# Summary of Product Characteristics

## 1 NAME OF THE MEDICINAL PRODUCT

Suxamethonium Chloride 50 mg/ml solution for injection/infusion

## 2 QUALITATIVE AND QUANTITATIVE COMPOSITION

Suxamethonium Chloride 50 mg/ml (100 mg/2 ml).

Each ml of solution for injection or infusion contains 50 mg of suxamethonium chloride (equivalent to 40.2 mg of suxamethonium). Each 2 ml ampoule contains 100 mg suxamethonium chloride (equivalent to 80.4 mg of suxamethonium).

For the full list of excipients, see section 6.1.

## 3 PHARMACEUTICAL FORM

Solution for Injection or Infusion.
Clear, colourless solution.
pH of the solution 3.0-4.2.
Osmolality of the product is 300-365 mOsmol/kg.

## 4 CLINICAL PARTICULARS

### 4.1 Therapeutic indications

Used ***for muscle relaxation during*** general anaesthesia.

### 4.2 Posology and method of administration

Posology
Use by intravenous infusion
Suxamethonium Chloride may be given by intravenous infusion as a 0.1% to 0.2% solution, diluted in 5% glucose solution or sterile isotonic saline solution, at a rate of 2.5 to 4mg per minute. The infusion rate should be adjusted according to the response of individual patients.

*Adults and Children over 12 years*

The dose is dependent on body weight, the degree of muscular relaxation required, the route of administration, and the response of individual patients.
To achieve endotracheal intubation Suxamethonium Chloride is usually administered intravenously in a dose of 1mg/kg. This dose will usually produce muscular relaxation in about 30 to 60 seconds and has a duration of action of about 2 to 6 minutes. Larger doses will produce more prolonged muscular relaxation, but doubling the dose does not necessarily double the duration of relaxation. Supplementary doses of Suxamethonium Chloride of 50% to 100% of the initial dose administered at 5 to 10 minute intervals will maintain muscle relaxation during short surgical procedures performed under general anaesthesia.
The total dose of Suxamethonium Chloride should not exceed 500mg.

*Paediatric population*
Infants and young children are more resistant to suxamethonium compared with adults.

*Children 1 to 12 years*
1-2mg/kg by intravenous injection.

*Infants, under 1 year*
2mg/kg by intravenous injection.

*Special populations*

Elderly:
As for adults.
The elderly may be more susceptible to cardiac arrhythmias, especially if digitalis-like drugs are also being taken (see section 4.4).

Use in renal impairment:
A normal single dose of suxamethonium injection may be administered to patients with renal insufficiency in the absence of hyperkalaemia. Multiples or larger doses may cause clinically significant rises in serum potassium and should not be used (see section 4.3 and 4.4).

Use in hepatic impairment:
Termination of the action of suxamethonium is dependent on plasma cholinesterase, which is synthesised in the liver. Although plasma cholinesterase levels often fall in patients with liver disease, with the exception of severe hepatic failure, levels are seldom low enough to significantly prolong suxamethonium-induced apnoea (see section 4.4).

Use in patients with reduced plasma cholinesterase:
Patients with reduced plasma cholinesterase activity may experience prolonged and intensified neuromuscular blockade following administration of suxamethonium. In these patients it may be advisable to administer reduced doses of suxamethonium injection (see section 4.3, 4.4 and 4.5).

Monitoring advice:
Monitoring of neuromuscular function is recommended during infusion of suxamethonium injection or if suxamethonium injection is to be administered in relatively large cumulative doses over a relatively short period of time in order to individualise dosage requirements (see section 4.4).

Method of administration:
By bolus injection or infusion.
For instructions on dilution of the medicinal product before administration, see section 6.2 and 6.6.

**4.3 Contraindications**

- Suxamethonium has no effect on the level of consciousness and therefore should not be administered to a patient who is not fully anaesthetised.
- Hypersensitivity to the active substance or to any of the excipients listed in section 6.1.
- Personal or family history of malignant hyperthermia (see section 4.4)
- Inherited atypical plasma cholinesterase activity (see section 4.4)
- Abnormal plasma pseudocholinesterase activity
- Hyperkalaemia from any cause (see section 4.4)
- Muscular dystrophy and other myopathies e.g. Duchenne muscular dystrophy
- Personal or family history of congenital myotonic diseases such as myotonia congenita and dystrophia myotonica

**4.4 Special warnings and precautions for use**

**Special warnings and precautions for use**
**Suxamethonium Chloride paralyses the respiratory muscles as well as other skeletal muscles but has no effect on consciousness.**

**Suxamethonium should be administered only by or under close supervision of an anaesthetist familiar with its action, characteristics and hazards, who is skilled in the management of artificial respiration and only where there are adequate facilities for immediate endotracheal intubation with administration of oxygen by intermittent positive pressure ventilation.**

Suxamethonium Chloride should not be mixed in the same syringe with any other agent, especially thiopental.

