

## Outline

- Diagnostic Criteria
- Epidemiology
- Etiology
- Adult Characteristics
- Evaluation
- Differential Diagnosis
- Treatment
- Summary
- Review Questions



## Diagnosis Begins... Utah Criteria-1993

- Paul Wender developed adult ADHD criteria
- ADHD sx in childhood-hyperactivity, inattention and impulsivity
- Hot temper-quick calming down
- Emotional overreactivity-easily stressed
- Disorganization-tasks not completed
- Impulsivity/impatience
- Associated sx-marital, vocational, occupational problems

• Wender, P. ADHD in Adults, Psychiatric Times, 1996 vol 13, No. 7  
• Wender PH. Attention-Deficit Hyperactivity Disorder in Adults, New York: Oxford University Press, 1995

## DSM

- DSM IV-NO CRITERIA FOR ADULTS
- DSM 5-2013-included in the section on **Neurodevelopmental Disorders**, and not disruptive behavior disorders
- Criteria include adult manifestations-such as difficulty paying bills
- For individuals 17 and above only 5 symptoms are needed instead of the 6-9 for those younger
- Central feature of ADHD is disinhibition
- Deficit in capacity to monitor their own behavior
- Hyperactivity is less overt

## Diagnostic Criteria and Symptoms

- Deficits in sustained attention remain
- Appointments are forgotten
- Impulsivity---socially inappropriate behavior-blurting out thoughts which are rude or insulting
- Frustration over the inability to be organized
- Inability to prioritize

## Adult Characteristics

- Hyperactivity-inability to relax
- Attention deficits-forgetfulness, losing things
- ABLE to concentrate on things they like
- Affective lability-mood shifts lasts for hours, not days



## Childhood Symptoms Versus Adult

### Hyperactivity

- Can't sit still, always on the go
- Climbs or runs at inappropriate times

### Restlessness

- Can't stay focused on one thing
- Is fidgety or impatient

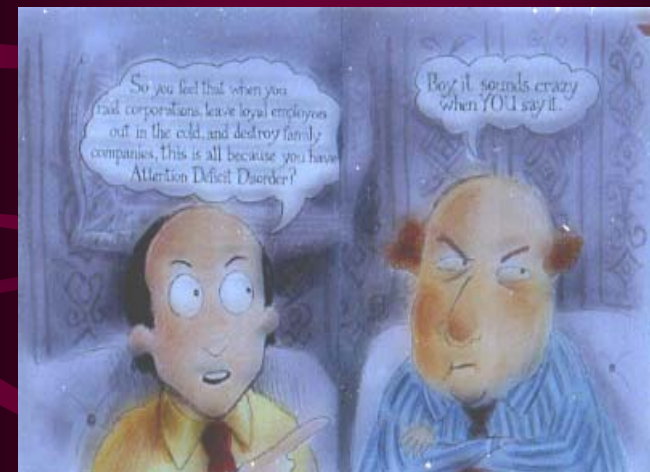
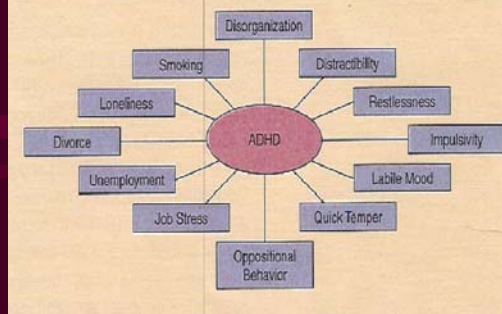
### Physical Impulsivity

- Does things that result in injuries

### Verbal Impulsivity

- Says the "wrong thing" or speaks out of turn

## Characteristic Problems of Adults With ADHD



## Epidemiology

- No studies
- 3-10% of children
- M: F-3:1 childhood, 2:1 adulthood
- Girls are more impaired cognitively and more often missed
- 1/3-2/3 persist
- 1-6% adults-9.4 million adults

Mannuzza S, Klein RG, Bessler A, et al. Adult outcome of hyperactive boys. Educational achievement, occupational rank and psychiatric status. Arch Gen Psychiatry. 1993;50(7):565-576



