Compound Summary for CID 11597698

Lisdexamfetamine

Cite this Record

STRUCTURE VENDORS DRUG INFO PHARMACOLOGY LITERATURE PATENTS

PubChem CID:	11597698
Chemical Names:	Lisdexamfetamine; Vyvanse; NRP104; UNII-H645GUL8KJ; 608137-32-2; Lisdexamfetamine (INN) More...
Molecular Formula:	$C_{15}H_{25}N_3O$
Molecular Weight:	263.385 g/mol
InChI Key:	VOBHXZCDAVEXEY-JSGCOSHPSA-N
Drug Information:	Drug Indication Therapeutic Uses Clinical Trials FDA Orange Book FDA UNII

Lisdexamfetamine is a dextroamphetamine drug precursor that also functions as a CENTRAL NERVOUS SYSTEM STIMULANT and DOPAMINE UPTAKE INHIBITOR and is used in the treatment of ATTENTION DEFICIT HYPERACTIVITY DISORDER.

from MeSH

Lisdexamfetamine is a Central Nervous System Stimulant. The physiologic effect of lisdexamfetamine is by means of Central Nervous System Stimulation.

FDA Pharmacology Summary from FDA Pharm Classes

Lisdexamfetamine is a prodrug of the d-isomer of amphetamine, a non-catecholamine sympathomimetic amine with central nervous system (CNS) stimulating activity. Upon administration, lisdexamphetamine is converted to dextroamphetamine through cleavage of the lysine group. Dextroamphetamine acts by facilitating the release of catecholamines, particularly noradrenaline and dopamine, from its storage sites in nerve terminals in the CNS, and inhibits their uptake within the mesocorticolimbic system, a major component of the brain reward system, resulting in measurable behavioral changes such as euphoria, mental alertness and excitement and appetite suppression. As a CNS stimulant, this agent may increase blood pressure.

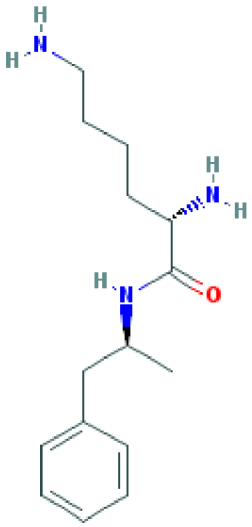
Pharmacology from NCIt

PUBCHEM > COMPOUND > LISDEXAMFETAMINE *Modify Date: 2018-09-15; Create Date: 2006-10-26*

Contents

1 2D Structure

Search Download Get Image



Magnify

from PubChem

2 3D Conformer

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Show Hydrogens Show Atoms Animate

from PubChem

3 Names and Identifiers

3.1 Computed Descriptors

3.1.1 IUPAC Name

(2S)-2,6-diamino-N-[(2S)-1-phenylpropan-2-yl]hexanamide

from PubChem

3.1.2 InChI

InChI=1S/C15H25N3O/c1-12(11-13-7-3-2-4-8-13)18-15(19)14(17)9-5-6-10-16/h2-4,7-8,12,14H,5-6,9-11,16-17H2,1H3,(H,18,19)/t12-,14-/m0/s1

from PubChem

3.1.3 InChI Key

VOBHXZCDAVEXEY-JSGCOSHPSA-N

from PubChem

3.1.4 Canonical SMILES

CC(CC1=CC=CC=C1)NC(=O)C(CCCCN)N

from PubChem

3.1.5 Isomeric SMILES

C[C@@H](CC1=CC=CC=C1)NC(=O)[C@H](CCCCN)N

from PubChem

3.2 Molecular Formula

$C_{15}H_{25}N_3O$

from PubChem

3.3 Other Identifiers

3.3.1 CAS

608137-32-2

from ChemIDplus, DrugBank, EPA DSStox, Human Metabolome Database (HMDB)

3.3.2 UNII

H645GUL8KJ

from FDA/SPL Indexing Data

3.3.3 Wikipedia

Title	lisdexamfetamine
Description	chemical compound

from Wikipedia

3.4 Synonyms

3.4.1 MeSH Entry Terms

1. Dimesylate, Lis-dexamfetamine
2. Dimesylate, Lisdexamfetamine
3. elvanse
4. Lis dexamfetamine Dimesylate
5. lis-dexamfetamine dimesylate
6. lisdexamfetamine
7. lisdexamfetamine dimesylate
8. NRP 104
9. NRP-104
10. NRP104
11. Vyvanse

from MeSH

3.4.2 Depositor-Supplied Synonyms

1. Lisdexamfetamine
2. Vyvanse
3. NRP104
4. UNII-H645GUL8KJ
5. 608137-32-2
6. Lisdexamfetamine (INN)
7. Lisdexamfetamine [INN]
8. H645GUL8KJ
9. Vyvanse (TN)
11. D00DEF
12. SCHEMBL158949
13. GTPL7213
14. CHEMBL1201222
15. HSDB 8277
16. DTXSID00209652
17. CHEBI:135925
18. (2S)-2,6-Diamino-N-((1S)-1-methyl-2-phenylethyl)hexanamide
19. ZINC11680943
21. LS-187377
22. D08130
23. (2S)-2,6-diamino-
24. (2S)-2,6-diamino-

10. L-lysine-d-amphetamine 20. DB01255

from PubChem

4 Chemical and Physical Properties

4.1 Computed Properties

Property Name	Property Value
Molecular Weight	263.385 g/mol
Hydrogen Bond Donor Count	3
Hydrogen Bond Acceptor Count	3
Rotatable Bond Count	8
Complexity	252
CACTVS Substructure Key Fingerprint	AAADceBzIAAAAAAAAAAAAAAAAAAAAAAAAAwAAAAAAAAAAABAAAAHgAQAAAADCjBmAQyAILAAACIAiFSEAACAAAgAAAIiIGIAIgIYDKAkRGUIAAglgCIiAcYiIAOAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA==
Topological Polar Surface Area	81.1 A^2
Monoisotopic Mass	263.2 g/mol
Exact Mass	263.2 g/mol
XLogP3-AA	1.2
Compound Is Canonicalized	true
Formal Charge	0
Heavy Atom Count	19
Defined Atom Stereocenter Count	2
Undefined Atom Stereocenter Count	0
Defined Bond Stereocenter Count	0
Undefined Bond Stereocenter Count	0
Isotope Atom Count	0
Covalently-Bonded Unit Count	1

from PubChem

4.2 Experimental Properties

4.2.1 Physical Description

Solid

from Human Metabolome Database (HMDB)

4.2.2 Color

Golden-colored solid from methanol

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 1026

from HSDB

4.2.3 Melting Point

120-122 deg C

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 1026

from HSDB

4.2.4 Flash Point

9.7 deg C; 49.5 deg F (closed cup)

Sigma-Aldrich; Material Safety Data Sheet for Lisdexamfetamine dimesylate, Product Number: L026, Version 5.3 (Revision Date 08/14/2014). Available from, as of October 30, 2015: http://www.sigmaaldrich.com/safety-center.html

from HSDB

4.2.5 Solubility

Water Solubility

792 mg/mL (dimesylate salt)

from DrugBank

In water, 1500 mg/mL at 25 deg C (est)

US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Oct 16, 2015: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm

from HSDB

8.77e-02 g/L

from Human Metabolome Database (HMDB)

4.2.6 Vapor Pressure

1.31X10-17 mm Hg at 25 deg C (est) (mp 121 deg C)

US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Oct 16, 2015: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm

from HSDB

4.2.7 LogP

1.06

from DrugBank, Human Metabolome Database (HMDB)

log Kow = 1.27 (est)

US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Oct 16, 2015: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm

from HSDB

4.2.8 Stability

Stable under recommended storage conditions.

Sigma-Aldrich; Material Safety Data Sheet for Lisdexamfetamine dimesylate, Product Number: L026, Version 5.3 (Revision Date 08/14/2014). Available from, as of October 30, 2015: http://www.sigmaaldrich.com/safety-center.html

from HSDB

4.2.9 Dissociation Constants

pKa1 = 8.43; pKa2 = 10.21; pKa3 = 15.89 (est)

Royal Soc Chem; ChemSpider. Lisdexamfetamine. (608137-32-2). Available from, as of Oct 19, 2015: http://www.chemspider.com/Search.aspx

from HSDB

4.3 Spectral Properties

4.3.1 Mass Spectrometry

4.3.1.1 GC-MS

GC-MS Spectrum 11060 - GC-MS Ei Predicted by CFMID-EI, energy0

from Human Metabolome Database (HMDB)

4.3.1.2 MS-MS

1. MS-MS Spectrum 52038 - 10V Positive Predicted by CFM-ID
2. MS-MS Spectrum 52039 - 20V Positive Predicted by CFM-ID
3. MS-MS Spectrum 52040 - 40V Positive Predicted by CFM-ID
4. MS-MS Spectrum 126312 - 10V Negative Predicted by CFM-ID
5. MS-MS Spectrum 126313 - 20V Negative Predicted by CFM-ID
6. MS-MS Spectrum 126314 - 40V Negative Predicted by CFM-ID

from Human Metabolome Database (HMDB)

5 Related Records

5.1 Related Compounds with Annotation

CLICK TO LOAD...

from PubChem

5.2 Related Compounds

Same Connectivity	16 records
Same Stereo	7 records
Same Isotope	5 records
Same Parent, Connectivity	26 records
Same Parent, Stereo	13 records
Same Parent, Isotope	10 records
Same Parent, Exact	5 records
Mixtures, Components, and Neutralized Forms	8 records
Similar Compounds	25836 records
Similar Conformers	19 records

from PubChem

5.3 Substances

5.3.1 Related Substances

All	72 records
Same	32 records
Mixture	40 records

from PubChem

5.3.2 Substances by Category

CLICK TO LOAD...

from PubChem

5.4 Entrez Crosslinks

PubMed	50 records

from PubChem

6 Chemical Vendors

CLICK TO LOAD...

from PubChem

7 Drug and Medication Information

7.1 Drug Indication

For the treatment of Attention Deficit/Hyperactivity Disorder (ADHD) in pediatric populations aged 6 to 12 years.

