

# The Treatment of ADHD as a Child and Adolescent Psychiatrist Sees It

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# Outline

- History of the disorder
- Diagnostic Criteria
- Age Trends
- How the disorder is diagnosed
  - Mimics and comorbidities
- How common is it
- Genetics
- Treatment

# The Story of Fidgety Phillip

--Dr. Heinrich Hoffman, 1844



"Let me see if Philip can  
Be a little gentleman;  
Let me see if he is able  
To sit still for once at table."  
Thus spoke, in earnest tone,  
The father to his son;  
And the mother looked very grave  
To see Philip so misbehave.  
But Philip he did not mind  
His father who was so kind.

He wriggled  
And giggled,  
And then, I declare,  
Swung backward and forward  
And tilted his chair,  
Just like any rocking horse;-  
"Philip! I am getting cross!"

# The Story of Johnny Head-In-Air



As he trudg'd along to school,  
It was always Johnny's-rule  
To be looking at the sky  
And the clouds that floated by;  
But what just before him lay,  
in his way,  
Johnny never thought about;  
So that everyone cried out -  
"look at little Johnny there,  
Little Johnny Head-In-Air!"

# A rose by any other name...

- **1902** Defects in moral character
- **1934** Organically driven
- **1940** Minimal Brain Syndrome
- **1957** Hyperkinetic Impulse Disorder
- **1960** Minimal Brain Dysfunction (MBD)
- **1968** Hyperkinetic Reaction of Childhood (DSM II)
- **1980** Attention Deficit Disorder - ADD (DSM III) -  
with-hyperactivity, -without-hyperactivity, -residual  
type

# Names for ADHD

- **1987** Attention-Deficit Hyperactivity Disorder or Undifferentiated Attention Deficit Disorder (DSM III-R)
- **1994** Attention-Deficit/Hyperactivity Disorder (DSM IV)
  - 314.01: ADHD, Combined Type
  - 314.00: ADHD, Predominantly Inattentive type
  - 314.01: ADHD, Predominantly Hyperactive-Impulsive Type

# DSM-IV Diagnostic Criteria (Inattention)

- Makes careless mistakes/poor attention to detail
- Difficulty sustaining attention in tasks/play
- Does not seem to listen when spoken to directly
- Difficulty following instructions
- Difficulty organizing tasks/activities
- Avoids tasks requiring sustained mental effort
- Loses items necessary for tasks/activities
- Easily distracted by extraneous stimuli
- Often forgetful in daily activities

# DSM-IV Diagnostic Criteria (Hyperactive/Impulsive)

- Fidgets
- Leaves seat
- Runs or climbs excessively (or restlessness)
- Difficulty engaging in leisure activities quietly
- “On the go” or “driven by a motor”
- Talks excessively
- Blurts out answers before question is completed
- Difficulty waiting turn
- Interrupts or intrudes on others





Elwood, who is hyperactive, impulsive and easily bored, is often the class clown.

# DSM-IV Functional Criteria

- 6 of 9 symptoms in either or both categories
- Three types: Inattentive; Hyperactive-Impulsive; or Combined Type
- **Persisting for at least 6 months**
- **Some symptoms present before 7 y/o**
- **Impairment in 2 or more settings**
- Social/academic/occupational impairment

# Issues for DSM-V

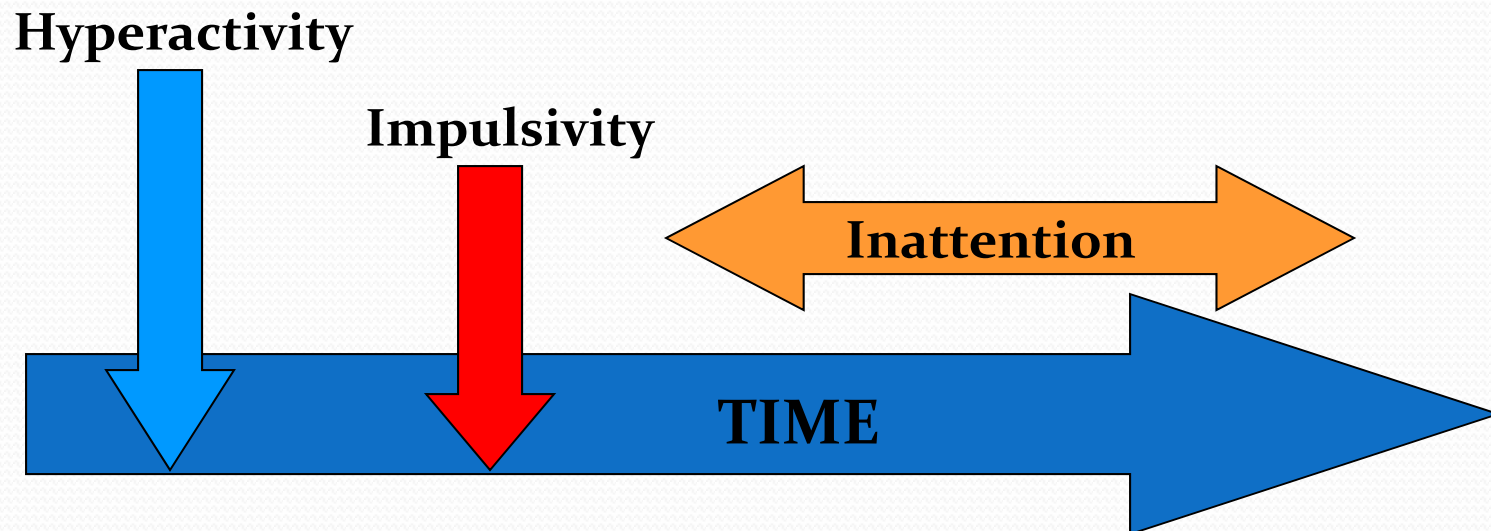
- Inattention list may be narrow
  - Broaden to include poor working memory (and possibly larger domain of executive functions)
- Symptoms and wording are not appropriate past childhood
  - Need more items for adult stage of disorder
- Symptom cutoffs (6 of 9) are also not appropriate past childhood or in the preschool years

# More Issues for DSM-V

- Duration may be too short for preschoolers:
  - try 1 year or more
- No requirement for corroboration by others
  - Yet that is essential when evaluating teens and young adults up to late 20s-early 30s due to under-reporting of symptoms
- Age of onset of 7 years lacks studies

# A Chronic Disorder

- Symptoms persist into adolescence and adulthood for majority of patients
  - Hyperactivity and impulsivity may diminish at a higher rate than inattention



# Clinical Presentation in teens

- Excessive motor activity tends to decrease
- May have sense of inner restlessness (rather than hyperactivity)
- Schoolwork disorganized and shows poor follow-through; fails to work independently
  - Comments: “Not living up to potential,” “spacey,” “hyper”
  - Behavioral issues: “Class clown”
- Engaging in “risky” behaviors (speeding and driving mishaps)
- Difficulty with authority figures
- Poor self-esteem
- Poor peer relationships
- Anger, emotional lability



# Inattention: Pediatric to Adult Symptom Migration

## Childhood DSM-IV-TR

### Symptoms:

- Difficulty sustaining attention
- Does not listen
- Difficulty following instructions
- Cannot organize
- Loses things
- Easily distracted/ forgetful

## Common Adult

### Symptoms:

- Difficulty sustaining attention to reading or paperwork
- Easily distracted and forgetful
- Poor concentration
- Poor time management
- Difficulty finishing tasks
- Misplaces things