## Etiology

- Not known
- Biological vulnerability
- Genetics-proven by adoption studies
- Neurochemical studies
- Frontal lobes

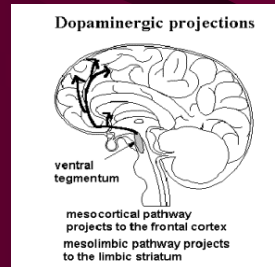


## Genetic Susceptibility to adult ADHD

- Heritability is 70% (Hudziak 1998)
- Biological children of adults with ADHD are at high risk for ADHD (Biederman 1992)
- D2 receptor gene (Faraone, 2002)
- D4 receptor gene (Faraone, 2002)
- DA transporter gene (Faraone, 2002)

## Neurochemical studies

- DA underactivity theory
- Shaywitz-rat pups depleted DA-ADHD
- NE and attention



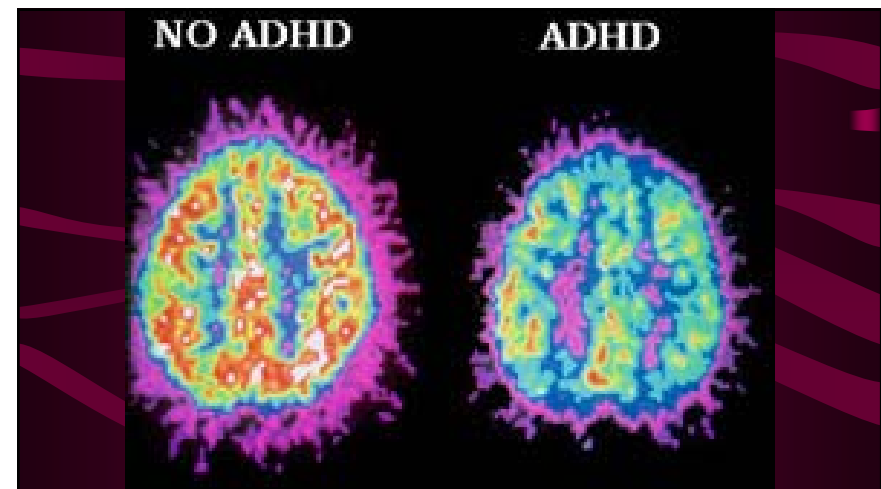
## The Frontal Lobes

- OFC-impulsive and aggressive behavior
- CBF and glucose utilization are different in ADHD vs. normal children
- Zametkin-1990-decreased glucose metabolism in adult frontal lobes of ADHD adults
- ?antecedents or complications of ADHD



## The Frontal Lobes II

- Impairments of frontostriatal brain regions
- Poor inhibitory control
- Similarity between ADHD individuals and those with frontal lobe lesions (Mattes, 1980)
- MRI of ADHD children-reduced volumetric measures of the prefrontal cortex (Filipek et al 1997)
- Persistent ADHD represents a continuation of inhibitory control deficits from childhood (Schultz, 2005)



## Why do PCPs miss the dx?

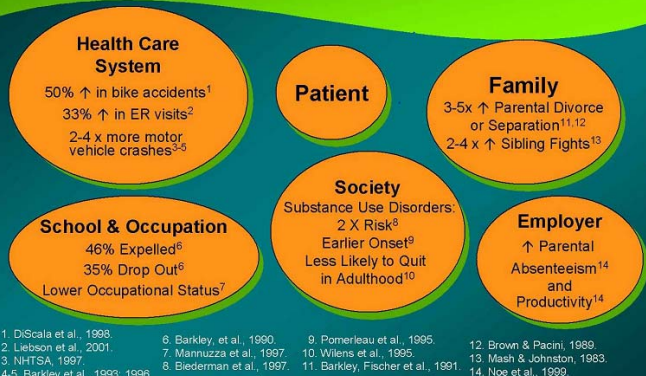
- Confusion about ADHD persisting into adulthood
- Symptoms in adult are less disruptive than they are in children
- PCP receive little training in the diagnosis of adult ADHD



