ADHD: from adolescence to adulthood

Martin Gignac, MD, FRCPC

Child and adolescent Psychiatrist
Forensic Psychiatrist
Associate Professor
McGill University

Disclosure

- Honorarium
  - Takeda
  - Elvium
  - Janssen

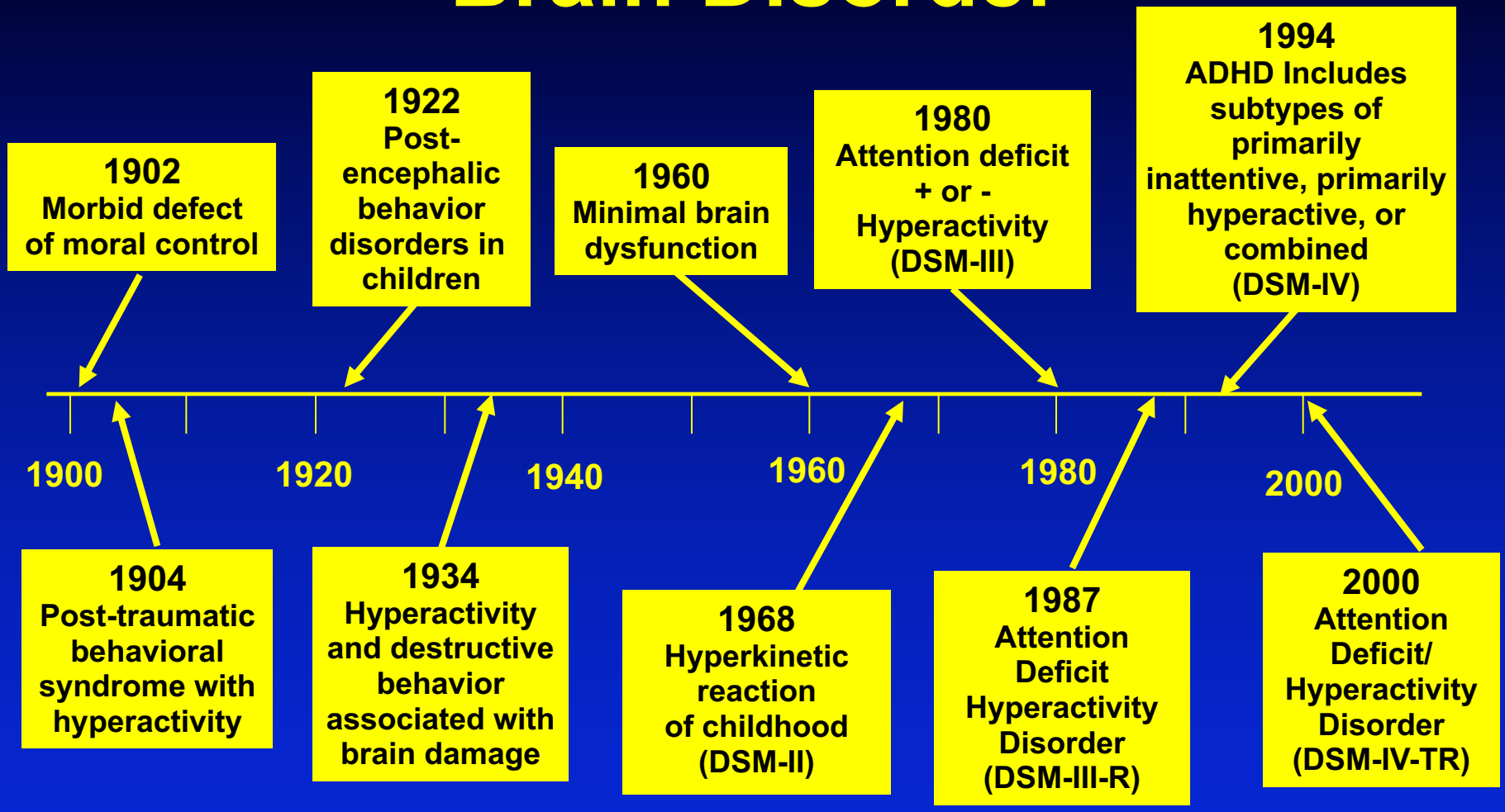
CONDITION OF OUR MODERN LIFESTYLE?

ADHD in 1854: Fidgety Phil

"Let me see if he is able to sit still for once at the table."
Thus Papa bade Phil behave;
And Mama looked very grave.
But Fidgety Phil, He won't sit still…
"Phil! I am getting cross!"…
Growing still more rude and wild,
Till his chair falls over quite.
Philip screams with all his might,
Catches all the cloth, but then…
How Mama did fret and frown,
When she saw them tumbling down!
And Papa made such a face!
Phil is in sad disgrace . . .

Hallowell & Ratey. *Driven to Distraction*, 1994.

ADHD: Behavioral Disorder to Brain Disorder



1. Attention-deficit/hyperactivity disorder – historical development and overview. *J Atten Disord* 2000;3:173-191.
2. Stubbe DE. Child *Adolesc Psychiatr Clin N Am* 2000;9:469-479.

ADHD – DSM-5 Definition

Attention Deficit Hyperactivity Disorder (ADHD) is a neurobiological condition characterized by developmentally inappropriate levels of:

- Inattention (concentration, distractibility)
- Hyperactivity
- Impulsivity

in various combinations across school, work, home, and social settings.