# Hyperactivity: Pediatric to Adult Symptom Migration

## Childhood DSM-IV-TR

### Symptoms:

- Squirms and fidgets
- Runs or climbs excessively
- Cannot play or work quietly
- “On the go,” driven by a motor
- Talks excessively

## Common Adult

### Symptoms:

- Inner restlessness
- Overwhelmed
- Self-selects active jobs
- Talks excessively
- Fidgets when seated



# Impulsivity: Pediatric to Adult Symptom Migration

## Childhood DSM-IV-TR

### Symptoms:

- Blurts out answers
- Cannot wait his or her turn
- Intrudes on or interrupts others

## Common Adult

### Symptoms:

- Impulsive job changes
- Drives too fast, has traffic accidents
- Irritability or quickness to anger

# What is the impact of ADHD on people?

- Increased # of students with ADHD drop out of school
- Only 5-10% will complete college
- 50-70% have few or no friends
- 70-80% will under-perform at work
- 40-50% will engage in antisocial activities
- More likely to experience teen pregnancy & sexually transmitted diseases
- Have more accidents & speed excessively
- Experience depression & personality disorders

# Adult ADHD Can Lead to Potentially Serious Consequences

- More than twice as likely to have been arrested
- Significantly more drivers with ADHD...
  - Drove without a license
  - Had licenses revoked or suspended
  - Had multiple crashes (2+)
  - Had multiple traffic citations (3+), especially for speeding
    - 47% more likely to have received >1 speeding ticket in a 12-month period
- 78% more likely to be addicted to tobacco
- Twice as likely to have been divorced
- 78% more likely to be currently unemployed



# Natural History

- By adulthood
  - 1/3 → complete resolution
  - 1/3 → continued inattention, some impulsivity
  - 1/3 → early ODD/CD, poor academic achievement, substance abuse, antisocial adults
- Age related changes:
  - Preschool (3-5 y/o) – hyperactive/impulsive
  - School age (6-12 y/o) – combination symptoms
  - Adolescence (13-18 y/o) – more inattn w/restlessness
  - Adult (18+) – largely inattn w/periodic impulsivity



*“I need you to line up according to attention span.”*

# Establishing a Diagnosis (1)

- Clinical Interview:

Diagnostic Assessment of Primary Complaint

Review of Psychiatric Systems (e.g., attention, hyperactivity/impulsivity, oppositional & conduct difficulties, mood, anxiety, psychosis, trauma, tics, substance abuse, etc.)

Medical, Psychiatric, & Developmental History

Detailed Educational History

Detailed Family & Social History

## Establishing a Diagnosis (2)

- There is no single test to identify ADHD
- Available “tests” are primarily Continuous Performance Tests (CPTs) are used in research studies and are not helpful in clinical evaluation:
  - TOVA (Test of Variables of Attention)
  - Conner’s CPT
  - Gordon Computerized Diagnostic System
  - IVA+ CPT

## Establishing a Diagnosis (3)

- The importance of interviewing others:
  - Patient
  - Primary Caregivers (parents, grandparents, etc.)
  - Teachers
  - School Counselors
  - Sunday School Teachers
  - Coaches
  - Music Teachers
  - Camp Counselors
  - Spouses/significant others



# Establishing a Diagnosis (4)

- Symptoms in  $\geq 1$  setting:
  - Never diagnose ADHD in a 1:1 interview
  - Individuals with ADHD can often function well in certain settings with no signs of symptoms when they are interested and maintain total focus (e.g., playing Nintendo, watching videos, etc.)
  - Symptoms in group settings are a must.
  - ADHD varies by setting!

## Establishing a Diagnosis (5)

- Rating scales are extremely useful for evaluating and assessing improvement:
  - SNAP – IV (for parents & teachers)
  - Conners (for teachers, parents, and affected adults)
  - ACTeRS (for teachers & parents)
  - Child Behavior Checklist
  - Behavior Assessment System for Children (BASC)
  - ADHD Rating Scale – IV
  - Brown ADD Scales

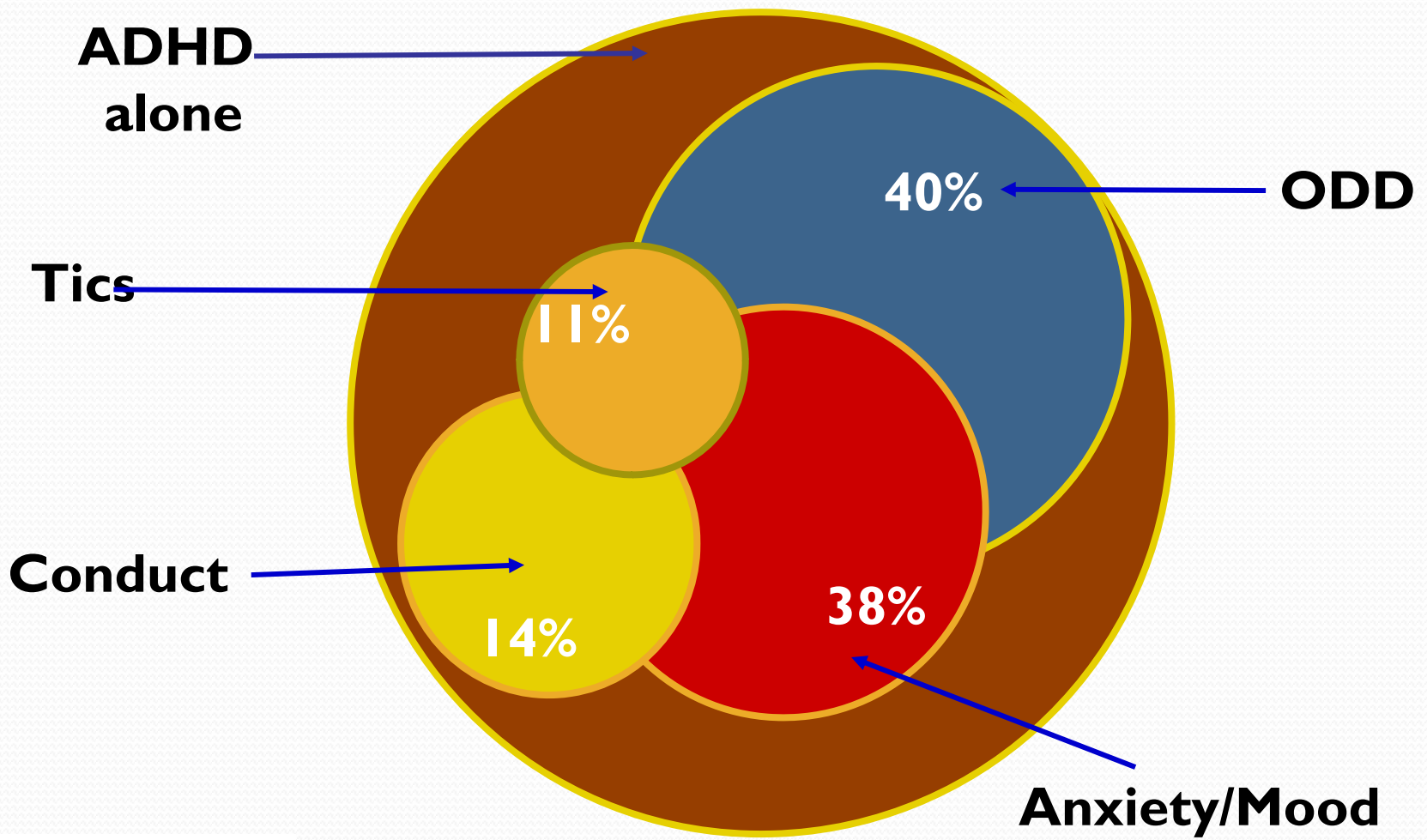
# Differential Diagnosis (Psychiatric)

- Mood and/or Psychotic Disorder
- Anxiety Disorder
- Learning Disorder
- Mental Retardation/Borderline IQ
- ODD/Conduct Disorder
- Pervasive Developmental Disorder
- Substance Abuse
- Axis II Disorders
- Psychosocial Cx (e.g., abuse, parenting, etc.)

