

# ADHD Update and Focus on Learning Disabilities

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# ADHD Prevalence -

- 3 to 5 % of school aged children
- M:F ratio for **combined type** = 4:1
  - Inattentive type is probably much closer to 1:1
- **1/3 to 1/2** of all mental health referrals for children
- Persists through lifespan
  - over 75% of adults who had ADHD as children have persistent functional impairment

# ADHD: Initial Presentation

- Younger children reach MH services when their *behavior* is problematic
  - Adults because they feel bad
- Boys are more likely to be hyperactive (thus disruptive) than girls
- Boys are referred earlier and more often than girls

# ADHD in Girls -

- 'Spacy', distracted , disorganized
- Unmotivated
- Disorganized, forgetful
- Often socially immature
- Problems in school often identified later
  - Assignments more complex, spread over time
  - Organization and planning problems grow more obvious

# Hyperactivity -

- often **fidgets** with hands or feet or squirms in seat
- often **leaves seat** in classroom or in other situations in which remaining seated is expected
- 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)
- often has **difficulty playing** or engaging in leisure activities **quietly**
- is often "**on the go**" or often acts as if "**driven by a motor**"
- often talks excessively

# Impulsivity

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

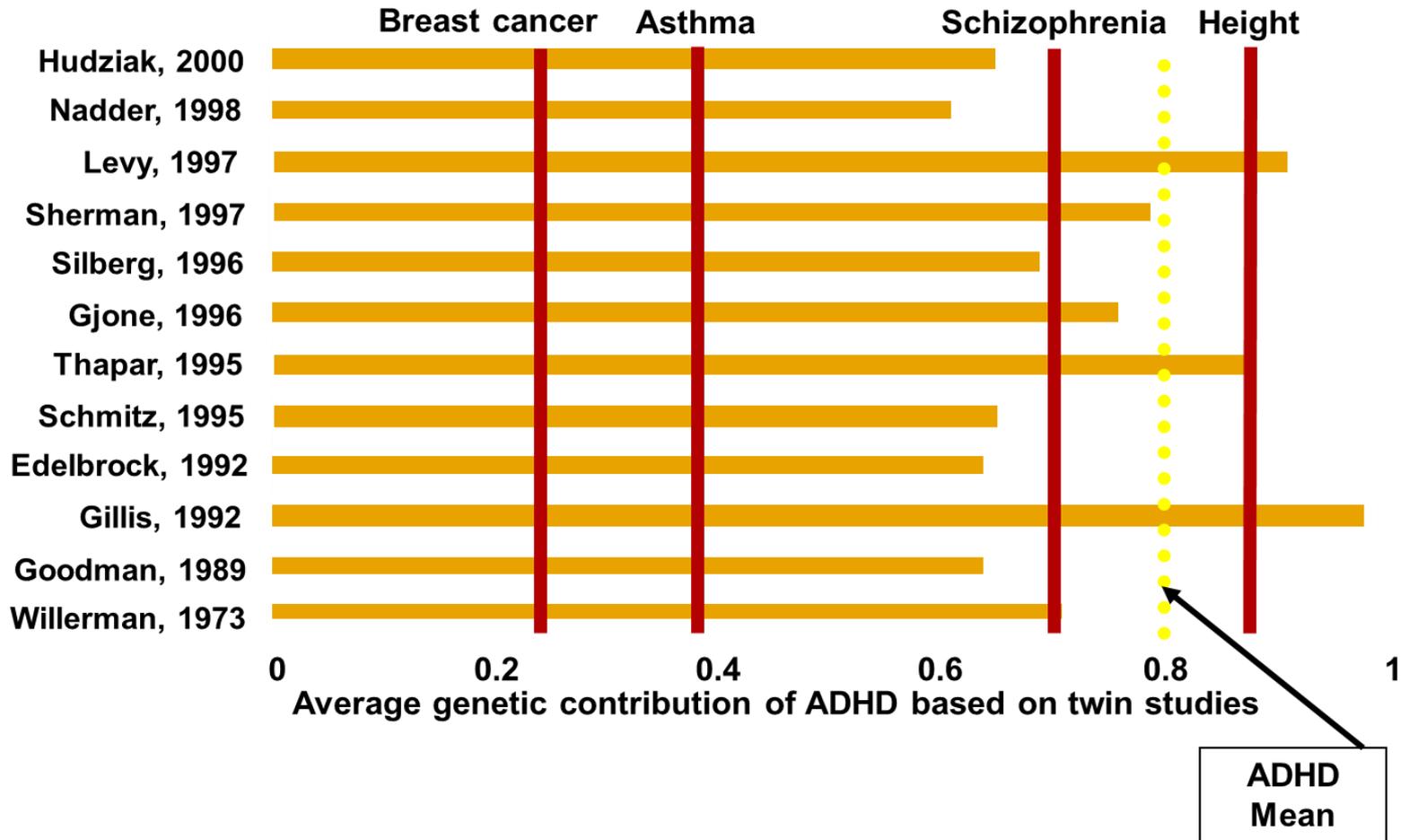
# Inattention -

- often fails to give close attention to details or makes **careless mistakes** in schoolwork, work, or other activities
- often has **difficulty sustaining attention** in tasks or play activities
- often **does not seem to listen** when spoken to directly
- 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)

# Inattention (cont'd)

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

# Twin Studies Show ADHD Is a Genetic Disorder



Faraone. *J Am Acad Child Adolesc Psychiatry*. 2000;39:1455-1457.

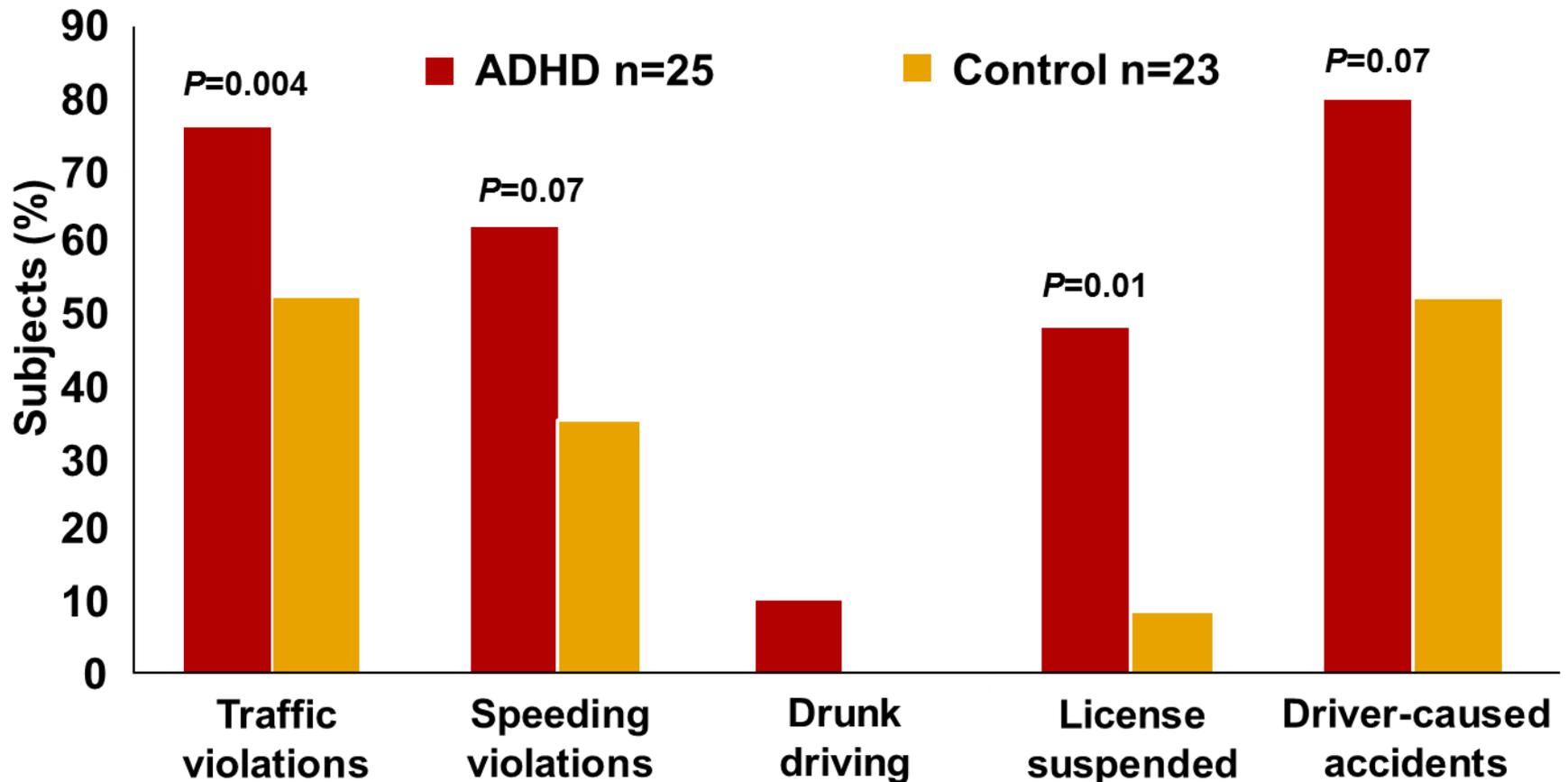
Hemminki. *Mutat Res*. 2001;25:11-21.

