Children With ADHD
The Battle Within The Mind
History of ADHD

- The question always comes up...

- Where did all of these ADHD children come from anyway?

- We didn’t have them in “my day”.
Symptoms of ADHD were described as early as 1798.

Cited by an early physician named Sir Alexander Crichton in 1798.

This distinguished physician took an early interest in “mental diseases”

He wrote 3 books on this topic.
History of ADHD

- In the 2nd chapter of the 2nd book, he had a chapter named “On Attention & It’s Diseases”

- He stated that there is a normal range of attention that is adequate to meet the needs of the individual.
However, he also stated he had seen many individuals with what he called “morbid alteration in attention.”.

In these individuals, the ability to attend to a specific stimuli was either completely or significantly lacking.
He described the individual markers of ADHD that we use today to diagnose ADHD as stated in the DSM-5.

He believed that this inability to have appropriate attention was R/T the nervous system.
He noted it was most pronounced in children but he had seen many cases when it persisted into adulthood in a milder form.
History of ADHD

This early physician:

- **did not** blame the parent’s ability to parent
- **did not** believe that these children were more able to attend and focus than what was observed
- **did** believe that there was a true pathophysiological connection to the brain
Prevalence of ADHD TODAY

- AAP estimates that 8-10% of children today have ADHD

- CDC states that between 1997 & 2006, the number of ADHD cases increased by about 3% per year
Children With ADHD

The Battle Within The Mind
OBJECTIVES of PRESENTATION

1. To Increase evidence based knowledge about ADHD

2. To increase understanding of the current therapeutic and pharmacological treatments of ADHD

3. To understand the prognosis for untreated ADHD children
Objective #1: Increase evidence based knowledge about ADHD
Evidence Based Knowledge About ADHD

What is ADHD?, Cause of ADHD, DSM-5 definition, Types of ADHD, Diagnosing ADHD, Co-morbidities with ADHD
What is ADHD?

ADHD is:

A common disorder...

- that begins in childhood, but often continues into adolescence and adulthood with 2 categories of symptoms...
  - Hyperactivity/impulsivity
  - Inattention
What is ADHD?

**ADHD is:**

**A brain-based disorder**

- Brain imaging studies using PET scans show that brain metabolism is lower in the areas of the brain that control attention, social, judgment & movement.
What is ADHD?

**ADHD is:**

A brain-based disorder

- Brain imaging studies have shown us that the brains of children with ADHD differ fairly consistently from those children without ADHD.
• Pre-frontal cortex, striatum, basal ganglia & cerebellum all tend to be small

• Brain size overall is 5% smaller than non-ADHD
Studies showing frontal and temporal lobe differences
**ADHD is:**

A brain based disorder

- There are also chemical differences in the ADHD brain.
- Lower levels of neurotransmitters, especially dopamine and norepinephrine.
What is ADHD?

ADHD is:
A genetic disorder

- Studies have identifies specific genes associated with ADHD and hundreds of gene variations that were not found in children without symptoms
  - (Guan, Wang, Chen, Yang & Qian, 2009)
  - (Elia et al., 2010)
What is ADHD?

**ADHD is:**
A genetic disorder

- Most children with ADHD have a relative in the family who has also had it
- At least 1/3 of all fathers who had ADHD in their youth have children with ADHD
- A majority of identical twins share the trait of ADHD
What is ADHD?

ADHD is:
Linked to problems during pregnancy
- Maternal cigarette smoke
- Drugs during pregnancy
- Low birth weight
- Preemies
ADHD is:

- Also linked to head trauma, particularly injuries to the frontal lobe of the brain.
Diagnosing ADHD

DSM-V
Vanderbilt or Connor Questionnaires
New diagnostic tools on the horizon
What does this look like in the ADHD child…

signs and symptoms:

- A sense of inner restlessness
- Disorganization and careless work habits
- Inability to follow complex directions and to complete tasks
What does this look like in the ADHD child…

signs and symptoms:

- Inability to work independently
- Poor self-esteem
- Poor peer relationships
- Easily distracted by both inner and external stimuli
We Know that there are 3 types of ADHD

1. Predominately inattentive

2. Predominantly hyperactive/impulsive

3. Combined inattentive/ hyperactive/ impulsive
Predominately Inattentive

1. *Often* does not give close attention to details or makes careless mistakes in schoolwork, work, or other activities.

2. *Often* has trouble keeping attention on tasks or play activities.

3. *Often* does not seem to listen when spoken to directly.
4. Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace.