## Missing The Diagnosis

- Lack of guidelines for primary care providers
- Lack of objectively verifiable tests
- Diagnostic criteria structured more toward childhood diagnoses
- High rate of media attention predisposing adults toward self diagnoses
- Common comorbidities
- Concern of schedule II drug abuse

## ADHD: Impact of Untreated & Under-Treated ADHD



## ADHD evaluation

- Most patients are self-referred (Faroane, 2004)
- Mental status examination
- Developmental hx
- Past and present triad-inattention, hyperactivity, impulsivity
- Impairment-school, work, family, peers





## What do adult ADHD patients say?

"As a child, I...  
zoned on TV"

"As an adolescent, I...  
had real social problems. I try to impress people & I've  
gotten kicked out of two fraternities."

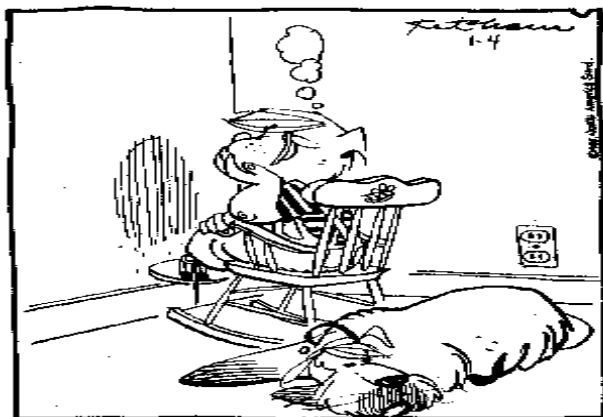
"As a graduate student, I...  
never proofed a paper...I never had time to proof it!"

"As an adult, I'm...  
- such a space cadet I wonder about ADD!"  
- tired of reading the same page over and over & not  
getting it!"

## Another ADHD Adult - 22 years old - the literal words:

"Like I go to the store for shampoo & tooth  
pastes and I come home with Hair spray &  
cookies - and I'm always late even when  
I've tried so hard to be on time. And I  
always forget to do the most important  
things. And I volunteer my self for two many  
things at one time. And my mood swings  
are bad, like one minute I am fine, & the  
next minute I get angry, scream & holler for  
know reason."

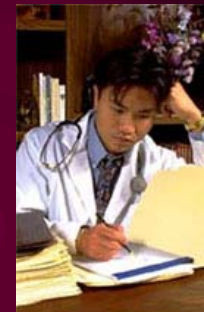
### DENNIS THE MENACE



"BY THE TIME I THINK ABOUT WHAT I'M  
GONNA DO... I ALREADY DID IT!"

## ADHD Evaluation II

- Family hx-ADHD, LC, tic disorders, PTSD, childhood abuse
- Interview SO and/or parent
- Neuro exam
- School hx
- Lab tests-thyroid
- Consider educational testing



## ADHD Evaluation III

- Psych hx-dx and rx
- Medical hx-thyroid, seizures, head trauma
- Medications-antihistamines, theophylline, steroids, sympathomimetics
- Rating scales
- PDF-procrastination,
- distractibility
- forgetfulness



## DSM-5 Adult ADHD Self-Report Scale-ASRS

- How often do you have difficulty concentrating on what people say to you, even when they are speaking to you directly? (*DSM-5 A1c*, scored 0-5)
- How often do you leave your seat in meetings or other situations in which you are expected to remain seated? (*DSM-5 A2b*, scored 0-5)
- How often do you have difficulty unwinding and relaxing when you have time to yourself? (*DSM-5 A2d*, scored 0-5)
- When you're in a conversation, how often do you find yourself finishing the sentences of people you are talking to before they finish them themselves? (*DSM-5 A2g*, scored 0-2)
- How often do you put things off until the last minute? (*Non-DSM*, scored 0-4)
- How often do you depend on others to keep your life in order and attend to details? (*Non-DSM*, scored 0-3)
- May 1, 2017, JAMA Psychiatry, developed with support from Shire Pharmaceuticals

