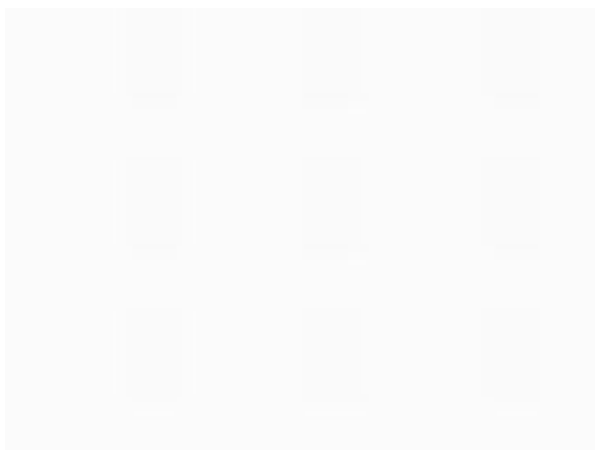


- To review commonly encountered developmental diagnoses encountered in pediatric patients
- To become familiar with potential ocular findings in these patients
- To discuss treatment options for a variety of developmental disorders
- To become part of a team in the treatment of these patients.

**Pediatric Developmental
Conditions**



Course Goals



Hyperkinetic Impulse Disorder ●

1955 – Ritalin

● 1980 - DSM 3

● ADD c/s hyperactivity

● 1987 – DSM3R

● ADHD

ADHD History

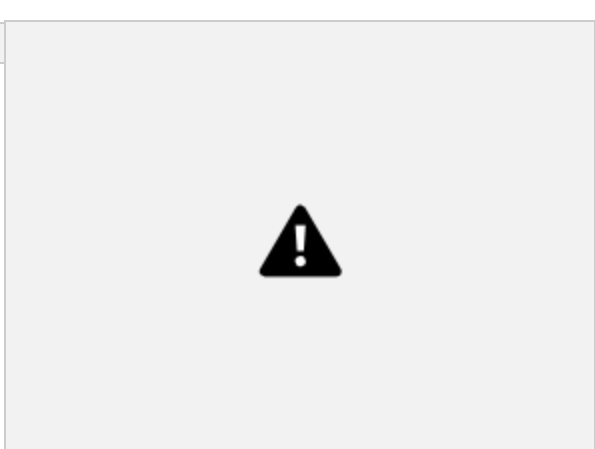
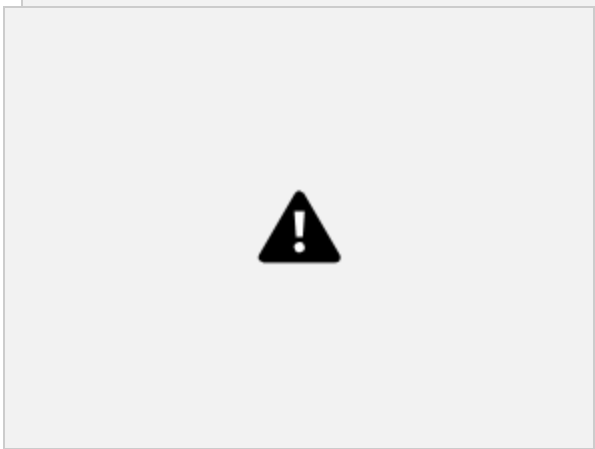
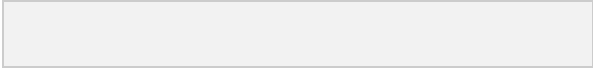
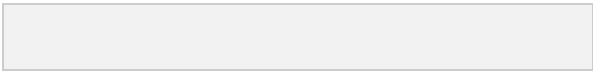
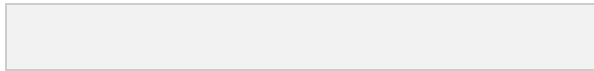
● 1902

● 1936 – Benzedrine

● Charles
Bradley

● 1962 – DSM2

●



Attention Deficit Hyperactivity Disorder

● Prevalence: 3-10% of all children

● Rowland, et al. (2002)

● 10%

● Harel & Brown (2003)

● 12%

● Barbaresi et al. (2002)

● 7.5%

● CDC (2011)

● 9%

● CDC (2016)



● APA (2018) ● 8.4%

<https://www.cdc.gov/nbddd/adhd/prevalence.html>

● 9.4%

Attention Deficit Hyperactivity Disorder

● Combined Presentation (80%)

● Predominantly Inattentive Presentation (10-15%)

● Predominantly Hyperactive/Impulsive Presentation (5%)

● Boys:Girls 2:1



DSM V Diagnostic Criteria

- with or taps hands or feet or squirms in seat
- Often leaves seat in situations when remaining seated is expected
- Often runs about or climbs in situations where it is inappropriate
- Often unable to play or engage in leisure activities quietly.
- Is often "on the go"



- A: Inattention/Hyperactivity that interferes with functioning
- B: Some symptoms onset < 12 years of age
 - Previously < 7 years of age
- C: Present in 2+ settings
- Verify by 2 people
- Inattention**
- Fails to give close attention to details or makes careless mistakes
- Difficulty sustaining attention in tasks or play
- Does not seem to listen

- Hyperactivity/Impulsivity**
- Often fidgets



Etiology/Risk Factor

S



• Low Birth

Weight •
Prematurity
• Alcohol/Tobacco

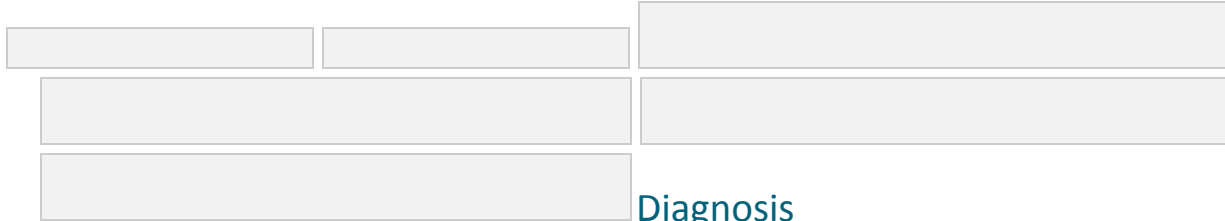
• Lead

exposure •
Injury to
prefrontal
cortex



Neurochemistry

- Frontal-subcortical systems
 - Catecholamine disruption
- Brain imaging found brains 3-4% smaller



Diagnosis

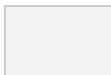


- Vanderbilt
- Connors
- Parent reports
-




- DSM-5
- Observation
- Checklist/Rating scales
 - ADHD Rating Scale IV

- Other reports
- Teacher
 - Other family



[Redacted]




