

## 5. PRODUCT INFORMATION

### 1.5.1 Prescribing Information (Summary of Products Characteristics)

#### 1. NAME OF THE MEDICINAL PRODUCT

Haloperidol Injection BP 5 mg/ml, 1 ml

#### 1.1 PRODUCT NAME

Haloperidol Injection BP 5 mg/ml, 1 ml

#### 1.2 STRENGTH

5 mg/ml

#### 1.3 PHARMACEUTICAL DOSAGE FORM

Solution for Injection

### 2. QUALITATIVE AND QUANTITATIVE COMPOSITION

#### 2.1 QUALITATIVE DECLARATION

Haloperidol Injection BP 5 mg/ml, 1 ml

#### 2.2 QUANTITATIVE DECLARATION

Each ml Contains:

Haloperidol BP 5 mg

Water for Injections BP Q.S.

### 3. PHARMACEUTICAL FORM

Solution for Injection

A colourless solution, free from visible particles and fibers

### 4. CLINICAL PARTICULARS

#### 4.1 THERAPEUTIC INDICATIONS

Haloperidol injection is indicated in adult patients for:

##### Adults:

- Rapid control of severe acute psychomotor agitation associated with psychotic disorder or manic episodes of bipolar I disorder when oral therapy is not appropriate.
- Acute treatment of delirium when non-pharmacological treatments have failed.

- Treatment of mild to moderate chorea in Huntington's disease, when other medicinal products are ineffective or not tolerated, and oral therapy is not appropriate.
- Single or combination prophylaxis in patients at moderate to high risk of postoperative nausea and vomiting, when other medicinal products are ineffective or not tolerated.
- Combination treatment of postoperative nausea and vomiting when other medicinal products are ineffective or not tolerated.

## 4.2 POSOLOGY AND METHOD OF ADMINISTRATION

### Posology

#### Adults

A low initial dose is recommended and this must be adjusted according to the patient's response in order to determine the minimal effective dose.

The dose recommendations for Haloperidol solution for injection are presented below:

**Haloperidol dose recommendations for adults aged 18 years and above:  
Rapid control of severe acute psychomotor agitation associated with psychotic disorder or manic episodes of bipolar I disorder when oral therapy is not appropriate**

- 5 mg intramuscularly.
- May be repeated hourly until sufficient symptom control is achieved.
- In the majority of patients, doses of up to 15 mg/day are sufficient. The maximum dose is 20 mg/day.

• The continued use of haloperidol should be evaluated early in treatment. Treatment with haloperidol solution for injection must be discontinued as soon as clinically indicated and, if further treatment is needed, oral haloperidol should be initiated at a 1:1 dose conversion rate followed by dose adjustment according to clinical response.

**Acute treatment of delirium when non-pharmacological treatments have failed**

- 1 to 10 mg intramuscularly.
- Treatment should be started at the lowest possible dose, and the dose should be adjusted in increments at 2- to 4-hour intervals if agitation continues, up to a maximum of 10 mg/day.

**Treatment of mild to moderate chorea in Huntington's disease, when other medicinal products are ineffective or not tolerated, and oral therapy is not appropriate**

- 2 to 5 mg intramuscularly.
- May be repeated hourly until sufficient symptom control is achieved or up to a maximum of 10 mg/day.

**Single or combination prophylaxis in patients at moderate to high risk of postoperative nausea and vomiting, when other medicinal products are ineffective or not tolerated**

- 1 to 2 mg intramuscularly, at induction or 30 minutes before the end of anaesthesia.

### **Combination treatment of postoperative nausea and vomiting when other medicinal products are ineffective or not tolerated**

- 1 to 2 mg intramuscularly.

### **Treatment withdrawal**

Gradual withdrawal of haloperidol is advisable.

### **Special populations**

#### **Elderly**

The recommended initial haloperidol dose in elderly patients is half the lowest adult dose.

Further doses may be administered and adjusted according to the patient's response. Careful and gradual dose up-titration in elderly patients is recommended.

The maximum dose is 5 mg/day.

Doses above 5 mg/day should only be considered in patients who have tolerated higher doses and after reassessment of the patient's individual benefit-risk profile.

