[Template:For](/wiki/Template:For" \o "Template:For) [Template:Good article](/wiki/Template:Good_article) [Template:Use dmy dates](/wiki/Template:Use_dmy_dates) [Template:Infobox drug](/wiki/Template:Infobox_drug)

**Adderall**[Template:#tag:ref](/wiki/Template:#tag:ref) is a [combination drug](/wiki/Combination_drug) containing [salts](/wiki/Salt_(chemistry)) of the two [enantiomers](/wiki/Enantiomer) of [amphetamine](/wiki/Amphetamine), a [psychostimulant](/wiki/Stimulant) of the [phenethylamine](/wiki/Substituted_phenethylamine) [class](/wiki/Chemical_classification). Adderall is prescribed in the treatment of [attention deficit hyperactivity disorder](/wiki/Attention_deficit_hyperactivity_disorder) (ADHD) and [narcolepsy](/wiki/Narcolepsy). It is also used as an athletic performance and [cognitive enhancer](/wiki/Nootropic), and recreationally as an [aphrodisiac](/wiki/Aphrodisiac) and [euphoriant](/wiki/Euphoriant). By salt content, the active ingredients of Adderall are 75% [dextroamphetamine](/wiki/Dextroamphetamine) salts (the [dextrorotary](/wiki/Dextrorotary) or 'right-handed' enantiomer) and 25% [levoamphetamine](/wiki/Levoamphetamine) salts (the [levorotary](/wiki/Levorotary) or 'left-handed' enantiomer).[Template:#tag:refTemplate:#tag:ref](/wiki/Template:#tag:ref)

Adderall increases the activity of the [neurotransmitters](/wiki/Neurotransmitter) [norepinephrine](/wiki/Norepinephrine) and [dopamine](/wiki/Dopamine) in the brain, which results from its interactions with [trace amine associated receptor 1](/wiki/TAAR1) (TAAR1) and [vesicular monoamine transporter 2](/wiki/Vesicular_monoamine_transporter_2) (VMAT2). Adderall shares many chemical and pharmacological properties with the human [trace amine](/wiki/Trace_amine) neurotransmitters, especially [phenethylamine](/wiki/Phenethylamine) and [Template:Nowrap](/wiki/Template:Nowrap), the latter being an [isomer](/wiki/Isomer) of amphetamine that is produced within the human body.[Template:#tag:ref](/wiki/Template:#tag:ref)

Adderall is generally well-tolerated and effective in treating the symptoms of ADHD. The most common side effects are cardiovascular, such as [irregular heartbeat](/wiki/Arrythmia) (usually manifesting as [tachycardia](/wiki/Tachycardia), i.e. a fast heartbeat), and psychological, such as euphoria or anxiety. Much larger doses of Adderall are likely to impair cognitive function and induce rapid muscle breakdown ([rhabdomyolysis](/wiki/Rhabdomyolysis)). [Drug addiction](/wiki/Addiction) is a serious risk of Adderall abuse, but only rarely arises from medical use. Very high doses can result in a [psychosis](/wiki/Stimulant_psychosis#Amphetamines) (e.g., delusions and paranoia) which rarely occurs at therapeutic doses even during long-term use. Recreational doses are generally much larger than prescribed therapeutic doses, and carry a far greater risk of serious side effects.[Template:#tag:ref](/wiki/Template:#tag:ref) [Template:TOC limit](/wiki/Template:TOC_limit)[Template:Clear right](/wiki/Template:Clear_right)

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## Uses[[edit](/index.php?title=(none)&action=edit&section=1)]

[thumb|alt=Adderall tablets|A group of 20 mg Adderall tablets, some broken in half, with a lengthwise-folded US dollar bill along the bottom for size comparison](/wiki/File:Amph_salts.jpg) [thumb|alt = Adderall capsules| A pair of 20 mg Adderall XR capsules with a US penny to illustrate size](/wiki/Image:Adderall_20mg_capsules.JPG)

### Medical[[edit](/index.php?title=(none)&action=edit&section=2)]

[Template:Transcluded-section](/wiki/Template:Transcluded-section) [Amphetamine](/wiki/Amphetamine)

Adderall is available as immediate release tablets or extended-release capsules.[[1]](#cite_note-1)[[2]](#cite_note-2) The extended release capsule is generally used in the morning.[[3]](#cite_note-3) The extended release formulation available under the brand Adderall XR is designed to provide a therapeutic effect and plasma concentrations identical to taking two doses 4 hours apart.[[2]](#cite_note-2)

### Performance-enhancing[[edit](/index.php?title=(none)&action=edit&section=3)]

[Template:Transcluded-section](/wiki/Template:Transcluded-section) [Amphetamine](/wiki/Amphetamine)