**Anaphylaxis**
High rates of cross-sensitivity (greater than 50%) between neuromuscular blocking agents have been reported: allergic and non-allergic severe anaphylactic reactions to neuromuscular blocking agents including Suxamethonium "Ethypharm" 50mg/ml

Solution for Injection or Infusion have been reported during anaesthesia induction, sometimes in subjects who have never been exposed to muscle relaxants. The reactions have in some cases been life-threatening and fatal. See Section 4.8.

The common clinical manifestations are cutaneous eruption i.e., rash, erythema, which are generalised or limited to the injection site. This may be further complicated by anaphylactic shock and/or bronchospasm. In some cases, the bronchospasm and/or anaphylactic shock are not associated by cutaneous manifestations.

The appearance of the first signs requires the definitive discontinuation of the administration of Suxamethonium if not already completed, and the initiation of symptomatic treatment.

Due to the potential severity of these reactions, the necessary precautions, such as the immediate availability of appropriate emergency treatment, should be taken.

Where possible, before administering suxamethonium, hypersensitivity to other neuromuscular blocking agents should be excluded. Suxamethonium, should only be used when absolutely essential in susceptible patients. Patients who experience a hypersensitivity reaction under general anaesthesia should be tested subsequently for hypersensitivity to other neuromuscular blockers. Allergy tests must be performed (immediate specimen then cutaneous test).

Neuromuscular blockade
Suxamethonium Chloride is rapidly hydrolysed by plasma cholinesterase which thereby limits the intensity and duration of the neuromuscular blockade.
Individuals with decreased plasma cholinesterase activity exhibit a prolonged response to suxamethonium. Approximately 0.05% of the population has an inherited cause of reduced cholinesterase activity (see section 4.3).

Prolonged and intensified neuromuscular blockade following Suxamethonium Injection may occur secondary to reduced plasma cholinesterase activity in the following states or pathological conditions:
• physiological variation as in pregnancy and the puerperium (see section 4.6)
• genetically determined abnormal plasma cholinesterase (see section 4.3)
• severe generalised tetanus, tuberculosis, other severe or chronic infections
• following severe burns
• chronic debilitating disease, malignancy, chronic anaemia and malnutrition
• end-stage hepatic failure, acute or chronic renal failure (see section 4.2)
• auto-immune diseases: myxoedema, collagen diseases
• iatrogenic: following plasma exchange, plasmapheresis, cardiopulmonary bypass, and as a result of concomitant drug therapy (see section 4.5).

The patient must be monitored fully with a peripheral nerve stimulator during prolonged administration of suxamethonium in order to avoid overdosage.

Hyperkalemia :
An acute transient rise in serum potassium often occurs following the administration of Suxamethonium in normal individuals; the magnitude of this rise is of the order of 0.5 mmol/litre. In certain pathological states or conditions, this increase in serum potassium following Suxamethonium administration may be excessive and cause serious cardiac arrhythmias and cardiac arrest for

- Patients recovering from major trauma, the period of greatest risk of hyperkalaemia is from about 5 to 70 days after injury and may be further prolonged if there is delayed healing due to persistent infection.
- Patients with neurological deficits involving spinal cord injury, peripheral nerve injury or acute muscle wasting (upper and/or lower motor neurone lesions); the potential for potassium release occurs within the first 6 months after the acute onset of the neurological deficit and correlates with the degree and extent of muscle paralysis. Patients who have been immobilised for prolonged periods of time may be at similar risk.
- Patients with pre-existing hyperkalaemia (see section 4.3). If there is no hyperkalaemia or neuropathy then renal failure is not a contraindication to the administration of a normal single dose of Suxamethonium Injection, but multiple or large doses may cause clinically significant rises in serum potassium and should not be used.
- Patients with severe sepsis, the potential for hyperkalaemia seems to be related to the severity and duration of infection.

Phase II block

If Suxamethonium Chloride is given over a prolonged period, the characteristic depolarising neuromuscular (or Phase I) block may change to one with characteristics of a non-depolarising (or Phase II) block. Although the characteristics of a developing Phase II block resemble those of a true non-depolarising block, the former cannot always be fully or permanently reversed by anticholinesterase agents. When a Phase II block is fully established, its effects will then usually be fully reversible with standard doses of neostigmine accompanied by an anticholinergic agent.

Muscle Pain
Muscle pains are frequently experienced after administration of suxamethonium and most commonly occur in ambulatory patients undergoing short surgical procedures under general anaesthesia. There appears to be no direct connection between the degree of visible muscle fasciculation after administration of Suxamethonium Injection and the incidence or severity of pain.

Bradycardia
In healthy adults, suxamethonium occasionally causes a mild transient slowing of the heart rate on initial administration. Bradycardias are more commonly observed in children and on repeated administration of suxamethonium in both children and adults.
Pre-treatment with intravenous atropine or glycopyrrolate significantly reduces the incidence and severity of suxamethonium-related bradycardia.