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

ADHD: Overview

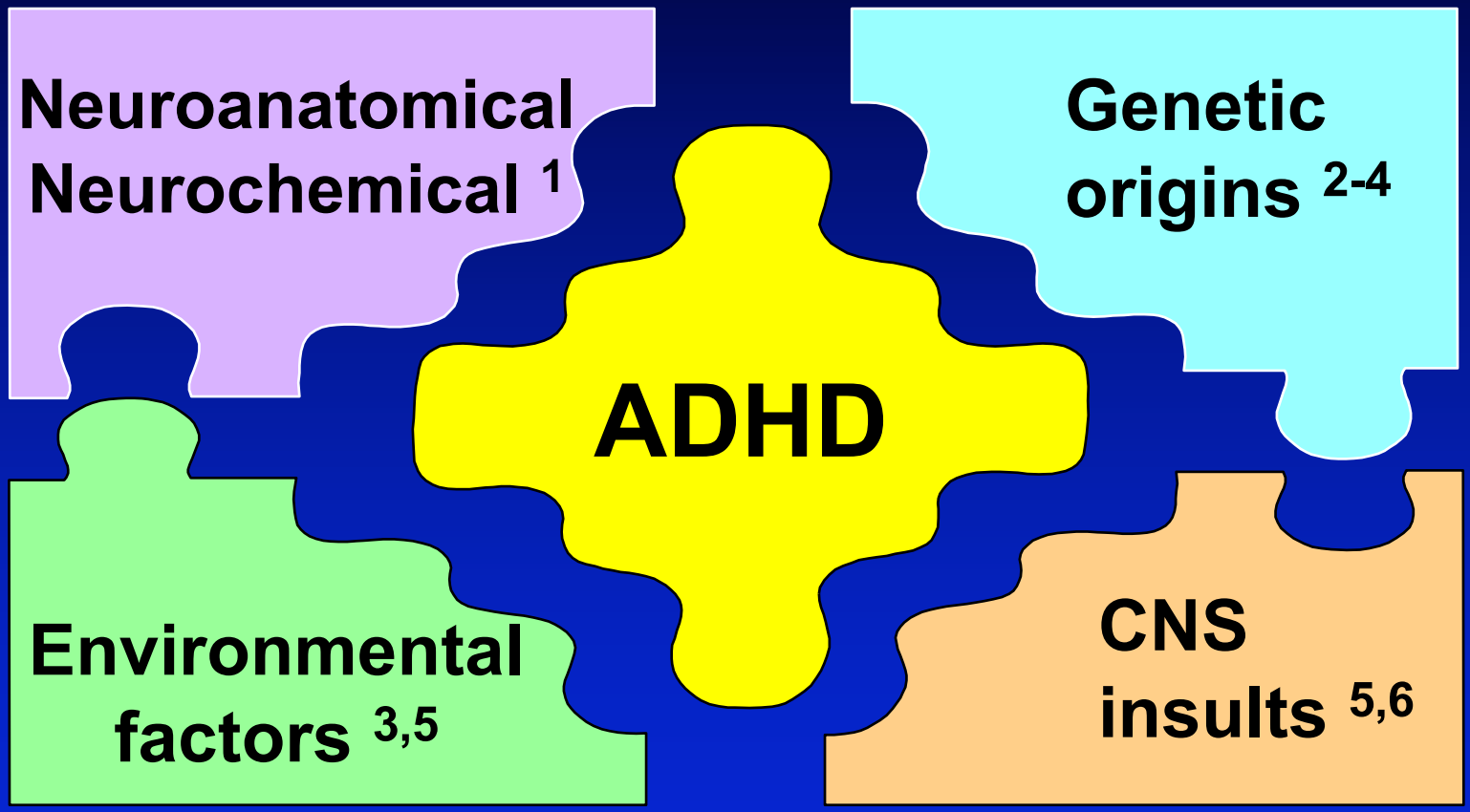
	Children	Adults
Prevalence:	6-8%	4.4%
Presentations:		
- Combined	50-75%	30-40%
- Pred. inattentive	20-30%	50-60%
- Pred. hyper./imp.	< 15%	5%
Male/Female Ratio:	2.5:1	1:1

DSM-IV-TR; Diagnosis and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision.

American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition, Text Revision. Washington, DC: American Psychiatric Association; 2000:85-93; Biederman J. *J Clin Psychiatry*. 2004;65:3-7; Faraone SV et al. *Biol Psychiatry*. 2000;48:9-20; Kessler RC, et al. *Am J Psychiatry*. 2006;163:716-723; Michelson D et al. *Biol Psychiatry*. 2003;53:112-120; *MMWR. Morb Mortal Wkly Rep*. 2005;54:842-847; Wender PH et al. *Ann N Y Acad Sci*. 2001;931:1-16; Wilens TE et al. *Annu Rev Med*. 2002;53:113-131.

ETIOLOGY

ADHD is most likely caused by a complex interplay of factors:

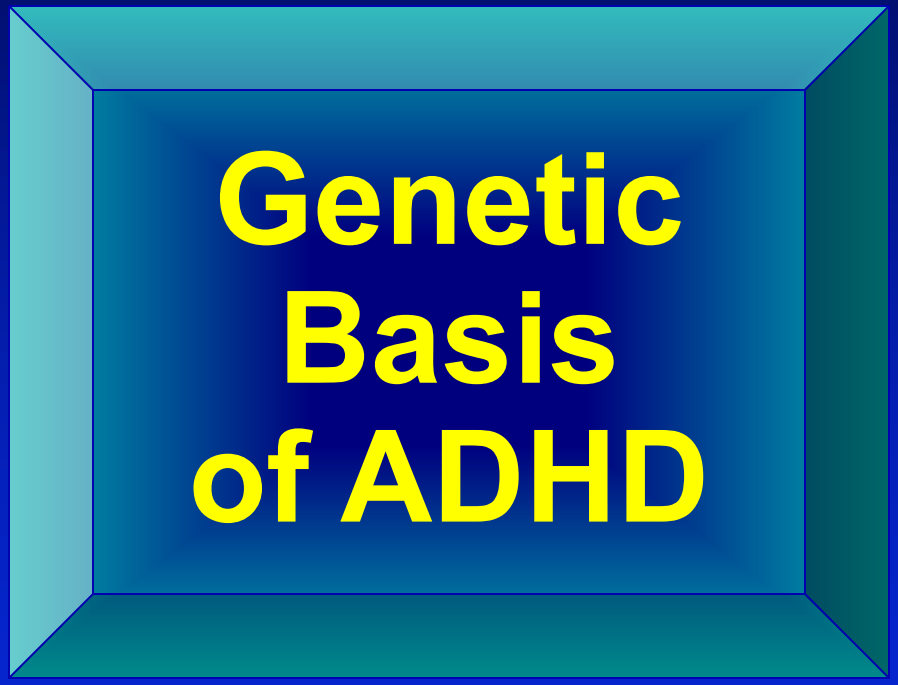


1. Swanson J, et al. *Curr Opin Neurobiol* 1998; 8:263-271.
2. Hauser P, et al. *N Engl J Med* 1993; 328:997-1001.
3. Swanson JM, et al. *Mol Psychiatry* 1998; 3:38-41.
4. Swanson JM, et al. *Lancet* 1998; 351:429-433.
5. Milberger S, et al. *Biol Psychiatry* 1997; 41:65-75.
6. Castellanos FX, et al. *Arch Gen Psychiatry* 1996; 53:607-616.