Adderall has been banned in the [National Football League](/wiki/National_Football_League) (NFL), [Major League Baseball](/wiki/Major_League_Baseball) (MLB), [National Basketball Association](/wiki/National_Basketball_Association) (NBA), and the National Collegiate Athletics Association (NCAA).[[4]](#cite_note-4) In leagues such as the NFL, there is a very rigorous process required to obtain an exemption to this rule even when the athlete has been medically prescribed the drug by their physician.[[4]](#cite_note-4)

### Recreational[[edit](/index.php?title=(none)&action=edit&section=4)]

[Template:See also](/wiki/Template:See_also)

Adderall is considered to have a high potential for misuse as a [recreational drug](/wiki/Recreational_drug_use).[[5]](#cite_note-5)[[6]](#cite_note-6) Adderall tablets can be crushed and snorted, or dissolved in water and injected.[[7]](#cite_note-7) Injection into the bloodstream can be dangerous because insoluble fillers within the tablets can block small blood vessels.[[7]](#cite_note-7)

## Contraindications[[edit](/index.php?title=(none)&action=edit&section=5)]

[Template:Transcluded-section](/wiki/Template:Transcluded-section) [Amphetamine](/wiki/Amphetamine)

## Side effects[[edit](/index.php?title=(none)&action=edit&section=6)]

[Template:Transcluded-section](/wiki/Template:Transcluded-section) The [side effects](/wiki/Side_effects) of Adderall are many and varied, but the amount of substance consumed is the primary factor in determining the likelihood and severity of side effects.[[8]](#cite_note-8)[[9]](#cite_note-9)[[10]](#cite_note-10) Adderall is currently approved for long-term therapeutic use by the USFDA.[[9]](#cite_note-9) [Recreational use](/wiki/Recreational_drug_use#Stimulants) of Adderall generally involves far larger doses and is therefore significantly more dangerous, involving a much greater risk of serious side effects.[[10]](#cite_note-10)[Amphetamine](/wiki/Amphetamine)

## Overdose[[edit](/index.php?title=(none)&action=edit&section=7)]

[Template:Transcluded-section](/wiki/Template:Transcluded-section) [Amphetamine](/wiki/Amphetamine)

## Interactions[[edit](/index.php?title=(none)&action=edit&section=8)]

* [Monoamine oxidase inhibitors](/wiki/Monoamine_oxidase_inhibitor) (MAOIs) taken with Adderall may result in a [hypertensive crisis](/wiki/Hypertensive_crisis) if taken within two weeks after last use of an MAOI type drug.[[11]](#cite_note-11)\* [Inhibitors of enzymes](/wiki/Enzyme_inhibitor) that directly metabolize amphetamine (particularly [FMO3](/wiki/FMO3) and [CYP2D6](/wiki/CYP2D6)) will prolong the elimination of amphetamine.[[11]](#cite_note-11)[[12]](#cite_note-12)\* [Stimulants](/wiki/Stimulants) and [antidepressants](/wiki/Antidepressants) ([sedatives](/wiki/Sedative) and [depressants](/wiki/Depressant)) may increase (decrease) the drug effects of Adderall, and vice versa.[[11]](#cite_note-11)\* Dietary [pH](/wiki/PH) affects the absorption and [elimination half-life](/wiki/Elimination_half-life) of Adderall; an alkaline diet increases the rate of absorption and decreases the rate of excretion, while acidic diets decrease absorption and increase excretion rates.[[11]](#cite_note-11)\* [Proton-pump inhibitors](/wiki/Proton-pump_inhibitor) (PPIs) modify the pharmacokinetics of Adderall XR. Co-administration requires monitoring for changes in clinical effect.[[11]](#cite_note-11)

## Pharmacology[[edit](/index.php?title=(none)&action=edit&section=9)]

[Template:Amphetamine pharmacodynamics](/wiki/Template:Amphetamine_pharmacodynamics)