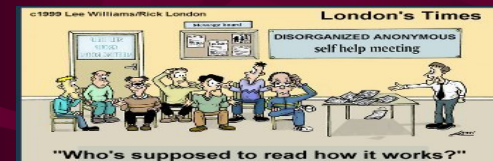
## ADHD Evaluation IV

- Interpersonal problems
- Selective inattention, related to pleasure in the task
- Impulsivity-immature, helpless, remorseful, talks excessively, impatient
- Problems initiating tasks



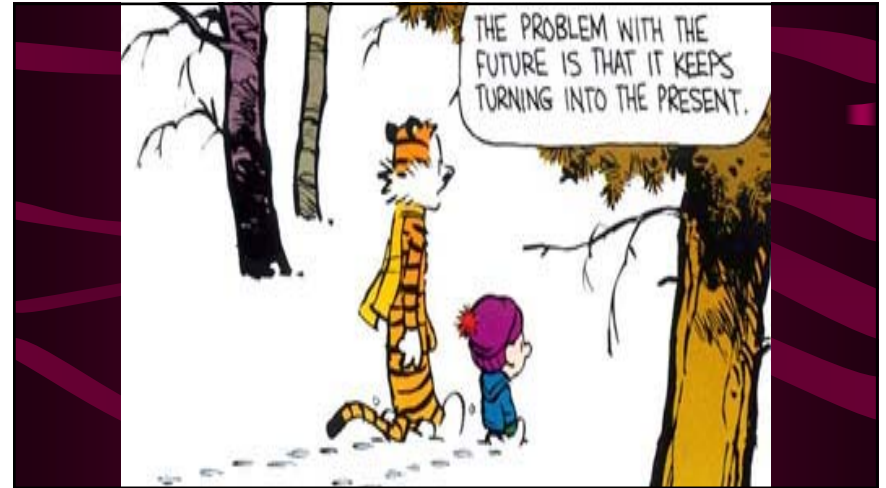
## ADHD Evaluation V

- Disorganized
- Difficulties planning, organizing and executing activities
- Inability to sustain task-seen as irresponsible, unreliable and inconsiderate



## Executive Function

- Disturbance in impulse control-response inhibition
- Planning problems
- Working memory
- Set shifting



## ADHD Evaluation VI

- Cycle of recrimination
- H/o impairment at work and at home
- Divorce, interpersonal conflicts, lower SES, job changes
- Some feel shame
- MVA



## Adults with ADHD and MVA

- Young adults with ADHD have more MVA
- 6 week pilot study, RCT using mixed amphetamine salts extended release 20-40 mg
- Driving simulator
- Situation awareness, hazard perception, risk assessment, decision making
- Driving performance was significantly improved compared to placebo





## Differential Dx and Comorbidity

- Depression, anxiety, OCD
- Agitated depression
- Anxiety makes ADHD harder to rx
- Cyclothymia vs affective instability



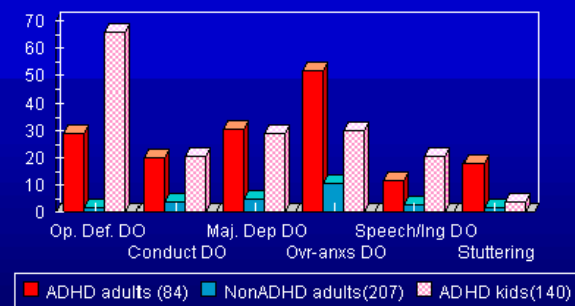
## Medical Conditions that Mimic ADHD

- Hyperthyroidism
- petit mal and partial complex seizures
- hearing deficits
- hepatic disease
- lead toxicity
- sleep apnea
- drug interactions

## The Developmental Sweep of ADHD

"Patterns of psychiatric comorbidity, cognition, and psychosocial functioning in adults with ADHD." Biederman, Faraone, et al. 'Am J Psychiatry' 150:12, 1792-1798, December, 1993.

% ADHD vs. non-ADHD Adults & ADHD Kids



## Differential Dx and Comorbidity

- Bipolar D/O-impulsivity in ADHD is thoughtless, compared to driven quality of manic episodes
- Substance abuse is often comorbid with ADHD-maybe stimulant rx in childhood decreases this????