from DrugBank

7.2 FDA Medication Guides

Vyvanse (lisdexamfetamine dimesylate) [2017 version]

from FDA Medication Guides

7.3 FDA Orange Book

7.3.1 Prescription Drug Products

Prescription Drug Products: 1 of 1 (RX Drug Ingredient)	
Drug Ingredient	LISDEXAMFETAMINE DIMESYLATE
Proprietary Name	VYVANSE
Applicant	1. SHIRE DEV LLC (Application Number: N208510. Patents: 7105486, 7223735, 7655630, 7659253, 7659254, 7662787, 7662788, 7671030, 7671031, 7674774, 7678770, 7678771, 7687466, 7687467, 7713936, 7718619, 7723305) 2. SHIRE DEVELOPMENT (Application Number: N021977. Patents: 7105486, 7223735, 7655630, 7659253, 7659254, 7662787, 7662788, 7671030, 7671031, 7674774, 7678770, 7678771, 7687466, 7687467, 7700561, 7713936, 7718619, 7723305)

from FDA Orange Book

7.4 Drugs at PubMed Health

Drugs at PubMed Health: 1 of 3 (PubMed Health Drug Name)	
Drug Name	Lisdexamfetamine (By mouth)
Description	Treats attention-deficit/hyperactivity disorder (ADHD) and binge eating disorder.
Drug Classes	CNS Stimulant

from PubMed Health

Drugs at PubMed Health: 2 of 3 (PubMed Health Drug Name)	
Drug Name	Vyvanse

Drugs at PubMed Health: 2 of 3 (PubMed Health Drug Name)	
Notes	See Amphetamine (By mouth)

from PubMed Health

Drugs at PubMed Health: 3 of 3 (PubMed Health Drug Name)	
Drug Name	Vyvanse
Notes	See Lisdexamfetamine (By mouth)

from PubMed Health

7.5 Clinical Trials

Download

1 to 5 of 39 View More

Record ID	Title	Status	Phase
NCT00247572	Safety, Tolerability and Abuse Liability Study of Intravenous NRP104 in Adults With Stimulant Abuse Histories	Completed	2
NCT00248092	Study to Evaluate the Likeability, Safety, and Abuse Potential of NRP 104 in Adults With Histories of Stimulant Abuse	Completed	2
NCT00334880	Study to Assess the Safety and Efficacy of NRP104 in Adults With Attention-Deficit Hyperactivity Disorder (ADHD)	Completed	3
NCT00500071	Dose-Optimization Study Evaluating the Efficacy, Safety and Tolerability of Vyvanse (Lisdexamfetamine Dimesylate) in Children Aged 6-12 Diagnosed With ADHD	Completed	4
NCT00500149	A Classroom Study to Assess the Time of Onset of Vyvanse (Lisdexamfetamine Dimesylate) in Pediatric Subjects Aged 6-12 With Attention Deficit/Hyperactivity Disorder (ADHD)	Completed	3

from ClinicalTrials.gov

7.6 Therapeutic Uses

Attention Deficit Disorder with Hyperactivity

National Library of Medicine's Medical Subject Headings. Lisdexamfetamine. Online file (MeSH, 2015). Available from, as of November 20, 2015: https://www.nlm.nih.gov/mesh/MBrowser.html

from HSDB

/CLINICAL TRIALS/ ClinicalTrials.gov is a registry and results database of publicly and privately supported clinical studies of human participants conducted around the world. The Web site is maintained by the National Library of Medicine (NLM) and the National Institutes of Health (NIH). Each ClinicalTrials.gov record presents summary information about a study protocol and includes the following: Disease or condition; Intervention (for example, the medical product, behavior, or procedure being studied); Title, description, and design of the study; Requirements for participation (eligibility criteria); Locations where the study is being conducted; Contact information for the study locations; and Links to relevant

information on other health Web sites, such as NLM's MedlinePlus for patient health information and PubMed for citations and abstracts for scholarly articles in the field of medicine. Lisdexamfetamine is included in the database.

NIH/NLM; ClinicalTrials.Gov. Available from, as of September 30, 2015: https://clinicaltrials.gov/search/intervention=nrp+104+OR+lisdexamfetamine

▸ *from HSDB*

Vyvanse is indicated for the treatment of: Attention Deficit Hyperactivity Disorder (ADHD) and moderate to severe binge eating disorder (BED). /Included in US product label/

NIH; DailyMed. Current Medication Information for Vyvanse (Lisdexamfetamine Dimesylate) Capsule (Updated: April 2015). Available from, as of November 20, 2015: http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=704e4378-ca83-445c-8b45-3cfa51c1ecad

▸ *from HSDB*

EXPL THER Attention deficits are often among the most persistent and debilitating impairments resulting from traumatic brain injury (TBI). This study examined the effects of lisdexamfetamine dimesylate (Vyvanse) in treating attention deficits due to moderate-to-severe TBI. It was the first study of lisdexamfetamine dimesylate with this population and, in fact, was the first controlled trial in this area examining a stimulant medication option other than methylphenidate. This was a 12-week, randomized, double-blind, placebo-controlled, cross-over trial. A total of 22 rigorously selected cases were enrolled, 13 of whom completed the trial. They were 16-42 years of age and had newly acquired attention deficits persisting for 6-34 months post-injury. They were assessed on a broad range of neuropsychological and behavioural measures at baseline, 6-weeks and at 12-weeks. Positive treatment effects were found involving selective measures of sustained attention, working memory, response speed stability and endurance and in aspects of executive functioning. No major problems with safety or tolerability were observed. Some moderating treatment effects were found from a broad range of pre-treatment subject characteristics and injury variables examined. Avenues for further research and treatment applications in this area are discussed.
Abstract: PubMed

Tramontana MG et al; Brain Inj 28 (11): 1461-72 (2014)

▸ *from HSDB*

EXPL THER Chronic amphetamine treatment decreases cocaine consumption in preclinical and human laboratory studies and in clinical trials. Lisdexamfetamine is an amphetamine prodrug in which L-lysine is conjugated to the terminal nitrogen of d-amphetamine. Prodrugs may be advantageous relative to their active metabolites due to slower onsets and longer durations of action; however, lisdexamfetamine treatment's efficacy in decreasing cocaine consumption is unknown. This study compared lisdexamfetamine and d-amphetamine effects in rhesus monkeys using two behavioral procedures: (1) a cocaine discrimination procedure (training dose = 0.32mg/kg cocaine, i.m.); and (2) a cocaine-versus-food choice self-administration procedure. In the cocaine-discrimination procedure, lisdexamfetamine (0.32-3.2mg/kg, i.m.) substituted for cocaine with lower potency, slower onset, and longer duration of action than d-amphetamine (0.032-0.32mg/kg, i.m.). Consistent with the function of lisdexamfetamine as an inactive prodrug for amphetamine, the time course of lisdexamfetamine effects was related to d-amphetamine plasma levels by a counter-clockwise hysteresis loop. In the choice procedure, cocaine (0-0.1mg/kg/injection, i.v.) and food (1g banana-flavored pellets) were concurrently available, and cocaine maintained a dose-dependent increase in cocaine choice under baseline conditions. Treatment for 7 consecutive days with lisdexamfetamine (0.32-3.2mg/kg/day, i.m.) or d-amphetamine (0.032-0.1mg/kg/hr, i.v.) produced similar dose-dependent rightward shifts in cocaine dose-effect curves and decreases in preference for 0.032mg/kg/injection cocaine. Lisdexamfetamine has a slower onset and longer duration of action than amphetamine but retains amphetamine's efficacy to reduce the choice of cocaine in rhesus monkeys. These results support further consideration of lisdexamfetamine as an agonist-based medication candidate for cocaine addiction.[Banks ML et al; Int J Neuropsychopharmacol 18(8) pii: pyv009 (2015).] Full text: PMC4458439
Abstract: PubMed

▸ *from HSDB*

7.7 Drug Warning

/BOX WARNING/ CNS stimulants (amphetamines and methylphenidate-containing products), including Vyvanse, have a high potential for abuse and dependence. Assess the risk of abuse prior to prescribing and monitor for signs of abuse and

dependence while on therapy.

NIH; DailyMed. Current Medication Information for Vyvanse (Lisdexamfetamine Dimesylate) Capsule (Updated: April 2015). Available from, as of November 20, 2015: http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=704e4378-ca83-445c-8b45-3cfa51c1ecad

from HSDB

Sudden death, stroke and myocardial infarction have been reported in adults with CNS stimulant treatment at recommended doses. Sudden death has been reported in children and adolescents with structural cardiac abnormalities and other serious heart problems taking CNS stimulants at recommended doses for ADHD. Avoid use in patients with known structural cardiac abnormalities, cardiomyopathy, serious heart arrhythmia, coronary artery disease, and other serious heart problems. Further evaluate patients who develop exertional chest pain, unexplained syncope, or arrhythmias during Vyvanse treatment.

NIH; DailyMed. Current Medication Information for Vyvanse (Lisdexamfetamine Dimesylate) Capsule (Updated: April 2015). Available from, as of November 20, 2015: http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=704e4378-ca83-445c-8b45-3cfa51c1ecad

from HSDB

Risk of prematurity, low birth weight, and withdrawal symptoms (e.g., dysphoria, lassitude, agitation) in infants born to dependent women.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2535

from HSDB

Manifestations of amphetamine overdose include restlessness, tremor, hyperreflexia, rapid respiration, confusion, assaultiveness, hallucinations, panic states, hyperpyrexia, and rhabdomyolysis. Fatigue and depression usually follow the central nervous system stimulation. Other reactions include arrhythmias, hypertension or hypotension, circulatory collapse, nausea, vomiting, diarrhea, and abdominal cramps. Fatal poisoning is usually preceded by convulsions and coma.

NIH; DailyMed. Current Medication Information for Vyvanse (Lisdexamfetamine Dimesylate) Capsule (Updated: April 2015). Available from, as of November 20, 2015: http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=704e4378-ca83-445c-8b45-3cfa51c1ecad

from HSDB

Safety and efficacy of lisdexamfetamine not established in children 3-5 years of age. Amphetamines not recommended for ADHD in children younger than 3 years of age. Not studied to date in adolescents. Aggressive behavior, hostility, and psychotic (e.g., hallucinations, delusional thinking) or manic symptoms reported in children and adolescents receiving stimulants for management of ADHD.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2536

from HSDB

Possible modest increases in average blood pressure (i.e., by about 2-4 mm Hg) and heart rate (i.e., by about 3-6 beats/minute); larger increases may occur. Modest increases not expected to have short-term sequelae; however, monitor all patients for larger changes in blood pressure and heart rate. Caution advised in patients with underlying medical conditions that might be affected by increases in blood pressure or heart rate (e.g., hypertension, heart failure, recent myocardial infarction, ventricular arrhythmia).

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2535

from HSDB

Amphetamines have a high potential for abuse. Administration of amphetamines for prolonged periods of time may lead to drug dependence. Particular attention should be paid to the possibility of individuals obtaining amphetamines for nontherapeutic use or distribution to others, and the drugs should be prescribed or dispensed sparingly. The possibility that family members may abuse the patient's medication should be considered.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2535

from HSDB

Amphetamines may impair the ability to engage in certain potentially hazardous activity (operating machinery or vehicles).

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2535

from HSDB

Children 6-12 years of age: Decreased appetite, insomnia, upper abdominal pain, irritability, vomiting, weight loss, nausea, dry mouth, dizziness, affect lability, rash, tic, pyrexia, somnolence. Adults: Decreased appetite, insomnia, dry mouth, diarrhea, nausea, anxiety, anorexia, jitteriness, increased blood pressure, agitation, restlessness, hyperhidrosis, increased heart rate, tremor, dyspnea.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2536

from HSDB

Amphetamines reported to exacerbate motor and phonic tics and Tourette's syndrome. However, a history of tics or their development during therapy is not an absolute contraindication to continued use. Nevertheless, evaluate for presence of tics and Tourette's syndrome in children and their families prior to initiating stimulant therapy.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2535

from HSDB

Visual disturbances (e.g., difficulty with accommodation, blurred vision) reported with stimulants.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2535

from HSDB

Aggressive behavior, hostility, and and psychotic behavior or manic symptoms have been reported in children receiving stimulants for the treatment of ADHD. /Stimulants/

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2535

from HSDB

Possible lowering of seizure threshold in patients with history of seizures, in those with prior EEG abnormalities but no history of seizures, and, very rarely, in those without history of seizures and with no prior evidence of EEG abnormalities. If seizures occur, discontinue therapy.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2535

from HSDB

Long-term (i.e., exceeding 12 months) administration expected to cause at least a temporary suppression of normal weight and/or height patterns in some children and adolescents. Dose-related weight loss reported in children during 4 weeks of therapy with lisdexamfetamine. Manufacturer recommends monitoring growth during treatment; patients not growing or gaining weight as expected may require temporary discontinuance of treatment. However, the American Academy of Pediatrics states that studies of stimulants in children found little or no decrease in expected height, with any decrease in growth early in treatment being compensated for later on.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2535

from HSDB

Aggressive behavior and hostility (frequently observed in children and adolescents with ADHD) reported in patients receiving drug therapy for ADHD. No systematic evidence that stimulants cause these adverse effects; however, monitor patients beginning treatment for ADHD for onset or worsening of aggressive behavior or hostility.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2535

from HSDB

May precipitate mixed or manic episodes in ADHD patients with comorbid bipolar disorder. Psychotic symptoms (e.g., hallucinations, delusional thinking) may occur with usual dosages in children and adolescents without prior history of psychotic illness. If psychotic symptoms occur, consider causal relationship to stimulants, and discontinue therapy as appropriate.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2535

▸ *from HSDB*

May exacerbate symptoms of behavior disturbance and thought disorder in patients with a pre-existing psychotic disorder.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2535

▸ *from HSDB*

Contraindicated within 14 days of monoamine oxidase (MAO) therapy.