[Redacted]

Vision

- CISS – Convergence Insufficiency Symptom Survey
 - Frequent difficulty in concentrating
 - Loss of place
 - Re-read
 - Trouble remembering what you read
 - Pulling around eyes
 - Eyes hurt when reading

[Redacted]




[Redacted]

Convergence Insufficienc

- y ● XP'>XP
 - ortho - 6 XP'
 - CITT
- Receded NPC
 - ≥6 cm break

● Poor BO/PFV



Vision

- Sutton. Psych Assess. 2011;23:805-9
- Poor VMI in patients with ADHD
- Shen. Res Dev Disabil. 2012;33:1301-9



● Poor handwriting (Chinese)



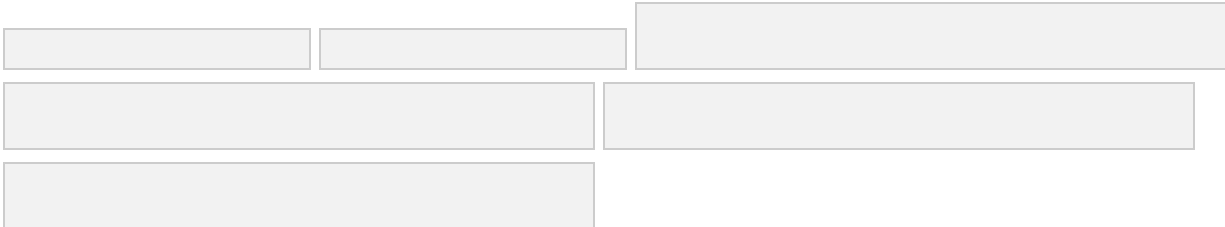
● Over can



minus by 2D cause ADHD symptoms!



Copyright 2015 Dr. Quaid





Other Causes for Inattention?

- Alabama School for the Blind
- UAB Low Vision
- Prevalence of ADHD 22.6%!
 - Alabama Prevalence 14.3%
 - National Prevalence 9.5%
- Less likely if diagnosis of nystagmus or total vision loss

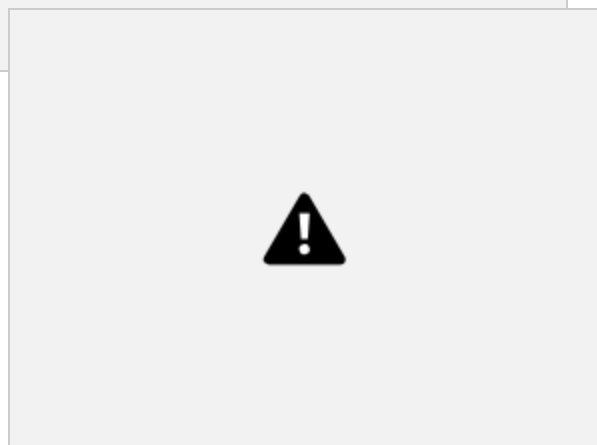
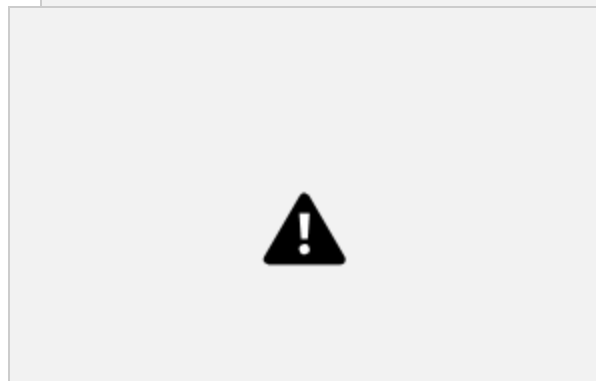
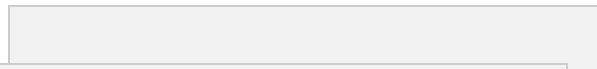
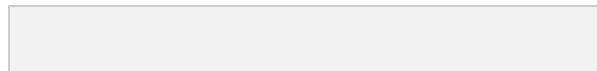
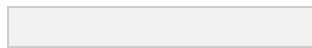
DeCarlo DK. Prevalence of attention-deficit/hyperactivity disorder among children With vision impairment. JAAPOS. 2014 Feb;18 (1) 10-4.

- Psychostimulants
- Generics: Methylphenidate, Dexamethylphenidate, Dextroamphetamine ● Dopamine
- Side Effects: **Motor tics, Vision changes/problems with accommodation,** Sleep disturbances, Potential for addiction/abuse, Depression, **Headaches,** Adverse effects on learning with high doses, *Growth reduction,* suicide? ● Benefits



ADHD – Non stimulants

- Atomoxetine HCl (**Strattera**)



- **Concerta**
- Metadate CD/ER
- Aptensio XR
- Daytrana (patch)
- Quillivant XR
- Dextroamphetamine – Dexedrine
- Lisdexamfetamine – **Vyvanse**
- Dextroamphetamine & Amphetamine – Adderall/XR
- Evekeo



• Norepinephrine reuptake inhibitor

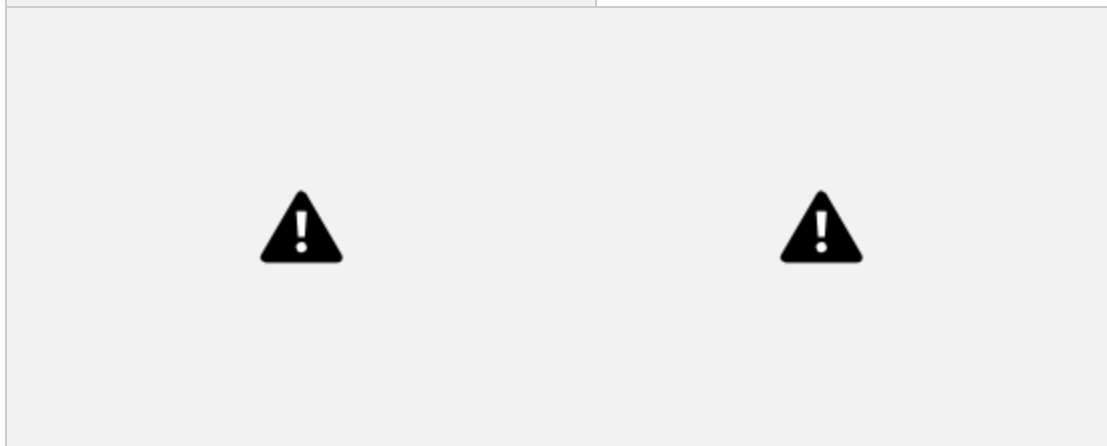
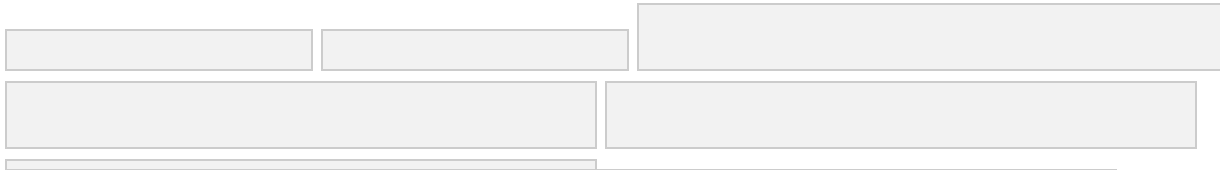
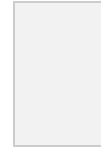
- Affects NE reuptake & ↑dopamine levels in the prefrontal cortex
- ADRs: inhibition of sleep, increase BP & pulse

