Pediatric ADHD

Elkhorn Spring Primary Care Conference May 12, 2018

MATC
Mental Health Services for Children, Youth and Families

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  - ***Manitoba's largest provider of Mental Health Services for Children, Youth & Families***
- ***ICRS, GDAAY, PASC Programs***

- ***Assistant Professor***
- ***Department of Psychiatry, Faculty of Medicine, University of Manitoba***

Acknowledgement

I acknowledge that today we are on Treaty One territory and on the homeland of the Metis Nation.

I also acknowledge that Manitoba includes the original lands of Anishinaabeg, Cree, Oji-Cree, Dakota and Dene people and Inuit people

We respect the Treaties that were made on these territories and we acknowledge the harms and mistakes of the past. We dedicate ourselves to moving forward in partnership with First Nations, Metis and Inuit communities in a spirit of reconciliation and collaboration.

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Outline and Objectives

- Prevalence
- Causes and neurobiology
- DSM5 criteria
- Clinical presentations
- Diagnosis
- Treatment

ADHD

- Single most common psychiatric disorder of childhood
  - 20+ studies (child) – US population
  - 30+ studies (child) – Non-US population
  - Both studies found the same prevalence ranges

Kessler et al, Am J Psych, 2006; Spencer et al, Ambul Ped. 2007; World Psychiatry 2003 (June); Faraone et al.

Epidemiology

ADHD symptoms	Children/Teens	Adults
Prevalence	6-8%	4.4%
Gender ratio	2.5:1	1:1
Combined subtype	50-75%	30-40%
Predominantly inattentive	20-30%	50-60%
Predominantly hyperactive/impulsive	15%	5%
Percent diagnosed	33%	7%

Estimated ADHD Sufferers in Canada

	ADHD in children/teens (age 5-19)	**ADHD in adults (age 20-59)**
Total Population	6, 182, 933	18, 567, 976
Prevalence [%]	6%	4%
Patients w/ ADHD	370,976	742,719
% Diagnosed	33%	7%
Patients Untreated	**248,544**	**690,729**

Stats Can, 2004 projected to 2005; % diagnosed calculated based on estimate of treated patients in Canada

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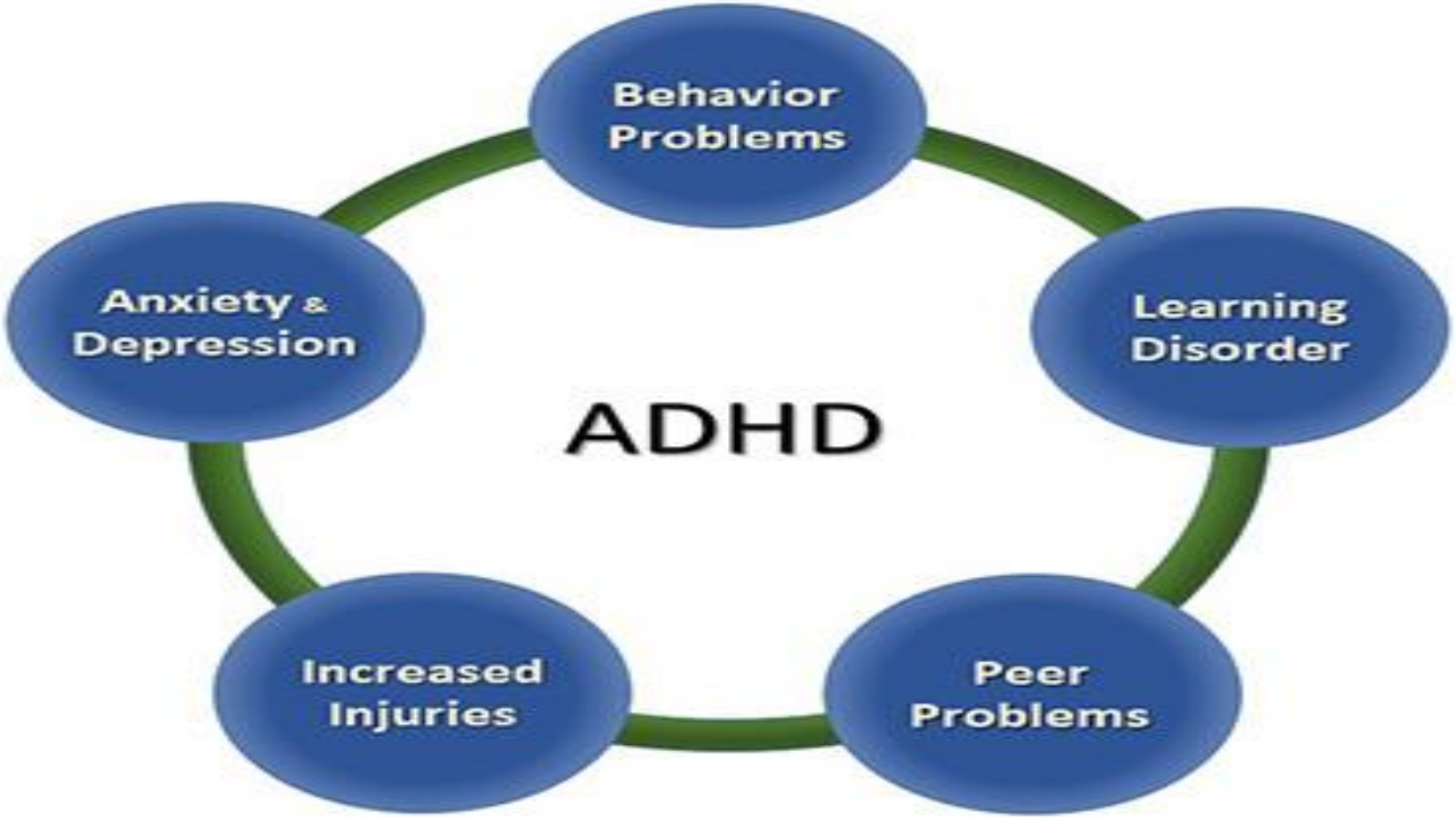
What are symptoms of ADHD?

- Hyperactivity
- Inattention
- Impulsivity
- Emotional dysregulation

Impact of ADHD beyond symptoms



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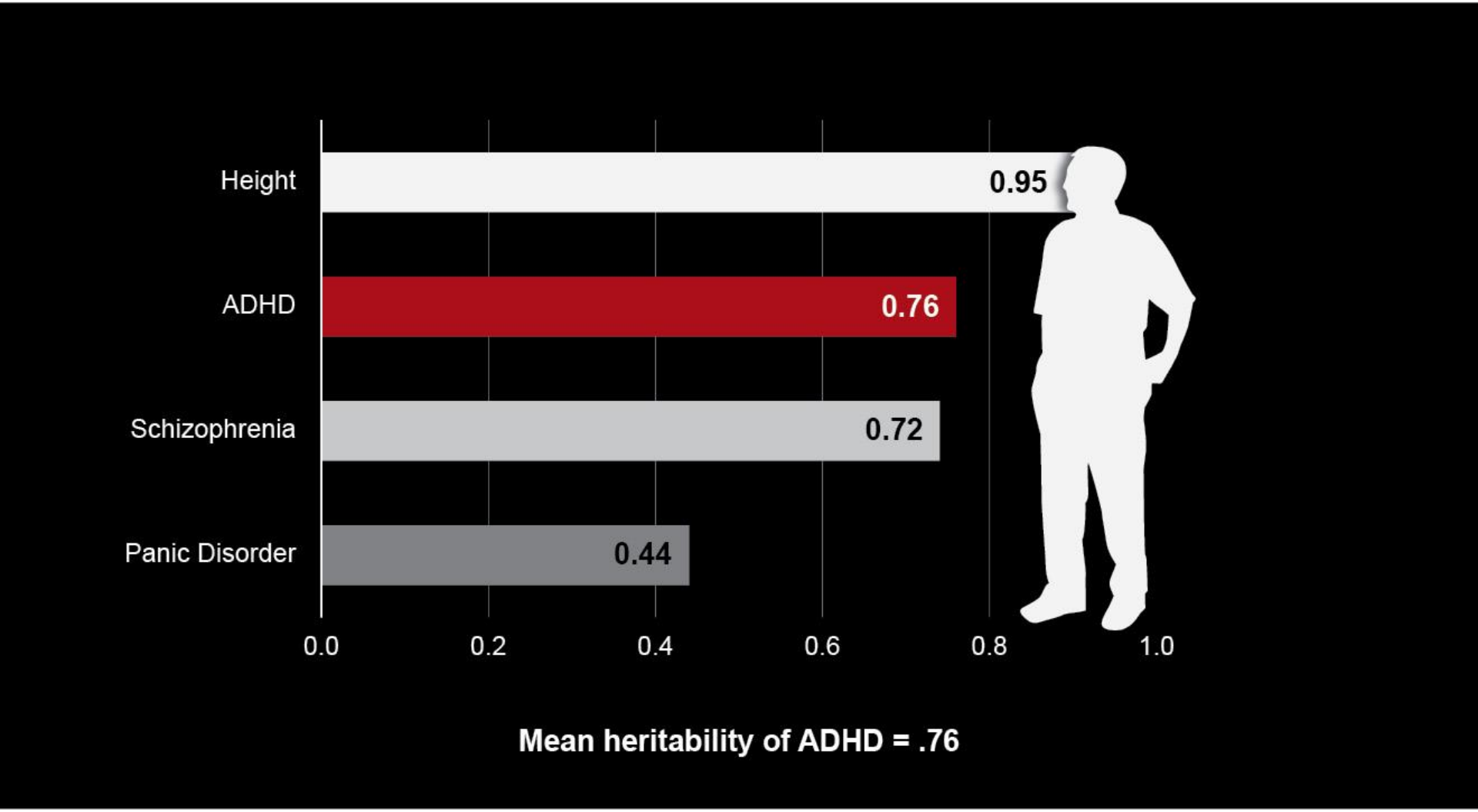
Causes- Multifactorial

