


**ADHD  
Parent Readiness  
Education Program  
(PREP)**

CADDAC  
416-637-8584  
www.caddac.ca

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**ADHD Treatment**

- ▷ Multimodal
- ▷ Psychoeducation
- ▷ Lifestyle
- ▷ Strategies and Accommodations
- ▷ Therapy (CBT)
- ▷ Medication
- ▷ Alternative

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**MULTIMODAL ADHD TREATMENT  
& PSYCHOEDUCATION**

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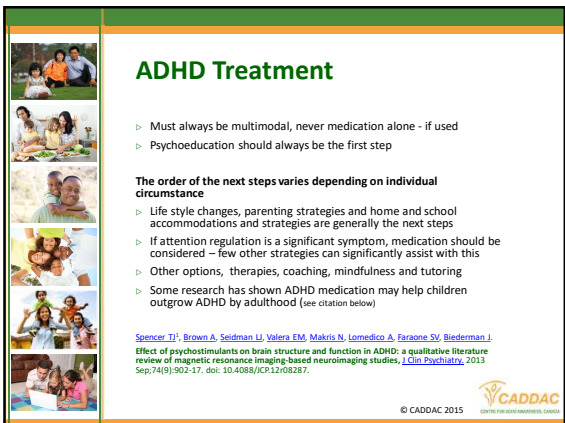
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**ADHD Treatment**

- ▷ Must always be multimodal, never medication alone - if used
- ▷ Psychoeducation should always be the first step

**The order of the next steps varies depending on individual circumstance**

- ▷ Life style changes, parenting strategies and home and school accommodations and strategies are generally the next steps
- ▷ If attention regulation is a significant symptom, medication should be considered – few other strategies can significantly assist with this
- ▷ Other options, therapies, coaching, mindfulness and tutoring
- ▷ Some research has shown ADHD medication may help children outgrow ADHD by adulthood (see citation below)

Spencer TJ, Brown A, Seidman LJ, Valera EM, Makris N, Lomedico A, Faraone SV, Biederman J. Effect of psychostimulants on brain structure and function in ADHD: a qualitative literature review of magnetic resonance imaging-based neuroimaging studies. *J Clin Psychiatry*. 2013 Sep;74(9):902-17. doi: 10.4088/JCP.12.08937.

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**LIFESTYLE**

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**Lifestyle**

- ▷ A healthy brain friendly life style is good, but will not eliminate symptoms
- ▷ A healthy balanced, protein rich diet is good for general brain functioning but elimination diets are not helpful unless special sensitivities are apparent
- ▷ Physical aerobic activity, increasing heart rate which pumps more blood to the brain
- ▷ Insufficient sleep impacts concentration, coordination, memory, and mood suffer, however ADHD in of itself can also cause sleep issues, good sleep habits may assist
- ▷ Some studies have shown that limiting screen time may be helpful, but research is still minimal, time management impairment and over-focusing may be implemented in excessive computer gaming
- ▷ Caffeine, energy drinks, cigarettes are all stimulants
- ▷ Beware of self medication through alcohol and marijuana

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**STRATEGIES AND ACCOMMODATIONS**

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**General Strategies and Accommodations**

- ▶ After psychoeducation with parents and extended family, coaches etc. individualized strategies such as external reminders and rewards should be implemented
- ▶ Parenting strategies should be put in place in the home
- ▶ School accommodations and teaching strategies should be put in place in the classroom through formal identification and an individualized education plan – this can be difficult and requires advocacy
- ▶ Organizational strategies and consistent routines for the entire family are generally a good idea

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**THERAPIES AND TUTORING**

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### Therapies

- ▶ Cognitive Behaviour therapy or CBT which challenges a person's underlying negative thinking and replaces it with better thinking patterns has been proven effective, especially in combination with medication
- ▶ CBT has not proven affective in children and is less effective in adolescents than adults, possibly due to less maturity and self insight pre adulthood
- ▶ Relaxation therapies and recently mindfulness have shown to be beneficial and is being implemented in some schools - even, or maybe especially, for parents
- ▶ Family and relationship therapy can be beneficial if the therapist has a good understanding of ADHD
- ▶ Anger management may be considered if anger is a concern