Guanfacine (Intuniv, Tenex)

- **Clonidine (Catapres, Kapvay)**

Alpha 2 adrenergic agonist

- Mechanism of action
- Side Effect: decreased BP

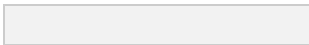
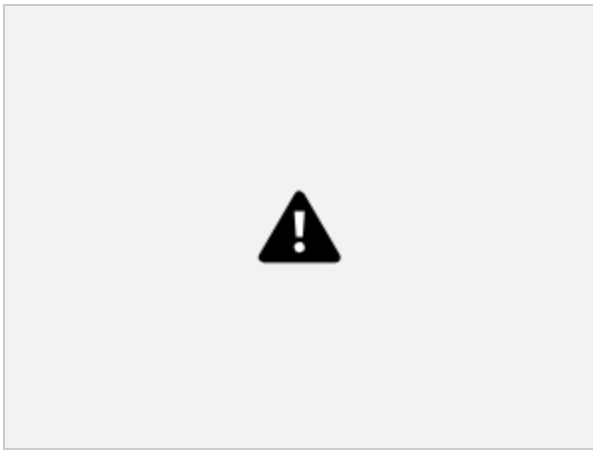


Case Report

- 6WM complains of “hard blinking” x 6 weeks; no redness/discharge/itch
- VA 20/20 each eye sc
- PERRL (-) APD
- Patient started stimulant medication 8 weeks ago
- No blinking before then
- PMH: ADHD

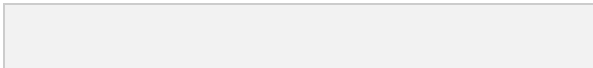
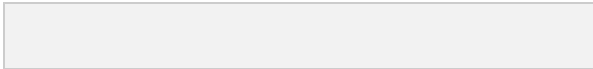
Examination Pointers • R/O visual

- causes for inattention
- Refractive
- Binocular
- Accommodative
- Oculomotor
- Know side effects of medications
- Headaches
- Blurred vision
- Tics



Developmental Disorders (PDD)

- Autistic Disorder
- Pervasive Developmental Disorder NOS (PDD)
- Asperger Syndrome
- Childhood Disintegrative Disorder
- Rett's Syndrome



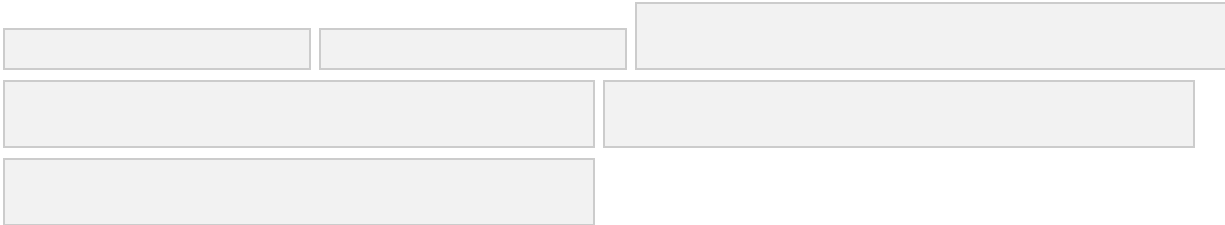
Overview

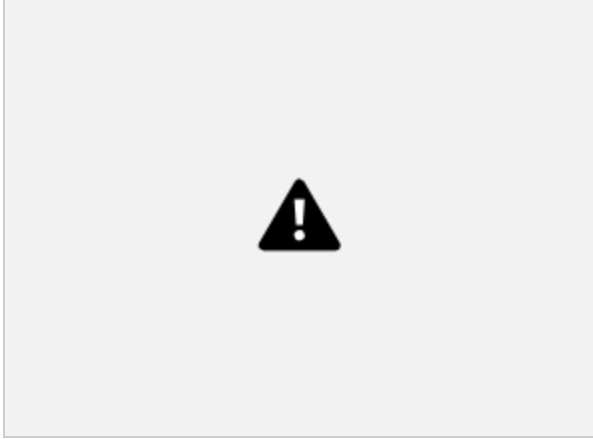


- Problems with Attention
- Autism Spectrum Disorders (ASD)
- Problems with Sensory Integration



Old Classification - Pervasive



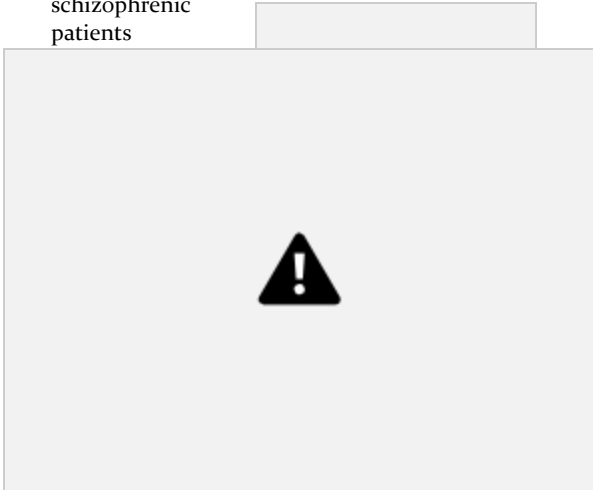


- 1967 - mothers
- 1977 - twin studies
- 1980 - separate from childhood schizophrenia (DSM)
- 1987 - autism disorder (DSM)
- 1991 - Special Education recognition
- 1994 - Asperger's Syndrome (DSM)
- 2013 - ASD

