

UCSF Osher Center for Integrative Medicine

**Do 4.2 Million Children Really
Need Ritalin? An Integrative
Approach to ADHD**

Sanford C. Newmark M.D.

**Pediatric Integrative
Neurodevelopmental Clinic**



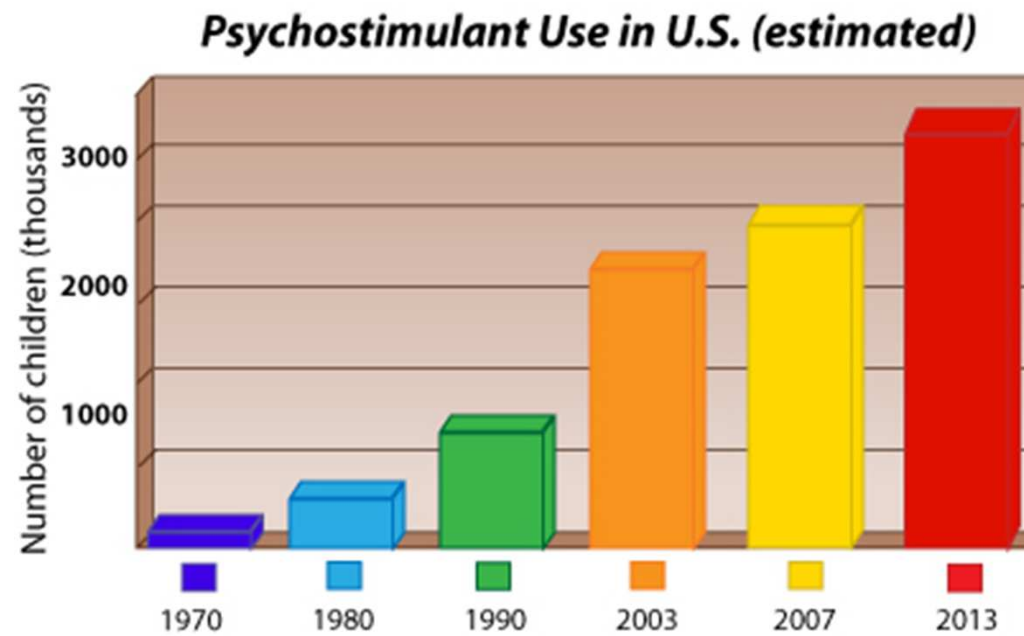
Your life, your health, your choice.

“In the past 12 months, I have no relevant financial relationships with the manufacturer(s) of any commercial product(s) and/or provider(s) of commercial services discussed in this CME activity.
I do not intend to discuss an unapproved/investigative use of a commercial product/device in my presentation.

Psychostimulant Use in the United States

- **1970 - 150,000 children**
- 1980 - 400,00 children
- 1990 - 900,000 children
- 2003 - 2,500,000 children
- **2007 - 2,700,000 children**
- **2012 - 4,200,000 children**

Psychostimulants – 1970-2012



ADHD Prevalence - CDC

- **11% of all children and now almost 20% of high school boys have received a diagnosis of ADHD.**
- **Medicaid Patients 14% prevalence (33% higher rate than non-Medicaid patients)**



Sales of stimulants more than doubled to **\$9 billion** in 2012 from **\$4 billion** in 2007.

So What is Going On?