#### **Renal impairment**

The influence of renal impairment on the pharmacokinetics of haloperidol has not been evaluated. No dose adjustment is recommended, but caution is advised when treating patients with renal impairment. However, patients with severe renal impairment may require a lower initial dose, with further doses administered and adjusted according to the patient's response.

#### **Hepatic impairment**

The influence of hepatic impairment on the pharmacokinetics of haloperidol has not been evaluated. Since haloperidol is extensively metabolised in the liver, it is recommended to halve the initial dose. Further doses may be administered and adjusted according to the patient's response.

#### **Paediatric population**

The safety and efficacy of haloperidol solution for injection in children and adolescents below 18 years of age have not been established. No data are available.

#### **Method of administration**

Haloperidol solution for injection is recommended for intramuscular administration only.

### **4.3 CONTRAINDICATIONS**

- Hypersensitivity to the active substance or to any of the excipients.
- Comatose state.
- Central nervous system (CNS) depression.
- Parkinson's disease.
- Dementia with Lewy bodies.
- Progressive supranuclear palsy.
- Known QTc interval prolongation or congenital long QT syndrome.
- Recent acute myocardial infarction.
- Uncompensated heart failure.

- History of ventricular arrhythmia or torsades de pointes.
- Uncorrected hypokalaemia.
  
- Concomitant treatment with medicinal products that prolong the QT interval

#### **4.4 SPECIAL WARNINGS AND PRECAUTIONS FOR USE**

##### **Increased mortality in elderly people with dementia**

Rare cases of sudden death have been reported in psychiatric patients receiving antipsychotics, including haloperidol.

Elderly patients with dementia-related psychosis treated with antipsychotics are at an increased risk of death. Analyses of seventeen placebo-controlled studies (modal duration of 10 weeks), largely in patients taking atypical antipsychotics, revealed a risk of death in treated patients of between 1.6 to 1.7 times the risk of death in placebo-treated patients. Over the course of a typical 10 week controlled study, the rate of death in patients treated with antipsychotics was about 4.5%, compared to a rate of about 2.6% in the placebo group. Although the causes of death were varied, most of the deaths appeared to be either cardiovascular (e.g., heart failure, sudden death) or infectious (e.g., pneumonia) in nature. Observational studies suggest that treatment of elderly patients with haloperidol is also associated with increased mortality. This association may be stronger for haloperidol than for atypical antipsychotic medicinal products, is most pronounced in the first 30 days after the start of treatment, and persists for at least 6 months. The extent to which this association is attributable to the medicinal product, as opposed to being confounded by patient characteristics, has not yet been elucidated.

Haloperidol solution for injection is not indicated for the treatment of dementia-related behavioural disturbances.

##### **Cardiovascular effects**

QTc prolongation and/or ventricular arrhythmias, in addition to sudden death, have been reported with haloperidol. The risk of these events appears to increase with high doses, high plasma concentrations, in predisposed patients or with parenteral use, particularly intravenous administration.

Haloperidol solution for injection is recommended for intramuscular administration only. However, if administered intravenously, continuous ECG monitoring must be performed for QTc interval prolongation and for ventricular arrhythmias.

Caution is advised in patients with bradycardia, cardiac disease, family history of QTc prolongation or history of heavy alcohol exposure. Caution is also required in patients with potentially high plasma concentrations.

A baseline ECG is recommended before intramuscular dosing. During therapy, the need for ECG monitoring for QTc interval prolongation and for ventricular arrhythmias must be assessed in all patients, but continuous ECG monitoring is recommended for repeated intramuscular doses. ECG monitoring is recommended up to 6 hours after administration of Haloperidol solution for injection to patients for prophylaxis or treatment of postoperative nausea and vomiting.

Whilst on therapy, it is recommended to reduce the dose if QTc is prolonged, but haloperidol must be discontinued if the QTc exceeds 500 ms.

Electrolyte disturbances such as hypokalaemia and hypomagnesaemia increase the risk for ventricular arrhythmias and must be corrected before treatment with haloperidol is started. Therefore, baseline and periodic electrolyte monitoring is recommended.

