

# NEW ZEALAND DATA SHEET

VYVANSE has a potential for abuse, misuse, dependence, or diversion for non-therapeutic uses. Physicians should assess the risk of abuse prior to prescribing and monitor for signs of abuse and dependence while on therapy. VYVANSE should be prescribed cautiously to patients with a history of substance abuse or dependence. Careful supervision is required during withdrawal from abusive use since severe depression may occur. Withdrawal following chronic therapeutic use may unmask symptoms of the underlying disorder that may require follow-up.

## 1 VYVANSE 30 mg, 50 mg, 70 mg capsules

VYVANSE 30 mg capsule

VYVANSE 50 mg capsule

VYVANSE 70 mg capsule

## 2 QUALITATIVE AND QUANTITATIVE COMPOSITION

Each capsule contains 30 mg, 50 mg, or 70 mg of lisdexamfetamine dimesilate.

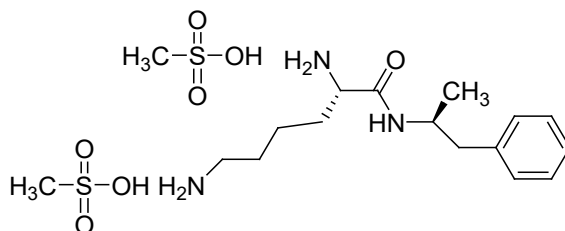
For the full list of excipients, see section 6.1.

## 3 PHARMACEUTICAL FORM

Capsule.

VYVANSE (lisdexamfetamine dimesilate) was developed as a capsule for once-a-day oral administration. The chemical designation for lisdexamfetamine dimesilate is (2*S*)-2,6-diamino-*N*-[(1*S*)-1-methyl-2-phenylethyl] hexanamide dimethanesulfonate. Lisdexamfetamine dimesilate is a white to off-white powder that is highly soluble in water. Lisdexamfetamine dimesilate has a 2-octanol/water partition coefficient (logP) of -1.76; p*K*<sub>a1</sub> of 10.5 / p*K*<sub>a2</sub> of 7.7; and pH of 4.1 when dissolved in water.

Chemical structure:



Formula: C<sub>17</sub>H<sub>33</sub>N<sub>3</sub>O<sub>7</sub>S<sub>2</sub>

Molecular weight: 455.59

CAS numbers: lisdexamfetamine: 608137-32-2

lisdexamfetamine dimesilate: 608137-33-3

VYVANSE 30 mg capsule: white opaque body and pink opaque cap, printed 'S489' and '30 mg' in black ink.

VYVANSE 50 mg capsule: white opaque body and blue opaque cap, printed 'S489' and '50 mg' in black ink.

VYVANSE 70 mg capsule: blue opaque body and pink opaque cap, printed 'S489' and '70 mg' in black ink.

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## 4 CLINICAL PARTICULARS

### 4.1 Therapeutic indications

VYVANSE is indicated for the treatment of Attention Deficit Hyperactivity Disorder (ADHD) in adults, adolescents and children aged 6 years and older. Treatment should be commenced by a specialist.

A diagnosis of ADHD implies the presence of hyperactive-impulsive or inattentive symptoms that caused impairment and were present before 12 years of age.

**Need for comprehensive treatment programme:** VYVANSE is indicated as an integral part of a total treatment program for ADHD that may include other measures (psychological, educational and social) for patients with this syndrome. Stimulants are not intended for use in the patient who exhibits symptoms secondary to environmental factors and/or other primary psychiatric disorders, including psychosis. Appropriate educational placement is essential and psychosocial intervention is often helpful. When remedial measures alone are insufficient, the decision to prescribe stimulant medication will depend upon the physician's assessment of the chronicity and severity of the patient's symptoms.

**Long term use:** The physician who elects to use VYVANSE for extended periods should periodically re-evaluate the long-term usefulness of the drug for the individual patient.

### 4.2 Dose and method of administration

Patients should be reviewed at least annually to assess if there is an ongoing requirement for treatment with VYVANSE. Blood pressure and cardiovascular status should also be regularly reviewed.

VYVANSE should be administered orally at the lowest possible dosage and should then be slowly adjusted to the lowest effective dose for each individual. VYVANSE should be taken in the morning with or without food; avoid afternoon doses because of the potential for insomnia.

VYVANSE capsules may be taken whole, or the capsule may be opened and the entire contents emptied and mixed with a soft food such as yogurt or in a glass of water or orange juice. If the contents of the capsule include any compacted powder, a spoon may be used to break apart the powder in the soft food or liquid. The contents should be mixed until completely dispersed. The patient should consume the entire mixture of soft food or liquid immediately; it should not be stored. The active ingredient dissolves completely once dispersed; however, a film containing the inactive ingredients may remain in the glass or container once the mixture is consumed. The patient should not take anything less than one capsule per day and a single capsule should not be divided.

#### Dose

In patients who are either starting treatment for the first time or switching from another medication, 30 mg once daily in the morning is the recommended starting dose. If the decision is made to increase the dose beyond 30 mg/day, daily dosage may be adjusted in increments of 20 mg in intervals no more frequently than weekly. The maximum recommended dose is 70 mg/day; doses greater than 70 mg/day of VYVANSE have not been studied. VYVANSE has not been studied in children under 6 years of age. The effectiveness of VYVANSE has not been studied in adults over 55 years of age. Due to reduced clearance in patients with severe renal insufficiency (GFR 15 to < 30 mL/min/1.73m<sup>2</sup>) the maximum dose should not exceed 50 mg/day. Further dosage reduction should be considered in patients undergoing dialysis.

See section 4.4 Special warnings and precautions for use – Renal impairment, and section 5.2 Pharmacokinetic properties – Special populations.

Lisdexamfetamine and dexamphetamine are not dialysable.

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## 4.3 Contraindications

VYVANSE is contraindicated in patients with:

- Advanced arteriosclerosis
- Symptomatic cardiovascular disease including cardiac arrhythmia, ischaemic heart disease
- Moderate to severe hypertension
- Hyperthyroidism
- Known hypersensitivity or idiosyncratic reaction to sympathomimetic amines or any of the excipients
- Glaucoma
- Agitated states such as severe anxiety, tension and agitation
- During or within 14 days following the administration of monoamine oxidase inhibitors (hypertensive crises may result)
- Pheochromatocytoma
- Tics, Tourette's syndrome
- Patients who currently exhibit severe depression, anorexia nervosa, psychotic symptoms or suicidal tendency
- Patients with known drug dependence or alcohol abuse

## 4.4 Special warnings and precautions for use

### Drug abuse and dependence

Note: Because of the potential for abuse, drugs of the amphetamine type are subject to special restrictions on their availability.

Amphetamines have a high potential for drug abuse. Care should be exercised in the selection of patients for amphetamine therapy and prescription size should be limited to that required to achieve the therapeutic goal. Patients should be cautioned against increasing the recommended dosage. Should psychological dependence occur, gradual withdrawal of the medication is recommended. Abrupt cessation following prolonged high dosage results in extreme fatigue and mental depression; changes have also been noted on the sleep EEG.