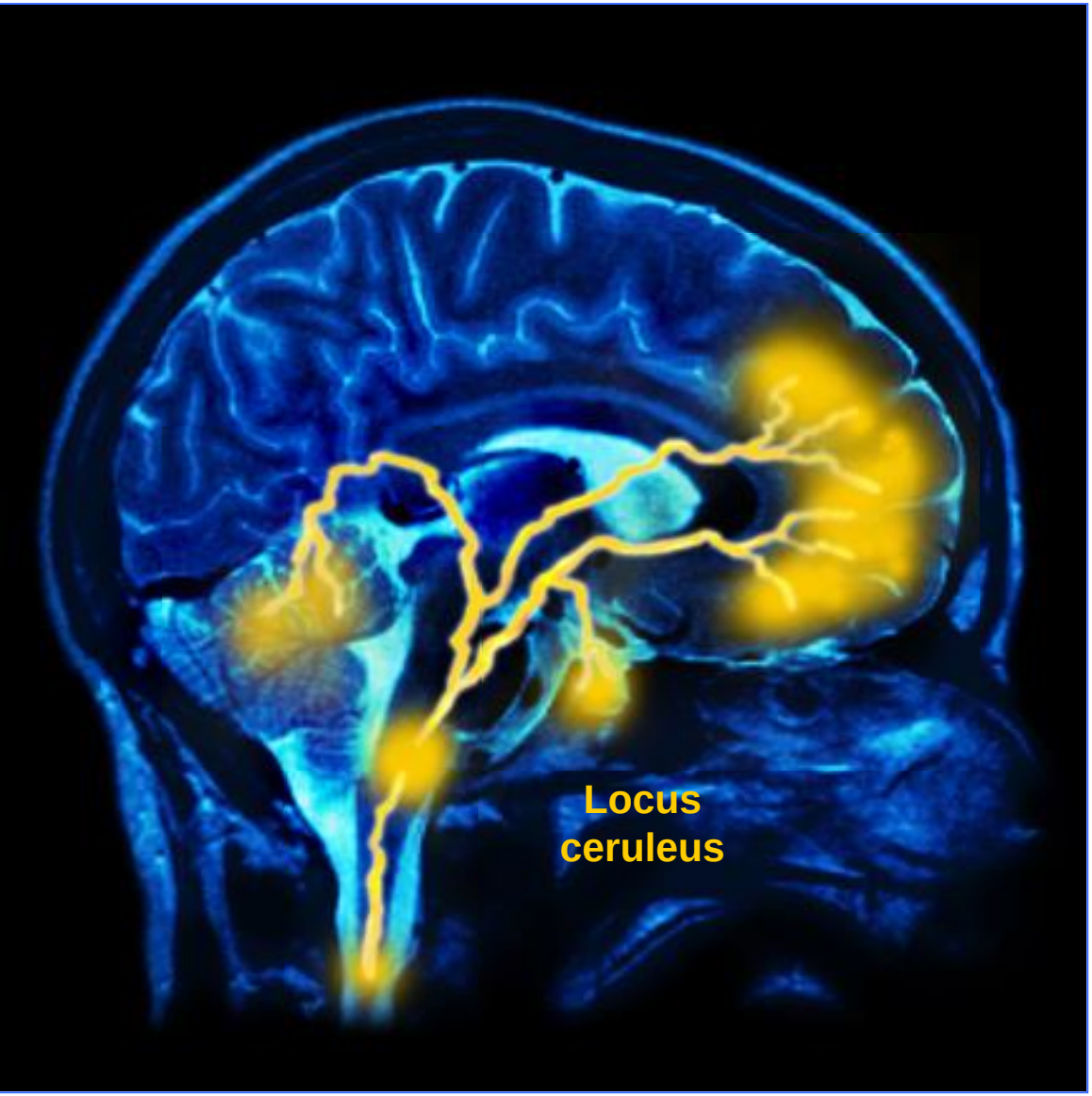
- **Catecholamines**
  - Less norepinephrine and dopamine in specific brain areas
- **Genetics**
  - 75-80% higher risk if 1st degree relative
  - Novelty seeking, poor frustration tolerance
- **CNS insults-** typically during pregnancy and delivery
  - IUGR, LBW, SUD in utero, toxins (eg. lead)
  - TBI, hypoxia, encephalitis
- **Environmental factors-** may perpetuate symptoms
  - Family dysfunction, abuse, parental difficulty

Heritability of ADHD



Faraone SV et al. *Biol Psychiatry.* 2005;57:1313-1323.

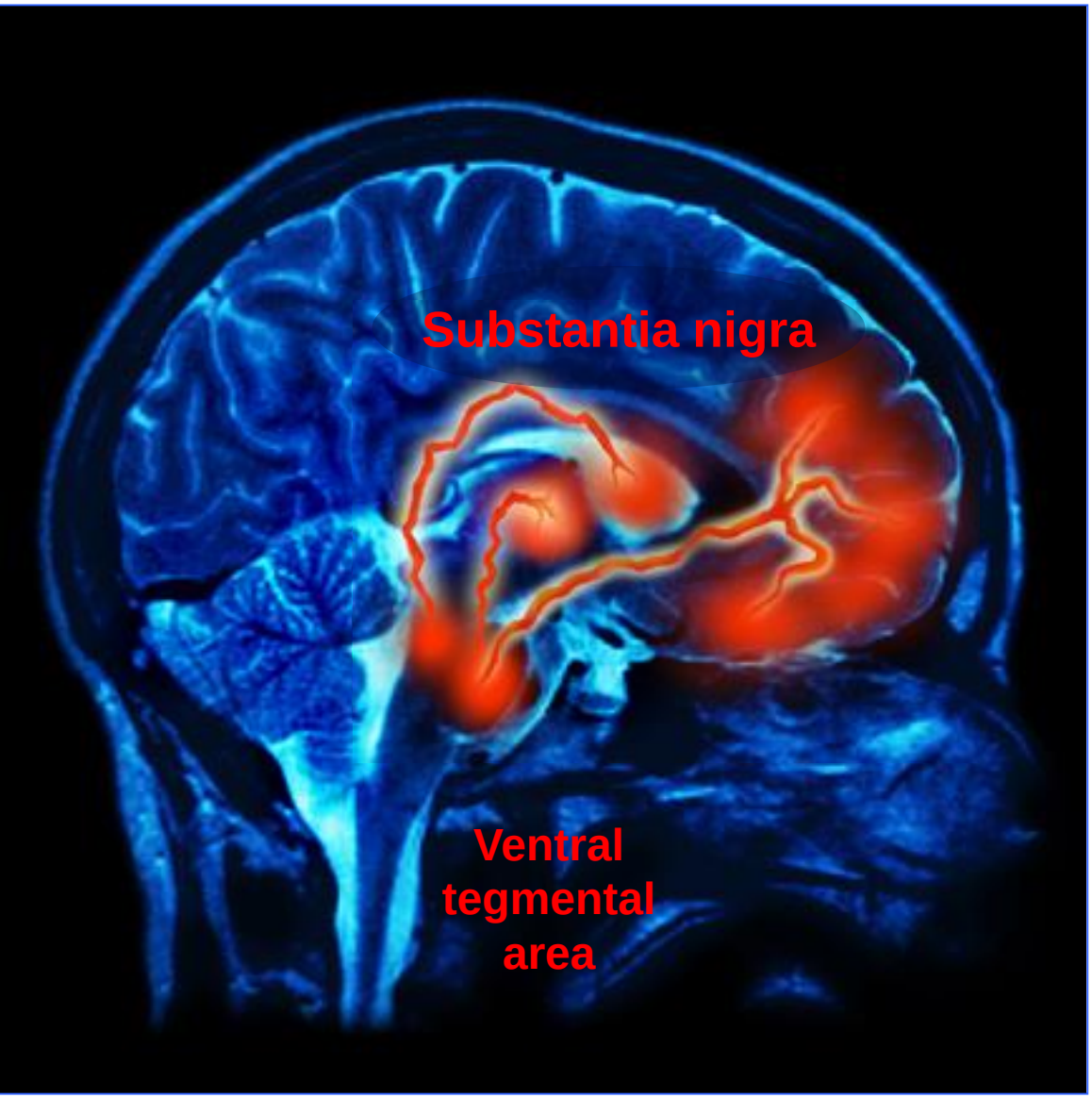
Role of Norepinephrine in Attention



- **Executive Functions**
- **Engage and disengage from stimuli**
- **Change focus to new stimuli**
- **Increases inhibition**
- **Inhibit distraction**
- **Dampens 'background' noise**

Solanto. *Stimulant Drugs and ADHD.* Oxford; 2001.

Role of Dopamine



Nigrostriatal: movement

Mesolimbic: pleasure, psychosis

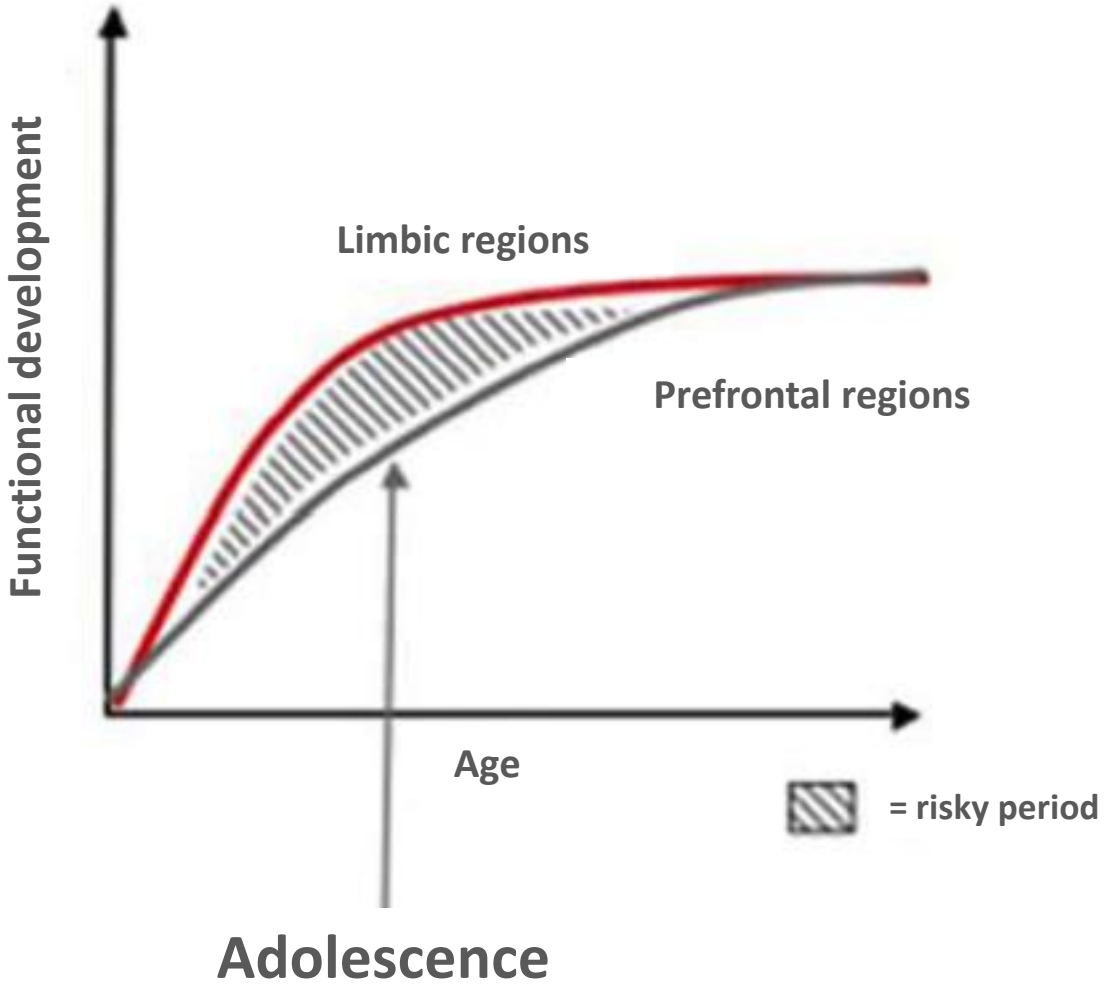
Mesocortical: attention, arousal

- Enhances signal
- May improve mood
- Improves attention
  - Focus
  - On-task behavior
  - On-task cognition

What's going on in the ADHD brain?

