

ADHD Advances in Treatment

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ADHD-DSM IV

- Either or Both:
- (1) Cognitive: Inattention Symptoms
- (2) Behavioral: Hyperactive/Impulsive Symptoms



ADHD - DSMIV

- Inattentive Symptoms
- six (or more) of the following symptoms of **inattention** have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:
 - a. often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities
 - b. often has difficulty sustaining attention in tasks or play activities

ADHD – DSIV-Inattentive Symptoms

- c. often does not seem to listen when spoken to directly
- d. often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions)
- e. often has difficulty organizing tasks and activities

ADHD-DSM IV –Inattentive symptoms-continued

- f. often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework)
- g. often loses things necessary for tasks or activities (e.g., toys, school assignments, pencils, books, or tools)
- h. is often easily distracted by extraneous stimuli
- i. is often forgetful in daily activities



ADHD - DSMIV

- six (or more) of the following symptoms of **hyperactivity-impulsivity** have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:

ADHD – DSM IV Hyperactive-Impulsive Symptoms

- Hyperactive
 - a. often fidgets with hands or feet or squirms in seat
 - b. often leaves seat in classroom or in other situations in which remaining seated is expected
 - c. often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feelings of restlessness)

ADHD-DSMIV-Hyperactive-Impulsive Symptoms

- d. often has difficulty playing or engaging in leisure activities quietly
- e. is often "on the go" or often acts as if "driven by a motor"
- f. often talks excessively

ADHD DSMIV Hyperactive-Impulsive

- Impulsivity Symptoms
 - g. often blurts out answers before questions have been completed
 - h. often has difficulty awaiting turn
 - i. often interrupts or intrudes on others (e.g., butts into conversations or games)

ADHD-DSMIV - continued

- Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before age 7 years.
- Some impairment from the symptoms is present in two or more settings (e.g., at school [or work] and at home).
- There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning.

ADHD-DSM IV

- The symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder and are not better accounted for by another mental disorder (e.g., Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

ADHD-DSMIV

- **Specify Type:**
- **Attention-Deficit/Hyperactivity Disorder, Combined Type:** if both Criteria A1 and A2 are met for the past 6 months
- **Attention-Deficit/Hyperactivity Disorder, Predominantly Inattentive Type:** if Criterion A1 is met but Criterion A2 is not met for the past 6 months
- **Attention-Deficit/Hyperactivity Disorder, Predominantly Hyperactive-Impulsive Type:** if Criterion A2 is met but Criterion A1 is not met for the past 6 months

ADHD – Fellow Travelers

- “In ADHD, comorbidity is the rule, rather than the exception”
- LD 1/3 (1/7)
- OCD 1/7 (1/100)
- Tic Disorders 1/7 (1/1000)
- ODD/Conduct 1/3 (1/10?)
- Mood Disorders

ADHD – Look Alikes

- Bipolar Disorder
- PDD Spectrum
- Depression
- Anxiety Disorders
- Fetal Alcohol Exposure

Anxiety NOS
 Arithmetic Disorder
 Asperger's Disorder
 Autism
 Bipolar Disorder I
 Bipolar Disorder II
 Conduct Disorder
 Cyclothymia
 Depression NOS
 Dysgraphia
 Dysrhythmia
 Enuresis
 Expressive Language Disorder
 Generalized Anxiety Disorder
 Hearing Impairment
 Hyperthyroidism
 Hypothyroidism
 Major Depressive Disorder
 Mathematics Disorder
 Mixed Receptive-Expressive Language Disorder
 Motor Tic Disorder
 Obsessive Compulsive Disorder
 Oppositional Defiant Disorder
 Tic Disorder
 Pervasive Developmental Disorder NOS
 Phorastion Disorder
 Post Traumatic Stress Disorder
 Prodromal Borderline Personality Disorder Symptoms
 Receptive Language Disorder
 Schizophrenia
 Schizophreniform Disorder
 Separation Anxiety Disorder
 Social Anxiety Disorder
 Substance Use and Dependence
 Tourette's Disorder
 Vision Impairment
 Vocal Tic Disorder
 Writing Disorder

Key

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Treatment



ADHD - Treatment

- Psychosocial
 - Social skills groups
 - Parent training
 - Classroom accommodations
 - LD Schools
 - Classroom behavioral intervention
 - Parent Education (Driven to/Answers to/Delivered From Distraction)

ADHD - Treatment

- Cognitive (Efficacy proof limited)
 - Cogmed
 - PACE Program
 - Biofeedback/Neurofeedback

ADHD - Treatment

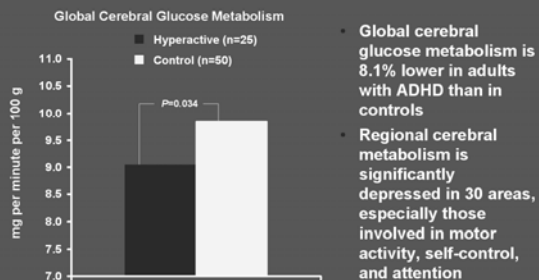
- Medication
 - First Line: Psychostimulants (Robust efficacy and proof)
 - Second Line: Strattera, Intuniv (Fair Efficacy, robust proof)
 - Third Line: Off Label FDA medications (mixed efficacy, limited proof)

