in testing young children with ADHD on whether dietary factors may contribute to the manifestation of the disorder and may have a beneficial effect on the children's behaviour."

Pelsser LM, et al. A randomised controlled trial into the effects of food on ADHD. Eur Child Adolesc Psychiatry. 2009 Jan;18(1):12-9.

# What about Gluten & Dairy?


- More anecdotal (clinical observation) than controlled trials.
- Better evidence in ASD
- Some evidence that peptides (gliadorphins & casomorphins) from these foods, specifically gluten, and gliadin can act like opiates in the body.
  - Rationale? Lack of enzymes in the small intestine to break these down properly and the ability to cross into the brain and activate opioid receptors.
- Niederhofer H. Association of attention-deficit/hyperactivity disorder and celiac disease: a brief report. Prim Care Companion CNS Disord. 2011;13(3). pii: PCC.10br01104.
- Khatoon H and Najam R. Chapter 29 - Bioactive Components in Camel Milk: Their Nutritive Value and Therapeutic Application. Nutrients in Dairy and their Implications on Health and Disease. 2017, Pages 377-387.





Review

# The Potential Influence of the Bacterial Microbiome on the Development and Progression of ADHD

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Received: 15 October 2019; Accepted: 13 November 2019; Published: 17 November 2019



**Abstract:** The latest research cumulates staggering information about the correlation between the microbiota-gut-brain axis and neurodevelopmental disorders. This review aims to shed light on the potential influence of the microbiome on the development of the most prevalent neurodevelopmental disease, attention-deficit-hyperactive disorder (ADHD). As the etiology and pathophysiology of ADHD are still unclear, finding viable biomarkers and effective treatment still represent a challenge. Therefore, we focused on factors that have been associated with a higher risk of developing ADHD, while simultaneously influencing the microbial composition. We reviewed the effect of a differing microbial makeup on neurotransmitter concentrations important in the pathophysiology of ADHD. Additionally, we deduced factors that correlate with a high prevalence of ADHD, while simultaneously affecting the gut microbiome, such as emergency c-sections, and premature birth as the former leads to a decrease of the gut microbial diversity and the latter causes neuroprotective *Lactobacillus* levels to be reduced. Also, we assessed nutritional influences, such as breastfeeding, ingestion of short-chain fatty acids (SCFAs) and polyunsaturated fatty acids (PUFAs) on the host's microbiome and development of ADHD. Finally, we discussed the potential significance of *Bifidobacterium* as a biomarker for ADHD, the importance of preventing premature birth as prophylaxis and nutrition as a prospective therapeutic measurement against ADHD.



A small, dark amber glass bottle with a black, ribbed screw cap is centered in the image. The bottle is surrounded by a dense layer of dried lavender flowers, which are small and light purple. The background is a light, neutral color, possibly white or light gray, which makes the lavender and the bottle stand out. The overall composition is simple and clean, focusing on the natural elements of homeopathy.

# Homeopathy



# Treatment for hyperactive children: homeopathy and methylphenidate compared in a family setting

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<sup>1</sup>Spezialarzt FMH für Kinder und Jugendliche, FA Homöopathie SVHA, Laupen, Switzerland; and <sup>2</sup>University of Berne, Switzerland

The sharp increase of the prescription of methylphenidate (MPD) in hyperactive children in recent years is a matter of increasing uneasiness among professionals, parents and politicians. There is little awareness of treatment alternatives. The purpose of this prospective trial was to assess the efficacy of homeopathy in hyperactive patients and to compare it MPD. The study was performed in a paediatric practice with conventional and homeopathic backgrounds. Children aged 3–17 y, conforming to the DSM-IV criteria for attention deficit hyperactivity disorder (ADHD) with a Conners Global Index (CGI) of 14 or higher were eligible for the study. All of them received an individual homeopathic treatment. When clinical improvement reached 50%, the parents were asked to reevaluate the symptoms. Those who did not improve sufficiently on homeopathy were changed to MPD, and again evaluated after 3 months. One hundred and fifteen children (92 boys, 23 girls) with a mean age of 8.3 y at diagnosis were included in the study. Prior to treatment the mean CGI was 20.63 (14–30), the mean index of the homeopathy group 20.52 and of the MPD-group 20.94. After an average treatment time of 3.5 months 86 children (75%) had responded to homeopathy, reaching a clinical improvement rating of 73% and an amelioration of the CGI of 55%. Twenty-five children (22%) needed MPD; the average duration of homeopathic (pre-) treatment in this group was 22 months. Clinical improvement under MPD reached 65%, the lowering of the CGI 48%. Three children did not respond to homeopathy nor to MPD, and one left the study. In cases where treatment of a hyperactive child is not urgent, homeopathy is a valuable alternative to MPD. The reported results of homeopathic treatment appear to be similar to the effects of MPD. Only children who did not reach the high level of sensory integration for school had to be changed to MPD. In preschoolers, homeopathy appears a particularly useful treatment for ADHD. *British Homeopathic Journal* (2001) 90, 183–188.



"The results of our meta-analysis are not compatible with the hypothesis that the clinical effects of homeopathy are completely due to placebo."