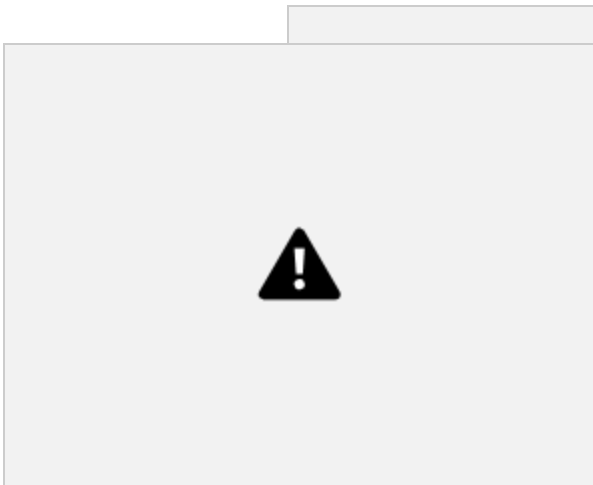


Autism History

- 1908- subset of withdrawn schizophrenic patients



Autism History



Autism Spectrum Disorder

- Symptoms cause clinically significant impairment in social, occupational or other areas of functioning
- Not explained by another disorder but child can have another disorder
 - Fragile X, Tuberous Sclerosis, Fetal Alcohol, PKU

Autism Spectrum Disorder

- **Spectrum** of disorders affecting social interactions, communication
- Present in early development



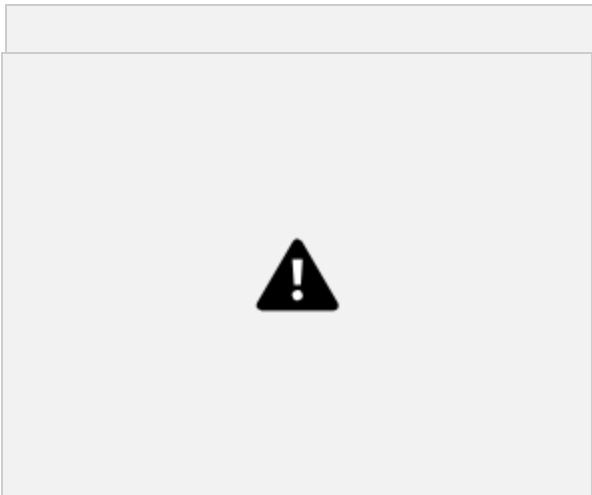
• Persistent Deficit in Social Communication and Social

Interaction

- Deficits in social-emotional reciprocity
 - Abnormal back and forth communication
 - Fail to initiate or respond to social interactions -
- Deficits in nonverbal communicative behaviors for social interaction
 - Poor eye contact and body language
 - Lack of facial expressions
- Deficits in developing, maintaining and understanding relationships
 - No imaginative play
 - No peer relationships



- Hyper- or hyporeactivity to sensory input or unusual interest in sensory aspects of environment



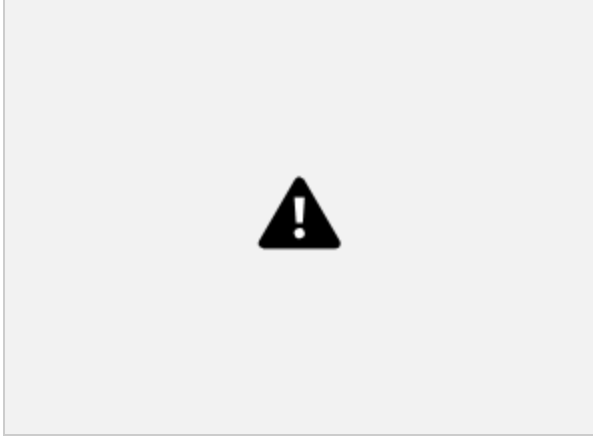
Autism Spectrum Disorder

Level 3 "Very substantial support"	Severe deficits, very limited social interactions, minimal social response	Very difficult to deal with change, very repetitive behaviors interfere in all areas
Level 2 "Substantial support"	Marked deficits, social impairments even with supports, reduced responses to others	Difficult to deal with change, very repetitive behaviors interfere in some areas
Level 1 "Support"	Without supports deficits cause impairments, difficulty initiating social interactions, decreased interest in social interactions	Inflexible behavior causes difficulty in 1+ area

Autism Spectrum Disorder

- Restricted, repetitive patterns of behavior, interests or activities (2+)
 - Stereotyped or repetitive motor movements, use of objects, speech
 - Insistence on sameness, inflexible adherence to routines or ritualized patterns of verbal or nonverbal behavior. -
 - Highly restricted, fixated interests that are abnormal in intensity or focus
 - Preoccupation with a certain object





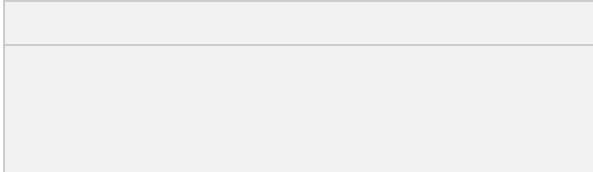
Rett Syndrome

- Genetic mutation (MeCP2)
- Neurodevelopmental disorder
 - Normal development until 5 months
 - Loss of speech
 - Gait abnormalities

- Loss of purposeful use of hands then repetitive hand movements
- Apraxia
- Females >>>>> Males
- Life expectancy
- MECP2 mutation (MECP2 mutation)

Autism Spectrum Disorder

- Prevalence
 - CDC 1/88 (2012)
 - CDC 1/59 (2014)
 - CDC 1/56 (2016)
- Boys:Girls
 - 4:1
- Familial
 - Siblings risk 18.7%
 - Ozonoff et al Pediatrics 2011



al cerebellum (1988)



- Frontal lobe
- Due to slowdown in normal "pruning" process
- larger volume ages 2-4 in 90% (2001)

- Surplus of synapses (2014)
 - Mother's age
 - Complications
 - Maternal antibodies
 - Father's age



[Redacted]

[Redacted]

[Redacted]