ADHD	BIPOLAR
CONSTANT	COMES & GOES
STRUGGLE TO WAKE UP	WAKE UP EARLY
CONFRONTATIONAL	WITHDRAWN
	FAMILY HISTORY

ADHD	BIPOLAR
Constant	Comes and goes
Struggle to wake up	Wakes up early
Confrontational	Withdrawn
	Family history

### Differential Dx and Comorbidity

- Antisocial personality disorder 18-45% childhood ADHD
- LD-62 % ADHD adults have reading problems
- Tourettes's syndrome

### Treatment

- Risk/benefit ratio
- Hyperactivity-internal restlessness decreases
- Inattention-better concentration-so is happy
- Mood lability-mood is level
- Stimulants are no cure
- H/o substance abuse is not a contraindication to rx



## Decision to Rx

- Impairment in functioning
- Troubled relationships, underachievement
- Need to devote time and energy to medication monitoring
- Failure to respond to nonpharmacological rx



## The Decision to Rx-II

- Temper-increase threshold to anger
- Disorganization-improves strategies
- Stress sensitivity-feel less hassled
- Less impulsive-more thoughtful
- Changes may only be seen by so
- Treatment may be life-changing
- Huge human toll when ADHD is missed



## Treatment

- Sparse rx data in adults
- 10 double blind placebo controlled studies
- Dramatic short term therapeutic effects
- Multimodal approach is advised
- Rx comorbid conditions, esp anxiety
- Establish target sx



## Monitoring Rx

- Vocational functioning
- Daily living skills-eg forgetting keys
- Emotional adjustment
- Family interactions
- Long term supportive rx
- Assess for concurrent drug/ETOH abuse
- Discussion about safe storage of medication



## Pharmacotherapy



- Behavioral plan BEFORE writing a prescriptions
- Methylphenidate and Amphetamine
- Bradley-1937-dramatic effect of amphetamine
- Numerous well-designed placebo controlled acute drug studies
- Use has doubled every 4-7 years since 1971-CONTROVERSIAL!

## Treatment

- Methylphenidate-5 double blind studies in adults-55% positive responders
- Aimless restlessness becomes more goal directed
- Sustained attention improves
- Inhibitory control improves



## Methylphenidate

- 0.1-1.0 mg/kg—20-80 mg/day
- Decreased appetite
- Sleep problems
- Increased HR
- Bp increased-usually minor



## Methylphenidate

- Short half life-roller coaster feeling
- Medication holidays for ongoing assessment
- Potential for abuse vs. poor impulse control leading to substance abuse
- Psychotic reactions in high doses

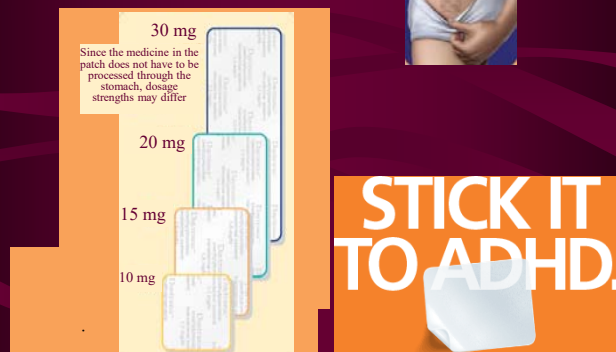
## Methylphenidate

- Drug interactions-MAOI-HTN
- Warfarin-monitor INR
- Lowers seizure threshold
- Pressor agents-increase pressor effects

## Forms of Methylphenidate

- Focalin-d-isomer of ritalin, 2.5 mg, 5.0 mg, 10.0 mg
- Concerta-18 mg, 27 mg, 36 mg, 54 mg
- Metadate ER-10 mg, 20 mg (released every 4 hours) Metadate CD 20 mg-6 mg initially and 14 mg over time
- Ritalin LA-10 mg, 20 mg, 30 mg, 40 mg- 8 hours

## The Patch-Methylphenidate Transdermal



## Mixed Amphetamine Salt

- D-amphetamine and l-amphetamine-may have smoother effects due to different absorption rates
- mixed amphetamine salts extended release is a 12 hour pill
- Capsule allows for dosing flexibility
- 5mg, 10 mg, 15 mg, 20 mg, 25 mg, 30 mg
- Recently approved for adult ADHD



## FDA Approval of the First and Only Stimulant Prodrug Lisdexamfetamine Dimesylate as a Novel Treatment for ADHD

23 Feb 2007 -

[This] prodrug is therapeutically inactive until metabolized in the body. In clinical studies designed to measure duration of effect, it provided significant efficacy compared to placebo for a full treatment day, up through and including 6:00 pm

The capsules are available in 30-, 50-, and 70-mg strengths for once-daily dosing.