Manifestations of chronic intoxication with amphetamines include severe dermatoses, marked insomnia, irritability, hyperactivity and personality changes. The most severe manifestation of chronic intoxication is psychosis, often clinically indistinguishable from schizophrenia.

### Pre-treatment assessment

Before starting treatment with VYVANSE, it is important to consider the patient's personal and family cardiac and psychiatric history. In patients with identified or potential cardiovascular or psychiatric risk factors, further investigation or specialist review may be considered.

Children, adolescents, or adults who are being considered for treatment with stimulant medications should have a careful history (including assessment for a family history of sudden death or ventricular arrhythmia) and physical exam to assess for the presence of cardiac disease, and should receive further cardiac evaluation if findings suggest such disease (e.g. electrocardiogram and echocardiogram). Patients who develop symptoms such as exertional chest pain, unexplained syncope, or other symptoms suggestive of cardiac disease during stimulant treatment should undergo a prompt cardiac evaluation.

### Cardiovascular disease

#### *Sudden death and pre-existing structural cardiac abnormalities or other serious heart problems*

Children and adolescents:

Sudden death has been reported in children and adolescents taking CNS stimulants at usual doses,

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including those with structural cardiac abnormalities or other serious heart problems. Although some serious heart problems alone carry an increased risk of sudden death, stimulant products generally should not be used in children or adolescents with known serious structural cardiac abnormalities, cardiomyopathy, serious heart rhythm abnormalities, or other serious cardiac problems that may place them at increased vulnerability to the sympathomimetic effects of a stimulant drug.

### Adults:

Sudden deaths, stroke, and myocardial infarction have been reported in adults taking stimulant drugs at usual doses for ADHD. Although the role of stimulants in these adult cases is also unknown, adults have a greater likelihood than children of having serious structural cardiac abnormalities, cardiomyopathy, serious heart rhythm abnormalities, coronary artery disease, or other serious cardiac problems. Adults with such abnormalities should also generally not be treated with stimulant drugs.

### *Hypertension and other cardiovascular conditions*

Stimulant medications cause a modest increase in average blood pressure (about 2-4 mmHg) and average heart rate (about 3-6 bpm), and individuals may have larger increases. While the mean changes alone would not be expected to have short-term consequences, all patients should be monitored for larger changes in heart rate and blood pressure. Caution is indicated in treating patients whose underlying medical conditions might be compromised by increases in blood pressure or heart rate, e.g., those with pre-existing hypertension, heart failure, recent myocardial infarction, or ventricular arrhythmia.

### Psychiatric disorders

#### *Pre-existing psychosis*

Administration of stimulants may exacerbate symptoms of behaviour disturbance and thought disorder in patients with pre-existing psychotic disorder.

#### *Bipolar illness*

Particular care should be taken in using stimulants to treat ADHD patients with comorbid bipolar disorder because of concern for possible induction of mixed/manic episode in such patients. Prior to initiating treatment with a stimulant, patients with comorbid depressive symptoms should be adequately screened to determine if they are at risk for bipolar disorder; such screening should include a detailed psychiatric history, including a family history of suicide, bipolar disorder, and depression.

#### *Emergence of new psychotic or manic symptoms*

Treatment emergent psychotic or manic symptoms, e.g., hallucinations, delusional thinking, or mania in children and adolescents without prior history of psychotic illness or mania can be caused by stimulants at usual doses. If such symptoms occur, consideration should be given to a possible causal role of the stimulant, and discontinuation of treatment may be appropriate.

#### *Aggression*

Aggressive behaviour or hostility is often observed in children and adolescents with ADHD, and has been reported in clinical trials and the postmarketing experience of some medications indicated for the treatment of ADHD, including VYVANSE. Stimulants may cause aggressive behaviour or hostility. Patients beginning treatment for ADHD should be monitored for the appearance of or worsening of aggressive behaviour or hostility.

### Seizures

There is some clinical evidence that stimulants may lower the convulsive threshold in patients with

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prior history of seizure, in patients with prior EEG abnormalities in absence of seizures, and very rarely, in patients without a history of seizures and no prior EEG evidence of seizures. In the presence of seizures, the drug should be discontinued.

### Visual disturbance

Difficulties with accommodation and blurring of vision have been reported with stimulant treatment.

### Tics

Stimulants have been reported to exacerbate motor and phonic tics and Tourette's syndrome. Therefore, clinical evaluation for tics and Tourette's syndrome in children and their families should precede use of stimulant medications.

### Long-term suppression of growth (height and weight)

VYVANSE was associated with dose-related reductions in weight in children, adolescents and adults in short-term studies. Although a causal relationship has not been established, suppression of growth (i.e. weight and/or height) has been reported with the long-term use of stimulants in children. Therefore, patients requiring long-term therapy should be carefully monitored. Patients who are not growing or gaining weight as expected should have their treatment interrupted.

### Prescribing and dispensing

The least amount of VYVANSE feasible should be prescribed or dispensed at one time in order to minimise the possibility of overdose. Consideration should be given when using VYVANSE in patients who use other sympathomimetic drugs.

### Children under 6 years

VYVANSE should not be used in children under the age of 6 years. Safety and efficacy in this age group has not been established.

### Adult patients aged over 55 years

Safety and efficacy has not been established in adult patients over the age of 55 years.

### Impaired hepatic function

No studies have been conducted in patients with hepatic impairment.

### Renal impairment

Due to reduced clearance in patients with severe renal insufficiency (GFR 15 to <30 mL/min/1.73 m<sup>2</sup>) the maximum dose should not exceed 50 mg/day. Further dosage reduction should be considered in patients undergoing dialysis. [See section 5.2 Pharmacokinetic properties – Special populations]

Lisdexamfetamine and dexamphetamine are not dialysable.

### Effect on laboratory test

Amphetamines can cause a significant elevation in plasma corticosteroid levels. This increase is greatest in the evening. Amphetamine may interfere with urinary steroid determinations.

## 4.5 Interaction with other medicines and other forms of interaction

### *In vitro* and *In vivo* enzyme inhibition and induction

Lisdexamfetamine dimesilate was not an *in vitro* inhibitor of the major human CYP450 isoforms (CYP1A2, CYP2A6, CYP2B6, CYP2C8, CYP2C9, CYP2C19, CYP2D6, and CYP3A4) in human hepatic microsomal suspensions, nor was it an *in vitro* inducer of CYP1A2, CYP2B6 or CYP3A4/5 in cultured fresh human hepatocytes. Lisdexamfetamine dimesilate was not an *in vitro* substrate for P-gp in MDCKII cells nor an *in vitro* inhibitor of P-gp in Caco-2 cells and is therefore unlikely to be involved in clinical interactions with drugs transported by the P-gp pump.

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In an *in vivo* human study, the co-administration of a single dose of lisdexamfetamine dimesilate did not result in any clinically meaningful effect on the pharmacokinetics of single doses of drugs metabolised by CYP1A2, CYP2D6, CYP2C19, or CYP3A.

