

## SUMMARY OF PRODUCT CHARACTERISTICS

### 1 NAME OF THE MEDICINAL PRODUCT

Prozac 20 mg per 5 ml oral solution

### 2 QUALITATIVE AND QUANTITATIVE COMPOSITION

Each 5 ml of oral solution contains 20 mg of fluoxetine (as fluoxetine hydrochloride).

Excipients with known effect: contains 3 g of sucrose per 5 ml dose. Also contains small amounts of ethanol (alcohol), less than 100 mg per 5 ml dose.

For the full list of excipients, see section 6.1.

### 3 PHARMACEUTICAL FORM

Oral solution.

The solution is clear, colourless, mint odoured.

### 4 CLINICAL PARTICULARS

#### 4.1 Therapeutic indications

Adults:

Major depressive episodes.

Obsessive-compulsive disorder.

Bulimia nervosa: Prozac is indicated as a complement of psychotherapy for the reduction of binge-eating and purging activity.

Children and adolescents aged 8 years and above:

Moderate to severe major depressive episode, if depression is unresponsive to psychological therapy after 4–6 sessions. Antidepressant medication should be offered to a child or young person with moderate to severe depression only in combination with a concurrent psychological therapy.

#### 4.2 Posology and method of administration

Posology

Adults

*Major depressive episodes*

Adults and the elderly: The recommended dose is 20mg daily. Dosage should be reviewed and adjusted if necessary within 3 to 4 weeks of initiation of therapy and thereafter as judged clinically appropriate. Although there may be an increased potential for undesirable effects at higher doses, in some patients,

with insufficient response to 20mg, the dose may be increased gradually up to a maximum of 60mg (see section 5.1). Dosage adjustments should be made carefully on an individual patient basis, to maintain the patients at the lowest effective dose.

Patients with depression should be treated for a sufficient period of at least 6 months to ensure that they are free from symptoms.

#### *Obsessive-compulsive disorder*

Adults and the elderly: The recommended dose is 20mg daily. Although there may be an increased potential for undesirable effects at higher doses, in some patients, if after two weeks there is insufficient response to 20mg, the dose may be increased gradually up to a maximum of 60mg.

If no improvement is observed within 10 weeks, treatment with fluoxetine should be reconsidered. If a good therapeutic response has been obtained, treatment can be continued at a dosage adjusted on an individual basis. While there are no systematic studies to answer the question of how long to continue fluoxetine treatment, OCD is a chronic condition and it is reasonable to consider continuation beyond 10 weeks in responding patients. Dosage adjustments should be made carefully on an individual patient basis, to maintain the patient at the lowest effective dose. The need for treatment should be reassessed periodically. Some clinicians advocate concomitant behavioural psychotherapy for patients who have done well on pharmacotherapy. Long-term efficacy (more than 24 weeks) has not been demonstrated in OCD.

#### *Bulimia nervosa*

Adults and the elderly: A dose of 60mg/day is recommended. Long-term efficacy (more than 3 months) has not been demonstrated in bulimia nervosa.

#### *All indications*

The recommended dose may be increased or decreased. Doses above 80mg/day have not been systematically evaluated.

#### Paediatric population - Children and adolescents aged 8 years and above (Moderate to severe major depressive episode)

Treatment should be initiated and monitored under specialist supervision. The starting dose is 10mg/day given as 2.5 ml of the Prozac oral solution. Dose adjustments should be made carefully, on an individual basis, to maintain the patient at the lowest effective dose.

After one to two weeks, the dose may be increased to 20mg/day. Clinical trial experience with daily doses greater than 20mg is minimal. There is only limited data on treatment beyond 9 weeks.

#### *Lower weight children:*

Due to higher plasma levels in lower weight children, the therapeutic effect may be achieved with lower doses (see section 5.2).

For paediatric patients who respond to treatment, the need for continued treatment after 6 months should be reviewed. If no clinical benefit is achieved within 9 weeks, treatment should be reconsidered.

#### Elderly patients

Caution is recommended when increasing the dose and the daily dose should generally not exceed 40mg. Maximum recommended dose is 60mg/day.

#### Patients with hepatic impairment

A lower or less frequent dose (e.g. 20mg every second day) should be considered in patients with hepatic impairment (see section 5.2), or in patients where concomitant medication has the potential for interaction with Prozac (see section 4.5).

Withdrawal symptoms seen on discontinuation of Prozac: Abrupt discontinuation should be avoided. When stopping treatment with Prozac the dose should be gradually reduced over a period of at least one to two weeks in order to reduce the risk of withdrawal reactions (see sections 4.4 and 4.8). If intolerable symptoms occur following a decrease in the dose or upon discontinuation of treatment, then resuming the previously prescribed dose may be considered. Subsequently, the physician may continue decreasing the dose, but at a more gradual rate.

#### Method of administration

For oral administration.

Fluoxetine may be administered as a single or divided dose, during or between meals.

When dosing is stopped, active drug substances will persist in the body for weeks. This should be borne in mind when starting or stopping treatment.

The capsule and oral solution forms are bioequivalent.

### **4.3 Contraindications**

Hypersensitivity to the active substance or to any of the excipients listed in section 6.1.