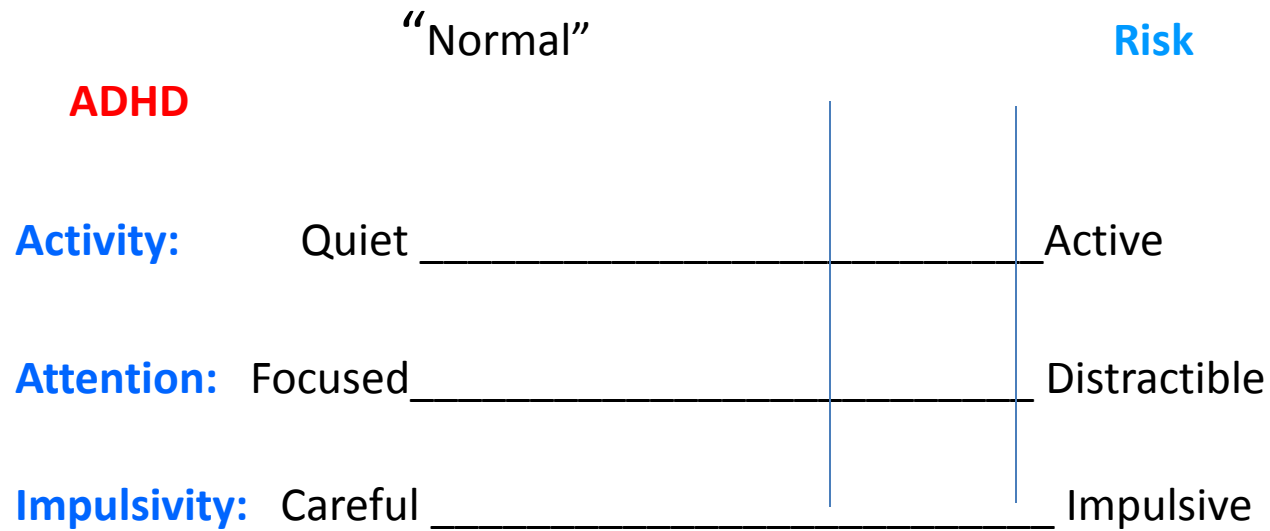
**Are there more kids with ADHD or
are we just diagnosing it more?**

Why the Explosion in the Diagnosis of ADHD?

Possible Explanations

1. There are **the same number of children with ADHD** but we are better at finding and helping them.
2. We have **loosened the definition** so more people are being diagnosed and treated.
3. We are actually **misdiagnosing** and treating many people who don't have ADHD, even by a loosened definition.
4. There are now **more people who actually have ADHD**

ADHD as a Continuum



1. We are better at finding and helping children who really do have ADHD.

- Kids previously termed lazy or stupid.
- “Behavior problems”.
- “Class Clowns”



2. We have loosened the definition so more kids are being diagnosed

Previously only the extremely hyperactive child treated.

Now:

- The inattentive child
- **Preschool kids who “can’t sit still”!**
- Kindergarteners who can’t read

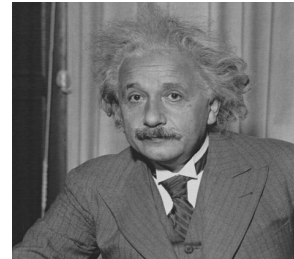


3. We are actually Misdiagnosing many children (and adults) who don't have ADHD, even by a loosened definition.

- **Lack of time for Adequate Evaluations**
 - Schools and parents demanding treatment
 - Parents without the time to provide appropriate parenting because they do not have time
 - Funneling a wide variety issues into ADHD because:
If it's ADHD you can give a pill

Conditions **Misdiagnosed** as ADHD

- Depression or bipolar disease
- Anxiety Disorder
- Learning disabilities
- The Gifted Child
- Sexual or Physical Abuse - Violence
- Difficult temperament
- Sleep apnea



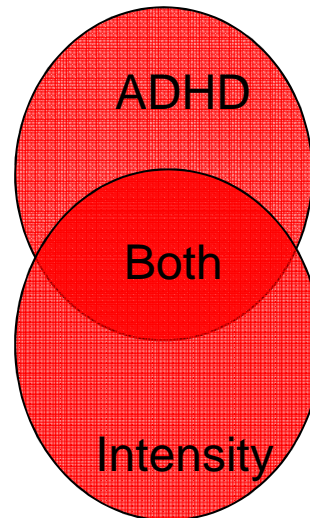
ADHD and Intensity

ADHD

- Hyperactive, Impulsive,
- Poor Attention Span
- May or may not be oppositional

Intense

- Difficult, Oppositional
- Sensitive
- Often Good attention span



Born in the Wrong Month?

