Botanical Strategies for ADHD Attention Deficit Hyperactivity Disorder
Dr Mary Bove ND

Attention Deficit Hyperactivity Disorder
Characterized by developmentally inappropriate levels of;
  Hyperactivity
  Impulsivity
  Inattention

ADHD
6-8 % of pediatric population
Surveys show up to 60% of ADHD using CAM
20-30 % of children do not respond to stimulant medication
Medications associated with SE- facial tics, hypertension, anorexia; Psychiatry. 2012; 2012: 804127

Attention Deficit Hyperactivity Disorder
Key traits being, distractibility, confusion, faulty abstract thinking, inflexibility, poor verbal skills, aimlessness, perceptual difficulties, inattention to body states, constant movement, food cravings, sleep problems, coordination problems, self-centeredness, impatience, recklessness, and extreme emotionalism.
Children with ADHD have difficulties with
  Inhibiting behavior responds
  Working memory
  Planning and organizing
  Verbal fluency
  Motor sequencing
  Other frontal lobe functions

Contributors to ADHD
Genetic predisposition
Toxin – environmental, vaccine exposure, Lead has a statistically significant relationship to symptoms of ADHD, 10 baby study, Pesticide toxicity-farm regions of US
Inflammatory triggers
Poor GI function, microbiome, poor nutrition
Food Allergies
Prenatal environment – testosterone exposure, heavy metals (amalgam), stress, viral infection
ADHD & Probiotics
Stress & Children
Chronic stress leads to long term hyper-arousal of brain stem activity increasing heart rate, blood pressure, and arousal states
Children may experience a change in brain chemistry, which leads to hyperactivity and anxiety

Stress can alter or impair brain circuit formation. Resulting in a smaller brain size in young children
Children with higher cortisol levels
  problems with physical, social, mental, and motor development, smaller brain electrical changes when forming memories, compromising new memory formation experience extreme hardship upholding attention, maintaining attention is a part of self regulation
HPA axis Deregulation
Poor sleep patterns are associated with higher HPA activity and with behavioral/emotional difficulties.
Interplay between unfavorable sleep patterns, deterioration of the HPA axis and behavioral/emotional difficulties is already apparent in pre-school children.
Memory, attention-span, and self regulation are influenced by cortisol production

SLEEP
Infants – 20-30% sleep fragmentation
Children -25-50% pre-schoolers - delayed sleep onset
School age children – strong association between lack of sleep and impairment of learning, memory, and other cognitive functions
Insomnia symptoms reported by 9.4% of adolescents
Increased inadequate sleep causes
- reduced attention
- cognitive dysfunction
- behavior challenges

Insomnia symptoms during adolescence present a risk factor for mental health problems in young adulthood
Roane BM, Taylor DJ. “Adolescent Insomnia as a Risk Factor for Early Adult Depression and Substance Abuse” Sleep (2008 Oct 1); 31(10): 1351–1356. © 2008 Assoc. Prof Sleep Societies, LLC.

Importance of Play
Play protects children’s emotional development; whereas a loss of free time in combination with a hurried lifestyle can be a source of stress, anxiety, and may even contribute to depression for many children.
The Centers for Disease Control concludes that a major missing ingredient is an hour per day of moderate physical activity. The Importance of Play in Promoting Healthy Child Development and Maintaining Strong Parent-Child Bonds. 119.1 (2007). American Academy of Pediatrics, Jan. 2007
Children and Nature
…………having nature close to a home protects the psychological well-being of children.
The impact is strongest for children with the highest levels of stressful life events.
In addition, having green space around the home boosts their cognitive functioning.

Green schoolyards as havens from stress and resources for resilience in childhood and adolescence
Natural schoolyards decrease stress, strengthen attention, reduce behavior problems, and enhance factors associated with resilience in children of all ages 2014 | Chawla, L., Keena, K., Pevec, I., Stanley, E
www.childrenandnature.org/research

The Effect of Green Exercise on Blood Pressure, Heart Rate and Mood State in Primary School Children
Children engaging in “green exercise” have lower blood pressure than when engaging in standard exercise

Reality Check
Childhood obesity rates have more than doubled the last 20 years
United States is the largest consumer of ADHD medications in the world
Pediatric prescriptions for antidepressants have risen dramatically
  ADHD & Nature is Stress Reduction

Cognitive Behavioral Interventions
Green Space Time
Animal Therapy
Light Therapy…..sunshine
Physical Activities Outside
Massage Therapy
Mindfulness Meditation
Yoga
Neurofeedback

The effect of an animal-assisted reading program on the reading rate, accuracy and comprehension of grade 3 students: A randomized control study
Third grade students significantly improve reading comprehension and retention when reading with a dog in an animal-assisted reading program 2014 | le Roux, M. C., Swart, E., Swartz, L
www.childrenandnature.org/research

