An Update on Pharmacological Therapy for ADHD

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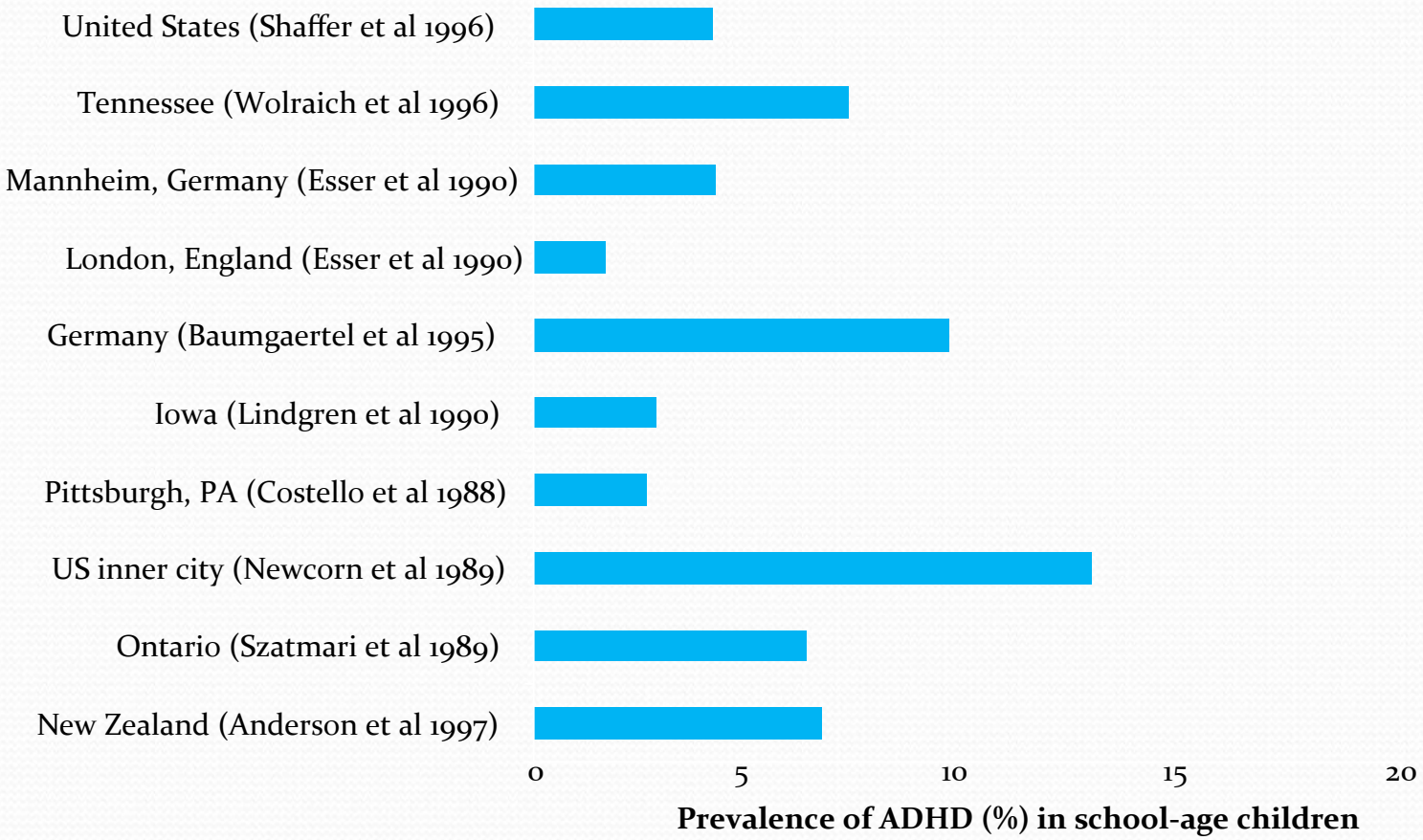
Epidemiology

- Most commonly diagnosed behavioral disorder of childhood
  - 1 in 20 children are affected worldwide
  - Roughly 3 – 7% of school children are affected
- Males>Females between 2:1 up to 9:1
  - Girls often show less hyperactivity, fewer conduct disorder, decreased rates of externalizing behaviors; inattentive subtype may be more common
- Hyperactive/Impulsive subtype more commonly diagnosed in young children

Worldwide Prevalence: 3% to 7%

Studies of ADHD prevalence



Goldman, et al. *JAMA*.1998;279:1100-1107.

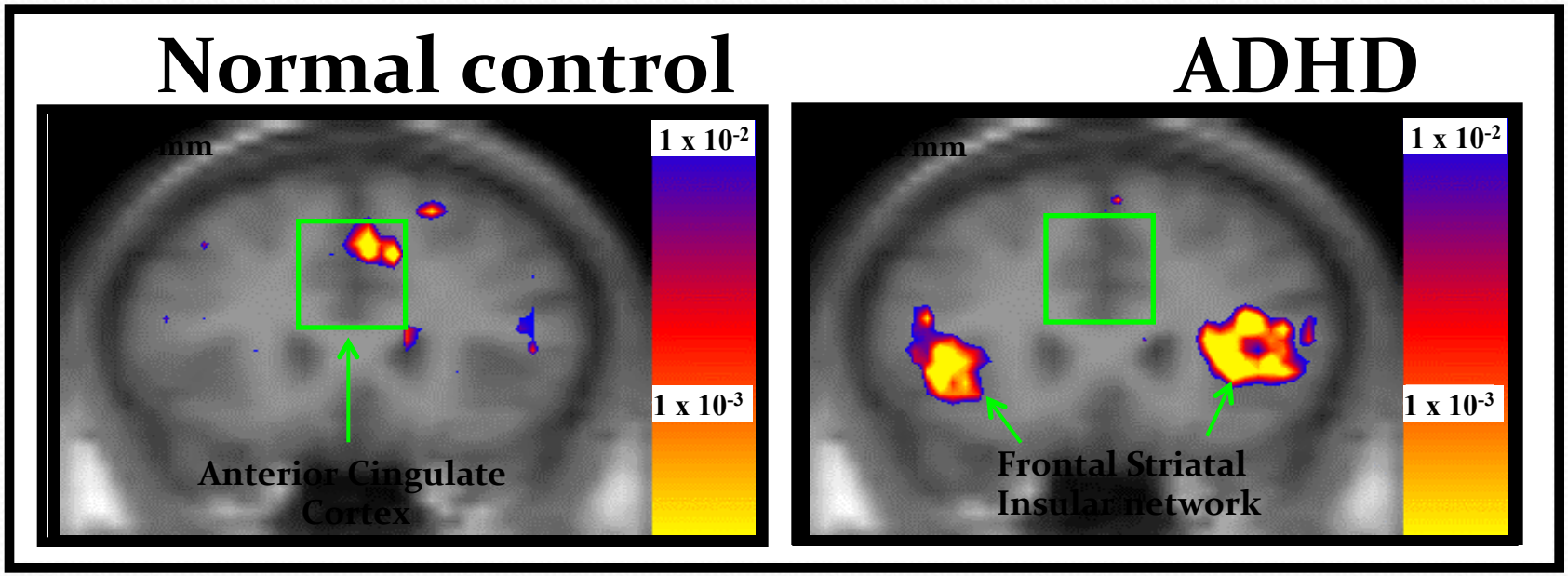
Etiology

- Dopamine + norepinephrine implicated historically
  - No specific tests to determine levels
- Imaging studies support frontal lobe dysfunction in ADHD + (sub)cortical circuit involvement
  - Neither of which are valid for diagnostic purposes
- Specific gene associations have been suggested
  - Thyroid receptor gene (chr #3)
  - DA/T_1 transporter gene (chr #5)
  - DA/D_4 receptor gene (chr #11)

Etiology

- Neurological Factors: ?
  - Imaging studies support
    - frontal lobe dysfunction
    - decreased R frontal lobe volume [DA receptors]
    - smaller basal ganglia/cerebellum
    - decreased striatal perfusion
    - decreased cerebral glucose metabolism superior prefrontal cortex and premotor areas
- NOT valid for diagnostic purposes

ADHD: Neuroimaging (fMRI)

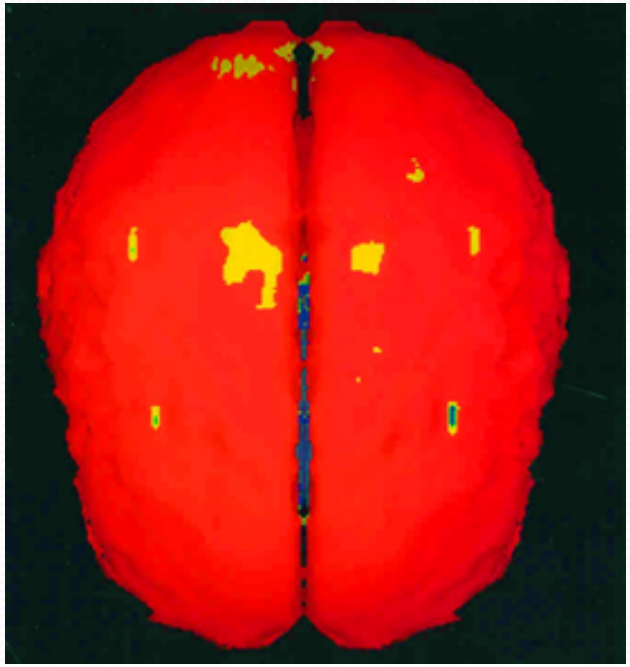


- fMRI shows decreased blood flow to the anterior cingulate and increased flow in the frontal striatum
- PET imaging shows decreased cerebral metabolism in brain areas controlling attention
- SPECT imaging shows increased DAT protein binding