ADHD: Genetics

Twin Studies

Family Studies



Adoption Studies

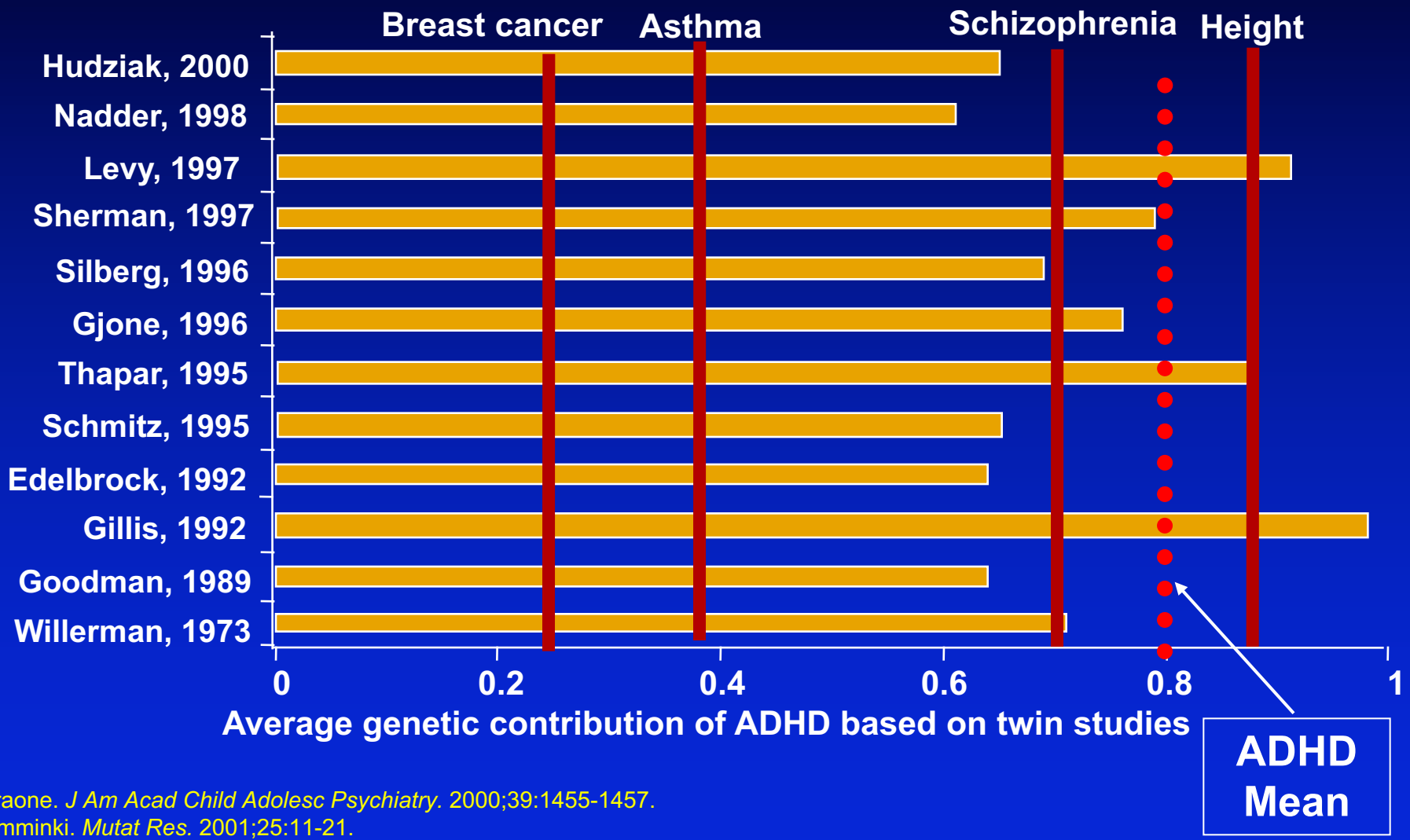
Molecular Genetics Studies

ADHD: A Family Affair

- Between 40-60% of parents with ADHD
  → will have a child with the disorder
- 25% of children with ADHD
  → will have parent with the disorder
- Added challenge of raising a child with ADHD
  → when the parent has the disorder

Murray & Johnston, J Abnorm Psychol, 2006; Sonuga-Barke et al. Am Acad Child Adolesc Psych, 2002

Twin Studies Show ADHD is a Genetic Disorder

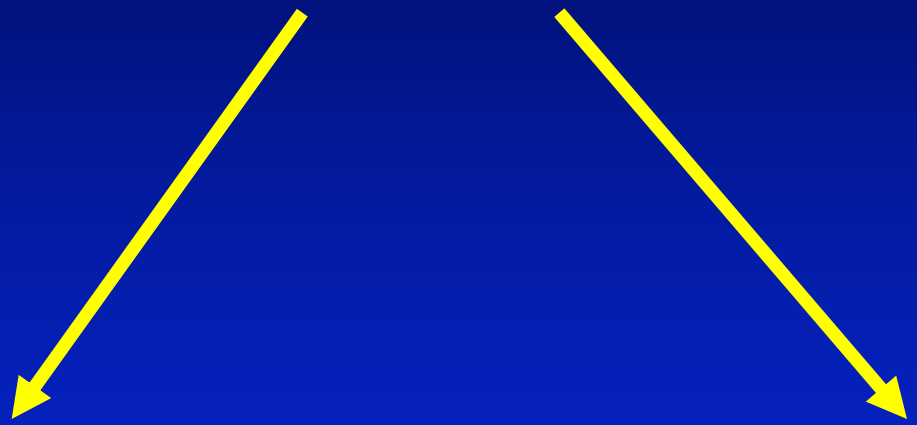


Faraone. *J Am Acad Child Adolesc Psychiatry.* 2000;39:1455-1457.
Hemminki. *Mutat Res.* 2001;25:11-21.
Palmer. *Eur Resp J.* 2001;17:696-702.

DIAGNOSIS

Definition of ADHD

Developmental Disorder recognized by significant symptoms of:



Inattention

Hyperactivity / Impulsivity

ADHD: DSM-5 Definition

Attention Deficit Hyperactivity Disorder (ADHD) is a neurobiological condition characterized by developmentally inappropriate levels of:

- **Inattention (concentration, distractibility)**
- **Hyperactivity**
- **Impulsivity**