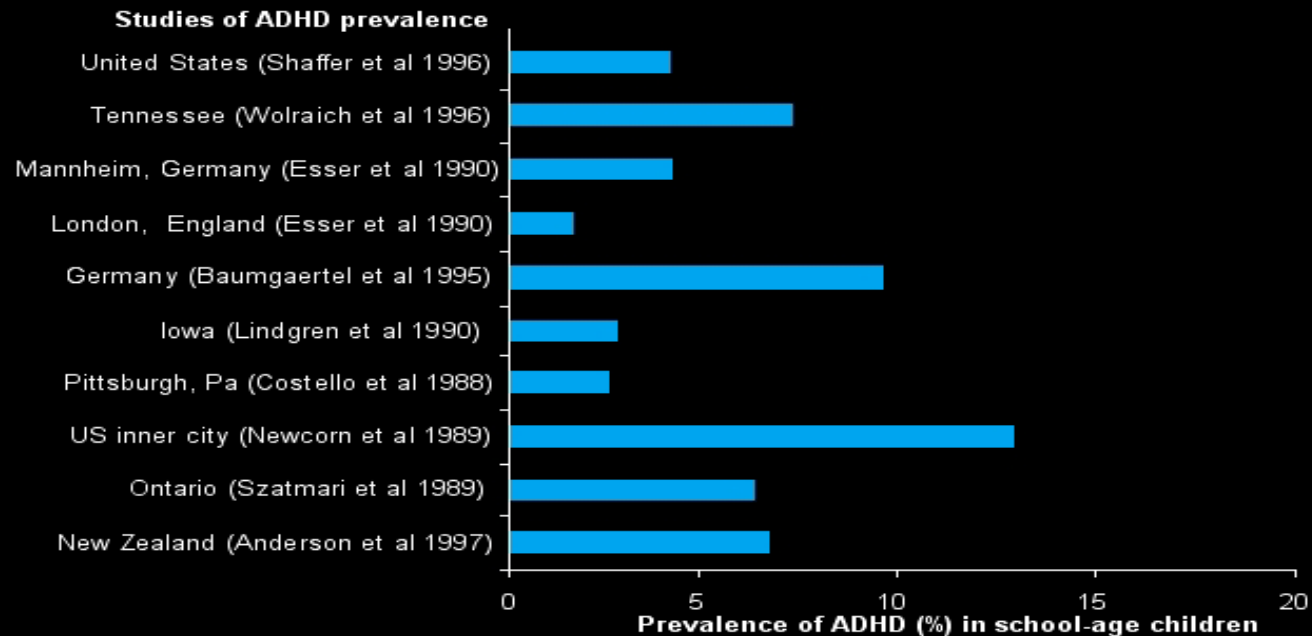
# Differential Diagnosis (Medical)

- Seizure Disorder (e.g., Absence, Complex-Partial)
- Chronic Otitis Media
- Hyperthyroidism
- Sleep Apnea
- Drug-Induced Inattentive Syndrome
- Head Injury
- Hepatic Illness
- Toxic Exposure (e.g., lead)
- Narcolepsy

# Comorbidity



# Worldwide Prevalence of ADHD Is 3% to 7%

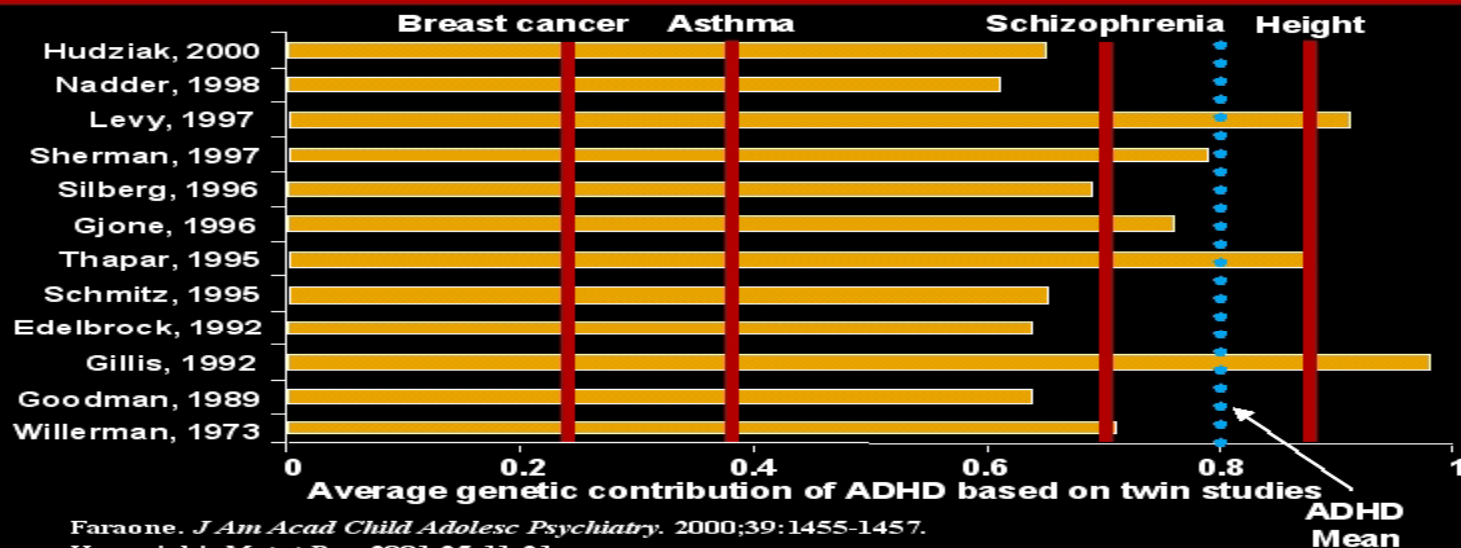


Goldman, et al. *JAMA*. 1998;279:1100-1107.