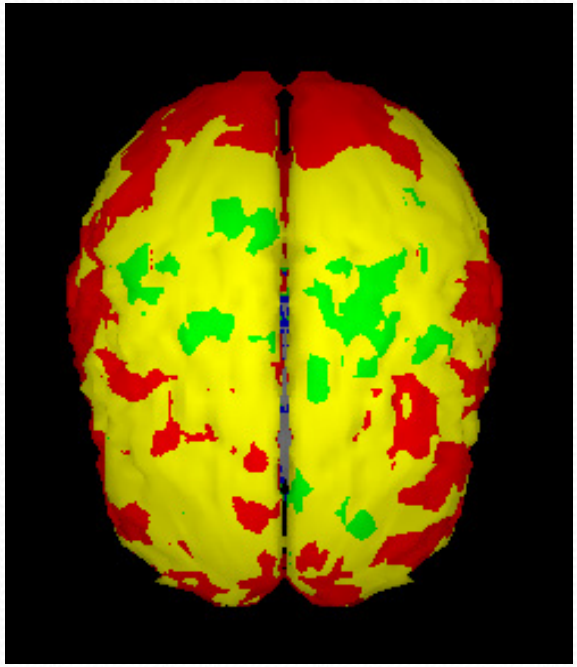
MGH-NMR Center & Harvard-MIT CITP. Adapted from Bush, et al. *Biol Psychiatry.* 1999;45:1542-1552.

SPECT scans

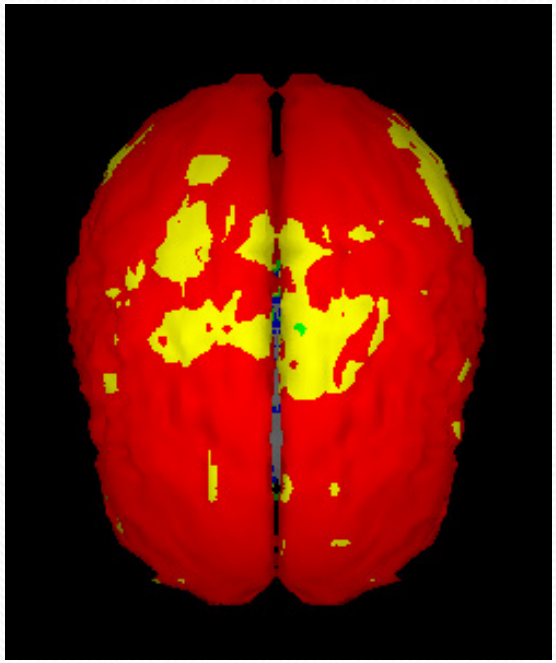
surface view from above



Normal Brain



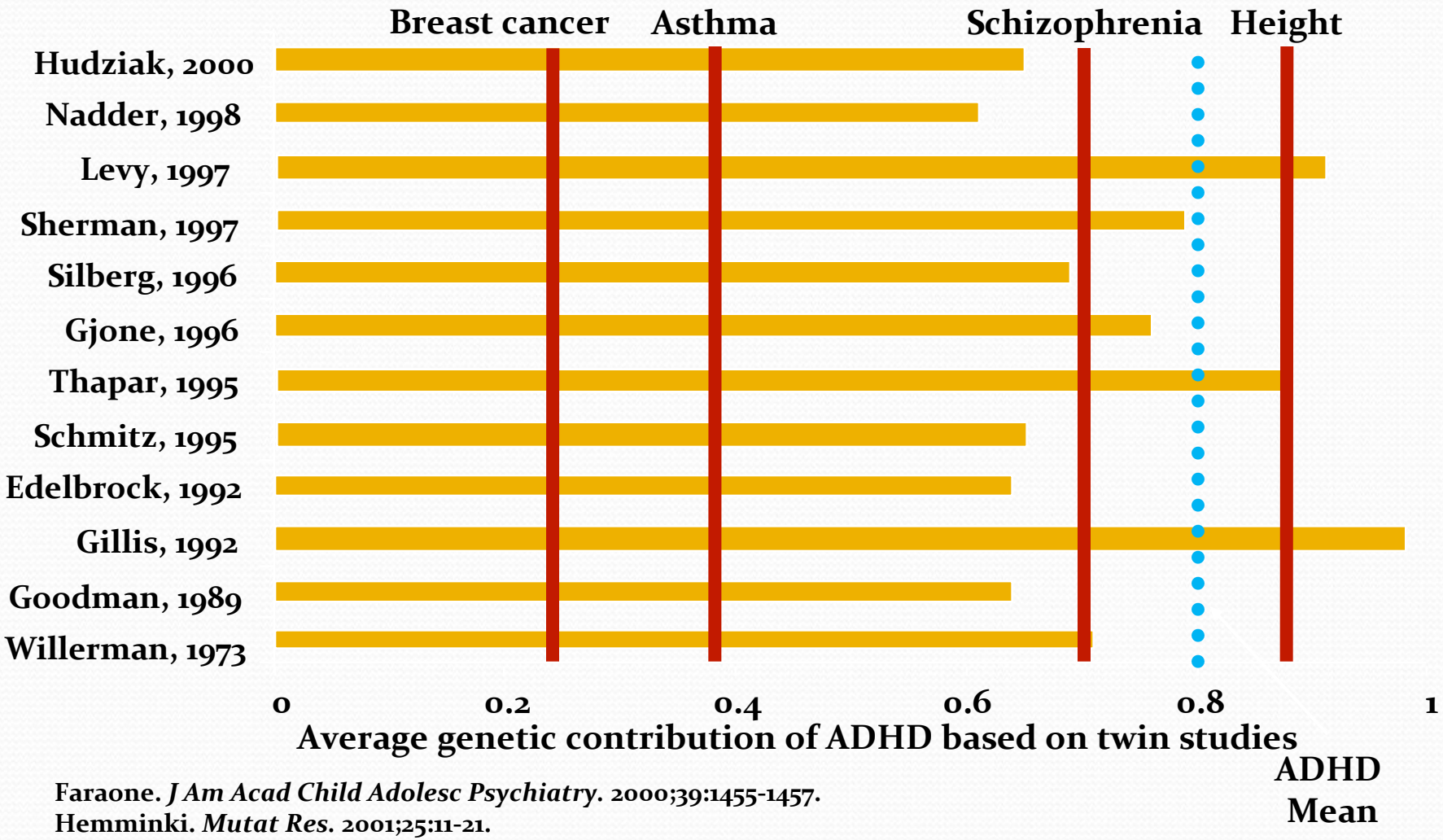
Brain of individual with ADHD



Same Brain with Adderall

In this FUNCTIONAL IMAGING STUDY, yellow and green colors show significant decreased activity, indicating decrease in perfusion when the subject is performing a concentration task

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.

Etiology

- Highly genetic condition
  - 80% heritable
- Pregnancy/Birth Complications
  - Labor, fetal distress, forceps, toxemia, eclampsia
- Thyroid Disorders
- Environmental Toxins
- Psychosocial Factors

Natural History

Features of ADHD tend to change with age

- Preschool Age (3-5 y/o) demonstrate more hyperactive/ impulsive symptoms
- School Age (6-12 y/o) demonstrate a combination of symptoms
- Adolescent Age (13-18 y/o) demonstrate more inattention symptoms but may describe feelings of “restlessness” or anxiety
- Adult demonstrates a preponderance of inattentional symptoms & periodic impulsivity (e.g., speeding tickets, arguments w/ employers, etc.)

Natural History

- ADHD follows the "Rule of Thirds":
  - →1/3 will show complete resolution of symptoms (good prognosis)
  - →1/3 will show continued inattention and some degree of impulsivity (fair prognosis)
  - →1/3 will show early oppositional & conduct disordered behavior, poor academic achievement, substance abuse, and demonstrate adult antisocial behavior (poor outcome)
- 50-65% of children diagnosed with ADHD continue to be symptomatic as adults

Treatment Options in ADHD

- Psychoeducation for patient/family members
  - Support groups (www.chadd.org)
  - Coaching (www.coaching.com)
- Psychosocial/behavioral interventions
- Pharmacotherapeutic Interventions
  - Stimulants (methylphenidate, amphetamine, etc.)
  - Non-stimulants
- Stimulant therapy is first-line treatment & behavioral therapy may improve outcomes.[1,2]

1.Greenhill L, et al, *J Atten Disord*, 2002;6 s89-100 2. AAP. *Pediatrics. 2001;108:1133-1144*

Pharmacotherapeutic Interventions

- FDA-approved
  - Psychostimulants
    - (dex)methylphenidate, (dextro)amphetamine
  - Atomoxetine (Strattera)
  - Intuniv
  - Kapvay
- “Off-label” drugs/agents

Pharmacotherapeutic Interventions

- "Off-label"
  - α2-adrenergic agonists
    - Clonidine (Catapres)
    - Guanfacine(Tenex)
  - Modafanil (Provigil), Armodafanil (Nuvigil)
  - Antidepressants (tricyclics, bupropion)
  - Others

FDA Approved Medications Indicated for ADHD in Children & Adolescents

Stimulants	Brand Names
d, l-methylphenidate	Ritalin®, Ritalin-SR®, Ritalin LA®, Concerta®, Metadate® CD, Methylin® ER, Daytrana™
d-methylphenidate	Focalin™, Focalin™ XR
Mixed amphetamine salts	Adderall®, Adderall XR®, Evekeo
d-amphetamine	Vyvanse, Dexedrine®, Dexedrine Spansule®, Zenzedi