Tachycardia and hypotension (including orthostatic hypotension) have also been reported. Caution is recommended when haloperidol is administered to patients manifesting hypotension or orthostatic hypotension.

### **Cerebrovascular events**

In randomised, placebo-controlled clinical studies in the dementia population, there was an approximately 3-fold increased risk of cerebrovascular adverse events with some atypical antipsychotics. Observational studies comparing the stroke rate in elderly patients exposed to any antipsychotic to the stroke rate in those not exposed to such medicinal products found an increased stroke rate among exposed patients. This increase may be higher with all butyrophenones, including haloperidol. The mechanism for this increased risk is not known. An increased risk cannot be excluded for other patient populations. Haloperidol must be used with caution in patients with risk factors for stroke.

### **Neuroleptic malignant syndrome**

Haloperidol has been associated with neuroleptic malignant syndrome: a rare idiosyncratic response characterized by hyperthermia, generalised muscle rigidity, autonomic instability, altered consciousness and increased serum creatine phosphokinase levels. Hyperthermia is often an early sign of this syndrome.

Antipsychotic treatment must be withdrawn immediately and appropriate supportive therapy and careful monitoring instituted.

### **Tardive dyskinesia**

Tardive dyskinesia may appear in some patients on long-term therapy or after discontinuation of the medicinal product. The syndrome is mainly characterized by rhythmic involuntary movements of the tongue, face, mouth or jaw. The manifestations may be permanent in some patients. The syndrome may be

masked when treatment is reinstated, when the dose is increased or when a switch is made to a different antipsychotic. If signs and symptoms of tardive dyskinesia appear, the discontinuation of all antipsychotics, including haloperidol, must be considered.

### **Extrapyramidal symptoms**

Extrapyramidal symptoms may occur (e.g. tremor, rigidity, hypersalivation, bradykinesia, akathisia, acute dystonia). The use of haloperidol 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.

Acute dystonia may occur during the first few days of treatment with haloperidol, but later onset as well as onset after dose increases has been reported. Dystonic symptoms can include, but are not limited to, torticollis, facial grimacing, trismus, tongue protrusion, and abnormal eye movements, including oculogyric crisis. Males and younger age groups are at higher risk of experiencing such reactions. Acute dystonia may necessitate stopping the medicinal product.

Antiparkinson medicinal products of the anticholinergic type may be prescribed as required to manage extrapyramidal symptoms, but it is recommended that they are not prescribed routinely as a preventive measure. If concomitant treatment with an antiparkinson medicinal product is required, it may have to be continued after stopping haloperidol if its excretion is faster than that of haloperidol in order to avoid the development or aggravation of extrapyramidal symptoms. The possible increase in intraocular pressure must be considered when anticholinergic medicinal products, including antiparkinson medicinal products, are administered concomitantly with haloperidol.

### **Seizures/Convulsions**

It has been reported that seizures can be triggered by Haloperidol. Caution is advised in patients suffering from epilepsy and in conditions predisposing to seizures (e.g. alcohol withdrawal and brain damage).

### **Hepatobiliary concerns**

As haloperidol is metabolised by the liver, half the initial dose and caution is advised in patients with hepatic impairment (see sections 4.2 and 5.2). Isolated cases of liver function abnormalities or hepatitis, most often cholestatic, have been reported.

### **Endocrine system concerns**

Thyroxin may facilitate Haloperidol toxicity. Antipsychotic therapy in patients with hyperthyroidism must be used only with caution and must always be accompanied by therapy to achieve a euthyroid state.

Hormonal effects of antipsychotic neuroleptic drugs include hyperprolactinaemia, which may cause galactorrhoea, gynaecomastia and oligo or amenorrhoea. Tissue culture studies suggest that cell growth in human breast tumours may be stimulated by prolactin. Although no clear association with the administration of antipsychotics and human breast tumours has been demonstrated in clinical and epidemiological studies, caution is recommended in patients with relevant medical history. Haloperidol must be used with caution in patients with pre-existing hyperprolactinaemia and in patients with possible prolactin-dependent tumours.

Hypoglycaemia and syndrome of inappropriate antidiuretic hormone secretion have been reported with haloperidol.