American Society of Health-System Pharmacists 2014; Drug Information 2014. Bethesda, MD. 2014, p. 2607

▸ *from HSDB*

Contraindicated in patients with advanced arteriosclerosis, cardiovascular disease, moderate to severe hypertension, hyperthyroidism, hypersensitivity or idiosyncrasy to sympathomimetic amines, glaucoma, or a history of substance abuse. Not to be used in agitated patients.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2535

▸ *from HSDB*

Distributed into milk; discontinue nursing or the drug.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2535

▸ *from HSDB*

FDA Pregnancy Risk Category: C /RISK CANNOT BE RULED OUT. Adequate, well controlled human studies are lacking, and animal studies have shown risk to the fetus or are lacking as well. There is a chance of fetal harm if the drug is given during pregnancy; but the potential benefits may outweigh the potential risk./

NIH; DailyMed. Current Medication Information for Vyvanse (Lisdexamfetamine Dimesylate) Capsule (Updated: April 2015). Available from, as of November 20, 2015: http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=704e4378-ca83-445c-8b45-3cfa51c1ecad

▸ *from HSDB*

8 Pharmacology and Biochemistry

8.1 Pharmacology

Lisdexamfetamine is a pro-drug of dextroamphetamine. It works primarily by inducing the release of the neurotransmitters dopamine and norepinephrine from their storage areas in nerve terminals. Both of these transmitters contribute to maintaining alertness, increasing focus, and sustaining thought, effort, and motivation.

from DrugBank

Lisdexamfetamine is a prodrug of the d-isomer of amphetamine, a non-catecholamine sympathomimetic amine with central nervous system (CNS) stimulating activity. Upon administration, lisdexamphetamine is converted to dextroamphetamine through cleavage of the lysine group. Dextroamphetamine acts by facilitating the release of catecholamines, particularly noradrenaline and dopamine, from its storage sites in nerve terminals in the CNS, and inhibits their uptake within the mesocorticolimbic system, a major component of the brain reward system, resulting in measurable behavioral changes such as euphoria, mental alertness and excitement and appetite suppression. As a CNS stimulant, this agent may increase blood pressure.

from NCIt

8.2 MeSH Pharmacological Classification

Central Nervous System Stimulants

A loosely defined group of drugs that tend to increase behavioral alertness, agitation, or excitation. They work by a variety of mechanisms, but usually not by direct excitation of neurons. The many drugs that have such actions as side effects to their main therapeutic use are not included here.
See a list of PubChem compounds matching this category.

from MeSH

Dopamine Uptake Inhibitors

Drugs that block the transport of DOPAMINE into axon terminals or into storage vesicles within terminals. Most of the ADRENERGIC UPTAKE INHIBITORS also inhibit dopamine uptake.
See a list of PubChem compounds matching this category.

from MeSH

8.3 FDA Pharmacological Classification

8.3.1 Active Moiety

LISDEXAMFETAMINE

from FDA Pharm Classes

8.3.2 FDA UNII

H645GUL8KJ

from FDA Pharm Classes

8.3.3 Pharmacological Classes

Established Pharmacologic Class [EPC]	Central Nervous System Stimulant
Physiologic Effects [PE]	Central Nervous System Stimulation

from FDA Pharm Classes

8.4 ATC Code

N - Nervous system
N06 - Psychoanaleptics
N06B - Psychostimulants, agents used for adhd and nootropics
N06BA - Centrally acting sympathomimetics
N06BA12 - Lisdexamfetamine

from WHO ATC

8.5 Absorption, Distribution and Excretion

Absorption

After oral administration, lisdexamfetamine is rapidly absorbed from the gastrointestinal tract.

from DrugBank

After oral administration, lisdexamfetamine is rapidly absorbed from the gastrointestinal tract.

NIH; DailyMed. Current Medication Information for Vyvanse (Lisdexamfetamine Dimesylate) Capsule (Updated: April 2015). Available from, as of November 20, 2015: http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=704e4378-ca83-445c-8b45-3cfa51c1ecad

from HSDB

Following the oral administration of a 70 mg dose of radiolabeled lisdexamfetamine dimesylate to 6 healthy subjects, approximately 96% of the oral dose radioactivity was recovered in the urine and only 0.3% recovered in the feces over a period of 120 hours. Of the radioactivity recovered in the urine, 42% of the dose was related to amphetamine, 25% to hippuric acid, and 2% to intact lisdexamfetamine. Plasma concentrations of unconverted lisdexamfetamine are low and transient, generally becoming non-quantifiable by 8 hours after administration.

NIH; DailyMed. Current Medication Information for Vyvanse (Lisdexamfetamine Dimesylate) Capsule (Updated: April 2015). Available from, as of November 20, 2015: http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=704e4378-ca83-445c-8b45-3cfa51c1ecad

from HSDB

/MILK/ Distributed into milk ... .

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2535

from HSDB

8.6 Metabolism/Metabolites

Metabolism

Lisdexamfetamine is converted to dextroamphetamine and L-lysine, which is believed to occur by first-pass intestinal and/or hepatic metabolism. Lisdexamfetamine is not metabolized by cytochrome P450 enzymes.

from DrugBank

The metabolic route of lisdexamfetamine is unusual because after absorption into the bloodstream it is metabolized by red blood cells to yield d-amphetamine and the natural amino acid, L-lysine, by rate- limited, enzymatic hydrolysis.[Heal DJ et al; J Psychopharmacol 27(6): 479-96 (2013).] Full text: PMC3666194
Abstract: PubMed

from HSDB

Lisdexamfetamine is converted to dextroamphetamine and l-lysine primarily in blood due to the hydrolytic activity of red blood cells. In vitro data demonstrated that red blood cells have a high capacity for metabolism of lisdexamfetamine; substantial hydrolysis occurred even at low hematocrit levels (33% of normal). Lisdexamfetamine is not metabolized by cytochrome P450 enzymes.

NIH; DailyMed. Current Medication Information for Vyvanse (Lisdexamfetamine Dimesylate) Capsule (Updated: April 2015). Available from, as of November 20, 2015: http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=704e4378-ca83-445c-8b45-3cfa51c1ecad

from HSDB

These studies investigated the absorption and metabolic conversion of lisdexamfetamine dimesylate (LDX), a prodrug stimulant that requires conversion to d-amphetamine for activity. Oral absorption of LDX was assessed in rat portal and jugular blood, and perfusion of LDX into isolated intestinal segments of anesthetized rats was used to assess regional absorption. Carrier-mediated transport of LDX was investigated in Caco-2 cells and Chinese hamster ovary (CHO) cells expressing human peptide transporter-1 (PEPT1). LDX metabolism was studied in rat and human tissue homogenates and human blood fractions. LDX was approximately10-fold higher in portal blood versus systemic blood. LDX and d-amphetamine were detected in blood following perfusion of the rat small intestine but not the colon. Transport of LDX in Caco-2 cells had permeability apparently similar to cephalexin and was reduced with concurrent PEPT1 inhibitor. Affinity for PEPT1 was also demonstrated in PEPT1-transfected CHO cells. LDX metabolism occurred primarily in whole blood (rat and human), only with red blood cells. Slow hydrolysis in liver and kidney homogenates was probably due to residual blood. The carrier-mediated absorption of intact LDX, likely by the high-capacity PEPT1 transporter, and subsequent metabolism to d-amphetamine in a high-capacity system in blood (ie, red blood cells) may contribute to the consistent, reproducible pharmacokinetic profile of LDX.[Pennick M; Neuropsychiatr Dis Treat 6: 317-327 (2010)] Full text: PMC2898170
Abstract: PubMed

from HSDB

8.7 Biological Half-Life

The plasma elimination half-life of lisdexamfetamine typically averaged less than one hour.

from DrugBank

The plasma elimination half-life of lisdexamfetamine typically averaged less than one hour in studies of lisdexamfetamine dimesylate in volunteers.

NIH; DailyMed. Current Medication Information for Vyvanse (Lisdexamfetamine Dimesylate) Capsule (Updated: April 2015). Available from, as of November 20, 2015: http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=704e4378-ca83-445c-8b45-3cfa51c1ecad

from HSDB

8.8 Mechanism of Action

Lisdexamfetamine is a pro-drug of dextroamphetamine. Amphetamines are thought to block the reuptake of norepinephrine and dopamine into the presynaptic neuron and increase the release of these monoamines into the

extraneuronal space. Norepinephrine and dopamine contribute to maintaining alertness, increasing focus, and sustaining thought, effort, and motivation. However, the exact therapeutic action in ADHD is not known.

from DrugBank

Lisdexamfetamine is a prodrug of dextroamphetamine. Amphetamines are non-catecholamine sympathomimetic amines with CNS stimulant activity. Amphetamines block the reuptake of norepinephrine and dopamine into the presynaptic neuron and increase the release of these monoamines into the extraneuronal space. The parent drug, lisdexamfetamine, does not bind to the sites responsible for the reuptake of norepinephrine and dopamine in vitro.

NIH; DailyMed. Current Medication Information for Vyvanse (Lisdexamfetamine Dimesylate) Capsule (Updated: April 2015). Available from, as of November 20, 2015: http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=704e4378-ca83-445c-8b45-3cfa51c1ecad

from HSDB

8.9 Human Metabolite Information

8.9.1 Metabolite Description

Description

Lisdexamfetamine (L-lysine-d-amphetamine) is a prodrug of the psychostimulant d-amphetamine coupled with the essential amino acid L-lysine. It was developed so that the amphetamine psychostimulant is released and activated more slowly as the prodrug molecule is hydrolyzed consequently cleaving off the amino acid-during the first pass through the intestines and/or the liver. Amphetamines target the trace amine-associated receptor 1 (TAAR1). Amphetamine is also believed to exert its effects by binding to the monoamine transporters (the dopamine transporter or DAT) and increasing extracellular levels of the biogenic amines dopamine, norepinephrine (noradrenaline) and serotonin.

from Human Metabolome Database (HMDB)

8.9.2 Cellular Locations

Membrane

from Human Metabolome Database (HMDB)

9 Use and Manufacturing

9.1 Methods of Manufacturing

Preparation: T. Mickle et al., World Intellectual Property Organization patent 05032474; eidem, USA patent 0505461 (both 2005 to New River Pharm.)

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 1026

from HSDB

9.2 Formulations/Preparations

Route of Administration	Dosage Form	Strength	Brand or Generic Form (Manufacturer)
Oral	Capsules	20 mg	Vyvanse, C-II (Shire)
Oral	Capsules	30 mg	Vyvanse, C-II (Shire)
Oral	Capsules	40 mg	Vyvanse, C-II (Shire)
Oral	Capsules	50 mg	Vyvanse, C-II (Shire)
Oral	Capsules	60 mg	Vyvanse, C-II (Shire)
Oral	Capsules	70 mg	Vyvanse, C-II (Shire)

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2536

from HSDB

10 Safety and Hazards

10.1 Safety and Hazard Properties

10.1.1 Explosive Limits and Potential

Upper explosion limit: 36 %(V); Lower explosion limit: 6 %(V)

Sigma-Aldrich; Material Safety Data Sheet for Lisdexamfetamine dimesylate, Product Number: L026, Version 5.3 (Revision Date 08/14/2014). Available from, as of October 30, 2015: http://www.sigmaaldrich.com/safety-center.html

▸ *from HSDB*

10.2 Fire Fighting Measures

Use water spray to cool unopened containers.