Yoga
Impacts neurophysiological functions including oxygen consumption, lateralization patterns, and cognition, often these are atypical in ADHD children
A foundation exercise for ADHD, breath training with rhythmic inhalation & exhalation that reduces sympathetic nervous system activity while providing an attentional focus; Atten Disord. 2004 May; 7(4):205-16.
Massage Therapy
RCT on ADHD adolescents receiving weekly or biweekly 15 min massage for 10 days to 4 weeks
After 10 consecutive school days showed improved teacher rated classroom behavior, improved mood and task focus going from 47% to 75%, Adolescence. 1998 Spring; 33(129):103-8

Green Space based on Attention Restoration Theory (ART)-2 forms of Attention; voluntary and involuntary
Attention deficit stems from over use and fatigue of voluntary attention
Classroom learning requires voluntary attention, green space environments are calming and gentle restoring voluntary attention while involuntary attention is functioning
Green Space based on Attention Restoration Theory (ART)
Study comparing children preforming verbal tasks which require concentration after walking in a park verses a residential or downtown setting

Create a Healthy Living Space- Decorate with nature – GREEN, Use aromatherapy diffuser, Full spectrum lighting, View from the windows, Windows? Colors, Animals
Why Botanical Medicines
Botanical medicines offer a unique way to support, strengthen, and regulate the neuro- endocrine system while aiding in managing common symptoms of stress;
- Anxiety, depression, moodiness
- Insomnia, relaxation
- Poor focus, distraction, restlessness
- Cognitive enhancement, memory
- Stress protective, adaptation
- Gut restoration
- Detoxification

Role of Botanicals
- Botanical Adaptogen Agents focus on ANS
- Botanical detoxification liver, bowel, lymphatic
- GI function and microbiota support
- Botanical Nervines and Relaxant Agents focus on CNS and PNS
- Cerebral Vascular Agents
- Botanical Physic Gardens- plants heal in many ways

*Ayurvedic approach for improving reaction time of attention deficit hyperactivity disorder affected children*
Herbal formula of Bacopa monnieri, Withania somnifera, and Valerian wallichii (2/1/1)
160 – 320 mg daily, ages 6- 14 years, 14 weeks duration
Outcomes showed decreased reaction time leading to improved attention, improvement in memory, performance, alertness, and mood enhancement; Ayu. 2010 Jul-Sep; 31(3): 338–342

Kids’ Herbal Formula for Attention and Focus
Lemon balm, Gotu Kola, Chamomile Flowers, American Skullcap, Wild Oats, Passionflower
Adaptogen Herbs
Ashwaganda root (Withania somnifera)
Bacopa monnieri
Gotu Kola ( Centella asiatica)
Holy basil (Ocimun sanctum),
Siberian Asiatic rose root (Rhodiola rosea)
Ashwagandha-Withania somnifera- Root, Solanaceae
Improves and conserves adaptive energy, Tonic and Adaptogen
Promoter of learning and memory retrieval, Cognitive enhancer, Promotes Sleep
5-10 mls/day 1:3 liquid extract, 1-3g/day dry root
*Bacopa monnieri*
Traditional Ayurvedic herb
Traditional use includes; memory enhancement, improve learning ability, calming
Adaptogen, modulates brain stress hormones, Restorative to CNS
Improvements in various parameters of cognition and affect, including recall, reaction times and depression/anxiety
Significantly improved verbal learning, memory acquisition, and delayed recall as measured by the ABLT (Rey Auditory verbal Learning Test)
160-320mg/day containing 55% bacosides bacoside A and bacoside B both triterpoiniod glycosides
Age 6-14 years, for 14 weeks duration
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Gotu Kola; Centella asiatica
Brain Revitalizer
Traditionally used to enhance mental functions such as concentration, memory and alertness
Increases brain levels of GABA, processing a relaxing effect on the CNS
Protects brain from oxidative stress, Increases cognitive function
Inhibits the uptake of glutamate in the brain

Holy Basil; Ocimum sanctum
Mental cloudiness, Uplifting, Enhancing mental clarity and meditation, Tones CNS
4-10mls/day 1:5LE
250-1000mg/d dry herb
Anti-anxiety and anti-depressant action
Calming effect that leads to clarity of thought
Study (n=150) using1200 mg/d extract
reduced general stress symptoms by 36% more than placebo*
Study of 35 people with GAD showed increased attention and improved mood with 500 mg BID**

Magnolia; Magnolia officinalis
Part used: Bark
Constituents: biphenolic compounds: honokiol and magnolol, other biphenolics, alkaloids and flavonoid glycosides
Actions: allosterically modulates GABA-A (thereby reducing the amount of GABA required to activate the
receptor) [magnolol]; reduce cortisol secretion from adrenal glands; enhance acetylcholine release thereby supporting
memory; honokiol exerts anxiolytic effects

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Siberian Asiatic Rose; Rhodiola rosea - Cooling
Active markers- rosavins & salidrose
4-8 ml/d liquid extract; 200-600mg/d dried root
Enhances resistance to high altitude sickness, Anemia
Fertility enhancer Increases memory, endurance & productivity
Reduces mental and physical fatigue, Increase oxygen uptake in muscles
Depression, anxiety, Insomnia
Tonic, adaptogen, Stress protecting

Nerve Tonics, Relaxants, & Sedative
A second group of botanical medicines for mood enhancement, stress relief and management
Lemon balm (Melissa officinalis)
Chamomile Flower (Chamomilla recutita)
Passion Flower (Passiflora incarnata)
American Skullcap (Scutellaria lateriflora)
Valerian Root (Valeriana officinalis)

American Skullcap; Scutellaria lateriflora
Traditional Therapeutic Uses; Anxiety, Agitation, Restlessness, Nervous fear, Cardiac irritability, Nervous irritation
of the CNS, Nervous Exhaustion- Trophorestorative, Depression, Drug/Substance Withdrawal
*For those who are hypersensitive to touch, highly sensitive, worry excessively.