# ADHD is Familial

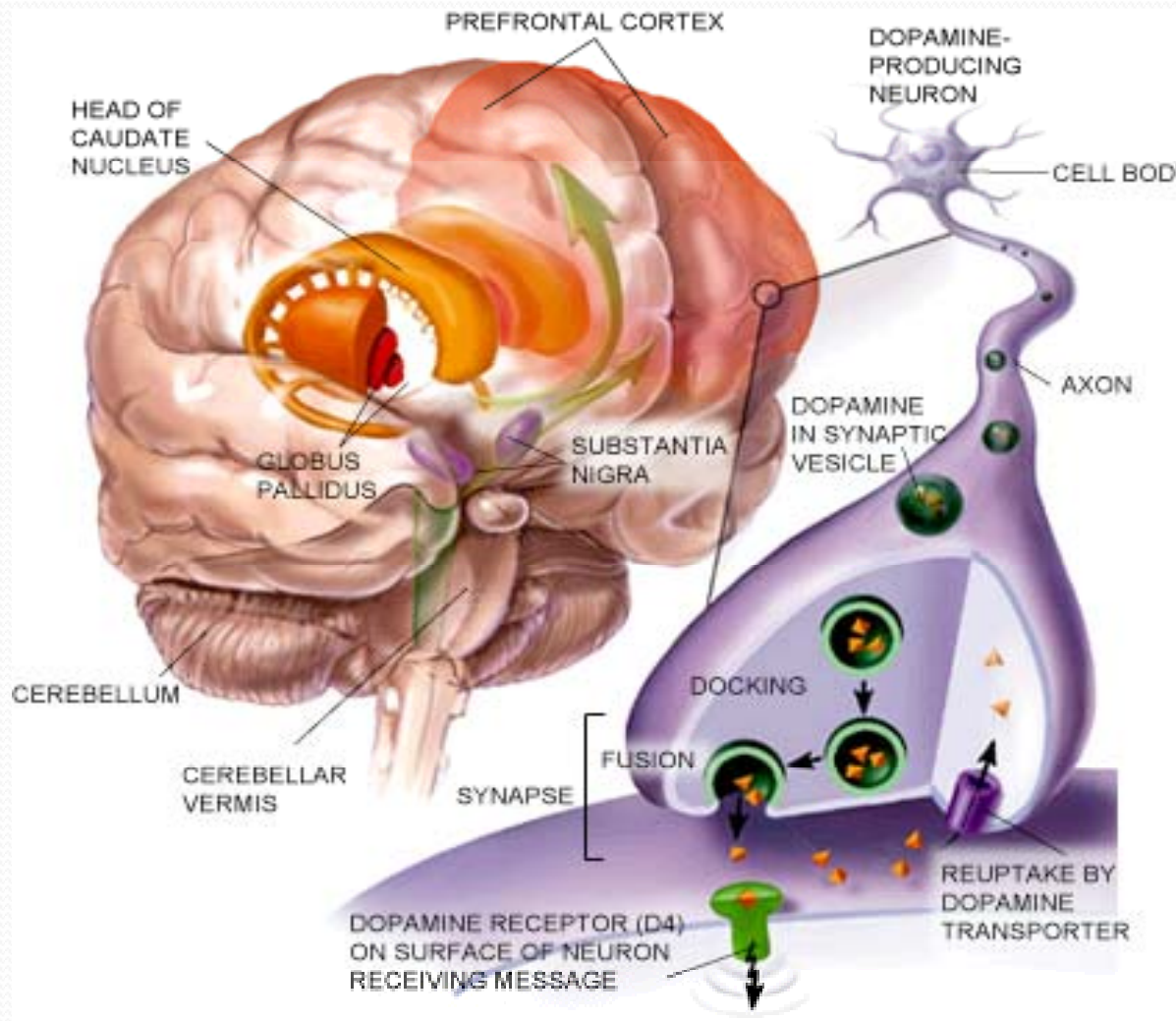
- Family studies: (1) sibling risk increases 2-5x; (2) 3-5x increased likelihood that parent is affected (9 – 35%)

## Twin Studies Show ADHD Is a Genetic Disorder





# Brain Regions Implicated in ADHD



*Scientific American, September 1998*





# Postcards

- *It is difficult to express what receiving this diagnosis meant to me. I felt an incredible relief in knowing that my difficulties in school were not my fault. It was like the feeling I got when I first put on a pair of glasses...I found myself looking at things in a new way. My initial embarrassment at having to take medicine to concentrate and focus better went away quickly when I recognized the huge difference in my ability to pay attention and learn*

# Postcards

- *As a medical student, living with ADHD was like constantly being overwhelmed by the floods of information we need to learn....but until I was diagnosed I sensed something was different – no matter how hard I tried, something seemed amiss, and I was not doing as well as I wanted.. It was not a matter of not understanding the material...I felt like I was constantly battling another part of myself. Once the problem was identified and treatment was begun, my work improved.*

# Treatment



# A case

- J is 7 years old. He is in the second grade lives with his parents and 4 siblings. His parents report that he has always been a lively boy who has “given them a run for their money.” Kindergarten teachers reported that he had difficulty during circle time, did not stick with one task and was often aggressive with other children. Now in second grade teachers still complain about his inability to remain seated, his impulsiveness and easy distractibility. Parents admit that they are reluctant to take him anywhere, he is constantly running away from them, can’t sit in a restaurant, is unable to settle down at bedtime and constantly fights with his siblings.

# Questions

- What is diagnosis
- Does he need treatment
- Which treatment

# Treatment Options

- Behavioral treatments
  - Daily Report Cards
  - Organizational Skills
  - Summer Programs
  - Parenting
- School support
- Socialization groups
- Medications
  - Stimulants
    - Methylphenidate
    - Amphetamine
  - Strattera
  - Clonidine & Guanfacine
  - Others
    - Wellbutrin
    - Tricyclics
    - Antipsychotics
- “Alternative treatments”
  - Feingold diet
    - Elimination diets
  - Vision Therapy
  - Mineral replacement
  - Chiropractic
  - Blue-green algae
  - Neuro-feedback
  - FocusFactor
  - Amen Clinic
  - Hair Analysis
  - Attend
  - FocusADD
  - Focus ADDult
  - Hypinol
  - Caffiene
  - Omega 3
  - Coenzyme Q
  - St John’s Wart

# Behavioral Treatments



"THIS IS POLLY, MRS MITCHELL. HOW DO YOU MAKE DENNIS GO TO BED? OH, REALLY? WELL, WHERE DO YOU KEEP THE CLUB?"



# How does behavior management work?

- A – Antecedent
  - What sets child off?
  - What occurs before behavior problem?
- B – Behavior
  - What behavior does teacher & parent want to change?
- C – Consequence
  - What happens after child misbehaves?

# Parent Training

- Establish clearly defined house rules and routines
- Praise appropriate behavior & ignore inappropriate behavior  
“Catch your child being good.”
- Make your praise specific “Nice job staying with me in the grocery store”.
- Use clear and consistent commands  
:The toys go in the box.”
- Use positive rewards  
“After we put the toys in the box, we can play a game. “
- Use time out (loss of privileges) for negative behavior  
If you do not put the toys in the box, you will be in time-out  
If you are not in by mid-night, you can not go out next Saturday
- Plan ahead & eliminate potential problems  
Before entering a store, remind child of the rules