Nonstimulants	
Atomoxetine	Strattera®
Guanfacine	Intuniv, Tenex
Clonidine	Kapvay, Clonidine

Stimulant Mechanism of Action

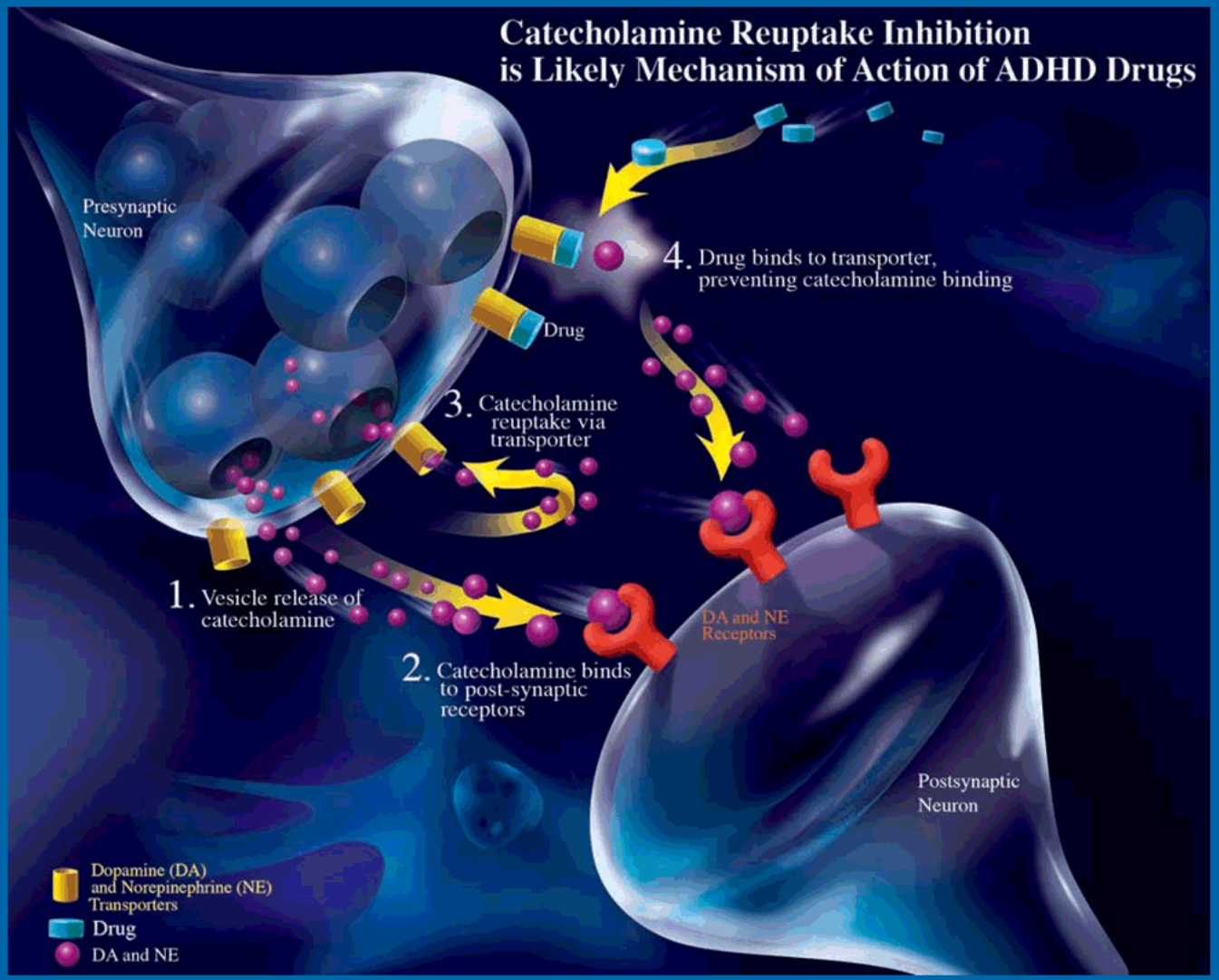
- Despite name, psychostimulants do NOT cause "stimulation" or activation when used at properly prescribed doses
  - When abused, much higher dose (often 100X or more typical prescribed dose)
  - Leads to very different effects/side effects
    - Euphoria or "high"
- Action does NOT result from paradoxical effect of medication
- Impact on brain is known and predictable based upon location ofdopaminergic and noradrenergic neurons

Stimulant Mechanism of Action

- Methylphenidate and amphetamine both block the dopamine and norepinephrine transporters
  - Increase dopamine and norepinephrine in the synapse
- Clinical efficacy of stimulants is likely correlated with synaptic dopamine and norepinephrine concentrations. [1,2]

1.Biederman J, Spencer T, *Biol Psychiatry*, 1999;46 1234-1242
2. Schiffer WK, et.al. *aSynapse. 2006;59:243-251*

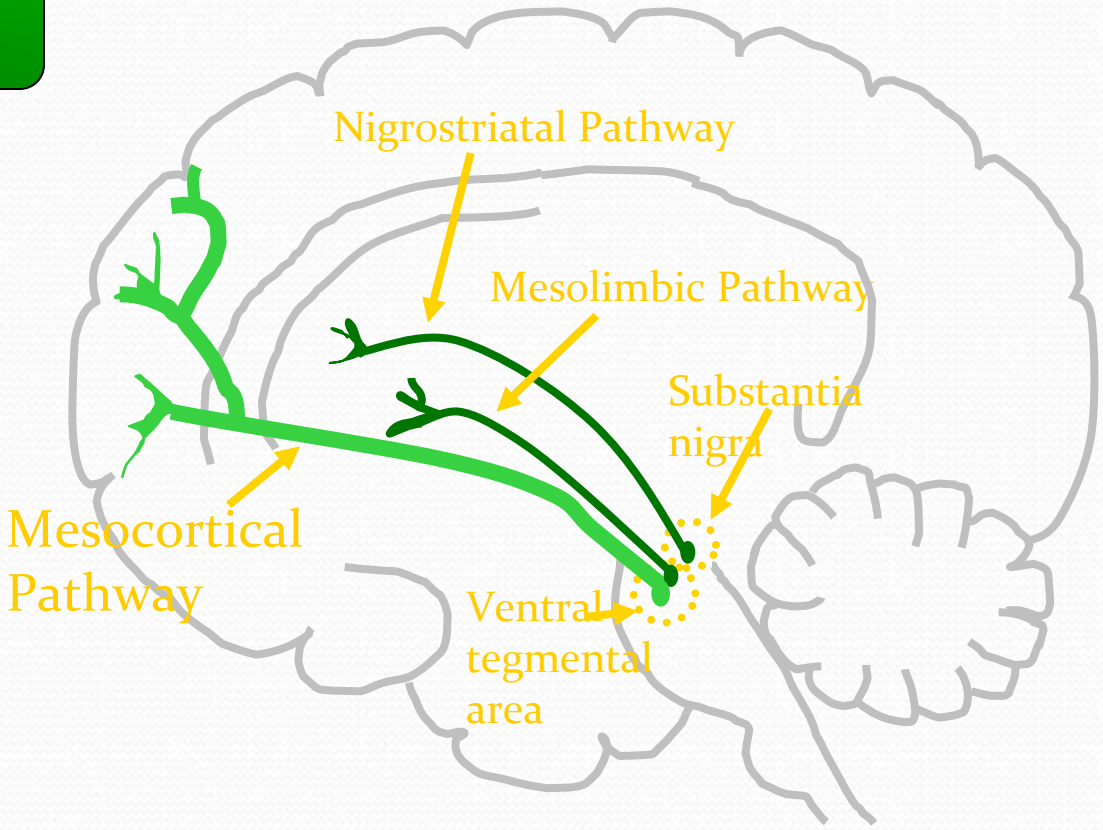
Catecholamine Reuptake Inhibition Is a Likely Mechanism of Action (MOA) of ADHD Drugs



Dopamine Neurotransmission-ADHD

Dopamine

- **Enhances signal**
- **Improves attention**
  - **Focus**
  - **On-task behavior**
  - **On-task cognition**