*Monoamine Oxidase Inhibitors:* Cases of serious and sometimes fatal reactions have been reported in patients receiving an SSRI in combination with a monoamine oxidase inhibitor (MAOI), and in patients who have recently discontinued an SSRI and have been started on a MAOI. Treatment of fluoxetine should only be started 2 weeks after discontinuation of an irreversible MAOI and the following day after discontinuation of a reversible MAOI-A.

Some cases presented with features resembling serotonin syndrome (which may resemble and be diagnosed as neuroleptic malignant syndrome). Cyproheptadine or dantrolene may benefit patients experiencing such reactions. Symptoms of a drug interaction with a MAOI include: hyperthermia, rigidity, myoclonus, autonomic instability with possible rapid fluctuations of vital signs, mental status changes that include confusion, irritability and extreme agitation progressing to delirium and coma.

Therefore, fluoxetine is contra-indicated in combination with a non-selective MAOI. Similarly, at least 5 weeks should elapse after discontinuing fluoxetine

treatment before starting a MAOI. If fluoxetine has been prescribed chronically and/or at a high dose, a longer interval should be considered.

The combination of fluoxetine with a reversible MAOI (e.g. moclobemide, linezolid, methylthioninium chloride (also called methylene blue; a reversible non-selective MAOI indicated for medicinal or chemical induced methaemoglobinaemia) is not recommended. Treatment with fluoxetine can be initiated the following day after discontinuation of a reversible MAOI.

In exceptional circumstances, linezolid (an antibiotic which is a reversible non-selective MAOI) can be given in combination with fluoxetine provided that there are facilities for close observation of symptoms of serotonin syndrome and monitoring of blood pressure.

#### **4.4 Special warnings and precautions for use**

##### Paediatric population - Children and adolescents under 18 years of age

Suicide-related behaviours (suicide attempt and suicidal thoughts), and hostility (predominantly aggression, oppositional behaviour and anger) were more frequently observed in clinical trials among children and adolescents treated with antidepressants compared to those treated with placebo. Prozac should only be used in children and adolescents aged 8 to 18 years for the treatment of moderate to severe major depressive episodes and it should not be used in other indications. If, based on clinical need, a decision to treat is nevertheless taken, the patient should be carefully monitored for the appearance of suicidal symptoms. In addition, only limited evidence is available concerning long-term effect on safety in children and adolescents, including effects on growth, sexual maturation and cognitive, emotional and behavioural developments (see section 5.3).

In a 19-week clinical trial decreased height and weight gain was observed in children and adolescents treated with fluoxetine (see section 5.1). It has not been established whether there is an effect on achieving normal adult height. The possibility of a delay in puberty cannot be ruled out (see sections 5.3 and 4.8). Growth and pubertal development (height, weight and TANNER staging) should therefore be monitored during and after treatment with fluoxetine. If either is slowed, referral to a paediatrician should be considered.

In paediatric trials, mania and hypomania were commonly reported (see section 4.8). Therefore, regular monitoring for the occurrence of mania/hypomania is recommended. Fluoxetine should be discontinued in any patient entering a manic phase.

It is important that the prescriber discusses carefully the risks and benefits of treatment with the child/young person and/or their parents.

##### Rash and allergic reactions

Rash, anaphylactoid events and progressive systemic events, sometimes serious (involving skin, kidney, liver or lung) have been reported. Upon the appearance of rash or of other allergic phenomena for which an alternative aetiology cannot be identified, fluoxetine should be discontinued.

### Seizures

Seizures are a potential risk with antidepressant drugs. Therefore, as with other antidepressants, fluoxetine should be introduced cautiously in patients who have a history of seizures. Treatment should be discontinued in any patient who develops seizures or where there is an increase in seizure frequency. Fluoxetine should be avoided in patients with unstable seizure disorders/epilepsy and patients with controlled epilepsy should be carefully monitored.

### Mania

Antidepressants should be used with caution in patients with a history of mania/hypomania. As with all antidepressants, fluoxetine should be discontinued in any patient entering a manic phase.

### Hepatic/Renal Function

Fluoxetine is extensively metabolised by the liver and excreted by the kidneys. A lower dose, e.g., alternate day dosing, is recommended in patients with significant hepatic dysfunction. When given fluoxetine 20mg/day for 2 months, patients with severe renal failure (GFR <10ml/min) requiring dialysis showed no difference in plasma levels of fluoxetine or norfluoxetine compared to controls with normal renal function.

### Tamoxifen

Fluoxetine, a potent inhibitor of CYP2D6, may lead to reduced concentrations of endoxifen, one of the most important active metabolites of tamoxifen. Therefore, fluoxetine should whenever possible be avoided during tamoxifen treatment (see section 4.5).

### *Cardiovascular Effects:*

Cases of QT interval prolongation and ventricular arrhythmia including torsade de pointes have been reported during the post-marketing period (see sections 4.5, 4.8 and 4.9).

Fluoxetine should be used with caution in patients with conditions such as congenital long QT syndrome, a family history of QT prolongation or other clinical conditions that predispose to arrhythmias (e.g., hypokalemia, hypomagnesemia, bradycardia, acute myocardial infarction or uncompensated heart failure) or increased exposure to fluoxetine (e.g., hepatic impairment).