- **Diagnosed with ADHD** -**10%** of Kindergarteners born in August (youngest in class) **4.5%** born in September (oldest in class)
- **Treated with Psychostimulants** - **8.3%** of those born in August, as **3.5%** born in September

900,000 Incorrect Diagnoses

Journal of Health Economics 2010

Age in Class and ADHD - Iceland

Younger Children in each class had higher likelihood ADHD diagnosis

Youngest third of class **50% more likely than those in the oldest third to be prescribed stimulants** between 7 and 14

Pediatrics Nov 2012



The ADHD Evaluation

- **History, History, History...**
 - Need to speak to the parents alone, the child alone, and the family together.
 - Use some type of standardized questionnaire.
 - Also speak to **teachers**, counselors, or school psychologists.
 - Review any previous psychological or educational evaluations or other professional consults.

Why the Explosion in ADHD?

More children now who actually have ADHD

Genes haven't changed, environment has:

- Environmental toxins in the prenatal and early childhood environment
- Television and Video
- Poor Nutrition
- Stressed parents with less time



Toxins in Umbilical Cord Blood

- 10 newborns –an average 200 industrial chemicals and pollutants
- 287 chemicals detected,, **217 are toxic to the brain and nervous system,**
- 208 cause birth defects or abnormal development in animal tests
- **Environmental Working Group 2005**



Organochlorines and Child Development

- Dichlorodiphenyl dichloro ethylene (p,p'DDE) **umbilical cord blood.**
- High levels = worse mental and psychomotor development.
- The higher the level, the worse the child's development at 13 months old.
- PEDIATRICS Vol. 111 No. 5 May 2003



Pesticides and ADHD

- **1139 children 8 to 15 years** “children with higher urinary levels of organophosphate metabolites were more likely to meet the diagnostic criteria for ADHD”
- For the most-commonly detected DMAP metabolite, dimethyl thiophosphate, **children with levels higher than the median of detectable concentrations had twice the odds of ADHD**

Pediatrics, June 2010

Does Eating Organic Help?

- Children who ate organic fruits and vegetables had 1/5th the level of organophosphate pesticide metabolites in their urine
- Children can “reduce exposure levels from ‘uncertain’ to ‘negligible’ risk”
- **Environmental Health Perspectives
2003**



Electronics and ADHD – 7+ Hours/Day!

- TV content: **4:29**
- Music audio: **2:31**
- Computer: **1:29**
- Video games: **1:13**
- Print: **0:38**
- Movies: **0:25**
- **Increased television watching at 2 years old, 5 years old, and adolescence = increased incidence of ADHD**

Kaiser family Foundation 2010



What About GMO's?

- Consequences for Human health – nothing known **yet**. Still very new
- Consequences for Farming – elimination of the livelihood of many farmers. Takeover by large corporations
- Consequences for the environment – some positive- unclear long-term
- **GMO products should be labeled!**

TV, Video and ADHD

- Not only were **both TV and Video game time** associated with ADHD
- A 13 month longitudinal study in middle schoolers demonstrated that this was not just a correlation **but likely a causal relationship.**

Pediatrics August

2010

So maybe it is no surprise that with:

- prenatal and postnatal toxin exposure,**
 - massive amounts of television and video games**
 - Greatly increased cognitive demands**
 - poor nutrition,**
 - and parents who have less time for them**
- That more kids have symptoms which cross the boundary into ADHD**

Do All Kids Who Have ADHD Need Psychostimulants?



Why not just use stimulants? They work, don't they?

- Short term- Stimulants effective 70% of time. Increase dopamine and noradrenalin levels frontal lobes.
- Can significantly improve school, home, and social success in some children.
- But they can have side-effects, and:
- **There are no long-term studies adequately addressing the effects of many years of these medications on the developing brain.**

Stimulant Medications and Side-Effects

- Decreased Appetite and Weight Loss
- Trouble Sleeping
- Abdominal Pain
- Headaches
- Tics
- Bizarre Behavior
- Hallucinations (at least 1:100)
- Increased Blood Pressure (may be bigger problem in adults)
- Decreased linear growth



More Subtle but “Worrisome” Effects

- “He’s just not himself”
- “She’s lost her spark, her joy”
- “He’s just not the same kid”
- “She’s teary, or sad a lot”
- “He’s not as enthusiastic or creative”



Do Stimulants Improve long term OUTCOME?