## Newest Treatment Options

- **Amphetamine extended-first orally disintegrating extended release product for the treatment of ADHD for people 6 or older.** It is the same as Adderall.... For adults, the maximum dosage is 12.5mg once daily. Tablets come in different forms, including 3.1 mg, 6.3 mg, 9.4 mg, 12.5 mg.
- **Mixed Amphetamine Salt-** long acting triple bead mixed amphetamine salt for 16 and up...lasts 16 hours...doses...12.5 mg, 25 mg, 37.5 mg, 50.0 mg

## Atomoxetine

ADHD, for >6 years old

- Only non-stimulant approved to rx ADHD
- NOT a controlled substance
- SNRI
- Drowsiness, nausea, vomiting, ??? Liver problems
- Takes 2-4 weeks
- 10 mg-80 mg/day

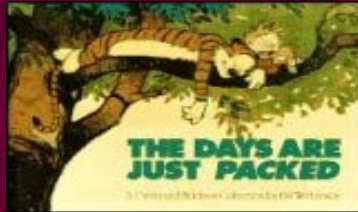
## Other Agents-Bupropion

Barrickman 1999 double blind crossover study bupropion and methylphenidate- both effective-but bupropion is effective after week 4

- Mean dose 360 mg/day
- 52 % vs. 11%

## Modafinil

- Approved for narcolepsy and excessive daytime sleepiness
- Wake promoting agent
- Headaches, nausea, nervousness, insomnia
- 100 mg-400 mg/day
- (Turner et al, Biol Psych
- 2004)



## Donepezil

- cholinesterase inhibitor-helps with executive functioning problems
- 2.5 mg/day, max dose 10 mg/day



## Nicotine-ABT-418

- Adolescents w/ ADHD smoke 2x as much as their counterparts
- Transdermal patch has been studied in adolescents with ADHD
- Nicotine improved inhibition
- Mecamylamine-1950's active in the brain's nicotinic receptors
- Nicotinic activation enhances DA transmission



## Other Agents

- SSRIs good for comorbid anxiety and depression
- Propranolol-promising for temper outbursts, excitability, irritability
- Clonidine-used in children for their irritability-no good studies in adults
- Guanfacine-also good for irritability



- ✦ Each day, make a list of what you need to do. Plan the best order for doing each task. Then make a schedule for doing them. Use a calendar or daily planner to keep yourself on track.
- ✦ Work in a quiet area. Do one thing at a time. Give yourself short breaks.



### Child Psychiatrist Referral

- Dangerous or disturbed behavior
- Comorbidities
- Failure to respond to treatment plan
- Wanting a second opinion

**CHADD<sup>®</sup>**  
Children and Adults With  
Attention-Deficit/Hyperactivity Disorder  
800-233-4050

## ADD/ADHD: A Positive View

Don't be a victim ("organic brain disease") - be a victor!

- A "warrior hunter", not a "meek farmer"
- Capable of astounding discoveries
- Imbued with boundless energy
- In understanding, there is strength
- In reconciling the ADD/ADHD syndrome with reality, there is wisdom

## Summary

- DSM5 adds an Adult ADHD diagnosis-stay tuned
- 1-6% population have adult ADHD-common d/o
- Inattention, impulsivity, hyperactivity
- Decreased DA
- impaired frontostriatal brain regions-lack of inhibition
- No laboratory marker-clinical diagnosis
- Rx may be life-changing
- Huge human toll when ADHD is missed
- Stimulants are the drug of choice



## Future Directions

- Etiology of ADHD
- Does early rx effect the DA system?
- Long term studies are needed-this is a chronic condition
- Over and under dx