Sigma-Aldrich; Material Safety Data Sheet for Lisdexamfetamine dimesylate, Product Number: L026, Version 5.3 (Revision Date 08/14/2014). Available from, as of October 30, 2015: http://www.sigmaaldrich.com/safety-center.html

▸ *from HSDB*

Advice for firefighters: Wear self-contained breathing apparatus for firefighting if necessary.

Sigma-Aldrich; Material Safety Data Sheet for Lisdexamfetamine dimesylate, Product Number: L026, Version 5.3 (Revision Date 08/14/2014). Available from, as of October 30, 2015: http://www.sigmaaldrich.com/safety-center.html

▸ *from HSDB*

Suitable extinguishing media: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Sigma-Aldrich; Material Safety Data Sheet for Lisdexamfetamine dimesylate, Product Number: L026, Version 5.3 (Revision Date 08/14/2014). Available from, as of October 30, 2015: http://www.sigmaaldrich.com/safety-center.html

▸ *from HSDB*

10.3 Accidental Release Measures

10.3.1 Cleanup Methods

Accidental Release Measures. Personal precautions, protective equipment and emergency procedures: Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas. Environmental precautions: Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Methods and materials for containment and cleaning up: Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations.

Sigma-Aldrich; Material Safety Data Sheet for Lisdexamfetamine dimesylate, Product Number: L026, Version 5.3 (Revision Date 08/14/2014). Available from, as of October 30, 2015: http://www.sigmaaldrich.com/safety-center.html

▸ *from HSDB*

10.3.2 Disposal Methods

SRP: Expired or waste pharmaceuticals shall carefully take into consideration applicable DEA, EPA, and FDA regulations. It is not appropriate to dispose by flushing the pharmaceutical down the toilet or discarding to trash. If possible return the pharmaceutical to the manufacturer for proper disposal being careful to properly label and securely package the material. Alternatively, the waste pharmaceutical shall be labeled, securely packaged and transported by a state licensed medical waste contractor to dispose by burial in a licensed hazardous or toxic waste landfill or incinerator.

▸ *from HSDB*

Product: Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Contaminated packaging: Dispose of as unused product.

Sigma-Aldrich; Material Safety Data Sheet for Lisdexamfetamine dimesylate, Product Number: L026, Version 5.3 (Revision Date 08/14/2014). Available from, as of October 30, 2015: http://www.sigmaaldrich.com/safety-center.html

▸ *from HSDB*

10.3.3 Other Preventative Measures

Conditions to avoid: Heat, flames and sparks. Extremes of temperature and direct sunlight.

Sigma-Aldrich; Material Safety Data Sheet for Lisdexamfetamine dimesylate, Product Number: L026, Version 5.3 (Revision Date 08/14/2014). Available from, as of October 30, 2015: http://www.sigmaaldrich.com/safety-center.html

▸ *from HSDB*

Precautions for safe handling: Avoid contact with skin and eyes. Avoid inhalation of vapor or mist. Use explosion-proof equipment. Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.

Sigma-Aldrich; Material Safety Data Sheet for Lisdexamfetamine dimesylate, Product Number: L026, Version 5.3 (Revision Date 08/14/2014). Available from, as of October 30, 2015: http://www.sigmaaldrich.com/safety-center.html

▸ *from HSDB*

Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands

Sigma-Aldrich; Material Safety Data Sheet for Lisdexamfetamine dimesylate, Product Number: L026, Version 5.3 (Revision Date 08/14/2014). Available from, as of October 30, 2015: http://www.sigmaaldrich.com/safety-center.html

▸ *from HSDB*

10.4 Handling and Storage

10.4.1 Storage Conditions

Conditions for safe storage, including any incompatibilities: Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Recommended storage temperature -20 degrees C

Sigma-Aldrich; Material Safety Data Sheet for Lisdexamfetamine dimesylate, Product Number: L026, Version 5.3 (Revision Date 08/14/2014). Available from, as of October 30, 2015: http://www.sigmaaldrich.com/safety-center.html

▸ *from HSDB*

10.5 Exposure Control and Personal Protection

10.5.1 Protective Equipment and Clothing

Respiratory protection: Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU)..

Sigma-Aldrich; Material Safety Data Sheet for Lisdexamfetamine dimesylate, Product Number: L026, Version 5.3 (Revision Date 08/14/2014). Available from, as of October 30, 2015: http://www.sigmaaldrich.com/safety-center.html

▸ *from HSDB*

Body Protection: Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Sigma-Aldrich; Material Safety Data Sheet for Lisdexamfetamine dimesylate, Product Number: L026, Version 5.3 (Revision Date 08/14/2014). Available from, as of October 30, 2015: http://www.sigmaaldrich.com/safety-center.html

▸ *from HSDB*

Skin protection: Handle with gloves.

Sigma-Aldrich; Material Safety Data Sheet for Lisdexamfetamine dimesylate, Product Number: L026, Version 5.3 (Revision Date 08/14/2014). Available from, as of October 30, 2015: http://www.sigmaaldrich.com/safety-center.html

▸ *from HSDB*

Eye/face protection: Face shield and safety glasses. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Sigma-Aldrich; Material Safety Data Sheet for Lisdexamfetamine dimesylate, Product Number: L026, Version 5.3 (Revision Date 08/14/2014). Available from, as of October 30, 2015: http://www.sigmaaldrich.com/safety-center.html

▸ *from HSDB*

10.6 Stability and Reactivity

10.6.1 Reactivities and Incompatibilities

Incompatible materials: Acids, Oxidizing agents, Alkali metals, Strong oxidizing agents, Strong acids, Acid chlorides, Acid anhydrides, Reducing agents, Strong reducing agents, and Phosphorus halides.

Sigma-Aldrich; Material Safety Data Sheet for Lisdexamfetamine dimesylate, Product Number: L026, Version 5.3 (Revision Date 08/14/2014). Available from, as of October 30, 2015: http://www.sigmaaldrich.com/safety-center.html

▸ *from HSDB*

Possibility of hazardous reactions: Vapors may form explosive mixture with air

Sigma-Aldrich; Material Safety Data Sheet for Lisdexamfetamine dimesylate, Product Number: L026, Version 5.3 (Revision Date 08/14/2014). Available from, as of October 30, 2015: http://www.sigmaaldrich.com/safety-center.html

▸ *from HSDB*

10.7 Regulatory Information

10.7.1 FDA Requirements

The Approved Drug Products with Therapeutic Equivalence Evaluations identifies currently marketed prescription drug products, including lisdexamfetamine dimesylate, approved on the basis of safety and effectiveness by FDA under sections 505 of the Federal Food, Drug, and Cosmetic Act. /Lisdexamfetamine dimesylate/

DHHS/FDA; Electronic Orange Book-Approved Drug Products with Therapeutic Equivalence Evaluations. Available from, as of September 30, 2015: http://www.fda.gov/cder/ob/

from HSDB

Schedule II shall consist of the drugs and other substances, by whatever official name, common or usual name, chemical name, or brand name designated, listed in this section. Each drug or substance has been assigned the DEA Controlled Substances Code Number set forth opposite it. ... (d) Stimulants. Unless specifically excepted or unless listed in another schedule, any material, compound, mixture, or preparation which contains any quantity of the following substances having a stimulant effect on the central nervous system: Lisdexamfetamine, its salts, isomers, and salts of its isomers (DEA Code Number: 1205) is included on this list.

21 CFR 1308.12(d) (USFDA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of October 7, 2015: http://www.ecfr.gov

from HSDB

11 Toxicity

11.1 Toxicological Information

11.1.1 Interactions

Amphetamines may antagonize the hypotensive effects of antihypertensives.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2536

▸ *from HSDB*

Amphetamines may counteract the sedative effects of antihistamines.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2536

▸ *from HSDB*

Enhanced activity of tricyclic antidepressants; desipramine or protriptyline cause striking and sustained increases in the concentration of dextroamphetamine in the brain; cardiovascular effects can be potentiated.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2536

▸ *from HSDB*

Decreased urinary excretion of amphetamines with concomitant use of alkalinizing agents (carbonic anhydrase inhibitors, sodium bicarbonate).

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2536

▸ *from HSDB*

Potential inhibition of adrenergic blockade /when used with adrenergic blockers/

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2536

▸ *from HSDB*

Increased urinary excretion and decreased serum concentrations and efficacy of amphetamines with concomitant use of urinary acidifying agents (ammonium chloride, sodium acid phosphate, cranberry juice).

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2536

▸ *from HSDB*

Amphetamines may delay absorption of phenytoin; concomitant use may produce a synergistic anticonvulsant action.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2536

▸ *from HSDB*

Amphetamines may delay absorption of phenobarbital; concomitant use may produce a synergistic anticonvulsant action.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2536

▸ *from HSDB*

Amphetamines enhance the adrenergic effects of norepinephrine.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2536

▸ *from HSDB*

Acidifying agents used with methenamine increase urinary excretion and decrease efficacy of amphetamines.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2536

from HSDB

Amphetamines potentiate the analgesic effect of meperidine.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2536

from HSDB

MAO inhibitors slow the metabolism of amphetamines, increasing their effect on the release of norepinephrine and other monoamines leading to headaches and other signs of hypertensive crisis. Toxic neurologic effects, hypertensive crisis, and malignant hyperpyrexia can occur, sometimes with fatal results.Amphetamines contraindicated in patients currently or recently (within 14 days) receiving MAO inhibitor.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2536

from HSDB

Lithium may inhibit the anorectic and stimulatory effects of amphetamine.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2536

from HSDB

Haloperidol inhibits the central stimulant effects of amphetamines by blocking dopamine receptors.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2536

from HSDB

Intestinal absorption of ethosuximide may be delayed.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2536

from HSDB

11.1.2 Toxicity Summary

Toxicity

Manifestations of acute overdosage with amphetamines include restlessness, tremor, hyperreflexia, rapid respiration, confusion, assaultiveness, hallucinations, panic states, hyperpyrexia and rhabdomyolysis. Fatigue and depression usually follow the central nervous system stimulation. Cardiovascular effects include arrhythmias, hypertension or hypotension and circulatory collapse. Gastrointestinal symptoms include nausea, vomiting, diarrhea, and abdominal cramps. Fatal poisoning is usually preceded by convulsions and coma.

from DrugBank

IDENTIFICATION AND USE: Lisdexamfetamine (trade name: Vynase) is a prescription medication, taken in oral capsules, indicated for the treatment of attention deficit hyperactivity disorder (ADHD) and moderate to severe binge eating disorder. It is listed as a Schedule II controlled substance by the US Drug Enforcement Agency. HUMAN EXPOSURE AND TOXICITY: In a single case report, accidental ingestion of Vynase resulted in symptoms of serotonin syndrome. Adverse events reported in epidemiological studies include acute chorea, agitation, tachycardia, abuse/misuse, decreased appetite, decreased weight, irritability, insomnia, headache, upper abdominal pain, and initial insomnia. Lisdexamfetamine, like many other CNS stimulants, carries a high potential for misuse and chemical dependence, especially in children and adolescents. An additional risk for children and adolescents is temporary growth suppression (in cases where Lisdexamfetamine is administered for more than 12 months). Additionally, it may impair the ability to engage in certain potentially hazardous activities (operating machinery or vehicles), it may exacerbate Tourette's syndrome associated motor and phonic tics, may precipitate mixed or manic episodes in ADHD patients with comorbid bipolar disorder, it may also exacerbate symptoms of behavior disturbance and thought disorder in patients with a pre-existing psychotic disorder, and may cause visual disturbances. Lisdexamfetamine may also lower the threshold for seizure activity, regardless of whether or not the patient has a prior history of seizures. Additional risks include increases in blood pressure, tachycardia, sudden death and cardiovascular events (notably in patients who abuse Lisdexamfetamine). Lisdexamfetamine is a prodrug that requires conversion to d-amphetamine (d-AMPH) for bioactivity. The metabolic route

of lisdexamfetamine is unusual because after absorption into the bloodstream it is metabolized by red blood cells to yield d-amphetamine and the natural amino acid, L-lysine, by rate- limited, enzymatic hydrolysis. ANIMAL STUDIES: In rodents, high doses of lisdexamfetamine have produced chronic, irreversible nerve damage. In rats, subchronic exposure has produced increased locomotor behavior (hyperlocomotion).