If patients with stable cardiac disease are treated, an ECG review should be considered before treatment is started.

If signs of cardiac arrhythmia occur during treatment with fluoxetine, the treatment should be withdrawn and an ECG should be performed.

### Weight Loss

Weight loss may occur in patients taking fluoxetine but it is usually proportional to baseline body weight.

### Diabetes

In patients with diabetes, treatment with an SSRI may alter glycaemic control. Hypoglycaemia has occurred during therapy with fluoxetine and

hyperglycaemia has developed following discontinuation. Insulin and/or oral hypoglycaemic dosage may need to be adjusted.

#### Suicide/suicidal thoughts or clinical worsening

Depression is associated with an increased risk of suicidal thoughts, self-harm and suicide (suicide-related events). This risk persists until significant remission occurs. As improvement may not occur during the first few weeks or more of treatment, patients should be closely monitored until such improvement occurs. It is general clinical experience that the risk of suicide may increase in the early stages of recovery.

Other psychiatric conditions for which Prozac is prescribed can also be associated with an increased risk of suicide-related events. In addition, these conditions may be co-morbid with major depressive disorder. The same precautions observed when treating patients with major depressive disorder should therefore be observed when treating patients with other psychiatric disorders.

Patients with a history of suicide-related events, those exhibiting a significant degree of suicidal ideation prior to commencement of treatment are known to be at greater risk of suicidal thoughts or suicide attempts, and should receive careful monitoring during treatment. A meta-analysis of placebo-controlled clinical trials of antidepressants drugs in adult patients with psychiatric disorders showed an increased risk of suicidal behaviour with antidepressants compared to placebo in patients less than 25 years old.

Close supervision of patients and in particular those at high risk should accompany drug therapy especially in early treatment and following dose changes. Patients (and caregivers of patients) should be alerted about the need to monitor for any clinical worsening, suicidal behaviour or thoughts and unusual changes in behaviour and to seek medical advice immediately if these symptoms present.

#### Akathisia/psychomotor restlessness

The use of fluoxetine has been associated with the development of akathisia, characterised by a subjectively unpleasant or distressing restlessness and need to move often accompanied by an inability to sit or stand still. This is most likely to occur within the first few weeks of treatment. In patients who develop these symptoms, increasing the dose may be detrimental.

#### Withdrawal symptoms seen on discontinuation of SSRI treatment

Withdrawal symptoms when treatment is discontinued are common, particularly if discontinuation is abrupt (see section 4.8). In clinical trials adverse events seen on treatment discontinuation occurred in approximately 60% of patients in both the fluoxetine and placebo groups. Of these adverse events, 17% in the fluoxetine group and 12% in the placebo group were severe in nature.

The risk of withdrawal symptoms may be dependent on several factors including the duration and dose of therapy and the rate of dose reduction. Dizziness, sensory disturbances (including paraesthesia), sleep disturbances (including insomnia and intense dreams), asthenia, agitation or anxiety, nausea and/or vomiting, tremor and headache are the most commonly reported

reactions. Generally these symptoms are mild to moderate however, in some patients they may be severe in intensity. They usually occur within the first few days of discontinuing treatment. Generally these symptoms are self-limiting and usually resolve within 2 weeks, though in some individuals they may be prolonged (2-3 months or more). It is therefore advised that Prozac should be gradually tapered when discontinuing treatment over a period of at least one to two weeks, according to the patient's needs (see *Withdrawal symptoms seen on discontinuation of Prozac*, section 4.2).

#### Haemorrhage

There have been reports of cutaneous bleeding abnormalities such as ecchymosis and purpura with SSRI's. Ecchymosis has been reported as an infrequent event during treatment with fluoxetine. Other haemorrhagic manifestations (e.g., gynaecological haemorrhages, gastrointestinal bleedings and other cutaneous or mucous bleedings) have been reported rarely. Caution is advised in patients taking SSRI's, particularly in concomitant use with oral anticoagulants, drugs known to affect platelet function (e.g. atypical antipsychotics such as clozapine, phenothiazines, most TCA's, aspirin, NSAID's) or other drugs that may increase risk of bleeding as well as in patients with a history of bleeding disorders.

#### Mydriasis

Mydriasis has been reported in association with fluoxetine; therefore, caution should be used when prescribing fluoxetine in patients with raised intraocular pressure or those at risk of acute narrow-angle glaucoma.

#### Electroconvulsive Therapy (ECT)

There have been rare reports of prolonged seizures in patients on fluoxetine receiving ECT treatment, therefore caution is advisable.

#### St John's Wort

An increase in serotonergic effects, such as serotonin syndrome, may occur when selective serotonin reuptake inhibitors and herbal preparations containing St John's Wort (*Hypericum perforatum*) are used together.

#### Serotonin syndrome or neuroleptic malignant syndrome-like events

On rare occasions development of a serotonin syndrome or neuroleptic malignant syndrome-like events have been reported in association with treatment of fluoxetine, particularly when given in combination with other serotonergic (among others L-tryptophan) and/or neuroleptic drugs. As these syndromes may result in potentially life-threatening conditions, treatment with fluoxetine should be discontinued if such events (characterised by clusters of symptoms such as hyperthermia, rigidity, myoclonus, autonomic instability with possible rapid fluctuations of vital signs, mental status changes including confusion, irritability, extreme agitation progressing to delirium and coma) occur and supportive symptomatic treatment should be initiated.