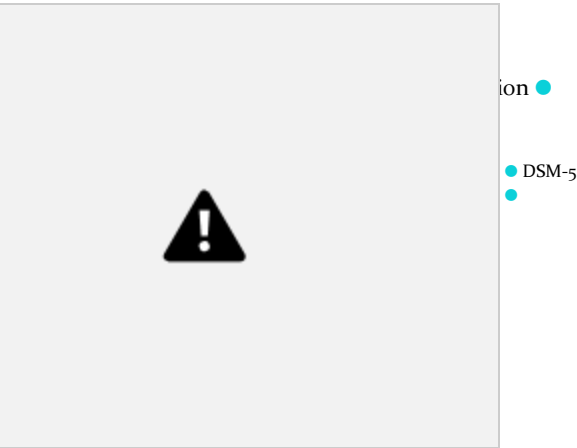
Diagnosis

Modified Checklist for Autism in Toddlers R/F

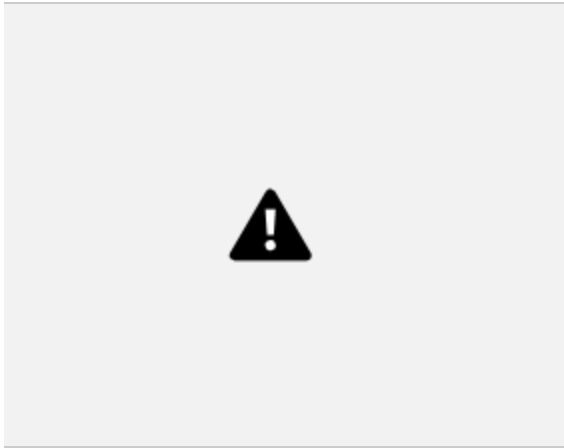
Multidisciplinary Information



Screening Tests M-CHAT R/F



Observation/Interview • Checklists/Rating Scales • ADOS

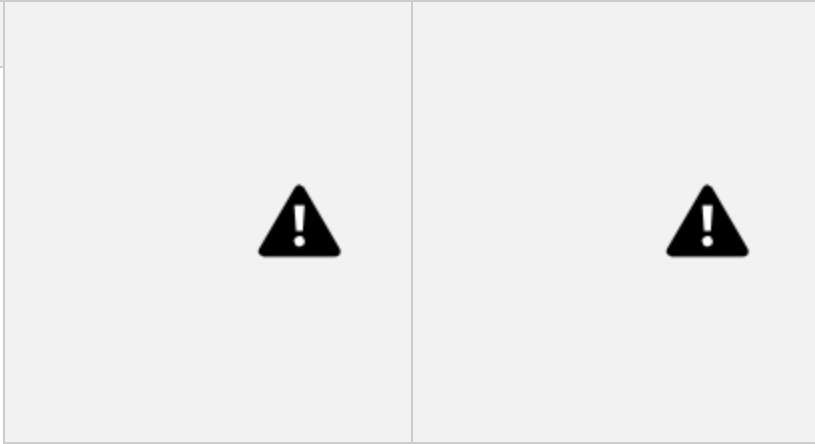


• Ages
• Risk Assessment

<https://cms.m-chat.org/LineagenMChat/media/Lineagen-M-Chat-Media/mchatDOTorg.pdf>

Vision in Autism

- Visual acuity
- Retinoscopy
- Amblyopia 3.8%
- Nystagmus 1.9%
- Optic Neuropathy 1.1% • ROP 0.5%
- Strabismus 10-21% • Reduced NPC



[Redacted]

[Redacted]

Vision in Autism

- Large lag of accommodation
- 18% ASD v. 5% non-ASD

[Redacted]

• Nott

• >+1.00

• Eliminate uncorrected hyperopia & medications affecting accommodation

• Anketell PM et al. OVS 2018 Accommodation function in individuals with autism spectrum disorder.

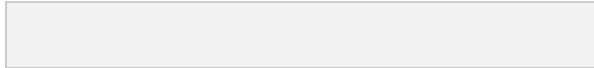
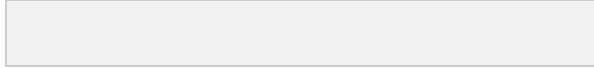
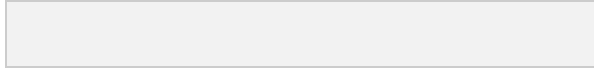
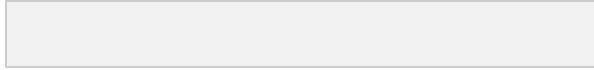
• Visual Acuity, Refractive Error and Adaptation to Spectacle Wear in Children with Autism and in Typical Peers