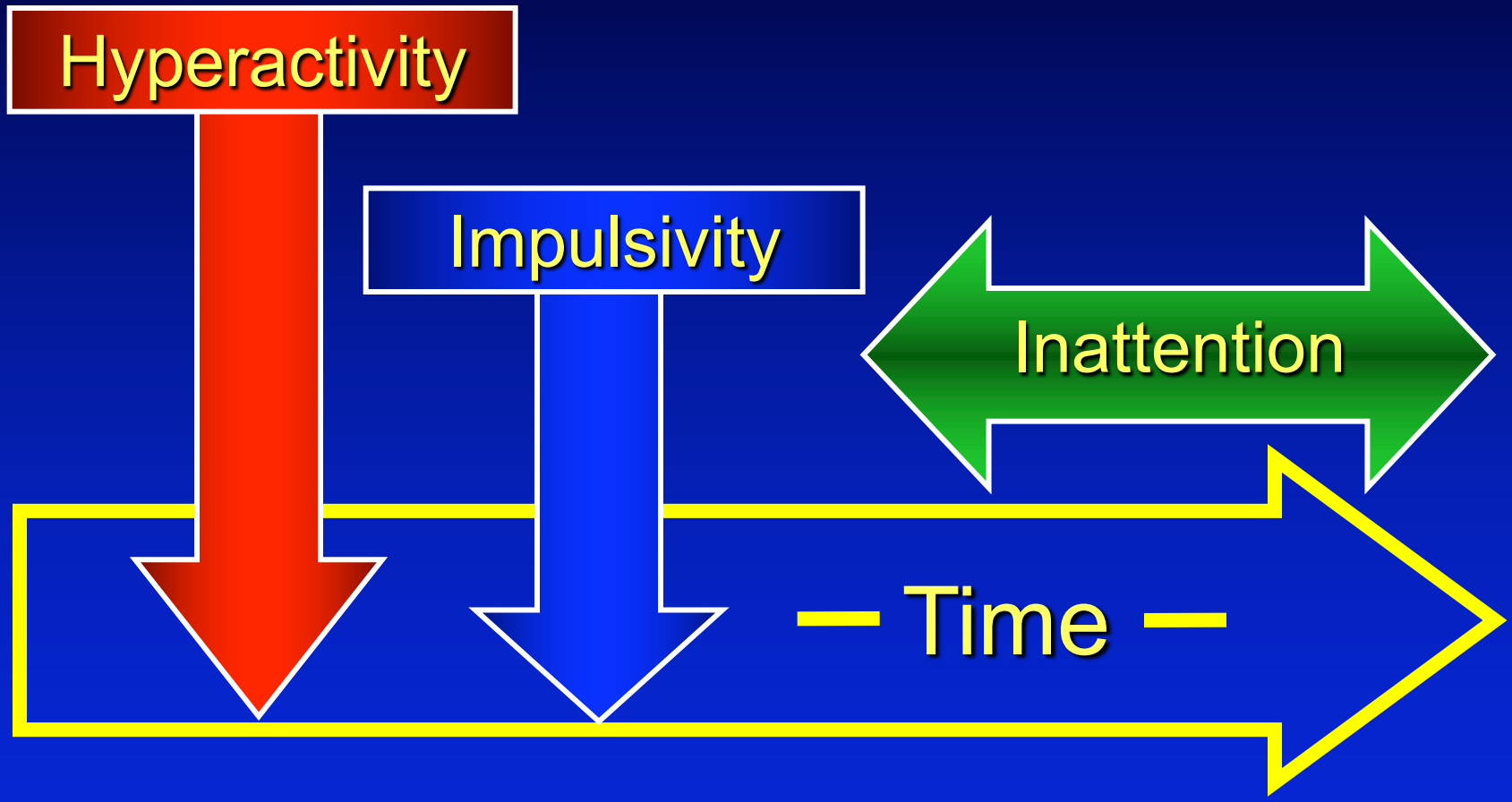
in various combinations across school, work, home, and social settings.

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

Symptoms

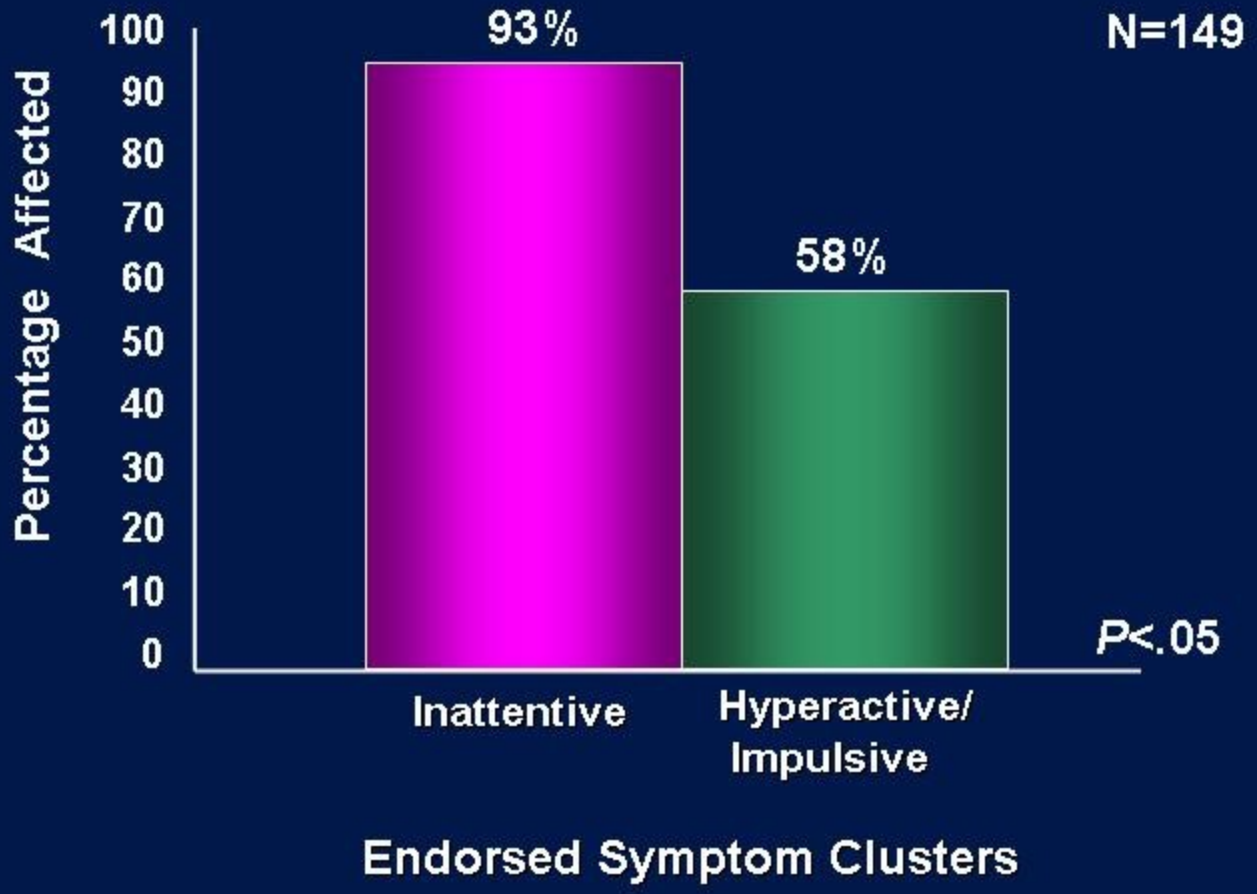
- Pervasive
  - Many settings
- Persistent
  - Duration 6 months
  - Onset before age 7 (DSM-IV); age 12 (DSM-5)
- Severe
  - Maladaptive, affect functioning
  - Inconsistent with developmental level
  - Clinical significant impairment, social, academic, occupational

Course of ADHD



Biederman J. et al. *Am J Psychiatry*. 2000 May;157(5):816-8.