Linde K, et al. Are the clinical effects of homoeopathy placebo effects? A meta-analysis of placebo-controlled trials. Lancet. 1997 Sep 20;350(9081):834-43.



# *Best Placebo, Ever!*

## The New England Journal of Medicine

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**VOLUME 347**

**JULY 11, 2002**

**NUMBER 2**



### A CONTROLLED TRIAL OF ARTHROSCOPIC SURGERY FOR OSTEOARTHRITIS OF THE KNEE

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BARUCH A. BRODY, PH.D., DAVID H. KUYKENDALL, PH.D., JOHN C. HOLLINGSWORTH, DR.P.H.,  
CAROL M. ASHTON, M.D., M.P.H., AND NELDA P. WRAY, M.D., M.P.H.

## ABSTRACT

**Background** Many patients report symptomatic relief after undergoing arthroscopy of the knee for osteoarthritis, but it is unclear how the procedure achieves this result. We conducted a randomized, placebo-controlled trial to evaluate the efficacy of arthroscopy for osteoarthritis of the knee.

**Methods** A total of 180 patients with osteoarthritis of the knee were randomly assigned to receive arthroscopic débridement, arthroscopic lavage, or placebo surgery. Patients in the placebo group received skin incisions and underwent a simulated débridement without insertion of the arthroscope. Patients and assessors of outcome were blinded to the treatment-group assignment. Outcomes were assessed at multiple points over a 24-month period with the use of five self-reported scores — three on scales for pain and two on scales for function — and one objective test of walking and stair climbing. A total of 165 patients completed the trial.

**Results** At no point did either of the intervention groups report less pain or better function than the placebo group. For example, mean ( $\pm$ SD) scores on the Knee-Specific Pain Scale (range, 0 to 100, with higher scores indicating more severe pain) were similar in the placebo, lavage, and débridement groups:  $48.9 \pm 21.9$ ,  $54.8 \pm 19.8$ , and  $51.7 \pm 22.4$ , respectively, at one year ( $P=0.14$  for the comparison between placebo and lavage;  $P=0.51$  for the comparison between placebo and débridement) and  $51.6 \pm 23.7$ ,  $53.7 \pm 23.7$ , and  $51.4 \pm 23.2$ , respectively, at two years ( $P=0.64$  and  $P=0.96$ , respectively). Furthermore, the 95 percent confidence intervals for the differences between the placebo group and the intervention groups exclude any clinically meaningful difference.

**Conclusions** In this controlled trial involving patients with osteoarthritis of the knee, the outcomes after arthroscopic lavage or arthroscopic débridement were no better than those after a placebo procedure.



# Common ADHD Homeopathic Remedies

Sulphur

Phosphorus

Lycopodium

Medorrhinum

Tuberculinum

Stramonium

Veratrum album

Tarentula hispanica

[www.bornintegrativemedicine.co](http://www.bornintegrativemedicine.com)

m







# Nutrients





# Iron def □ linked to insomnia, low IQ and attention problems.

- Konofal, E. "Impact of Restless Legs Syndrome and Iron Deficiency on Attention-deficit/hyperactivity Disorder in Children." *Sleep Medicine* 8.7-8 (2007): 711-15.
- Konofal, E. "Effects of Iron Supplementation on Attention Deficit Hyperactivity Disorder in Children." *Pediatr Neurol.* 38.1 (2008): 20-26.
- Konofal, E. "Iron Deficiency in Children with Attention-deficit/hyperactivity Disorder." *Arch Pediatr Adolesc Med.* 158.12 (2004): 1113-115.
- Lahat, E. "Iron Deficiency in Children with Attention-Deficit/Hyperactivity Disorder." *IMAJ* 13.9 (2011): 530-3.



# Magnesium def □hyperactivity

- Koziol, T. "Assessment of Magnesium Levels in Children with Attention Deficit Hyperactivity Disorder (ADHD)." *Magnesium Research* 10.2 (2007): 143-48.
- Mousain-Bosc, M. "Improvement of Neurobehavioral Disorders in Children Supplemented with Magnesium-vitamin B6. I. Attention Deficit Hyperactivity Disorders." *Magnesium Research* 19.1 (2006): 53-62.
- Starobrat-Hermelin, B. "The Effects of Magnesium Physiological Supplementation on Hyperactivity in Children with Attention Deficit Hyperactivity Disorder (ADHD). Positive Response to Magnesium Oral Loading Test." *Magnesium Research* 10.2 (1997): 149-56.