### Mechanism of action[[edit](/index.php?title=(none)&action=edit&section=10)]

[Template:For](/wiki/Template:For) Amphetamine, the active ingredient of Adderall, works primarily by increasing the activity of the [neurotransmitters](/wiki/Neurotransmitter) [dopamine](/wiki/Dopamine) and [norepinephrine](/wiki/Norepinephrine) in the brain.[[13]](#cite_note-13)[[14]](#cite_note-14) It also triggers the release of several other hormones (e.g., [epinephrine](/wiki/Epinephrine)) and neurotransmitters (e.g., [serotonin](/wiki/Serotonin) and [histamine](/wiki/Histamine)) as well as the synthesis of certain [neuropeptides](/wiki/Neuropeptide) (e.g., [cocaine and amphetamine regulated transcript](/wiki/Cocaine_and_amphetamine_regulated_transcript) [CART] peptides),.[[15]](#cite_note-15)[[16]](#cite_note-16) Both active ingredients of Adderall, [dextroamphetamine](/wiki/Dextroamphetamine) and [levoamphetamine](/wiki/Levoamphetamine), bind to the same [biological targets](/wiki/Biological_target),[[10]](#cite_note-10)[[17]](#cite_note-17) but their [binding affinities](/wiki/Binding_affinities) (that is, [potency](/wiki/Potency_(pharmacology))) differ somewhat.[[10]](#cite_note-10)[[17]](#cite_note-17) Dextroamphetamine and levoamphetamine are both potent [full agonists](/wiki/Full_agonist) (activating compounds) of [trace amine-associated receptor 1](/wiki/Trace_amine-associated_receptor_1) (TAAR1) and interact with [vesicular monoamine transporter 2](/wiki/Vesicular_monoamine_transporter_2) (VMAT2), with dextroamphetamine being the more potent agonist of TAAR1.[[17]](#cite_note-17) Consequently, dextroamphetamine produces more [Template:Abbr](/wiki/Template:Abbr) stimulation than levoamphetamine;[[17]](#cite_note-17)[[18]](#cite_note-18) however, levoamphetamine has slightly greater cardiovascular and peripheral effects.[[10]](#cite_note-10) Levoamphetamine provides Adderall with a quicker onset and longer-lasting effects than dextroamphetamine alone.[[19]](#cite_note-19) It has been reported that certain children have a better clinical response to levoamphetamine.[[20]](#cite_note-20)[[21]](#cite_note-21) In the absence of amphetamine, [Template:Abbr](/wiki/Template:Abbr) will normally move [monoamines](/wiki/Monoamine) (e.g., [dopamine](/wiki/Dopamine), [histamine](/wiki/Histamine), [serotonin](/wiki/Serotonin), [norepinephrine](/wiki/Norepinephrine), etc.) from the [intracellular fluid](/wiki/Intracellular_fluid) of a monoamine [neuron](/wiki/Neuron) into its [synaptic vesicles](/wiki/Synaptic_vesicle), which are essentially chemical storage units inside a neuron.[[15]](#cite_note-15) When amphetamine enters a neuron and interacts with VMAT2, the transporter reverses its direction of transport, thereby releasing stored monoamines inside synaptic vesicles back into the neuron's intracellular fluid.[[15]](#cite_note-15) Meanwhile, when amphetamine activates TAAR1, the receptor causes the neuron's [cell membrane](/wiki/Cell_membrane)-bound [monoamine transporters](/wiki/Monoamine_transporter) (i.e., the [dopamine transporter](/wiki/Dopamine_transporter), [norepinephrine transporter](/wiki/Norepinephrine_transporter), or [serotonin transporter](/wiki/Serotonin_transporter)) to either stop transporting molecules altogether (via [internalization](/wiki/Endocytosis)) or even transport them *in reverse*;[[22]](#cite_note-22) in other words, the reversed membrane transporter will push dopamine, norepinephrine, and serotonin out of the neuron's intracellular fluid and into the [synaptic cleft](/wiki/Synaptic_cleft).[[22]](#cite_note-22) In summary, by interacting with both VMAT2 and TAAR1, amphetamine releases neurotransmitters from synaptic vesicles (the effect from [Template:Abbr](/wiki/Template:Abbr)) into the intracellular fluid where they subsequently exit the neuron through the membrane-bound, reversed monoamine transporters (the effect from [Template:Abbr](/wiki/Template:Abbr)).[[22]](#cite_note-22)[[15]](#cite_note-15)

### Pharmacokinetics[[edit](/index.php?title=(none)&action=edit&section=11)]

[Template:Transcluded-section](/wiki/Template:Transcluded-section) [Amphetamine](/wiki/Amphetamine)

### Related endogenous compounds[[edit](/index.php?title=(none)&action=edit&section=12)]

[Template:Transcluded-section](/wiki/Template:Transcluded-section) [Amphetamine](/wiki/Amphetamine)

## History, society, and culture[[edit](/index.php?title=(none)&action=edit&section=13)]

[Template:Main](/wiki/Template:Main)

Richwood Pharmaceuticals, which later merged with [Shire plc](/wiki/Shire_plc), introduced the current Adderall brand in 1996 as an instant-release tablet.[[23]](#cite_note-23) In 2006, Shire agreed to sell rights to the Adderall name for this instant-release medication to [Duramed Pharmaceuticals](/wiki/Duramed_Pharmaceuticals).[[24]](#cite_note-24) DuraMed Pharmaceuticals was acquired by [Teva Pharmaceuticals](/wiki/Teva_Pharmaceuticals) in 2008 during their [acquisition](/wiki/Mergers_and_acquisitions) of [Barr Pharmaceuticals](/wiki/Barr_Pharmaceuticals), including Barr's Duramed division.[[25]](#cite_note-25) The first generic version of Adderall IR was introduced to market in 2002.[[26]](#cite_note-26) Later on, Barr and Shire reached a settlement agreement permitting Barr to offer a generic form of the drug beginning in April 2009.[[26]](#cite_note-26)[[27]](#cite_note-27)