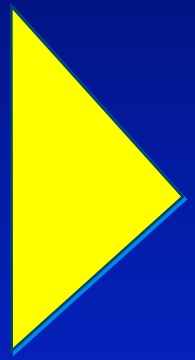
Inattention Drives Presentation of ADHD in Adults



Millstein RB, et al. *J Aff Dis*. 1997;2:159-166.

Hyperactivity: Pediatric to Adult Symptom Migration

- **Childhood *DSM-IV-TR*®; DSM-5 symptoms[1]**
  - Squirms and fidgets
  - Runs or climbs excessively
  - Cannot play or work quietly
  - "On the go"; driven by a motor
  - Talks excessively

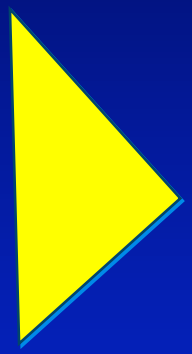


- **Common adult symptoms [2]**
  - Inner restlessness
  - Overwhelmed
  - Self-selects active jobs
  - Talks excessively
  - Fidgets when seated

1. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 5th edition. Washington, DC: American Psychiatric Press, 2013.
2. Adler L, Cohen J. Psychiatr Clin N Am. 2004;27:187-201.

Impulsivity: Pediatric to Adult Symptom Migration

- **Childhood *DSM-IV-TR®*; DSM-5 symptoms[1]**
  - Blurts out answers
  - Cannot wait his or her turn
  - Intrudes on or interrupts others



- **Common adult symptoms[2]**
  - Impulsive job changes
  - Drives too fast, has traffic accidents
  - Irritability or quickness to anger

1. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 5th edition. Washington, DC: American Psychiatric Press, 2013.
2. Adler L, Cohen J. Psychiatr Clin N Am. 2004;27:187-201.

Inattention: Pediatric to Adult Symptom Migration

- **Childhood *DSM-IV-TR®*; DSM-5 symptoms[1]**
  - Difficulty sustaining attention
  - Does not listen
  - Difficulty following instructions
  - Cannot organize
  - Loses things
  - Easily distracted, forgetful

- **Common adult symptoms[2]**
  - Difficulty sustaining attention to reading or paperwork
  - Easily distracted, forgetful
  - Poor concentration
  - Poor time management
  - Difficulty finishing tasks
  - Misplaces things

1. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 5th edition. Washington, DC: American Psychiatric Press, 2013.
2. Adler L, Cohen J. Psychiatr Clin N Am. 2004;27:187-201.

Other Qualifiers

1. Symptoms in 2 or more settings – home, school, work, friends/relationships, other activities
2. Symptoms interfere with social, academic, or occupational functioning
3. Not exclusively during course of schizophrenia/ other psychosis or better explained by
   - Mood Disorder
   - Anxiety Disorder
   - Dissociative Disorder
   - Personality Disorder
   - Substance intoxication or withdrawal

Presentations
(not subtypes as not stable)

- Combined Presentation
- Predominately Inattentive Presentation
- Predominately Hyperactive-Impulsive Presentation

Attention-Deficit Hyperactivity Disorder

- In partial remission
- ADHD – Not-Otherwise Specified
  - impairment
  - sub threshold criteria
- Mild: few symptoms, milder impairment
- Moderate: between mild and severe
- Severe: many severe symptoms, marked impairment

DIFFERENTIAL DIAGNOSIS

Differential Diagnosis in ADHD: Psychiatric and Medical

Psychiatric disorders that can mimic ADHD

- Anxiety disorders
- Mood disorders
- Adjustment disorders
- Learning and language deficits
- Psychotic disorders
- Stress

Medical disorders that can mimic ADHD

- Developmental disorders
- Use of other medications
- Substance use disorder
- Seizure disorder (petit mal)
- Sleep apnea
- Hearing &Vision problems
- Thyroid disorder
- Hypoglycemia

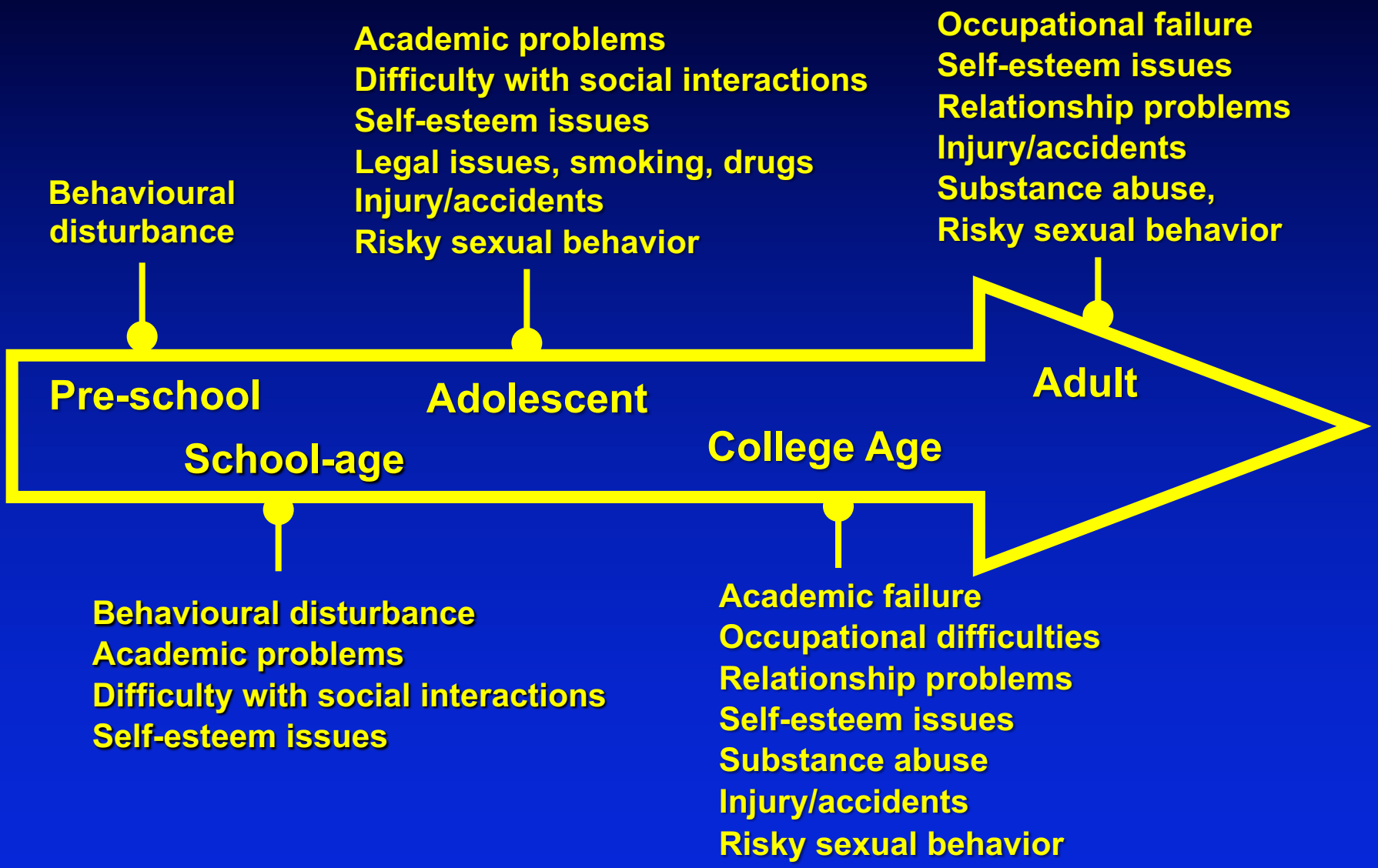
McCracken JT. *Kaplan and Sadock's Comprehensive textbook of psychiatry*. 2000;2679-2688.