- Frontal lobe under-activated
- Brainstem reward and movement systems under-activated
- Poor cerebellar and intra-hemispheric communication
  - Coordination problems, delayed milestones
- Smaller brains that are less active
  - Hyperactivity, distractible/novelty seeking, reactive

Neurobiology of adolescence

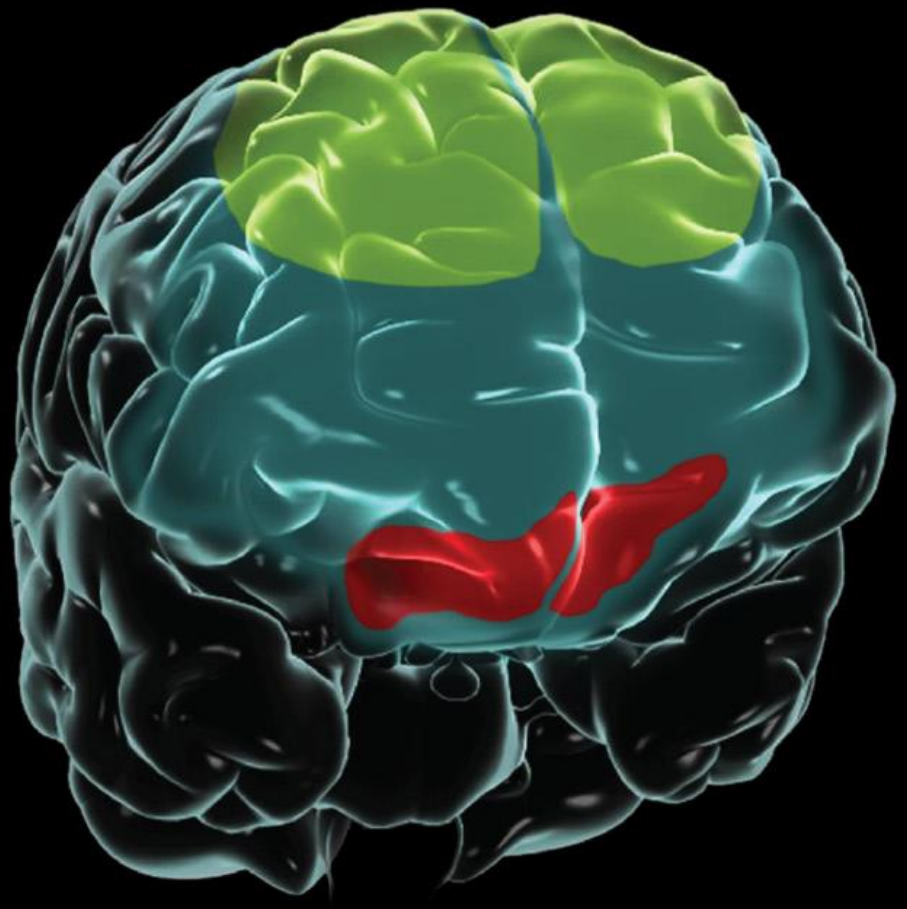


Variations in the structure and function of the frontoparietal and frontostriatal circuits are responsible for enhanced self-control

Frontal Lobe Underactivated

- **Poor executive functioning (NE and DA)**
  - Activation- able to learn at higher level
  - Focus- sustaining vs. task switching
  - Effort- processing speed
  - Emotion- frustration, silliness
  - Memory- working memory and recall
  - Action- self regulation, impulsivity
- **Poor modulation of movement and activity (NE and DA)**
  - Hyperactivity
- **Alternate reward seeking behavior (DA)**
  - Underwhelmed and offline in low stimulation
  - May often seek 'negative' attention

ADHD: Neurobiologic Basis

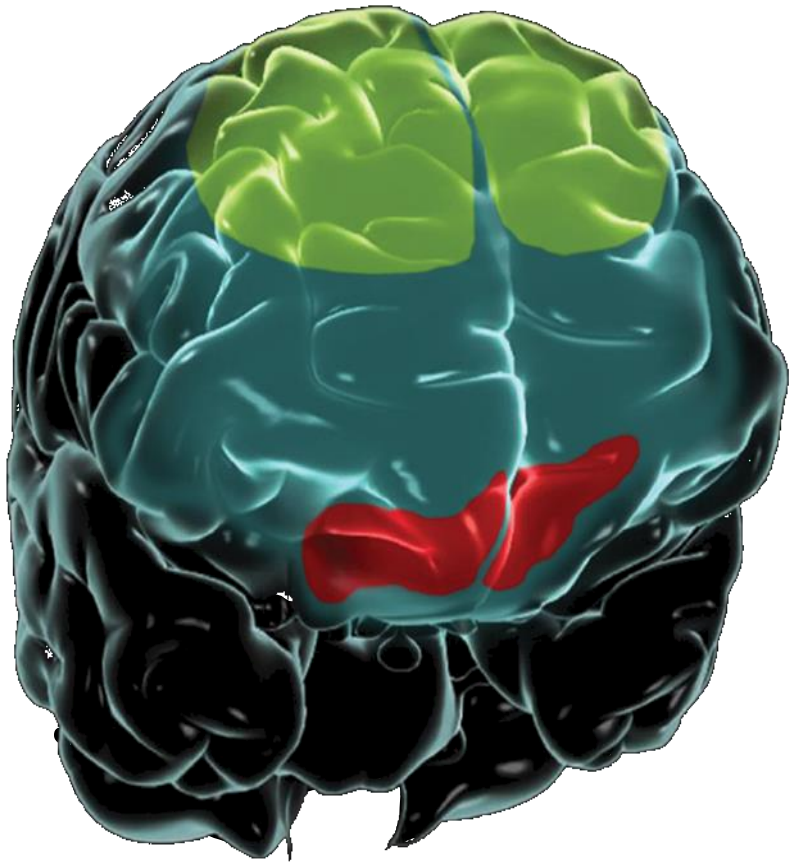


- **Pre Frontal Cortex**
  - Judgment
  - Analysis
  - Problem Solving
  - Critical Thinking
  - Forward Thinking
- **Dorsolateral PFC**
  - Organization
  - Working Memory
  - Attention
- **Orbital Frontal Area**
  - Impulse Control
  - Socialization

Posner and Raichle. Images of the Mind. Scientific American Books; 1996.

Neuroanatomical differences: the brain and ADHD

- Thinner areas of the dorsolateral prefrontal cortex (DLPC)
- Smaller anterior cingulate cortex (ACC)
- More white matter
- Generally less grey matter
- Larger nucleus accumbens



Siedman et al. Biol Psychiatry 2006; 60: 1071-80.

Reward and movement underactivated

- Less dopamine in nucleus accumbens
  - Looking for anything more interesting all the time-instant gratification
  - Novelty/stimulating activity seeking behavior
  - Difficult to structure someone always looking for something more interesting than requested task
- Less dopamine in nigrostriatal and basal ganglia
  - Poor regulation of movement

DSM5 Criteria

DSM5 Criteria

Neurodevelopmental condition characterized by a persistent pattern of:

Inattention

and/or

Hyperactivity-Impulsivity

Interferes with:

-Functioning and development

-School/work

-Occurs in multiple settings (home/school/social)

Adapted from American Psychiatric Association, DSM-5, 2013.

Symptoms

- Pervasive – many settings
- Persistent – duration is 6 months
- Onset before age 12
- Severe
- Maladaptive, affects functioning
- Inconsistent with developmental level
- Clinical significant impairment
- Social, academic, occupational problems

DSM-5 Inattention in ADHD

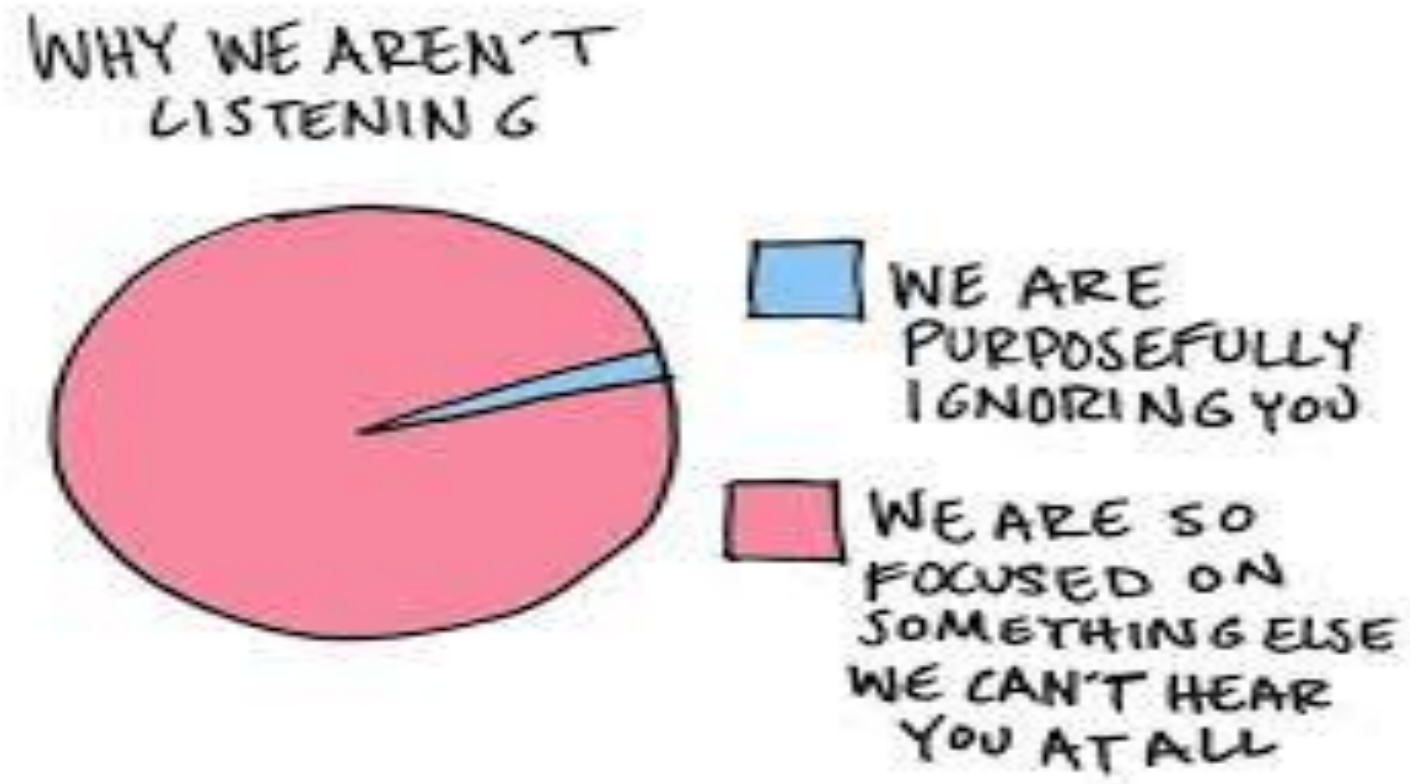
6 symptoms for 6 months (only 5 needed if over 16)

- Careless Mistakes
- Difficulty sustaining attention in activities
- Doesn't seem to listen
- No follow through
- Disorganized, messy
- Avoids/dislikes tasks requiring sustained mental effort
- Often loses things necessary for tasks
- Often distracted by extraneous stimuli
- Forgetful - chores

*** Inattention maladaptive/inconsistent with development level**

Adapted from American Psychiatric Association, DSM-5, 2013.

Hyperfocus



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DSM-5 Hyperactivity-Impulsivity in ADHD

6 symptoms for 6 months (only 5 needed if over 16)

- Often fidgets – squirms in seat
- Can't stay seated
- Runs/climbs excessively
- On the go – driven by motor
- Talks excessively
- Blurts out answers
- Difficulty waiting turn
- Interrupts/intrudes on others

Maladaptive and inconsistent with developmental level

Adapted from American Psychiatric Association, DSM-5, 2013.