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### Tutoring

- ▶ Specialized tutoring can be beneficial, especially if the tutor focuses on strengthening EF skills
- ▶ Increased accountability to a tutor can increase compliance
- ▶ It is not recommended that parents act as tutors – this places additional strain on the parent child relationship

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### MEDICATION

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### The Medication Dilemma

- ▷ Extremely stressful decision for parents to make
- ▷ Misinformation and therefore stigma remains a factor
- ▷ This is the most common topic leading to discord between parents, other than the diagnosis
- ▷ Medication can become a power struggle between parents and ultimately the parents & child
- ▷ One parent can sabotage the treatment
- ▷ This discord can be one of the reasons why medication is often stopped after the first sign of side effects
- ▷ Education of care givers is the key to accessing and continuing the best multimodal treatment regime, but difficult to access

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### Information to Consider When Reviewing Medication as a Treatment Option

- ▷ Decisions around medication are individual
- ▷ Untreated ADHD has serious side effects as well
- ▷ Consider the level of your child's impairment – safety issues?
- ▷ Has academic impairment occurred for some time resulting in learning gaps?
- ▷ Consider impairments other than academic - family relationships, friendships, sports/hobbies
- ▷ How quickly do you need treatment to take effect?
- ▷ Have other treatments and strategies been tried?
- ▷ Is self medication occurring?

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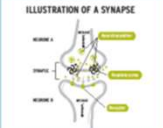
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**ILLUSTRATION OF A SYNAPSE**

Neurotransmitter release from the brain (© West-Grainger, 2004; West-Grainger, 2011)

**ADHD Pharmacologic Treatment Steps\***

Consider the child and child's unique characteristics: symptoms, comorbidities, and family history.

**ADHD Diagnosis – clinical indicator to treat with medication**

Start long acting psychostimulant (methylphenidate or lisdexamfetamine) first.

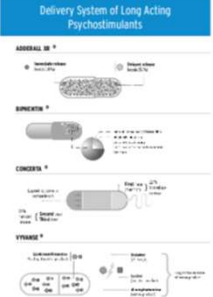
- Consider location of office, address, medication and when symptoms
- Monitor for symptoms and side effects in all areas where symptoms
- Monitor side effects

**Follow-up/adjustment** Try a different long acting psychostimulant

- Monitor for symptoms and side effects in all areas where symptoms
- Monitor for symptoms and side effects in all areas where symptoms

**Follow-up/adjustment** Consider a switch to non-stimulant (atomoxetine)

\*See national resources: Consider adding a non-stimulant (atomoxetine) combination therapy



**Delivery System of Long Acting Psychostimulants**

**AMPHETAMINE \***

• Immediate-release

• Extended-release

**BUPROPION \***

• Immediate-release

• Extended-release

**CONCENTRIN \***


• Immediate-release

• Extended-release

**VYVANNE \***

• Immediate-release

• Extended-release

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### Brain Functioning

**How the brain and nervous systems communicate**

- ▶ Brain cells are made up of neurons which are separated by tiny gaps called synapses
- ▶ Neurons pass information to each other by sending chemical messengers or neurotransmitters across the synapses
- ▶ The neurotransmitter binds with the receptor site on the next neuron
- ▶ The unused portion of the neurotransmitter is reabsorbed by the neuron that produced it

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### Brain Functioning and ADHD

**What needs to happen for this to work effectively?**

1. Enough neurotransmitters need to be produced by the neuron and released
2. The neurotransmitter must stay in the synapse space long enough for it to bind with the receptor site on the next neuron

In people with ADHD the neurotransmitter is sometimes prematurely reabsorbed – this prevents messages to be sent in a timely or adequate manner