Psychiatric Disorders to Consider in the Differential Diagnosis of ADHD in Adults

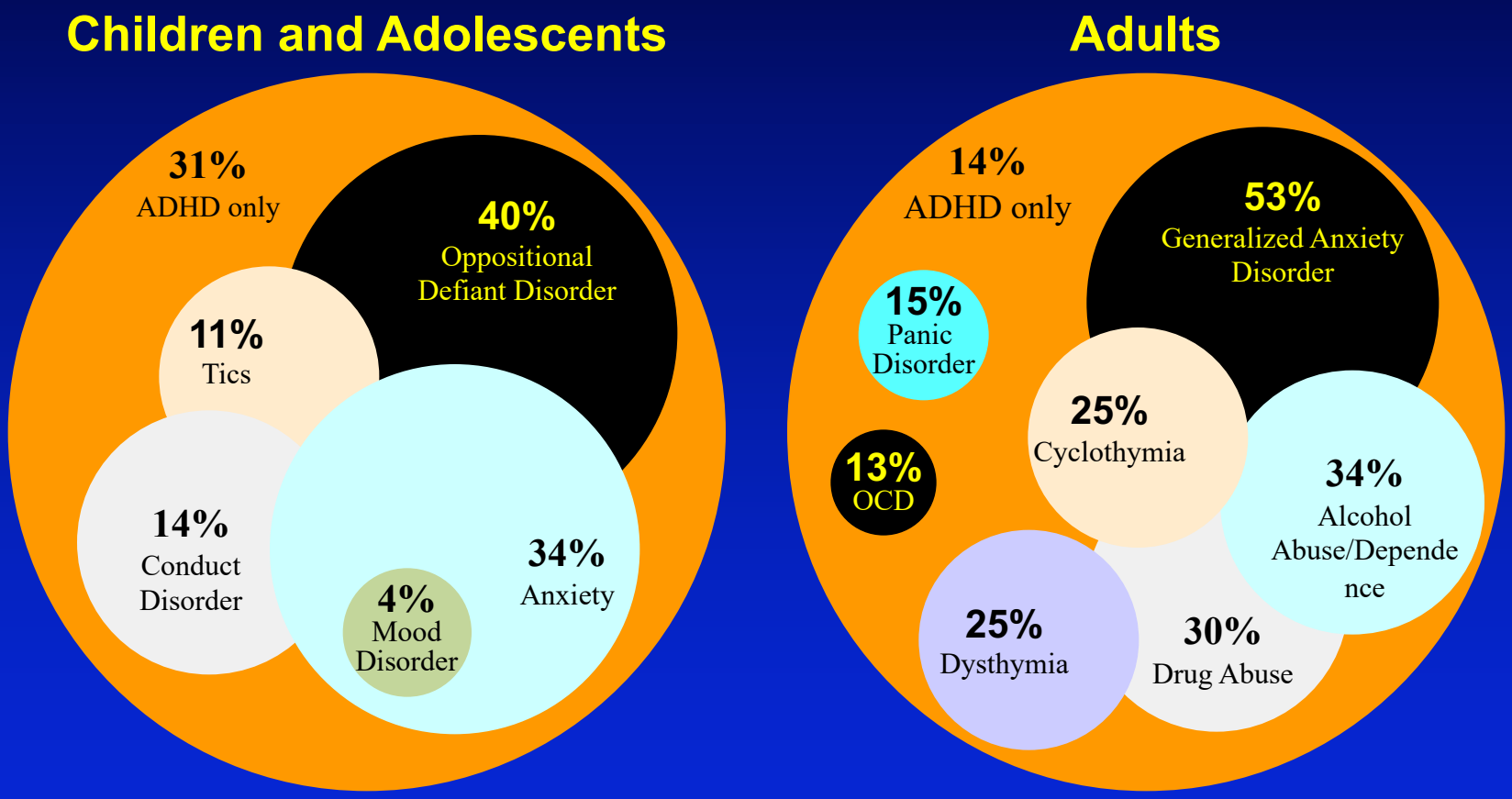
Psychiatric disorder	Features Shared w ADHD	Differential Features
Major depression	• Subjective report of poor concentration, attention and memory • Difficulty with task completion	• Substantial and episodic dysphoria
Bipolar Disorder	• Increased activity, difficulty maintaining attention/focus • Irritability	• Enduring dysphoric or euphoric mood • Insomnia • Psychotic symptoms
Generalized Anxiety	• Fidgetiness • Difficulty concentrating	• Exaggerated apprehension, worry • Somatic symptoms of anxiety

Searight HR, et al. *Am Fam Physician* 2000;62:2077-2092.

Developmental Impact of ADHD



Patients with ADHD Frequently Have Coexisting Disorders



1. The MTA Cooperative Group. *Arch Gen Psych.* 1999;56(12):1073-1086; 2. Shekim WO, *et al. Compr Psych*. 1990;31(5):416-425; 3. Biederman J, *et al. Arch Gen Psych*. 1996;53(5):437-446; 4. Barkley RA. 2nd ed. 1998:152-213; 5. Biederman J, *et al. Am J Psych.* 993;150(12):1792-1798.