### **Venous thromboembolism**

Cases of venous thromboembolism (VTE) have been reported with antipsychotic drugs. Since patients treated with antipsychotics often present with acquired risk factors for VTE, all possible risk factors for VTE should be identified before and during treatment with Haloperidol and preventive measures undertaken.

### **Treatment response and withdrawal**

In schizophrenia, the response to antipsychotic treatment may be delayed. If antipsychotics are withdrawn, recurrence of symptoms related to the underlying condition may not become apparent for several weeks or months. There have been very rare reports of acute withdrawal symptoms (including nausea, vomiting and insomnia) after abrupt withdrawal of high doses of antipsychotics. Gradual withdrawal is advisable as a precautionary measure.

### **Patients with depression**

It is recommended that haloperidol is not used alone in patients in whom depression is predominant. It may be combined with antidepressants to treat those conditions in which depression and psychosis coexist.

### **Switch from mania to depression**

There is a risk in the treatment of manic episodes of bipolar disorder for patients to switch from mania to depression. Monitoring of patients for the

switch to a depressive episode with the accompanying risks such as suicidal behaviour is important in order to intervene when such switches occur.

#### **Poor metabolisers of CYP2D6**

Haloperidol should be used with caution in patients who are known poor metabolisers of cytochrome P450 (CYP) 2D6 and who are coadministered a CYP3A4 inhibitor.

### **4.5 INTERACTION WITH OTHER MEDICINAL PRODUCTS AND OTHER FORMS OF INTERACTION**

#### **Cardiovascular effects**

Haloperidol is contraindicated in combination with medicinal products known to prolong the QTc interval. Examples include:

- Class IA antiarrhythmics (e.g. disopyramide, quinidine).
- Class III antiarrhythmics (e.g. amiodarone, dofetilide, dronedarone, ibutilide, sotalol).
- Certain antidepressants (e.g. citalopram, escitalopram).
- Certain antibiotics (e.g. azithromycin, clarithromycin, erythromycin, levofloxacin, moxifloxacin, telithromycin).
- Other antipsychotics (e.g. phenothiazine derivatives, sertindole, pimozide, ziprasidone)
- Certain antifungals (e.g. pentamidine).
- Certain antimalarials (e.g. halofantrine).
- Certain gastrointestinal medicinal products (e.g. dolasetron).
- Certain medicinal products used in cancer (e.g. toremifene, vandetanib).
- Certain other medicinal products (e.g. bepridil, methadone).

Caution is advised when haloperidol is used in combination with medicinal products known to cause electrolyte imbalance.

#### Medicinal products that may increase haloperidol plasma concentrations

Haloperidol is metabolised by several routes. The major pathways are glucuronidation and ketone reduction. The cytochrome P450 enzyme system is also involved, particularly CYP3A4 and, to a lesser extent, CYP2D6. Inhibition of these routes of metabolism by another medicinal product or a decrease in CYP2D6 enzyme activity may result in increased haloperidol concentrations. The effect of CYP3A4 inhibition and of decreased CYP2D6 enzyme activity may be additive (see section 5.2). Based on limited and sometimes conflicting information, the potential increase in haloperidol plasma concentrations when a CYP3A4 and/or CYP2D6 inhibitor is coadministered may range between 20 to 40%, although in some cases, increases of up to 100% have been reported.



Examples of medicinal products that may increase haloperidol plasma concentrations (based on clinical experience or drug interaction mechanism) include:

- CYP3A4 inhibitors – alprazolam, fluvoxamine, indinavir, itraconazole, ketoconazole, nefazodone, posaconazole, saquinavir, verapamil, voriconazole.
- CYP2D6 inhibitors – bupropion, chlorpromazine, duloxetine, paroxetine, promethazine, sertraline, venlafaxine.
- Combined CYP3A4 and CYP2D6 inhibitors: fluoxetine, ritonavir.
- Uncertain mechanism – buspirone.

Increased haloperidol plasma concentrations may result in an increased risk of adverse events, including QTc-prolongation. Increases in QTc have been observed when haloperidol was given with a combination of the metabolic inhibitors ketoconazole (400 mg/day) and paroxetine (20 mg/day).