5. Often has trouble organizing activities.

6. Often avoids, dislikes, or doesn’t want to do things that take a lot of mental effort for a long period of time (such as schoolwork or homework).
7. Often loses things needed for tasks and activities (e.g. toys, school assignments, pencils, books, or tools).

8. Is often easily distracted.

9. Is often forgetful in daily activities.
To fit the diagnostic criteria of the DSM-5:

**Six or more** of those symptoms must be present for **at least 6 months** to an extent that is disruptive and inappropriate for developmental level.
INTERESTING:
Children with this type of ADHD have changes to the transporter genes for the neurotransmitter norepinephrine
Hyperactive Symptoms

1. Often fidgets or squirms in seat.

2. Often leaves seat in situations when remaining seated is expected and runs about or climbs in situations where it is not appropriate.

3. Often unable to play or take part in leisure activities quietly.
Hyperactive Symptoms…

4. Often "on the go" acting as if "driven by a motor".

5. Often talks excessively.

6. Often has trouble waiting his/her turn.
To fit the diagnostic criteria of the DSM-5:

**Six or more** of those symptoms must be present for at **least 6 months** to an extent that is disruptive and inappropriate for developmental level.
*Interesting*…

Children with this ADHD had changes to their dopamine transport gene, thus affecting dopamine levels in the brain
Combined: Inattentive Hyperactive Impulsive

- The most common type: 50-60% of children with ADHD have this type
- Combination of both types
- For the DSM-V diagnosis:
  - The diagnostic criteria of both A and B must be met for 6 months
Interesting...

Children with this type of ADHD have decreases in transporter genes for both norepinephrine and dopamine.
Some symptoms that cause impairment were present before age 12 years.

Some impairment from the symptoms is present in two or more settings (e.g. at school/work and at home).
There must be *clear evidence* of clinically significant impairment in at least 2 of the following areas:

- Social settings, school, or home.

**The symptoms:**
are not better accounted for by another mental disorder.
How is the data assembled?

Questionnaire assessment forms for parents and teacher to form a collateral history

1. Vanderbilt Assessment Scales
2. Connors 3rd Edition ADHD Assessment
**How is the data assembled?**

- Both look for the co-morbidities of anxiety & depression
- Very important to look at *history over time*
New Diagnostic Strategies

- Neuro-imaging studies already reviewed find that even though the differences between ADHD and non-ADHD to be consistent...

- They are viewed as too small to be used as a diagnostic strategy at this time
As of July 15, 2013, the FDA approved marketing of the first medical device based on brain function to help assess attention-deficit/hyperactivity disorder in children and adolescents aged 6 to 17 years.

“NEBA SYSTEM”

C. Foreman, *Infectious Diseases in Children*, July 2013
New Diagnostic Strategies

- **NEBA System**: Neuropsychiatric EEG-Based Assessment Aid System

  - A 15-20 minute non-invasive test that calculates the ratio of beta and theta brain wave frequencies.

  - We know that theta and beta ratios are higher in children and adolescents with ADHD.
New Diagnostic Strategies

- Reviewed by the FDA through a process where NEBA manufacturers submitted data from a clinical study evaluating 275 children and adolescents with attention on behavioral concerns.

- Considered investigational and unproven for the diagnostic work-up of ADHD
At almost the same time (May 2013) a new study found that the parent-reported cases of attention-deficit/hyperactivity disorder diagnosis in their children may be a more accurate method for monitoring state and national based prevalence of the disorder than previously thought.

- Visser SN. JAMA Pediatr. 2013; 2364
Co-Morbidities with ADHD

Learning disabilities
Psychosocial disorders including bipolar disorder, anxiety disorders and depression
Co-Morbidities With ADHD

- **Learning Disabilities**
  - Higher incidence of learning disorders in children with ADHD than in general population of children
  - Present in 70% of children with ADHD
  - Disability in written expression two times more common (65%) than a learning disability in reading, math, or spelling
Co-Morbidities With ADHD

Learning Disabilities

- More severe learning problems than children who had LD but no ADHD
- More severe attention problems than children who had ADHD but no LD.
- Further, children with ADHD but no LD still had some degree of learning problem
- Higher incidence of dyslexia in children with ADHD

Co-Morbidities With ADHD

- Higher incidence of psychosocial disorders than in general population of children
  - Bi-Polar Disorder
  - Anxiety Disorders
  - Depression
  - The morbidity rate for these disorders increases in untreated teenager.
Objective 2:
To increase understanding of current therapeutic and pharmacological treatments of ADHD
Therapy or Medication?