Clinical Presentation of ADHD

Clinical Presentation in School Aged Children

- Full of energy and out of seat
- Easily distracted
- Disruptive in class and frequent trips to Principal's office
- Homework poorly organized, careless errors, often incomplete or lost
- Low academic scores
- Often interrupts and intrudes on others
- Low self-esteem
- Displays aggression
- Difficult peer relationships
- Does not wait turns in games
- Perception of "immaturity"
- Unwilling or unable to do chores at home
- Accident prone

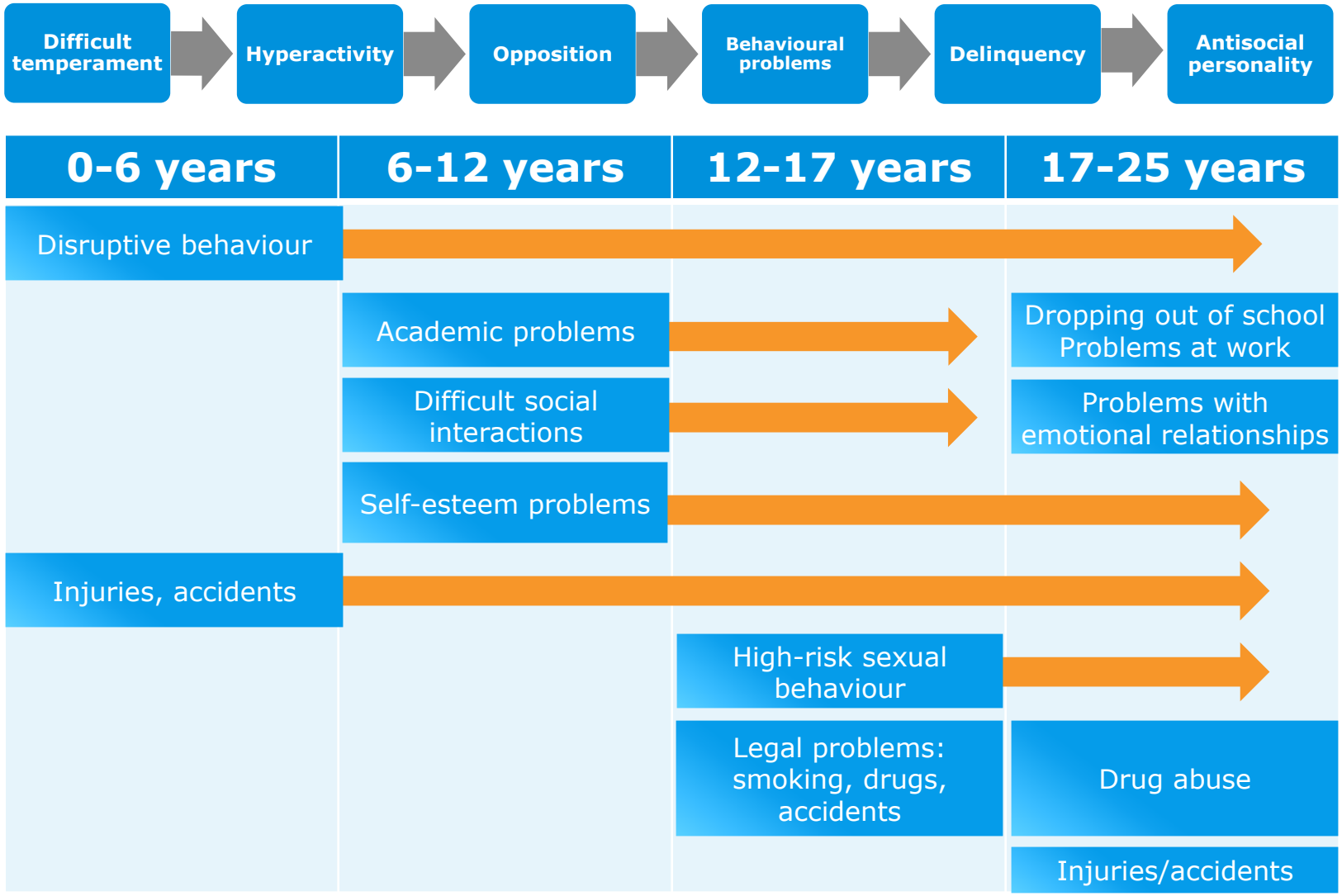
Greenhill LL. *J Clin Psychiatry* 1998;59 Suppl 7:31-41.

Clinical Presentation In Teenagers

- More subtle than for younger children
- Increased boredom
- Significant school underachievement
- Inner restlessness instead of hyperactivity
- Poor independence, self-esteem, peers, authority
- “Risky” behavior- sex, speeding, substance abuse
- More injuries and accidents
- Increased risk of suicide attempt, especially when associated with mood, CD, SUD problems
- 15-20% of children have poor academic outcome
- Almost 30% of ADHD subjects fail grades
- 10% of ADHD pupils suspended
- 25% persistently antisocial

Greenhill LL. *J Clin Psychiatry* 1998;59 (Suppl 7):31-41.

Developmental trajectory of ADHD



Harke A. Bosma. "Introduction à la psychopathologie développementale ", L'orientation scolaire et professionnelle [Online], 35/2 | 2006, posted online September 28, 2009, consulted August 6, 2012. Adapted by A. Dansereau URL: http://osp.revues.org/index1097.html

Diagnosing ADHD

When is ADHD first diagnosed?

- ADHD most often diagnosed at age 7
- Symptoms appear as early as 3-7 years
  - 4-year-olds settle down, take naps, sit for meals
  - Child with ADHD is ‘on the go’ all the time
- Commonly diagnosed due to academics
  - Easily quantifiable

Initial screening questions

- Do you feel restless or the need to always move around?
- Do you get easily distracted?
- Do you find it hard to concentrate at school, home, or during certain activities?
- Do you get easily annoyed, called annoying, or are difficult in groups?
- Do you get in trouble for doing things without thinking?
- Does anyone in your family have ADHD?

Red flags

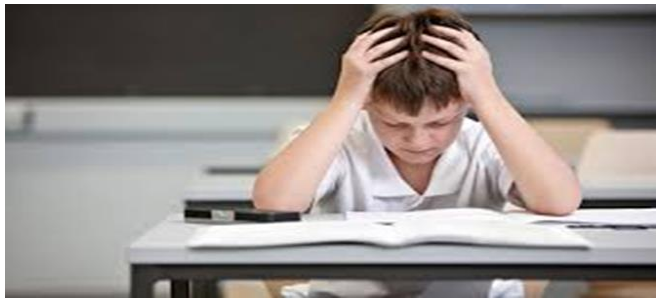
- Having to work or study harder than peers to get the same or worse grades
- Certain subjects which were easy while others extremely difficult
- Needing a lot of support and structure from parents and teachers
- Bored all the time and can't structure self
- Frequent accidents, injuries, or fights
  - Punching walls, breaking game controllers
- Explosive anger followed by apology later

Diagnosing ADHD

- **Clinical observations and collateral**
  - Ruling out sensory problems, seizure, thyroid
- **Academic record**
  - Learning assessments and disabilities
- **SNAP4**
  - Children and adolescents
  - **ASRS** for adults
- **Psychological testing**
  - Conner's testing for working memory deficits
  - Cognitive testing for FSIQ and adaptive function
- **Occupational therapy assessment**
  - Coordination, attention tests, adaptive function
- **Functional imaging (lol)**

Physical exam

- Vital signs
  - Heart rate
  - Blood pressure
- Weight
  - Underweight kids and stimulants



- Height
  - Stimulants don't have significant effect
- Cardiovascular
  - Arrhythmias
  - Structural defects (HOCM)
  - Consider EKG if no family history or concerning personal/family hx

Differential Diagnosis in ADHD

- **Psychiatric disorders**
  - Age appropriate behavior
  - Stress or adjustment disorder
  - ODD or conduct
  - Intermittent explosive
  - Other neurodevelopmental
    - ID, learning, language, ASD
  - Mood/anxiety disorders
  - Disruptive mood dysregulation
  - Tic disorder
  - Substance use
- **Medical disorders**
  - Fetal alcohol syndrome
  - Sleep apnea
  - Substance use disorder
  - Developmental disorders
  - Use of other medications
  - Seizure disorder
  - Vision or hearing problems
  - Thyroid disorder

McCracken JT. *Kaplan and Sadock's Comprehensive textbook of psychiatry*. 2000;2679-2688.

Comorbidity of ADHD

70% have 1, 30% have none, 20% have >1

- Oppositional defiant (50%)
- Coordination problems (33%)
- Anxiety (30%)
- Learning disability (30%)
- Depression or dysthymia (25%)
- Conduct disorder (20%)
- SUD (15%)

- Tic disorder or Tourette's (10%)
- Communication disorder

ADHD: Simple versus Complex

Simple

- Patients with one subtype of ADHD, but no other learning disabilities or co-morbid disorders
- One in five cases

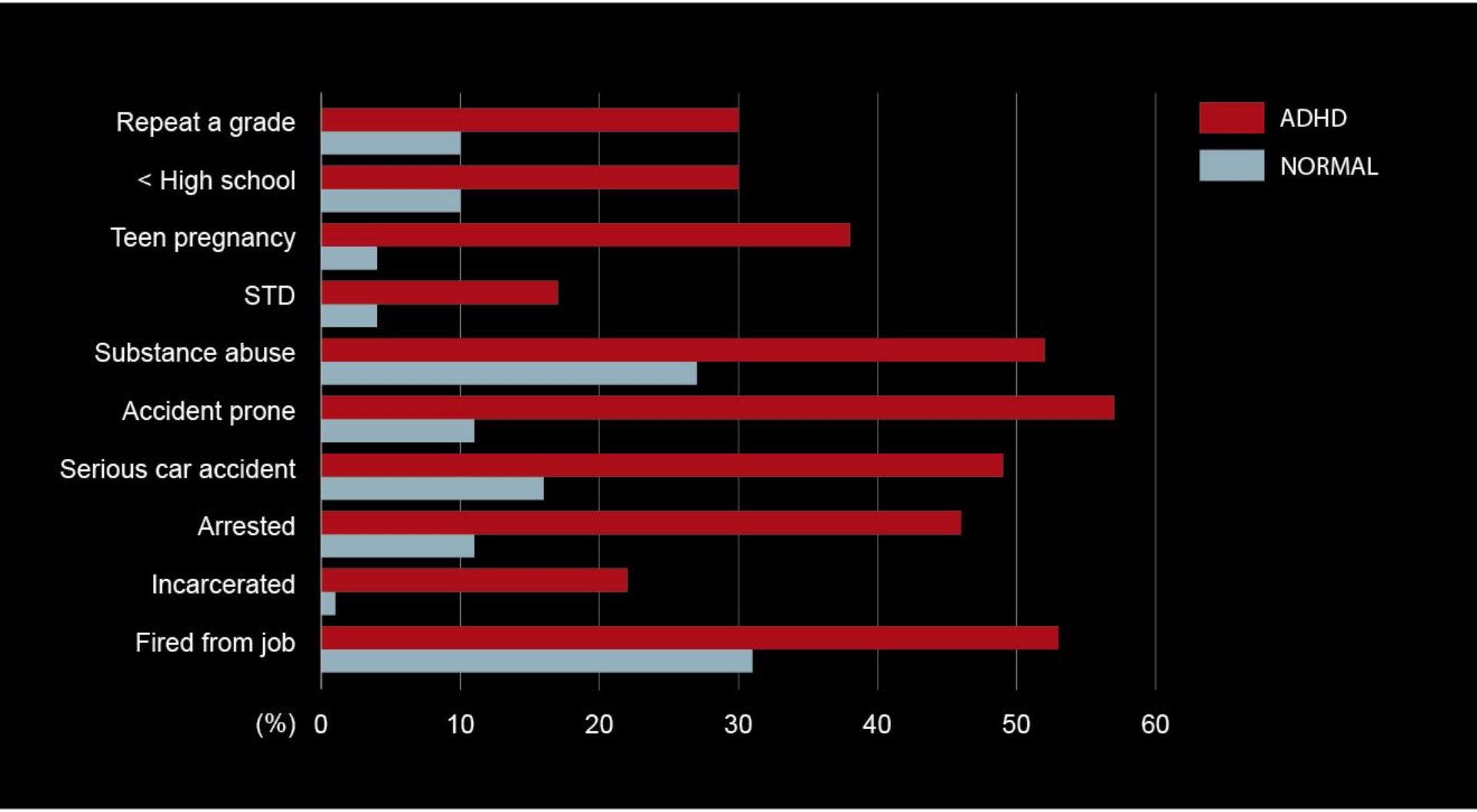
Complex

- Combined learning disabilities
- Development disorders and / or
- Associated comorbid psychiatric disorders

Canadian ADHD Resource Alliance (CADDRA): *Canadian ADHD Practice Guidelines*, 3rd Edition, 2011.