Prozac oral solution contains sucrose: Patients with rare hereditary problems of fructose intolerance, glucose-galactose malabsorption or sucrase-isomaltase insufficiency should not take this medicine.

## 4.5 Interaction with other medicinal products and other forms of interaction

*Half-life:* The long elimination half-lives of both fluoxetine and norfluoxetine should be borne in mind (see section 5.2) when considering pharmacodynamic or pharmacokinetic drug interactions (e.g. when switching from fluoxetine to other antidepressants).

*Monoamine oxidase inhibitors:* (see section 4.3).

Not recommended combinations: MAOI-A (see section 4.3)

Combinations requiring precautions for use: MAOI-B (selegiline): risk of serotonin syndrome. Clinical monitoring is recommended.

*Phenytoin:* Changes in blood levels have been observed when combined with fluoxetine. In some cases manifestations of toxicity have occurred. Consideration should be given to using conservative titration schedules of the concomitant drug and to monitoring clinical status.

*Serotonergic drugs:* Co-administration with serotonergic drugs (e.g. tramadol, triptans) may increase the risk of serotonin syndrome. Use with triptans carries the additional risk of coronary vasoconstriction and hypertension.

*Lithium and tryptophan:* There have been reports of serotonin syndrome when SSRIs have been given with lithium or tryptophan and, therefore, the concomitant use of fluoxetine with these drugs should be undertaken with caution. When fluoxetine is used in combination with lithium, closer and more frequent clinical monitoring is required.

*CYP2D6 isoenzyme:* Because fluoxetine's metabolism (like tricyclic antidepressants and other selective serotonin antidepressants) involves the hepatic cytochrome CYP2D6 isoenzyme system, concomitant therapy with drugs also metabolised by this enzyme system may lead to drug interactions. Concomitant therapy with drugs predominantly metabolised by this isoenzyme, and which have a narrow therapeutic index (such as flecainide, encainide, carbamazepine and tricyclic antidepressants), should be initiated at or adjusted to the low end of their dose range. This will also apply if fluoxetine has been taken in the previous 5 weeks.

Pharmacokinetic interaction between CYP2D6 inhibitors and tamoxifen, showing a 65-75 % reduction in plasma levels of one of the more active forms of the tamoxifen, i.e. endoxifen, has been reported in the literature. Reduced efficacy of tamoxifen has been reported with concomitant usage of some SSRI antidepressants in some studies. As a reduced effect of tamoxifen cannot be excluded, co-administration with potent CYP2D6 inhibitors (including fluoxetine) should whenever possible be avoided (see section 4.4).

*Oral anticoagulants:* Altered anti-coagulant effects (laboratory values and/or clinical signs and symptoms), with no consistent pattern, but including increased bleeding, have been reported uncommonly when fluoxetine is co-administered with oral anticoagulants. Patients receiving warfarin therapy should receive careful coagulation monitoring when fluoxetine is initiated or stopped. (See section 4.4, *Haemorrhage*).

*Electroconvulsive Therapy (ECT):* There have been rare reports of prolonged seizures in patients on fluoxetine receiving ECT treatment, therefore caution is advisable.

*QT interval prolongation:* Pharmacokinetic and pharmacodynamic studies between fluoxetine and other medicinal products that prolong the QT interval have not been performed. An additive effect of fluoxetine and these medicinal products cannot be excluded. Therefore, co-administration of fluoxetine with medicinal products that



prolong the QT interval, such as Class IA and III antiarrhythmics, antipsychotic (e.g. phenothiazine derivatives, pimozide, haloperidol), tricyclic antidepressants, certain antimicrobial agents (e.g. sparfloxacin, moxifloxacin, erythromycin IV, pentamidine), anti-malaria treatment particularly halofantrine, certain antihistamines (astemizole, mizolastine), should be used with caution.

*Alcohol:* In formal testing, fluoxetine did not raise blood alcohol levels or enhance the effects of alcohol. However, the combination of SSRI treatment and alcohol is not advisable.

*St. John's Wort:* In common with other SSRIs, pharmacodynamic interactions between fluoxetine and the herbal remedy St. John's Wort (*Hypericum perforatum*) may occur, which may result in an increase of undesirable effects.

#### Paediatric population

Interaction studies have only been performed in adults.

## **4.6 Fertility, pregnancy and lactation**

### Pregnancy

Some epidemiological studies suggest an increased risk of cardiovascular defects associated with the use of fluoxetine during the first trimester. The mechanism is unknown. Overall the data suggest that the risk of having an infant with a cardiovascular defect following maternal fluoxetine exposure is in the region of 2/100 compared with an expected rate for such defects of approximately 1/100 in the general population.

Epidemiological data have suggested that the use of SSRIs in pregnancy, particular in late pregnancy, may increase the risk of persistent pulmonary hypertension in the newborn (PPHN). The observed risk was approximately 5 cases per 1000 pregnancies. In the general population 1 to 2 cases of PPHN per 1000 pregnancies occur.

