The Carter-Jenkins Center presents
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Professor Emeritus of Psychiatry at University of Michigan
ADHD Informational
(March 2007)

by
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ADHD: Prevalence

- Affects 3-5% school-aged children\(^1\)
  - Recent data suggest rates of up to 7.5% in school-aged children\(^2\)
  - Diagnosed in boys 3 to 4 times more than in girls\(^3,4\)

- Accounts for 30-50% of mental health referrals for children\(^5\)

- Resulted in 9.7 million physician-office visits in 2001\(^4\)

- Persists in some patients into adolescence and adulthood\(^6\)
  - 40-70% of adolescents\(^7,8\)
  - Up to 50% of adults\(^6,8\)

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\(^3\) US Department of Health and Human Services. 1999.
\(^8\) Gillman et al. Arch Gen Psychiatry. 1985;42(10):937-47.
ADHD Through The Life Cycle: Myths About ADHD

1) Only affects children and/or disappears in adolescence and/or does not affect adults

2) Ritalin has paradoxical effects in children not in adults, thus it does not work in adults

3) Dangerous drug because possibility of addiction
ADHD: Timeline of Definitions

- **1902**: First Description of ADHD by Still
- **1922**: Post-encephalitic Behavior Disorder
- **1930**: Minimal Brain Damage
- **1937**: Hyperactive Child Syndrome
- **1950**: Minimal Brain Dysfunction
- **1968**: Efficacy of Amphetamine Dr. Bradley
- **1970**: Hyperkinetic Reaction of Childhood (DSM-II)
- **1980**: Attention Deficit Disorder (DSM-III)
- **1987**: Attention Deficit Disorder ± Hyperactivity (DSM-III-R)
- **1994**: Attention Deficit/Hyperactivity Disorder (DSM-IV)
ADHD Through The Life Cycle
History of the Disorder

ADHD is a genetic disorder involving several genes

- They have a tendency to segregate together that means they lie close together in the DNA

- Runs in families manifesting itself with different degrees of severity in any given generation

- Shows itself with different degrees of severity in each one of the various generations
ADHD Through The Life Cycle
Some General Characteristics

- Some have learning disabilities (5-10%)
- Some have soft neurological signs
- Watch for Tourette’s disorder
- 1 or 2% may be co-morbid with BD
- As they grow older can become ODD, CD etc
ADHD Through The Life Cycle
Some General Characteristics

- Lack of social skills, unpopular, need to be first
- Needs are imperative, now, can not wait
- Lower threshold for stimuli (ADHD a misnomer)
- Writing a problem, reversal of letters etc
ADHD Through The Life Cycle
Symptoms In Children

- Distractability, inability to pay attention
- Hyperactivity (more in boys than girls)
- Impulsivity (doing things without thinking of the consequences)
- I will add irritability (very short fuses)
Characteristic Problems of Adults With ADHD

- Disorganization
- Distractibility
- Restlessness
- Impulsivity
- Labile Mood
- Quick Temper
- Oppositional Behavior
- Job Stress
- Unemployment
- Divorce
- Loneliness
- Smoking
ADHD Through The Life Cycle Adult Characteristics

1) ADHD persist into adulthood 75% of the time and up to 4% of adults suffer from it

2) Diagnosis similar to that in children but:

   a) At times hyperactivity is better controlled

   b) In adults nearly as many females as males

   c) Can be a crippling disorder for adults too
ADHD Through The Life Cycle
Adult Characteristics

d) Conflicts are the same that in childhood but with a change of scenarios. School becomes the workplace, peers-spouses, teacher-bosses etc

3) Treatment is similar to that of children
ADHD Through The Life Cycle
Adult Characteristics

4) Watch for alcohol and or drug abuse (common)

5) Watch for substance abusers:
   a) Interview wife
   b) Call their physician, pastor etc
   c) Offer Desipramine
ADHD Through The Life Cycle

Symptoms Of Adults

1) Distractability in different degrees

2) Hyperactivity present but under better control sometimes

3) Impulsivity (acting without thinking)

4) Irritability, hot temper, affective lability

5) Significant stress intolerance
What about tantrums?