Treatment

Functional Impairment in Patients with ADHD



Barkley RA. Attention-Deficit Hyperactivity Disorder. *A Handbook for Diagnosis and Treatment,* 1998
Barkley RA, et al. *J Am Acad Child Adolesc Psychiatry.* 1990;29:546-557.
Biederman J, et al. *Arch Gen Psychiatry.* 1996;53:437-446.
Weiss G, et al. *J Am Acad Child Psychiatry.* 1985;24:211-220.
Satterfield JH, Schell A. *J Am Acad Child Adolesc Psychiatry.* 1997;36:1726-1735.
Biederman J, et al. *Am J Psychiatry.* 1995;152:1652-1658.

Untreated & Under-Treated ADHD

Health Care System

50% ↑ in bike accidents[1]

33% ↑ in ER visits[2]

2-4 x more motor vehicle crashes[3-5]

School & Occupation

46% Expelled[6]

35% Drop Out[6]

Lower Occupational Status[7]

Family

3-5x ↑ Parental Divorce or Separation[11,12]

2-4 x ↑ Sibling Fights[13]

Society

Substance Use Disorders:
2 X Risk[8]
Earlier Onset[9]
Less Likely to Quit in Adulthood[10]

Employer

↑ Parental Absenteeism[14] and ↓ Productivity[14]

1. DiScala et al., 1998
2. Liebson et al., 2001
3. NHTSA, 1997
4-5. Barkley et al., 1993; 1996
6. Barkley, et al., 1990
7. Manuzza et al., 1997
8. Biederman et al., 1997
9. Pomerleau et al., 1995
10. Wilens et al., 1995
11. Barkley, Fischer et al., 1991
12. Brown & Pacini, 1989
13. Mash & Johnston, 1983
14. Noe et al., 1999

Start ADHD Treatment here…

- Lifestyle
  - Proper nutrition
  - Good sleep hygiene
  - Positive family time
  - Regular exercise
  - Extracurricular activities
  - Stress management
  - Go outside
  - Screen time

Psychosocial Treatments for ADHD

- Psychoeducation
- Individual Education Plan (Academic)
- Organization & time management skills
- Behavioral Parent Management Training
- Remediation
- Social Skills
- Anger management
- Relaxation Technique (anger, anxiety)
- Individual psychotherapy (low self-esteem)
- Family therapy to prevent “scapegoating”
- Yoga and meditation currently under study

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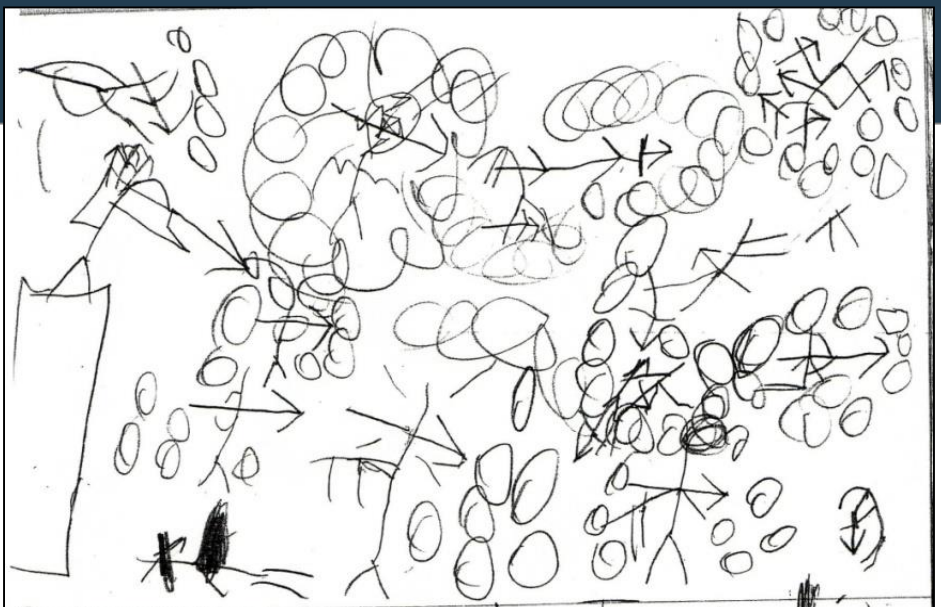
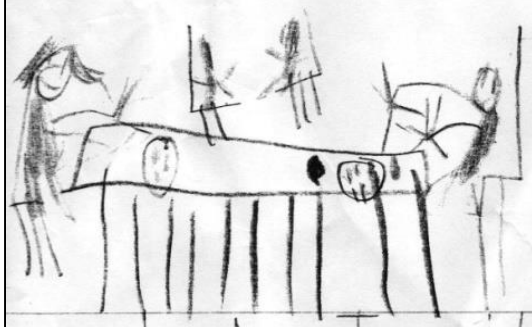
Off Meds



On the weekend I played tiny
and we had WRO

On Meds

Monday June. 21, 20[illegible].



yesterday I went to Red lopst
yesterday for Father's Day
I odtd chicFiggrs with Fris
and for dsht cacwar and my
moms fron and acacac.
and we all shand.

Medication Treatment

80% effective in studies, for kids 6 and older

Stimulants

*Dextro-Amphetamine

*Methyl-Phenidate

Non Stimulants

*Atomoxetine (Strattera)

*Clonidine and guanfacine (Intuniv XR)

Bupropion (Wellbutrin, Zyban)

Effexor XR

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Methylphenidate- (0.5-1mg/kg/day)

- Ritalin IR (3-4h)
  - 5, 10, 20mg
- Ritalin LA or SR (6-8h)
  - 10, 20mg
- Concerta (10-12h)
  - 18, 27, 36, 54mg
  - Non-crushable therefore hard to abuse
- Biphentin (10-12h)
  - 10, 15, 20, 30, 40, 50, 60, 80, 100mg

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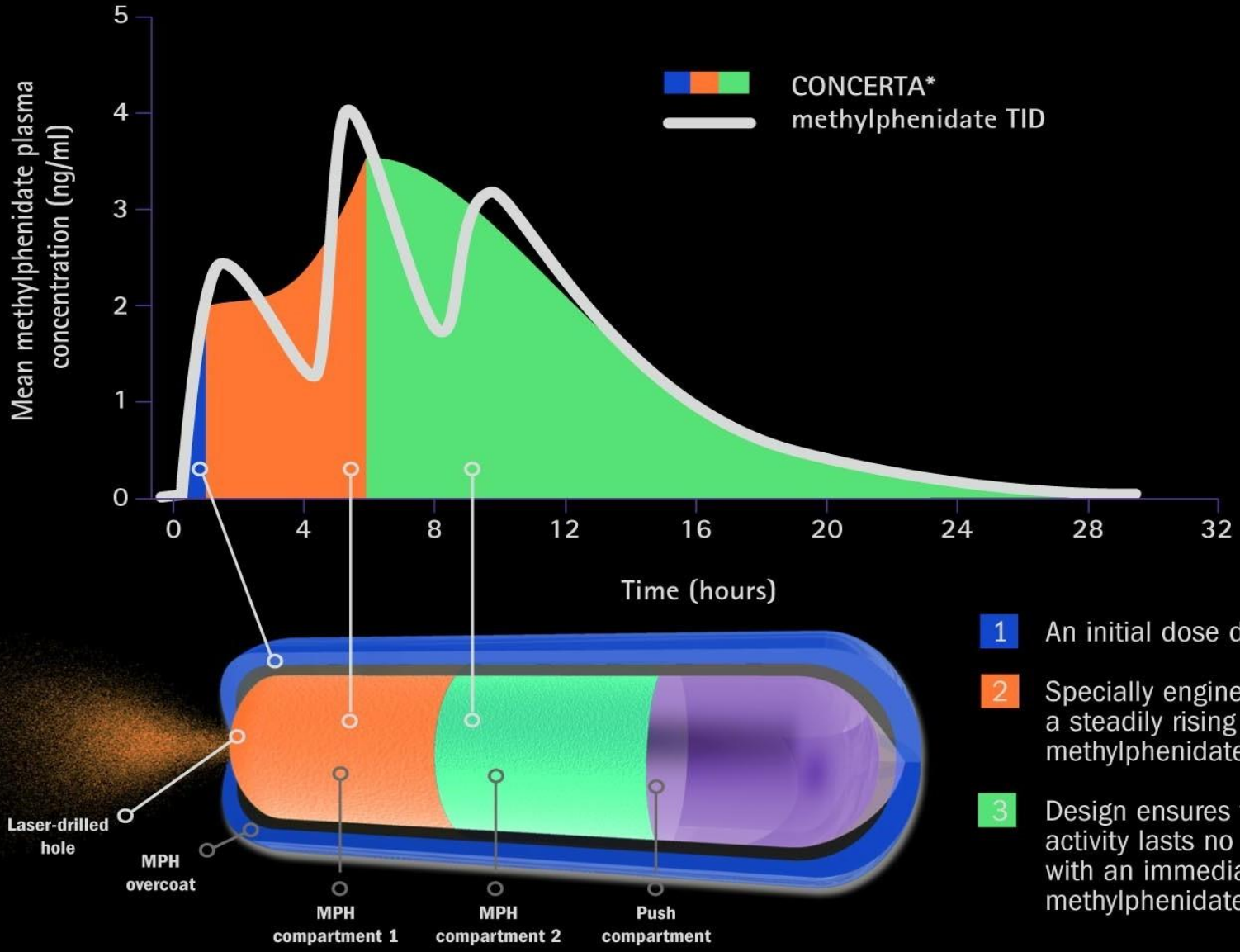
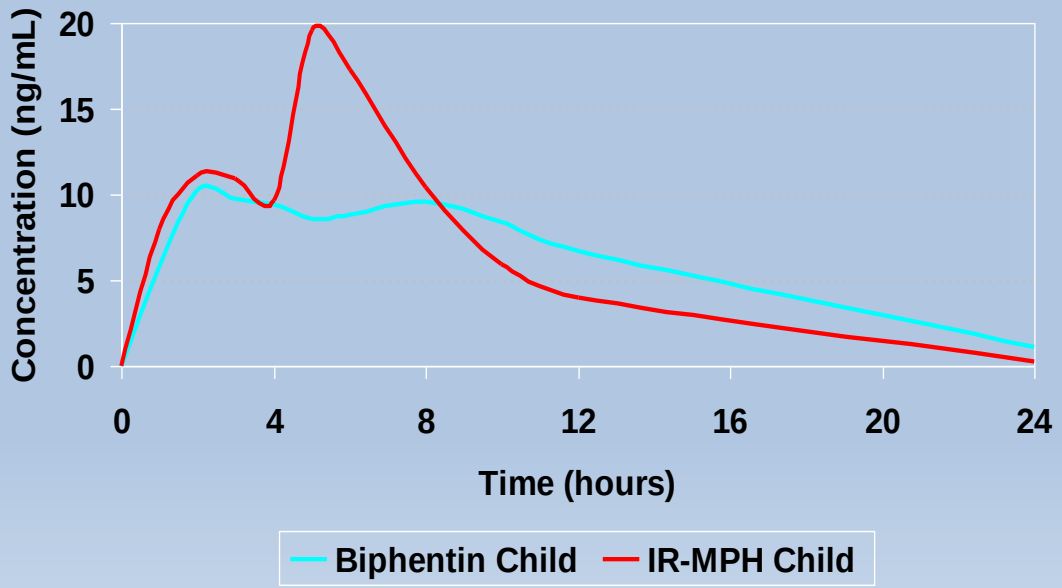
CONCERTA*: OROS Technology to Clinical Efficacy



1. An initial dose dissolves within an hour
2. Specially engineered capsule releases a steadily rising concentration of methylphenidate
3. Design ensures that physiological activity lasts no longer than that seen with an immediate-release TID methylphenidate preparation