Furthermore, although fluoxetine can be used during pregnancy, caution should be exercised, especially during late pregnancy or just prior to the onset of labour since some other effects have been reported in neonates: irritability, tremor, hypotonia, persistent crying, difficulty in sucking or in sleeping. These symptoms may indicate either serotonergic effects or a withdrawal syndrome. The time to occur and the duration of these symptoms may be related to the long half-life of fluoxetine (4-6 days) and its active metabolite, norfluoxetine (4-16 days).

### Breast-feeding

Fluoxetine, and its metabolite norfluoxetine, are known to be excreted in human breast milk. Adverse events have been reported in breastfeeding infants. If treatment with fluoxetine is considered necessary, discontinuation of breastfeeding should be considered; however, if breastfeeding is continued, the lowest effective dose of fluoxetine should be prescribed.

### Fertility

Animal data have shown that fluoxetine may affect sperm quality (see section 5.3).

Human case reports with some SSRI's have shown that an effect on sperm quality is reversible.

Impact on human fertility has not been observed so far.

#### 4.7 Effects on ability to drive and use machines

Prozac has no or negligible influence on the ability to drive and use machines. Although fluoxetine has been shown not to affect psychomotor performance in healthy volunteers, any psychoactive drug may impair judgement or skills. Patients should be advised to avoid driving a car or operating hazardous machinery until they are reasonably certain that their performance is not affected.

#### 4.8 Undesirable effects

##### a. Summary of the safety profile

The most commonly reported adverse reactions in patients treated with fluoxetine were headache, nausea, insomnia, fatigue and diarrhoea. Undesirable effects may decrease in intensity and frequency with continued treatment and do not generally lead to cessation of therapy.

##### b. Tabulated list of adverse reactions

The table below gives the adverse reactions observed with fluoxetine treatment in adult and paediatric populations. Some of these adverse reactions are in common with other SSRIs.

The following frequencies have been calculated from clinical trials in adults (n= 9297) and from spontaneous reporting.

Frequency estimate: Very common ( $\geq 1/10$ ), common ( $\geq 1/100$  to  $< 1/10$ ), uncommon ( $\geq 1/1,000$  to  $< 1/100$ ), rare ( $\geq 1/10,000$  to  $< 1/1,000$ ).

Very Common	Common	Uncommon	Rare
<i>Blood and lymphatic system disorders</i>			
			Thrombocytopenia
<i>Immune system disorders</i>			
			Anaphylactic reaction Serum sickness
<i>Endocrine disorders</i>			
			Inappropriate antidiuretic hormone secretion
<i>Metabolism and nutrition disorders</i>			
	Decreased appetite <sup>1</sup>		Hyponatraemia
<i>Psychiatric disorders</i>			
Insomnia <sup>2</sup>	Anxiety Nervousness Restlessness Tension	Depersonalisation Elevated mood Euphoric mood Thinking abnormal	Hypomania Mania Hallucinations Agitation

Very Common	Common	Uncommon	Rare
	Libido decreased <sup>3</sup> Sleep disorder Abnormal dreams <sup>4</sup>	Orgasm abnormal <sup>5</sup> Bruxism Suicidal thoughts and behaviour <sup>6</sup>	Panic attacks Confusion Dysphemia
<i>Nervous system disorders</i>			
Headache	Disturbance in attention Dizziness Dysgeusia Lethargy Somnolence <sup>7</sup> Tremor	Psychomotor hyperactivity Dyskinesia Ataxia Balance disorder Myoclonus Memory impairment	Convulsion Akathisia Buccoglossal syndrome Serotonin syndrome
<i>Eye disorders</i>			
	Vision blurred	Mydriasis	
<i>Ear and labyrinth disorders</i>			
		Tinnitus	
<i>Cardiac disorders</i>			
	Palpitations		Ventricular arrhythmia including torsade de pointes Electrocardiogram QT prolonged
<i>Vascular disorders</i>			
	Flushing <sup>8</sup>	Hypotension	Vasculitis Vasodilatation
<i>Respiratory, thoracic and mediastinal disorders</i>			
	Yawning	Dyspnoea Epistaxis	Pharyngitis Pulmonary events (inflammatory processes of varying histopathology and/or fibrosis) <sup>9</sup>
<i>Gastrointestinal disorders</i>			
Diarrhoea Nausea	Vomiting Dyspepsia Dry mouth	Dysphagia Gastrointestinal haemorrhage <sup>10</sup>	Oesophageal pain
<i>Hepato-biliary disorders</i>			
			Idiosyncratic hepatitis
<i>Skin and subcutaneous tissue disorders</i>			
	Rash <sup>11</sup> Urticaria Pruritus Hyperhidrosis	Alopecia Increased tendency to bruise Cold sweat	Angioedema Ecchymosis Photosensitivity reaction Purpura

Very Common	Common	Uncommon	Rare
			Erythema multiforme <sup>12</sup>
<i>Musculoskeletal and connective tissue disorders</i>			
	Arthralgia	Muscle twitching	Myalgia
<i>Renal and urinary disorders</i>			
	Frequent urination <sup>13</sup>	Dysuria	Urinary retention Micturition disorder
<i>Reproductive system and breast disorders</i>			
	Gynaecological bleeding <sup>14</sup> Erectile dysfunction Ejaculation disorder <sup>15</sup>	Sexual dysfunction	Galactorrhoea Hyperprolactinemia Priapism
<i>General disorders and administration site conditions</i>			
Fatigue <sup>16</sup>	Feeling jittery Chills	Malaise Feeling abnormal Feeling cold Feeling hot	Mucosal haemorrhage
<i>Investigations</i>			
	Weight decreased	Abnormal liver function tests	

