

# Adult ADHD

Mental Health Teleconference  
April 17<sup>th</sup> 2008

## Kenneth J Herrmann M.D.

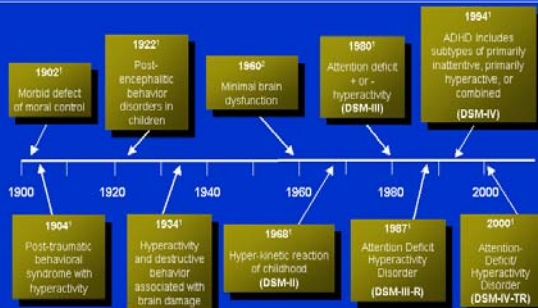
- Medical school at Chicago medical school
- Internship, residency in general psychiatry, fellowship in child and adolescent psychiatry at the Univ. of Iowa
- Currently psychiatric consultant at the Mental Health Center of Dane Co., assistant clinical professor at the Univ of WI., and Director of Research and Managing Partner Regent Mental Health Group
- Board of Directors NAMI Wisconsin

## Task for the next hour

- History and diagnosis
- Epidemiology
- Course and prognosis
- Comorbidities
- Treatment
- Referral suggestions

## ADHD History and Diagnosis

### ADHD: Behavioral Disorder to Brain Disorder



1. Attention-deficit/hyperactivity disorder - historical development and overview [editorial]. *J Atten Disord* 2006;3:172-181.  
2. Shubert DE. *Child Adolesc Psychiatr Clin N Am* 2000;9:493-473.

### Definition of ADHD

Developmental Disorder  
recognized by significant symptoms of:

Inattention

Hyperactivity/  
Impulsivity

Adapted from American Psychiatric Association, DSM-IV TR, 2000.

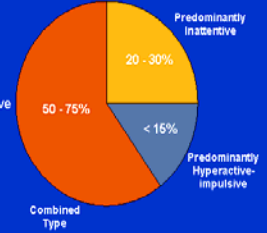
## ADHD: Impairments Across the Life Cycle

- ◆ Family stress<sup>1</sup>
- ◆ Poor peer relationships<sup>2</sup>
- ◆ Socialization deficit<sup>2</sup>
- ◆ Accidents and injuries<sup>3</sup>
- ◆ Smoking<sup>3</sup>
- ◆ Substance abuse<sup>3</sup>
- ◆ Delinquency<sup>3</sup>
- ◆ Academic difficulties, underachievement<sup>2</sup>
- ◆ Employment difficulties<sup>2</sup>
- ◆ Relationship difficulties<sup>1</sup>
- ◆ Parenting difficulties<sup>1</sup>

1. Brown III and Pashak M. *J of Learning Disabilities* 1992; 25(8), 561-567.  
 2. Stonebraker L, et al. *J Abnormal Child Psychology* 1995; 23(3), 303-316.  
 3. Barkley RD. *Attention Deficit Hyperactivity Disorder: A Handbook for Diagnosis and Treatment*, 2nd Edition, 1990.

## ADHD Clinical Subtypes

- Predominantly inattentive:**
- ◆ Easily distracted
  - ◆ Not excessively hyperactive or impulsive in behavior
- Predominantly hyperactive-impulsive:**
- ◆ Extremely hyperactive and impulsive
  - ◆ Not highly inattentive (may have no inattentive signs)
  - ◆ Often younger children
- Combined type:**
- ◆ Most patients
  - ◆ All three classical signs of the disorder



Adapted from American Psychiatric Association, DSM-IV TR, 2000.

## Diagnosis of ADHD: Summary

- ◆ Core symptoms of ADHD are inattention, hyperactivity, and impulsivity
- ◆ These symptoms appear in early childhood and often persist into adulthood
- ◆ ADHD symptoms affect many facets of a patient's life
- ◆ Adults are less likely to have hyperactivity than children
- ◆ Childhood symptoms often manifest differently in adults

## Epidemiology of ADHD

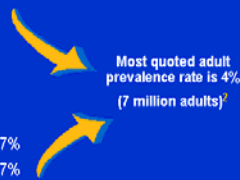
## Determining the Prevalence of ADHD: Two Epidemiologic Approaches