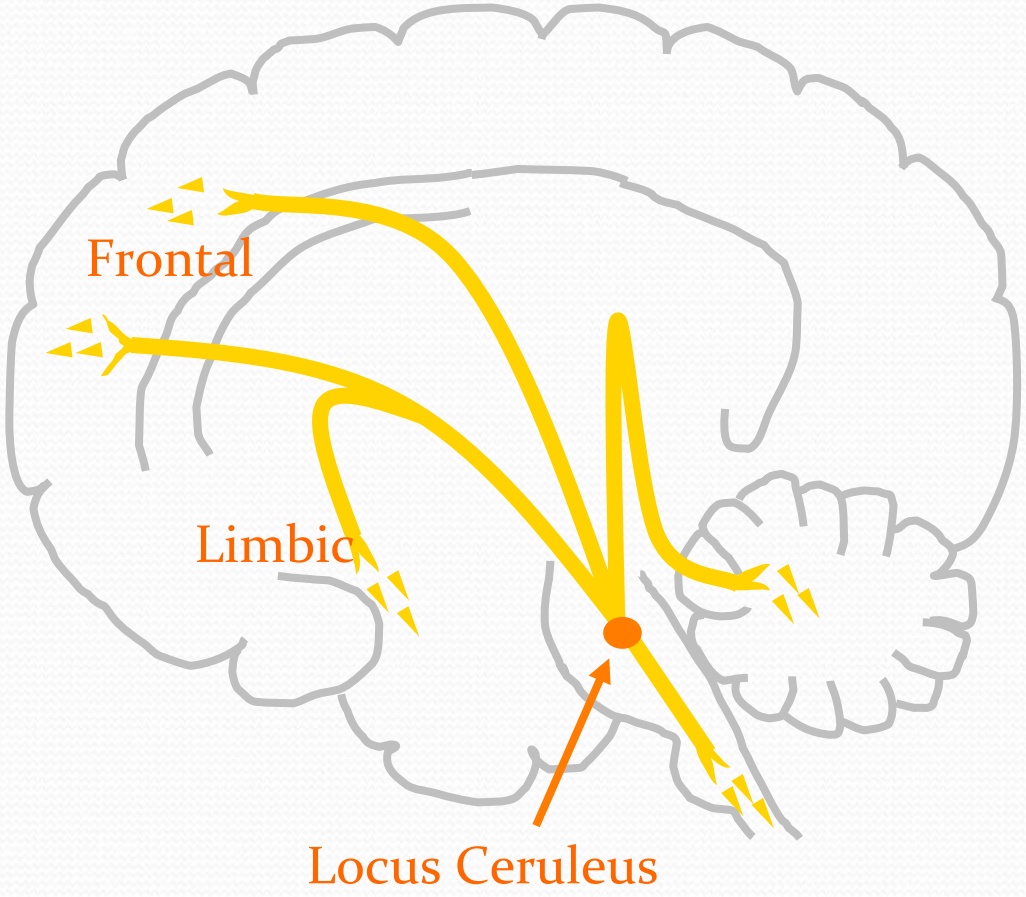


Solanto. *Stimulant Drugs and ADHD*. Oxford; 2001.

Norepinephrine Neurotransmission- ADHD

Norepinephrine

- **Dampens noise**
- **Executive operations**
- **Increases inhibition**



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

Stimulants Improve

- Core Symptoms
  - Inattention
  - Impulsivity
  - Hyperactivity

Other Symptoms

Noncompliance
Impulsive aggression
Social interactions
Academic efficiency
Academic accuracy
Family dynamics

ADHD Practice Parameters. *J Am Acad Child Adolesc Psychiatry*. 1997;36:85S.
Greenhill LL, et al. *J Am Acad Child Adolesc Psychiatry*. 1999;38:503-512.

Stimulant side effects

Transient/dose increase

- GI issues
- Headache

Limit use

- Weight loss
- Insomnia
- Change of "personality"
- Activation

Variable

- "Rebound"
  - Return of prior symptoms often to slightly higher level

Emergent

- Anxiety/nervousness
- Irritability
- Dysphoria
- Suicidality
- Psychosis
- Tics

Stimulants: History

- Amphetamine was first synthesized in 1887 by Lazar Edeleanu (University of Berlin)
  - Derived from plant derivative, Ephedrine
- Gordon Alles resynthesized the compound & introduced it to the world in the form of Benzedrine in 1927
- Methylphenidate (ritalin) developed in the 1950's but emerged prominently in the 1970's as a treatment for the disorder

Stimulants: History

- Since 1970's only **two** new medications for ADHD have been developed and approved
  - Strattera (atomoxetine)
  - Focalin (dexmethylphenidate)
    - refined form of Ritalin®, isolating only the centrally active isomer
  - *Provigil (modifanil)*
    - *headed for approval but was NOT*
- The only other thing that has changed since that time is the PACKAGING (i.e. the delivery system) of the original molecules (methylphenidate, amphetamine)

Methylphenidates

- Short acting
  - Ritalin® 2-4 hrs
  - Focalin® 3-5 hrs
- Long acting
  - Metadate®CD 6-8 hrs
  - Ritalin® LA 8-9 hrs
  - Focalin® XR 10-12 hrs
  - Concerta® 10-12 hrs
  - Aptensio XR 10-12 hrs?
  - Quillivant® 10-12 hrs
  - Daytrana®(patch) 12+hrs

Amphetamines

- Short Acting
  - Dextroamphetamine
    - Dexedrine/Dextrostat 6 hrs
    - Zenedia® 6 hrs
  - Mixed Salts
    - Adderall® 6 hrs
- Long Acting
  - Dextroamphetamine
    - Dexedrine Spansules 6-8hrs
    - Vyvanse® 12 hrs
  - Mixed Salts
    - Adderall XR™ 8 hrs
    - Evekeo® 8 hrs

Extended Release Mechanisms

- First attempts (not really successful)
  - Ritalin-SR, Metadate ER, Dexedrine Spansules
- "Back Loaded"
  - Concerta (22/78),Metadate CD (30/70)
- Even Release (50/50)
  - Ritalin LA, Focalin XR
  - Adderall XR
- Transdermal patch
  - Daytrana
- Prodrug
  - Vyvanse
- Liquid
  - Quillivant

Psychostimulants

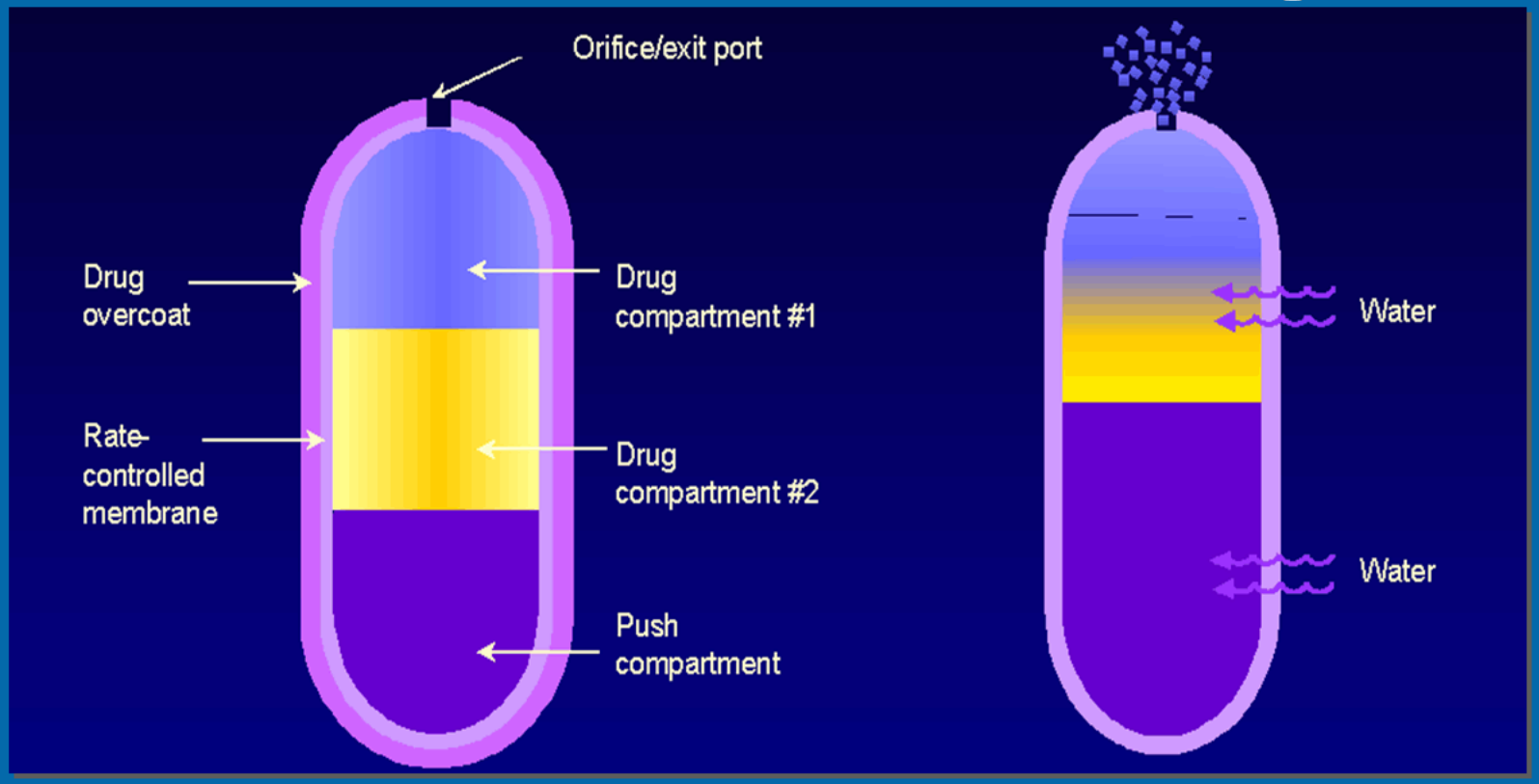
Concerta®:	methylphenidate formulated to mimic TID duration (12 hours)
Adderall XR™:	extended-release formulation of mixed amphetamines (75% d-AMP) that mimics BID dosing (8-9 hours)
Ritalin® LA:	once-daily formulation of Ritalin® that mimics BID dosing and designed to last the school day (8-9 hrs)
Metadate® CD:	methylphenidate formulation designed to mimic BID duration (8-9 hours)

Psychostimulants

Focalin ® XR:	once-daily formulation of Focalin® that mimics BID dosing and designed to last 10-12 hrs
Strattera™:	selective norepinephrine reuptake inhibitor that can be dosed BID or QD
Daytrana™:	transdermal preparation of methylphenidate that offers flexibility of duration of action
Vyvanse™:	lisdexamfetamine dimesylate, prodrug of dextroamphetamine with longer duration (12 hrs)

Concerta® Caplets: OROS® Delivery System

d,l-MPH
22% Immediate Release / 78% in Ascending Release



Concerta® and OROS® are registered trademarks of ALZA Corporation.