All children with ADHD do better with both

So...
What therapies?
What meds?
Therapy or Medication?

Therapies for parents to consider:

- Behavioral
- Cognitive
- Family
- Interpersonal
Therapy or Medication?

- **Goal of Behavioral Therapy:**
  - Teach more adaptive behaviors

- **Goal of Cognitive Therapy:**
  - To help child replace dysfunctional thinking with more positive thoughts
  - “I can’t do anything right.” vs. “This is really hard for me.”
Therapy or Medication?

- **Goal of Family Therapy**
  - Teach family members skills in helping child organize & function
  - Parenting classes
  - No yelling, no hitting + rewards

- **Goal of Interpersonal Therapy**
  - Teach social skills with peers to help them interact socially in a more successful way
Therapy or Medication?

- Medication is essential in the treatment of ADHD!
- Remember… it has a biological basis with decreased neurotransmitter abnormalities
- Not giving meds for ADHD is like asking the diabetic to make his own insulin.
Therapy or Medication?

- Parents say: “My child is not going to be on medication! He/she just needs to try harder!”

- Parents need to understand that the child cannot fix themselves.

- Ask the child to try harder to control impulses and pay attention in school is like asking the diabetic to try harder to produce insulin...
Therapy or Medication?

This is the life of the ADHD child with out meds:

- Marked impairment in school success
- Can’t follow routine instruction from teachers to “sit down, take out your math book, turn to page 4 and answer the first 10 questions.” Always in trouble!
- Inability to fit in with peers: good boy/bad boy
- Seen as a troublemaker
We have to make the parents understand!

Their child’s self esteem is being destroyed

Remember that they are corrected, punished, teased and humiliated on a daily basis.
Therapy or Medication?

- Erikson’s Theory of Personality Development & ADHD

- Children from 6-12: Industry Vs. Inferiority
  - Children in elementary school are in this stage
  - This is also the age that ADHD is most detrimental to their success
Erikson: Industry vs. Inferiority
School Age Child

**Positive resolution:**
- Develops a sense of competence and perseverance.
- Focus of stage is achievement & accomplishment, & mastery.
- Learns to compete, to cooperate, & to follow rules.
- *Inability to meet goals causes child to develop sense of inadequacy.*
These children are destroyed by the time they leave elementary school behind without help.

They do not believe they CAN succeed.

They are looking for escape.

If we don’t medicate appropriately in these years, these children will medicate themselves in middle school and high school.
Therapy or Medication?

- My answer to I’m not going to medicate my child to make him behave...
  - We are *not* medicating your child to make him behave.
  - We are medicating your child to rebuild the damage to his soul caused by his inability to succeed in home or school
  - If we don’t rebuild him now, it will be too late.
Proper pharmacological treatment reduces the symptoms of ADHD hyperactivity and inattention **by 80%!**

With these outcomes, why would we not want these kids on meds?
Medications fall into one of 3 categories:

1. Stimulants
2. Amphetamines
3. Non-stimulants
MEDICATIONS
Stimulants
Amphetamines
Non-stimulants
Adverse reactions
Medication Recommendations

- **1st Line**: Stimulants
- **2nd Line**: Amphetamines
- **3rd Line**: Non-stimulants
**Drug Names of Short Acting Stimulants:**
- Ritalin (methylphenidate)
- Methylin (methylphenidate)
- Focalin (dexemethylphenidate)
- Daytrana (methylphenidate patch)

All are methylphenidate. The molecule has been slightly altered to make them different from each other.
Drug Names of Long Acting Stimulants:
- Ritalin LA
- Focalin XR
- Daytrana
- Concerta
- Metadate CD
- Methylphenidate ER
- Medication can be given in the a.m. for all day assistance.
The pros and cons between the short acting and long acting:

- Long acting can be taken once in the morning so the child doesn’t have to go to the health room.

- Short acting can be more effective.

- Short acting has sharper spikes and valleys.
Medications

Drug Names of Amphetamines:
- Adderall XR
- Dexadrine
- Vyvanase... the newest one

- All are dextro-amphetamine.
- As in stimulants, the molecule is altered slightly to create the different drugs.
Common side effects of amphetamines and stimulants:
- Headache... transient
- Stomach ache... transient
- Decreased appetite
- Irritability
- Difficulty sleeping
- Dry mouth
Medications
Potential Side Effects

**Decreased appetite**
- Dose after meals, even though better efficacy if given 30 mins. before meals
- Frequent snacks

**Irritability**
- Decrease dose
- Try another stimulant
Medications

Potential Side Effects

Short Acting

Sleep problems

- Firm bedtime routine
- Move late afternoon dosing (only if needed) to earlier time