It is recommended that patients who take haloperidol concomitantly with such medicinal products be monitored for signs or symptoms of increased or prolonged pharmacologic effects of haloperidol, and the haloperidol dose be decreased as deemed necessary.

Medicinal products that may decrease haloperidol plasma concentrations

Coadministration of haloperidol with potent enzyme inducers of CYP3A4 may gradually decrease the plasma concentrations of haloperidol to such an extent that efficacy may be reduced. Examples include:

- Carbamazepine, phenobarbital, phenytoin, rifampicin, St John's Wort (*Hypericum perforatum*).

Enzyme induction may be observed after a few days of treatment. Maximal enzyme induction is generally seen in about 2 weeks and may then be sustained for the same period of time after the cessation of therapy with the medicinal product. During combination treatment with inducers of CYP3A4, it is recommended that patients be monitored and the haloperidol dose increased as deemed necessary. After withdrawal of the CYP3A4 inducer, the concentration of haloperidol may gradually increase and therefore it may be necessary to reduce the haloperidol dose.

Sodium valproate is known to inhibit glucuronidation, but does not affect haloperidol plasma concentrations.

### **Effect of haloperidol on other medicinal products**

Haloperidol can increase the CNS depression produced by alcohol or CNS-depressant medicinal products, including hypnotics, sedatives or strong

analgesics. An enhanced CNS effect, when combined with methyl dopa, has also been reported.

Haloperidol may antagonise the action of adrenaline and other sympathomimetic medicinal products (e.g. stimulants like amphetamines) and reverse the blood pressure-lowering effects of adrenergic-blocking medicinal products such as guanethidine.

Haloperidol may antagonise the effect of levodopa and other dopamine agonists.

Haloperidol is an inhibitor of CYP2D6. Haloperidol inhibits the metabolism of tricyclic antidepressants (e.g. imipramine, desipramine), thereby increasing plasma concentrations of these medicinal products.

### **Other Forms of Interaction**

In rare cases the following symptoms were reported during the concomitant use of lithium and haloperidol: encephalopathy, extrapyramidal symptoms, tardive dyskinesia, neuroleptic malignant syndrome, acute brain syndrome and coma. Most of these symptoms were reversible. It remains unclear whether this represents a distinct clinical entity.

Nonetheless, it is advised that in patients who are treated concomitantly with lithium and haloperidol, therapy must be stopped immediately if such symptoms occur.

Antagonism of the effect of the anticoagulant phenindione has been reported.

## **4.6 PREGNANCY AND LACTATION**

### **Pregnancy**

A moderate amount of data on pregnant women (more than 400 pregnancy outcomes) indicates no malformative or foeto/ neonatal toxicity of haloperidol. However, there have been isolated case reports of birth defects following foetal exposure to haloperidol, mostly in combination with other medicinal products. Animal studies have shown reproductive toxicity (see section 5.3). As a precautionary measure, it is preferable to avoid the use of haloperidol during pregnancy.

Newborn infants exposed to antipsychotics (including haloperidol) during the third trimester of pregnancy are at risk of adverse reactions including extrapyramidal and/or withdrawal symptoms that may vary in severity and duration following delivery. There have been reports of agitation, hypertonia, hypotonia, tremor, somnolence, respiratory distress, or feeding disorder. Consequently, it is recommended that newborn infants be monitored carefully.

### **Breast-feeding**

Haloperidol is excreted in human milk. Small amounts of haloperidol have been detected in plasma and urine of breast-fed newborns of mothers treated with haloperidol. There is insufficient information on the effects of haloperidol in breast-fed infants. A decision must be made whether to discontinue breastfeeding or to discontinue haloperidol therapy taking into account the benefit of breastfeeding for the child and the benefit of therapy for the woman.

### **Fertility**

Haloperidol elevates prolactin level. Hyperprolactinaemia may suppress hypothalamic GnRH, resulting in reduced pituitary gonadotropin secretion. This may inhibit reproductive function by impairing gonadal steroidogenesis in both female and male patients.

