# ADHD : UPDATE ON DIAGNOSIS AND TREATMENT

## 2020 Michael J. Bresnan Continuing Medical Education Course in Child Neurology

# DAVID K. URION, M.D., FAAN

DIRECTOR, BEHAVIORAL NEUROLOGY CLINICS AND PROGRAMS
DIRECTOR OF EDUCATION
CHARLES F. BARLOW CHAIR
DEPT. OF NEUROLOGY
BOSTON CHILDREN'S HOSPITAL

# DISCLOSURES

- I HAVE NO DISCLOSURES OF FINANCIAL SIGNIFICANCE
- I HAVE RECEIVED NO COMPENSATION FOR THIS TALK
- I AM THE AUTHOR OF CHAPTER ON ADHD, NELSON'S TEXTBOOK OF PEDIATRICS, 20th and 21st editions

# GOALS AND OBJECTIVES

- Identify the changes in the DSM-5 definition of ADHD which have changed clinical assessment
- Discuss how to choose evaluation tools for older children presenting with ADHD
- Explain newer formulations of dopaminergic stimulants and their rational use

# DIFFERENTIAL DIAGNOSIS

# EPIDEMIOLOGY

- BEST STUDIES SHOW THAT 5 - 7% NORTH AMERICAN POPULATION MEET DSM-5 CRITERIA
- THIS IS A PRIMARY CARE PROBLEM

# EPIDEMIOLOGY, CONT.

- RESEARCH SHOWS ISLANDS OF HIGH DIAGNOSIS, IN A SEA OF UNDERDIAGNOSIS
- RESEARCH SHOWS CERTAIN GROUPS MORE LIKELY TO BE DIAGNOSED, OTHERS LESS SO

# CURRENT DSM-5 FORMULATION

- DIVIDES INTO ATTENTION DISORDERS WITH AND WITHOUT HYPERACTIVITY, AND MIXED TYPE
- UTILIZES CRITERIA BASED UPON CHILD HAVING MORE OF A CHARACTERISTIC BEHAVIOR THAN IS USUAL FOR AGE
- UNCHANGED FROM DSM-IV-TR

# CURRENT, CONT.

- ISSUES MUST BE PRESENT IN TWO OR MORE SETTINGS AND **IDENTIFIED BY TWO INDEPENDENT OBSERVERS**
- MUST APPEAR BEFORE AGE **12** YEARS
- MUST NOT BE BETTER EXPLAINED BY SOME OTHER NEUROLOGIC OR PSYCHIATRIC DIAGNOSIS
- MUST BE CAUSING PROBLEMS

# THUS

- The **categorical descriptions** of the disorder and its subtypes are fundamentally **unchanged** from DSM-IV
- The two most significant **changes** are a widening of the **age of onset** and the requirement for **different informants from two different settings**

# AGE OF ONSET

- The evidence basis for this was good, in that examination of accuracy of parental recall showed that the previous standard was unrealistic

# AGE OF ONSET, CONT.

- The practical implications, however, are significant
- We now must be clear that certain disorders that have attentional symptoms as prominent early signs, and manifest between ages 7 and 12, are not present

# EXPANDED DIFFERENTIAL DIAGNOSIS FOR ADHD

- Leukodystrophies
  - X-linked adrenoleukodystrophy
  - Metachromatic leukodystrophy
  - Vanishing White Matter Disease

# THIS DOES NOT MEAN

- Every child between ages 7 and 12 years needs an imaging study
- It does mean we need to do a neurologic examination for these children which can address these issues