# Classroom Behavior Management Procedures

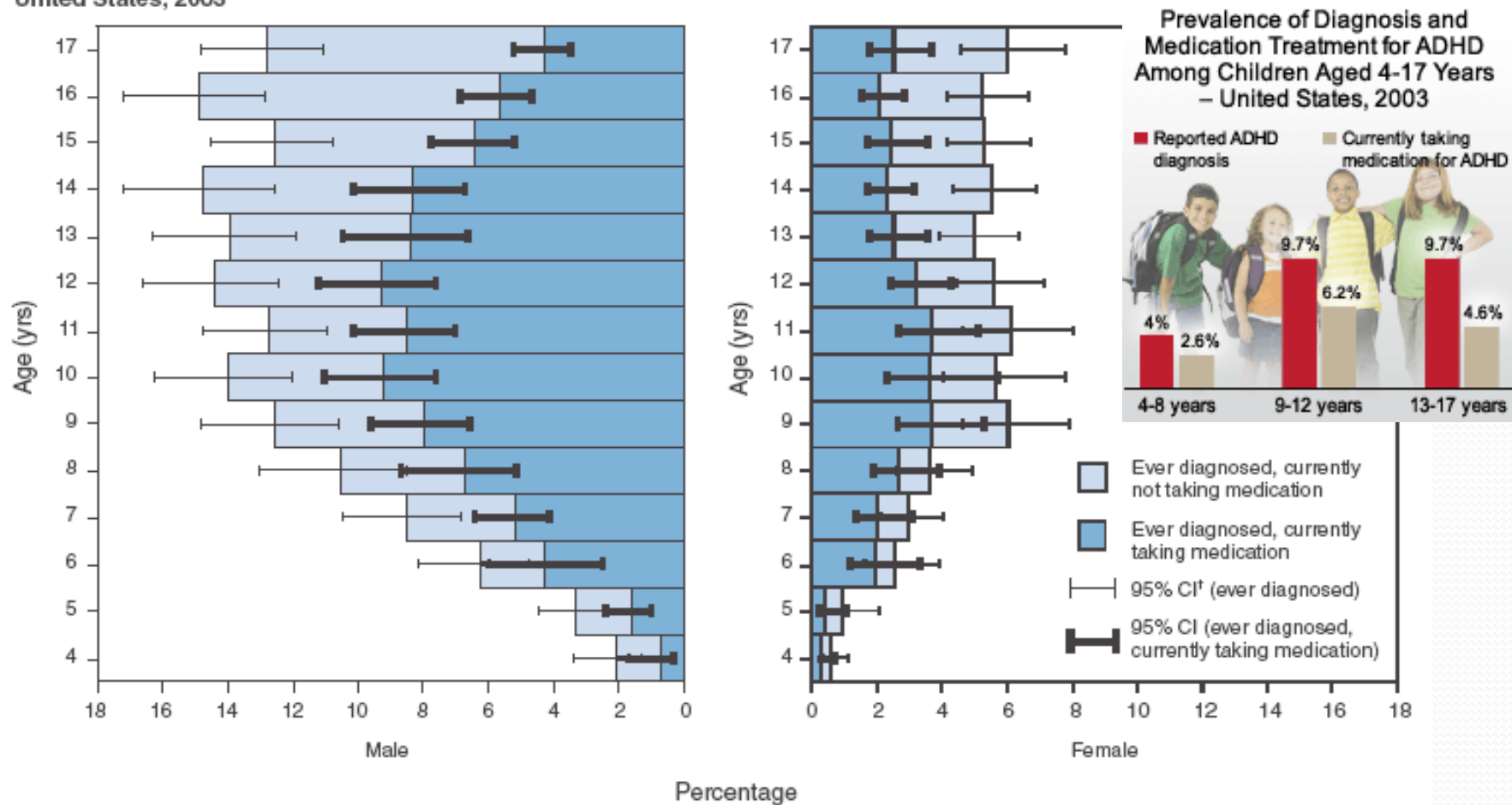
- Rules and structure
  - Respectful of others, Obey, Stay in seat, Raise hand, etc
- Praise appropriate behaviors & choose battles
  - Ignore mild problems
  - Cue positive comments
- Appropriate commands/reprimands
  - Clear and specific commands
  - Reprimands – brief, clear, immediate, & private
- **Daily school-home report card**
  - Target individual behavior
  - Parent can reward based on specific behaviors

# Medication Treatment

# Why Medicate?

- Medications are the most effective treatments we have available for ADHD with the largest evidence base
- Stimulants
  - Most well studied drugs in psychiatry
    - 350+ studies
- They are more effective than any other treatment for the core symptoms of ADHD
- Their safety is incredibly well established
- They improve 70-90 percent of clinical cases, normalizing 50-60% of such cases
- They can be used for years, even into adulthood

**FIGURE 1. Percentage of children aged 4–17 years ever diagnosed with ADHD,\* by age, sex, and medication treatment status — United States, 2003**



\* Attention-deficit/hyperactivity disorder.  
 † Confidence interval.

# History of Stimulant Formulations

- 1937 – IR d, l-amphetamine
- 1940 – IR d-amphetamine
- 1963 – IR methylphenidate
- 1970 – IR pemoline
- 1980 – SR methylphenidate
- 2000 – New formulations
  - Pills
  - Pumps
  - Pellets
  - Patches
  - Pro-drugs



# A history of stimulant approval

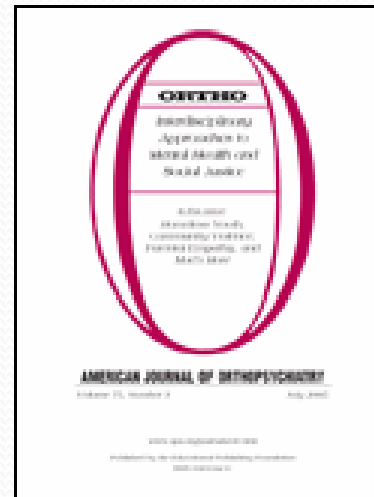
Drug	Product	Approval	Development	Marketing
d,l-AMP	Benezedrine <sup>®</sup>	1937	S, K&F	S, K&F
d-AMP	Dexedrine <sup>®</sup>	1940	S, K&F	S, K&F
d,l-MPH	Benezedrine Spansules <sup>®</sup>	1950	S, K&F	S, K&F
d-AMP	Dexedrine Spansules <sup>®</sup>	1950	S, K&F	S, K&F
d,l-MPH	Ritalin <sup>®</sup>	1963	CIBA	CIBA
d,l-AMP	Obetrol <sup>®</sup>	1950	Rexar	Rexar
pemoline	Cylert <sup>®</sup>	1975	Abbott	Abbott
d,l-MPH	Ritalin SR <sup>®</sup>	1980	CIBA	CIBA
d,l-MPH	Metadate <sup>®</sup>	1982	MD	Medeva
d,l-AMP	Adderall <sup>®</sup>	1996	Richwood	Shire
d,l-MPH	Concerta <sup>®</sup>	2000	Alza	J&J
d,l-MPh	Ritalin LA <sup>®</sup>	2002	Novartis	Novartis
atomoxetine	Strattera <sup>®</sup>	2002	Lilly	Lilly
d,l-MPH	Metadate CD <sup>®</sup>	2003	Medeva	UCB
d-MPH	Focalin <sup>®</sup>	2004	Celgene	Novartis
d,l-MPH	Focalin LA <sup>®</sup>	2005	Novartis	Novartis
d,l-MPH	Bifentin <sup>®</sup>	2006	PurdueCanada	PurdueCanada
d-l,MPH	Daytrana <sup>®</sup>	2006	Noven	Shire
AMP	Vyvance <sup>®</sup>	2007	New River	Shire

# Historical Perspectives

- 1937- Charles Bradley published “The Behavior of Children Receiving Bazedrine” in the *American Journal of Orthopsychiatry*.