ADHD Subtypes, Comorbidities, and Age

n=3559	<6 years	Children	Adolescent	Adults
ADHD/ADD	ADHD>ADD	ADHD>ADD	ADHD=ADD	ADD>ADHD
Oppositional defiant disorder (ODD)	+ + +	+ + +	+ +	+?
Communication disorders	+ +	+	+?	+?
Conduct disorder (CD)	+	+ +	+ + +	Anti-social
Anxiety disorders	-/+	+ +	+ + +	+ + +
Mood disorders	-	+	+ +	+ + +
Depressive disorders	-	+	+ +	+ + +
Substance use	-	-	+	+ +

1. Turgay A. *Essent Psychopharmacol*. 2005;6(5):277-90; 2. Turgay A. APA. 2006; Abstract 723.

TREATMENT

Canadian ADHD Practice Guidelines

Fourth Edition

CADDRA

CANADIAN ADHD RESOURCE ALLIANCE

GUIDE CADDRA POUR LES TRAITEMENTS PHARMACOLOGIQUES DU TDAH AU CANADA — FÉVRIER 2020

	Type de molécules et illustration		Mode de libération	Durée d'action[1]	Posologie de départ[2]	Mode de libération immédiate/ prolongée (%)	Augmentation de la dose selon la monographie de produit[3]
PSYCHOSTIMULANTS À BASE D'AMPHÉTAMINES							
Première intention	Adderall XR®	Capsules 5, 10, 15, 20, 25, 30 mg 	Granules saupoudrables	~12 h	5-10 mg die a.m.	50/50	▲5-10 mg par palier de 7 j Dose max/j: Enfant = 30 mg Adolescent et adulte = 20-30 mg
Première intention	Vyvanse®	Gélules 10, 20, 30, 40, 50, 60, 70[4] mg  Comprimés à croquer 10, 20, 30, 40, 50, 60 mg 	Contenu des gélules peut être dissout dans un liquide ou saupoudré Les comprimés à croquer doivent être croqués complètement	~13-14 h	20 - 30 mg die a.m.	Sans objet (promédicament)	▲10-20 mg selon discrétion du md par palier de 7 j Dose max/j: Tous âges = 60 mg
Deuxième intention	Dexedrine®	Comprimés 5 mg  Spansules 10, 15 mg 	Comprimé sécable Formulation à granules	~4 h ~6-8 h	Comprimé = 2,5-5 mg b.i.d. Spansule = 10 mg die a.m.	100/0 50/50	▲5 mg par palier de 7 j Dose max/j: (die ou b.i.d.) Enfant et adolescent = 20-30 mg Adulte = 50 mg
PSYCHOSTIMULANTS À BASE DE MÉTHYLPHÉNIDATE							
Première intention	Biphentin®	Capsules 10, 15, 20, 30, 40, 50, 60, 80 mg 	Granules saupoudrables	~10-12 h	10 - 20 mg die a.m.	40/60	▲10 mg par palier de 7 j Dose max/j: Enfant et adolescent = 60 mg Adulte = 80 mg
Première intention	Concerta®	Comprimés à libération prolongée 18, 27, 36, 54 mg 	Mode de libération contrôlée par la pression osmotique (OROS®)	~12 h	18 mg die a.m.	22/78	▲18 mg par palier de 7 j Dose max/j: Enfant et adolescent = 54 mg Adulte = 72 mg
Première intention	Foquest®	Capsules 25, 35, 45, 55, 70, 85, 100 mg 	Granules saupoudrables	~16 h	25 mg die a.m.	20/80	▲10-15 mg par palier d'au moins 5 j Dose max/j: Enfant et adolescent = 70 mg Adulte = 100 mg
Deuxième intention	Méthylphénidate courte action Ritalin® SR	Comprimés 5 mg (générique) 10, 20 mg (Ritalin®)  Comprimés 20 mg 	Comprimé sécable Matrice à base de cire	~3-4 h ~8 h	5 mg b.i.d. à t.i.d. Adulte - envisager q.i.d. 20 mg	100/0 100/0	▲5mg par palier de 7 j Dose max/j: Tous âges = 60 mg
NON PSYCHOSTIMULANT — INHIBITEUR SÉLECTIF DU RECAPTAGE DE LA NORADRÉNALINE							
Deuxième intention	Strattera® (atomoxétine)	Capsules 10, 18, 25, 40, 60, 80, 100 mg 	Capsule doit être avalée entière pour réduire les effets secondaires GI	Jusqu'à 24 h	Enfant et adolescent: 0,5 mg/kg/j Adulte = 40 mg die x 7 à 14 j	Sans objet	Maintenir dose au moins 7-14 j avant d'ajuster: Enfant = 0,8 puis 1,2 mg/kg/j 70 kg ou adulte = 60 puis 80 mg/j Dose max/j: 1,4 mg/kg/j ou 100 mg
NON PSYCHOSTIMULANT — AGONISTE SÉLECTIF DES RÉCEPTEURS ALPHA-2A ADRÉNERGIQUES							
Deuxième intention	Intuniv XR® (guanfacine XR)	Comprimés à libération prolongée 1, 2, 3, 4 mg 	Comprimé doit être avalé entier pour conserver le mécanisme de libération intact	Jusqu'à 24 h	1 mg die (matin ou en soirée)	Sans objet	Maintenir dose pour au moins 7 j avant d'ajuster par palier ne dépassant pas 1 mg/semaine Dose max/j: Monothérapie: 6-12 ans = 4 mg 13-17 ans = 7 mg En traitement d'appoint avec un psychostimulant : 6-17 ans = 4 mg

La taille réelle des comprimés et capsules n'est pas celle illustrée. Les stimulants à longue durée d'action ont tendance à avoir un potentiel d'abus inférieur à celui des formulations à courte durée d'action. Les non-stimulants n'ont pas de potentiel d'abus. [1]Les réponses pharmacocinétiques et pharmacodynamiques varient d'un individu à l'autre. Le clinicien doit utiliser son jugement clinique quant à la durée de l'efficacité et non seulement aux valeurs de courbes pharmacocinétiques et de durée de l'effet rapportées. [2]Les doses de départ sont tirées des monographies de produit. La CADDRA recommande de débuter en général avec la plus petite posologie disponible. [3]Pour les informations spécifiques concernant l'instauration, l'ajustement et le changement de médicament pour le TDAH, les cliniciens sont invités à consulter les lignes directrices canadiennes sur le TDAH (www.caddra.ca). [4]Vyvanse 70 mg est un dosage hors indication pour le traitement du TDAH au Canada. La version originale de ce tableau fut développée par Annick Vincent M.D. en collaboration avec la Direction des communications et de la philanthropie de l'Université Laval. Consultez l'information sur les formulaires provinciaux et fédéraux au tinyurl.com/uf3mxrl

Benefits of Long-Acting Stimulant Formulations

- Core impairments continue all day long
- Use of a long-acting stimulant formulation may improve medication compliance[1]
- May decrease abuse potential
- Smoother, more consistent coverage

[1]Swanson J., CNS Drugs, 2003; 17:117-131.