## Zinc def □ inattention Supplementation may enhance some Rx

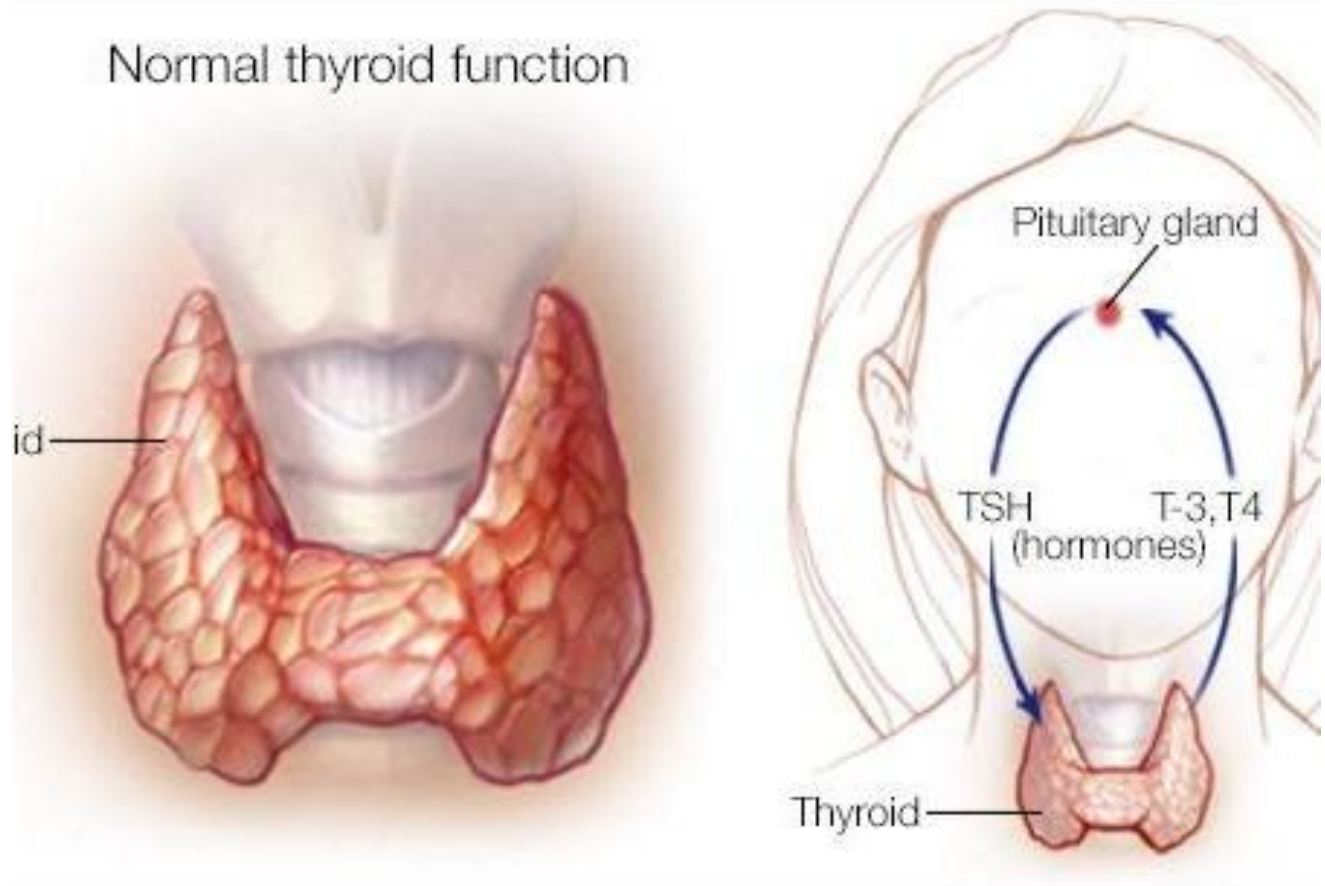
- Arnold, LE. "Serum Zinc Correlates with Parent- and Teacher- Rated Inattention in Children with Attention-deficit/hyperactivity Disorder." J Child Adolesc Psychopharmacol. 15.4 (2005): 628-36.
- Bekaroğlu, M. "Relationships between Serum Free Fatty Acids and Zinc, and Attention Deficit Hyperactivity Disorder: A Research Note." J Child Psychol Psychiatry. 37.2 (1996): 225-27.
- Dodig-Curković, K. "The Role of Zinc in the Treatment of Hyperactivity Disorder in Children." Acta Med Croatica. 63.4 (2009): 307-13.

# Hypothyroid

Developmental delay  
and inattention.

Bradstreet, JJ. "Biomarker-guided Interventions of Clinically Relevant Conditions Associated with Autism Spectrum Disorders and Attention Deficit Hyperactivity Disorder." *Altern Med Rev* 15.1 (2010): 15-32.

Weiss, RE. "Attention-deficit Hyperactivity Disorder and Thyroid Function." *Journal of Pediatrics* 123.4 (1993): 539-45.





# Essential Fatty Acids

1-3 Grams Daily





## Omega-3 fatty acid status in attention-deficit/hyperactivity disorder

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<sup>c</sup>Department of Chemistry, Indiana University-Purdue University, Fort Wayne, IN, USA