Charles Bradley, M.D., 1902–1979



First author	Publication date	Drug	Dosing method	N in drug group	N in placebo group	Mean age	% Male	DSM version
Klorman	1987	MPH	Fixed	19	19	15	84	3
Taylor	1987	MPH	Best	37	37	9	100	3
Douglas	1988	MPH	Fixed	19	19	9	89	3
Arnold	1989	D-Amph	Fixed	18	18	–	100	3
Klorman	1994	MPH	Best	44	44	9	84	3R
Schachar	1997	MPH	Best	37	29	8	77	3R
Manos	1999	MAS	Best	42	42	10	79	4
Manos	1999	MPH	Best	42	42	10	79	4
Zeiner	1999	MPH	Best	36	36	9	100	3R
Pliszka	2000	MAS	Best	20	18	8	–	4
Pliszka	2000	MPH	Best	20	18	8	–	4
James	2001	MAS	–	35	35	9	60	4
James	2001	D-Amph	–	35	35	9	60	4
James	2001	D-Amph ER	–	35	35	9	60	4
Wolraich	2001	MPH	Best	97	90	9	87	4
Wolraich	2001	OROS MPH	Best	95	90	9	78	4
Biederman	2002	MAS-XR	Fixed	120	203	9	80	4
Greenhill	2002	MPH-MR	Best	155	159	9	83	4
Biederman	2003	MPH-LA	Best	63	71	9	77	4
Wigal	2004	MPH	Best	41	41	10	88	4
Wigal	2004	D-MPH	Best	42	41	10	88	4
Findling	2005	OROS MPH	Best	89	85	9	70	4
Wilens	2006	OROS MPH	Best	87	90	15	80	4
Spencer	2006	MAS-XR	Fixed	27	24	14	64	4
Spencer	2006	MAS-XR	Fixed	26	28	14	64	4
Findling	2006	MPH	Best	120	39	10	79	4
Findling	2006	MPH-MR	Best	120	39	10	81	4
Biederman	2007	LDX	Fixed	73	72	9	71	4
Palumbo	2008	MPH	Best	29	30	9	83	4
Findling	2008	OROS MPH	Best	78	77	9	66	4
Findling	2008	MTS	Best	82	77	9	60	4
Newcorn	2008	OROS MPH	Best	220	74	10	71	4

Studies are listed multiple times if they studied more than one drug



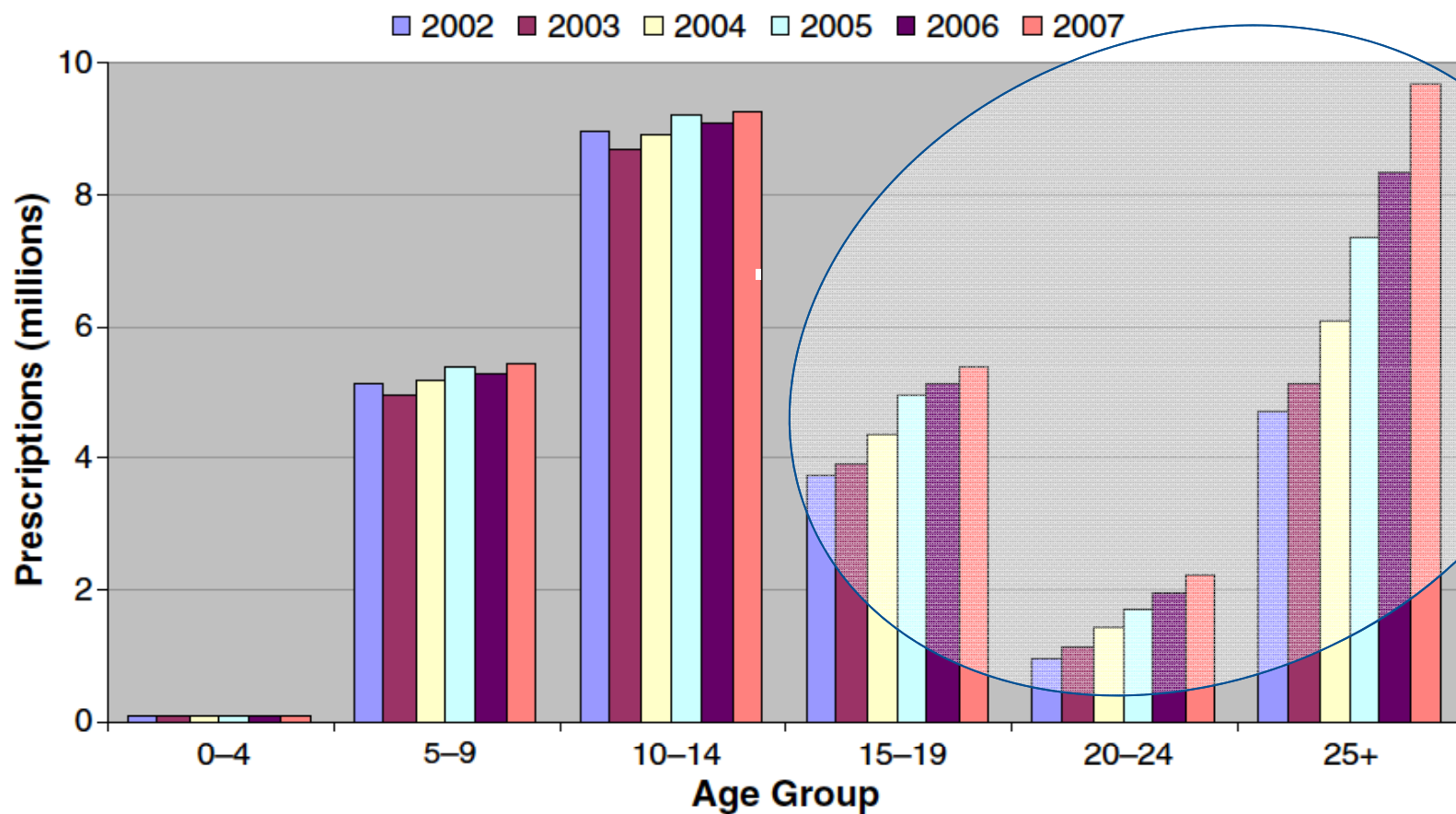
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# MTA