**Evidence for long term positive effects of
ADHD treatment is very weak(or non-existent-
depending on your perspective).**

Long-term prospective studies have failed to
show positive effects on outcome

Multimodal Treatment Study of Children With ADHD (MTA)

- 579 children –randomized to medication, behavioral, combination or community care
- At 14 months medication and combined superior to others.
- Randomized part of study ended at 14 months, patients followed to 36 months

Jensen 2007 Journal of the American Academy of Child and Adolescent Psychiatry

Multimodal Treatment Study of Children With ADHD (MTA)

- **At 24 months effects persisted, but only 50% as powerful. No effect by 36 months**
- “the modest significant advantages we found at the 24-month assessment for the MTA Medication Algorithm... were completely lost by 36 months. Likewise, we found no differences in rates of ADHD diagnosis and other comorbid conditions across the originally assigned treatment groups” at 36 months”
- Jensen 2007 Journal of the American Academy of Child and Adolescent Psychiatry

MTA – Long Term Follow-up

- “subsequent outcomes may have been increasingly influenced by dissipation of treatment intensity and adherence”
- “Although our original randomly assigned treatment groups no longer differed at 36 months, **we were struck by the remarkable degree of improvement in all four groups seen from baseline in all of the later assessment points in symptoms and overall functioning**”

Do Medications Prevent Ongoing ADHD? – PATS Study

- 230 children preschool-diagnosed ADHD -ages 3-5
- Assessed at ages 7, 8 and 10
- At age 10 about 75% of children still had ADHD -moderate to severe
- 79.% on medication had ADHD
- 73.1 off medications had ADHD
- Symptoms of those taking medication just as severe as those not taking medication

Does Medication Treatment Prevent Substance Abuse? MTA 8 year F/U

- Average age 17 years old
- Children with ADHD more likely than controls to have Substance Abuse
- Medication did not decrease this risk.
- **“Medication for ADHD did not protect from, or contribute to, visible risk of substance use or SUD by adolescence... over an 8-year follow-up from childhood.”**
- J. Adolescent&Child Psychiatry March 2013

An Integrative Approach to ADHD

It is important to see the **whole child, with his or her unique combination of strengths and weaknesses**, in the context of family, friends, school, and community, and not just a set of symptoms to fix.

Sometimes a change in the home environment, school or teacher is more important than any medicine, nutritional supplement or herb.

An Integrative Approach to ADHD

- Nutrition - Food Sensitivities and Elimination diets
- Nutrition - Basic principles
- Nutritional Supplements
 - Omega-3 Fatty Acids
 - Zinc
 - Iron
 - Magnesium

Alternative or Complementary Therapies

- Herbal or Botanical approaches
- Homeopathy
- Craniosacral Therapy
- Traditional Chinese Medicine
- Other Energy Medicines

An Integrative Approach to ADHD

- Parenting Skills/Behavioral Interventions
- School Interventions
- EEG Neurofeedback
- Exercise/meditation/martial arts

**Effect of a Restricted Elimination Diet on the Behavior of
Children with ADHD: (INCA Study) a Randomized
Controlled Trial – Lancet, Feb 2011**

- 100 children – 50 on restrictive diet – 50 controls 5 weeks
- Restricted diet (few foods) Rice, meat, vegetables, pears, water as basic diet
- **After 5 weeks 64% of children had 40% improvement on ADHD rating Scales**
- Assessor blinded, but parents and teachers not

INCA Study – Phase 2

- **Double Blind Placebo Controlled Trial of those who responded to elimination diet in Phase I**
- Children were given challenge foods and relapse of ADHD sx occurred in 19 of 30 children.
- Evaluators, patients and family were blinded as to which foods were being challenged.