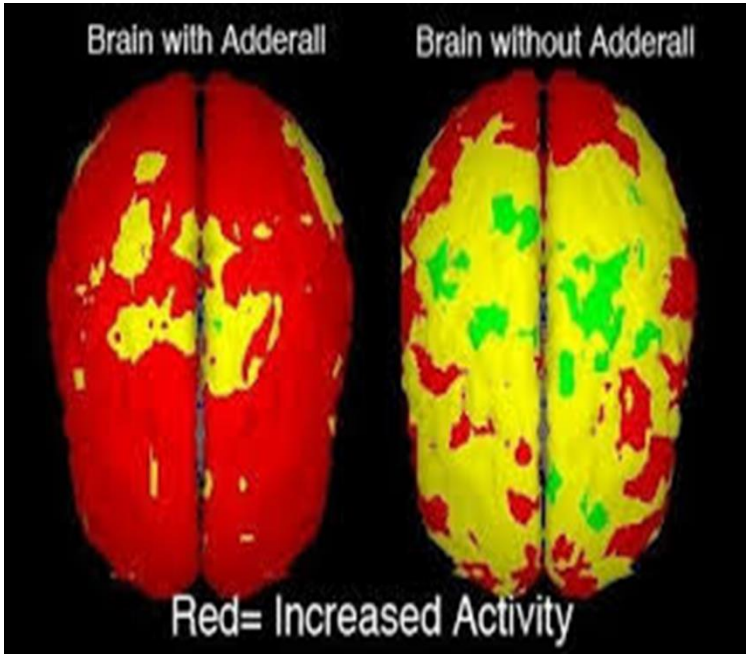
Biphentin

Multi-layer release (MLR)



Dextroamphetamines- 0.25-0.5mg/kg/day

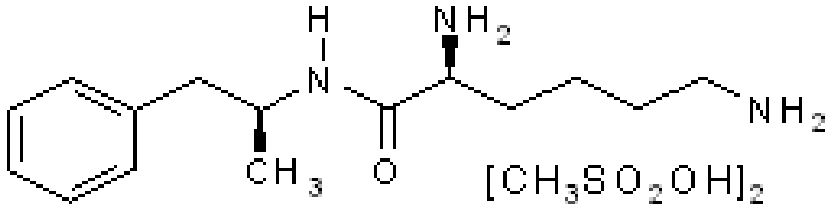
- Dexedrine (4-6h)
  - 5, 10mg
- Dexedrine spansules (6-8h)
  - 10, 15mg
- Adderal XR (10-12h)
  - 5, 10, 15, 20, 25, 30mg
- Lisdexamphentamine-Vyvanse (13-14h)
  - 20, 30, 40, 50, 60mg



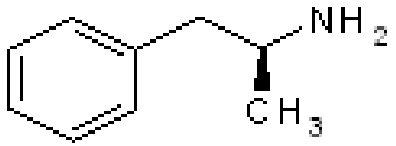
Amphetamine mixed salts (Adderall XR)

- *d*- and *l*-amphetamine salt at 3:1 ratio
- Equal quantities of IR and ER beads

Lisdexamfetamine (Vyvanse)



Lisdexamfetamine dimesylate



d-amphetamine

Comparison of Newer Long-acting Stimulants

Drug	Release Mechanism	% of dose immediately released	Durations	Available Doses
MLR methylphenidate	Multi-layer Beads Bi-modal	40%	10-12 hours	8
OROS methyphenidate	Water Absorption push mechanism	22%	10-12 hours	4
Mixed amphetamine salts XR	Two Beads BID delivery	50%	10-12 hours	6
Lisdexamfetamine	Prodrug, lysine is cleaved in blood stream	Continuous	13-14 hours	5

Canadian ADHD Resource Alliance (CADDRA): *Canadian ADHD Practice Guidelines*, 3rd Edition, 2011.

Benefits of Long Acting Stimulant Formulations

- Core impairments continue all day
- Use of long-acting stimulant formulation may improve medication compliance
- May decrease abuse potential
- Smoother, more consistent coverage

Pliszka SR et al., J Am Acad Child Adolesc Psychiatry. 2006 Jun;45(6):642-57.
Swanson J., CNS Drugs, 2003; 17:117-131.

Common stimulant side effects

- Extra energy
- Mild euphoria
  - (first few days)
- Tachycardia
- Sweating
- Headaches
- Insomnia
- Poor appetite
- Anxiety
- Caffeine ‘tremor’
- Weight loss

Concerning Stimulant Side Effects

- **Seizures**
  - safe with well controlled epilepsy
- **Insomnia**
  - cause of mania if underlying bipolar disorder
- **Tolerance or craving**
  - addiction/abuse/diversion
- **Panic attacks or dysphoria**
  - with comorbid depression
- **Unmasking of tics**
  - sometimes improves tics
- **Psychosis**
  - 1/1000 generally, higher in SCZ
- **Possible growth suppression**
  - small loss and likely reversible with withdrawal of treatment
- **Heart attack**
  - undiagnosed arrhythmia/HOCM

Atomoxetine (Strattera) NRI 0.5mg/kg/day

- 10, 18, 25, 40, 60, 80, 100mg
- Patients 6-17 not responding to stimulants, significant side effects, or Tourette's Syndrome/Chronic Motor Tic Disorder
- Especially helpful with ADHD and comorbid Anxiety- 24 hour duration
- 65% effective in studies
- 3 total studies (n=558), 3/3 positive
  - 3 double-blind, placebo-controlled tri
  - No crossover studies, no comparator trials
- Side effects include
  - Headache, somnolence, dizziness
  - abdominal pain, nausea, vomit and decreased appetite
  - Rare hepatic failure
  - FDA black box warning for suicidal ideation

Alpha 2 Adrenergic Agonists

- Act on presynaptic autoreceptor inhibiting NE release
- 50% effective, up to 24 hour duration of action
- For kids 6-17 years
- **Clonidine**- start 0.025-0.05 BID, up to 0.1-0.4mg/d
- **Guanfacine**
- **Guanfacine XR (Intuniv XR)**- 1, 2, 3, 4mg
- Side effects include:
  - Somnolence, headache, fatigue, dizzy, sedation, insomnia, dry mouth, decreased pulse and BP, rebound tach

Antidepressants

- **Wellbutrin (NDRI)**
  - Increases NE and DA
  - 55% effective in studies
  - 4 total studies (n=257), 4/4 positive
    - 2 double-blind, placebo-controlled trials
    - No crossover studies, no comparator trials
    - 1 open-label study with comorbid bipolar disorder

- **Effexor XR (SNRI)**

Alternative Treatments NOT **Confirmed Efficacious for ADHD**

- Biofeedback
- Fish Oils
- Herbal Remedies

Canadian Pediatric Society. The use of alternative therapies in treating children with attention deficit hyperactivity disorder. 2002.

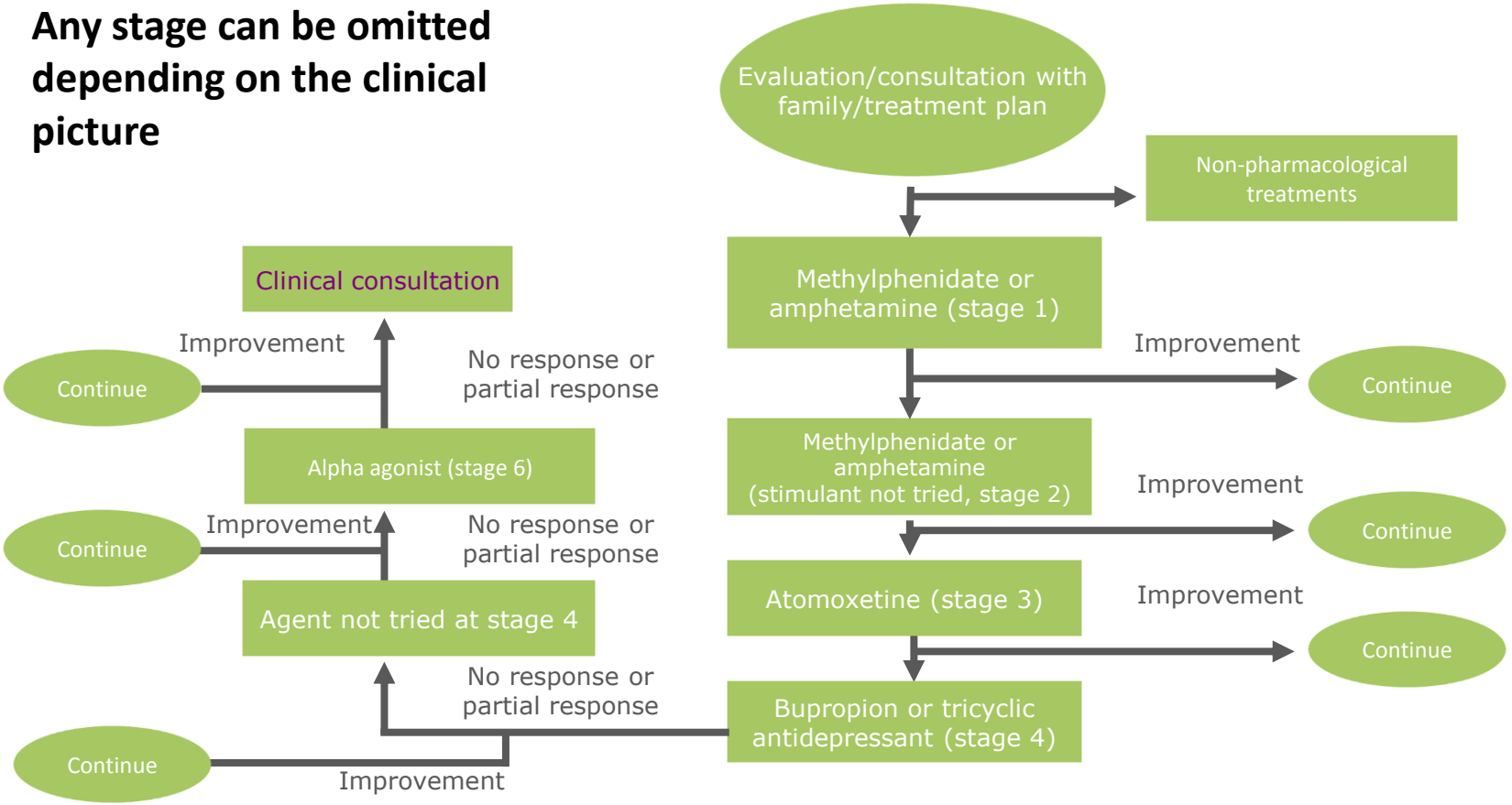
Drug-drug Interactions of Stimulants

- Caution with monoamine oxidase inhibitors (MAOIs) e.g. phenelzine
- Inhibits metabolism of warfarin, anticonvulsants, tricyclic antidepressants - need to adjust dose

Canadian ADHD Resource Alliance (CADDRA): *Canadian ADHD Practice Guidelines*, 3rd Edition, 2011.