### Abstract

Lower levels of long-chain polyunsaturated fatty acids, particularly omega-3 fatty acids, in blood have repeatedly been associated with a variety of behavioral disorders including attention-deficit/hyperactivity disorder (ADHD). The exact nature of this relationship is not yet clear. We have studied children with ADHD who exhibited skin and thirst symptoms classically associated with essential fatty acid (EFA) deficiency, altered plasma and red blood cell fatty acid profiles, and dietary intake patterns that do not differ significantly from controls. This led us to focus on a potential metabolic insufficiency as the cause for the altered fatty acid phenotype. Here we review previous work and present new data expanding our observations into the young adult population. The frequency of thirst and skin symptoms was greater in newly diagnosed individuals with ADHD ( $n = 35$ ) versus control individuals without behavioral problems ( $n = 112$ ) drawn from the Purdue student population. A follow up case-control study with participants willing to provide a blood sample, a urine sample, a questionnaire about their general health, and dietary intake records was conducted with balancing based on gender, age, body mass index, smoking and ethnicity. A number of biochemical measures were analyzed including status markers for several nutrients and antioxidants, markers of oxidative stress, inflammation markers, and fatty acid profiles in the blood. The proportion of omega-3 fatty acids was found to be significantly lower in plasma phospholipids and erythrocytes in the ADHD group versus controls whereas saturated fatty acid proportions were higher. Intake of saturated fat was 30% higher in the ADHD group, but intake of all other nutrients was not different. Surprisingly, no evidence of elevated oxidative stress was found based on analysis of blood and urine samples. Indeed, serum ferritin, magnesium, and ascorbate concentrations were higher in the ADHD group, but iron, zinc, and vitamin B6 were not different. Our brief survey of biochemical and nutritional parameters did not give us any insight into the etiology of lower omega-3 fatty acids, but considering the consistency of the observation in multiple ADHD populations continued research in this field is encouraged.

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# Omega-3 Fatty Acid Supplementation for the Treatment of Children With Attention-Deficit/Hyperactivity Disorder Symptomatology: Systematic Review and Meta-Analysis

Michael H. Bloch, M.D., M.S., AND Ahmad Qawasmi, M.D.

**Objective:** Several studies have demonstrated differences in omega-3 fatty acid composition in plasma and in erythrocyte membranes in patients with attention-deficit/hyperactivity disorder (ADHD) compared with unaffected controls. Omega-3 fatty acids have anti-inflammatory properties and can alter central nervous system cell membrane fluidity and phospholipid composition. Cell membrane fluidity can alter serotonin and dopamine neurotransmission. The goal of this meta-analysis was to examine the efficacy of omega-3 fatty acid supplementation in children with ADHD. **Method:** PubMed was searched for randomized placebo-controlled trials examining omega-3 fatty acid supplementation in children with ADHD symptomatology. The primary outcome measurement was standardized mean difference in rating scales of ADHD severity. Secondary analyses were conducted to determine the effects of dosing of different omega-3 fatty acids in supplements. **Results:** Ten trials involving 699 children were included in this meta-analysis. Omega-3 fatty acid supplementation demonstrated a small but significant effect in improving ADHD symptoms. Eicosapentaenoic acid dose within supplements was significantly correlated with supplement efficacy. No evidence of publication bias or heterogeneity between trials was found. **Conclusion:** Omega-3 fatty acid supplementation, particularly with higher doses of eicosapentaenoic acid, was modestly effective in the treatment of ADHD. The relative efficacy of omega-3 fatty acid supplementation was modest compared with currently available pharmacotherapies for ADHD such as psychostimulants, atomoxetine, or  $\alpha_2$  agonists. However, given its relatively benign side-effect profile and evidence of modest efficacy, it may be reasonable to use omega-3 fatty supplementation to augment traditional pharmacologic interventions or for families who decline other psychopharmacologic options. *J. Am. Acad. Child Adolesc. Psychiatry*, 2011;50(10):991–1000. **Key Words:** attention-deficit disorder with hyperactivity, polyunsaturated fatty acids, omega-3 fatty acids, eicosapentaenoic acid, meta-analysis



## A randomized double-blind, placebo-controlled study of the effects of supplementation with highly unsaturated fatty acids on ADHD-related symptoms in children with specific learning difficulties

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<sup>b</sup>MRI Unit, MRC Clinical Sciences Centre, Imperial College School of Medicine, Hammersmith Hospital, Du Cane Road, London W12 0HS, England, UK

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### Abstract

(1) The authors tested the prediction that relative deficiencies in highly unsaturated fatty acids (HUFAs) may underlie some of the behavioral and learning problems associated with attention-deficit/hyperactivity disorder (ADHD) by studying the effects of HUFA supplementation on ADHD-related symptoms in children with specific learning difficulties (mainly dyslexia) who also showed ADHD features. (2) Forty-one children aged 8–12 years with both specific learning difficulties and above-average ADHD ratings were randomly allocated to HUFA supplementation or placebo for 12 weeks. (3) At both baseline and follow-up, a range of behavioral and learning problems associated with ADHD was assessed using standardized parent rating scales. (4) At baseline, the groups did not differ, but after 12 weeks mean scores for cognitive problems and general behavior problems were significantly lower for the group treated with HUFA than for the placebo group; there were significant improvements from baseline on 7 out of 14 scales for active treatment, compared with none for placebo. Group differences in change scores all favored HUFA, reaching conventional significance levels for 3 out of 14 scales. (5) HUFA supplementation appears to reduce ADHD-related symptoms in children with specific learning difficulties. Given the safety and tolerability of this simple treatment, results from this pilot study strongly support the case for further investigations. © 2001 Elsevier Science Inc. All rights reserved.