Palmer. *Eur Resp J*. 2001;17:696-702.

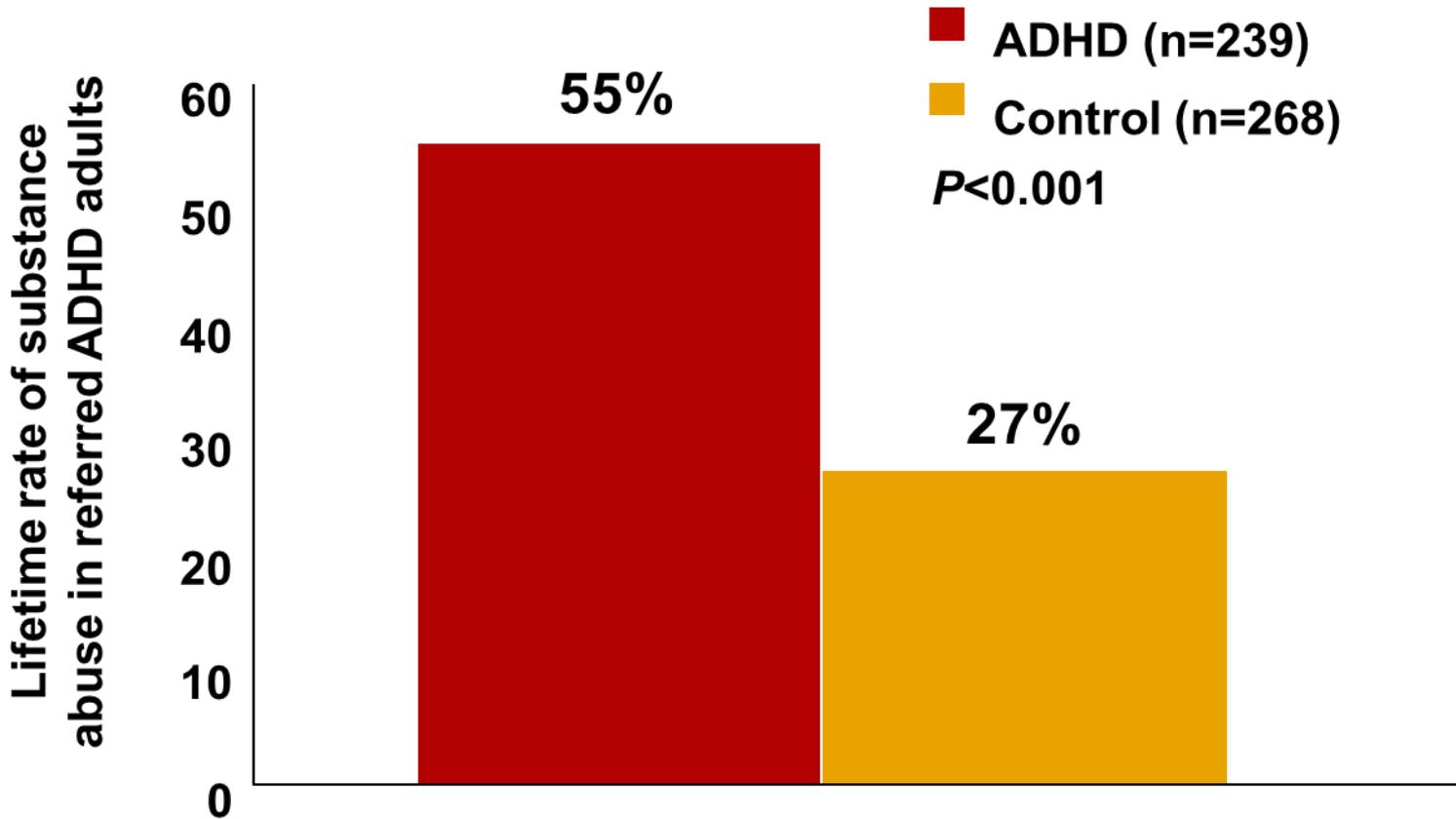
# Parents with ADHD

- Have difficulty following through with consistent discipline, homework times, bedtimes
- Struggle with med compliance, remembering kids' appointments
- Parents often seek assessment when they see their children respond to treatment
- Sometimes it's better for school nurse to give meds