• Coulter RA, et al. Vis Dev Rehab 6: 208-20 • Acuity differences

• Refractive Error

• Adaptation to spectacles

• 1 week

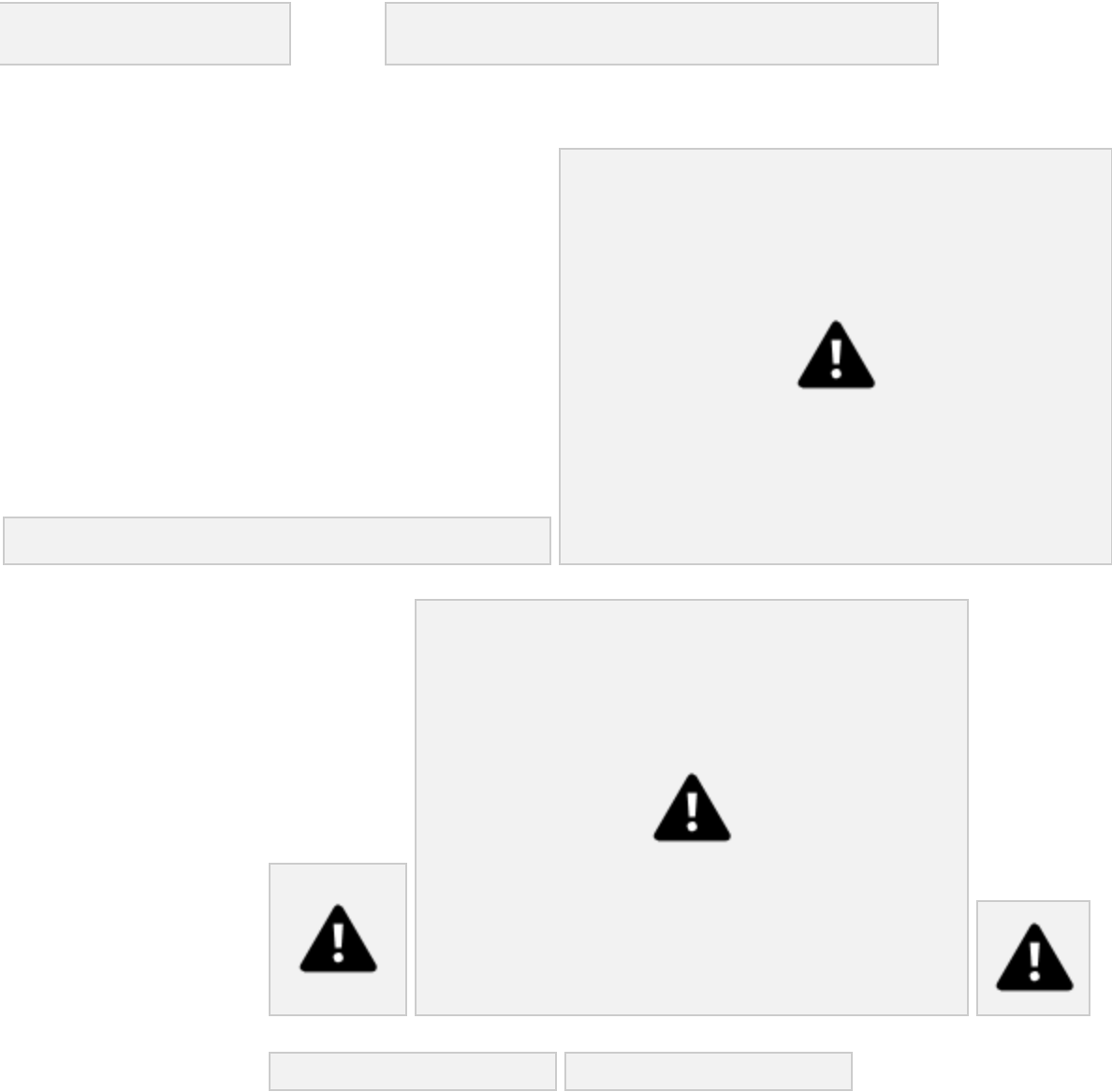


Vision in Autism • Face Perception



Klin A and Jones W 2002

Vision in Autism

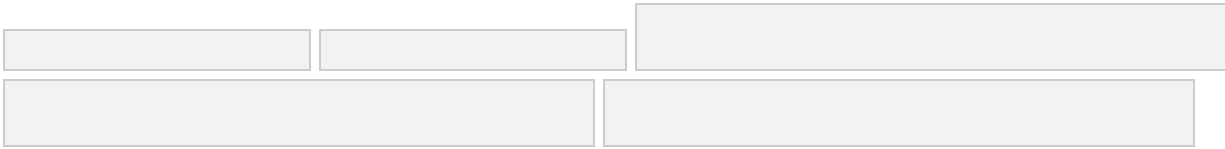


Other Behaviors in ASD

- Absence of eye contact
- Normal 8 weeks
- Absence of social smile
- Normal 12 weeks
- Lateral Glancing
- “Stimming”
- Absence of joint attention

Other Findings

- Echolalia
- Like routines
- Toe walking
- Harmful behaviors

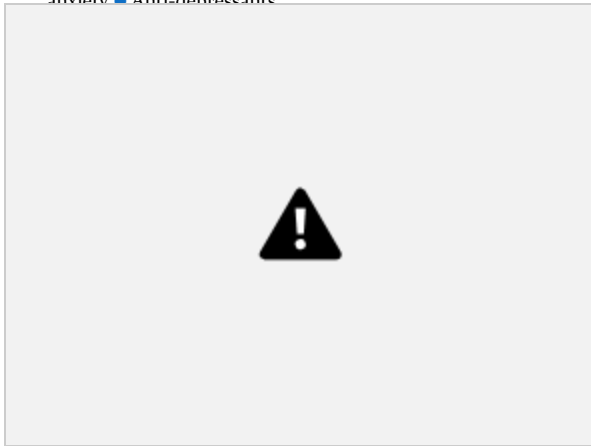




- S ● Work Quickly
- Pre-exam visit
- Limit stimuli
 - Wait in exam room not waiting room
 - Quietertime of day for appointment
- Picture Cards (visual schedule)
- Discussion of Tests
 - Choices
 - Demos

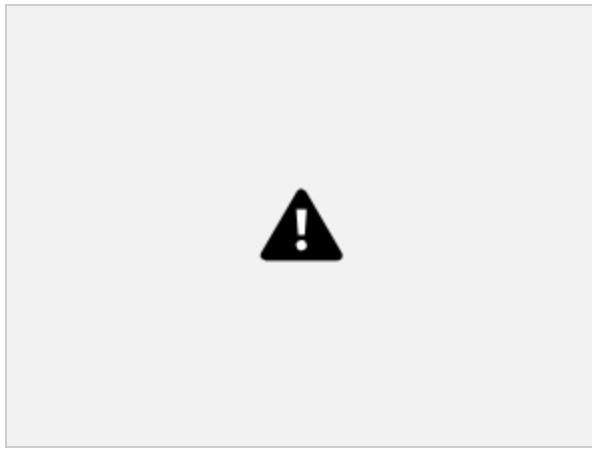
Treatment

- Early intervention!
- Speech/Communication Therapy
- OT
- Medications
 - Risperidone (Risperdal)
 - Repetitive behavior, aggression, anxiety
 - Anti-depressants



Examination Pointer

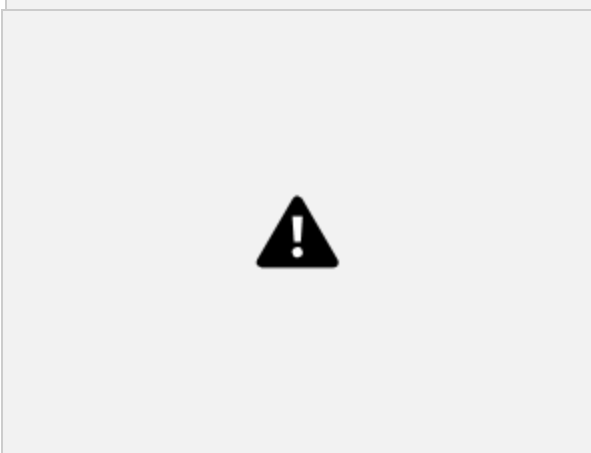
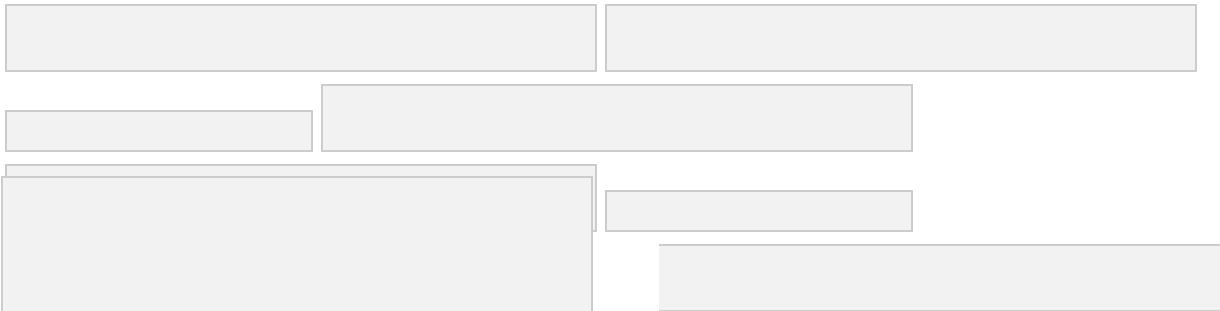




