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Stimulant formulations for the treatment of ADHD

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STIMULANT FORMULATIONS FOR THE TREATMENT OF ADHD

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Why & how did we do this?

- Clinicians have access to a variety of formulations of methylphenidate and amphetamine to treat attention-deficit hyperactivity disorder (ADHD).
- However, due to new emerging formulations clinicians may lack up-to-date knowledge about all available stimulant formulations.
- We present a comprehensive guide of 13 formulations of methylphenidate and 10 formulations of amphetamine that have U.S. Food and Drug Administration (FDA) approval to treat ADHD.
- We searched PubMed using the following medical heading (MeSH) terms: “attention-deficit hyperactivity disorder”, “ADHD”, “stimulant”, “amphetamine”, and “methylphenidate”.
- Our inclusion criteria were randomized control trials and systematic reviews until and through 2017.
Methylphenidate

- Immediate release (IR)
- Sustained release (SR)
- Long acting (LA)
- OROS
- Transdermal
- Chewable tablet
Methylphenidate

- Dexmethylphenidate and dexamethasphenidate extended release (ER)
- Suspension solution
- Orally disintegrating tablet
- Multilayer-release beads
Amphetamines

- Mixed amphetamine salt (MAS)
- Dextroamphetamine IR and SR
- Lisdexamfetamine
- Dextroamphetamine extended release (XR)
- Amphetamine orally disintegrating tablet
- Amphetamine immediate release
- Amphetamine oral solution
<table>
<thead>
<tr>
<th>Formulations</th>
<th>Time to Reach Peak Plasma Concentration</th>
<th>Duration of Action</th>
<th>Dosing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Methylphenidate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concerta (osmotic controlled-release delivery)</td>
<td>1 h, overall peak 6–10 h</td>
<td>12 h</td>
<td>Once daily</td>
</tr>
<tr>
<td>Daytrana (transdermal)</td>
<td>7.5–10.5 h</td>
<td>12 h</td>
<td>Once daily</td>
</tr>
<tr>
<td>Quillivant XR (suspension)</td>
<td>5–6 h</td>
<td>12 h</td>
<td>Once daily</td>
</tr>
<tr>
<td>Aptensio XR (multilayer beads)</td>
<td>5 h, shoulder at 7 h</td>
<td>12 h</td>
<td>Once daily</td>
</tr>
<tr>
<td>Cotempla CR-ODT (orally disintegrating tablets)</td>
<td>&lt;6 h</td>
<td>Up to 12 h</td>
<td>Once daily</td>
</tr>
<tr>
<td>Focalin XR (dextromethylphenidate)</td>
<td>1–3 h, shoulder at 4.7–6.3 h</td>
<td>8 h</td>
<td>Once daily</td>
</tr>
<tr>
<td>Quillichew ER (chewable tablets)</td>
<td>4–5 h</td>
<td>8 h</td>
<td>Once daily</td>
</tr>
<tr>
<td>Ritalin LA (long acting)</td>
<td>1–3 h, shoulder at 4.7–6.3 h</td>
<td>8 h</td>
<td>Once daily</td>
</tr>
<tr>
<td>Ritalin SR (sustained release)</td>
<td>4.7 h</td>
<td>8 h</td>
<td>Once daily</td>
</tr>
<tr>
<td>Focalin IR (dextromethylphenidate)</td>
<td>1–2 h</td>
<td>4 h</td>
<td>3 times daily</td>
</tr>
<tr>
<td>Methylir IR (chewable tablets)</td>
<td>1–2 h</td>
<td>3–6 h</td>
<td>3 times daily</td>
</tr>
<tr>
<td>Ritalin (immediate release)</td>
<td>1.9 h</td>
<td>3–6 h</td>
<td>3 times daily</td>
</tr>
<tr>
<td><strong>Amphetamine</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mydayis XR (dextroamphetamine)</td>
<td>7–10 h</td>
<td>16 h</td>
<td>Once daily</td>
</tr>
<tr>
<td>Vyvanse (lisdexamfetamine)</td>
<td>3–5 h for active compound</td>
<td>&gt;8 h</td>
<td>Once daily</td>
</tr>
<tr>
<td>Adderall XR (extended release)</td>
<td>7 h</td>
<td>&gt;8 h</td>
<td>Once daily</td>
</tr>
<tr>
<td>Adzenys XR (orally disintegrating tablets)</td>
<td>5 h</td>
<td>&gt;8 h</td>
<td>Once daily</td>
</tr>
<tr>
<td>Evekeo IR (dextroamphetamine/levoamphetamine)</td>
<td>4 h</td>
<td>9 h</td>
<td>Once daily</td>
</tr>
<tr>
<td>Dynavel XR (dextroamphetamine/levoamphetamine suspension)</td>
<td>4 h</td>
<td>8 h</td>
<td>Once daily</td>
</tr>
<tr>
<td>Procentra IR (dextroamphetamine suspension)</td>
<td>&lt;3 h</td>
<td>&lt;6 h</td>
<td>2 times daily/3 times daily</td>
</tr>
<tr>
<td>Adderall (immediate release)</td>
<td>3 h</td>
<td>4–6 h</td>
<td>3 times daily</td>
</tr>
</tbody>
</table>

Abbreviations: CR = controlled release, ER = extended release, IR = immediate release, XR = extended release.
Clinical points

- Many stimulant formulations are available for the treatment of attention-deficit/hyperactivity disorder (ADHD)

- Stimulant formulations for ADHD have unique properties such as type of formulation, time to reach peak plasma concentration, duration of action, and dosing schedule

- Currently available formulations of methylphenidate and amphetamine are highly customizable for many unique patient factors
Disclosures


- **Financial disclosure:** Drs Gautam and Prabhakar have no personal affiliations or financial relationships with any commercial interest to disclose relative to this article

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- **Disclosure of off-label usage:** The authors have determined that, to the best of their knowledge, no investigational information about pharmaceutical agents that is outside US Food and Drug Administration–approved labeling has been presented in this article
References