ADHD and Food Sensitivity - 2

- **76 children Oligoantigenic diet**
- 62 improved.
- 28 completed a DBPCFT
active Symptoms worse on foods than placebo.
- Wheat, dairy, artificial colors and preservatives commonest



Lancet 1985

ADHD and Food Sensitivity - 3

- 78 hyperactive children placed on few foods diet
- 59 improved
- Again double blind second phase positive

- **Archives of Disease in Childhood.**
1993



Modified Elimination Diet

- Eliminate – for 21 Days
 - **Gluten**
 - **Dairy**
 - Eggs
 - Soy
 - Nuts
 - Corn
 - Artificial Colors and Flavors
- After 21 Days, Add foods 1 by 1, for 3 or 4 days each

Artificial Colors, Flavors, and Preservatives

- 153 3 year olds & 144 8/9 year olds
- Given Sodium Benzoate and an artificial color and additive mixture or placebo
- **Artificial colours or a sodium benzoate preservative (or both) in the diet result in increased hyperactivity in 3-year-old and 8/9-year-old children in the general population.**



Lancet

2007

In Europe, Dyed Foods Get Warning Label

- Products with Yellow 5, Red 40, Other Dyes
“May Have an Adverse Effect on Activity and Attention in Children” July 20, 2010



Basic Nutrition - or - **When did “Pop Tarts” become a breakfast food?”**

- Eating well
- Maintaining a normal blood sugar
 - Sugar
 - Processed Carbohydrates
 - Protein
- [The Glycemic Index](#)

- Here's what happens: A child eats a breakfast that has no fat, no protein, and a high glycemic index — let's say a bagel with fat-free cream cheese. His blood sugar goes up, but pretty soon it crashes, which triggers the release of stress hormones like adrenaline. What you're left with, at around 10 a.m., is a kid with low blood sugar and lots of adrenaline circulating in his bloodstream.
- **He's jittery and fidgety and not paying attention.**
- That's going to look an awful lot like ADHD to his teacher.
- The possibility exists that **in children predisposed to ADHD, quality of diet may have additional impact.**

- David Ludwig, M.D.Children's Hospital Boston

Glycemic Index

- **52 Adolescents had high or low Glycemic Index breakfast, or No breakfast**
- 30 and 120 Minutes Cognitive testing
- Low GI Breakfast:
 - Better Executive function
 - Better Working memory
 - Better Attention



British Journal of Nutrition

2012

Appleton Central High School

- Appleton Central Alternative Charter High School – kids “struggling in conventional settings”-
“...disruptive in class, truant. have psychological and emotional problem, come from dysfunctional home environments.”
- A healthful meal program for breakfast and lunch
- Vending machines selling candy, soda, and chips removed.

Appleton Central -2

- **“...”I can say without hesitation that it's changed my job as a principal...”**
- "Since we've started this program, I have had zero weapons on campus, zero expulsions from the school, zero premature deaths or suicides, zero drugs or alcohol on campus. Those are major statistics.”



Appleton Central -3

- "Since the introduction of the food program, **I have noticed an enormous difference in the behavior of my students in the classroom,**" said teacher Mary Bruyette.
- "They're on task, they are attentive. They can concentrate for longer periods of time."



Omega -3 Fatty Acids and ADHD- What Do We Know?

- Children with ADHD have **decreased levels of Omega-3's** in red blood cells and plasma
- **Omega-3 supplementation increases those levels**
- **Childhood disorders such as ADHD and autism spectrum disorders are associated with a relative lack of ω -3 fatty acids**
- **European Journal Peds 2010**

Omega-3's for ADHD-Meta-Analysis

“Omega-3’s, particularly with high doses EPA, were modestly effective in the treatment of ADHD”

- About 40% as effective as stimulants
- Very few and mild side-effects



- **Journal of the American Academy of Child and Adolescent Psychiatry 2011**

Fish Oil: Unanswered Questions

- What is the right dose, and how does it vary by age? (**My rec: small kids 1000 total DHA+EPA ---Bigger kids 2000 total**)
- What are the ideal ratios of EPA and DHA? (more EPA)
- Are all brands the same?
- **How do you get your kids to take this stuff?**
(chewables and gummies 16-20/day!)

ADHD and Iron Deficiency

- Fifty-three children with ADHD and 27 controls.

- **Serum Ferritin**

ADHD = **23**

Controls = **44**



- Serum iron, Hemoglobin, and hematocrit were normal.