### Commercial formulation[[edit](/index.php?title=(none)&action=edit&section=14)]

Chemically, Adderall is a mixture of several amphetamine salts; specifically, it is composed of equal parts (by [mass](/wiki/Mass)) of amphetamine [aspartate monohydrate](/wiki/Aspartic_acid), amphetamine [sulfate](/wiki/Sulfate), dextroamphetamine sulfate, and dextroamphetamine [saccharate](/wiki/Saccharate).[[2]](#cite_note-2) This drug mixture has slightly stronger [Template:Abbr](/wiki/Template:Abbr) effects than racemic amphetamine due to the higher proportion of dextroamphetamine.[[22]](#cite_note-22)[[10]](#cite_note-10) Adderall is produced as both an immediate release (IR) and extended release (XR) formulation.[[26]](#cite_note-26)[[1]](#cite_note-1)[[2]](#cite_note-2) [Template:As of](/wiki/Template:As_of), ten different companies have produced generic Adderall IR at one point, while [Teva Pharmaceutical Industries](/wiki/Teva_Pharmaceutical_Industries), [Actavis](/wiki/Actavis), and [Barr Pharmaceuticals](/wiki/Barr_Pharmaceuticals) currently manufacture generic Adderall XR.[[26]](#cite_note-26) [Shire plc](/wiki/Shire_plc), the company that held the original patent for Adderall and Adderall XR, still manufactures brand name Adderall XR, but not Adderall IR.[[26]](#cite_note-26)

### Comparison to other formulations[[edit](/index.php?title=(none)&action=edit&section=15)]

Adderall is one of several formulations of pharmaceutical amphetamine, including singular or mixed enantiomers and as an enantiomer prodrug. The table below compares these medications (based on US approved forms):

[Template:Amphetamine base in marketed amphetamine medications](/wiki/Template:Amphetamine_base_in_marketed_amphetamine_medications)

### Past formulations[[edit](/index.php?title=(none)&action=edit&section=16)]

Rexar, a pharmaceutical company, reformulated another drug, branded as Obetrol, and continued to sell this new formulation under the same brand name. This new unapproved formulation was later rebranded and sold as Adderall by Richwood after it acquired Rexar resulting in FDA warning in 1994. Richwood submitted this formulation as NDA 11-522 and Adderall gained FDA approval for the treatment of attention-deficit/hyperactivity disorder on 13 February 1996.<ref name=HND>[Template:Cite news](/wiki/Template:Cite_news)</ref>

### Legal status[[edit](/index.php?title=(none)&action=edit&section=17)]

* In Canada, amphetamines are in Schedule I of the [Controlled Drugs and Substances Act](/wiki/Controlled_Drugs_and_Substances_Act), and can only be obtained by prescription.[[28]](#cite_note-28)\* In Japan, the use, production, and import of any medicine containing amphetamine are prohibited.[[29]](#cite_note-29)\* In South Korea, amphetamines are prohibited.[[30]](#cite_note-30)\* In Thailand, Amphetamines are classified as Type 1 Narcotics.[[31]](#cite_note-31)\* In the United Kingdom, amphetamines are regarded as [Class B](/wiki/Misuse_of_Drugs_Act_1971) drugs. The maximum penalty for unauthorized possession is five years in prison and an unlimited fine. The maximum penalty for illegal supply is 14 years in prison and an unlimited fine.[[32]](#cite_note-32)\* In the United States, amphetamine is a [Schedule II](/wiki/Schedule_II_(US)) prescription drug, classified as a [Template:Abbr](/wiki/Template:Abbr) stimulant.[[33]](#cite_note-33)\* Internationally ([United Nations](/wiki/United_Nations)), amphetamine is in Schedule II of the [Convention on Psychotropic Substances](/wiki/Convention_on_Psychotropic_Substances).[[34]](#cite_note-34)[[35]](#cite_note-35)

## See also[[edit](/index.php?title=(none)&action=edit&section=18)]

[Template:Portal](/wiki/Template:Portal)

* [Amphetamine](/wiki/Amphetamine)
* [Dextroamphetamine](/wiki/Dextroamphetamine)
* [Levoamphetamine](/wiki/Levoamphetamine)

## Notes[[edit](/index.php?title=(none)&action=edit&section=19)]

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## Reference notes[[edit](/index.php?title=(none)&action=edit&section=20)]

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