from HSDB

11.1.3 Antidote and Emergency Treatment

A 6-year-old girl displayed symptoms of serotonin syndrome after accidental ingestion of Vyvanse (lisdexamfetamine dimesylate). Dexmedetomidine was administered because of persistent neuromuscular hyperactivity and severe agitation despite initial therapy with benzodiazepines. Some children show a paradoxical reaction to benzodiazepines, and dexmedetomidine has a possible role in the treatment of serotonin syndrome.
Abstract: PubMed

Akingbola OA et al; Am J Crit Care 21(6): 456-9 (2012).

from HSDB

/SRP:/ Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR if necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean patient forward or place on the left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention. /Poisons A and B/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds).; Emergency Care For Hazardous Materials Exposure. 3rd revised edition, Elsevier Mosby, St. Louis, MO 2007, p. 160

from HSDB

/SRP:/ Basic treatment: Establish a patent airway (oropharyngeal or nasopharyngeal airway, if needed). Suction if necessary. Watch for signs of respiratory insufficiency and assist ventilations if needed. Administer oxygen by nonrebreather mask at 10 to 15 L/min. Monitor for pulmonary edema and treat if necessary ... . Monitor for shock and treat if necessary ... . Anticipate seizures and treat if necessary ... . For eye contamination, flush eyes immediately with water. Irrigate each eye continuously with 0.9% saline (NS) during transport ... . Do not use emetics. For ingestion, rinse mouth and administer 5 mL/kg up to 200 mL of water for dilution if the patient can swallow, has a strong gag reflex, and does not drool ... . Cover skin burns with dry sterile dressings after decontamination ... . /Poisons A and B/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds).; Emergency Care For Hazardous Materials Exposure. 3rd revised edition, Elsevier Mosby, St. Louis, MO 2007, p. 160

from HSDB

/SRP:/ Advanced treatment: Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious, has severe pulmonary edema, or is in severe respiratory distress. Positive-pressure ventilation techniques with a bag valve mask device may be beneficial. Consider drug therapy for pulmonary edema ... . Consider administering a beta agonist such as albuterol for severe bronchospasm ... . Monitor cardiac rhythm and treat arrhythmias as necessary ... . Start IV administration of D5W TKO /SRP: "To keep open", minimal flow rate/. Use 0.9% saline (NS) or lactated Ringer's (LR) if signs of hypovolemia are present. For hypotension with signs of hypovolemia, administer fluid cautiously. Watch for signs of fluid overload ... . Treat seizures with diazepam or lorazepam ... . Use proparacaine hydrochloride to assist eye irrigation ... . /Poisons A and B/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds).; Emergency Care For Hazardous Materials Exposure. 3rd revised edition, Elsevier Mosby, St. Louis, MO 2007, p. 160-1

from HSDB

Emergency and supportive measures. 1. Maintain an open airway and assist ventilation if necessary. 2. Treat agitation, seizures, coma, and hyperthermia if they occur. 3. Continuously monitor the temperature, other vital signs, and the ECG for a minimum of 6 hours. /Amphetamines/

OLSON, K.R. (Ed). Poisoning and Drug Overdose, Sixth Edition. McGraw-Hill, New York, NY 2012, p. 79

from HSDB

Specific drugs and antidotes. There is no specific antidote. 1. Agitation. Benzodiazepines are usually satisfactory, although antipsychotic agents may be added as needed. 2. Hypertension is best treated with sedation and, if this is not effective, a parenteral vasodilator such as phentolamine or nitroprusside. 3. Treat tachyarrhythmias with propranolol or esmolol. NOTE: Paradoxical hypertension can occur owing to unopposed alpha-adrenergic effects when beta2-mediated vasodilation is blocked; be prepared to give a vasodilator if needed. 4. Treat arterial vasospasm ... . /Amphetamines/

OLSON, K.R. (Ed). Poisoning and Drug Overdose, Sixth Edition. McGraw-Hill, New York, NY 2012, p. 79

from HSDB

Decontamination. Administer activated charcoal orally if conditions are appropriate. Gastric lavage is not necessary after small to moderate ingestions if activated charcoal can be given promptly. Consider whole-bowel irrigation and repeated doses of charcoal after ingestion of drug-filled packets (body stuffers). /Amphetamines/

OLSON, K.R. (Ed). Poisoning and Drug Overdose, Sixth Edition. McGraw-Hill, New York, NY 2012, p. 79

from HSDB

Enhanced elimination. Dialysis and hemoperfusion are not effective. repeat-dose charcoal has not been studied. Renal elimination of dextroamphetamine may be enhanced by acidification of the urine, but this is not recommended because of the risk for aggravating the nephrotoxicity of myoglobinuria. /Amphetamines/

OLSON, K.R. (Ed). Poisoning and Drug Overdose, Sixth Edition. McGraw-Hill, New York, NY 2012, p. 79

from HSDB

11.1.4 Human Toxicity Excerpts

/SIGNS AND SYMPTOMS/ Sudden death, stroke and myocardial infarction have been reported in adults with CNS stimulant treatment at recommended doses. Sudden death has been reported in children and adolescents with structural cardiac abnormalities and other serious heart problems taking CNS stimulants at recommended doses for ADHD. Avoid use in patients with known structural cardiac abnormalities, cardiomyopathy, serious heart arrhythmia, coronary artery disease, and other serious heart problems. Further evaluate patients who develop exertional chest pain, unexplained syncope, or arrhythmias during Vyvanse treatment.

NIH; DailyMed. Current Medication Information for Vyvanse (Lisdexamfetamine Dimesylate) Capsule (Updated: April 2015). Available from, as of November 20, 2015: http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=704e4378-ca83-445c-8b45-3cfa51c1ecad

from HSDB

/SIGNS AND SYMPTOMS/ Manifestations of amphetamine overdose include restlessness, tremor, hyperreflexia, rapid respiration, confusion, assaultiveness, hallucinations, panic states, hyperpyrexia, and rhabdomyolysis. Fatigue and depression usually follow the central nervous system stimulation. Other reactions include arrhythmias, hypertension or hypotension, circulatory collapse, nausea, vomiting, diarrhea, and abdominal cramps. Fatal poisoning is usually preceded by convulsions and coma. /Amphetamine/

NIH; DailyMed. Current Medication Information for Vyvanse (Lisdexamfetamine Dimesylate) Capsule (Updated: April 2015). Available from, as of November 20, 2015: http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=704e4378-ca83-445c-8b45-3cfa51c1ecad

from HSDB

/CASE REPORTS/ Amphetamine-derived medications are being prescribed with increasing frequency to younger pediatric patients to treat attention deficit hyperactivity disorder. Although choreiform movements were reported in adults with amphetamine abuse and in those under therapeutic treatment for attention deficit hyperactivity disorder, previous literature concerning the pediatric population is sparse. We describe two children who developed chorea after ingesting amphetamine-derived medications prescribed to treat attention deficit hyperactivity disorder. Patient 1, a 10-year-old boy, accidently received an extra dose of lisdexamfetamine dimesylate the night before the onset of acute chorea involving his arms, legs, and trunk. Patient 2, an 8-month-old boy, accidentally ingested his stepbrother's mixed amphetamine salts (Adderall XR) and developed acute chorea. Benzodiazepines, diphenhydramine, benztropine, and

opioids did not suppress the chorea in either case. The 10-year-old received haloperidol, which significantly improved his abnormal findings, and he returned to baseline in approximately 48 hours. The 8-month-old was observed in the pediatric intensive care unit, and his signs resolved by 72 hours. Our cases demonstrate that choreiform movements of sustained duration can occur in children with acute supratherapeutic ingestions of amphetamine-derived medications.
Abstract: PubMed

Ford JB et al; Pediatr Neurol 47(3): 216-8 (2012).

from HSDB

/EPIDEMIOLOGY STUDIES/ Lisdexamfetamine dimesylate (LDX) is the first prodrug stimulant and is indicated for the treatment of attention-deficit/hyperactivity disorder. A single-center, double-blind, randomized, placebo-controlled, 6-period crossover study evaluated the abuse potential of single oral doses of 50, 100 (equivalent to 40 mg d-amphetamine), and 150 mg LDX, 40 mg d-amphetamine and 200 mg diethylpropion in 36 individuals with a history of stimulant abuse. On the primary abuse liability measure, maximum change of the Drug Rating Questionnaire-Subject Liking Scale compared with placebo, d-amphetamine and diethylpropion showed significant differences of 4.5 and 4.0 units, respectively ($P < 0.001$ for both vs placebo). LDX, administered at 50, 100 and 150 mg, showed nonsignificant differences of 2.0 and 2.1 units, respectively, at the two lower doses but a significant ($P < 0.001$ vs placebo) difference of 6.1 units at the highest dose. Subjects significantly favored d-amphetamine 40 mg versus LDX 100 mg (2.4 units difference; $P < 0.05$). There was no significant difference in liking scores between d-amphetamine 40 mg and LDX 150 mg. Drug Rating Questionnaire-Subject Feel-Drug-Effect score was significantly lower for 100 mg LDX than for 40 mg d-amphetamine. There were no statistically significant differences between LDX and diethylpropion hydrochloride, a Schedule IV amphetamine-like stimulant, on abuse-related liking scores. Cardiovascular responses of LDX and d-amphetamine were similar at equivalent doses. In conclusion, at an equivalent amount of amphetamine base taken orally, LDX 100 mg had attenuated responses on measures of abuse liability compared with immediate-release d-amphetamine 40 mg. Abuse-related liking scores of LDX at a dose corresponding to a 50% higher amphetamine base (LDX 150 mg) were similar to d-amphetamine 40 mg.
Abstract: PubMed

Jasinski DR et al; J Psychopharmacol 23 (4): 419-27 (2009)

from HSDB

/SURVEILLANCE/ Lisdexamfetamine is a pro-drug stimulant that requires the enzymatic hydrolysis of lysine from dexamphetamine for pharmacologic effects. A retrospective observational case series of single-substance exposures to lisdexamfetamine, dextroamphetamine/amphetamine extended release, or dextroamphetamine/amphetamine immediate release reported to the National Poison Data System from 2007 to 2012 was performed. Data were analyzed for demographics, reason, clinical effects, management site, and outcomes. There were 23,553 exposures: lisdexamfetamine (7,113), dextroamphetamine/amphetamine extended release (6,245), and dextroamphetamine/amphetamine immediate release (10,195). The most frequent clinical effects observed for lisdexamfetamine, dextroamphetamine/amphetamine extended release, and dextroamphetamine/amphetamine immediate release were agitation (19.8%, 21.7%, and 25.1%, respectively) and tachycardia (19.2%, 22.8%, and 23.9%, respectively). The reason was most often exploratory (93.4%) in children < 6 years and therapeutic error (65.6%) in children aged 6-12 years. In adolescents and adults most common reasons were suicide attempts (28.4%) followed by abuse (19.5%) and therapeutic errors (18.8%). Overall, 61.6% of cases were managed in a health care facility, with the majority treated in the emergency department only. The majority of cases (76.0%) experienced no or minor effects. More serious outcomes (moderate/major/death) occurred in 21.2% of lisdexamfetamine, 24.7% of dextroamphetamine/amphetamine extended release, and 25.5% of dextroamphetamine/amphetamine immediate release. There were 4 deaths (1 dextroamphetamine/amphetamine extended release and 3 dextroamphetamine/amphetamine immediate release). In patients aged 6 years and more, abuse/misuse was more frequently reported for dextroamphetamine/amphetamine immediate release (32.5%) and dextroamphetamine/amphetamine extended release (23.0%) than that for lisdexamfetamine (13.5%). The odds of abuse/misuse was 2.3 (95% confidence interval [CI]: 2.0-2.4) times higher for dextroamphetamine/amphetamine immediate release than that for lisdexamfetamine and dextroamphetamine/amphetamine extended release combined; the odds of dextroamphetamine/amphetamine extended release abuse/misuse was 1.9 (95% CI: 1.7-2.2) times higher than lisdexamfetamine. In 2011, the number of lisdexamfetamine abuse/misuse cases exceeded dextroamphetamine/amphetamine extended release by approximately 26% and plateaued in 2012, but was significantly lower (75%) than dextroamphetamine/amphetamine immediate release. Toxic effects were similar for all three drugs. Although the majority of cases were treated at health care facilities, the majority of patients experienced no effects or minor toxicity. Serious outcomes occurred in approximately 21% of lisdexamfetamine and 25% of dextroamphetamine/amphetamine extended release and dextroamphetamine/amphetamine immediate release.