Chamomile Flowers
Clinical studies indicate;
- Chamomile essential oil inhalation – sedative and mood enhancing effect
- Chamomile Infusion – induction of deep sleep
- Chamomile Extract – increased T-lymphocyte rosette formation
- Polysaccharides/heteroglycans- demonstrate immunostimulating activity
- Apigenin binds GABA receptors
- Generalized anxiety disorder – 6-8wks
- Depression with long term use 12 wks or greater
- Irritable bowel syndrome- reduction of symptoms in 2-4 wks – bisabolol and chamazulene compounds
- Gingivitis, canker sores, dental plaque- oral mouthwash
- Therapeutic Application with Kids- Insomnia; Relaxes, Calming to Restlessness, Mood Elevating, Anxiety, worry, agitation, nervousness, Stress related dermatitis, Ulceration of gastrointestinal tract, mucous membranes, Diarrhea in children with pecin

Lemon Balm
- *Melissa officinalis*
- Uses and Indications for Kids - Insomnia, trouble falling to sleep, Restlessness, Hyperactivity, Anxiety(GAD), Nervousness, Agitation, Improves Cognitive Function and Focus, Antiviral- topical application, Antispasmodic and Analgesic for stomach discomfort, colic, and constipation. (Often combined with fennel seed and chamomile)
- Double blind, placebo controlled study with 18 healthy volunteers
- 300 mg or 600 mg dose of a standardized lemon balm extract or placebo for 7 days
- Outcome showed 600 mg dose of lemon balm increased mood and significantly increased calmness and alertness
- Dose-specific increases in calmness, and dose-dependent decrements in timed memory task performance
- “Lemon Balm Reduces Acute Anxiety” In children aged 6-7 years, lemon balm ethanol extract 6 mg/kg reduced anxious behaviors during a dental examination

Lemon Balm and Valerian
- A combination of valerian and lemon balm for effectiveness in the treatment of restlessness and nervous insomnia
- Multi-center study 918 children, under 12 years; Children were evaluated for therapeutic efficacy and tolerability
- In conclusion, was effective in younger children with restlessness and insomnia; Very well tolerated

Passion Flower
- *Passiflora incarnata*
- CLINICAL INDICATIONS in Children and Teens
  - Attention Deficit Hyperactivity Disorder
  - Generalized Anxiety Disorder (GAD); Anxiety or nervousness
  - Insomnia, Palpitations
- Double-blind, placebo-controlled investigation of the efficacy of P. incarnata tea on sleep quality
  - 41 healthy young adults, using sleep diaries validated by polysomnography plus an anxiety inventory
  - Subjects with a history of sleep disorder were excluded
  - 1 cup Passionflower or placebo tea (Parsley) for 1 week, followed by a 1 week ‘washout’ period and crossed over
- Sleep quality was significantly better (p <0.01) for those who drank Passionflower tea
- Numerous pharmacological effects of Passiflora incarnata are mediated via modulation of the GABA system including affinity to GABA(A) and GABA(B) receptors, and effects on GABA uptake and release.

Botanical Nervine Summary
- Lemon Balm
  - Attention, focus, cognitive function, memory
  - Insomnia, restlessness, hyperactivity
  - Mood elevation, anxiety
- Passion Flower
  - Insomnia
  - Generalized anxiety
  - Hyperactivity, nervousness
American Skullcap
- Nervous irritation, fear, anxiety
- Depression
- Substance withdrawal

Chamomile Flowers
- Agitation, worry, nervousness, anxiety
- Insomnia, restlessness
- Mood elevation

Cerebral Vascular Support Botanicals
- Gingko biloba
- Rosemary officinalis
- Pycnogenol

**Ginkgo biloba in the treatment of attention-deficit/hyperactivity disorder in children and adolescents. RPCT**

**CONCLUSIONS:**
The G. biloba is an effective complementary treatment for ADHD. Further studies with longer treatment duration are warranted in this regard.

Dose: 80-120 mg gingko           Complement Ther Clin Pract, 2015 May;21(2):61-71

Pinus Pinaster Bark/ Pycnogenol
- Vasodilator improves cerebral blood flow to brain regions involved in ADHD
- May act to regulate and modulate possibly elevated catecholamines in ADHA children

One month RCT, 1mg/kg/day pycnogenol extract; decrease in inattention & improved teacher rated hyperactivity. After washout period researchers noted a return of symptoms.