### Childhood

- ◆ 3 - 7% of school-aged children<sup>1</sup>
- ◆ 60% continue to have impairment into adulthood<sup>2</sup>
- ◆ Therefore 2 - 4.2% prevalence in adults

### Adult

- ◆ Murphy and Barkley 1996a 4.7%
- ◆ Murphy and Barkley 1996b 4.7%
- ◆ DuPaul, Weyandt et. al. 1997 4.5%
- ◆ Heiligenstein et. al. 1997 4.0%



1. DSM-IV-TR #1 ed. 2000-53-61.  
 2. Barkley RA. In: Murphy KR, Gidycz M, eds. 1998-61. (includes review articles)

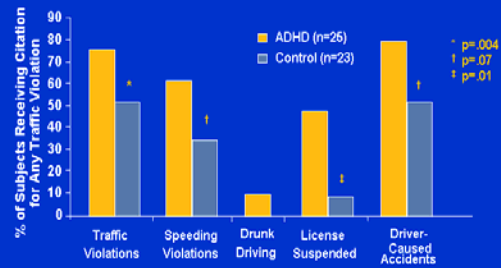
## Course and Prognosis of ADHD

## Prognosis of Childhood ADHD

- Childhood symptoms (often modified) of ADHD may persist into adolescence and adulthood<sup>1</sup>
- High risk of adolescent and adult encounters with the law<sup>2</sup>
- Adults are more capable of controlling behavior and masking symptoms<sup>3</sup>
- The strongest predictors of persistence into adulthood are
  - rule-breaking behavior<sup>1</sup>
  - familial<sup>1</sup>
  - adversity<sup>1</sup>
  - psychiatric comorbidity<sup>1</sup>

1. Biederman J, et al. *J Am Acad Child Adolesc Psychiatry* 1996;35:140-151.  
 2. Biederman J, et al. *J Pediatr* 1991;119:544-551.  
 3. Moffitt TE, et al. *J Am Acad Child Adolesc Psychiatry* 2002;41:102-109.

## Untreated ADHD Increases Risk of Traffic Violations and Accidents in Young Adults

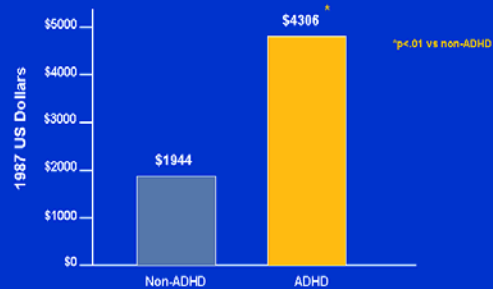


## Psychosocial Consequences of ADHD in Adults<sup>1,2</sup>

- Work performance**
  - Employers rate ADHD adults as
    - Less adequate in fulfilling work demands
    - Less likely to work independently
    - Less likely to get along well with supervisor
  - More likely to be fired or laid-off than normal controls
  - ADHD adults in general have lower job status
  - More likely to quit a job or change jobs
- Lower Self-Esteem**
  - Low self-esteem persists into adulthood
  - Self-perception of incompetence
- Family Concerns**
  - Higher levels of family adversity impacting the outcome of the disorder
  - More likely to have marital difficulties and increased divorce rates
- Impaired Social Skills**
  - Greater social skill and interaction problems (particularly male-female interactions)

1. Faraone S, et al. *Biol Psychiatry* 2000;46:5-20.  
 2. Yonko C, et al. 1997;472.

## ADHD: Cost of Medical Care 9-year Median Cost Per Person



## Comorbidities and Neurodevelopmental Disorders in ADHD

## Comorbidity and Adult ADHD

Comorbidity	Est. Prevalence
Mood Disorder	19% - 37% <sup>1,2,3</sup>
Anxiety Disorder	25% - 50% <sup>1,2,3</sup>
Alcohol Abuse	32% - 53% <sup>1,2,4,5</sup>
Other Substance Abuse	8% - 32% <sup>1,2,3,5</sup>
Personality Disorder	10% - 20% <sup>1</sup>
Antisocial Behavior	18% - 28% <sup>1,3</sup>

1. Biederman J, et al. *Am J Psychiatry* 1992;149:1732-1738.  
 2. Shelton WD, et al. *Group Psychology* 1993;21:419-435.  
 3. Manoski S, et al. *Arch Gen Psych* 1991;39:585-591.  
 4. Murphy K, et al. *Group Psychology* 1996;24(1):391-401.  
 5. Ray-Syme F, et al. *Group Psychology* 1997;25:122-144.