### Agents whose blood levels may be affected by VYVANSE

Extended release guanfacine: In a drug interaction study, administration of an extended release guanfacine in combination with VYVANSE induced a 19% increase in guanfacine maximum plasma concentrations, whereas, exposure (area under the curve; AUC) was increased by 7%. These small changes are not expected to be clinically meaningful. In this study, no effect on dexamphetamine exposure was observed following coadministration of extended release guanfacine and VYVANSE.

Extended release venlafaxine: In a drug interaction study, administration of 225 mg extended release venlafaxine, a CYP2D6 substrate, in combination with 70 mg VYVANSE induced a 9% decrease in the  $C_{max}$  and 17% decrease in the AUC for the primary active metabolite *o*-desmethylvenlafaxine and a 10% increase in  $C_{max}$  and 13% increase in AUC for venlafaxine. VYVANSE (dexamphetamine) may be a weak inhibitor of CYP2D6. Lisdexamfetamine has no effect on the AUC and  $C_{max}$  of the composite of venlafaxine and *o*-desmethylvenlafaxine. These small changes are not expected to be clinically meaningful. In this study, no effect on dexamphetamine exposure was observed following coadministration of extended release venlafaxine and VYVANSE.

### Agents and conditions that alter urinary pH and impact the urinary excretion and half-life of amphetamine

Ascorbic acid and other agents or conditions that acidify urine increase urinary excretion and decrease half-life of amphetamine. Sodium bicarbonate and other agents or conditions that alkalinise urine decrease urinary excretion and extend the half-life of amphetamine.

### Monoamine oxidase inhibitors

Do not administer VYVANSE concomitantly with monoamine oxidase inhibitors or within 14 days after discontinuing MAOI treatment. Concomitant use of MAOIs and CNS stimulants can cause hypertensive crisis. Severe outcomes including death may occur. [See section 4.3 Contraindications]

### Serotonergic drugs

Serotonin syndrome can occur in association with the use of amphetamines such as VYVANSE, when given in conjunction with serotonergic drugs, including selective serotonin reuptake inhibitors (SSRIs) and serotonin and noradrenaline reuptake inhibitors (SNRIs). It has also been reported in association with overdose of amphetamines, including VYVANSE. [See section 4.9 Overdose]

### Agents whose effects may be reduced by amphetamines

Antihypertensives: Amphetamines may decrease the effectiveness of antihypertensive medications.

### Agents whose effects may be potentiated by amphetamines

Amphetamines potentiate the analgesic effect of narcotic analgesics.

### Agents that may reduce the effects of amphetamines

Chlorpromazine: Chlorpromazine blocks dopamine and noradrenaline receptors, thus inhibiting the central stimulant effects of amphetamines.

Haloperidol: Haloperidol blocks dopamine receptors, thus inhibiting the central stimulant effects of amphetamines.

Lithium carbonate: The anorectic and stimulatory effects of amphetamines may be inhibited by lithium carbonate.

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## 4.6 Fertility, pregnancy and lactation

### Effects on fertility

A fertility study of lisdexamfetamine dimesilate has not been conducted. Amphetamine (*d-* to *l-* enantiomer ratio of 3:1) did not adversely affect fertility or early embryonic development in the rat at oral doses of up to 20 mg total amphetamine base/kg/day. This dose resulted in a plasma amphetamine AUC which was 4 (males) and 6 (females) fold the AUC expected in adults at the maximum recommended dose of 70 mg.

### Use in pregnancy (Category B3)

The effects of VYVANSE on labour and delivery in humans are unknown.

There are no adequate and well-controlled studies with VYVANSE in pregnant women. VYVANSE should be used during pregnancy only if the potential benefit justifies the potential risk to foetus.

Infants born to mothers taking amphetamines should be monitored for symptoms of withdrawal such as feeding difficulties, irritability, agitation and excessive drowsiness.

Lisdexamfetamine dimesilate had no apparent effects on embryofoetal 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 resulted in respective plasma dexamphetamine AUC values which were 5 and 2 fold the AUC expected in adults at the maximum recommended dose of 70 mg, and respective plasma lisdexamfetamine AUC values which were 12 and 40 fold the AUC expected in adults at the maximum recommended dose.

A study of lisdexamfetamine dimesilate has not been conducted in rats treated throughout gestation and lactation. Amphetamine sulphate (*d-* to *l-* enantiomer ratio of 3:1), when given orally to rats from early gestation through to weaning at doses of 2, 6 and 10 mg total amphetamine base/kg/day, reduced the number of liveborn pups and pup viability during lactation. Body weight gain of offspring was reduced during lactation and after weaning, development was delayed, and increases in locomotor activity were observed. The reproductive performance of the offspring was also reduced. Some effects were observed at the 2 mg/kg/day dose, which was associated with a plasma amphetamine AUC about half that expected in adults at the maximum recommended dose of 70 mg.

### Use in lactation

Amphetamines are excreted in human milk. Mothers taking VYVANSE should be advised to refrain from breast feeding.

Oral administration of amphetamine sulfate to rats from early gestation through to weaning was associated with adverse effects on offspring. [See Use in pregnancy].

## 4.7 Effects on ability to drive and use machines

VYVANSE can cause dizziness, drowsiness and visual disturbances including difficulties with accommodation, diplopia and blurred vision. These are uncommon but could have a moderate influence on the ability to drive and use machines. If affected, patients should avoid potentially hazardous activities such as driving or operating machinery.

## 4.8 Undesirable effects

Adverse drug reactions observed with VYVANSE treatment mainly reflect side effects commonly associated with amphetamine use. Tables 1-3 present common adverse drug reactions (ADRs) reported in parallel-group, controlled clinical trials of children, adolescents and adults who received VYVANSE. Table 4 presents common ADRs reported in long-term, open-label clinical trials in children, adolescents and adults who received VYVANSE.

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**Table 1: Adverse Drug Reactions Occurring in ≥5% of Children who Received VYVANSE in Short-term, Parallel-group, Controlled Studies**