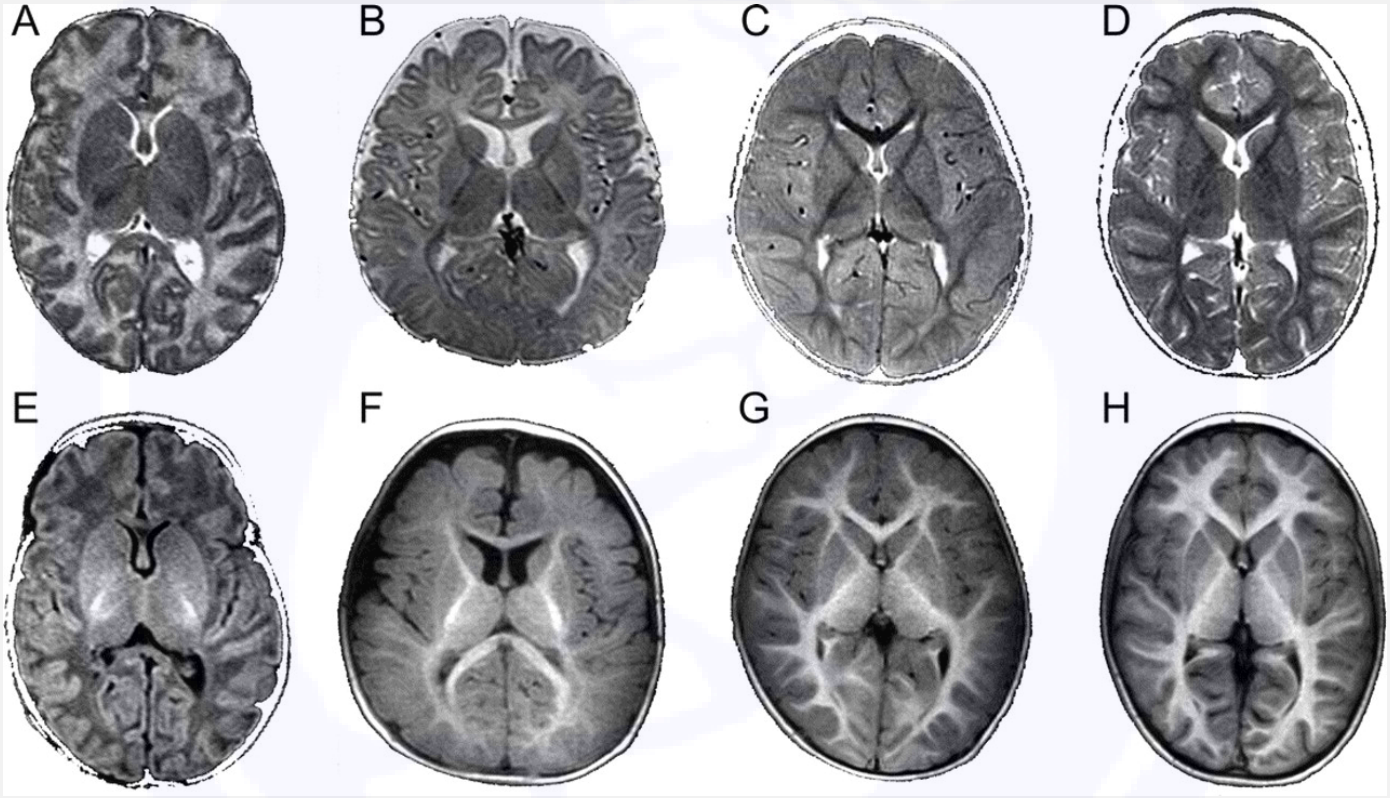
# SOME BASIC RULES

- Affected WM is HYPERINTENSE on T2
- Less pronounced in hypomyelinating syndromes
- Some hypomyelinating disorders are associated with peripheral neuropathies
- Otherwise, describe lesions as
  - Confluent
  - Isolated
  - Multifocal