# Botanical Medicines





# *Bacopa monnieri* (Bacopa)

- Medicinal parts: leaf, flower, stem, and root
  - 250-600 mg daily, standardized to  $\geq 50\%$  bacosides
- Significant improvement in cognitive and memory function and decreased hyperactivity and attention deficit.
  - Kean JD, et al. A systematic review of the Ayurvedic medicinal herb Bacopa monnieri in child and adolescent populations. Complement Ther Med. 2016 Dec;29:56-62.
- MOA via bacoside triterpenoid saponins.
  - Nootropic, restores cholinergic function, modulates GABA and/or serotonin levels, reduces  $\beta$ -amyloid levels, reduces free radical damage, alters brain stress hormone levels, and decreases neuroinflammation.

Rastogi M, et al. Prevention of age associated neurodegeneration and promotion of healthy brain ageing in female Wistar rats by long term use of bacosides. Biogerontology 2012;13:183–195.

Kamkaew N, et al. Bacopa monnieri increases cerebral blood flow in rat independent of blood pressure. Phytother Res 2013;27:135–138.

Rastogi M, et al. Amelioration of age associated neuroinflammation on long term bacosides treatment. Neurochem Res 2012; 37:869–874.

Kean JD, et al. Systematic Overview of Bacopa monnieri (L.) Wettst. Dominant Poly-Herbal Formulas in Children and Adolescents. Medicines (Basel). 2017 Nov 22;4(4):86.





# *Centella asiatica* (Gotu kola)

- ❑ Medicinal parts: leaves, flowers, stems, and roots.
- ❑ Nootropic effects via triterpenoid saponins (asiaticoside, asiatic acid, madecassoside, and madecassic acid).
- ❑ No efficacy studies in ADHD as a standalone, but effective in formulas
  - Dose 75-200 mg daily
- ❑ Positive studies in elder adults
  - Improves cognition, memory, mood and impulse control (750 mg)
- ❑ Anxiolytic

Wattanathorn J, et al. Positive modulation of cognition and mood in the healthy elderly volunteer following the administration of Centella asiatica. J Ethnopharmacol 2008;116:325–332.

Puttarak P, et al. Effects of Centella asiatica (L.) Urb. on cognitive function and mood related outcomes: A Systematic Review and Meta-analysis. Sci Rep. 2017 Sep 6;7(1):10646.

Katz M, et al. A compound herbal preparation (CHP) in the treatment of children with ADHD: a randomized controlled trial. J Atten Disord. 2010 Nov;14(3):281-91.



# *Crocus sativus* L. Versus Methylphenidate in Treatment of Children with Attention-Deficit/Hyperactivity Disorder: A Randomized, Double-Blind Pilot Study

Sara Baziar, MD,<sup>1,\*</sup> Ali Aqamolaei, MD,<sup>1,\*</sup> Ebrahim Khadem, PhD,<sup>2</sup> Seyyed Hosein Mortazavi, MD,<sup>1</sup> Sina Naderi, MD,<sup>1</sup> Erfan Sahebolzamani, MD,<sup>1</sup> Amirhosein Mortezaei, MD,<sup>1</sup> Shakiba Jalilevand, MD,<sup>1</sup> Mohammad-Reza Mohammadi, MD,<sup>1</sup> Mahsa Shahmirzadi, PharmD,<sup>1</sup> and Shahin Akhondzadeh, PhD<sup>1</sup>

## Abstract

**Objective:** Attention-deficit/hyperactivity disorder (ADHD) is one of the most common neuropsychiatric disorders of childhood and adolescence. About 30% of patients do not respond to stimulants or cannot tolerate their side effects. Thus, alternative medication, like herbal medicine, should be considered. The aim of this trial is to compare the safety and efficacy of *Crocus sativus* (saffron) versus methylphenidate in improving symptoms of children with ADHD.

**Methods:** In a 6-week randomized double-blind study, 54 patients (children 6–17 years old) with a Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) diagnosis of ADHD were randomly assigned to receive either 20–30 mg/d (20 mg/d for <30 kg and 30 mg/d for >30 kg) methylphenidate (MPH) or 20–30 mg/d saffron capsules depending on weight (20 mg/d for <30 kg and 30 mg/d for >30 kg). Symptoms were assessed using the Teacher and Parent Attention-Deficit/Hyperactivity Disorder Rating Scale-IV (ADHD-RS-IV) at baseline and weeks 3 and 6.

**Results:** Fifty patients completed the trial. General linear model repeated measures showed no significant difference between the two groups on Parent and Teacher Rating Scale scores ( $F=0.749$ ,  $df=1.317$ ,  $p=0.425$ , and  $F=0.249$ ,  $df=1.410$ ,  $p=0.701$ , respectively). Changes in Teacher and Parent ADHD Rating Scale scores from baseline to the study end were not significantly different between the saffron group and the MPH group ( $p=0.731$  and  $p=0.883$ , respectively). The frequency of adverse effects was similar between saffron and MPH groups.

**Conclusion:** Short-term therapy with saffron capsule showed the same efficacy compared with methylphenidate. Nevertheless, larger controlled studies with longer treatment periods are necessary for future studies.