Therapeutic approaches: ADHD

Any stage can be omitted depending on the clinical picture



Treatment algorithms for comorbid

(Always treat most severe disorder first)

- **Depression**- treat moderate to severe mood first and assess safety, stimulant may help improve low energy and motivation of depression
- **Anxiety-** consider Strattera early in treatment
- **Autism spectrum disorder**- stimulants may agitate thus helpful to have atypical antipsychotic started first
- **Bipolar and psychosis-** treat before adding stimulant
- **Tics-** consider clonidine
- **Aggression-** treat ADHD first, then add atypical or alpha2 agonist
- **Epilepsy-** treat epilepsy first, new onset seizure managed with antiepileptic medication, antiepileptic level may increase with MPH (enzyme inhibition)
- **SUD-** important to stabilize the addiction before prescribing stimulant

Disruptive Behaviour Disorder and ADHD

Oppositional Disorder

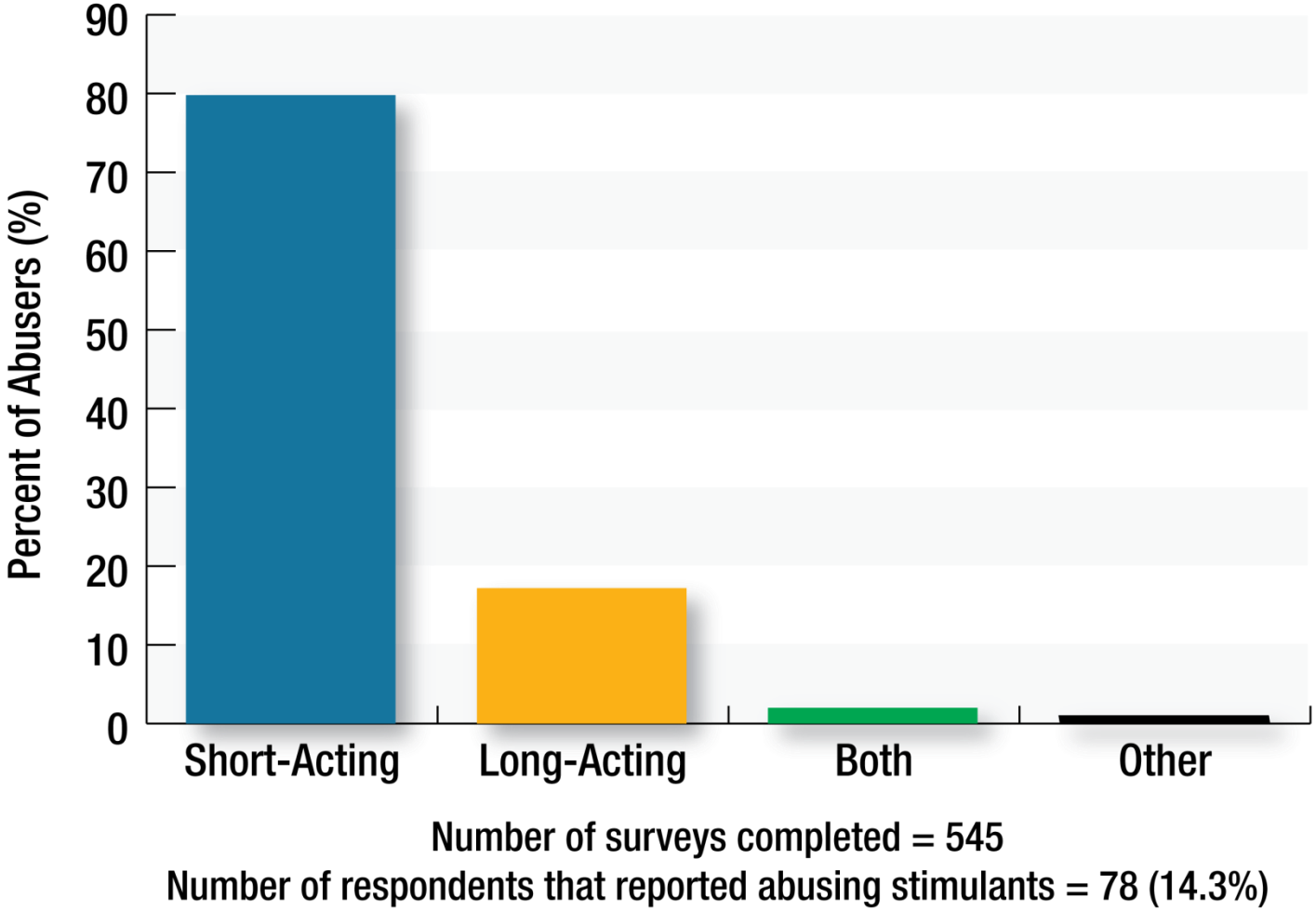
- Treat both at same time
- Ensure psychosocial interventions
- Severe cases may require combos of psychostimulants and alpha 2 agonist

- Treatment of ADHD symptoms often causes significant improvements in ODD, CD and emotional impulsivity (Barkley)

Conduct Disorder

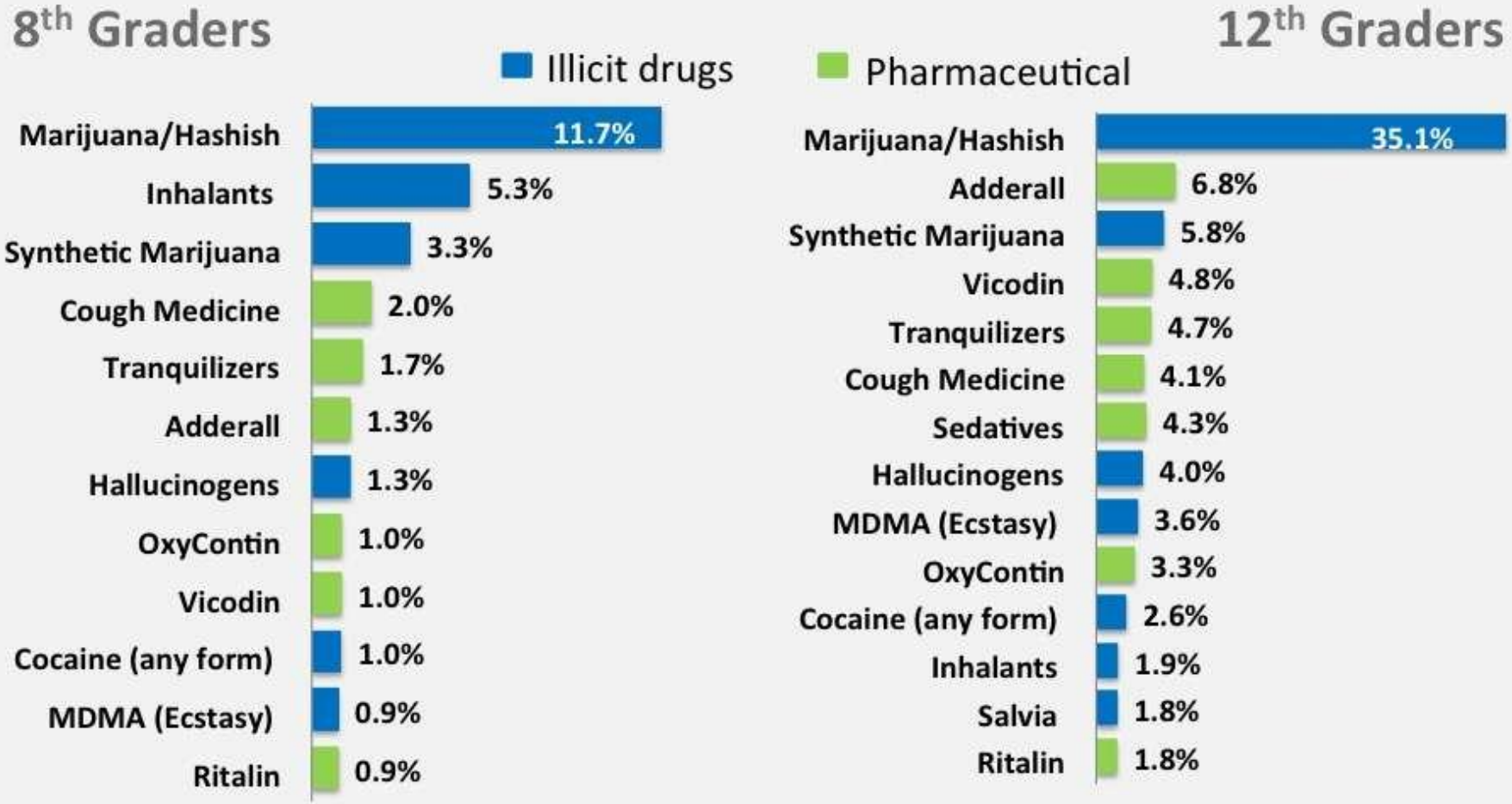
- Treat both at same time
- Ensure psychosocial interventions
- Severe cases may require combos of psychostimulants and alpha 2 agonist
- Expect legal issues
- Adding an antipsychotic might improve the symptoms of conduct disorder, according to some cases cited in the literature.

What Types of Stimulants are Most Abused?



Bright GM, Medscape J Med, 2008.

Top Drugs among 8th and 12th Graders, Past Year Use



*** Only 12th graders surveyed about sedatives use**

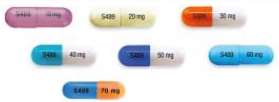
Source: University of Michigan, 2014 Monitoring the Future Study

ADHD Resources

- www.adhd.net
- www.caddra.ca
- www.aacap.org
- www.caddac.ca

- Parent ADHD support groups

CADDRA Guide to ADHD Pharmacological Treatments in Canada - 2018

Medications available and illustrations	Characteristics	Duration of action [1]	Starting dose [2]	Dose titration as per product monograph	Dose titration as per CADDRA www.caddra.ca
AMPHETAMINE-BASED PSYCHOSTIMULANTS					
Dexedrine® tablets 5 mg **Dexedrine®** spansules 10, 15 mg 	Pill can be crushed [3] Spansule (not crushable)	~ 4 h ~ 6 - 8 h	Tablets = 2.5 to 5 mg BID Spansules = 10 mg q.d. a.m.	↑ 2.5 - 5 mg at weekly intervals; Max. dose/day: (q.d. or b.i.d.) All ages = 40 mg	↑ 2.5 - 5 mg/day at weekly intervals Max. dose/day: (q.d. or b.i.d.) Children and Adolescents = 20 - 30 mg Adults = 50 mg
Adderall XR® Capsules 5, 10, 15, 20, 25, 30 mg 	Sprinkable Granules	~ 12 h	5 - 10 mg q.d. a.m.	↑ 5 - 10 mg at weekly intervals Max. dose/day: Children = 30 mg Adolescents and Adults = 20 - 30 mg	Children: ↑ 5 mg at weekly intervals Max. dose/day = 30 mg Adolescents and Adults: ↑ 5 mg at weekly intervals max. dose/day = 50 mg
Vyvanse® capsules 10, 20, 30, 40, 50, 60, 70* mg 	Capsule content can be diluted in water, orange juice and yogurt	~ 13 - 14 h	20 - 30 mg q.d. a.m.	↑ by clinical discretion at weekly intervals Max. dose/day: All ages = 60 mg	↑ 10 mg at weekly intervals Max. dose/day: Children = 60mg Adolescents and Adults = 70 mg
METHYLPHENIDATE-BASED PSYCHOSTIMULANTS					
Methylphenidate short acting, tablets 5 mg (generic) 10, 20 mg (Ritalin®) 	Pill can be crushed [3]	~ 3 - 4 h	5 mg b.i.d. to t.i.d. Adult = consider q.i.d.	↑ 5 - 10 mg at weekly intervals Max. dose/day: All ages = 60 mg	↑ 5 mg at weekly intervals Max. dose/day: Children and Adolescents = 60 mg Adults = 100 mg
Biphentin® Capsules 10, 15, 20, 30, 40, 50, 60, 80 mg 	Sprinkable Granules	~ 10 - 12 h	10 - 20 mg q.d. a.m.	↑ 10 mg at weekly intervals Max. dose/day: Children and Adolescents = 60 mg Adults = 80 mg	↑ 5 - 10 mg at weekly intervals Max. dose/day: Children = 60 mg Adolescents and Adults = 80 mg
Concerta® Extended Release Tabs 18, 27, 36, 54 mg 	Pill needs to swallowed whole to keep delivery mechanism intact	~ 12 h	18 mg q.d. a.m.	↑ 18 mg at weekly intervals Max. dose/day: Children = 54 mg Adolescents = 54 mg / Adults = 72 mg	↑ 9 - 18 mg at weekly intervals Max. dose/day: Children = 72 mg Adolescents = 90 mg / Adults = 108 mg
Foquest® Capsules 25, 35, 45, 55, 70, 85, 100 mg 	Sprinkable Granules	~ 16 h	25 mg q.d. a.m.	↑ 10-15 mg in intervals of no less than 5 days Max. dose/day: Adults = 100 mg	↑ 10-15 mg in intervals of no less than 5 days Max. dose/day: Adults = 100 mg
NON PSYCHOSTIMULANT - SELECTIVE NOREPINEPHRINE REUPTAKE INHIBITOR					
Strattera[MD] (Atomoxetine) Capsules 10, 18, 25, 40, 60, 80, 100 mg 	Capsule needs to swallowed whole to reduce GI side effects	Up to 24 h	Children and Adolescents : 0.5 mg/kg/day Adults = 40 mg q.d. for 7-14 days	Maintain dose for a minimum of 7 - 14 days before adjusting: Children = 0.8 then 1.2 mg/kg/day 70 kg or Adults = 60 then 80 mg/day Max. dose/day : 1.4 mg/kg/day or 100 mg	Maintain dose for a minimum of 7 - 14 days before adjusting: Children = 0.8 then 1.2 mg/kg/day 70 kg or Adults = 60 then 80 mg/day Max. dose/day: 1.4 mg/kg/day or 100 mg
NON PSYCHOSTIMULANT - SELECTIVE ALPHA-2A ADRENERGIC RECEPTOR AGONIST					
Intuniv XR® (Guanfacine XR) Extended release tabs 1, 2, 3, 4 mg 	Pills need to be swallowed whole to keep delivery mechanism intact	Up to 24 h	1 mg q.d. (morning or evening)	Maintain dose for a minimum of 7 days before adjusting by no more than 1 mg increment weekly Max. dose/day: Monotherapy: 6-12 years = 4 mg, 13-17 years = 7 mg As adjunctive therapy to psychostimulants 6-17 years = 4 mg	Maintain dose for a minimum of 7 days before adjusting by no more than 1 mg increment weekly Max. dose/day: Monotherapy: 6-12 years = 4 mg, 13-17 years = 7 mg As adjunctive therapy to psychostimulants 6-17 years = 4 mg