System Organ Class Preferred Term	NRP104.301 (forced dose; 4 weeks)		SPD489-325 (dose optimisation; 7 weeks)		
	VYVANSE N=218 (n [%])	Placebo N=72 (n [%])	VYVANSE N=77 (n [%])	Placebo N=79 (n [%])	Concerta N=80 (n [%])
<b>Gastrointestinal disorders</b>					
Abdominal pain upper	25 (11.5)	4 (5.6)	6 (7.8)	5 (6.3)	6 (7.5)
Diarrhoea	1 (0.5)	2 (2.8)	4 (5.2)	1 (1.3)	2 (2.5)
Nausea	13 (6.0)	2 (2.8)	8 (10.4)	2 (2.5)	6 (7.5)
Vomiting	19 (8.7)	3 (4.2)	3 (3.9)	1 (1.3)	2 (2.5)
<b>General disorders and administration site conditions</b>					
Irritability	21 (9.6)	0	3 (3.9)	0	3 (3.8)
Pyrexia	5 (2.3)	1 (1.4)	3 (3.9)	0	4 (5.0)
<b>Investigations</b>					
Weight decreased	21 (9.6)	2 (2.8)	10 (13.0)	0	4 (5.0)
<b>Metabolism and nutrition disorders</b>					
Anorexia	16 (7.3)	1 (1.4)	8 (10.4)	2 (2.5)	3 (3.8)
Decreased appetite	72 (33.0)	2 (2.8)	19 (24.7)	3 (3.8)	14 (17.5)
<b>Nervous system disorders</b>					
Dizziness	11 (5.0)	0	1 (1.3)	1 (1.3)	1 (1.3)
Headache	26 (11.9)	7 (9.7)	9 (11.7)	12 (15.2)	13 (16.3)
<b>Psychiatric disorders</b>					
Aggression	3 (1.4)	0	4 (5.2)	1 (1.3)	3 (3.8)
Initial insomnia	8 (3.7)	0	2 (2.6)	1 (1.3)	4 (5.0)
Insomnia	42 (19.3)	2 (2.8)	12 (15.6)	0	6 (7.5)

**Note:** Subjects are only counted once within each treatment group and by system organ class and preferred term. Percentages are based on the number of subjects in the Safety Population for each treatment group.

**Table 2: Adverse Drug Reactions Occurring in ≥5% of Adolescents who Received VYVANSE or Active Treatment in Short-term, Parallel-group, Controlled Studies**

System Organ Class Preferred Term	SPD489-305 (forced dose; 4 weeks)		SPD489-325 (dose optimisation; 7 weeks)		
	VYVANSE N=233 (n [%])	Placebo N=77 (n [%])	VYVANSE N=34 (n [%])	Placebo N=31 (n [%])	Concerta N=31 (n [%])
<b>Gastrointestinal disorders</b>					
Abdominal pain upper	2 (0.9)	3 (3.9)	2 (5.9)	1 (3.2)	3 (9.7)
Dry mouth	11 (4.7)	1 (1.3)	2 (5.9)	0	1 (3.2)
Nausea	9 (3.9)	2 (2.6)	4 (11.8)	1 (3.2)	2 (6.5)
Vomiting	3 (1.3)	4 (5.2)	1 (2.9)	0	2 (6.5)
<b>General disorders and administration site conditions</b>					
Fatigue	10 (4.3)	2 (2.6)	2 (5.9)	1 (3.2)	0
Irritability	17 (7.3)	3 (3.9)	1 (2.9)	0	1 (3.2)
<b>Investigations</b>					
Weight decreased	24 (10.3)	0	5 (14.7)	0	1 (3.2)
<b>Metabolism and nutrition disorders</b>					
Anorexia	4 (1.7)	0	4 (11.8)	0	3 (9.7)
Decreased appetite	80 (34.3)	2 (2.6)	9 (26.5)	0	3 (9.7)
<b>Nervous system disorders</b>					
Dizziness	10 (4.3)	3 (3.9)	3 (8.8)	0	1 (3.2)



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Headache	34 (14.6)	10 (13.0)	7 (20.6)	10 (32.3)	9 (29.0)
Psychiatric disorders					
Initial insomnia	6 (2.6)	0	1 (2.9)	0	3 (9.7)
Insomnia	26 (11.2)	3 (3.9)	4 (11.8)	0	3 (9.7)

**Note: Subjects are only counted once within each treatment group and by system organ class and preferred term. Percentages are based on the number of subjects in the Safety Population for the treatment group.**

**Table 3: Adverse Drug Reactions Occurring in ≥5% of Adults who Received VYVANSE in Short-term, Parallel-group, Controlled Studies**

Preferred Term	VYVANSE N=493 (n [%])	Placebo N=202 (n [%])
<b>Gastrointestinal disorders</b>		
Decreased appetite	122 (24.7)	6 (3.0)
Dry mouth	113 (22.9)	8 (4.0)
Diarrhoea	29 (5.9)	2 (1.0)
Nausea	26 (5.3)	5 (2.5)
<b>Nervous system disorders</b>		
Headache	100 (20.3)	13 (6.4)
<b>General disorders and administration site conditions</b>		
Irritability	31 (6.3)	7 (3.5)
Fatigue	25 (5.1)	7 (3.5)
Feeling jittery	25 (5.1)	0
<b>Investigations</b>		
Weight decreased	19 (3.9)	0
<b>Psychiatric disorders</b>		
Insomnia	79 (16.0)	12 (5.9)
Initial insomnia	26 (5.3)	6 (3.0)
Anxiety	25 (5.1)	0

**Note: Subjects were counted once within each preferred term and treatment group. Percentages are based on the number of subjects in the Safety Population for each treatment group. Adverse events were coded using Medical Dictionary for Regulatory Activities Version 11.1.**

**Table 4: Adverse Drug Reactions Occurring in > 5% of Children, Adolescents or Adults who Received VYVANSE in Long-term, Open-label Studies**

System Organ Class Preferred Term	NRP104.302 (children) (52 weeks open-label VYVANSE) N=270 (n [%])	SPD489-306 (adolescents) (52 weeks; open-label VYVANSE) N=265 (n [%])	NRP104.304 (adults) (52 weeks; open-label VYVANSE) N=349 (n [%])
<b>Gastrointestinal disorders</b>			
Abdominal pain upper	28 (10.4)	8 (3.0)	5 (1.4)
Dry mouth	0	14 (5.3)	58 (16.6)
Vomiting	23 (8.5)	7 (2.6)	3 (0.9)
<b>General disorders and administration site conditions</b>			
Irritability	26 (9.6)	33 (12.5)	39 (11.2)
<b>Investigations</b>			
Weight decreased	44 (16.3)	43 (16.2)	21 (6.0)
<b>Metabolism and nutrition disorders</b>			
Decreased appetite	84 (31.1)	56 (21.1)	50 (14.3)
<b>Nervous system disorders</b>			
Dizziness	0	14 (5.3)	15 (4.3)

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Headache	48 (17.8)	55 (20.8)	60 (17.2)
Psychiatric disorders			
Affect lability	17 (6.3)	0	2 (0.6)
Anxiety	3 (1.1)	3 (1.1)	29 (8.3)
Insomnia	48 (17.8)	32 (12.1)	68 (19.5)

**Note: Subjects are only counted once within each study and by system organ class and preferred term. Percentages are based on the number of subjects in each study.**

In addition the following adverse reactions have been identified in clinical trials of VYVANSE: agitation, logorrhoea, libido decreased, dysphoria, euphoria, psychomotor hyperactivity, bruxism, mania, hallucinations, restlessness, tremor, somnolence, tachycardia, dyspnoea, hyperhidrosis, rash, increased blood pressure, erectile dysfunction and constipation.