Lisdexamfetamine may have less abuse potential, especially compared with the immediate-release dextroamphetamine/amphetamine formulation.
Abstract: PubMed

Kaland ME et al; Clin Toxicol 53(5): 477-85 (2015).

from HSDB

/OTHER TOXICITY INFORMATION/ In a review the safety and tolerability profile of lisdexamfetamine dimesylate (LDX), the first long-acting prodrug stimulant for the treatment of attention-deficit/hyperactivity disorder (ADHD), A PubMed search was conducted for English-language articles published up to 16 September 2013 using the following search terms: (lisdexamfetamine OR lisdexamphetamine OR SPD489 OR Vyvanse OR Venvanse OR NRP104 NOT review [publication type]). In short-term, parallel-group, placebo-controlled, phase III trials, treatment-emergent adverse events (TEAEs) in children, adolescents, and adults receiving LDX were typical for those reported for stimulants in general. Decreased appetite was reported by 25-39 % of patients and insomnia by 11-19 %. The most frequently reported TEAEs in long-term studies were similar to those reported in the short-term trials. Most TEAEs were mild or moderate in severity. Literature relating to four specific safety concerns associated with stimulant medications was evaluated in detail in patients receiving LDX. Gains in weight, height, and body mass index were smaller in children and adolescents receiving LDX than in placebo controls or untreated norms. Insomnia was a frequently reported TEAE in patients with ADHD of all ages receiving LDX, although the available data indicated no overall worsening of sleep quality in adults. Post-marketing survey data suggest that the rate of non-medical use of LDX was lower than that for short-acting stimulants and lower than or equivalent to long-acting stimulant formulations. Small mean increases were seen in blood pressure and pulse rate in patients receiving LDX. The safety and tolerability profile of LDX in individuals with ADHD is similar to that of other stimulants.[Coghill DR et al; CNS Drugs 28(6): 497-511 (2014).] Full text: PMC4057639
Abstract: PubMed

from HSDB

/OTHER TOXICITY INFORMATION/ Lisdexamfetamine dimesylate (LDX) is a novel pro-drug of d-amphetamine that is currently used for the treatment of attention-deficit/hyperactivity disorder in children and adults aged 6 years and over. LDX is enzymatically cleaved to form d-amphetamine following contact with red blood cells, which reduces the rate of appearance and magnitude of d-amphetamine concentration in the blood and hence the brain when compared with immediate-release d-amphetamine at equimolar doses. Thus, the increase of striatal dopamine efflux and subsequent increase of locomotor activity following d-amphetamine is less prominent and slower to attain maximal effect following an equimolar dose of LDX. Furthermore, unlike d-amphetamine, the pharmacodynamic effects of LDX are independent of the route of administration underlining the requirement to be hydrolyzed by contact with red blood cells. It is conceivable that these pharmacokinetic and pharmacodynamic differences may impact the psychostimulant properties of LDX in the clinic.
Abstract: PubMed

Hutson PH et al; Neuropharmacology 87:41-50 (2014).

from HSDB

/OTHER TOXICITY INFORMATION/ Risk of prematurity, low birth weight, withdrawal symptoms in infants born to dependent women.

American Society of Health-System Pharmacists 2014; Drug Information 2014. Bethesda, MD. 2014, p. 2608

from HSDB

/OTHER TOXICITY INFORMATION/ Lisdexamfetamine is an amphetamine prodrug, comprising an l-lysine amino acid covalently bonded to dextroamphetamine (d-amphetamine). Lisdexamfetamine is approved in the US for the treatment of attention-deficit hyperactivity disorder in children aged 6-12 years. Lisdexamfetamine is a therapeutically inactive molecule. After oral ingestion, lisdexamfetamine is hydrolyzed to l-lysine, a naturally occurring essential amino acid, and active d-amphetamine, which is responsible for the activity of the drug. In a well designed pharmacodynamic study in adult stimulant abusers, 50 or 100 mg doses of oral lisdexamfetamine had less likability than d-amphetamine 40 mg, suggesting a reduced abuse potential. Through rate-limited hydrolysis in the body, l-lysine is cleaved, gradually releasing pharmacologically active d-amphetamine. The pharmacokinetics of lisdexamfetamine suggest a reduced potential for abuse. In two well designed trials in children aged 6-12 years with attention-deficit hyperactivity disorder (ADHD), the efficacy of lisdexamfetamine was superior to that of placebo in improving symptoms associated with ADHD. Adverse events with lisdexamfetamine were, in general, mild to moderate in severity and consistent with those commonly reported

with amphetamine.
Abstract: PubMed

Blick SK, Keating GM; Paediatr Drugs 9 (2): 129-35 (2007)

from HSDB

/OTHER TOXICITY INFORMATION/ CNS stimulants (amphetamines and methylphenidate-containing products), including Vyvanse, have a high potential for abuse and dependence. Assess the risk of abuse prior to prescribing and monitor for signs of abuse and dependence while on therapy.

NIH; DailyMed. Current Medication Information for Vyvanse (Lisdexamfetamine Dimesylate) Capsule (Updated: April 2015). Available from, as of November 20, 2015: http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=704e4378-ca83-445c-8b45-3cfa51c1ecad

from HSDB

11.1.5 Non-Human Toxicity Excerpts

/LABORATORY ANIMALS: Acute Exposure/ Acute administration of high doses of amphetamine (d- or d,l-) has been shown to produce long-lasting neurotoxic effects, including irreversible nerve fiber damage, in rodents. The significance of these findings to humans is unknown. /d-, l- amphetamine/

NIH; DailyMed. Current Medication Information for Vyvanse (Lisdexamfetamine Dimesylate) Capsule (Updated: April 2015). Available from, as of November 20, 2015: http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=704e4378-ca83-445c-8b45-3cfa51c1ecad

from HSDB

/LABORATORY ANIMALS: Subchronic or Prechronic Exposure/ Lisdexamfetamine dimesylate (LDX) is a prodrug that requires conversion to d-amphetamine (d-AMPH) for bioactivity. Treatment with d-AMPH induces hyperlocomotion and is regarded as a putative animal model of bipolar mania. Therefore, we sought to determine the behavioral and oxidative stress alterations induced by sub-chronic LDX administration as well as their reversal and prevention by lithium in rats. A significant increment in locomotor behavior was induced by LDX (10 and 30 mg/kg). To determine Li effects against LDX-induced alterations, in the reversal protocol rats received LDX (10 or 30 mg/kg) or saline for 14 days. Between days 8 and 14 animals received Li (47.5 mg/kg, i.p.) or saline. In the prevention paradigm, rats were pretreated with Li or saline prior to LDX administration. Glutathione (GSH) levels and lipid peroxidation was determined in the prefrontal cortex (PFC), hippocampus (HC) and striatum (ST) of rats. Lithium prevented LDX-induced hyperlocomotion at the doses of 10 and 30 mg/kg, but only reversed LDX-induced hyperlocomotion at dose of 10mg/kg. In addition, both doses of LDX decreased GSH content (in ST and PFC), while Li was able to reverse and prevent these alterations mainly in the PFC. LDX (10 and 30 mg/kg) increased lipid peroxidation which was reversed and prevented by Li. In conclusion, LDX-induced hyperlocomotion along with associated increments in oxidative stress show promise as an alternative animal model of mania.
Abstract: PubMed

Macedo DS et al; Prog Neuropsychopharmacol Biol Psychiatry 43: 230-7 (2013).

from HSDB

/LABORATORY ANIMALS: Chronic Exposure or Carcinogenicity/ No evidence of carcinogenicity was found in studies in which d-, l-amphetamine (enantiomer ratio of 1:1) was administered to mice and rats in the diet for 2 years at doses of up to 30 mg/kg/day in male mice, 19 mg/kg/day in female mice, and 5 mg/kg/day in male and female rats. /d-,l-amphetamine/

NIH; DailyMed. Current Medication Information for Vyvanse (Lisdexamfetamine Dimesylate) Capsule (Updated: April 2015). Available from, as of November 20, 2015: http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=704e4378-ca83-445c-8b45-3cfa51c1ecad

from HSDB

/LABORATORY ANIMALS: Developmental or Reproductive Toxicity/ Lisdexamfetamine dimesylate had no apparent effects on embryofetal morphological development or survival when administered orally to pregnant rats and rabbits throughout the period of organogenesis at doses of up to 40 and 120 mg/kg/day, respectively. These doses are approximately 4 and 27 times, respectively, the maximum recommended human dose of 70 mg/day given to adolescents, on a mg/sq m body surface area basis.

NIH; DailyMed. Current Medication Information for Vyvanse (Lisdexamfetamine Dimesylate) Capsule (Updated: April 2015). Available from, as of November 20, 2015: http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=704e4378-ca83-445c-8b45-3cfa51c1ecad

▸ *from HSDB*

/LABORATORY ANIMALS: Developmental or Reproductive Toxicity/ Amphetamine (d- to l-enantiomer ratio of 3:1) did not adversely affect fertility or early embryonic development in the rat at doses of up to 20 mg/kg/day. /Amphetamine/

NIH; DailyMed. Current Medication Information for Vyvanse (Lisdexamfetamine Dimesylate) Capsule (Updated: April 2015). Available from, as of November 20, 2015: http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=704e4378-ca83-445c-8b45-3cfa51c1ecad

▸ *from HSDB*

/GENOTOXICITY/ Lisdexamfetamine dimesylate was not clastogenic in the mouse bone marrow micronucleus test in vivo and was negative when tested in the E. coli and S. typhimurium components of the Ames test and in the L5178Y/TK+- mouse lymphoma assay in vitro.