# *Ginkgo biloba* (Ginkgo) leaf

20-240 mg daily, standardized to 24% flavone glycosides, 6% terpene lactones.

## MOA

- Inhibit toxicity and cell death induced by beta-amyloid peptide. Influences cholinergic system. (-) COMT. ↑brain alpha-adrenoreceptors
- COMT is important in the prefrontal cortex, which is involved with personality, planning, inhibition of behaviors, abstract thinking, emotion, and working (short-term) memory.

Uebel-von Sandersleben H, Rothenberger A, Albrecht B, et al. Ginkgo biloba extract EGb 761® in children with ADHD. *Z Kinder Jugendpsychiatr Psychother* 2014;42:337–347.

Shakibaei F, Radmanesh M, Salari E, Mahaki B. Ginkgo biloba in the treatment of attention-deficit/hyperactivity disorder in children and adolescents. A randomized, placebo-controlled, trial. *Complement Ther Clin Pract* 2015;21:61–67.

Salehi B, Imani R, Mohammadi MR, et al. Ginkgo biloba for attention-deficit/hyperactivity disorder in children and adolescents: A double blind, randomized controlled trial. *Prog Neuropsychopharmacol Biol Psychiatry* 2010;34:76–80.

Ernst E & Pittler MH. Ginkgo biloba for dementia: a systematic review of double-blind, placebo-controlled trials. *Clin Drug Investig*. 1999;17:301-308.

<https://ghr.nlm.nih.gov/gene/COMT>





# *Pinus pinaster* (French Maritime Pine) bark

A bioflavonoid extract from the pine bark

1 mg/kg has been shown to be effective:

- ↓ hyperactivity
- Improve attention
- Improve visual-motoric coordination and concentration

MOA unknown

- Theorized to improve DNA damage

Chovanová Z, et al. Effect of polyphenolic extract, Pycnogenol, on the level of 8-oxoguanine in children suffering from attention deficit/hyperactivity disorder. Free Radic Res. 2006 Sep;40(9):1003-10.

Trebatická J, et al. Treatment of ADHD with French maritime pine bark extract, Pycnogenol. Eur Child Adolesc Psychiatry. 2006 Sep;15(6):329-35.

Dvoráková M, et al. Urinary catecholamines in children with attention deficit hyperactivity disorder (ADHD): modulation by a polyphenolic extract from pine bark (pycnogenol). Nutr Neurosci. 2007 Jun-Aug;10(3-4):151-7.

Dvoráková M, et al. The effect of polyphenolic extract from pine bark, Pycnogenol on the level of glutathione in children suffering from attention deficit hyperactivity disorder (ADHD). Redox Rep. 2006;11(4):163-72.





# Herbs for Attention-Deficit/Hyperactivity Disorder

Eric Yarnell, ND, RH (AHG)

## Abstract

Nootropic herbs can be very helpful in people with attention-deficient/hyperactivity disorder (ADHD). Two herbs both called *brahmi* in the Ayurvedic tradition, *Bacopa monnieri* (bacopa) and *Centella asiatica* (gotu kola), as well as formulas featuring these herbs, are discussed in great depth for this purpose. Additional general nootropic herbs discussed are *Ginkgo biloba* (ginkgo) and *Acorus calamus* (sweetflag), including both American and Eurasian varieties. Nootropic herbs from the Lamiaceae (mint) family with a focus on *Rosmarinus officinalis* (rosemary) and various species of *Salvia* (sage) are also reviewed. The general failure of nervine herbs such as *Hypericum perforatum* (St. John's wort) and *Valeriana officinalis* (valerian) for ADHD is highlighted, giving further impetus for the need to focus on nootropic herbs instead. The safety and clinical use of all relevant herbs is highlighted.

**Keywords:** attention-deficit/hyperactivity disorder, herbal medicine, nootropic

## Introduction

Attention-deficit/hyperactivity disorder (ADHD) is a fairly self-explanatory though controversial condition. According to the *Diagnostic and Statistical Manual IV*, it requires the presence of six or more of a list of symptoms of inattention and/or hyperactivity/impulsivity for at least six months (with onset prior to seven years of age), with these symptoms being more severe than that of peers at a similar developmental age. The symptoms result in impaired function in two or more settings (home, school, and/or work). The *Diagnostic and Statistical Manual V* broadened the diagnosis, saying symptoms only had to be present prior to 12 years of age, thus opening the diagnosis to adolescents and adults, and requiring only five or more symptoms of inattention or hyperactivity/impulsivity to be present for diagnosis. It now requires impairment in only one setting, and adds mild, moderate, and severe categories based on degree of dysfunction, as well as specifying three subtypes: predominantly inattentive, predominantly hyperactive-impulsive, and combined.