## **4.7 EFFECTS ON ABILITY TO DRIVE AND USE MACHINES**

Haloperidol has a moderate influence on the ability to drive and use machines. Some degree of sedation or impairment of alertness may occur, particularly with higher doses and at the start of treatment and may be potentiated by alcohol. It is recommended that patients be advised not to drive or operate machines during treatment, until their susceptibility is known.

## **4.8 UNDESIRABLE EFFECTS**

Adverse reactions are listed below by system organ class and frequency. Frequencies are defined as: 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 rare ( $< 1/10,000$ ), not known (cannot be estimated from the available data).

### **Blood and lymphatic system disorders**

Uncommon: Leukopenia

Not Known: Agranulocytosis; Neutropenia; Pancytopenia; Thrombocytopenia

### **Immune System Disorders**

Uncommon: Hypersensitivity

Not Known: Anaphylactic reaction

### **Endocrine Disorders**

Rare: Hyperprolactinaemia

Not Known: Inappropriate antidiuretic hormone secretion

### **Metabolic and Nutritional Disorders**

Not Known: Hypoglycaemia

### **Psychiatric Disorders**

Very Common: Agitation; Insomnia

Common: Depression; Psychotic disorder

Uncommon: Confusional state; Libido Decreased; Loss of libido; Restlessness

### **Nervous system disorders**

Very Common: Extrapyramidal disorder; Hyperkinesia; Headache

Common: Tardive dyskinesia; Dystonia; Dyskinesia; Akathisia; Bradykinesia; Hypokinesia; Hypertonia; Somnolence; Tremor; Dizziness

Uncommon: Convulsion; Parkinsonism; Sedation; Muscle Contractions  
Involuntary

Rare: Motor dysfunction; Neuroleptic malignant syndrome; Nystagmus;

Not Known: Akinesia; Cogwheel rigidity; Masked Facies

### **Eye Disorders**

Common: Oculogyric Crisis; Visual disturbance

Uncommon: Vision blurred

### **Cardiac Disorders**

Uncommon: Tachycardia

Not Known: Ventricular Fibrillation; Torsade de pointes; Ventricular Tachycardia;  
Extrasystoles

### **Vascular Disorders**

Common: Orthostatic Hypotension; Hypotension

### **Respiratory, thoracic and mediastinal Disorders**

Uncommon: Dyspnoea

Rare: Bronchospasm

Not Known: Laryngeal Oedema; Laryngospasm

### **Gastrointestinal Disorders**

Common: Constipation; Dry mouth; Salivary hypersecretion; Nausea; Vomiting

### **Hepatobiliary Disorders**

Common: Liver function test abnormal

Uncommon: Hepatitis; Jaundice

Not Known: Acute Hepatic Failure; Cholestasis

### **Skin and subcutaneous tissue disorders**

Common: Rash

Uncommon: Photosensitivity Reaction; Urticaria; Pruritis; Hyperhidrosis

Not Known: Leukocytoclastic Vasculitis; Dermatitis Exfoliative

### **Musculoskeletal and Connective Tissue Disorders**

Uncommon: Torticollis; Muscle rigidity; Muscle Spasms; Musculoskeletal  
stiffness

Rare: Trismus; Muscle Twitching

Not Known: Rhabdomyolysis

### **Renal and Urinary Disorders**

Common: Urinary retention

### **Pregnancy, Puerperium and Perinatal Conditions**

Not Known: Drug withdrawal syndrome neonatal

### **Reproductive System and Breast Disorders**

Common: Erectile dysfunction

Uncommon: Amenorrhoea; Dysmenorrhoea; Galactorrhoea; Breast Discomfort;  
Breast Pain;

Rare: Menorrhagia; Menstrual Disorder; Sexual Dysfunction

Not Known: Gynaecomastia, Priapism

### **General Disorders and Administration Site Conditions**

Uncommon: Gait disturbance; Hyperthermia; Oedema

Not Known: Sudden Death; Face Oedema; Hypothermia

### **Investigations**

Common: Weight increased; Weight decreased

Rare: Electrocardiogram QT prolonged

## **4.9 OVERDOSE**

### **Symptoms and signs:**

The manifestations of haloperidol overdose are an exaggeration of the known pharmacological effects and adverse reactions. The most prominent symptoms are severe extrapyramidal reactions, hypotension and sedation. An extrapyramidal reaction is manifest by muscular rigidity and a generalised or localised tremor. Hypertension rather than hypotension is also possible.