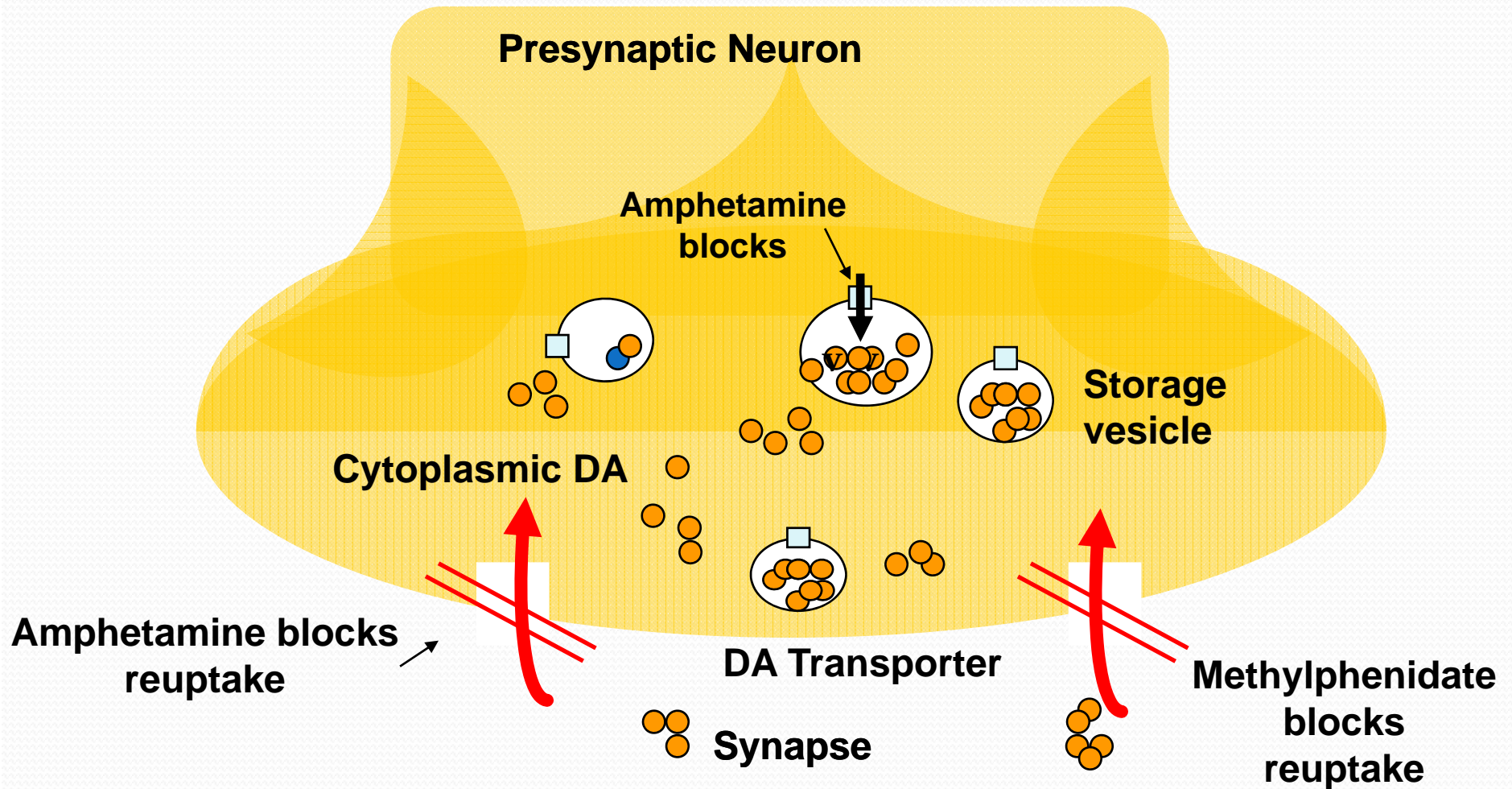
- Medication Management
  - MPH tid, algorithmic dose adjustment, case management by pharmacotherapist
- Intensive behavioral treatment
  - Parent training, 12 weeks of ½ time in classroom behavioral specialist, structured teacher consultation, 8 week summer treatment
- Med Management + Behavioral treatment
- Community Care
  - 2/3 received medication, all had f/u assessment

# How many prescriptions are written?





# How does it work



# Benefits of stimulants

- Increased concentration and persistence
- Decreased impulsivity and hyperactivity
- Increased work accuracy
- Decreased days absent from school
- Increased reading achievement by age 18
- Decreased likelihood of grade retention
- Decreased aggression and defiance

# Benefits of stimulants (2)

- Increased compliance
- Better working memory
- Improved handwriting and motor control
- Improved peer acceptance
- Improved attention and reaction time during driving





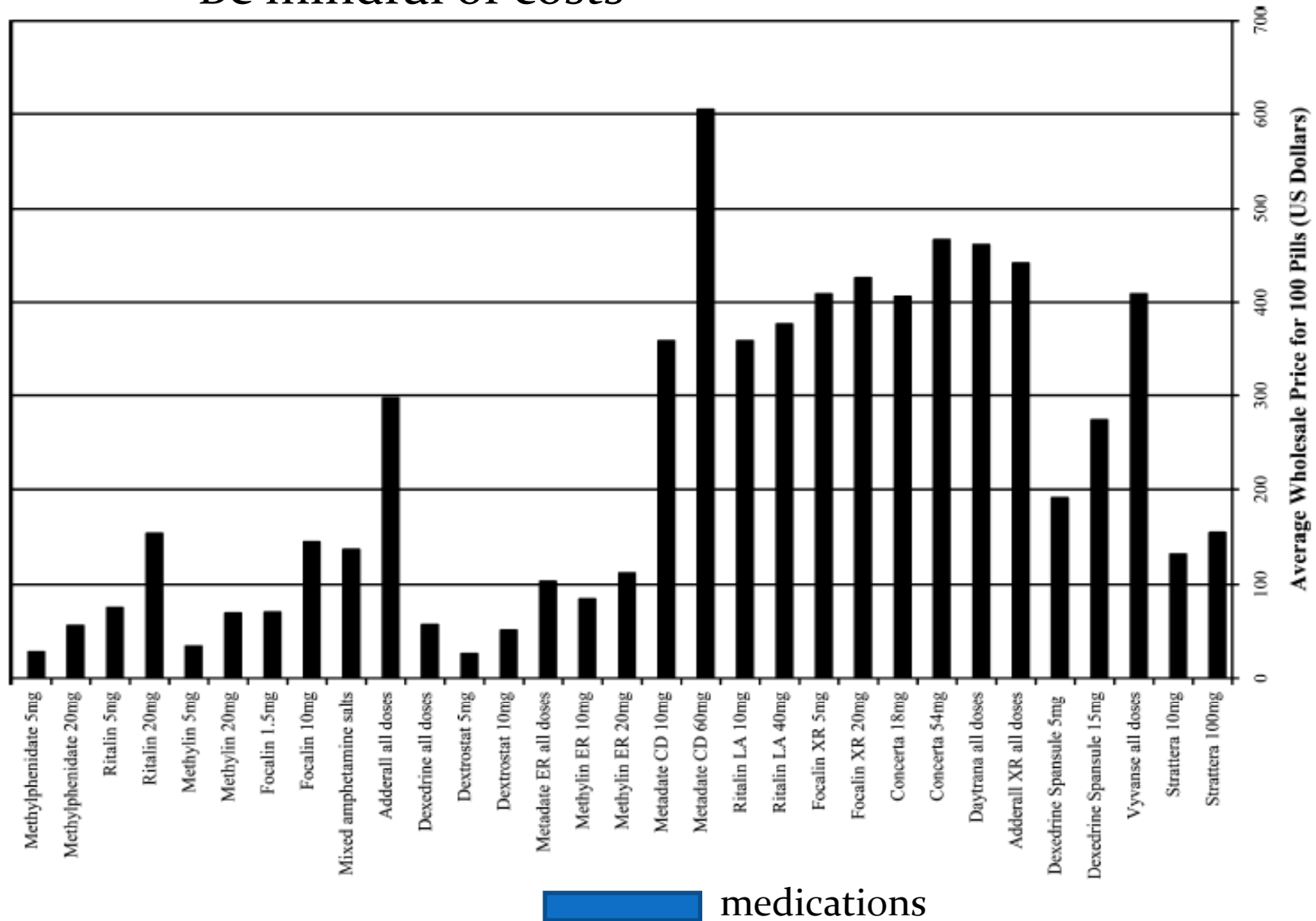
# Stimulant Options

- Short acting
  - Methylphenidate (Ritalin, Methalin)
  - D-methylphenidate (Focalin)
  - D-amphetamine (Dexedrine, Dextrostat)
  - Mixed amphetamine salts (Adderall)
- Long-acting (old delivery system)
  - Methylphenidate SR (Ritalin SR)
  - D-amphetamine spansule (Dexedrine Spansule)
- Long-acting
  - Concerta (Methylphenidate)
  - Metadate CD (Methylphenidate)
  - Ritalin LA (Methylphenidate)
  - Focalin XR (d-Methylphenidate)
  - Daytrana- patch (Methylphenidate)
  - Adderall XR (Amphetamine)
  - Vyvanse (Amphetamine)

# Approximate potency equivalents of stimulants


- Short acting
  - Ritalin x 1
  - Focalin x2
  - Adderall x 2
- Long acting
  - Ritalin LA x 1
  - Focalin XR x 2
  - Concerta x .8
  - Adderall XR x 2
  - Vyvanse x 1
  - Daytrana x 1.5-2

# Be mindful of costs



# Initiation of Stimulants

- Informed consent
- comprehensive psychiatric evaluation
  - Evaluate for tics
- medical history
- Cardiac history
  - family h/o heart defects, sudden early death
  - child history of congenital cardiac problems (consider cardiology consultation)
  - Fainting, palpitations, chest pain (exertion/rest)
  - baseline ECG are not recommended
  - monitor heart rhythm/blood pressure
- Baseline height/weight with periodic monitoring



Probably the most effective drug I could recommend for your child's problems is Ritalin.