# Increased Traffic Violations and Motor Vehicle Accidents in Adolescents and Adults with ADHD



# Increased Lifetime Substance Abuse in Untreated Adults with ADHD



Biederman, et al. *Biol Psychiatry*. 1998;44:269-273.

# ADHD and Future Substance Abuse

- 1999: report of a strong **protective** effect (against drug abuse) on stimulant-treated white male ADHD patients
- this was not maintained at 10 year follow up
  - Treatment factors?
- Still, data indicate that stimulant treatment does NOT increase substance abuse risk

# Assessment: Rating Scale -

- Rating scales are the most efficient way of obtaining data on school functioning
- Vanderbilt scale is easy, familiar to teachers, and can be interpreted by provider in seconds during a visit
- Symptoms grouped into inattention, hyperactivity, impulsivity
- Before- and after- treatment scales can help
  - Tracking response to med or dose change

# Treatment Options

- What works best?
- MTA (multimodal treatment of ADHD) was a multicenter study of 579 children with ADHD (combined type), ages 7 to 9
- Randomized to various treatments
- Medication, behavioral therapy, both, or “community based”
- Followed for 14 months
- Meds and behavioral therapy > meds alone >> behavioral therapy

# Medication Options

- General principal: enhance DA and NE transmission in PFC
- Stimulants (methylphenidate or amphetamine preparations)
- Atomoxetine (NE, indirect DA)
- Guanfacine, clonidine (NE)
- Antidepressants (variable)

# Stimulants: First Line Therapy

- Response rate to first stimulant tried is about **70%** across studies
- Changing non-responders to a second stimulant raises response rate to **over 80%**
- Side effects more common with comorbid:
  - Anxiety
  - Mood
  - PDD (autism-like) symptoms

# Choosing a Stimulant -

- All are basically amphetamine salts or methylphenidate
  - Adderall XR®, Vyvanse®
  - Concerta®, Daytrana®, others
- Duration of action varies
- Adderall XR can be sprinkled
- Vyvanse can be dissolved in liquid
- Daytrana is a patch that can be removed at the time desired

# Lisdexamfetamine (Vyvanase)

- L-lysine d-amphetamine
- Lysine remains bound in serum, but is cleaved by hydrolysis in GI tract
  - Parenteral use (snorting, injection) does not cause a 'high'
- Limited rate of hydrolysis allows for long duration

# Dosing Stimulants

- Start low, go **fast**
  - adderall XR : 5 mg increments
  - In very small children, can open and sprinkle 2.5 mg on food
  - concerta: 18 mg increments (have to swallow pill)
- Response is immediate
- Some kids (and adults) are rapid metabolizers- don't be afraid to go up past 72 mg concerta, 30 mg adderall

# Atomoxetine

- Norepinephrine reuptake blocker
- Indirectly increases dopamine in some areas of the brain (PFC)
- Does not increase dopamine in nucleus accumbens (less reward, so lower abuse potential)
- Response rate not as high as with stimulants
- Dosing: start with 0.5 mg/kg/day, titrate to 1.2 to 1.4 mg/kg/day (100 mg/day max)

# Atomoxetine: Rare toxicity

- 6 cases of drug-induced liver injury cited by FDA as of mid-2009, one resulting in death
  - Median age 10.5 (range 7-26)
  - Median time to onset 2 months (3wks- 2yrs)

# Guanfacine (Tenex, Intuniv), and Clonidine (Catapres)

- Both are centrally-acting alpha-2 adrenergic agonists, acting in PFC
- Enhance attentiveness and working memory
- Inhibit impulsive behavior
- Can be sedating
- A good option for kids with Tourette's **if** stimulants worsen their tics (50%)
- Clonidine great for insomnia with ADHD

# Antidepressants

- Need to target DA and/or NE transmission
  - SSRI's not helpful here
- Bupropion (lowers seizure threshold)
- Mirtazapine (weight gain, sedation)
- TCA's (potential for cardiotoxicity)
  