In extreme cases, the patient would appear comatose with respiratory depression and hypotension that could be severe enough to produce a shock-like state. The risk of ventricular arrhythmias, possibly associated with QTc prolongation, must be considered.

### **Management:**

There is no specific antidote. Treatment is supportive. Dialysis is not recommended in the treatment of overdose because it removes only very small amounts of haloperidol.

For comatose patients, a patent airway must be established by use of an oropharyngeal airway or endotracheal tube. Respiratory depression may necessitate artificial respiration.

It is recommended that ECG and vital signs be monitored, and that monitoring continues until the ECG is normal. Treatment of severe arrhythmias with appropriate anti-arrhythmic measures is recommended.

Hypotension and circulatory collapse may be counteracted by use of intravenous fluids, plasma or concentrated albumin and vasopressor agents, such as dopamine or noradrenaline. Adrenaline must not be used because it might cause profound hypotension in the presence of haloperidol.

In cases of severe extrapyramidal reactions, parenteral administration of an antiparkinson medicinal product is recommended.

## **5. PHARMACOLOGICAL PROPERTIES**

### **5.1 PHARMACODYNAMICS PROPERTIES**

**Pharmacotherapeutic group:** Antipsychotic Agent

**ATC Code:** N05AD01

**Mechanism of action**

Haloperidol is an antipsychotic belonging to the butyrophenones group. It is a potent central dopamine type 2 receptor antagonist, and at recommended doses, has low alpha-1 antiadrenergic activity and no antihistaminergic or anticholinergic activity.

### **Pharmacodynamic effects**

Haloperidol suppresses delusions and hallucinations as a direct consequence of blocking dopaminergic signalling in the mesolimbic pathway. The central dopamine blocking effect has activity on the basal ganglia (nigrostriatal bundles). Haloperidol causes efficient psychomotor sedation, which explains the favourable effect on mania and other agitation syndromes.

The activity on the basal ganglia probably underlies the undesirable extrapyramidal motor effects (dystonia, akathisia and parkinsonism).

The antidopaminergic effects of haloperidol on lactotropes in the anterior pituitary explain hyperprolactinaemia due to inhibition of dopamine-mediated tonic inhibition of prolactin secretion. Additionally, the antidopaminergic effect on the chemoreceptor-trigger zone of the area postrema explains the activity against nausea and vomiting.

## **5.2 PHARMACOKINETIC PROPERTIES**

### **Absorption**

Following intramuscular administration, haloperidol is completely absorbed. Peak plasma concentrations of haloperidol are attained within 20 to 40 minutes.

### **Distribution**

Mean haloperidol plasma protein binding in adults is approximately 88 to 92%. There is a high inter-subject variability for plasma protein binding. Haloperidol is rapidly distributed to various tissues and organs, as indicated by the large volume of distribution (mean values 8 to 21 l/kg after intravenous dosing). Haloperidol crosses the blood-brain barrier easily. It also crosses the placenta and is excreted in breast milk.

### **Biotransformation**

Haloperidol is extensively metabolised in the liver. The main metabolic pathways of haloperidol in humans include glucuronidation, ketone reduction, oxidative N-dealkylation and formation of pyridinium metabolites. The metabolites of haloperidol are not considered to make a significant contribution to its activity; however, the reduction pathway accounts approximately for 23% of the biotransformation, and back-conversion of the reduced metabolite of haloperidol to haloperidol cannot be fully ruled out. The cytochrome P450 enzymes CYP3A4 and CYP2D6 are involved in haloperidol metabolism. Inhibition or induction of CYP3A4, or inhibition of CYP2D6, may affect

haloperidol metabolism. A decrease in CYP2D6 enzyme activity may result in increased haloperidol concentrations.