- indicated
- Low plus
- Yoked prisms
- Eye control/fixation
- Binocular Treatment

Optometric Treatments ● Rx when

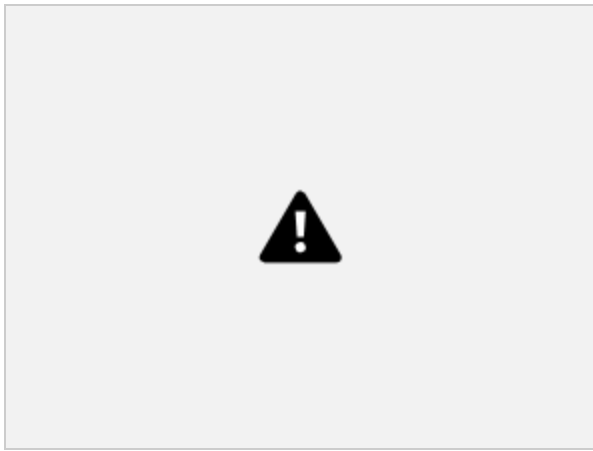
8
11/29/2020



Sensory Integration Dysfunction or
[Redacted]
Sensory Processing Disorder

Case Report – New Diagnosis?

- 3 y/o M “rule out amblyopia”
 - PCP noted OD turn in
- Motor problems
- Right head tilt
- Fear of doctors
- Also referred for hearing
- VA: F&F
- EOMs: full/doll’s head
- Cover test: Hirschberg
- Response to light



Overview

- Problems with Attention



- Difficulty in using sensory information for self-regulation and skill development
- 5-13% of children entering school
- 75% boys
- Jean Ayres, PhD
- Problems with ● Attention
- Social skills/Pay skills

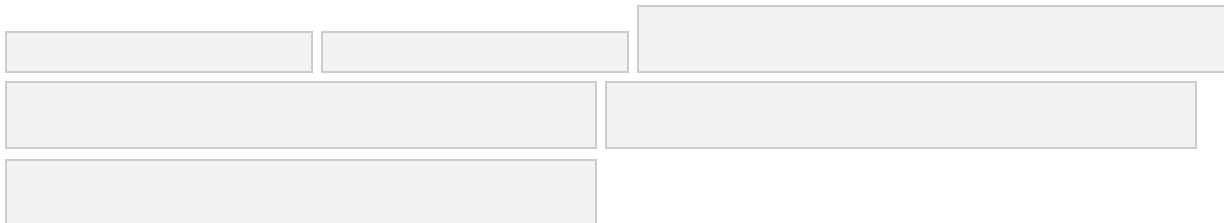


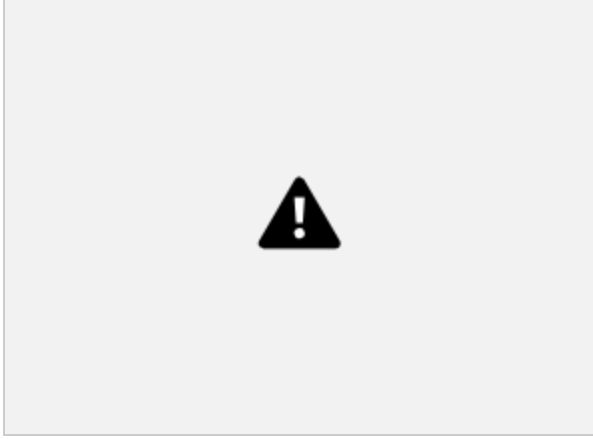
Sensorimotor Function

- Fine/gross/oral motor skills
- ADLs
- Sleep /eating / elimination



- Comorbid diagnoses:
- LD
- ADHD
- ASD
- Language disorders ● Behavioral disorders





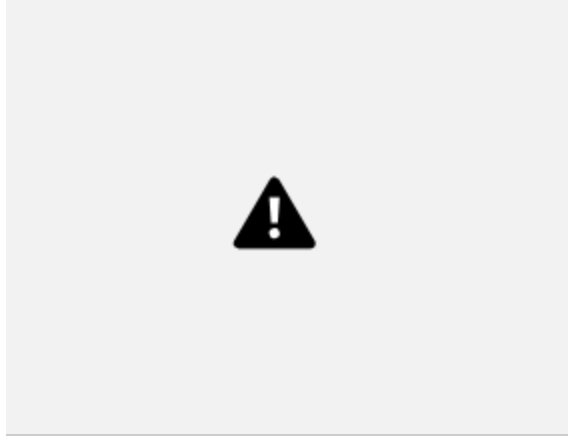
Vision (in ASD)

) Hypersensitive

- Focus on tiny pieces of objects (e.g. dust, ants)
- Dislikes bright lights
- Covers eyes
- Looks down

Hyposensitive

- Looks at objects
- Finger/object flicking
- Touching objects
- Likes shiny objects



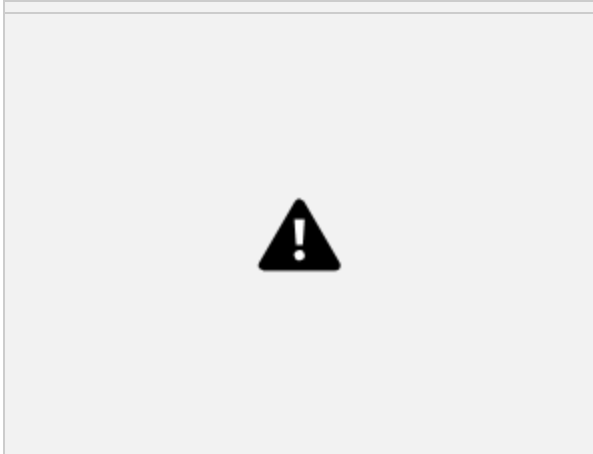
Tactile

Hypersensitive

- Adjusts clothing
- Doesn't like dressing/grooming/bathing
- Dislikes crowds
- Withdraws or hits when peers reach toward