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### How ADHD Medication Works

Medications work in two ways

1. It increases the release of the transmitters Dopamine and Norepinephrine
2. It blocks or slows the reabsorption of the neurotransmitter

Therefore, more transmitters are held in the synapse space so it can bind with the receptor and messages can be more effectively transmitted

- ▶ Methylphenidate based medications primarily block the reuptake and secondarily increases the release of chemicals
- ▶ Amphetamines mostly increase the release of the stored chemicals or transmitters and secondarily decrease uptake
- ▶ This may be why some people respond more to one medication than the other

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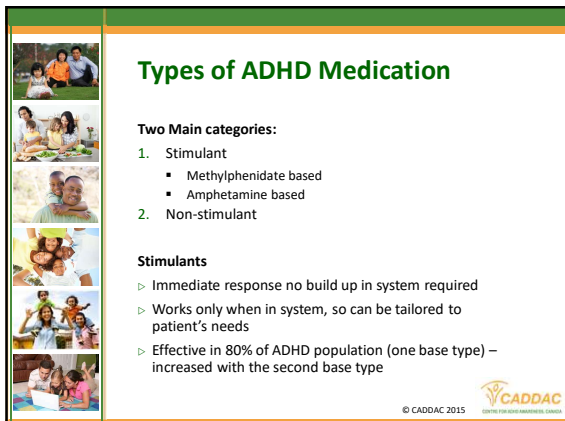
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## Types of ADHD Medication

**Two Main categories:**

1. Stimulant
  - Methylphenidate based
  - Amphetamine based
2. Non-stimulant

**Stimulants**

- ▷ Immediate response no build up in system required
- ▷ Works only when in system, so can be tailored to patient's needs
- ▷ Effective in 80% of ADHD population (one base type) – increased with the second base type

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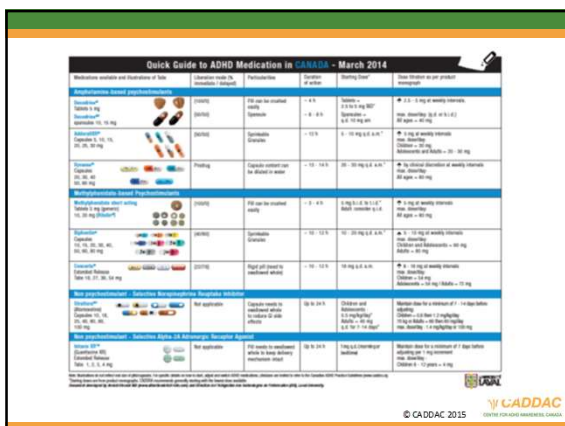
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**Quick Guide to ADHD Medication in CANADA - March 2014**

Medication (brand and generic names, if any)	Controlled Substance	Prescription	Stimulant	Stimulant Class	Comments (see also product literature)
<b>Methylphenidate based (methylphenidate)</b> Ritalin® Ritalin SR® Concerta® Biphentin® Teva-Methylphenidate ER-C (generic)	Controlled Substance	Prescription	Stimulant	Methylphenidate	<ul style="list-style-type: none"> <li>▶ 1-3 mg of methylphenidate daily</li> <li>▶ 1-2 mg of methylphenidate daily</li> <li>▶ 1-2 mg of methylphenidate daily</li> <li>▶ 1-2 mg of methylphenidate daily</li> <li>▶ 1-2 mg of methylphenidate daily</li> <li>▶ 1-2 mg of methylphenidate daily</li> </ul>
<b>Amphetamine based (amphetamine)</b> Adderall® Adderall XR® Dexedrine® Dexedrine ER® Proactiv® Proactiv XR®	Controlled Substance	Prescription	Stimulant	Amphetamine	<ul style="list-style-type: none"> <li>▶ 1-2 mg of methylphenidate daily</li> <li>▶ 1-2 mg of methylphenidate daily</li> <li>▶ 1-2 mg of methylphenidate daily</li> <li>▶ 1-2 mg of methylphenidate daily</li> <li>▶ 1-2 mg of methylphenidate daily</li> <li>▶ 1-2 mg of methylphenidate daily</li> </ul>
<b>Atomoxetine based (atomoxetine)</b> Strattera®	Controlled Substance	Prescription	Non-stimulant	Atomoxetine	<ul style="list-style-type: none"> <li>▶ 1-2 mg of methylphenidate daily</li> <li>▶ 1-2 mg of methylphenidate daily</li> <li>▶ 1-2 mg of methylphenidate daily</li> <li>▶ 1-2 mg of methylphenidate daily</li> <li>▶ 1-2 mg of methylphenidate daily</li> <li>▶ 1-2 mg of methylphenidate daily</li> </ul>