### **Elimination**

The terminal elimination half-life of haloperidol is on average 21 hours (range 13 to 36 hours) after intramuscular administration. Haloperidol apparent clearance after extravascular administration ranges from 0.9 to 1.5 l/h/kg and is reduced in poor metabolisers of CYP2D6. Reduced CYP2D6 enzyme activity may result in increased concentrations of haloperidol. The inter-subject variability (coefficient of variation, %) in haloperidol clearance was estimated to be 44% in a population pharmacokinetic analysis in patients with schizophrenia. After intravenous haloperidol administration, 21% of the dose was eliminated in the faeces and 33% in the urine. Less than 3% of the dose is excreted unchanged in the urine.

### **Linearity/non-linearity**

A linear relationship exists between haloperidol dose and plasma concentrations in adults.

### **Special populations**

#### **Elderly**

Haloperidol plasma concentrations in elderly patients were higher than in younger adults administered the same dose. Results from small clinical studies suggest a lower clearance and a longer elimination half-life of haloperidol in elderly patients. The results are within the observed variability in haloperidol pharmacokinetics. Dose adjustment is recommended in elderly patients.

### **Renal impairment**

The influence of renal impairment on the pharmacokinetics of haloperidol has not been evaluated. About one-third of a haloperidol dose is excreted in urine, mostly as metabolites. Less than 3% of administered haloperidol is eliminated unchanged in the urine. Haloperidol metabolites are not considered to make a significant contribution to its activity, although for the reduced metabolite of haloperidol, back-conversion to haloperidol cannot be fully ruled out. Even though impairment of renal function is not expected to affect haloperidol elimination to a clinically relevant extent, caution is advised in patients with renal impairment, and especially those with severe impairment, due to the long half-life of haloperidol and its reduced metabolite, and the possibility of accumulation.

Because of the high haloperidol distribution volume and its high protein binding, only very small amounts are removed by dialysis.

### **Hepatic impairment**

The influence of hepatic impairment on the pharmacokinetics of haloperidol has not been evaluated. However, hepatic impairment may have significant effects on the pharmacokinetics of haloperidol because it is extensively metabolised in the liver. Therefore, half the initial dose and caution is advised in patients with hepatic impairment.

### **Cardiovascular effects**

The risk of QTc prolongation increases with haloperidol dose and with haloperidol plasma concentrations.

### **Extrapyramidal symptoms**

Extrapyramidal symptoms can occur within the therapeutic range, although the frequency is usually higher with doses producing higher than therapeutic concentrations.

## **6. PHARMACEUTICAL PARTICULARS**

### **6.1 LIST OF EXCIPIENT(S)**

Methyl Paraben BP  
Propylene Glycol BP  
Lactic Acid BP  
Water for Injections BP

### **6.2 INCOMPATIBILITIES**

Haloperidol Injection should not be mixed with other products unless their compatibility is known.

### **6.3 SHELF-LIFE**

36 months

### **6.4 SPECIAL PRECAUTIONS FOR STORAGE**

Do not store above 30°C. Protect from light.

**KEEP OUT OF REACH OF CHILDREN.**

### **6.5 NATURE AND CONTENTS OF CONTAINER**

10 x 1 ml Amber Glass ampoules packed in a carton along with an insert & tray.

### **6.6 SPECIAL PRECAUTIONS FOR DISPOSAL AND OTHER HANDLING**

For single use only.

If only part of the contents of an ampoule is used, the remaining solution should be discarded.



Any unused medicinal product or waste material should be disposed of in accordance with local requirements.

**7. MARKETING AUTHORISATION HOLDER  
SWISS PARENTERALS LTD.**

808,809& 810 Kerala Industrial Estate, GIDC,  
Nr. Bavla, City: Ahmedabad  
Dist. Ahmedabad-382 220.  
Gujarat, India.

**8. MARKETING AUTHORIZATION NUMBER  
TAN 21 HM 0229**

**9. DATE OF FIRST AUTHORIZATION/RENEWAL OF AUTHORIZATION  
3<sup>rd</sup> June, 2021**

**10. DATE OF REVISION OF THE TEXT**

-----

**11. LEGAL CATEGORY**

Prescription Only Medicine.

**12. INSTRUCTIONS FOR PREPARATION OF  
RADIOPHARMACEUTICALS**

Not applicable.