### Suppression of growth in paediatric patients with ADHD

#### *Weight*

Weight change compared to placebo has been evaluated in 4-week trials for children (age 6- 12) and adolescents (age 13-17). Higher doses were associated with greater weight loss. In children, mean weight loss from baseline to endpoint was -0.39, -0.84, and -1.12kg, respectively, for patients assigned to receive 30 mg, 50 mg, and 70 mg of VYVANSE, compared to a 0.46 kg weight gain for patients receiving placebo. In adolescents, mean weight change from baseline to endpoint was -1.24, -1.94, and -2.16 kg, respectively, for patients assigned to receive 30 mg, 50 mg, and 70 mg of VYVANSE, compared to a 0.9 kg weight gain for patients receiving placebo.

In children and adolescents who received VYVANSE over 12 months, careful monitoring of weight suggested that consistent medication (i.e., treatment for 7 days per week throughout the year) resulted in a slowing of growth as measured by body weight. In children, the average weight percentiles at baseline (n=271) and 12 months (n=146), were 60.9 and 47.2, respectively. The age- and sex-normalised mean change from baseline in percentile over 1 year was -13.4. In adolescents, the average weight percentiles at baseline (n=265) and 12 months (n=156), were 66.0 and 61.5, respectively. The age- and sex-normalised mean change from baseline in percentile over 1 year was -6.5. [See section 4.4 Special warnings and precautions for use]

#### *Long term growth*

Long term controlled height and weight data with use of VYVANSE are not available. In a long-term study, careful follow-up of weight and height in children ages 7 to 10 years who were randomised to either methylphenidate or non-medication treatment groups over 14 months, as well as in naturalistic subgroups of newly methylphenidate-treated and nonmedication treated children over 36 months (to the ages of 10 to 13 years) (total of all subgroups n=370), suggests that consistently medicated children (i.e., treatment for 7 days per week throughout the year) have a temporary slowing in growth rate (on average, a total of about 2 cm less growth in height and 2.7 kg less growth in weight over 3 years), without evidence of growth rebound during this period of development.

### Postmarketing experience

The following adverse reactions have been identified during post approval use of VYVANSE. These events are as follows: palpitations, cardiomyopathy, mydriasis, blurred vision, eosinophilic hepatitis, anaphylactic reaction, hypersensitivity, chest pain, dyskinesia, dysgeusia, tics, depression, affect lability, dermatillomania, psychotic episodes, Stevens-Johnson Syndrome, angioedema, urticaria, seizures, Raynaud's phenomenon, epistaxis and intestinal ischemia.

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## 4.9 Overdose

Manifestations of acute overdosage with amphetamines include restlessness, tremor, hyperreflexia, rapid respiration, confusion, aggression, hallucinations, panic states, hyperpyrexia, rhabdomyolysis and other features of serotonin syndrome. 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, diarrhoea, and abdominal cramps. Fatal poisoning is usually preceded by convulsions and coma.

Management of acute amphetamine intoxication is largely symptomatic and includes administration of activated charcoal and sedation. If acute severe hypertension complicates amphetamine overdosage, administration of intravenous phentolamine has been suggested. However, a gradual drop in blood pressure will usually result when sufficient sedation has been achieved.

Lisdexamfetamine and dexamphetamine are not dialysable. Acidification of the urine increases amphetamine excretion but is believed to increase risk of acute renal failure if myoglobinuria is present.

The prolonged release of VYVANSE in the body should be considered when treating patients with overdose.

For advice on the management of overdose please contact the National Poisons Centre on 0800 POISON (0800 764766).

## 5 PHARMACOLOGICAL PROPERTIES

### 5.1 Pharmacodynamic properties

Pharmacotherapeutic group: centrally acting sympathomimetics, ATC code: N06 BA12.

#### Pharmacodynamic effects

Lisdexamfetamine is a pharmacologically inactive prodrug of dexamphetamine, which is a central nervous system stimulant.

After oral administration, lisdexamfetamine is rapidly absorbed from the gastrointestinal tract and hydrolysed primarily in whole blood to dexamphetamine, which is responsible for the drug's activity. Amphetamines are non-catecholamine sympathomimetic amines with CNS stimulant activity. The mode of therapeutic action of amphetamine in ADHD is not fully established, however it is thought to be due to its ability to block the reuptake of noradrenaline 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 noradrenaline and dopamine *in vitro*.

#### Clinical trials

The effects of VYVANSE in the treatment of ADHD have been demonstrated in two controlled trials in children aged 6 to 12 years, one controlled study in adolescents aged 13 to 17 years, one controlled study in children and adolescents (6 to 17 years), two controlled trials in adults, one maintenance trial in children and adolescents and one maintenance trial in adults.

In clinical studies conducted in children and adults, the effects of VYVANSE were ongoing at 13 hours after dosing in children and at 14 hours in adults when the product was taken once daily in the morning (data presented below).

In dose optimisation studies, the mean daily dose of VYVANSE tended to be slightly lower in studies in children (range 44.3-50.5 mg) than in adolescents (range 53.5-58.8 mg) or adults (range 52.3-56.8 mg). This observation is consistent with the lower weights of children.

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### *Children aged from 6 to 12 years*

A double-blind, randomised, placebo-controlled, parallel-group study was conducted in children aged 6 to 12 (N=290) who met DSM-IV criteria for ADHD (either the combined type or the hyperactive-impulsive type). Patients were randomised to fixed dose treatment groups receiving final doses of 30, 50, or 70 mg of VYVANSE or placebo once daily in the morning for four weeks. All subjects receiving VYVANSE were initiated on 30 mg for the first week of treatment. Subjects assigned to the 50 and 70 mg dose groups were titrated by 20 mg per week until they achieved their assigned dose. Significant improvements in ADHD symptoms, based upon investigator ratings on the ADHD Rating Scale (ADHD-RS), were observed at endpoint for all VYVANSE doses compared to patients who received placebo. Mean effects at all doses were fairly similar, although the highest dose (70 mg/day) was numerically superior to both lower doses (30 and 50 mg/day). The effects were maintained throughout the day based on parent ratings (Conners' Parent Rating Scale) in the morning (approximately 10 am), afternoon (approximately 2 pm), and early evening (approximately 6 pm). ADHD-RS results for Study NRP104.301 are shown in the following table:

Treatment	Baseline		Change from Baseline				≥50% Response <sup>a</sup>			
	n	Mean (SD)	n	LS Mean (SE) Change	LS Means Diff.	95% CI	p-value <sup>b</sup>	n	Percent	p-value <sup>c</sup>
Placebo	72	42.4 (7.13)	72	-6.2 (1.56)				72	12.5	
VYVANSE 30mg	69	43.2 (6.68)	69	-21.8 (1.60)	-15.58	(-20.78 -10.38)	<0.0001	71	52.1	<0.001
VYVANSE 50mg	71	43.3 (6.74)	71	-23.4 (1.56)	-17.21	(-22.33, -12.08)	<0.0001	74	60.8	<0.001
VYVANSE 70mg	73	45.1 (6.82)	73	-26.7 (1.54)	-20.49	(-25.63, -15.36)	<0.0001	73	71.2	<0.001

<sup>a</sup> Defined as a ≥50% decrease from baseline in ADHD-RS Total Score at endpoint.