NIH; DailyMed. Current Medication Information for Vyvanse (Lisdexamfetamine Dimesylate) Capsule (Updated: April 2015). Available from, as of November 20, 2015: http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=704e4378-ca83-445c-8b45-3cfa51c1ecad

▸ *from HSDB*

/OTHER TOXICITY INFORMATION/ Lisdexamfetamine mesylate (Vyvanse) is a novel prodrug approved for attention deficit hyperactivity disorder (ADHD). It is metabolized to d-amphetamine and l-lysine. In drug-experienced humans, lisdexamfetamine evoked lower "Drug liking" scores on Drug Rating Questionnaire (DRQ) scales than immediate-release (IR) d-amphetamine. This study investigated why lisdexamphetamine may have lower abuse potential and a better therapeutic window than d-amphetamine. We compared the pharmacokinetic/pharmacodynamic relationships of lisdexamfetamine and IR d-amphetamine in freely-moving rats by measuring simultaneously extracellular concentrations of striatal dopamine, plasma concentrations of d-amphetamine and lisdexamfetamine, and locomotor activity. At equivalent doses (1.5 mg/kg d-amphetamine base), lisdexamfetamine produced smaller, but more sustained, increases in striatal dopamine efflux than d-amphetamine and substantially less locomotor activation. Consistent with it being a prodrug, increased striatal dopamine and locomotion correlated with plasma concentration of its metabolite, d-amphetamine, but not the parent compound. Compared with IR d-amphetamine, lisdexamfetamine produced an identical AUC for plasma d-amphetamine, but a 50% lower C(max) and significantly delayed t(max). Where a hysteresis relationship did exist between plasma concentrations of d-amphetamine and striatal dopamine or locomotor activity, they were anticlockwise in direction for lisdexamfetamine and IR d-amphetamine. For extracellular striatal dopamine (neurochemical mediator) and locomotor activity (functional outcome), it was anticlockwise for lisdexamfetamine, but clockwise for IR d-amphetamine. This shows that lisdexamfetamine produced less pronounced behavioral activation as dopamine concentrations increased, but activity was maintained for longer when they declined. These findings help explain why the unusual pharmacokinetics of lisdexamfetamine evoked lower "Drug liking" scores than IR d-amphetamine and also suggest therapeutic window between efficacy and stimulant side-effects will be larger.
Abstract: PubMed

Rowley HL et al; Neuropharmacology 63(6): 1064-74 (2012).

▸ *from HSDB*

/OTHER TOXICITY INFORMATION/ Lisdexamfetamine dimesylate (LDX) is a d-amphetamine prodrug developed for the treatment of attention-deficit/hyperactivity disorder. The toxicity profile of orally administered LDX has been evaluated in rats. In an acute study, LDX doses of 60 mg/kg and higher caused increased motor activity. At 1000 mg/kg, one rat died and another was euthanized. In a 7-day repeat-dose study, all rats dosed with LDX (14 per dose group for each sex) showed increased activity; 10 male rats and 11 female rats at 300 mg/kg/day and 3 female rats at 100 mg/kg/day were euthanized because of self-mutilation and 1 male rat at 300 mg/kg/day was found dead. In a 28-day study, only rats at 80 mg/kg showed signs of self-mutilation and thin body condition. In both the 7- and 28-day studies, LDX caused significant changes in some blood chemistry parameters (e.g. blood urea nitrogen, alanine aminotransferase, aspartate aminotransferase) and organ weights (e.g. particularly heart, liver, brain, and spleen). Overall, no apparent treatment-related histopathologic changes were observed. Toxicokinetic assessments indicated that as the dose of LDX was increased, rats were exposed to increasing levels of LDX and d-amphetamine. The extent of exposure to LDX and d-amphetamine increased after repeated-dose in the 28-day study. The findings of the repeat-dose studies indicate that the toxicity profile in rats administered LDX orally is comparable to that for d-amphetamine; however, the apparent lethal dose of LDX in rats is more than five times higher than the LD(50) of orally administered d-amphetamine, supporting a

putative protective effect of conjugating amphetamine with lysine.
Abstract: PubMed

Krishnan S, Montcrief S; Basic Clin Pharmacol Toxicol 101 (4): 231-40 (2007)

from HSDB

11.1.6 Populations at Special Risk

Sudden death has been reported in children and adolescents with structural cardiac abnormalities and other serious heart problems taking CNS stimulants at recommended doses for ADHD. Avoid use in patients with known structural cardiac abnormalities, cardiomyopathy, serious heart arrhythmia, coronary artery disease, and other serious heart problems. Further evaluate patients who develop exertional chest pain, unexplained syncope, or arrhythmias during Vyvanse treatment.

NIH; DailyMed. Current Medication Information for Vyvanse (Lisdexamfetamine Dimesylate) Capsule (Updated: April 2015). Available from, as of November 20, 2015: http://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=704e4378-ca83-445c-8b45-3cfa51c1ecad

from HSDB

Contraindicated in patients with advanced arteriosclerosis, cardiovascular disease, moderate to severe hypertension, hyperthyroidism, hypersensitivity or idiosyncrasy to sympathomimetic amines, glaucoma, or a history of substance abuse. Not to be used in agitated patients.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2535

from HSDB

Possible lowering of seizure threshold in patients with history of seizures, in those with prior EEG abnormalities but no history of seizures, and, very rarely, in those without history of seizures and with no prior evidence of EEG abnormalities.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2535

from HSDB

May exacerbate symptoms of behavior disturbance and thought disorder in patients with a pre-existing psychotic disorder.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2535

from HSDB

May precipitate mixed or manic episodes in ADHD patients with comorbid bipolar disorder.

American Society of Health-System Pharmacists 2015; Drug Information 2015. Bethesda, MD. 2015, p. 2535

from HSDB

11.2 Ecological Information

11.2.1 Environmental Fate/Exposure Summary

Lisdexamfetamine's production and administration as a medication may result in its release to the environment through various waste streams. If released to air, an estimated vapor pressure of 1.3X10-7 mm Hg at 25 deg C indicates lisdexamfetamine will exist in both the vapor and particulate phases the particulate phase in the atmosphere. Vapor-phase lisdexamfetamine will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 1 hr. Particulate-phase lisdexamfetamine will be removed from the atmosphere by wet and dry deposition. Lisdexamfetamine contains chromophores that absorb at wavelengths >290 nm and, therefore, may be susceptible to direct photolysis by sunlight. If released to soil, lisdexamfetamine is expected to have slight mobility based upon an estimated Koc of 4900. The estimated pKa1, pKa2 and pKa3 of lisdexamfetamine are 8.43, 10.21 and 15.89, respectively, indicating that this compound will exist partially in the cation form in the environment

and cations generally adsorb more strongly to soils containing organic carbon and clay than their neutral counterparts. Volatilization from moist soil surfaces is not expected to be an important fate process based upon an estimated Henry's Law constant of 2.3X10-15 atm-cu m/mole. Lisdexamfetamine is not expected to volatilize from dry soil surfaces based upon its vapor pressure. Biodegradation data in soil or water were not available. If released into water, lisdexamfetamine is expected to adsorb to suspended solids and sediment based upon the estimated Koc. Volatilization from water surfaces iis not expected to be an important fate process based upon this compound's estimated Henry's Law constant. An estimated BCF of 3 suggests the potential for bioconcentration in aquatic organisms is low. Hydrolysis is expected to be an important environmental fate process since this compound contains functional groups that hydrolyze under environmental conditions (pH 5 to 9). Occupational exposure to lisdexamfetamine may occur through inhalation and dermal contact with this compound at workplaces where lisdexamfetamine is produced or used. The general public is not likely to be exposed to lisdexamfetamine unless by direct medical treatment. (SRC)

from HSDB

11.2.2 Artificial Sources

Lisdexamfetamine's production and administration as a medication(1) may result in its release to the environment through various waste streams(SRC).

(1) O'Neil MJ, ed; The Merck Index. 15th ed., Cambridge, UK: Royal Society of Chemistry, p. 1026 (2013)

from HSDB

11.2.3 Environmental Fate

TERRESTRIAL FATE: Based on a classification scheme(1), an estimated Koc value of 4900(SRC), determined from a structure estimation method(2), indicates that lisdexamfetamine is expected to have slight mobility in soil(SRC). The estimated pKa1, pKa2 and pKa3 of lisdexamfetamine are 8.43, 10.21 and 15.89(3), respectively, indicating that this compound will exist partially in the cation form in the environment and cations generally adsorb more strongly to soils containing organic carbon and clay than their neutral counterparts(4). Volatilization of lisdexamfetamine from moist soil surfaces is not expected to be an important fate process(SRC) given an estimated Henry's Law constant of 2.3X10-15 atm-cu m/mole(SRC), using a fragment constant estimation method(5). Lisdexamfetamine is not expected to volatilize from dry soil surfaces(SRC) based upon an estimated vapor pressure of 1.3X10-7 mm Hg at 25 deg C(SRC), determined from a fragment constant method(2). Biodegradation data in soil were not available(SRC, 2015).

(1) Swann RL et al; Res Rev 85: 17-28 (1983) (2) US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Oct 19, 2015: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm (3) Royal Soc Chem; ChemSpider. Lisdexamfetamine. (608137-32-2). Available from, as of Oct 19, 2015: http://www.chemspider.com/Search.aspx (4) Doucette WJ; pp. 141-188 in Handbook of Property Estimation Methods for Chemicals. Boethling RS, Mackay D, eds. Boca Raton, FL: Lewis Publ (2000) (5) Meylan WM, Howard PH; Environ Toxicol Chem 10: 1283-93 (1991)

from HSDB

AQUATIC FATE: Based on a classification scheme(1), an estimated Koc value of 4900(SRC), determined from a structure estimation method(2), indicates that lisdexamfetamine is expected to adsorb to suspended solids and sediment(SRC). Volatilization from water surfaces is not expected(3) based upon an estimated Henry's Law constant of 2.3X10-15 atm-cu m/mole(SRC), developed using a fragment constant estimation method(4). According to a classification scheme(5), an estimated BCF of 3(SRC), from an estimated log Kow of 1.27(2) and a regression-derived equation(2), suggests the potential for bioconcentration in aquatic organisms is low(SRC). Biodegradation data in water were not available(SRC, 2015).

(1) Swann RL et al; Res Rev 85: 17-28 (1983) (2) US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Oct 19, 2015: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm (3) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 15-1 to 15-29 (1990) (4) Meylan WM, Howard PH; Environ Toxicol Chem 10: 1283-93 (1991) (5) Franke C et al; Chemosphere 29: 1501-14 (1994)

from HSDB

ATMOSPHERIC FATE: According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere(1), lisdexamfetamine, which has an estimated vapor pressure of 1.3X10-7 mm Hg at 25 deg C(SRC), determined from a fragment constant method(2), will exist in both the vapor and particulate phases in the ambient atmosphere. Vapor-phase lisdexamfetamine is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals(SRC); the half-life for this reaction in air is estimated to be 1 hr(SRC), calculated from its rate constant of 9.8X10-11 cu cm/molecule-sec at 25 deg C(SRC). Particulate-phase lisdexamfetamine may be removed from the air by wet and dry deposition(SRC). Lisdexamfetamine contains chromophores that absorb at wavelengths >290 nm(3) and, therefore, may be susceptible to direct photolysis by sunlight(SRC).

(1) Bidleman TF; Environ Sci Technol 22: 361-367 (1988) (2) US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Oct 19, 2015: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm (3) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 8-12 (1990)

▸ *from HSDB*

11.2.4 Abiotic Degredation

The rate constant for the vapor-phase reaction of lisdexamfetamine with photochemically-produced hydroxyl radicals has been estimated as 9.8X10-11 cu cm/molecule-sec at 25 deg C(SRC) using a structure estimation method(1). This corresponds to an atmospheric half-life of about one hour at an atmospheric concentration of 5X10+5 hydroxyl radicals per cu cm(1). Lisdexamfetamine is expected to undergo hydrolysis in the environment due to the presence of functional groups that hydrolyze under environmental conditions(2). Lisdexamfetamine contains chromophores that absorb at wavelengths >290 nm(2) and, therefore, may be susceptible to direct photolysis by sunlight(SRC).

(1) Meylan WM, Howard PH; Chemosphere 26: 2293-99 (1993) (2) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 7-4, 7-5, 8-12 (1990)

▸ *from HSDB*

11.2.5 Bioconcentration

An estimated BCF of 3 was calculated in fish for lisdexamfetamine(SRC), using an estimated log Kow of 1.27(1) and a regression-derived equation(1). According to a classification scheme(2), this BCF suggests the potential for bioconcentration in aquatic organisms is low(SRC).