Note: Illustrations do not reflect real size of pills/capsules. For specific details on how to start, adjust and switch ADHD medications, clinicians are invited to refer to the Canadian ADHD Practice Guidelines (www.caddra.ca)

[1] Pharmacokinetics and pharmacodynamic response vary from individual to individual. The clinician must use clinical judgement as to the duration of efficacy and not solely rely on reported values for PK and duration of effect.

[2] Starting doses are from product monographs. CADDRA recommends generally starting with the lowest dose available. [3] Higher abuse potential. * Vyvanse 70 mg is an off-label dosage for ADHD treatment in Canada.

Document developed by Annick Vincent MD (www.attentiondeficit-info.com) and Direction des communications et de la philanthropie, Laval University, with the special collaboration of CADDRA.

UNIVERSITÉ LAVAL

CADDRA CANADIAN ADHD RESOURCE ALLIANCE

Version : February 2018

Pharmacological treatment for ADHD must be integrated in a multimodal approach and needs to include medical evaluation and follow-up. Comorbid disorders and co-administration of other medications must be taken into account. Here is a brief summary of contraindications and possible drug interactions.

CONTRAINDICATIONS TO PSYCHOSTIMULANTS*

- Treatment with MAO inhibitors and for up to 14 days after discontinuation
- Symptomatic cardiovascular disease
- Glaucoma
- Advanced arteriosclerosis
- Untreated hyperthyroidism
- Known hypersensitivity or allergy to the products
- Acute psychiatric conditions such as mania or psychosis
- Moderate to severe hypertension

Contraindications to Atomoxetine (Strattera)

- Treatment with MAOI and for up to 14 days after discontinuation
- Narrow angle glaucoma
- Uncontrolled hyperthyroidism
- Pheochromocytoma
- Moderate to severe hypertension
- Symptomatic cardiovascular disease
- Severe cardiovascular disorders
- Advanced arteriosclerosis
- Known hypersensitivity or allergy to the products

Contraindications to Guanfacine XR (Intuniv XR)

- Known hypersensitivity or allergy to the products
- Precautions are advised for those with a history of bradycardia, cardiovascular disease, heart block, hypotension, and syncope.

* For contraindications to guanfacine XR and atomoxetine hydrochloride, see chapter 5, Canadian ADHD Practice Guidelines 4th Edition, 2018, www.caddra.ca

MAIN POTENTIAL DRUG INTERACTIONS

Psychostimulants

- Monoamine oxidase inhibitors are contraindicated
- SSRIs and SNRIs – possible increased risk of serotonin syndrome
- TCAs – amphetamines and methylphenidate may interact with TCAs by different mechanisms
- Antipsychotics (e.g. chlorpromazine, fluphenazine) – may reduce the effect of amphetamines
- Anticonvulsants – methylphenidate may increase the level of phenytoin, primidone and phenobarbital
- Warfarin – methylphenidate may increase serum concentrations of warfarin

Atomoxetine (Strattera)

- Monoamine oxidase inhibitors are contraindicated.
- Inhibitors of CYP2D6 (e.g., paroxetine, fluoxetine, bupropion, quinidine) – may increase atomoxetine serum concentrations.
- Decongestants (e.g. pseudoephedrine) – possible increase in blood pressure and heart rate.
- QT prolonging agents (e.g. quetiapine, quinidine)- May ↑ QTc interval, consider alternatives.

Guanfacine XR (Intuniv XR)

- QT prolonging drugs (e.g. quetiapine, quinidine) – since quanfacine XR may cause a decrease in heart rate, concomitant use with QT prolonging drugs is not recommended.
- Beta-blockers – may increase risk of rebound hypertensive effect if guanfacine XR is stopped abruptly.
- Anticonvulsants – guanfacine XR may ↑ serum concentrations of valproic acid. Carbamazepine, phenobarbital and phenytoin may ↓ serum concentrations of guanfacine XR through CYP3A4 induction.
- CYP3A4 inducers or inhibitors (e.g. rifampin, fluconazole, ritonavir) - Inducers may ↓ serum concentrations of guanfacine XR Inhibitors may ↑ serum concentrations of guanfacine XR.

Additional information: Chapter 5, Canadian ADHD Practice Guidelines 4th Edition, 2018, www.caddra.ca

How can CADDRA help you in your practice?

- **The Canadian ADHD Practice Guidelines**: Written and reviewed by a multidisciplinary team of medical experts, the Guidelines provide practical information on how to screen, assess and treat ADHD in children, adolescents and adults.
- **ADHD Assessment Toolkit**: This is a step-by-step guide to ADHD assessment, provides information on differential diagnosis and comorbid disorders, and includes all required forms and handouts.
- **CADDRA eLearning Portal**: www.adhdlearning.caddra.ca is a virtual library of resources, including video presentations, podcasts, ePosters and documents on ADHD.
- **Education and Training programs**: Training on ADHD and comorbid disorders across the lifespan.
- **Benefits of becoming a Member**: Join a network of health professionals working in the field of ADHD, receive newsletters, updates and notifications, obtain a discount of 20% on the cost of our annual conference; get premium access to our ADHD Learning and receive a printed copy of the Canadian ADHD Practice Guidelines in French or English.
- **During our annual conferences**, you have an opportunity to hear the top international experts in the field of ADHD speaking on topical subjects, to participate in practical and interactive workshops on ADHD and take part in networking sessions.

www.caddra.ca

Clinicians are invited to refer to the Canadian ADHD Practice Guidelines, 4th edition, for more information on ADHD diagnosis and treatments, www.caddra.ca

Document developed by Annick Vincent MD (www.attentiondeficit-info.com) and Direction des communications et de la philanthropie, Laval University.

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Patient Name:
Date of Birth: MRN/File No:
Physician Name: Date:

SNAP-IV 26 — Teacher and Parent Rating Scale

Name: _____ Gender: _____ Age: _____

Grade: _____ Ethnicity: ☐ African-American ☐ Asian ☐ Caucasian ☐ Hispanic Other: _____

Completed by: _____ Type of Class: _____ Class size: _____

For each item, check the column which best describes this child:	Not At All	Just A Little	Quite A Bit	Very Much
1. Often fails to give close attention to details or makes careless mistakes in schoolwork or tasks				
2. Often has difficulty sustaining attention in 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				
5. Often has difficulty organizing tasks and activities				
6. Often avoids, dislikes, or reluctantly engages in tasks requiring sustained mental effort				
7. Often loses things necessary for activities (e.g., toys, school assignments, pencils, or books)				
8. Often is distracted by extraneous stimuli				
9. Often is forgetful in daily activities				
10. Often fidgets with hands or feet or squirms in seat				
11. Often leaves seat in classroom or in other situations in which remaining seated is expected				
12. Often runs about or climbs excessively in situations in which it is inappropriate				
13. Often has difficulty playing or engaging in leisure activities quietly				
14. Often is “on the go” or often acts as if “driven by a motor”				
15. Often talks excessively				
16. Often blurts out answers before questions have been completed				
17. Often has difficulty awaiting turn				
18. Often interrupts or intrudes on others (e.g. butts into conversations/ games)				
19. Often loses temper				
20. Often argues with adults				
21. Often actively defies or refuses adult requests or rules				
22. Often deliberately does things that annoy other people				
23. Often blames others for his or her mistakes or misbehavior				
24. Often touchy or easily annoyed by others				
25. Often is angry and resentful				
26. Often is spiteful or vindictive				

THE END

Hope you enjoyed the show

Guidelines for ADHD Children and Adolescents

- Canadian ADHD Resource Alliance (CADDRA)

  www.caddra.ca/pdfs/caddraGuidelines2011.pdf

- American Academy of Paediatrics

  http://pediatrics.aappublications.org/content/early/2011/10/14/peds.2011-2654.full.pdf

- American Academy of Child & Adolescent Psychiatry

  http://download.journals.elsevierhealth.com/pdfs/journals/0890-8567/PIIS0890856709621821.pdf

- British Association for Psychopharmacology

  http://www.bap.org.uk/pdfs/ADHD_Guidelines.pdf

- National Institute for Clinical Excellence (NICE)

  http://guidance.nice.org.uk/CG72

Management of Common Stimulant-induced Adverse Effects

Anorexia, nausea, weight loss

- Administer medication with meals
- Use caloric supplements
- Encourage frequent smaller meals
- Eat early in the morning
- Allow to eat late in the evening (when appetite comes back)
- Encourage healthy snacks

Management of Common Stimulant-induced Adverse Effects

Insomnia

- Administer earlier in day
- Change to short acting
- Discontinue late dosing
- Consider adjunctive treatment (i.e. melatonin)

Management of Common Stimulant-induced Adverse Effects

Rebound phenomena

- Up to 30% of inpatient ADHD youth
- Change to long acting preparation or combine
- Overlap stimulant dosing

Management of Common Stimulant-induced Adverse Effects

Irritability

- Assess timing of phenomena (peak or withdrawal)
- Evaluate comorbid symptoms
- Change preparation
- Consider adjunctive or alternate treatment
- Determine it is not from hypoglycemia (secondary to not eating)

Cardiac Effects of ADHD Medications

- **ADHD Drugs and Serious Cardiovascular Events**
  - Large, retrospective cohort study in children and young adults (2-24yrs) treated with ADHD medication
  - No association found between use of certain ADHD medications and adverse cardiovascular events, e.g., stroke, heart attack, and sudden cardiac death
  - Medications studied include stimulants (amphetamine products and methylphenidate) and atomoxetine
- **Recommendations**
  - Continue to prescribe drugs used for the treatment of ADHD according to the professional prescribing directions
  - Stimulant products and atomoxetine should generally not be used in patients with serious heart problems, or for whom an increase in blood pressure or heart rate would be problematic
  - Patients treated with ADHD medications should be periodically monitored for changes in heart rate or blood pressure

Results of Multi-modal Treatment Analysis (MTA)

- Medication management alone

  OR

- Medication with behavioral treatment

  WAS FOUND TO BE

- Nearly equally effective and superior to
  - Behavioral treatment alone
  - Community based treatment