<sup>b</sup> p-value is adjusted based on Dunnett's multiple comparison procedure for comparing the active doses to placebo.

<sup>c</sup> p-value is based on Cochran-Mantel-Haenszel test comparing each active dose to placebo controlling for pooled site.

**Note: Endpoint is the last post-randomisation treatment week for which a valid ADHD-RS-IV Total Score is obtained.**

Note: Response is defined as a percentage reduction from baseline in the ADHD-RS-IV Total Score of ≥50%

Full Analysis Set=full analysis set (all subjects who took at least 1 dose of investigational product and who had a valid baseline and at least 1 post-baseline ADHD-RS total score); SE=standard error.

A second double-blind, placebo-controlled, randomised, crossover design, analog classroom study was conducted in children aged 6 to 12 (N=129) who met DSM-IV criteria for ADHD (either the combined type or the hyperactive-impulsive type). Following a 4-week open-label dose titration with VYVANSE (30, 50, 70 mg), patients were randomly assigned to continue VYVANSE or placebo once daily in the morning for 1 week each treatment. A significant difference in patient behaviour, based upon the average of investigator ratings on the SKAMP-Department scores across all 7 assessments conducted at 1.5, 2.5, 5.0, 7.5, 10.0, 12.0, and 13.0 hours post-dose, were observed between patients who received VYVANSE compared to patients who received placebo. Significant differences at all assessments from 1.5 hours through 13 hours post-dose were observed between patients who received VYVANSE compared to patients who received placebo.

### *Adolescents aged from 13 to 17 years*

A double-blind, randomised, placebo-controlled, parallel-group study was conducted in adolescents aged 13 to 17 (N=314) who met DSM-IV criteria for ADHD. In this four-week study, patients were randomised in a 1:1:1:1 ratio to a daily morning dose of VYVANSE (30, 50 or 70 mg/day) or placebo for a double-blind stepwise forced dose titration (3 weeks) followed by a 1-week Dose Maintenance

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Period. All subjects receiving VYVANSE were initiated on 30 mg for the first week of treatment. Subjects assigned to the 50 and 70 mg dose groups were titrated by 20 mg per week until they achieved their assigned dose. Significant improvements in ADHD symptoms, based upon investigator ratings on the ADHD Rating Scale (ADHD-RS), were observed at endpoint for all VYVANSE doses compared to placebo. ADHD-RS results for Study SPD489-305 are shown in the following table:

Treatment	Baseline		Change from Baseline				≥50% Response <sup>a</sup>			
	n	Mean (SD)	n	LS Mean (SE) Change	LS Means Diff.	95% CI	p-value <sup>b</sup>	n	Percent	p-value <sup>c</sup>
Placebo	77	38.5 (7.11)	76	-12.8 (1.25)				77	33.8	
VYVANSE 30mg	78	38.3 (6.71)	76	-18.3 (1.25)	-5.5	(-9.7, -1.3)	0.0056	78	50.0	0.041
VYVANSE 50mg	76	37.3 (6.33)	72	-21.1 (1.28)	-8.3	(-12.5, -4.1)	<0.0001	77	59.7	0.001
VYVANSE 70mg	78	37.0 (7.30)	75	-20.7 (1.25)	-7.9	(-12.1, -3.8)	<0.0001	78	56.4	0.005

<sup>a</sup> Defined as a ≥50% decrease from baseline in ADHD-RS Total Score at endpoint.

<sup>b</sup> p-value is adjusted based on Dunnett's multiple comparison procedure for comparing the active doses to placebo.

<sup>c</sup> p-value is based on Cochran-Mantel-Haenszel test comparing each active dose to placebo controlling for pooled site  
**Note: Endpoint is the last post-randomisation treatment week for which a valid ADHD-RS-IV Total Score is obtained.**

Note: Response is defined as a percentage reduction from baseline in the ADHD-RS-IV Total Score of ≥50%

Full Analysis Set=full analysis set (all subjects who took at least 1 dose of investigational product and who had a valid baseline and at least 1 post-baseline ADHD-RS total score); SE=standard error.

### *Children and adolescents aged from 6 to 17 years*

A double-blind, randomised, placebo- and active-controlled parallel-group, dose-optimisation study was conducted in children and adolescents aged 6 to 17 years (N=336) who met DSM-IV criteria for ADHD. In this eight-week study, patients were randomised to a daily morning dose of VYVANSE (30, 50 or 70 mg/day), a long-acting methylphenidate formulation (Concerta) (18 mg, 36 mg or 54 mg/day) or placebo (1:1:1). The study consisted of 3 periods, as follows: a Screening and Washout Period (up to 42 days), a 7-week Double-blind Evaluation Period (consisting of a 4-week Dose-Optimisation Period followed by a 3-week Dose-Maintenance Period), and a 1-week Washout and Follow-up Period. During the 4-week Dose Optimisation Period, subjects were titrated until an optimal dose, based on TEAEs and clinical judgment, was reached.

VYVANSE showed significantly greater efficacy than placebo. The placebo-adjusted mean reduction from baseline in the ADHD-RS-IV total score was 18.6 (p<0.001). With regard to functional outcome, 78.0% of subjects on VYVANSE showed Improvement ("very much improved" or "much improved") on the Clinical Global Impression-Improvement (CGI-I) rating scale. VYVANSE also showed significant improvement in child achievement in academic performance, as measured by the Health Related Quality of Life instrument CHIP-CE:PRF Achievement Domain, VYVANSE demonstrated a significant improvement compared to placebo from baseline (VYVANSE: 9.4 vs. Placebo -1.1) with a mean difference between the two treatment groups of 10.5 (p<0.001). Outcome results for Study SPD489-325 are shown in the following table:

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<b>Table 7: Results for Study SPD489-325 at Endpoint (Children and Adolescents; Full Analysis Set)</b>			
	<b>VYVANSE</b>	<b>Placebo</b>	<b>Concerta</b>
<b>Change in ADHD-RS IV Total Score</b>			
Least Square Mean	-24.3	-5.7	-18.7
Effect size (versus Placebo)	1.804	N/A	1.263
P-value (versus Placebo)	<0.001	N/A	<0.001
Percent with ≥50% Response <sup>a</sup>	65.4	13.2	49.5
P-value (versus Placebo)	<0.001		<0.001
<b>Analysis of CGI-I</b>			
Patients Showing Improvement <sup>b</sup>	78% (78/100)	14% (15/104)	61% (63/104)
Difference in improvement from placebo (percentage point improvement)	64	N/A	46
P-value (versus Placebo)	<0.001	N/A	<0.001
<b>Change in CHIP-CE: PRF Achievement Domain</b>			
Least Square Mean	9.4	-1.1	6.4
Effect size (versus Placebo)	1.28	N/A	0.912
P-value (versus Placebo)	<0.001	N/A	<0.001

<sup>a</sup> Defined as a ≥50% decrease from baseline in ADHD-RS Total Score at endpoint

<sup>b</sup> Improvement (“very much improved” or “much improved”)

Note: Endpoint is defined as the last on-treatment post-Baseline visit of the dose optimisation or dose maintenance Period (Visits 1-7) with a valid value

The long-acting methylphenidate formulation (Concerta) was included as a reference arm to validate the results of the trial.