The Pathophysiology of ADHD Involves DA and NE Neurotransmission

- ADHD is associated with abnormal DA and NE neurotransmission in frontal/striatal areas^{1,2}
- Corticostriatal circuits play an important role in ADHD^{1,3,4}
- Efficacy of ADHD medications with pharmacologic activity affecting DA and NE lends support to the theory of monoamine dysfunction in ADHD³

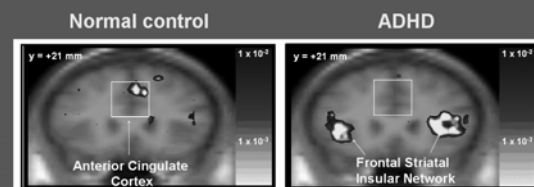
DA = dopamine; NE = norepinephrine.
 1. Mercugliano M. *Ment Retard Dev Disabil Res Rev*. 1995;1:220-226; 2. Krause K-H et al. *Neurosci Lett*. 2000;285:107-110; 3. Markowitz JS et al. *Pharmacotherapy*. 2003;23:1281-1299; 4. Zametkin AJ et al. *J Clin Psychiatry*. 1998;59(suppl 7):17-23.

Cerebral Glucose Metabolism Is Reduced in Adults With ADHD



Zametkin AJ et al. *N Engl J Med*. 1990;323:1361-1366.

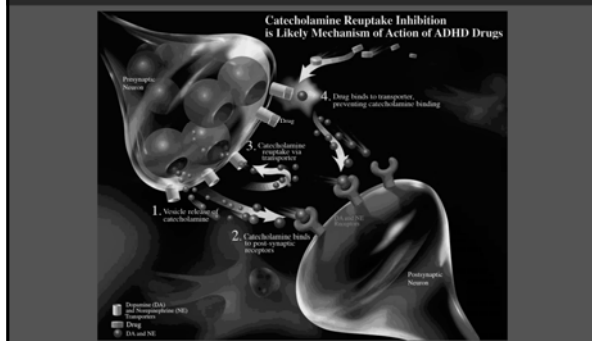
Abnormal Blood Flow to Cortical and Striatal Areas in Adults With ADHD



Functional MRI shows decreased blood flow to anterior cingulate and increased flow in frontal striatum in patients with ADHD

MRI = magnetic resonance imaging.
 MGH-NMR Center & Harvard-MIT CTRP.
 Adapted with permission from Bush, et al. *Biol Psychiatry*. 1999;45:1542-1552.

Catecholamine Reuptake Inhibition Is a Likely MOA of ADHD Drugs



ADHD Treatment: Stimulants

- Stimulants
 - Dextroamphetamine (Dexadrine) Based
 - Methylphenidate (Ritalin) Based
 - Both target Cognitive & Behavioral Symptoms
 - Ritalin is slightly less effective
 - Dexadrine is slightly more side effect prone
 - Either category work 70% of the time and 90% if both tried

ADHD Treatment: Stimulants

- Side Effects
 - Stomach aches, headaches
 - Appetite Suppression
 - Insomnia (stimulation or rebound)
 - Changes in Mood and anxiety level
 - Problematic for people with history of fainting or family history of arrhythmia or heart attack before age 50

ADHD Treatment: Dextroamphetamine Products

ADHD Treatment: Ritalin Products

ADHD Treatment: Second Line

- Strattera (atomoxetine)
 - FDA Approved 2003
 - 40% efficacy for cognitive & behavioral symptoms
 - Side effects: nausea, fatigue
 - Can be used as booster to stimulants
 - Warning of potential to cause suicide thoughts

ADHD Treatment: Second Line

- Intuniv(guanfacine-extended release)
 - FDA Approved September 2009
 - Decreases Behavioral Symptoms
 - Side effects: fatigue, low blood pressure
 - Can be used assist stimulants

ADHD Treatment: Third Line

Non-Stimulants – FDA Approved – NOT FDA INDICATED FOR ADHD

Trade Name	Generic Name
Tenex	guanfacine
CatapressPatch	clonidine patch
Wellbutrin	bupropion hydrochloride
EffexorXR	venlafaxine(extended release)
Pristiq	desvenlafaxine
Cymbalta	duloxetine

ADHD Treatment: Clinical Example #2

16 year old 10th grade boy on football team with ADHD Combined Type and LD-Math and Reading

Vyvnase with possible Dexadrine booster– needs coverage from 7AM – 10PM + weekend evening driving

ADHD Treatment: Clinical Example #2

7 yo 2nd Grade girl with Inattentive Type ADHD, parents very concerned about side effects, has very little homework

Metadte CD - 8 hour benefit covers school day, low risk of insomnia, no need for evening coverage

ADHD Treatment: Clinical Example #3

11 yo Boy with ADHD Combined Type and Separation Anxiety Disorder

**Zoloft treated anxiety but all stimulant trials failed due to insomnia and significant weight loss with Concerta being the least bad
Tried conversion to Strattera**