As with most mental health conditions, there is no gold standard test available against which to compare these criteria to determine if they are accurate. Though studies have been done to validate the criteria, the ongoing problem of what to validate them in relation to remains a sticking point.<sup>1</sup> In the real world, diagnoses are often made relatively quickly, particularly without ruling out complicating diagnoses such as learning disabilities, posttraumatic stress, and anxiety. The extremely variable rates of diagnosis of ADHD between U.S. states, ranging from a low of 4.2% in Nevada to a high of 14.8% in Kentucky, raise questions about the accuracy of diagnoses.<sup>2</sup> Studies around the world documenting that younger children within a grade cohort are far more likely to be diagnosed than older children suggests a fair number of relatively immature children are being inappropriately diagnosed with ADHD.<sup>3-5</sup> Even more troubling is ample evidence that pharmaceutical companies selling medications for ADHD have used various nefarious means to drive over-diagnosis and over-treatment.<sup>6,7</sup>

This article will focus on treating those children and adults who truly have ADHD. Large, carefully conducted surveys in predominantly white and predominantly African American children in North Carolina suggest a prevalence of ADHD of 1-3% (with significantly more boys than girls being affected).<sup>8,9</sup> This group may benefit from stimulant medications, which work, it is believed, primarily by affecting dopamine metabolism in the central nervous system and not because they are stimulants. However, following the naturopathic principle of using the least force necessary, starting with safer options including herbal medicines is reasonable. Medications can always be prescribed later if herbs or other low-force options do not work. Dietary changes and nutrient therapies, such as hypoallergenic diets and omega 3 fatty acids, also play an important role in helping many people with ADHD, but are beyond the scope of this article.<sup>10,11</sup>

## Nootropic Herbs: The Brahmis

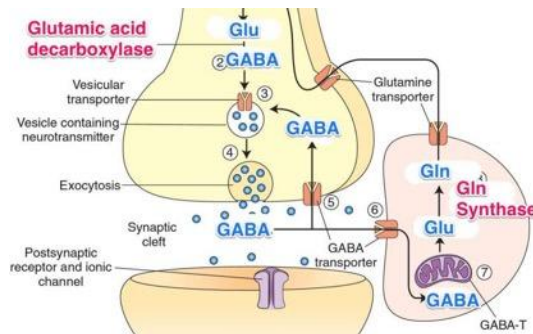
The primary herbal treatments for ADHD are nootropics. These are herbs that enhance cognitive function and memory, though they appear generally to have other beneficial effects, including supporting nerve regeneration and growth. Many clinicians reach first for nervine herbs (those that calm the nervous system), but generally these are not nearly as effective,



# GABA & L-Theanine

## GABA ( $\gamma$ -aminobutyric acid)

- Inhibitory neurotransmitter
- Evidence also suggests a deficit in cortical inhibition via the GABAergic system.
  - Edden RA, et al. Reduced GABA Concentration in Attention-Deficit/Hyperactivity Disorder. Arch Gen Psychiatry. 2012;69(7):750-753.
- 100-2000 mg daily\*



## L-Theanine

200 mg orally twice daily

- Increases the % of time spent in restful sleep & decreases the number of bouts of nocturnal motor activity.

Lyon MR, et al. The effects of L-theanine (Suntheanine®) on objective sleep quality in boys with attention deficit hyperactivity disorder (ADHD): a randomized, double-blind, placebo-controlled clinical trial. Altern Med Rev. 2011;16(4):348-354.



# ENDEAVOR



## Sign of the Times

EndeavorRx™ is the first-and-only FDA cleared prescription treatment for attention in children with ADHD delivered through a digital therapy (video game experience).

Indicated to improve attention function as measured by computer-based testing in children ages 8-12 years old with primarily inattentive or combined-type ADHD.

<https://www.endeavorrx.com/>



# Endeavor: How Does it Work?

Evaluated in over 600 children with ADHD across 5 clinical studies, the EndeavorRx treatment uses sensory stimuli and simultaneous motor challenges designed to target areas of the brain that play a key role in attention function.

- STARS-ADHD Pivotal Study: Kollins et al, Lancet Digital Health, 2020. STARS-Adjunctive Study: Data on File, Akili, 2020. (manuscript in progress). Proof of concept study: Davis et al, PLOS One, 2018. Pilot studies: Anguera et al., PLOS One, 2017. Yerys et al., J Autism Dev Disord, 2019.

The goal is for the child to successfully navigate their character through a course while collecting targets and avoiding bumping into obstacles. These actions require focus and flexibility to manage multiple tasks at the same time.

- ✓ Frustration 6.1%
- ✓ Headache 1.3%
- ✓ Dizziness 0.6%
- ✓ Emotional reaction 0.4%
- ✓ Nausea 0.4%
- ✓ Aggression 0.2%