Methylphenidate interactions with other drugs

1. **Caution with Monoamine oxidase inhibitors (MAOI) antidepressants**: e.g.,

   Phenelzine (Nardil)

   Tranylcypromine (Parnate)

   Isocarboxazid (Marplan)

   Orphenadrine (Norflex)

   Cyclophosphamide (Cytoxan)

2. **Inhibits metabolism**

   a) warfarin (Coumadin)

   b) anticonvulsants (Phenobartital, Donnatal)

   c) tricyclic antidepressants (Imipramine)

   → **Need to adjust dose**

Guide to ADHD Psychoeducation

What is ADHD?

Attention Deficit Hyperactivity Disorder is a neurodevelopmental condition with symptoms existing along a continuum from mild to severe. It occurs across the life span.

How is ADHD Treated?

Treatment should be **multimodal.** Incorporating different interventions, such as education, medication, and behavioral modifications/motivational interviewing/ psychotherapy, produces a better outcome.

Treatment must be collaborative among the physician, the patient, and the family. It should be targeted to each individual's needs and goals, which may change over time.

Two important components of a multimodal approach:

PSYCHOEDUCATION

Psychoeducation should be the first intervention. Educating the family/ patient about ADHD (symptoms, functional impairment, possible comorbidities and treatment) will ensure a more successful outcome.

PSYCHOSOCIAL INTERVENTIONS

Psychosocial interventions can reduce impairments associated with ADHD symptoms and improve overall quality of life. Interventions can be **cognitive** or **behavioral**.

Psychoeducation

Discover

- What does the individual/ family know about ADHD?

Demystify

- Myths about ADHD
- Diagnosis and assessment processes

Instill Hope

- Evidence-based treatments and interventions **do** exist and **will** promote a positive outcome

Educate

- Importance of combining pharmacological and psychosocial interventions
- Risks and benefits

Empathize

- Acknowledge feelings of discouragement, grief, and frustration.

Encourage

- A strength-based approach
- Make more positive than negative comments
- Discourage criticisms

Recognize

- Appropriate behavior, whether observed or reported
- Goals achieved

Be Sensitive

- Ethnic, cultural and gender issues may shape the perception and beliefs about ADHD and its treatment

Motivate

- Nurture strengths and talents
- Encourage skills

Promote

- Regular exercise
- Consistent sleep hygiene
- Healthy nutrition routine

Humour

Humour can defuse awkward, tense situations and avoid or reduce conflict

Give Resources

- Websites
- Local community resources
- Book lists

CADDRA

For further information, please refer to the Psychosocial Interventions and Treatments chapter, Canadian ADHD Practice Guidelines at caddra.ca

Version: October 2016

Guide to ADHD Psychosocial Interventions

At Home

Instructional
- Make eye and/or gentle physical contact before giving one or two clear instructions. Have instructions repeated back, or confirm they were understood, before proceeding

Behavioral
- Use a positive approach and calm tone of voice. Teach calming techniques to de-escalate conflict
- Use praise, catch them being good (playing nicely)
- Set clear attainable goals and limits (homework and bedtime routines, chores) and connect them to earning privileges, special outings etc.
- Use positive incentives and natural consequences: *When you..., then you may...*
- Empathy statements can be useful, such as *I understand*
- Adults should model emotional self-regulation and a balanced lifestyle (good eating and sleep habits, exercise and hobbies)
- Choices should be limited to two or three options

Environmental
- Structure and routine are essential. Parents/partners must be united, consistent, firm, fair and follow through
- Encourage prioritizing instead of procrastination
- Post visual reminders (rules, lists, sticky notes, calendars) in prominent locations
- Use timers/apps for reminders (homework, chores, limiting electronics, paying bills)
- Keep labeled, different coloured folders or containers in prominent locations for items (keys, electronics).
- Find the work area best suited to the individual (dining table, quiet area)
- Break down tasks
- Allow movement breaks
- Allow white noise (fan, background music) during homework or at bedtime

At School

Instructional
- Keep directions clear and precise
- Get student's attention before giving instructions
- Check understanding and provide clarification as needed
- Actively engage the student by providing work at the appropriate academic level

Behavioral
- Provide immediate and frequent feedback
- Use direct requests – *when...then*
- Visual cues for transitions
- Allow for acceptable opportunities for movement- "walking passes"

Environmental
- Preferential seating
- Quiet place for calming down

Accommodations
- Chunk and break down steps to initiate tasks
- Provide visual supports to instruction
- Reduce the amount of work required to show knowledge
- Allow extended time on tests and exams
- Provide note taker or access to assistive technology
- Supports can include the CADDRA psychoeducational and accommodations template
- Request school support services

At Work

Accommodations
- Identify accommodation needs
- Provide CADDRA workplace accommodations template

Counsel
- Suggest regular and frequent meetings with manager and support collaborative approach
- Set goals, learn to prioritize, review progress regularly
- Identify time management techniques that work for the client, e.g. using a planner, apps
- Declutter and create a work-friendly environment

Tools
- Organizational apps and/or productivity websites caddra.ca/medical-resources/psychosocial-information

Relationships

- Understand the impact ADHD can have on relationships with partners, family, friends, teachers, peers and co-workers.
- Recognize and accept ADHD can cause unintended friction and frustration between parent and child as well as between partners (e.g. difficulties with self-regulation, time management difficulties)
- Learn how to listen and communicate effectively
- Organize frequent time to communicate (don't just talk) to discuss goals and plans (what works, what doesn't) within home, educational and work environments
- Schedule regular fun with family, partner, friends
- Practice relaxation and mindfulness techniques caddra.ca/medical-resources/psychosocial-information
- Stay calm, be positive, recognize/validate and celebrate strengths!

Other referrals may be needed:

- Psychologist
- Tutor, Family Therapist
- Parenting Programs
- Social Skills Program
- Organizational Skill Course
- Occupational Therapist
- Speech and Language
- Audiologist
- Learning Strategist
- ADHD Coach
- Vocational Coach

CADDRA

For further information, please refer to the Psychosocial Interventions and Treatments chapter, Canadian ADHD Practice Guidelines at caddra.ca

Version: October 2016

Summary

- ADHD is very prevalent
  - 6-8% of child population
  - 4% of adult population
- Hyperactivity & impulsivity decrease with age
- Genetics & brain development implicated in etiology

Summary (continued)

- ADHD is highly comorbid
  - 70% in childhood
  - 85% in adulthood
- Nature of comorbidity changes with time
- Need to treat all impairment
  - Psychosocial treatments
  - Medication treatments