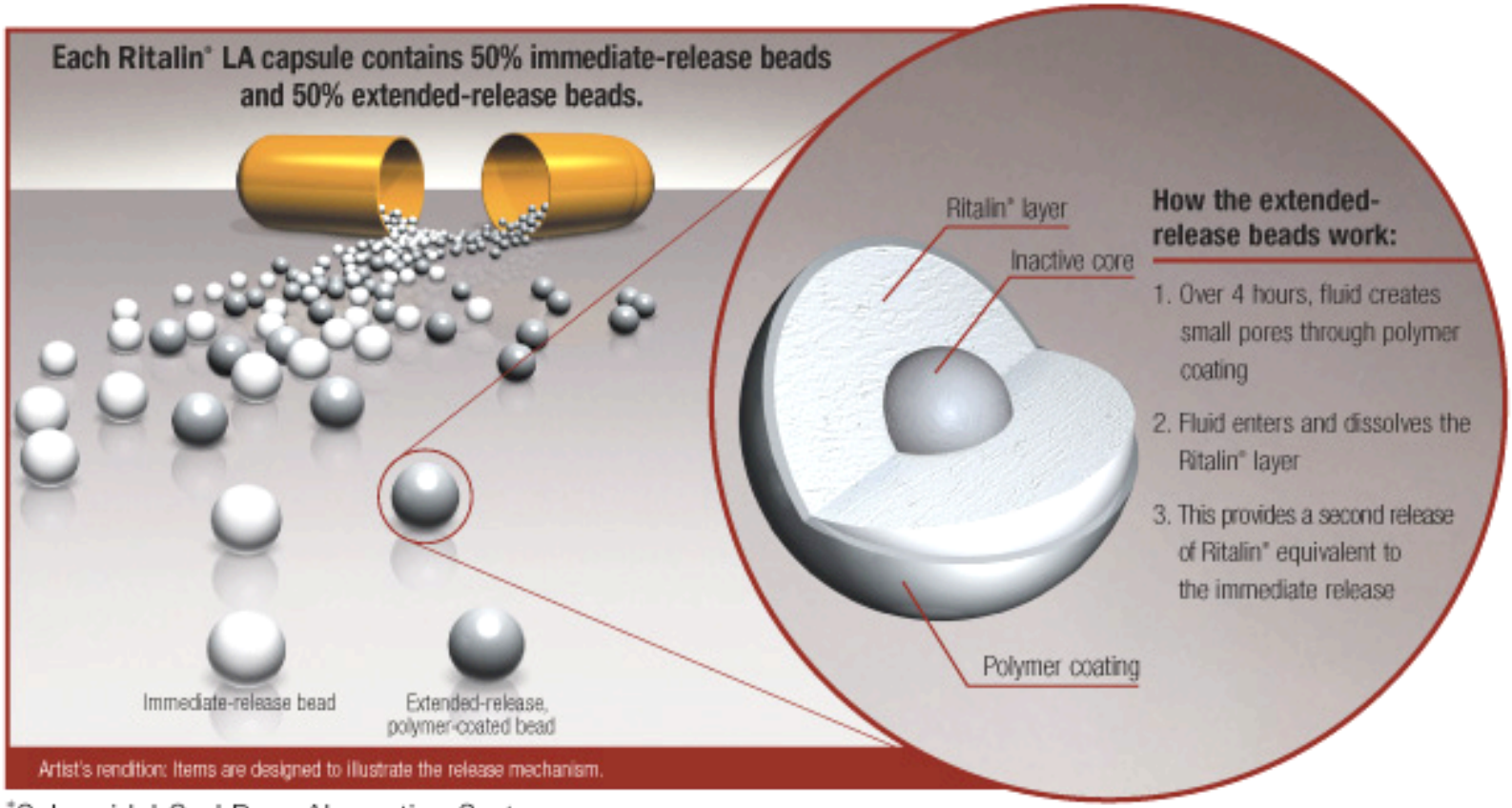
Adderall® XR Capsules: Microtrol® Delivery System

_d,l_-amphetamine

50% Immediate / 50% Extended Release

- 50% of the beads dissolve immediately
- 50% of the beads release 4 hours later

Ritalin® LA: Extended-release Delivery via SODAS™ Technology

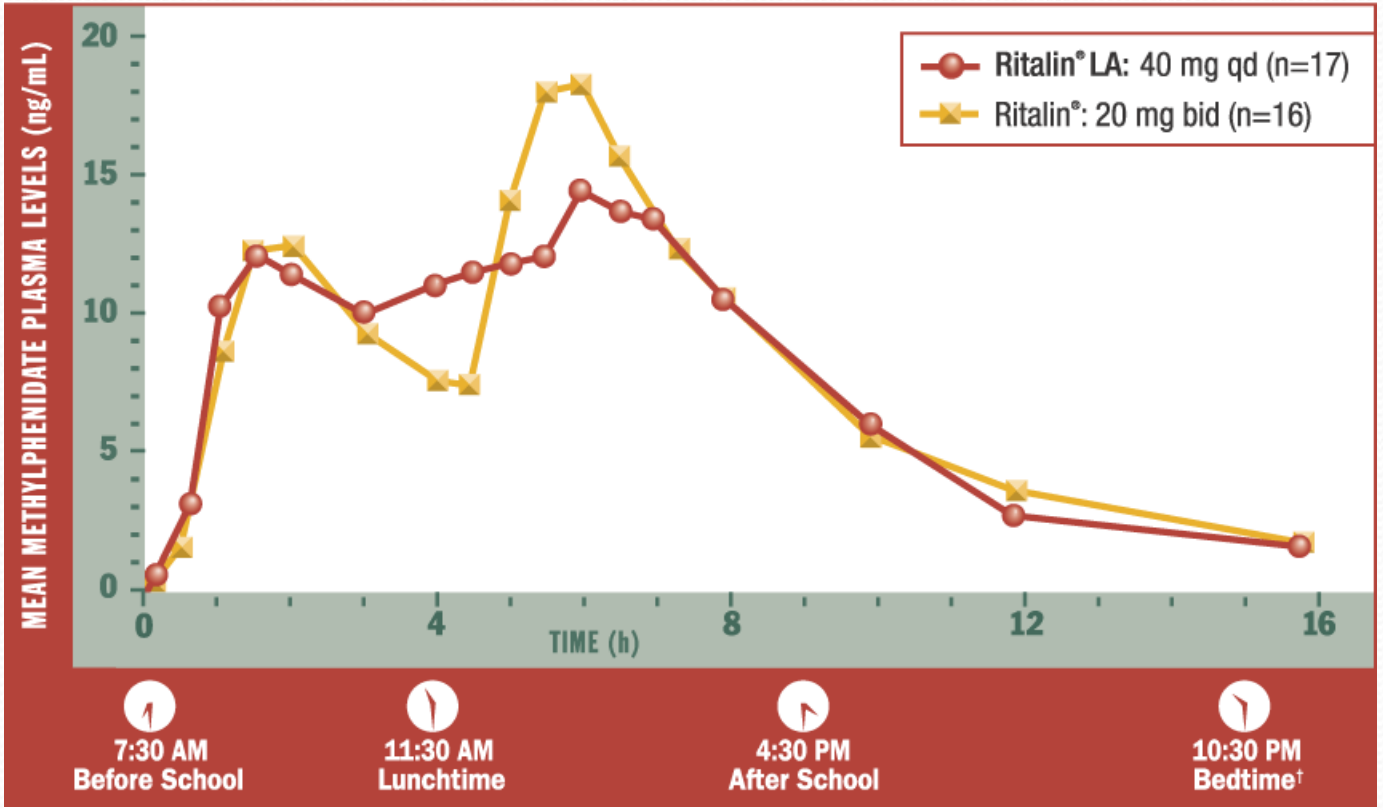


*Spheroidal Oral Drug Absorption System.