## Differential Diagnosis in ADHD: Psychiatric and Medical

- Psychiatric disorders can mimic ADHD
  - Mood disorders
  - Psychotic disorders
  - Adjustment disorders
  - Anxiety disorders
  - Learning and language deficits
  - Stress
- Medical disorders that can mimic ADHD
  - Sleep apnea
  - Substance use disorder
  - Developmental disorders
  - Use of other medications
  - Seizure disorder
  - Vision problems
  - Thyroid disorder

McCracken JT. Kaplan and Sadock's Comprehensive textbook of psychiatry 2009:2678-2688.

## Psychiatric Disorders to Consider in the Differential Diagnosis of ADHD in Adults

Psychiatric Disorder	Features Shared With ADHD	Differential Features
<b>Major Depression</b>	<ul style="list-style-type: none"> <li>Subjective report of poor concentration, attention and memory</li> <li>Difficulty with task completion</li> </ul>	<ul style="list-style-type: none"> <li>Substantial and episodic dysphoria</li> </ul>
<b>Bipolar Disorder</b>	<ul style="list-style-type: none"> <li>Increased activity, difficulty with maintaining attention and focus</li> <li>Irritability</li> </ul>	<ul style="list-style-type: none"> <li>Enduring dysphoric or euphoric mood</li> <li>Insomnia</li> <li>Psychotic symptoms</li> </ul>
<b>Generalized Anxiety</b>	<ul style="list-style-type: none"> <li>Fidgetiness</li> <li>Difficulty concentrating</li> </ul>	<ul style="list-style-type: none"> <li>Exaggerated apprehension and worry</li> <li>Somatic symptoms of anxiety</li> </ul>

Seung HT, et al. Am Fam Physician 2006;52:2077-2082.

## Standardized Assessment Tools for ADHD

## Commonly Used Rating Scales for ADHD

### Adolescent

- Adolescent Symptom Inventory-4 (ASI-4)<sup>1,2</sup>
- Conners/Wells Adolescent Self Report of Symptoms (CAAS)<sup>3</sup>
- Child Behavior Checklist (CBCL)<sup>4,5</sup>
- Brown ADD Scale for Adolescents<sup>6</sup>

### Adults

- Conners' Adult ADHD Rating Scales (CAARS)<sup>7,8</sup>
- Wender Reimherr Adult Attention Deficit Disorder Scale (WRAADDS)<sup>9</sup>
- Adult ADHD Self Report Scale (Adult ASRS): Screener and Symptom Checklist<sup>10</sup>

1. Johnson CB, et al. Attention-Deficit/Hyperactivity Disorder Rating Manual, 4th ed.  
2. Conners CK, et al. Attention-Deficit/Hyperactivity Disorder Rating Manual, 4th ed.  
3. Conners CK, et al. Attention-Deficit/Hyperactivity Disorder Rating Manual, 4th ed.  
4. Achenbach TM. Manual for the ASEBA School Forms and Profiles. Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families; 2001.  
5. Achenbach TM, Rescorla LA. Manual for the ASEBA School Forms and Profiles. Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families; 2001.

6. Brown L. ADD Scale for Adolescents. Copyright © 2000 by Brown University.  
7. Conners CK, et al. Conners' Adult ADHD Rating Scales (CAARS). Copyright © 2000 by Conners Clinical Systems, Inc.  
8. Conners CK, et al. Conners' Adult ADHD Rating Scales (CAARS). Copyright © 2000 by Conners Clinical Systems, Inc.  
9. Wender ER, et al. Wender Reimherr Adult Attention Deficit Disorder Scale (WRAADDS). Copyright © 2000 by Wender Reimherr, MD.  
10. Barkley RA, et al. Adult ADHD Self-Report Scale (ASRS). Copyright © 2003 by Multi-Health Systems, Inc.