# CONFLUENT LESIONS

- Distribution is very helpful

# Normal Myelination

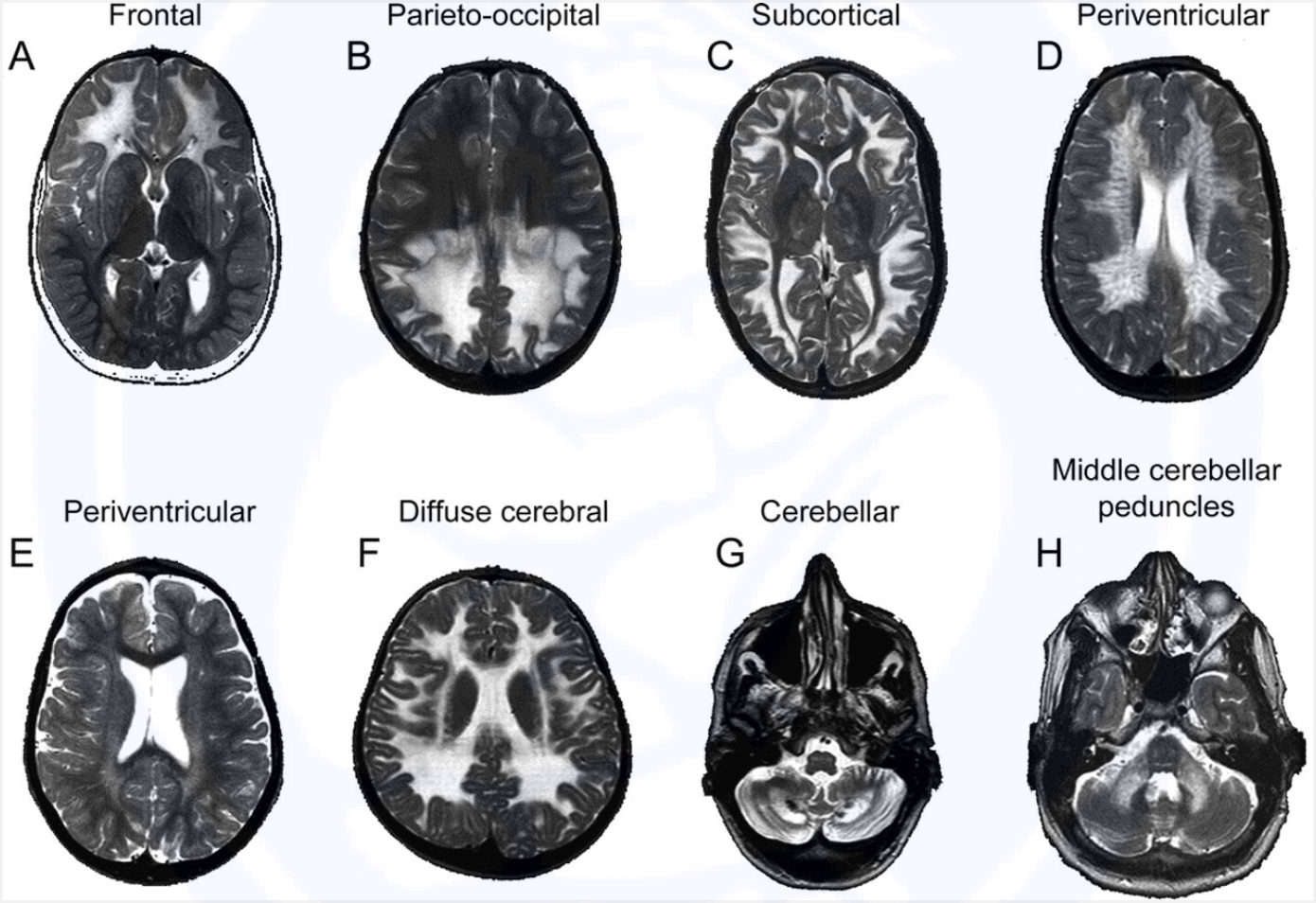



**Schiffmann, R. et al. Neurology 2009;72:750-759**

Neurology®

AMERICAN ACADEMY OF NEUROLOGY

# Abnormal myelin A: Alexander B: X-ALD C: Kearnes-Sayre D: MLD E: NCL F: central hypomyelination/vanishing white matter G: cerebrotendinous xanthomatosis H: adult-onset AD leukodystrophy (LMNB1)




**Schiffmann, R. et al. Neurology 2009;72:750-759**

Neurology®

AMERICAN ACADEMY OF NEUROLOGY

# EXPANDED DDX FOR ADHD, CONT.

- Psychiatric Disorders
  - Juvenile bipolar disorder
  - Anxiety Disorders
  - Oppositional Defiant Disorder
  - Intermittent Explosive Disorder

# EXPANDED DDX FOR ADHD

- Medications
  - Antiepileptic drugs
  - INH
  - Sympathomimetics
  - Neuroleptics
  - Thyroid hormone replacement

# EXPANDED DDX FOR ADHD

- Substance abuse
- Physical and sexual abuse

# TWO INFORMANTS

- Comes from work which showed that parental assessment of teacher attribution and teacher's own attribution were significantly discordant
- Thus, cannot make diagnosis without data from parents and teachers

# CHOICE OF AGENT

# CHOICE OF AGENT

- Should be based upon the patient's needs, based upon some basic knowledge of their day, when they need effect from medication, and medication profiles

# CHOICE OF AGENT

- Thus, we need to know basic pharmacokinetics of the agents

# AGENTS

| AGENT TYPE | FUNCTIONAL T 1/2 |
|---|---|
| DEXTROAMPHETAMINE | X |
| METHYLPHENIDATE | 1.5X |
| DEXTROAMPHETAMINE SP | 1.5 – 1.75 X |
| RACEMIC AMPHETAMINE | 2X |
| MEPHEN SR | 2.25X |
| RACEMIC AMPH SR | 2.5 – 2.75X |
| OROS MEPHEN | 2.625 – 3 X |
| BEAD DISPERSAL MEPHEN | 2.75 – 3.25X |
| TRANSDERMAL MEPHEN | 3 – 3.5X |
| LISDEXAMFETAMINE | 3 – 3.5X |