Behavioral rebound

- Try longer acting form
- Add a small dose in afternoon
Medications

- Infrequent side effects of amphetamines and stimulants:
  - Weight loss
  - Dizziness
  - Growth suppression
  - Tics
  - Increased HR & B/P

- BE SURE THE CHILD HAS NO CARDIAC PROBLEMS: No ventricular, no atrial, no vascular problems
Drug Names of Non-Stimulants

- **Strattera**
  - Useful for some children
  - Indicated for ADHD
  - Causes a significant stomach ache that many children can’t tolerate
Medications

Drug Names of Non-Stimulants

- **Intuniv**
  - *New*, extended-release formulation of the high-blood pressure medication guanfacine (Tenex)
  - *Can be used alone or along with stimulant medications in children ages 6 to 17.*
Medications

Medications used but not indicated:

- **Catapres** *(clonidine)*
  - Med for hypertension
  - Has shown benefit in reducing symptoms in ADHD *(Kapvay brand)*
- Side effects: dry mouth, constipation
Medications

Medications used but not indicated:

- **Nuvigil or Provigil**
  - Used in narcolepsy
  - Has shown some benefit in reducing symptoms in ADHD
  - Side effects: headache, insomnia
Medications

Medications used but not indicated:
Anti-depressants that are not labeled for <18 yrs.
- Wellbutrin XL and Wellbutrin SR
- Cymbalta
- Effexor
- Celexa

Have all shown benefit in reducing symptoms of ADHD. Added benefit of treating depression in ADHD kids.
Medications

- Some ADHD kids CAN be explosive and accelerate from frustration to rage

- Anti-psychotics are often prescribed.

- Anti psychotics are much more dangerous to use as side effects are significant and require close monitoring!
Medications

- **Risperdal & Seroquel: similar SE profile**
  1. Parkinsonism
  2. Metabolic changes including DM & weight gain
  3. Hyperprolactinemia & gynecomastia
  4. Leukopenia & neutropenia
  5. Priapism
  6. Dysphagia & dyspepsia
Concern is valid about the drugs we use.

It is not something that should be undertaken carelessly or without skill of the prescriber.

Each class of drug has its own side effect profile and risks and benefits.

Often… mild side effects just need a patient parent.
Medication Concerns

- With appropriate dosing and monitoring, these drugs can be safely used.

- ADHD children benefit so much from them that we need to be willing to use them wisely.

- It is no fun to fail at everything you try to do everyday of your life.
Objective #4: To understand the prognosis for untreated children with ADHD

What can we predict about their future?
The Future

Much depends on:

- whether the child was properly diagnosed early
- whether the child was treated in therapeutic ways by family and teachers
- Whether the child received pharmacological help
The Future: Untreated ADHD

- Only 37% of children with untreated ADHD graduate from high school.
- Only 5% receive a college degree.
- Teens with untreated ADHD are more likely to engage in high risk behaviors, including MVA’s, unsafe sex, vandalism and stealing.

Gephart, H.D., Advance Studies in Medicine, Managing ADHD, S161-S162
Children do not outgrow their ADHD.

- The hyperactivity tends to fade, but the other symptoms do not.

- We are just now beginning to understand the complexity of problems associated with adult ADHD.
The Future

**FACT:**

- IT REALLY DOES MATTER THAT WE RECOGNIZE AND TREAT CHILDREN WITH ADHD APPROPRIATELY.
When I spoke at the Kansas School Nurse conference a couple of years ago,, a school nurse came up to me after I spoke.

She expressed frustration with the way ADHD kids were treated by their teachers she worked with.

One teacher angrily told her: “I can’t save them all”
My reply:

Maybe this teacher can’t save them all, but no teacher has the right to destroy any of them.
My Story.....
Interesting….

- **Theoretically… from an evolutionary standpoint:**
  - This may also be an adaptive disorder
  - Risk taking behaviors are a part of ADHD
  - Not good at managing things, but are more willing to take on dangerous assignments… great hunts, great travels, etc..
  - **In truth, ADHD has many strengths outside the classroom.**
One paper I reviewed actually suggested that we have a higher incidence of ADHD in the US because of the characteristics of ADHD.

Who else would be more willing to leave a quiet life in a small town and jump on a ship to America than the risk taking ADHD adult.

It reminds us... there are some very positive things about ADHD too.


References

Studies of NEBA:

Studies of NEBA:

To contact me with questions

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I would be happy to visit with anyone who wants more information