## ADHD Diagnostic Tools: Neuropsychological Tests

- Objective measure of sustained attention and prefrontal cortex functions (mental flexibility, abstraction, and working memory)<sup>1</sup>
- These tests alone are not diagnostic for ADHD because they only assess cognition<sup>2</sup>
- May be useful to determine patterns of strengths and weaknesses and screening for possible cognitive deficits<sup>1</sup>
- Examples:
  - Continuous Performance Test (CPT)
  - Wisconsin Card Sorting Test
  - Stroop Word-Color Association Test
  - Test of Working Memory

1. Conners CK, et al. *Compend of Clinicals* 1999.  
2. Doyle AE, et al. *J Consult Clin Psychol* 2000;68:417-433.

## Treatment of ADHD

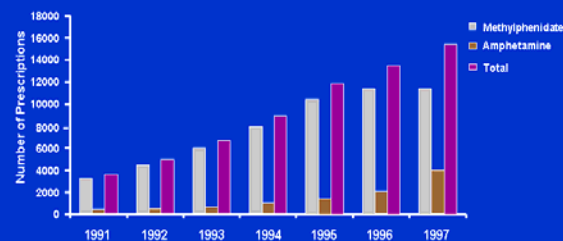
## Treatment Process for ADHD

- ◆ Evaluation (Diagnosis)
- ◆ Treatment
  - Education for family and patient
  - Counseling
  - Medication
  - Accommodations/Modifications
    - at home
    - in school
    - in the community
- ◆ Symptom Monitoring and Strategy Adjustment

## Proven & Unproven Efficacies in ADHD

- ◆ Efficacy established in ADHD
  - Pharmacological treatment
  - Cognitive/educational therapies
  - Behavioral therapies
  - Psychosocial therapies
- ◆ Efficacy in ADHD is unproven
  - Nutritional modifications, vitamins
  - Biofeedback
  - Other alternative therapies

## Methylphenidate and Amphetamine Prescriptions for ADHD



BIS Health, National Prescription Audit Plus™

## FDA-Approved Pharmacotherapy for ADHD

### Stimulant Medications

#### Methylphenidate

- Ritalin®
- Concerta®
- Ritalin LA®
- Methylin®
- Focalin®
- Metadate CD®

#### Amphetamine mixed salts

- Adderall®
- Adderall XR®

### Non-Stimulant Medication

#### Atomoxetine hydrochloride

- Strattera®

#### Dextroamphetamine

- Dexedrine®
- Dexedrine Spansules®
- DextroStat®

#### Methamphetamine

- Desoxym®

#### Pemoline

- Cylert®

Spencer T, et al. *J Am Acad Child Adolesc Psychiatry* 1996;35:403-402.

## Pharmacology of Stimulants: Methylphenidate and Amphetamine

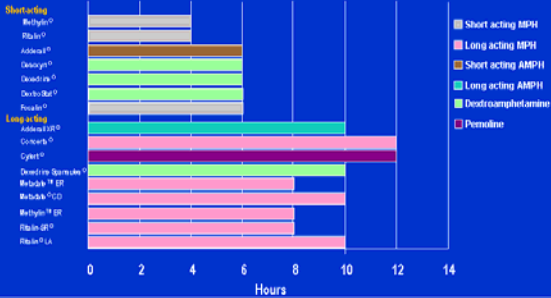
- ◆ Efficacy in ADHD
  - alert, focus attention through inhibitory effect<sup>1</sup>
  - increase motivation, energy, and wakefulness
- ◆ Response to stimulants
  - 70% of children with ADHD will respond to any one stimulant<sup>2</sup>
  - An additional 20% will respond to the next attempted stimulant<sup>2</sup>
  - All stimulants are thought to be of generally equal efficacy
  - Adult ADHD largely based on pediatric experience<sup>3</sup>

1. Zentgraf AL, Rapoport JL. *J Am Acad Child Adolesc Psychiatry* 1987;26(5):674-686.  
 2. Wolraich DL, et al. *Clin Pediatr* 1991;30(5):407-404.  
 3. Spencer T, et al. *Child Adolesc Psychiatry Clin N Am* 2000;9:77-87.

## Black box warning? For Stimulants

- HTN
- Stroke
- Sudden death
- Heart attack
- Palpitations
- Arrhythmia

## Stimulants: Duration of Action



Adapted from Physician's Desk Reference, 2002.