Mum! Dad said that if strange men offer me drugs, I should just say 'No'.

Emma Webster 2005



# First Steps

- Choosing the stimulant
  - Short acting stimulants are often used in treatment of very young and small children
  - In patients who will be on long-acting stimulants there is no need to start with short-acting
- Doses are guidelines – not absolutes
- In general there is a linear relationship between dose and + clinical effect
- Titrate every 1-3 weeks



# Maintenance and Monitoring

- No routine laboratory studies indicated
- vital signs and growth parameters monitored routinely
- Blood levels – generally useless
- Rating Scales (Conners, SNAP etc) sensitive to medication effects, used to monitor adequacy of dose, response and medication effects
- Monitor for side effects



# Choices

- Stimulants should be first-line
  - (effect size approaches 1)
- AMPH vs MPH
  - Pill, Capsule, Patch, Chewable, Liquid?
  - Short vs Long
    - How long
    - What % when
  - Prodrug

# Stimulants: Side Effects

- Largely benign; <5% discontinue due to adverse events
- All side effects are dose responsive
- Most common:
  - Insomnia
  - Loss of Appetite
  - Headaches
  - Stomach Aches
  - Irritable, Prone to Crying, as dose is wearing off, occ. affective flattening
  - Nervous Habits & Mannerisms
  - Mild Weight Loss (mean = 1-4 lbs.; transient)

# Side effects - stimulants

- Increased heart rate (3-10 bpm),
- Increased blood pressure (1.5-14 mmHg)
  - higher changes African-American males
- <3% experience stimulant hallucinatory phenomena
- No discernible long-term adverse consequences found to date

# What about these?

- Growth
- Tics
- Cardiovascular Risk / Sudden Death
- Rebound
- Psychotic Symptoms
- Bipolar
- Abuse Potential
- Seizures

# Growth

- Monitor regularly
- Children on stimulants may have slower growth – height and weight
- Rate of growth slows for the first several years after initiating stimulants then later resumes at a near normal rate
  - 10% of children may have significant slowing
- No change in pubertal development
- Slowing of growth
  - Probably related to decreased appetite and food intake
  - Growth hormone secretion normal
- Slowing of growth greater in
  - Boys
  - Prepubertal
  - Tall or overweight
  - Higher doses/long-acting stimulants

# ADHD & Tourette

- Multiple studies have demonstrated that
  - Stimulants do not cause Tourette Disorder
  - the proportion of individuals reporting tic exacerbations was similar amongst those treated with methylphenidate (20%), clonidine (26%), or placebo (22%).
- In 2/3, tic severity actually decreases with methylphenidate treatment
- In cases of suspected exacerbation, stimulant withdrawal with later rechallenge is suggested

# Cardiovascular Risk

- FDA discovery of 25 reports of death among users of stimulants between 1999 and 2003 and 54 cases of serious heart problems
- The risk of dying of a sudden cardiac event is still under 1/1,000,000 and no more than is expected in an untreated population
- Get family history

# Rebound

- Tends to be minor
- Outpatient studies
  - 35-45% report whether on active meds or placebo
- Inpatient
  - Occurs in 30%
    - Problematic in < 10%
- Treatment - low dose stimulant at end of day
  - May result in increase in sensitivity, tearfulness and initial insomnia



# Stimulants: Common Myths

- Addictive When Used as Prescribed
  - No, must be inhaled or injected
- Greater Risk of Later Substance Abuse
  - No, 15 studies find no such result; a few also found decreased risk if continued through teens
- Creates Aggressive, Assaultive Behavior
  - No, decreases aggression & antisocial actions
  - One of the best treatments for impulsive aggression
- Increased Risk of Seizures
  - No, Only at very, very high doses
- These drugs are over-prescribed
  - 4.3 % on medication vs. 7.8% prevalence

# ADHD and other conditions

- With anxiety
  - Generally good response to stimulants of ADHD symptoms
  - No increase in anxiety
  - ~20% will show a decrease in anxiety
- With Depression
  - Generally treat mood symptoms first
- With bipolar/psychosis
  - Stabilize first
- Autism/PDD
  - May be helpful, expect more side effects

# Atomoxetine (Strattera)

- Focuses on norepinephrine
- When to use
  - Stimulant non-responders
  - Stimulant partial responders
  - Adverse effects to stimulants
  - Concerns of stimulant diversion
  - Comorbid ADHD plus
    - Anxiety
    - Tics
    - Mood
    - Substance abuse (?)
- Can be combined with stimulants

# More on Strattera

- Final dose is based on weight
- May take up to 3-4 weeks to get to final dose
- May take up to 6 weeks to reach full effectiveness
- Not as helpful as stimulants for inattentive symptoms
- Reduces ADHD, ODD, & aggression
- May treat anxiety
- Better “morning after” behavior
- Less insomnia than stimulants
- No emotional blunting – restriction of range
- Treats ADHD in Autistic Spectrum, may have fewer side effects than stimulants

# Strattera: Adverse effects

- Decreased appetite
  - Weight loss of 1-5lbs in the first year, then no further loss
    - Transient effects on height
- Dizziness
- GI distress, nausea
- Sedation
- Increased blood pressure (2 mm/Hg diastolic; 3 mm HG systolic); Increase of 8 bpm pulse
- Less common are dry mouth, constipation and sexual effects

# $\alpha$ 2a – adrenoreceptor agonists

- Clonidine
  - FDA approved for hypertension
  - Other uses
    - Dymenorrhea
    - Opiate and alcohol (with benzo) withdrawal
  - Pending approval of clonidine xr (clonixel) for ADHD
- Guanfacine
  - FDA approved for hypertension
  - Other uses
    - PTSD
    - ? Opiate, alcohol and nicotine withdrawal
    - recent approval of guanfacine xr for ADHD,

# $\alpha$ 2a – adrenoreceptor agonists

- Historically used off label as a second or third line treatment for ADHD
- Has shown to reduce tic severity and hyperactive/impulsive symptoms of ADHD
- Associated with significant sedation
  - Clonidine > guanfacine

# Intuniv

- Guanfacine ER
- alpha-2A receptor agonist indicated for ADHD
- Indicated for children and adolescents, ages 6 – 17 years
- Availability as of November of 2009
- Dosages of 1, 2, 3, and 4 mg once daily
- Tablets should not be crushed, chewed or broken before swallowing because this will increase the rate of guanfacine release.



# Other Antidepressants

## Bupropion

- Dopamine/Norepinephrine reuptake inhibitor
- Stimulant-like action
- Ease of administration
  - Generic IR and SR
  - Once-daily XL
- No cardiac related issues –unlike the tricyclic antidepressants
  - Risk of Seizures
  - May exacerbate tics

## Modafanil

- Risk of Rash