Temper tantrums are common in ADHD children early on and may persist all through life, even in adulthood sometimes!
ADHD: Impact of Untreated & Under-Treated ADHD

Health Care System
- 50% ↑ in bike accidents
- 33% ↑ in ER visits
- 2-4 x more motor vehicle crashes

Patient
- 3-5x ↑ Parental Divorce or Separation
- 2-4 x ↑ Sibling Fights

School & Occupation
- 46% Expelled
- 35% Drop Out
- Lower Occupational Status

Society
- Substance Use Disorders: 2 X Risk
- Earlier Onset
- Less Likely to Quit in Adulthood

Employer
- ↑ Parental Absenteeism and Productivity

References:
4-5. Barkley et al., 1993; 1996.
10. Wilens et al., 1995.
Drugs most used are various forms of:

a) **Methylphenidate**: Ritalin, Ritalin LA, Focalin and Focalin XR, Metadate CD, Methylin (chewable and liquid), Concerta, & various others

b) **Dextro-amphetamines** (Various forms)

c) **Tricyclics antidepressants** (rarely nowadays), antihypertensive such as Clonidine and Tenex

d) **Antipsychotics** should be avoided if possible

e) **Monoamine Oxidase Inhibitors** (effective but very dangerous, particularly in children)

f) **Atomoxetine** (Strattera)
**Methylphenidate is classified as a psychostimulant drug and comes in several forms:**

a) Straight Ritalin (5, 10, and 15 mg) (3 ½ H)
b) SR Ritalin (Ciba 20 mg) (not recommended)
c) Metadate CD, ER, (10, 20, 30, 40, 50 & 60 mg) (5-6 H)  
   (Can be Sprinkle)
d) Concerta (ER) (18, 27, 36, 54 & 72 mg) (11-12 H)
e) FocalinTM (2.5, 5, 10 mg) (4 hours)
f) Focalin XR (5, 10, 20 mg) (5 1/2 to 6 hours)
g) Ritalin LA (20, 30, 40 mg) (5 1/2 to 6 hours) (Sprinkle)
h) Methylin Chewable Tablets (2.5, 5 & 10 mg)  
   and Liquid Solution (5mg/5 ml & 10mg/5ml)
i) Daytrana patch (MTS), 10, 15, 20 & 30 mg (up to  
   12 hours)
Other Medications Used For Treatment (Amphetamines)

Dextro-amphetamines:

1) Most used straight release in this group:
   a) Dexedrine (5mg), (4 ½ H)
   b) Dextrostat (5 and 10 mg) (4 ½ H)
   c) Adderall (5, 10, 20, mg) (4 ½ H)

2) Most used slow releases in this group:
   a) Dexedrine SR (5, 10, 15 mg) (6-7 H) (Sprinkle)
   b) Adderall XR (5, 10, 15, 20, 25 & 30 mg capsules) (6 H) (Sprinkle)

3) Newly approved: Vyvanse (lisdexamfetamine). It remains inactive until swallowed. Same black boxes *.
ADHD Through The Life Cycle
Drugs Used For Treatment

**Tricyclic antidepressants:**

1) Longer duration of action (once daily dosing)

2) No rebound or insomnia problems

3) Can monitor plasma drug levels (for safety and compliance)

4) No risk of abuse, small doses of 10-25 mg

5) Some death reports in children with TCA’s (next)
Tricyclic Antidepressants (cont)

- Those more frequently used *in the past* were:
  a) Norpramin (imipramine+desipramine)
     - Dirty, many side effects
  b) Better to use Desipramine (less side effects, may respond by third day)
  c) Nortriptiline (not generally used)

- Always monitor cardiovascular side effects
ADHD Through The Life Cycle
Drugs Used For Treatment

The Use of Catapres (Clonidine) and Tenex:

1) Clonidine is an imidazoline derivative used as antihypertensive agent

2) Reduce the activation or arousal of ADHD, Tourette’s syndrome and aggression

3) Used in highly irritable, impulsive and aggressive children
ADHD Through The Life Cycle
Drugs Used For Treatment

4) On occasion can be taken up to 3x q. d (6 hours interval) at doses of up to 0.1 mg (total of 0.3-0.3 ½ mg)

5) Useful in motor tics, overactive ADHD but not useful to control the distractability itself

6) Helps to sleep if taken in early evening (1/2 an hour before sleeping time)
ADHD Through The Life Cycle
Drugs Used For Treatment

- 7) Major side effect is sedation starting 30-60 minutes after dose is taken.