Arch Pediatr Adolesc Med. 2004

Effects of iron supplementation on ADHD

- 23 children with ferritin <30, not anemic
- Treated for 12 weeks with iron or placebo
- **ADHD, as measured by standard measuring tools, improved in the iron taking group and not the placebo.**
- **Pediatric Neurology 2008**

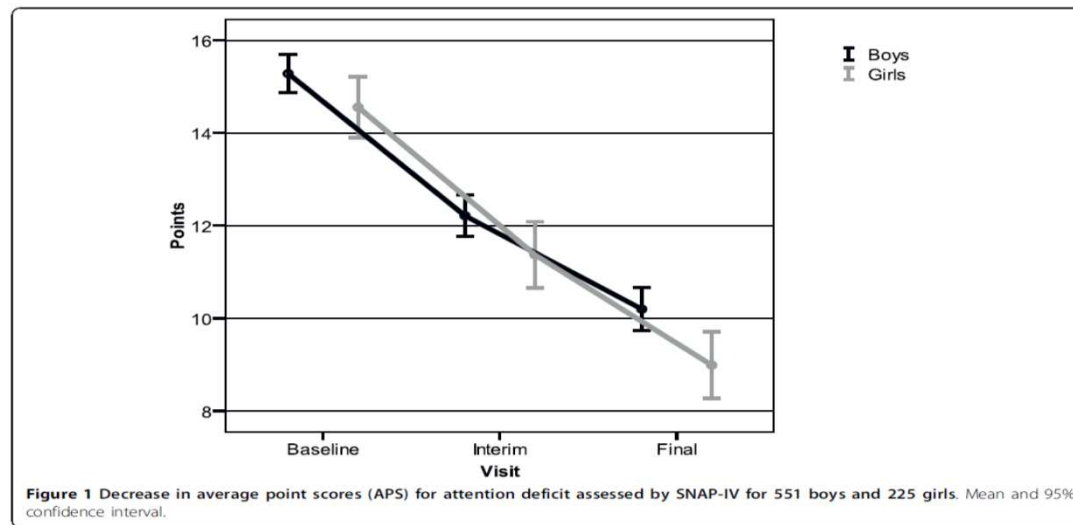
Zinc for ADHD

- Arnold (2011) 15 or 30mg zinc in randomized trial with and without amphetamine.
- Zinc alone no results.
- With 30mg zinc - 37% reduction optimal amphetamine dose.
- **Overall- Zinc is an important nutritional factor in ADHD. Worth checking and treating in those who are deficient (or low normal?)**
- **Journal of Child & Adolescent Psychopharmacology. 21(1):1-19, 2011 Feb.**

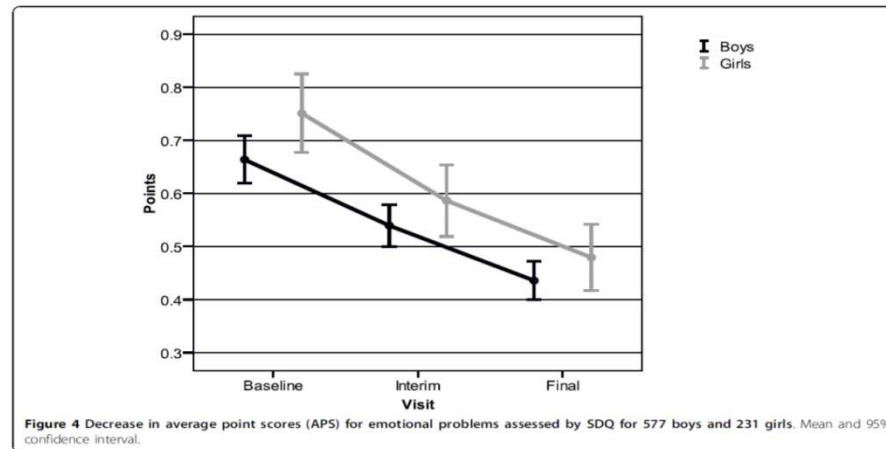
Putting Them Together

- 3 Month Open Label Trial – 800 children
 - **Omega-3 EPA** (eicosapentaenoic acid) 400 mg
 - **Omega-3 DHA** (docosahexaenoic acid) 40 mg
 - **Omega-6 GLA** (gamma-linolenic acid) 60 mg
 - **Magnesium** 80 mg (21% of RDA)
 - **Zinc** 5 mg (50% of RDA)
- **Lipids in Health and Disease 2010**