- Always explain about risk of activation to mania or suicidal ideation

# ADHD and Diet: the Research

- Sugar has *small* effect on aggression in some preschool boys
- If zinc deficiency present, supplement may augment stimulant effect
- “Healthy” diet associated with less ADHD than “western” diet in 14-year cohort
  - More fruits, vegetables, whole grains, fish
  - Less processed meat, high fat snacks
- Ketogenic diet may help kids with abnormal EEG’s

# ADHD and Diet: the Research

- N= 75, double-blind, placebo controlled
- Daily dose: 558 mg EPA, 174 mg DHA, 60 mg gamma linoleic acid (an omega-6), and 10.8 mg vitamin E
- After 3 months, 26% of active group and 7% of placebo group 'responded' (had 25% improvement on ADHD measures)
- Responders had the biggest change in their omega 3:6 ratios

Johnson M et al. Fatty acids in ADHD: Plasma profiles in a placebo-controlled study of omega 3/6 fatty acids in children and adolescents *Atten Def Hyp Disord* (2012) 4:199-204

# ADHD: Comorbid Conditions

- **About 75% have learning disabilities**
- 45-64% 'oppositional-defiant disorder'
- 8-30% anxiety disorders
- 8-25% conduct disorder
- 15-75% mood disorders (any)
- 8-34% tics
- **Substance abuse, FAS, ARND**
  - girls with ADHD are more likely to become mothers of substance-exposed children

# Learning Problems

- Often missed in children with ADHD
- Meds may result in improvement in effort, impulsivity, hyperactivity- but expected academic improvement doesn't materialize
- Parents need to request testing **IN WRITING**
  - Particularly if performance is worse in one subject area, or if there is family history of LD, and in cases of prematurity, low birth weight, or suspected/known substance exposure

# ADHD and Learning Problems

- Penn State study: 70% of children with ADHD found to have learning disability
- Children with ADHD had more severe LD
- Children with LD but not ADHD still had *some* focus/attentional problems

**Mayes S, Calhoun S:** Learning Disabilities and ADHD: Overlapping Spectrum Disorders. *Journal of Learning Disabilities*, Vol. 33, No. 5, 417-424 (2000)

# ADHD and Learning Problems

- 1312 sets of twins
- IQ, parent and teacher ADHD ratings, parent ratings of reading problems
- Reading problems and inattention were linked genetically
- IQ and hyperactivity varied independently

Paloyelis Y et al. The genetic association between ADHD symptoms and Reading Difficulties: the role of inattentiveness and IQ. J Abnorm Child Psychol ; Nov 2010

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# ADHD and Learning Problems

- Children with reading disorder show problems with early automatic error detection (in the moment)
- Children with ADHD show problems with post-hoc evaluation and detection of errors
- Children with RD and ADHD show BOTH

Van de Voorde S et al. Error monitoring in children with ADHD or reading disorder: an event-related potential study Biological Psychiatry; Vol 84  
Issue 2: May 2010

# LD and the Law (IDEA)

- Either *a parent of a child* or a public agency may initiate a request for an initial evaluation to determine if the child is a child with a disability. The initial evaluation:
  - Must be *conducted within 60 days of receiving parental consent* for the evaluation or, if the State establishes a timeframe within which the evaluation must be conducted, within that timeframe; and
  - Must consist of procedures to determine if the child is a child with a disability

<http://idea.ed.gov/explore/home>

# Advocating for Special Ed Services

- Parents **must** request psycho-educational evaluation **in writing** in order to trigger IDEA (Individuals with Disabilities Education Act)
- School is then required to respond, and parents have rights to appeal, seek independent assessment, etc.
- Once a child has an IEP (Individual Educational Plan), it is a binding legal document, transferable if the family moves

# Advocating for Special Ed Services

- Remember that many parents have ADHD or LD, and are not confident in approaching school authorities
- Schools often put off parents' verbal requests for testing- "lets see how this semester goes first", "he's just not motivated", or "she just likes to socialize too much"- when they ask about having their child tested
- The squeaky wheel gets the grease, especially when budgets are shrinking

# Summary

- ADHD is a heritable disorder, associated with accidental injury, academic and employment failure, and substance abuse
- Be alert to the likelihood of learning problems, especially in reading
- Educate families about rights under IDEA, communicate with school
- Locate advocacy resources in your community
  - State department of education
  - ADHD parent groups