- 10) Excretion half life 8-12 hours but very variable.

- 11) May take 2 - 4 weeks to see response (beyond sedation) (next)
ADHD Through The Life Cycle
Drugs Used For Treatment

- 12) Patches can be used delivering 0.1-0.3 mg q.d for a week according to size of patch

- 13) Guanfacine (Tenex) can be given in doses of 1-3 mg q.d (6 hours interval between doses)

- 14) Guanfacine (Tenex) has the same indications of Clonidine
**MEDICATIONS**

*Drugs most used are various forms of:*

a) **Methylphenidate**: Ritalin, Ritalin LA, Focalin and Focalin XR, Metadate CD, Methylin (chewable and liquid), Concerta, & various others

b) **Dextro-amphetamines** (Various forms)

c) **Tricyclics antidepressants** (rarely nowadays), antihypertensive such as Clonidine and Tenex

d) **Antipsychotics should be avoided if possible**

e) **Monoamine Oxidase Inhibitors** (effective but very dangerous, particularly in children)

f) **Atomoxetine (Strattera)**
Atomoxetine (Strattera) is a re-uptake inhibitor of norepinephrine. It is not a psychostimulant.

- Effective only 30-35% of the time.
- Black box warnings about possible liver damage and increased suicidality in children. Use only after 6 years of age.
- Best doses seems to be 1.2 mg/kg/day
- Does not exacerbate tics. Covers patient 24 hours.
- Not controlled by FDA.
- Side effects: Decreased appetite, nausea, loss of weight, somnolence, etc. Loss of libido (8%). Non-addictive.
# Dosing Information

<table>
<thead>
<tr>
<th>Patient Weight Range</th>
<th>Starting Dose (Minimum of 3 days)</th>
<th>Target Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-62 lbs</td>
<td>18 mg</td>
<td>25 mg</td>
</tr>
<tr>
<td>63-93 lbs</td>
<td>25 mg</td>
<td>40 mg</td>
</tr>
<tr>
<td>94-126 lbs</td>
<td>40 mg</td>
<td>60 mg</td>
</tr>
<tr>
<td>127+ lbs</td>
<td>40 mg</td>
<td>80 mg*</td>
</tr>
</tbody>
</table>

*Combination of (2) 40-mg capsules

Can Be Taken With or Without Food
Unique Microtrol® Two-Bead Delivery System\textsuperscript{1,2}

**Immediate-Release Beads**

50% of Beads in Each Capsule
Release amphetamine salts for absorption promptly after ingestion

**Delayed-Release Beads**

50% of Beads in Each Capsule
Release a second pulse of drug approximately 4 hours later, due to a special polymer coating

4 hours
# Daytrana™ Dosing

<table>
<thead>
<tr>
<th>Dose Delivered Over 9 Hours</th>
<th>Delivery Rate*†</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 mg</td>
<td>1.1 mg/hr x 9 hrs</td>
</tr>
<tr>
<td>15 mg</td>
<td>1.6 mg/hr x 9 hrs</td>
</tr>
<tr>
<td>20 mg</td>
<td>2.2 mg/hr x 9 hrs</td>
</tr>
<tr>
<td>30 mg</td>
<td>3.3 mg/hr x 9 hrs</td>
</tr>
</tbody>
</table>

*In pediatric subjects aged 6 to 12 when applied to the hip, based on a 9-hour wear period.†

- Daytrana is available in 4 dosage strengths: 10 mg, 15 mg, 20 mg, and 30 mg.
- Daytrana is packaged in 10-count and 30-count trays.
- Start all patients on the 10-mg patch; titrate dose to effect.
- Daytrana should be worn for 9 hours to achieve a 12-hour duration of effect.†
  - Significance shown at 2 hours—the first time point measured.†
- Wear time can be individualized.
  - Daytrana may be removed earlier than the recommended 9-hour wear time if a shorter duration of effect is desired or if late-day side effects appear.†
NEW WARNINGS

- Psychostimulants should not be used in patients with severe depression, schizophrenia or suicidal tendencies.