Maintenance of Efficacy Study - A double-blind, placebo-controlled, randomised withdrawal study was conducted in children and adolescents aged 6 to 17 years (N=276) who met the diagnosis of ADHD (DSM-IV criteria). A total of 276 patients were enrolled into the study, 236 patients participated in the preceding study SPD489-325 and 40 subjects directly enrolled. In order to ensure that the appropriate population was included in the randomised withdrawal period to evaluate the long-term maintenance of efficacy, subjects were treated with open-label VYVANSE for an extended period (at least 26 weeks) prior to being assessed for entry into the randomised withdrawal period. Eligible patients had to demonstrate treatment response as defined by CGI-S <3 and total score on the ADHD-RS ≤22. ADHD-RS Total score is a measure of core symptoms of ADHD. Of patients that maintained open label treatment response, 157 were randomised to ongoing treatment with the same dose of VYVANSE (N=78) or switched to placebo (N=79) during the double-blind phase. Patients were observed for relapse (treatment failure) during the 6 week double-blind phase. Maintenance of efficacy was demonstrated based on the significantly lower proportion of treatment failure among VYVANSE subjects (15.8%) compared to placebo (67.5%) at endpoint of the randomised withdrawal period (p<0.001). The endpoint measurement was defined as the last post-randomisation treatment week at which a valid ADHD-RS total score and CGI-S were observed. Treatment failure was defined as a ≥50% increase (worsening) in the ADHD-RS total score and a ≥2-point increase in the CGI-S score compared to scores at entry into the double-blind randomised withdrawal phase. For the majority of subjects (70.3%) who were treatment failures ADHD symptoms worsened at or before the week 2 visit following randomisation.

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### Adults

A double-blind, randomised, placebo-controlled, parallel-group study was conducted in adults (N=420) who met DSM-IV criteria for ADHD. In this four-week study, patients were randomised to fixed dose treatment groups receiving final doses of 30, 50, or 70 mg of VYVANSE or placebo. All subjects receiving VYVANSE were initiated on 30 mg for the first week of treatment. Subjects assigned to the 50 and 70 mg dose groups were titrated by 20 mg per week until they achieved their assigned dose. Significant improvements in ADHD symptoms, based upon investigator ratings on the ADHD Rating Scale (ADHD-RS), were observed at endpoint for all VYVANSE doses compared to placebo. ADHD-RS results for Study NRP104.303 are shown in the following table:

Treatment	Baseline		Change from Baseline					≥50% Response <sup>a</sup>		
	n	Mean (SD)	n	LS Mean (SE) Change	LS Means Diff.	95% CI	p-value <sup>b</sup>	n	Percent	p-value <sup>c</sup>
Placebo	62	39.4 (6.42)	62	-8.2 (1.43)				62	12.9	
VYVANSE 30mg	115	40.5 (6.21)	115	-16.2 (1.06)	-8.04	(-12.14, -3.95)	<0.0001	119	36.1	0.002
VYVANSE 50mg	117	40.8 (73.0)	117	-17.4 (1.05)	-9.16	(-13.25, -5.08)	<0.0001	117	40.2	<0.001
VYVANSE 70mg	120	41.0 (6.02)	120	-18.6 (1.03)	-10.41	(-14.49, -6.33)	<0.0001	122	44.3	<0.001

<sup>a</sup> Defined as a ≥50% decrease from baseline in ADHD-RS Total Score at endpoint

<sup>b</sup> p-value is adjusted based on Dunnett's multiple comparison procedure for comparing the active doses to placebo.

<sup>c</sup> p-value is based on Cochran-Mantel-Haenszel test comparing each active dose to placebo controlling for pooled site

**Note: Endpoint is the last post-randomisation treatment week for which a valid ADHD-RS-IV Total Score is obtained.**

Note: Response is defined as a percentage reduction from baseline in the ADHD-RS-IV Total Score of ≥50%

Full Analysis Set=full analysis set (all subjects who took at least 1 dose of investigational product and who had a valid baseline and at least 1 post-baseline ADHD-RS total score); SE=standard error.

The second study was a multi-centre, randomised, double-blind, placebo-controlled, crossover design, modified analog classroom study of VYVANSE to simulate a workplace environment in 142 adults who met DSM-IV-TR criteria for ADHD. There was a 4-week open-label, dose optimisation phase with VYVANSE (30, 50, or 70 mg/day in the morning). Subjects were then randomised to one of two treatment sequences: 1) VYVANSE (optimised dose) followed by placebo, each for one week, or 2) placebo followed by VYVANSE, each for one week. Efficacy assessments occurred at the end of each week, using the Permanent Product Measure of Performance (PERMP). The PERMP is a skill-adjusted mathematics test that measures attention in ADHD. VYVANSE treatment, compared to placebo, resulted in a statistically significant improvement in attention across all post-dose time points, as measured by average PERMP total scores over the course of one assessment day, as well as at each time point measured. The PERMP assessments were administered at pre-dose (-0.5 hours) and at 2, 4, 8, 10, 12, and 14 hours post-dose. In this study most subjects (> 80%) required a dose greater than 30 mg. The majority of subjects (~50%) had a final dose of 50 mg.

Maintenance of Efficacy Study - A double-blind, placebo-controlled, randomised withdrawal design study was conducted in adults aged 18 to 55 (N=123) who met DSM-IV criteria for ADHD. At study entry, subjects must have had documentation of treatment with VYVANSE for a minimum of 6 months and had to demonstrate treatment response as defined by CGI-S ≤3 and Total Score on the ADHD-RS with adult prompts <22. ADHD-RS with adult prompts Total Score is a measure of core symptoms of ADHD. Subjects that maintained treatment response at week 3 of open label treatment phase (N=116) were eligible to enter the 6 week double-blind randomised withdrawal phase, and received their entry dose of VYVANSE (N=56) or placebo (N=60). Maintenance of efficacy for subjects treated with VYVANSE was demonstrated by the significantly lower proportion of treatment failure

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(<9%) compared to subjects receiving placebo (75%) in the double-blind randomised withdrawal phase ( $p < 0.0001$ ). Treatment failure was defined as a  $\geq 50\%$  increase in the ADHD-RS with adult prompts Total Score and  $\geq 2$ -point increase in the CGI-S score compared to scores at entry into the double-blind randomised withdrawal phase. For subjects receiving VYVANSE, the median and mean duration in the double-blind randomised withdrawal phase was 42.0 and 39.1 days, respectively. For subjects receiving placebo, the median and mean duration in the double-blind randomised withdrawal phase was 13.0 and 18.2 days, respectively. The difference in duration between the two treatment groups was because the majority of treatment failures occurred in the first 14 days after subjects were switched from open-label SPD489 treatment to placebo.