Hyposensitive

- Decreased awareness if clothes poorly adjusted
- Oral input needed
- Messy eater
- Drops objects and doesn't know it



Auditory

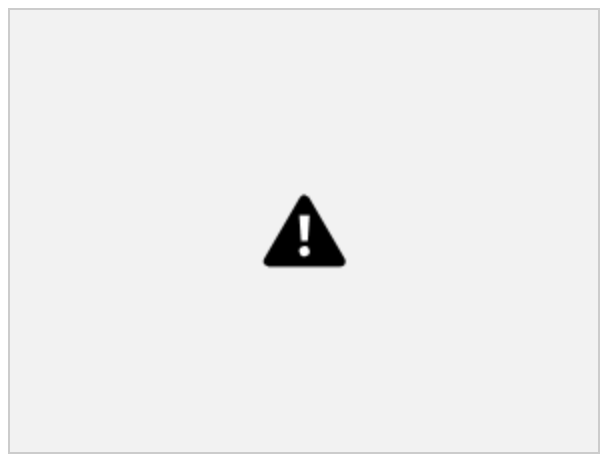
- Hypersensitive
- Overreacts to

unexpected noises

- Distracted by unnoticeable sounds
- Holds hands over ears when loud noises
- Hyposensitive
- Confused about directions of sounds
- Appears not to hear
- Fails to listen

● Makes loud

noises ● Talks incessantly



Testing

- Sensory Integration and Praxis Tests (SIPT) • Ages
- 17 Subtests

- Standing and Walking Balance
- Postural Praxis
- Oral Praxis

- Kinesthesia
- Graphesthesia
- Postrotary Nystagmus

- Location of Tactile Stimuli

Placeholder boxes at the top of the page.



- Occupational Therapy with a Sensory Integration Approach/Ayres Sensory Integration

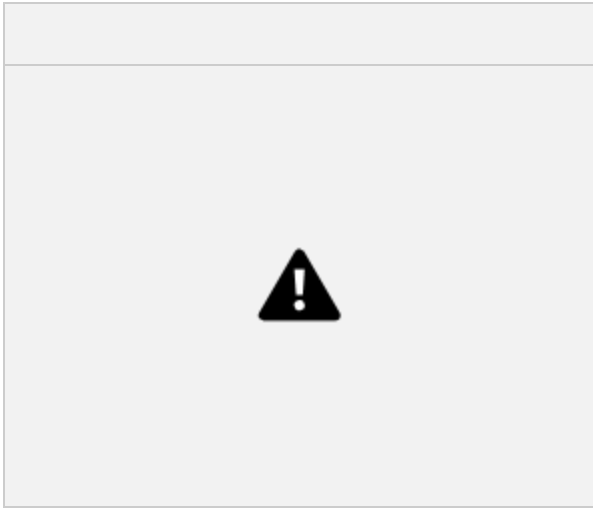
Testing

Design Copying



Treatment

Placeholder boxes at the bottom of the page.

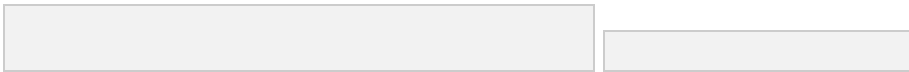


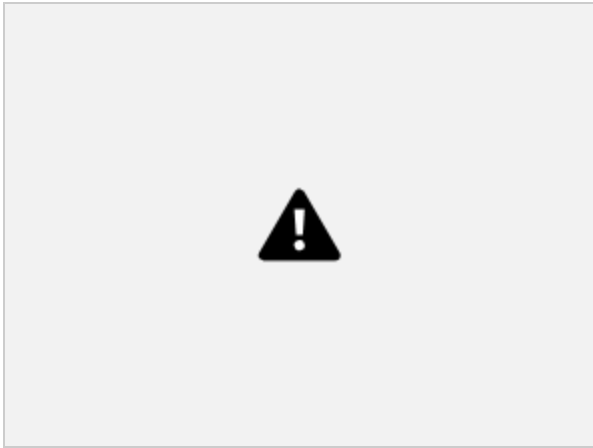
erate trial fra

Slanted
writing or
reading
surface ●
Give
frequent
breaks
● Increase
visual
stimulation



- Minimize visual clutter
- Use natural lighting (away from window)
- Sunglasses
- Colored transparencies
- Use
- Highlight text
- Use different colored papers or headings.
- Use natural lighting or bright lighting
- Resistant to patching or occluder
- Can't sit in chair - wiggly





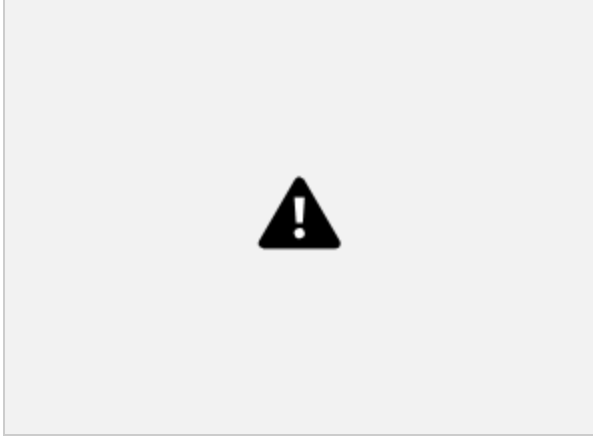
- VA 20/25 OD/OS HOTV blocked
- Cover Test: ortho
- CVF: full to toys
- Ret +0.25+1.00x20 OS, +0.25+1.00x18o
- “Would not tolerate trial frame, pulled off multiple times and banged it against head. Would not tolerate patch or occluder in front of either eye. Poor attention during testing.”

Case Example – Sensory Problems?

- 4 y/o comprehensive exam
- Glasses 1 year prior outside OD – stopped wearing after 2 weeks
- Poor handwriting
- Diagnosis: ADHD per psych
- Asthma: does not tolerate nebulizer



Eye Exam



• ADL: irritable with hair cutting



OT Evaluation

- History also noted: frequent mouthing causing sores on thumbs or requiring his shirts to be changed
- Vision
- Hearing: sensitive to loud noises
- Social: parents divorced

PT Evaluation

- Gross Motor Delay, Lack of coordination, muscle weakness



Neurology Referral

- MRI brain done: normal
- Diagnosis: Probable Metabolic Myopathy – Mitochondrial Disorder

Summary

- Vision Findings are a component of many developmental disorders
- ODs should be aware of clinical picture
- Vision problems found by other specialists ● ODs part of an interdisciplinary team