## Additional Stimulant Choices

Dexmethylphenidate (Focalin XR) 5, 10, 15, 20mg, isomer so theoretically half the methylphenidate dose

Daytrana Patch (Daytrana), 14 hr duration, 10, 15, 20, 30mg

Lisdexamfetamine Dimesylate (Vyvanse) lasts 12 hours, prodrug –need stomach to activate, 20, 30, 40, 50, 60, 70mg

## Treatment Holidays with Stimulants in ADHD

### MYTHS

- "Accepted practice"
- Will minimize side effects of stimulants
- Only used Monday through Friday from 8 am to 2 pm
- ADHD has minimal impact on nonacademic situations
- ADHD disappears and is not an issue at puberty

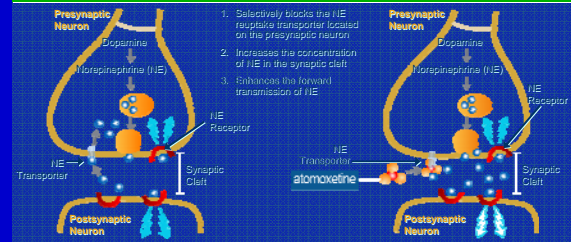
### REALITIES

- Rebound effect leading to irritability, hyperactivity, and excessive weekend sleepiness
- Exacerbation of side effects upon re-starting medication
- Increased family conflict
- Poor social acceptance by peers
- Poor performance in recreational activities, homework
- Poor judgment, more risk-taking and more substance use
- Impaired driving

## The Mechanism of Action of Atomoxetine Is Different From a Stimulant

Atomoxetine is a selective norepinephrine reuptake inhibitor\*

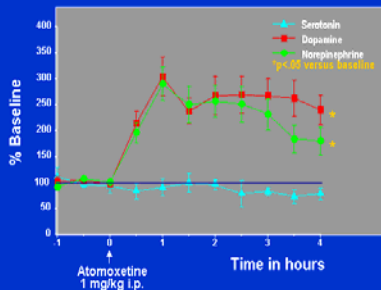
### Mechanism of Action



The precise mechanism by which atomoxetine produces its therapeutic effects in ADHD is unknown

Based on preclinical data: Dumaisier, C. et al. Neuropharmacology. 2009; 57:688-711.

## Effects of Atomoxetine on Extracellular Levels of Monoamines in the Rat Prefrontal Cortex



Bymaster, F., et al. Neuropharmacology 2002; 43(5): 689-711.

## Adverse Events Occurring in Atomoxetine Treated Poor Metabolizers

Adverse Event	Percentage of Patients (n=717) Reporting Events	
	Poor Metabolizers	Extensive Metabolizers
Decreased appetite	23	16
Insomnia	13	7
Sedation	4	2
Depression	6	2
Tremor	4	1
Early morning awakening	3	1
Pruritus	2	1
Mydriasis	2	1

Adverse events occurring in at least 2% of poor metabolizers and either twice as frequent or statistically significantly more often compared with extensive metabolizers

Atomoxetine Package Insert.

## Treatments for ADHD Not FDA-Approved<sup>1-2</sup>

- ♦ Mixed monoamine reuptake inhibitors
  - Bupropion (Wellbutrin®, Wellbutrin SR®)
  - Tricyclics (imipramine, desipramine)
  - Venlafaxine (Effexor®, Effexor XR®)
- ♦ Miscellaneous
  - Alpha-2 Adrenergic Agonists: clonidine (Catapres®) and guanfacine (Tenex®)
  - Buspirone (Buspar®)
  - Nicotinic patch

1. Jarrod AR, et al. Agency for Healthcare Research and Quality: 1993. AHRQ Publ. No. 93-0015.  
2. Coombs CK, et al. J Am Acad Child Adolesc Psychiatry 1996;35:1114-1121.

## FDA Application was in progress

- Modafinil (Sparlon, Provigil)

## Things to consider with medication:

- Comorbidities: anxiety, subst. abuse,
- Compliance
- Formulary (preferred drug list)

## Specific Non-medical Management Strategies

- Headphones
- Organization
- More time
- Get another to help
- Support groups
- Reduce environmental distraction:
  - cubical, shades over windows
  - Socially acceptable movements

## Referral Suggestions

- Refractory (2-3 meds with little improvement and/or strong side effects)
- Cycling nature
- Depression
- Family History for mood disorder
- Psychosis
- Suicide/self harm