<sup>1</sup> Includes anorexia

<sup>2</sup> Includes early morning awakening, initial insomnia, middle insomnia

<sup>3</sup> Includes loss of libido

<sup>4</sup> Includes nightmares

<sup>5</sup> Includes anorgasmia

<sup>6</sup> Includes completed suicide, depression suicidal, intentional self-injury, self-injurious ideation, suicidal behaviour, suicidal ideation, suicide attempt, morbid thoughts, self-injurious behaviour. These symptoms may be due to underlying disease

<sup>7</sup> Includes hypersomnia, sedation

<sup>8</sup> Includes hot flush

<sup>9</sup> Includes atelectasis, interstitial lung disease, pneumonitis

<sup>10</sup> Includes most frequently gingival bleeding, haematemesis, haematochezia, rectal haemorrhage, diarrhoea haemorrhagic, melaena, and gastric ulcerhaemorrhage

<sup>11</sup> Includes erythema, exfoliative rash, heat rash, rash, rash erythematous, rash follicular, rash generalized, rash macular, rash macular-papular, rash morbilliform, rash papular, rash pruritic, rash vesicular, umbilical erythema rash

<sup>12</sup> Could progress to Stevens-Johnson syndrome or Toxic Epidermal Necrolysis (Lyell Syndrome)

<sup>13</sup> Includes pollakiuria

<sup>14</sup> Includes cervix haemorrhage, uterine dysfunction, uterine bleeding, genital haemorrhage, menometrorrhagia, menorrhagia, metrorrhagia, polymenorrhea, postmenopausal haemorrhage, uterine haemorrhage, vaginal haemorrhage

<sup>15</sup> Includes ejaculation failure, ejaculation dysfunction, premature ejaculation, ejaculation delayed, retrograde ejaculation

<sup>16</sup> Includes asthenia

c. Description of selected adverse reactions

*Suicide/suicidal thoughts or clinical worsening:* Cases of suicidal ideation and suicidal behaviour have been reported during fluoxetine therapy or early after treatment discontinuation (see section 4.4).

*Bone fractures:* Epidemiological studies, mainly conducted in patients 50 years of age and older, show an increased risk of bone fractures in patients receiving SSRIs and TCAs. The mechanism leading to the risk is unknown.

*Withdrawal symptoms seen on discontinuation of fluoxetine treatments:* Discontinuation of fluoxetine commonly leads to withdrawal symptoms. Dizziness, sensory disturbances (including paraesthesia), sleep disturbances (including insomnia and intense dreams), asthenia, agitation or anxiety, nausea and/or vomiting, tremor and headache are the most commonly reported reactions. Generally these events are mild to moderate and are self-limiting, however, in some patients they may be severe and/or prolonged (see section 4.4). It is therefore advised that when Prozac treatment is no longer required, gradual discontinuation by dose tapering should be carried out (see sections 4.2 and 4.4).

d. Paediatric population (see sections 4.4 and 5.1)

Adverse reactions that have been observed specifically or with a different frequency in this population are described below. Frequencies for these events are based on paediatric clinical trial exposures (n = 610).

In paediatric clinical trials, suicide-related behaviours (suicide attempt and suicidal thoughts), hostility (the events reported were: anger, irritability, aggression, agitation, activation syndrome), manic reactions, including mania and hypomania (no prior episodes reported in these patients) and epistaxis, were commonly reported and were more frequently observed among children and adolescents treated with antidepressants compared to those treated with placebo.

Isolated cases of growth retardation have been reported from clinical use (See also section 5.1).

In paediatric clinical trials, fluoxetine treatment was also associated with a decrease in alkaline phosphatase levels.

Isolated cases of adverse events potentially indicating delayed sexual maturation or sexual dysfunction have been reported from paediatric clinical use. (See also section 5.3).

Reporting of suspected adverse reactions

Reporting suspected adverse reactions after authorisation of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via [www.mhra.gov.uk/yellowcard](http://www.mhra.gov.uk/yellowcard)

## 4.9 Overdose

### Symptoms

Cases of overdose of fluoxetine alone usually have a mild course. Symptoms of overdose have included nausea, vomiting, seizures, cardiovascular dysfunction ranging from asymptomatic arrhythmias (including nodal rhythm and ventricular arrhythmias) or ECG changes indicative of QTc prolongation to cardiac arrest (including very rare cases of Torsade de Pointes), pulmonary dysfunction, and signs of altered CNS status ranging from excitation to coma. Fatality attributed to overdose of fluoxetine alone has been extremely rare.

### Management

Cardiac and vital signs monitoring are recommended, along with general symptomatic and supportive measures. No specific antidote is known.

Forced diuresis, dialysis, haemoperfusion, and exchange transfusion are unlikely to be of benefit. Activated charcoal, which may be used with sorbitol, may be as or more effective than emesis or lavage. In managing overdosage, consider the possibility of multiple drug involvement. An extended time for close medical observation may be needed in patients who have taken excessive quantities of a tricyclic antidepressant if they are also taking, or have recently taken, fluoxetine.