Improvements in Attention



Improvements in Emotional Problems



Behavioral Management

- Many parents are **frustrated, confused, angry, helpless, guilty** about their lack of parenting success.
- Often end up in maladaptive patterns with high levels of criticism and negative emotions.
- **Helping parents with this is crucial. Can make a dramatic difference in behavior**
- Many approaches – Important to pick one and stick to it- Mental health consultation often necessary.

School Interventions

- **The right school and the right teacher can make all the difference**
- Sometimes 1st grade awful, 2nd grade fine, 3d grade terrible, etc. etc.
- 504 plan –reasonable classroom modifications
 - Set of books for home
 - Modified homework
 - More time or quiet place for test taking
 - Direct communication of homework assignments

Tolson School-the Nurtured Heart

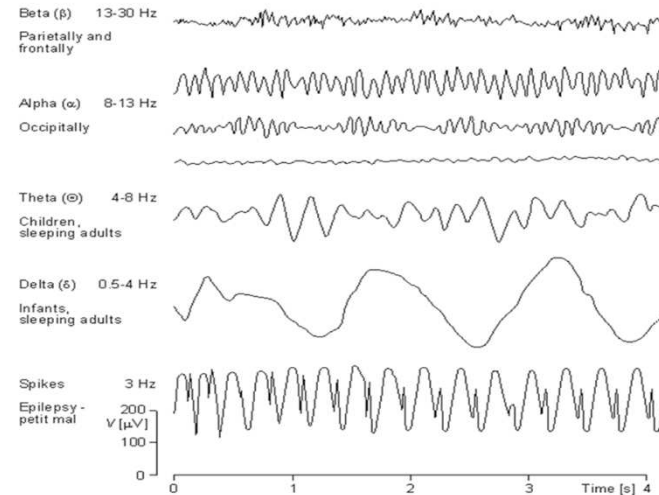
- Tolson School, Tucson. “Failing School” 75% of children from low income families.
- **Entire school** began to apply the **Nurtured Heart** approach
- Behavioral management system based on highly increased positive feedback, clear rules, and well defined consequences, given without ‘energy”

Tolson School

- Discipline problems dropped sharply
- Special education dropped from 31 students to 7 students
- **2 of 519 students on medication for ADHD (0.3%)!**
- “Performing Plus School” - increasing test scores.

EEG Neurofeedback

- Children with ADHD:
- **More slow wave (Theta-low arousal)**
- **Less Fast Wave (Beta-high arousal) activity**
- One study –QEEG had 86% sensitivity 98% specificity
- 2014 NEBA EEG test approved by FDA for diagnosis of ADHD



EEG Neurofeedback

- **Children can be trained to alter these brain waves by biofeedback techniques, and their ADHD symptoms improve.**
- **A good body of research suggests significant effectiveness,** in some cases similar to psychostimulants. What is lacking are long term studies. (what happens a year later?)
- Expensive and time-consuming. 30-40 sessions and \$3000-\$5000.
- Journal of Attention Disorders 2011

Life Choices and Mind Body

- **Decrease electronic media!**
- **Sleep**
- Yoga or meditation
- Mindfulness training
- Hypnotherapy
- Exercise
- Martial Arts
- Time in nature



How Do I Treat ADHD?

- **Make sure the diagnosis is correct!**
- **Clean Up the Diet**
- Elimination Diets
- Check serum Ferritin, Zinc,
- Omega-3's
- Behavioral Interventions
- School Modifications

How Do I Treat ADHD?

- EEG Neurofeedback
- Exercise- Martial Arts
- Mind-Body – Yoga-meditation
- Sometimes botanical and other CAM treatments
- Psychostimulants when necessary



Take Home Message

**Let's be Careful Not to Over Diagnose
ADHD**

**When we do diagnose ADHD, consider
beginning with safe, non-pharmaceutical
options before prescribing psychostimulants.**