SODAS™ is a trademark of Elan Corporation, PLC

Ritalin® LA: Optimized PK Profile for Rapid Onset and School-day Duration

- Same rapid onset as Ritalin®
- 50/50 bimodal release mimics Ritalin® BID dosing

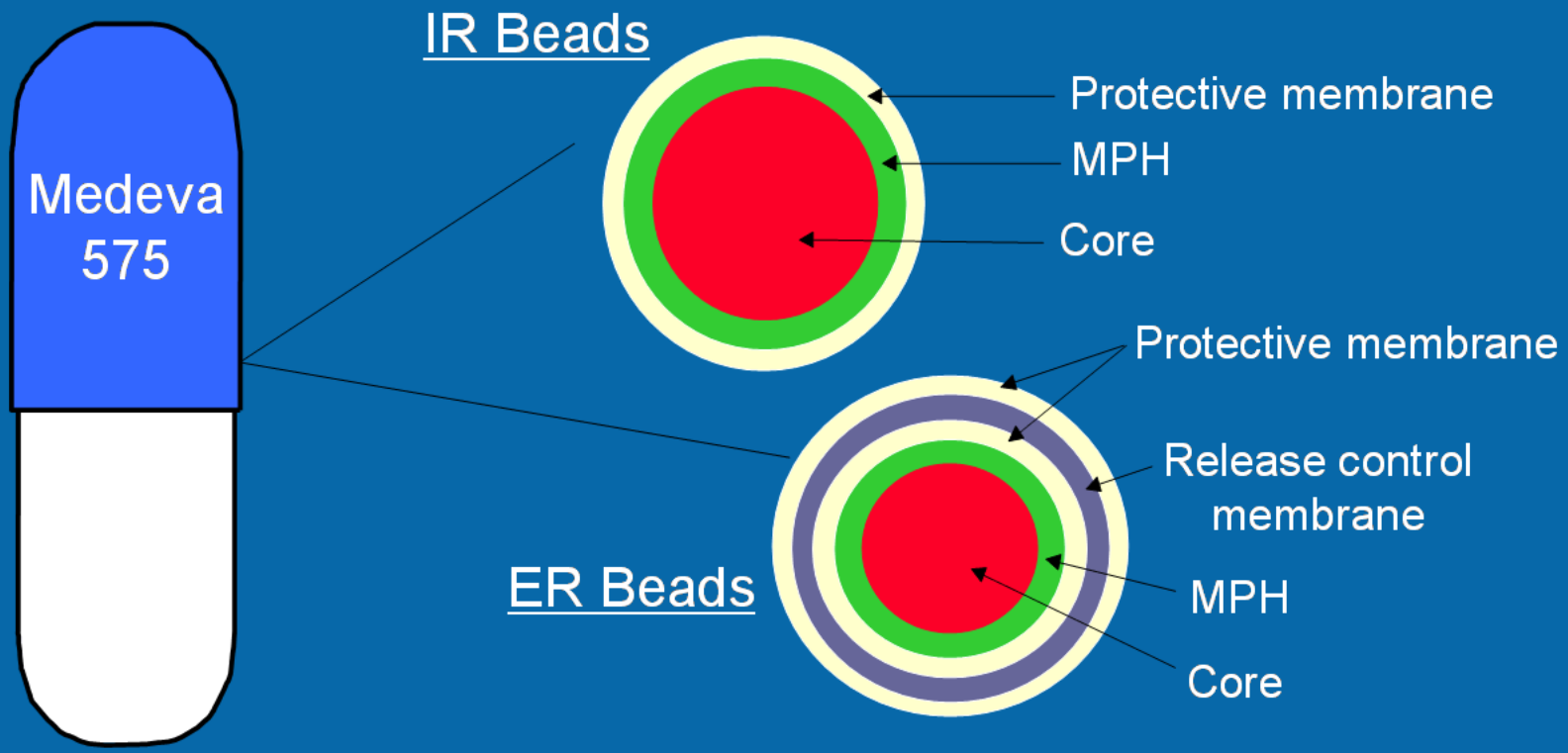


Times displayed in clocks are for illustrative purposes only.

†Approaching pre-dose levels.

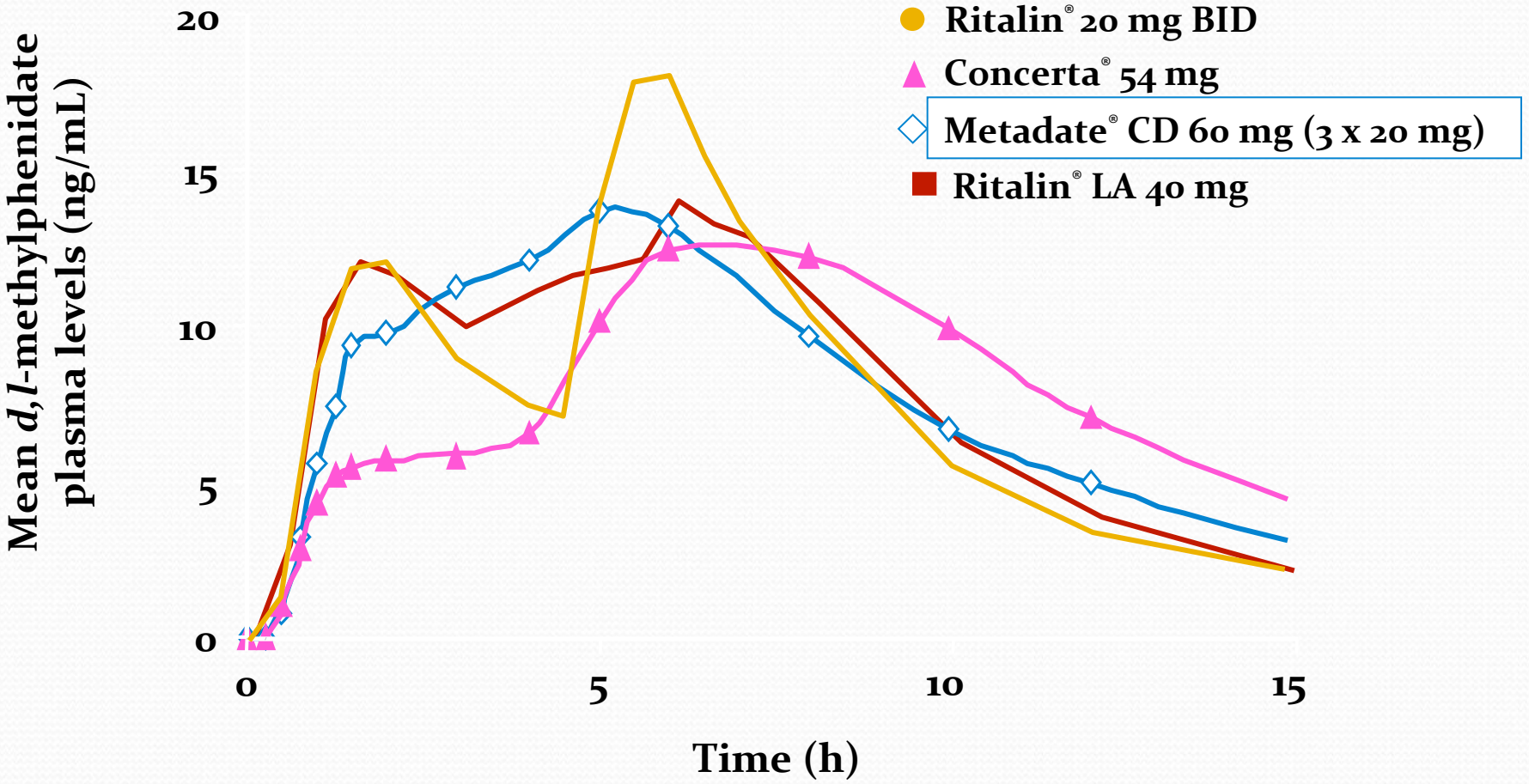
Metadate® CD Capsules: Diffucaps® Delivery System

d,l-MPH: 30% Immediate / 70% Extended Release



Metadate® CD is a registered trademark of Celltech Pharma Limited; Diffucaps® is a registered trademark of Eurand.

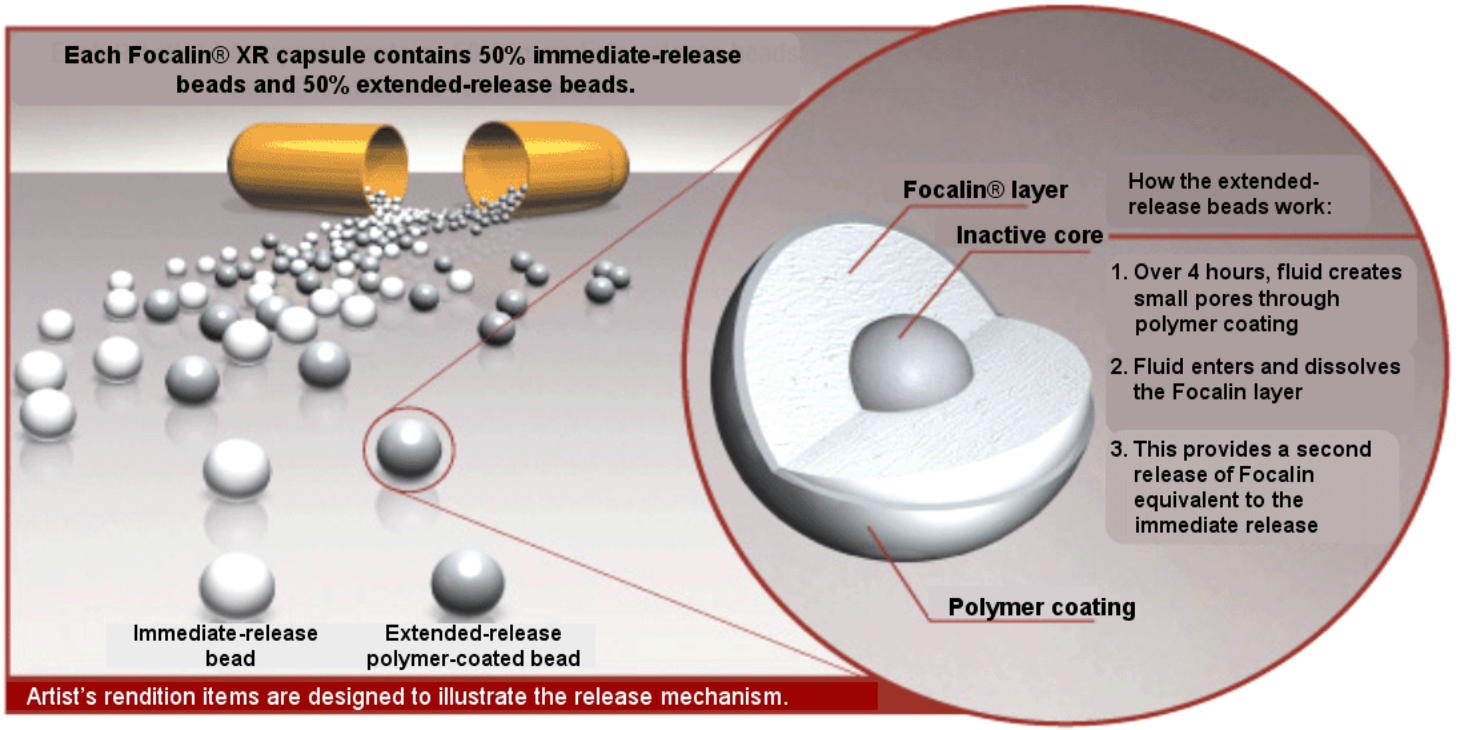
Comparison of Extended-release Methylphenidate Dosage Forms



Gonzalez MA, et al. *Int J Clin Pharmacol Ther*. 2002;40:175-184.
Data on file, Novartis Pharmaceuticals.