- Contraindicated in angina pectoris, cardiac arrhythmias, heart failure, recent acute myocardial infarction or in cases of hyperthyroidism or thyrotoxicosis and/or patients with structural cardiac abnormalities or other serious heart problems.

- Psychostimulants should be used cautiously in patients with high blood pressure. Blood pressure should first be controlled and then monitored regularly in such cases.

- Clear communications on side effects, potential dangers etc, must exist between parents, patients and doctors, so as to achieve a proper informed consent.

- Black box warnings about mental and heart problems in effect.

- Mixing alcohol and MPH seems potentially dangerous.*
The following medications can be used:

Sprinkled:
1) Ritalin LA
2) Adderall
3) Metadate

Liquid (NEW):
1) Methylin (Oral Solution)
   (5 mg/5 ml & 10 mg/5 ml)

Chewable:
1) Methylin (Chewable Tablet)
   (2.5 mg, 5 mg & 10 mg) and liquid

Patch:
   Daytrana, MTS Transdermal TM
The Concerta™ OROS® System

- After the MPH overcoat dissolves, Concerta™ continues to deliver MPH in the morning, followed by a higher concentration in the afternoon to maintain efficacy through 12 hours.\(^1\,^2\)
- Smooth delivery minimizes fluctuations in peak-trough plasma concentrations seen with MPH tid.
One morning dose provides smooth delivery throughout the day

Release of Methylphenidate from a Concerta® 18-mg Tablet

Morning
A MPH overcoat provides an immediate release of 22% of the dose within 1 hour.

1 hour later
The push mechanism absorbs fluid and expands, acting as an osmotic pump to provide smooth delivery of MPH for the rest of the morning.

Afternoon
As the push mechanism continues to expand, a higher concentration of MPH is released during the afternoon.

Delivering an ascending profile results in a smooth effect through 12 hours, with or without food.
CONCERTA®: Treatment

The unique ascending profile is designed to maintain a consistent, 12-hour therapeutic effect, providing a reduction of symptoms throughout the day.

COMMON COMORBIDITIES OF ADHD

- Anxiety
- Depression
- Oppositional Defiant Disorder
- Conduct Disorder
- Substance Abuse
- Learning disabilities
- Obsessive Compulsive Disorder
- Bipolar Disorders
- Tourette’s Disorder
What I Have Learned

1) ADHD is a misnomer. The word deficit seems to imply that they are lacking something.

2) In fact what they are is hyperattentive. In other words, they pay attention to everything, to every stimuli, even smells, but they cannot stay focused on any one.

3) The world is full of stimuli that surrounds you everywhere. Think of a class room with 30 students.

4) Exciting things and some forms of anxiety release adrenalin: WHATEVER RELEASES ADRENALIN HELPS CORRECT THE PROBLEM!!
Aim for the highest therapeutic goal

**IMPROVEMENT**

- 90 to 100%
- 80%
- 60%
- 50%

The secret is: Titration

Don’t Stop at Just Partial Symptom Control

Reach to the top
Additional Sources of Information

Children and Adults with Attention-Deficit/Hyperactivity Disorder (CHADD)
www.chadd.org
8181 Professional Place
Suite 201
Landover, MD 20785
Phone: (800) 233-4050;
(301) 306-7070
Fax: (301) 306-7090

The Attention Deficit Information Network, Inc.
www.addinfonetwork.com
475 Hillside Avenue
Needham, MA 02194
Phone: (781) 455-9895
Fax: (781) 444-5466

National Attention Deficit Disorder Association (ADDA)
www.add.org
1788 Second Street, Suite 200
Highland Park, IL 60035
Phone: (847) 432-ADDA;
(847) 432-2332
Fax: (847) 432-5874

National Institute of Mental Health
www.nimh.nih.gov/publicat/adhd.cfm
NIMH Public Inquiries
6001 Executive Boulevard
Room 8184, MSC 9663
Bethesda, MD 20892-9663
Phone: (301) 443-4513
Fax: (301) 443-4279

ADHD Support Group at the Carter-Jenkins Center (Tampa), call Clarisse Castro for Information at:
813-264-2404
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The End

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