## 5 PHARMACOLOGICAL PROPERTIES

### 5.1 Pharmacodynamic properties

Pharmacotherapeutic group: Selective serotonin reuptake inhibitors.

ATC code: N06A B03.

#### Mechanism of action

Fluoxetine is a selective inhibitor of serotonin reuptake, and this probably accounts for the mechanism of action. Fluoxetine has practically no affinity to other receptors such as  $\alpha_1$ -,  $\alpha_2$ -, and  $\beta$ -adrenergic; serotonergic; dopaminergic; histaminergic; muscarinic; and GABA receptors.

#### Clinical efficacy and safety

*Major depressive episodes:* Clinical trials in patients with major depressive episodes have been conducted versus placebo and active controls. Prozac has been shown to be significantly more effective than placebo as measured by the Hamilton Depression Rating Scale (HAM-D). In these studies, Prozac produced a significantly higher rate of response (defined by a 50% decrease in the HAM-D score) and remission, compared to placebo.

*Dose response:* In the fixed dose studies of patients with major depression there is a flat dose response curve, providing no suggestion of advantage in terms of efficacy for using higher than the recommended doses. However, it is clinical experience that up-titrating might be beneficial for some patients.

*Obsessive-compulsive disorder:* In short-term trials (under 24 weeks), fluoxetine was shown to be significantly more effective than placebo. There was a therapeutic effect at 20mg/day, but higher doses (40 or 60mg/day) showed a higher response rate. In long term studies (three short term studies extension phase and a relapse prevention study) efficacy has not been shown.

*Bulimia nervosa:* In short term trials (under 16 weeks), in out-patients fulfilling DSM-III-R-criteria for bulimia nervosa, fluoxetine 60mg/day was shown to be significantly more effective than placebo for the reduction of bingeing, vomiting and purging activities. However, for long-term efficacy no conclusion can be drawn.

*Pre-Menstrual Dysphoric Disorder:* Two placebo-controlled studies were conducted in patients meeting Pre-Menstrual Dysphoric Disorder (PMDD) diagnostic criteria according to DSM-IV. Patients were included if they had symptoms of sufficient severity to impair social and occupational function and relationships with others. Patients using oral contraceptives were excluded. In the first study of continuous 20mg daily dosing for 6 cycles, improvement was observed in the primary efficacy parameter (irritability, anxiety and dysphoria). In the second study, with intermittent luteal phase dosing (20mg daily for 14 days) for 3 cycles, improvement was observed in the primary efficacy parameter (Daily Record of Severity of Problems score). However, definitive conclusions on efficacy and duration of treatment cannot be drawn from these studies.

#### Paediatric population

*Major depressive episodes:* Clinical trials in children and adolescents aged 8 years and above have been conducted versus placebo. Prozac, at a dose of 20mg, has been shown to be significantly more effective than placebo in two short-term pivotal studies, as measured by the reduction of Childhood Depression Rating Scale-Revised (CDRS-R) total scores and Clinical Global Impression of Improvement (CGI-I) scores. In both studies, patients met criteria for moderate to severe MDD (DSM-III or DSM-IV) at three different evaluations by practising child psychiatrists. Efficacy in the fluoxetine trials may depend on the inclusion of a selective patient population (one that has not spontaneously recovered within a period of 3-5 weeks and whose depression persisted in the face of considerable attention). There is only limited data on safety and efficacy beyond 9 weeks. In general, efficacy of fluoxetine was modest. Response rates (the primary endpoint, defined as a 30% decrease in the CDRS-R score) demonstrated a statistically significant difference in one of the two pivotal studies (58% for fluoxetine versus 32% for placebo,  $P=0.013$  and 65% for fluoxetine versus 54% for placebo,  $P=0.093$ ). In these two studies the mean absolute changes in CDRS-R from baseline to endpoint were 20 for fluoxetine versus 11 for placebo,  $P=0.002$  and 22 for fluoxetine versus 15 for placebo,  $P<0.001$ .

*Effects on growth, see sections 4.4 and 4.8:*

After 19 weeks of treatment, paediatric subjects treated with fluoxetine in a clinical trial gained an average of 1.1cm less in height ( $p=0.004$ ) and 1.1kg less in weight ( $p=0.008$ ) than subjects treated with placebo.

In a retrospective matched control observational study with a mean of 1.8 years of exposure to fluoxetine, paediatric subjects treated with fluoxetine had no difference in growth adjusted for expected growth in height from their matched, untreated controls (0.0 cm,  $p=0.9673$ ).

## **5.2 Pharmacokinetic properties**

### Absorption

Fluoxetine is well absorbed from the gastrointestinal tract after oral administration. The bioavailability is not affected by food intake.

### Distribution

Fluoxetine is extensively bound to plasma proteins (about 95%) and it is widely distributed (Volume of Distribution: 20 - 40 L/kg). Steady-state plasma concentrations are achieved after dosing for several weeks. Steady-state concentrations after prolonged dosing are similar to concentrations seen at 4 to 5 weeks.