Focalin® XR Once-Daily Formulation: SODAS Extended-Release Technology

50% Immediate / 50% Extended Release mimics bid dosing



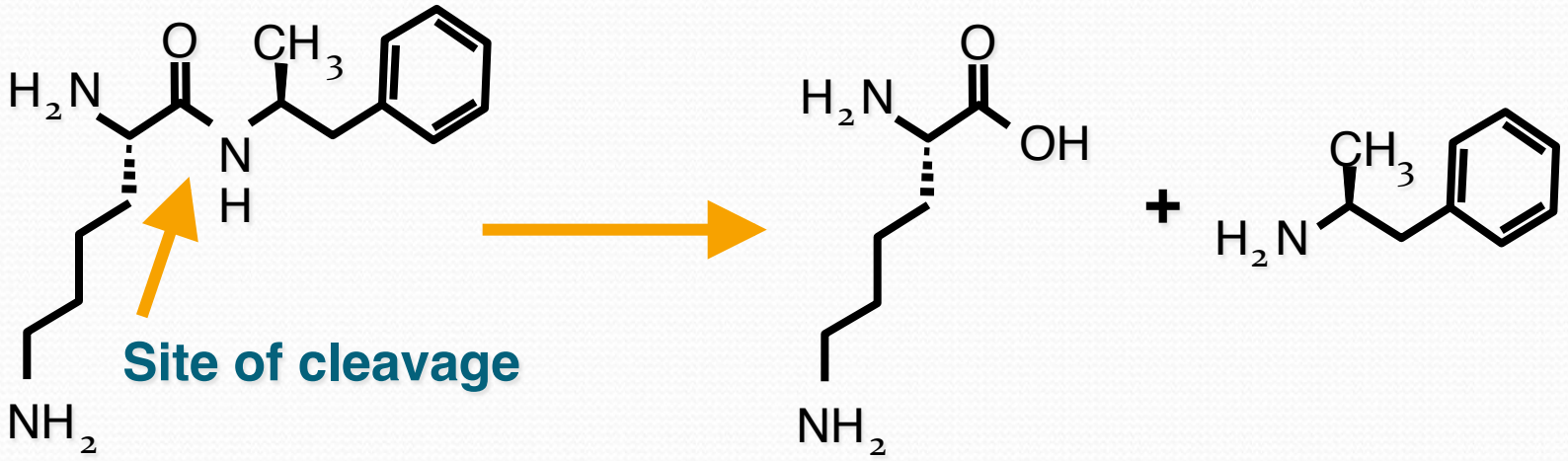
*Spheroidal Oral Drug Absorption System.

SODAS = Spheroidal Oral Drug Absorption.

SODAS® is a registered trademark of Elan Corporation, plc.

Vyvanse Converted to *d*-Amphetamine

- After ingestion, Vyvanse remains intact until enzymes cleave the peptide bond, releasing free *d*-amphetamine and *l*-lysine[1]



Lisdexamfetamine (Prodrug) | ***l*-lysine** | ***d*-amphetamine (active)**

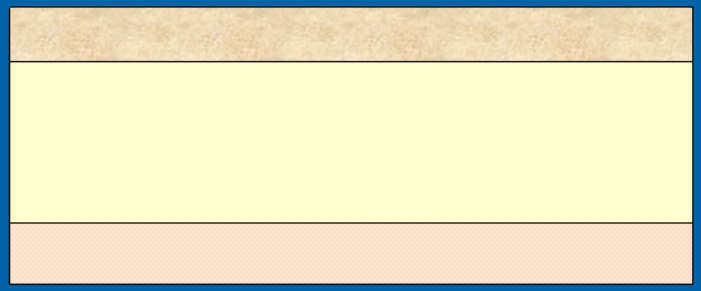
Release of the active ingredient in Vyvanse does not rely on gastrointestinal (GI) factors such as GI transit time or gastric pH[2,3]

1. Vyvanse® [package insert]. Wayne, PA: Shire US Inc.; 2008; 2. Krishnan S, Zhang Y. *J Clin Pharmacol*. 2008;48:293-302; 3. Shojaei A et al. Presented at: Annual Meeting of the American Psychiatric Association; May 19-24, 2007; San Diego, CA.

Daytrana™: Dot Matrix™ Delivery System

Transdermal Delivery of *d,l*-MPH

The patch consists of three layers, as seen in the figure below (cross-section of the patch)



- MPH is absorbed through the skin at a continual rate
- Average lag time to detectable *d*-MPH plasma concentrations is 3.1 hours (range, 1-6 hours)

Daytrana [package insert]. Wayne, PA: Shire Pharmaceuticals Ireland Ltd; April 2006.

Daytrana transdermal patch

- Benefits
  - Because bypasses G.I. tract have lower GI side effects
  - Useful for those individuals who cannot swallow.
  - Can control time of onset and offset
- Limitations
  - Rash/sensitivity
    - Hydration with lotion is critical
  - Tactile/sensory issues may limit use in ASD

New ADHD Medications

Quillivant XR	liquid extended release methylphenidate designed for those who cannot swallow pills
Aptensio XR	multi layered extended-release bead methylphenidate capsule
Evekeo	branded 1:1 mixture of amphetamine salts (L-amphetamine+ D-amphetamine)
Zenzedi	branded D amphetamine

Quillivant liquid

- Benefits
  - Designed for those that cannot swallow pills
  - Allows for easy and more precise titration of dose
  - Flexible dosing possible
    - Can use one dose during the week and another during the weekend
- Limitations
  - Practical issues related to the use of liquid

Evekeo

- Designed based upon evidence that L-amphetamine has greater impact on attention+ D-amphetamine has greater impact on impulsivity/ hyperactivity
  - Equal mixture of D-amphetamine + L-amphetamine
  - Adderall = 3: 1 (D-amp/L-amp)
- Indication studies demonstrated efficacy in classroom setting in children out to 10 hours
- Tolerability also seemed fairly good

Psychostimulants Sprinkle forms

- Methylphenidate
  - Focalin XR, Ritalin LA, Metadate CD (NOT Concerta)
- Amphetamine
  - Adderall XR, Vyvanse (can be suspended liquid also)
- Sprinkled on applesauce, (also yogurt, ice cream, etc)

Delivery systems of long-acting agents are different

- Medication delivery systems differ in amount and time of medication release.
  - Affect timing of symptom control
- Choice of long acting medication depends upon the individual need of the patient.
  - Sensitivity to specific side effects.
  - Time in which greater symptom coverage as needed

Generic vs Branded Medications

- Branded + generic medications do indeed contain the exact same active ingredient or DRUG
  - Generics are **BIOEQUILIVENT**
- Branded +generic medications may **differ** in 2 significant ways
  - As established by the FDA, generic products are considered bioequivalent if they contain 80-125% dose of the active compound
    - Generic medications usually contain less rather than more
  - Brands typically vary by only 3-5% of the dose
  - Packing, fillers, colors may differ significantly
- These differences may impact efficacy and side effects
  - Can impact drug breakdown, absorption, blood level rise, etc.
  - Therefore, not all generics are considered to have the same **BIOAVAILABILITY**

Generic vs Branded Medications

Concerta Problem

- BRAND
  - Originally manufactured by Ortho McNeil Janssen
  - Very specific release mechanism (OROS) responsible for the extended release
  - Specifically designed and patented barrel shaped capsule
- GENERICS
  - When Concerta went generic in 2014, several generic alternatives emerged including Watson (purchased by Actavis) and several others
  - These are very different in terms of size, shape, design and ultimately release.
  - Many of these are **NOT** OROS design

Generic vs Branded Medications

Concerta Problem

- Concerta problems
- Originally manufactured by Ortho McNeil Janssen + subsequently by Watson/Actavis

- Versions by Malinckrodt + Kudco

Generic vs Branded Medications

Concerta Problem

- Concerta/methylphenidate ER was designed to release the drug over a period of 10-12 hours
- Analysis by the FDA revealed that Mallinckrodt and Kudco products they delivered the drug at a slower rate of 7-12 hours
- As a result, the FDA change the **therapeutic equivalence** rating for these products from AB to BX
  - These products are still approved and can be prescribed that are no longer recommended as automatic substitution that the pharmacy for Concerta
  - FDA requested that these manufacturers confirm the bioequivalence of their products or voluntarily withdraw them from the market
  - http://www.fda.gov/Drugs/DrugSafety/ucm422568.htm

Nonstimulants

- Atomoxetine (Strattera)
- Alpha Agonists
  - Guanfacine(Tenex)
    - Intuniv
  - Catapres (Clonidine)
    - Kapvay
- Modafinil (Provigil)
- Armodafinil (Nuvigil)

Atomoxetine (Strattera)

- Advantages
  - Not a controlled substance
    - No C II Rx/refills possible
  - Continuous coverage throughout day
  - Often better tolerated vs stimulants
    - Good for those with anxiety, tics

Atomoxetine (Strattera)

- Issues
  - Takes time to build up/benefit
    - Impatient-patient/parent
  - Overall lower efficacy?
  - Suicidality warning

Alpha agonists

- Clonidine
  - Short acting-Catapres –PO + patch
  - Long acting-Kapvay
- Guanfacine
  - Short acting-Tenex
  - Long acting-Intuniv

Alpha Agonists

- Used alone or in combination with stimulants
- Useful for hyperactivity, insomnia, symptoms of aggression, lability/ irritability, impulsivity, anxiety and tics
  - Effect on inattention?
- Side effects: dry mouth, drowsiness, cognitive dulling, lower BP
- Long acting uses?
  - Tolerability?