(1) US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Oct 19, 2016: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm/ (2) Franke C et al; Chemosphere 29: 1501-14 (1994)

▸ *from HSDB*

11.2.6 Soil Adsorption/Mobility

Using a structure estimation method based on molecular connectivity indices(1), the Koc of lisdexamfetamine can be estimated to be 4900(SRC). According to a classification scheme(2), this estimated Koc value suggests that lisdexamfetamine is expected to have slight mobility in soil. The estimated pKa1, pKa2 and pKa3 of lisdexamfetamine are 8.43, 10.21 and 15.89(3), respectively, indicating that this compound will exist partially in the cation form in the environment and cations generally adsorb more strongly to soils containing organic carbon and clay than their neutral counterparts(4).

(1) US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Oct 19, 2015: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm (2) Swann RL et al; Res Rev 85: 17-28 (1983) (3) Royal Soc Chem; ChemSpider. Lisdexamfetamine. (608137-32-2). Available from, as of Oct 19, 2015: http://www.chemspider.com/Search.aspx (4) Doucette WJ; pp. 141-188 in Handbook of Property Estimation Methods for Chemicals. Boethling RS, Mackay D, eds. Boca Raton, FL: Lewis Publ (2000)

▸ *from HSDB*

11.2.7 Volatilization from Water/Soil

The Henry's Law constant for lisdexamfetamine is estimated as 2.X10-15 atm-cu m/mole(SRC) using a fragment constant estimation method(1). This Henry's Law constant indicates that lisdexamfetamine is expected to be essentially nonvolatile from water and moist soil surfaces(2). Lisdexamfetamine is not expected to volatilize from dry soil surfaces(SRC) based upon an estimated vapor pressure of 1.3X10-17 mm Hg(SRC), determined from a fragment constant method(3).

(1) Meylan WM, Howard PH; Environ Toxicol Chem 10: 1283-93 (1991) (2) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 15-1 to 15-29 (1990) (3) US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Oct 19, 2015: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm

▸ *from HSDB*

11.2.8 Water Concentrations

While data specific to lisdexamfetamine were not located(SRC, 2015), the literature suggests that some pharmaceutically active compounds originating from human and veterinary therapy are not eliminated completely in municipal sewage treatment plants and are, therefore, discharged into receiving waters(1). Wastewater treatment processes often were not designed to remove them from the effluent(2). Selected organic waste compounds may be degrading to new and more persistent compounds that may be released instead of or in addition to the parent compound(2).

(1) Heberer T; Tox Lett 131: 5-17 (2002) (2) Koplin DW et al; Environ Sci Toxicol 36: 1202-211 (2002)

▸ *from HSDB*

11.2.9 Probable Routes of Human Exposure

Occupational exposure to lisdexamfetamine may occur through inhalation and dermal contact with this compound at workplaces where lisdexamfetamine is produced or used. The general public is not likely to be exposed to lisdexamfetamine unless by direct medical treatment. (SRC)

▸ *from HSDB*

12 Literature

12.1 Depositor Provided PubMed Citations

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from PubChem

12.2 NLM Curated PubMed Citations

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from PubChem

12.3 Synthesis References

Synthesis Reference

Michael J. Bauer, Gary Richard Callen, Judi Christine Humphrey, Todd Jeffrey Johnson, Matthew Wendell Schiesher, "Methods and Compositions for Preparing Lisdexamfetamine and Salts Thereof." U.S. Patent US20120157706, issued June 21, 2012.

from DrugBank

12.4 General References

General Reference

Jasinski DR, Krishnan S: Human pharmacology of intravenous lisdexamfetamine dimesylate: abuse liability in adult stimulant abusers. J Psychopharmacol. 2009 Jun;23(4):410-8. doi: 10.1177/0269881108093841. Epub 2008 Jul 17. Abstract: PubMed

from DrugBank

General Reference

Madaan V: Lisdexamfetamine dimesylate for childhood ADHD. Drugs Today (Barc). 2008 May;44(5):319-24. doi: 10.1358/dot.2008.44.5.1215724.
Abstract: PubMed

from DrugBank

General Reference

Krishnan S, Moncrief S: An evaluation of the cytochrome p450 inhibition potential of lisdexamfetamine in human liver microsomes. Drug Metab Dispos. 2007 Jan;35(1):180-4. Epub 2006 Oct 11.
Abstract: PubMed

from DrugBank

12.5 Metabolite References

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1 to 3 of 3

PMID	Reference
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18548134	Madaan V: Lisdexamfetamine dimesylate for childhood ADHD. Drugs Today (Barc). 2008 May;44(5):319-24. doi: 10.1358/dot.2008.44.5.1215724.
18635707	Jasinski DR, Krishnan S: Human pharmacology of intravenous lisdexamfetamine dimesylate: abuse liability in adult stimulant abusers. J Psychopharmacol. 2009 Jun;23(4):410-8. doi: 10.1177/0269881108093841. Epub 2008 Jul 17.

from Human Metabolome Database (HMDB)

12.6 Springer Nature References

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from Springer Nature

12.7 Chemical Co-Occurrences in Literature

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from PubChem

12.8 Chemical-Disease Co-Occurrences in Literature

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from PubChem

12.9 Chemical-Gene Co-Occurrences in Literature

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from PubChem

13 Patents

1. US7659253
2. US7718619
3. US7659254
4. US7671030
5. US7662788
6. US7687467
7. US7678770
8. US7671031
9. US7713936
10. US7674774
11. US7678771
12. US7655630
13. US7687466
14. US7223735
15. US7700561
16. US7662787
17. US7723305
18. US7105486

from DrugBank

13.1 Depositor-Supplied Patent Identifiers

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from PubChem

13.2 FDA Orange Book Patents

FDA Orange Book Patents: 1 of 18 (FDA Orange Book Patent ID)	
Patent	7105486
Expiration	Feb 24, 2023
Applicant	SHIRE DEV LLC
Drug Application	1. N208510 (Prescription Drug: VYVANSE. Ingredients: LISDEXAMFETAMINE DIMESYLATE) 2. N208510 (Prescription Drug: VYVANSE. Ingredients: LISDEXAMFETAMINE DIMESYLATE)

from FDA Orange Book

FDA Orange Book Patents: 2 of 18 (FDA Orange Book Patent ID)	
Patent	7223735
Expiration	Feb 24, 2023
Applicant	SHIRE DEV LLC
Drug Application	1. N208510 (Prescription Drug: VYVANSE. Ingredients: LISDEXAMFETAMINE DIMESYLATE) 2. N208510 (Prescription Drug: VYVANSE. Ingredients: LISDEXAMFETAMINE DIMESYLATE)

from FDA Orange Book

FDA Orange Book Patents: 3 of 18 (FDA Orange Book Patent ID)	
Patent	7655630
Expiration	Feb 24, 2023
Applicant	SHIRE DEVELOPMENT
Drug Application	1. N021977 (Prescription Drug: VYVANSE. Ingredients: LISDEXAMFETAMINE DIMESYLATE) 2. N021977 (Prescription Drug: VYVANSE. Ingredients: LISDEXAMFETAMINE DIMESYLATE)

from FDA Orange Book

View All 18 FDA Orange Book Patents

14 Biomolecular Interactions and Pathways

14.1 DrugBank Interactions

Target	Alpha-1B adrenergic receptor
Action	antagonist
PubChem Protein Target	P35368
PubChem Gene Target	ADRA1B
General Function	Protein heterodimerization activity
Specific Function	This alpha-adrenergic receptor mediates its action by association with G proteins that activate a phosphatidylinositol-calcium second messenger system. Its effect is mediated by G(q) and G(11) proteins. Nuclear ADRA1A-ADRA1B heterooligomers regulate phenylephrine (PE)-stimulated ERK signaling in cardiac myocytes.
Reference	Imming P, Sinning C, Meyer A: Drugs, their targets and the nature and number of drug targets. Nat Rev Drug Discov. 2006 Oct;5(10):821-34. Abstract: PubMed
Reference	Chen X, Ji ZL, Chen YZ: TTD: Therapeutic Target Database. Nucleic Acids Res. 2002 Jan 1;30(1):412-5. Abstract: PubMed

from DrugBank

Target	Sodium-dependent dopamine transporter
Action	inhibitor
PubChem Protein Target	Q01959
PubChem Gene Target	SLC6A3
General Function	Monoamine transmembrane transporter activity
Specific Function	Amine transporter. Terminates the action of dopamine by its high affinity sodium-dependent reuptake into presynaptic terminals.
Reference	Hamidovic A, Dlugos A, Palmer AA, de Wit H: Polymorphisms in dopamine transporter (SLC6A3) are associated with stimulant effects of D-amphetamine: an exploratory pharmacogenetic study using healthy volunteers. Behav Genet. 2010 Mar;40(2):255-61. doi: 10.1007/s10519-009-9331-7. Epub 2010 Jan 21. Abstract: PubMed

from DrugBank

15 Classification

15.1 Ontologies

15.1.1 MeSH Tree

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from MeSH

15.1.2 ChEBI Ontology

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from ChEBI

15.1.3 KEGG: USP

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15.1.4 KEGG: ATC

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15.1.5 KEGG: Drug Classes

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15.1.6 WHO ATC Classification System

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from WHO ATC

15.1.7 FDA Pharm Classes

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from FDA Pharm Classes

15.1.8 WIPO IPC

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from WIPO

15.1.9 ChemIDplus

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from ChemIDplus

16 Information Sources

1. ChemIDplus /source/ChemIDplus

   Lisdexamfetamine [INN]
   https://chem.nlm.nih.gov/chemidplus/sid/0608137322 https://chem.nlm.nih.gov/chemidplus/sid/0608137322
   ChemIDplus Chemical Information Classification
   https://chem.sis.nlm.nih.gov/chemidplus/chemidheavy.jsp https://chem.sis.nlm.nih.gov/chemidplus/chemidheavy.jsp

2. DrugBank /source/DrugBank

   Lisdexamfetamine
   http://www.drugbank.ca/drugs/DB01255 http://www.drugbank.ca/drugs/DB01255
   http://www.drugbank.ca/drugs/DB01255#targets http://www.drugbank.ca/drugs/DB01255#targets

3. EPA DSStox /source/EPA DSStox

   Lisdexamfetamine
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4. Human Metabolome Database (HMDB) /source/Human Metabolome Database (HMDB)

   Lisdexamfetamine
   http://www.hmdb.ca/metabolites/HMDB0015385 http://www.hmdb.ca/metabolites/HMDB0015385

5. ClinicalTrials.gov /source/ClinicalTrials.gov

   Lisdexamfetamine
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6. FDA Pharm Classes /source/FDA Pharm Classes

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7. NCIt /source/NCIt

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8. HSDB /source/HSDB

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10. FDA Orange Book /source/FDA Orange Book

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11. FDA/SPL Indexing Data /source/FDA/SPL Indexing Data

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13. Springer Nature /source/Springer Nature

Literature references related to scientific contents from Springer Nature journals and books. Read more ... https://link.springer.com/nrp104
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15. Wikipedia /source/Wikipedia

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16. PubChem

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https://pubchem.ncbi.nlm.nih.gov https://pubchem.ncbi.nlm.nih.gov

17. MeSH /source/MeSH

Lisdexamfetamine Dimesylate
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MeSH Tree
http://www.nlm.nih.gov/mesh/meshhome.html http://www.nlm.nih.gov/mesh/meshhome.html
Central Nervous System Stimulants
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Dopamine Uptake Inhibitors
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18. ChEBI /source/ChEBI

ChEBI Ontology
http://www.ebi.ac.uk/chebi/userManualForward.do#ChEBI%20Ontology
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19. KEGG /source/KEGG

USP drug classification
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Anatomical Therapeutic Chemical (ATC) classification
http://www.genome.jp/kegg-bin/get_htext?br08303.keg http://www.genome.jp/kegg-bin/get_htext?br08303.keg
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International Patent Classification
http://www.wipo.int/classifications/ipc/ http://www.wipo.int/classifications/ipc/