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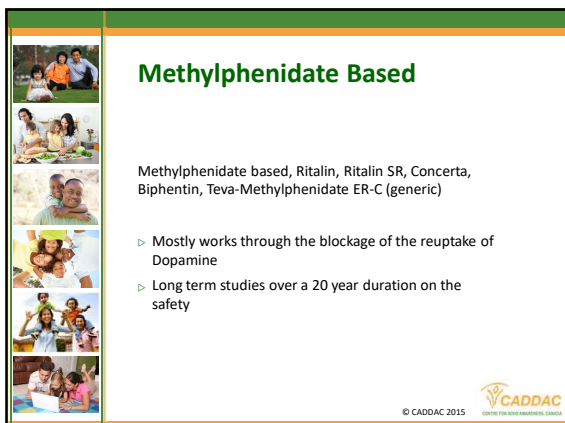
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## Methylphenidate Based

Methylphenidate based, Ritalin, Ritalin SR, Concerta, Biphentin, Teva-Methylphenidate ER-C (generic)

- ▷ Mostly works through the blockage of the reuptake of Dopamine
- ▷ Long term studies over a 20 year duration on the safety

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### Ritalin and Ritalin Slow Release

- ▶ Short acting (3-4 hours) and SR intermediary acting (5-6 hours) may be less for fast metabolizers
- ▶ Needs to be taken 2 to 3 times a day
- ▶ Can be prone to peak and valley effects
- ▶ May run out at inopportune times of day
- ▶ Compliance may be impacted by forgetfulness commonly seen as a symptom of ADHD
- ▶ May be used to top off long acting or for flexible dosing
- ▶ Greater risk of diversion and abuse

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### Concerta

- ▶ The tablet has a rigid water-permeable jacket with one or more laser drilled small holes. As the tablet passes through the body, the osmotic pressure of water entering the tablet pushes the active drug through the opening in the tablet
- ▶ Approved for all age groups
- ▶ Approximately 10 to 12 hour symptom control
- ▶ 22% immediate release, 78% time released
- ▶ May need to be topped up in the morning
- ▶ Difficult to break or crush, reduces potential abuse

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### Biphentin

- ▶ Approved for all age groups
- ▶ Only available in Canada
- ▶ Uses a multilayer-release (MLR) bead formulation. The active ingredients are arranged in layers.
- ▶ 40% of the total MPH dose is situated in the outermost bead layer for immediate release while the other 60% sits in the innermost bead layer for delayed release. The two active layers are separated by a delayed release and a controlled release coating
- ▶ Approximately 10 to 12 hour symptom control
- ▶ May need to be topped up in the afternoon
- ▶ Capsules may be opened and beads sprinkled for children who has difficulty swallowing pills

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### Teva-Methylphenidate ER-C

- ▶ Generic version of Concerta approved by health Canada to be bioequivalent which leads to direct substitution
- ▶ Cheaper than brand
- ▶ There are issues with method of finding a drug to be bioequivalent
- ▶ Bioequivalency does not equal clinical equivalency
- ▶ Delivery mechanism unknown
- ▶ Maximum concentration (Tmax) peaks earlier
- ▶ Looks like Concerta but can be crushed and diverted
- ▶ Pharmacists need not inform patients of substitution
- ▶ Anecdotal evidence of issues with decreased efficacy in symptom control and length of control and increased side effects
- ▶ Not everyone is impacted by this and some may be fine with the generic