# AMPHETAMINES

| AGENT TYPE | FUNCTIONAL T 1/2 |
|---|---|
| DEXTROAMPHETAMINE | X |
| DEXTROAMPHETAMINE SP | 1.5 – 1.75X |
| RACEMIC AMPHETAMINE | 2X |
| RACEMIC AMPH SR | 2.25X |
| LISDXAMFETAMINE | 3 – 3.5X |

# METHYLPHENIDATE

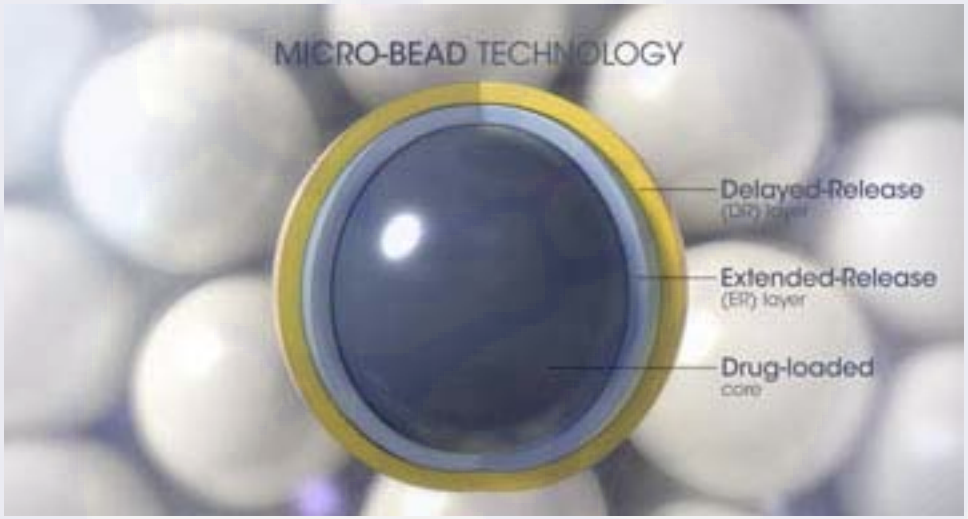
| AGENT TYPE | FUNCTIONAL T 1/2 |
|---|---|
| METHYLPHENIDATE | Y |
| SR MEPH | 1.5 Y |
| OROS MEPH | 1.75 – 2Y |
| BEAD DISPERSAL MEPH | 1.8-2.2Y |
| TRANSDERMAL MEPH | 2 – 2.3Y |

# DOSING RANGES

- For methylphenidate, most people respond in doses between 0.5 – 1.5 mg/kg/day
- For amphetamine compounds, most people respond in doses between 0.25 – 0.75 mg/kg/day

# "JORNAY"

- LONG-ACTING FORM OF METHYLPHENIDATE
- PROPRIETARY DELIVERY SYSTEM, WITH OUTER COATING THAT INHIBITS DISPERSION FOR ROUGHLY 8 HOURS
- GIVEN AT BEDTIME, USUALLY STARTS BEING ABSORBED IN MORNING
- DURATION OF ACTION ROUGHLY COMPARABLE TO BEAD DISPERSAL SYSTEMS AFTER THAT



# ASSESSMENT OF THE OLDER CHILD

- Vanderbilt Rating Scale is validated through 12 years of age
- It may underreport comorbid symptoms, so in those settings a second scale may be helpful

# BASC

- GOOD FOR ATTENTION, COMORBID CONDITIONS
- NOT QUITE SO GOOD FOR HYPERACTIVITY
- HAS VALIDATION SCALE
- HOME AND SCHOOL

# CBCL

- GOOD FOR COMORBID CONDITIONS
- ELICITS SOME HISTORICAL INFORMATION
- NOT SO USEFUL FOR HYPERACTIVITY

# BRIEF

- VERY USEFUL FOR COMORBID LEARNING DISORDERS, ESPECIALLY ISSUES WHICH OFTEN MASQUERADE AS ADHD OR ADD

# AN EXAMPLE

- You are caring for a 10 year old boy with a well-established diagnosis of ADHD
- He weighs 30 kg, and is on 20 mg of methylphenidate CD taken each morning
- His family reports that his attention is said to flag by 1400 at school, and he struggles with homework

# YOUR THOUGHTS?

# THIS IS MY MOTIVE MOST SUBLIME TO MAKE THE PUNISHMENT FIT THE CRIME

THE MIKADO

# AS VOLTAIRE TAUGHT US

- " A physician is someone who prescribes medications, about which they know little, for diseases, about which they know less, to human beings, about whom they know nothing at all."