### 5.2 Pharmacokinetic properties

Pharmacokinetic studies of dexamphetamine after oral administration of lisdexamfetamine dimesilate have been conducted in healthy adult subjects and paediatric (6-12 years) patients with ADHD.

#### Absorption

After oral administration, lisdexamfetamine is rapidly absorbed from the gastrointestinal tract, thought to be mediated by the high capacity PEPT1 transporter.

In 18 paediatric patients (6-12 years) with ADHD, the  $T_{max}$  of dexamphetamine was approximately 3.5 hours following single-dose oral administration of lisdexamfetamine dimesilate either 30 mg, 50 mg, or 70 mg after an 8-hour overnight fast. The  $T_{max}$  of lisdexamfetamine dimesilate was approximately 1 hour. Linear pharmacokinetics of dexamphetamine after single-dose oral administration of lisdexamfetamine dimesilate was established over the dose range of 30 mg to 70 mg in children aged 6 to 12 years and over the dose range of 50 mg to 250 mg in adults.

Dexamphetamine pharmacokinetic parameters following administration of lisdexamfetamine in adults exhibited low inter-subject (<25%) and intra-subject (<8%) variability. Safety and efficacy have not been studied above the maximum recommended dose of 70 mg.

Food (a high fat meal or soft food such as yogurt) or orange juice does not affect the observed AUC and  $C_{max}$  of dexamphetamine in healthy adults after single-dose oral administration of 70 mg of VYVANSE capsules. Food prolongs  $T_{max}$  by approximately 1 hour (from 3.8 h at fasted state to 4.7 h after a high fat meal or to 4.2 h after soft food such as yogurt).

After an 8-hour fast, the AUC for dexamphetamine following oral administration of lisdexamfetamine dimesilate in solution and as intact capsules were equivalent.

Weight/Doses normalised AUC and  $C_{max}$  for dexamphetamine were 22% and 12% lower, respectively, in adult females than in males on day 7 following a 70 mg/day dose of lisdexamfetamine for 7 days. Weight/Dose normalised AUC and  $C_{max}$  values were the same in girls and boys following single doses of 30-70 mg.

#### Distribution

There is no accumulation of dexamphetamine AUC at steady state in healthy adults and no accumulation of lisdexamfetamine dimesilate after once-daily dosing for 7 consecutive days.

#### Metabolism

Lisdexamfetamine is converted to dexamphetamine and L-lysine, not by cytochrome P450 enzymes metabolism, but by metabolism in blood primarily due to the hydrolytic activity of red blood cells. Red blood cells have a high capacity for metabolism of lisdexamfetamine as *in vitro* data demonstrated substantial hydrolysis occurs even at low haematocrit levels.

Amphetamine is reported to be oxidised at the 4 position of the benzene ring to form 4-hydroxyamphetamine, or on the side chain  $\alpha$  or  $\beta$  carbons to form alpha-hydroxy-amphetamine or norephedrine, respectively. Norephedrine and 4-hydroxy-amphetamine are both active and each is



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subsequently oxidised to form 4-hydroxy-norephedrine. Alpha-hydroxy-amphetamine undergoes deamination to form phenylacetone, which ultimately forms benzoic acid and its glucuronide and the glycine conjugate hippuric acid. Although the enzymes involved in amphetamine metabolism have not been clearly defined, CYP2D6 is known to be involved with formation of 4-hydroxy-amphetamine.

### Excretion

Following the oral administration of a 70 mg dose of radiolabelled lisdexamfetamine dimesilate to 6 healthy subjects, approximately 96% of the oral dose radioactivity was recovered in the urine and only 0.3% recovered in the faeces 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. The plasma elimination half-life of lisdexamfetamine typically averaged less than one hour in studies of lisdexamfetamine dimesilate in volunteers.

### Special populations

#### *Age*

The pharmacokinetics of dexamphetamine is similar in paediatric (aged 6 to 12) and adolescent (aged 13 to 17) ADHD patients, and healthy adult volunteers. Any differences in kinetics seen after oral administration are a result of differences in mg/kg dosing. Following administration of lisdexamfetamine dimesilate in a study of 47 subjects aged 55 years of age or older, amphetamine clearance was approximately 0.7 L/h/kg for subjects 55-74 years of age and 0.55 L/h/kg for subjects  $\geq 75$  years of age. This is slightly reduced compared to younger adults (approximately 1 L/h/kg for subjects 18-45 years of age).

#### *Sex*

Following administration of lisdexamfetamine dimesilate, systemic exposure to dexamphetamine is similar for men and women given the same mg/kg dose.

#### *Race*

Formal pharmacokinetic studies for race have not been conducted.

#### *Renal disease*

In a pharmacokinetic study of lisdexamfetamine in subjects with normal and impaired renal function, dexamphetamine clearance was reduced from 0.7 L/h/kg in normal subjects to 0.4 L/h/kg in subjects with severe renal impairment (GFR 15 to  $<30$  mL/min/1.73m<sup>2</sup>). [See section 4.4 Special warnings and precautions for use – Renal impairment]

In subjects with ESRD requiring dialysis, mean dexamphetamine clearance was reduced to 0.3 L/h/kg both pre- and post-dialysis. Dialysis did not significantly affect the clearance of dexamphetamine.

### 5.3 Preclinical safety data

#### Carcinogenicity

Carcinogenicity studies of lisdexamfetamine dimesilate have not been performed.

No evidence of carcinogenicity was found in studies in which *d*-, *l*-amphetamine sulphate (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.

#### Genotoxicity

Lisdexamfetamine dimesilate was negative (not clastogenic) in the mouse micronucleus test *in vivo* and was negative in the bacterial reverse mutation test and the L5178Y/TK+/- mouse lymphoma

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assay *in vitro*.

## 6 PHARMACEUTICAL PARTICULARS

### 6.1 List of excipients

VYVANSE capsules contain the following inactive ingredients: microcrystalline cellulose, croscarmellose sodium, and magnesium stearate. The capsule shells contain gelatin, titanium dioxide (all strengths), erythrosine (30mg and 70 mg), brilliant blue FCF (50 mg, and 70 mg), and TekPrint SW-9008 (all strengths). Refer to Section 2 – QUALITATIVE AND QUANTITATIVE COMPOSITION.

### 6.2 Incompatibilities

Not applicable.

### 6.3 Shelf life

30 months.

### 6.4 Special precautions for storage

Store below 25°C.

### 6.5 Nature and contents of container

VYVANSE capsules are packed in high density polyethylene (HDPE) bottles containing 30 capsules, inside a cardboard carton.

### 6.6 Special precautions for disposal <and other handling>

No special requirements.

## 7 MEDICINE SCHEDULE

Controlled Drug – B2

## 8 SPONSOR

Takeda New Zealand Limited  
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## 9 DATE OF FIRST APPROVAL

29 March 2021

## 10 DATE OF REVISION OF THE TEXT

17 August 2022

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## SUMMARY TABLE OF CHANGES

<b>Section changed</b>	<b>Summary of new information</b>
4.8	Addition of epistaxis and intestinal ischemia in postmarketing experience section.