Alpha Agonists

- Clonidine (Catapres)
  - (0.1 - 0.4 mg/day)
  - Sedation, depression (in some)
  - Patch form
- Guanfacine (Tenex)
  - (1 – 4 mg/day)
  - Lacks sedation vs clonidine
- Dosage: Typically start with evening doses and titrate toward the morning

Non-stimulants-modafanil

- Modafanil (Provigil)
  - Indications-narcolepsy, shift phase work
  - Originally described as impacting histamine but likely also affects dopamine.
    - Promotes alertness >concentration
- Not approved by FDA for ADHD tx
  - Studies demonstrated benefits at 400 mg/day
  - Safety concerns regarding rash
  - Cost limit use for many
- Armodafinil (Nuvigil)
  - Single isomer cousin

Nonstimulants

- Modafinil (Provigil)
  - Not a stimulant
    - Affects histamine
    - Promotes alertness > concentration
  - Not approved by FDA
    - Studies demonstrated effect at 400mg
    - “Safety” concerns regarding rash
    - Cost limits use for many
  - “Cousin” drug will likely get approval

Nonstimulants

- Wellbutrin
- Dual action antidepressants
  - Cymbalta (duloxetine)
  - Effexor (XR) (venlafaxine)
- Tricyclic Antidepressants

Nonstimulants

- Bupropion (Wellbutrin (SR/XL)/Zyban)/ budeprion
  - Possible benefit for some
  - Limited data in children
- Dual action antidepressants
  - Duloxetine (Cymbalta) + Venlafaxine Effexor (XR)
  - NO data
  - Tolerability?
    - Suicidality issues and children/young adult

Alternative/New Medications

- Omega 3 Fatty Acids
- Memory/Dementia Medications
  - Aricept (donepezil)
  - Exelon (rivistigmine)
  - Namenda (memantime)
- Nicotine analogues

Alternative/New Medications

- Omega 3 Fatty Acids
  - Support the neuronal support cells (glia)
  - Work well adjunctively
    - Probably not sufficient for most by themselves
  - Have mood/anti-anxiety properties
  - Also affect attention, memory, language (?)
  - Very few side effects
    - GI upset can happen
    - Activation especially if FH of Mood D/O
  - Dosing still to be determined

Alternative/New Medications

- Memory/Dementia Medications
  - Aricept (donepezil)
  - Exelon (rivistigmine)
  - Namenda (memantime)
  - Small number of studies (mostly for Aricept)
    - Namenda also studies for Autism
  - Might be relevant when other medications not tolerated

Thank you

Support

- Speaker Bureau-current
  - Arbor (Evekeo + Zenzedi)
  - Lundbeck (Brintellex)
- Speaker Bureau-past
  - Astra Zeneca (Seroquel)
  - Bristol Meyers Squibb (Abilify)
  - Glaxo Smith Kline (Vyvanse)
  - Janssen (Risperidone)
  - Lilly (Strattera)
  - Novartis (Focalin XR/Ritalin LA/Focalin/Fanapt)
  - Pfizer (Zoloft/Geodon)
  - Shionogi (Kapvay)
  - Shire (Vyvanse/Intuniv)
- Research Projects
  - Bristol Meyers Squibb (Abilify) (past)
    - Early Onset Schizophrenia Study (Asarnow, Caplan)

ADHD Medication Guide*

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Methylphenidate Derivatives – Long Acting/Extended Release

5 Quillivant XR® 25mg/5ml (5mg/ml) (Banana Flavor)	Dose: 10mg 2ml; 1 Bottle: 300mg 60ml	Dose: 20mg 4ml; 1 Bottle: 600mg 120ml	Dose: 30mg 6ml; 1 Bottle: 900mg 180ml	Dose: 40mg 8ml; 2 Bottles: 600mg 120ml	Dose: 50mg 10ml; 2 Bottles: 750mg 150ml	Dose: 60mg 12ml; 2 Bottles: 900mg 180ml

Concerta®†	G 18mg	G 27mg	G 36mg	G 54mg	G 72mg (+)				
Focalin® XR ‡ (dexmethylphenidate)	G 5mg		G 10mg	G 15mg	20mg	25mg	G 30mg	35mg	G 40mg
2 Ritalin® LA ‡	10mg		G 20mg	G 30mg	G 40mg				
3 Metadate® CD ‡	G 10mg		G 20mg	G 30mg	G 40mg	G 50mg	G 60mg		
4 Ritalin® SR			G 20mg						

3 Daytrana®

Methylphenidate Derivatives – Short Acting/Immediate Release

3 Focalin® (dexmethylphenidate)		G 2.5mg	G 5mg	G 10mg
1 Ritalin®		G 5mg	G 10mg	G 20mg
2 Methylin® Chewable § (Grape Flavor)	2.5mg	5mg	10mg	
2 Methylin® Solution (Grape Flavor)		G 5mg/5ml	G 10mg/5ml	

G indicates a generic formulation is available; generic products are not shown.

*Disclaimer: The ADHD Medication Guide was created by Dr. Andrew Adesman of the North Shore-LIJ Health System. The North Shore-Long Island Jewish Health System is not affiliated with the owner of any of the brands referenced in this Guide.

This Guide should not be used as an exclusive basis for decision-making. The user understands and accepts that if the health system were to accept the risk of harm to the user from use of this Guide, it would not be able to make the Guide available because the cost to cover the risk of harm to all users would be too great. Thus, use of this ADHD Medication Guide is strictly voluntary and at the user's sole risk.

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North Shore LIJ — Steven & Alexandra Cohen Children's Medical Center of NY

ADHD Medication Guide*

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Amphetamine Derivatives – Short Acting/Immediate Release

10 Evekeo™ (d- & l- amphetamine sulfate)		5mg		10mg				
8 Zenzedi® (d-amphetamine sulfate)	2.5mg	G 5mg	7.5mg	G 10mg		15mg	20mg	30mg
1 Adderall® (mixed amphetamine salts)		G 5mg	G 7.5mg	G 10mg	G 12.5mg	G 15mg	G 20mg	G 30mg
8 ProCentra® (Bubblegum Flavor)		5mg/5ml						

Amphetamine Derivatives – Long Acting/Extended Release

5 Vyvanse®¥ (lisdexamfetamine)	10mg	20mg	30mg	40mg	50mg	60mg	70mg
Adderall XR®‡ (mixed amphetamine salts)		G 5mg 5	G 10mg 5	G 15mg 5	G 20mg 5	G 25mg 2	G 30mg 2
7 Dexedrine Spansule® (d-amphetamine sulfate)		G 5mg	G 10mg	G 15mg			

Non-Stimulants

3 Intuniv®† (guanfacine, extended release)	G 1mg	G 2mg	G 3mg	G 4mg			
3 Kapvay®† (clonidine, extended release)	0.1mg	0.2mg (only in dose pack)					
5 Strattera®† (atomoxetine)	10mg	18mg	25mg	40mg	60mg	80mg	100mg

Administration Key

† Must be swallowed whole
¥ Vyvanse Can Be Mixed With Yogurt, Orange Juice, or Water
§ Chewable
‡ Capsule can be opened and medication sprinkled on applesauce

Ages for Which Medications Have an FDA Indication for Treatment of ADHD

Tab #	1	2	3	4	5	6	7	8	9	10
3-5 Years	✔							✔		✔
6-12 Years	✔	✔	✔	✔	✔		✔	✔		✔
13-16 Years			✔		✔	✔	✔	✔		✔
17 Years			✔		✔	✔				✔
Adults				✔	✔	✔			✔	✔

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The ADHD Medication Guide is a visual aid for professionals caring for individuals with ADHD. The Guide includes only medications indicated for the treatment of ADHD by the FDA. In clinical practice, this guide may be used to assist patients in identifying medications previously tried, and may allow clinicians to identify ADHD medication options for the future. Medications have been arranged on the card for ease of display and comparison, but dosing equivalence cannot be assumed. Practitioners should refer to the FDA-approved product information to learn more about each medication. Although every effort has been made to depict each medication in its actual size and color, we cannot guarantee that there are not minor distortions in the final image. This Guide is accurate as of April 1, 2015.

- Updated versions of the ADHD Medication Guide can be viewed at www.ADHDMedicationGuide.com
- Laminated copies of the **ADHD Medication Guide** can be obtained at: www.ADDWarehouse.com
- Contact Dr. Andrew Adesman at ADHDMedGuide@NSHS.edu with any questions, suggestions or comments

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