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### Amphetamine Based

Dexedrine and Dexedrine Spansules, Adderall XR and Vyvanse

- ▶ Mostly works through the blockage of the reuptake of Dopamine
- ▶ Also increases the release of dopamine and noradrenalin
- ▶ Dextro-amphetamine has been available for more than 50 years with a safe and effective history

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### Dexedrine and Dexedrine Spansules

- ▶ Short acting (3-5 hours) and SR intermediary acting (6-8 hours) may be less for fast metabolizers
- ▶ Needs to be taken 2 to 3 times a day
- ▶ Can be prone to peak and valley effects
- ▶ Can be used to top up longer acting medications or for flexible dosing

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### Adderall XR

- ▷ Made up of a combination of mixed amphetamine salts
- ▷ Contains about 75% d-amphetamine and 25% l-amphetamine
- ▷ Uses a beaded double-pulse type formulation designed to produce a similar to the release of two equal doses of short-acting d-amphetamine given 4 hours apart
- ▷ Containing 50% uncoated immediate release beads and 50% enteric-coated controlled release beads
- ▷ Approved for all age groups
- ▷ Approximately 10 to 12 hour symptom control
- ▷ Reduced abuse potential from short acting
- ▷ May be necessary to top up in late afternoon

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### Lisdexamfetamine dimesylate Vyvanse

- ▷ Vyvanse is a Prodrug which means that the active drug (d-amphetamine) is bound to an amino acid (lysine) to render it therapeutically inactive until it is released in the gastrointestinal tract upon cleavage of the lysine portion of the molecule
- ▷ Contains 100% d-amphetamine which may work better on hyperactivity and impulsivity and have less effect on anxiety
- ▷ Symptom control up to 13 hours in children and up to 14 in adults
- ▷ Approved for all ages
- ▷ Capsules can be opened and diluted in water if there is an issue with swallowing pills
- ▷ Symptom control can be more stable over time and more consistent from person to person
- ▷ Since the active ingredient is activated only after oral ingestion it has a much lower potential for abuse
- ▷ It is not affected by gastric PH or transit time through the system

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### Atomoxetine Strattera

- ▷ Is a non-stimulant and not a controlled substance
- ▷ It is a specific nor-adrenaline re-up take inhibitor
- ▷ Approved for all ages
- ▷ Continuous coverage into the evening and early morning
- ▷ Must be taken daily
- ▷ Starts working in 3-4 weeks with maximum potential reached in 6-8 weeks
- ▷ No substance abuse potential
- ▷ May be useful when tic disorders, anxiety or side effects to stimulant medication are present

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### Guanfacine Hydrochloride ER - Intuniv

- ▷ Is a alpha 2A-adrenergic receptor agonist – the receptor inhibits release of norepinephrine, but exact way GXR works is unknown
- ▷ Is not a controlled substance
- ▷ Intuniv has been approved for children between 6 and 12 for children with inadequate treatment by a stimulant as a stand alone treatment or an adjunct medication
- ▷ Continuous coverage- late night and early morning
- ▷ May be useful in cases with tic disorders, anxiety, ODD and aggression, or with significant side effects to stimulants
- ▷ Maximum treatment effect takes several weeks and onset gradual
- ▷ Sedation and lowering of pulse and blood pressure effect – medication should not be stopped abruptly
- ▷ Should not be crushed, chewed or broken