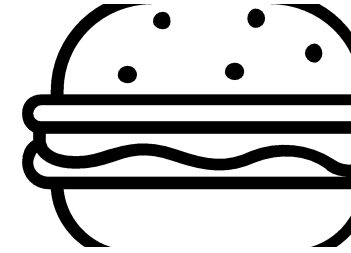
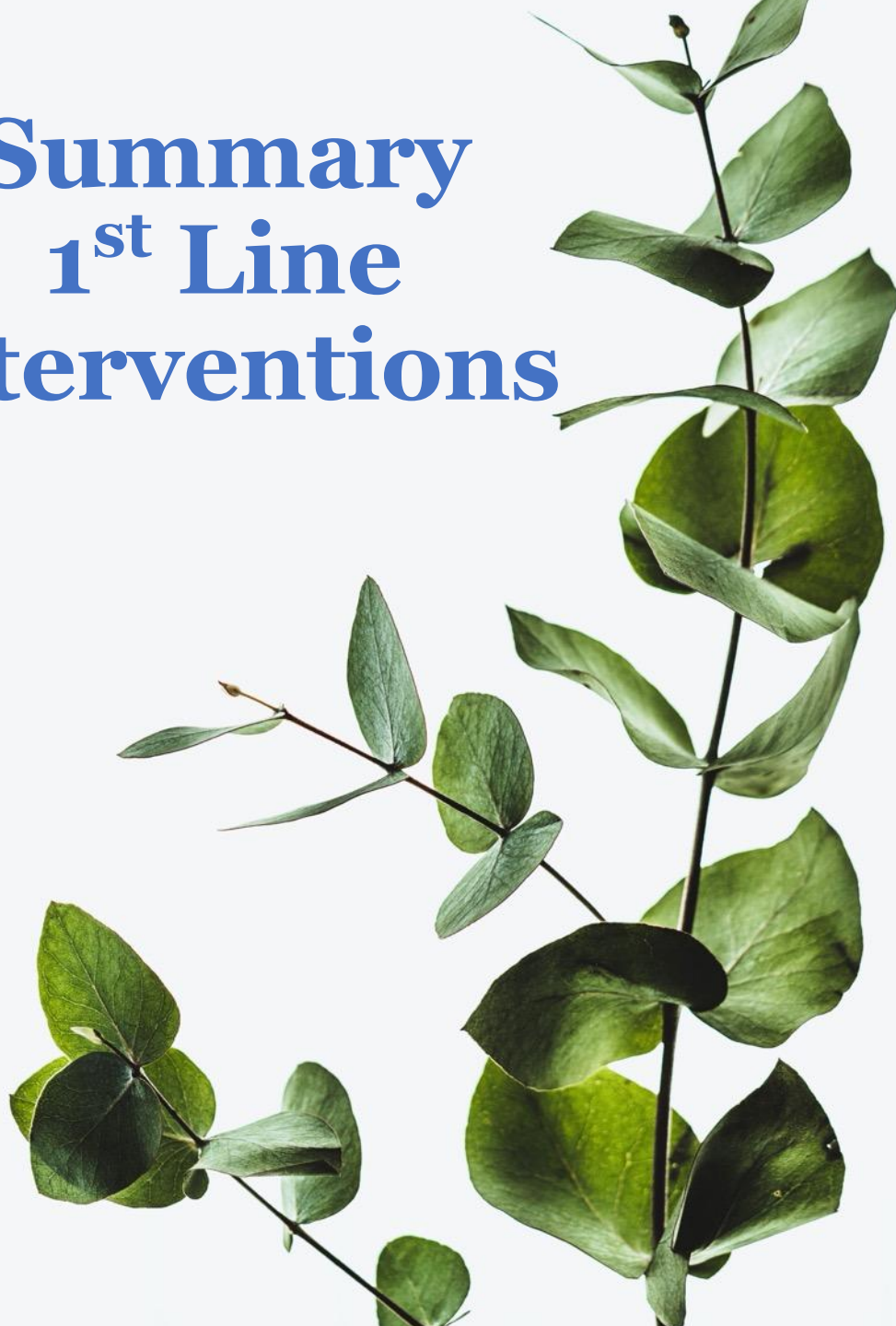
STARS-ADHD Pivotal Study: Kollins et al, Lancet Digital Health, 2020. STARS-Adjunctive Study: Data on File, Akili, 2020. (manuscript in progress). Proof of concept study: Davis et al, PLOS One, 2018. Pilot studies: Anguera et al., PLOS One, 2017. Yerys et al., J Autism Dev Disord, 2019.

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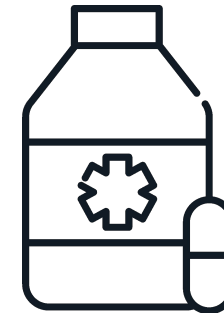


# Summary 1<sup>st</sup> Line Interventions



## Discuss Diet

Very least, remove ALL artificial flavorings, colors and additives



Constitutional homeopathic



# Summary 2<sup>nd</sup> Line Interventions

High quality MVM

High quality fish oil

High quality probiotic





# Summary

## 3rd Line Interventions



### Botanicals

- *Nootropics* (mint family, Bacopa, Gotu kola...)
- *Anxiolytics/Nervines* (Passionflower, Chamomile, Kava, Lavender, Lemon balm...)
- *Non-stimulating Adaptogens* (American ginseng, Ashwagandha, Holy Basil, Rhodiola...)

### Blood tests

### Neuro-psych eval

### Behavior modification (slide 12)

- School-based interventions
- Social skills training
- Psychotherapy

### Biotherapeutic drainage





# Final Thoughts

These slides are not an exhaustive list, but rather a consolidation of what has better evidence clinically, both from published human studies and my own personal clinical experiences.



Thank  
you!



"Mr. Osborne, may I be excused? My brain is full."

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