#### Biotransformation

Fluoxetine has a non-linear pharmacokinetic profile with first pass liver effect. Maximum plasma concentration is generally achieved 6 to 8 hours after administration. Fluoxetine is extensively metabolised by the polymorphic enzyme CYP2D6. Fluoxetine is primarily metabolised by the liver to the active metabolite norfluoxetine (desmethylfluoxetine), by desmethylation.

#### Elimination

The elimination half-life of fluoxetine is 4 to 6 days and for norfluoxetine 4 to 16 days. These long half-lives are responsible for persistence of the drug for 5-6 weeks after discontinuation. Excretion is mainly (about 60 %) via the kidney. Fluoxetine is secreted into breast milk.

#### *Special populations*

Elderly: Kinetic parameters are not altered in healthy elderly when compared to younger subjects

Paediatric population: The mean fluoxetine concentration in children is approximately 2-fold higher than that observed in adolescents and the mean norfluoxetine concentration 1.5-fold higher. Steady state plasma concentrations are dependent on body weight and are higher in lower weight children (see section 4.2). As in adults, fluoxetine and norfluoxetine accumulated extensively following multiple oral dosing; steady-state concentrations were achieved within 3 to 4 weeks of daily dosing.

Hepatic insufficiency: In case of hepatic insufficiency (alcoholic cirrhosis), fluoxetine and norfluoxetine half-lives are increased to 7 and 12 days, respectively. A lower or less frequent dose should be considered.

Renal insufficiency: After single-dose administration of fluoxetine in patients with mild, moderate or complete (anuria) renal insufficiency, kinetic parameters have not been altered when compared to healthy volunteers. However, after repeated administration, an increase in steady-state plateau of plasma concentrations may be observed.

### **5.3 Preclinical safety data**

There is no evidence of carcinogenicity or mutagenicity from in vitro or animal studies.

#### Adult animal studies

In a 2-generation rat reproduction study, fluoxetine did not produce adverse effects on the mating or fertility of rats, was not teratogenic, and did not affect growth, development, or reproductive parameters of the offspring.



The concentrations in the diet provided doses approximately equivalent to 1.5, 3.9, and 9.7mg fluoxetine/kg body weight.

Male mice treated daily for 3 months with fluoxetine in the diet at a dose approximately equivalent to 31mg/kg showed a decrease in testis weight and hypospermatogenesis. However, this dose level exceeded the maximum-tolerated dose (MTD) as significant signs of toxicity were seen.

#### Juvenile animal studies

In a juvenile toxicology study in CD rats, administration of 30mg/kg/day of fluoxetine hydrochloride on postnatal days 21 to 90 resulted in irreversible testicular degeneration and necrosis, epididymal epithelial vacuolation, immaturity and inactivity of the female reproductive tract and decreased fertility. Delays in sexual maturation occurred in males (10 and 30mg/kg/day) and females (30mg/kg/day). The significance of these findings in humans is unknown. Rats administered 30mg/kg also had decreased femur lengths compared with controls and skeletal muscle degeneration, necrosis and regeneration. At 10mg/kg/day, plasma levels achieved in animals were approximately 0.8 to 8.8 fold (fluoxetine) and 3.6 to 23.2 fold (norfluoxetine) those usually observed in paediatric patients. At 3mg/kg/day, plasma levels achieved in animals were approximately 0.04 to 0.5 fold (fluoxetine) and 0.3 to 2.1 fold (norfluoxetine) those usually achieved in paediatric patients.

A study in juvenile mice has indicated that inhibition of the serotonin transporter prevents the accrual of bone formation. This finding would appear to be supported by clinical findings. The reversibility of this effect has not been established.

Another study in juvenile mice (treated on postnatal days 4 to 21) has demonstrated that inhibition of the serotonin transporter had long lasting effects on the behaviour of the mice. There is no information on whether the effect was reversible. The clinical relevance of this finding has not been established.

## **6 PHARMACEUTICAL PARTICULARS**

### **6.1 List of excipients**

Benzoic Acid

Sucrose

Glycerine

Mint flavour (containing 0.23% ethanol (alcohol))

Purified Water

### **6.2 Incompatibilities**

Not applicable

### **6.3 Shelf life**

2 years

### **6.4 Special precautions for storage**

Do not store above 30°C

Store in the original bottle to protect from light

### **6.5 Nature and contents of container**

Brown glass bottles containing 60ml, 70ml or 140ml oral solution. The pack may include one of the following measuring and dosing devices:

- a measuring cup, with a 5ml graduation,
- a 5ml capacity syringe with graduations to measure 1.25, 2.5, 3.75 and 5ml,
- a 5ml capacity syringe with graduations to measure 5, 10, 15 and 20 mg,
- a double ended spoon with the smaller spoon marked with a fill level equivalent to 2.5ml and the larger spoon marked with a fill level equivalent to 5ml.

Not all bottle sizes may be marketed.

### **6.6 Special precautions for disposal**

No special requirements

## **7 MARKETING AUTHORISATION HOLDER**

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## **8 MARKETING AUTHORISATION NUMBER(S)**

PL 00006/0272

## **9 DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION**

28/10/1992 / 01/04/2013

## **10     DATE OF REVISION OF THE TEXT**

01/04/2013