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### Side Effects

- ▷ All medications including over the counter meds have common as well as rare life threatening side effects
- ▷ The important thing is to be aware of which side effects are expected to be short term, when they become significant enough to consider changing medications or dose and which are the side effects that require monitoring and an urgent call to the doctor
- ▷ If the child is too "wired", irritable or too serious during the time medication is working, the dose may be too high or a different medication may need to be tried
- ▷ More common side effects seen on CADDAC medication chart
- ▷ Serious but very rare side effects of all ADHD medications, agitation, psychosis, suicidal ideation, arrhythmias and sudden cardiac death

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### Things to Consider When choosing a Medication

- ▷ Length of symptom control required, early or late hour coverage?
- ▷ Is immediate symptom control required?
- ▷ The symptom profile including comorbidities
- ▷ Family history on ADHD medications
- ▷ Physical medical problems – BP, medication interactions, cardiac risk
- ▷ Cost
- ▷ Are their problems with swallowing pills?
- ▷ Diversion or abuse potential
- ▷ There may be no way of knowing which medication will be the most effective with the least number of side effects without a trial
- ▷ The rule of thumb is "start low" and "go slow" with the titration of medication dose – therefore it may take some time for optimal medication and dose to be found

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## Alternative Treatments

- ▷ Bottom line, to date other than medication, life style changes, and therapies discussed earlier there is no scientific evidence to-date that indicates the use of alternative treatments
- ▷ Very slight possible benefits of Omega 3 for primarily inattentive ADHD and reading disorders
- ▷ To-date neurofeedback and brain training including Cogmed have not shown any long term effects
- ▷ Some natural products may have a stimulant effect, so be aware that using them in combination with medication may be dangerous - discuss this with your doctor
- ▷ People self medicate with caffeinated beverages, cigarettes etc. and can become dependent more easily

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## Summary of Latest Research

- ▷ Lack of evidence for cognitive training, neurofeedback, antidepressants, antipsychotics, dietary therapy, fatty acids, and other complementary and alternative medicine
- ▷ Behavioural therapy alone was more effective than placebo
- ▷ Stimulants were superior to behavioral therapy
- ▷ Stimulants (methylphenidate and amphetamine) worked better than non-stimulants (atomoxetine and guanfacine)
- ▷ Behavioral therapy, combined with stimulants, was better than stimulants or non-stimulants alone
- ▷ Behavioral therapy, stimulants and their combination showed the best profile of acceptability
- ▷ Both stimulants and non-stimulants seemed well tolerated
- ▷ Most of the efficacious pharmacological treatments were associated with harms (anorexia, weight loss and insomnia), but an increased risk of serious adverse events was not observed

Catalá-López F, Hutton B, Núñez-Beltrán A, et al. The pharmacological and non-pharmacological treatment of attention deficit hyperactivity disorder in children and adolescents: a systematic review with network meta-analysis of randomised trials. *PLoS One*. 2017;12(7). doi.org/10.1371/journal.pone.0180355. Published July 12, 2017. Accessed December 18, 2017. *atomoxetine* and *clonidine* seemed better accepted than placebo and *atomoxetine*.

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## How to Assess Research Studies

**Questions to ask:**

- ▷ Is the study a double blind study? (neither the participant nor examiner knows if the patient is receiving the medication or placebo)
- ▷ Is it a large scale study?
- ▷ Has the study been duplicated many times with the same results?
- ▷ Is the study published in a reputable medical journal?
- ▷ Has the study been peer reviewed? (been reviewed for methodology, analysis and findings by others in the field)
- ▷ Has the study found causality or just correlation?
- ▷ Is more research required before conclusions can be drawn ?

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**DISCUSSION AND QUESTIONS?**

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<http://add.about.com/od/treatmentoptions/f/How-Do-Stimulants-Work.htm>
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- Quick guide to ADHD Medication in Canada 2014, developed by Dr. Annick Vincent ([www.attentiondeficit-info.com](http://www.attentiondeficit-info.com)) and Direction de l'intégration des technologies de l'information (DIRI), Laval University <http://www.attentiondeficit-info.com/pdf/quick-guide-adhd-medication-canada.pdf>

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