Ventricular arrhythmias
In the absence of pre-existing or evoked hyperkalaemia, ventricular arrhythmias are rarely seen following suxamethonium administration. Patients taking digitalis-like drugs are however more susceptible to such arrhythmias (see section 4.5). The action of suxamethonium on the heart may cause changes in cardiac rhythm including cardiac arrest.

Myasthenia Gravis
It is inadvisable to administer Suxamethonium injection to patients with advanced myasthenia gravis. Although these patients are resistant to suxamethonium they develop a state of Phase II block which can result in delayed recovery. Patients with myasthenic Eaton-Lambert syndrome are more sensitive than normal to Suxamethonium injection necessitating dosage reduction

Open Eye Injuries/Glaucoma:
Suxamethonium causes a slight transient rise in intra-ocular pressure and is therefore not recommended in the presence of open eye injuries, or where an increase in intra-ocular pressure is undesirable, unless the potential benefit outweighs the potential risk to the eye.

Tachyphylaxis
Tachyphylaxis occurs after repeated administration of suxamethonium.

Hyperthermia
Suxamethonium is contraindicated in patients with a personal or family history of malignant hyperthermia (see section 4.3) and if the condition occurs unexpectedly, all anaesthetic agents known to be associated with its development including Suxamethonium must be discontinued straight away. Full supportive measures must be employed immediately. Intravenous dantrolene sodium is indicated in the treatment of malignant hyperthermia.

Paediatric population
Bradycardias are more commonly observed in children and on repeated administration of suxamethonium. Some authorities advocate routine premedication of paediatric patients with intravenous atropine. Intramuscular atropine is not effective. Pretreatment with intravenous atropine or glycopyrrolate significantly reduces the incidence and severity of suxamethonium-related bradycardia.

**Non-treatable cases of cardiac arrest have been described in paediatric patients with undiagnosed neuromuscular disease.** Extra care or monitoring must be carried out on infants and children being given suxamethonium, due to the increased risks of undiagnosed muscular disorders or unknown predisposition to malignant hyperthermia (see section 4.3 and 4.8).

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

Suxamethonium, a depolarising muscle relaxant of short duration, may interact with the following:

*Anti-arrhythmics:*
lidocaine, procaine, procainamide, chloroprocaine, cocaine, quinidine and verapamil enhance muscle relaxant effect.

*Antibacterials:*
effect of muscle relaxants is enhanced by aminoglycosides such as dibekacin, kanamycin, neomycin, ribostamycin and streptomycin, the effect of suxamethonium is also enhanced by vancomycin, azlocillin, clindamycin, colistin, piperacillin and polymyxin B.

*Anticholinesterases:*
Cholinesterase and pseudocholinesterase both degrade suxamethonium. Therefore anticholinesterases will enhance suxamethonium. Examples of anticholinesterases include donepezil, galantamine, rivastigmine, aprotinin, cyclophosphamide, dexpanthenol, ecothiopate, metoclopramide (non-selective drug), neostigmine, phenelzine (MAOI), promazine, quinine and chloroquine (antimalarials), tacrine and trimetaphan (ganglion blocking drug). Exposure to pesticides may also reduce pseudocholinesterase activity such as diazinon, malathion and sheep dips.

*Blood transfusion:*
Blood transfusions may contribute to an increase in plasma cholinesterase levels, as a result of which the therapeutic effect of suxamethonium can be influenced unpredictably.

*ACE inhibitors:*
Concomitant use of medicines that may increase potassium levels, such as ACE inhibitors, can cause hyperkalaemia (see section 4.3).

*Antiepileptics*:
Effect of muscle relaxants antagonised by carbamazepine and phenytoin (recovery from neuromuscular blockade accelerated).

*Antineoplastics (anticancer drugs):*
cyclophosphamide, chlormethine, thiotepa and tretamine all reduce pseudocholinesterase activity.

*Benzodiazepines:*
diazepam and midazolam may alter the depth/duration of suxamethonium.

*Calcium-channel Blockers:*
nifedipine and verapamil enhance effect of non-depolarising muscle relaxants; hypotension, myocardial depression, and hyperkalaemia reported with intravenous dantrolene and verapamil.

*Cardiac Glycosides:*
arrhythmias if suxamethonium given with digoxin.

*Cytotoxics*:
cyclophosphamide and thiotepa enhance effect of suxamethonium.

*General Anaesthetics*:
propofol can cause serious bradycardia if given with suxamethonium and fentanyl citrate-droperidol (Innovar) enhances the effects of suxamethonium. Suxamethonium also interacts with halothane, isoflurane, enflurane, cyclopropane, propanidid and ether.

*Magnesium Salts:*
parenteral magnesium enhances effect of suxamethonium.

*Parasympathomimetics:*
Demecarium and ecothiopate eye-drops, neostigmine and pyridostigmine, and possibly donepezil enhance effect of suxamethonium but antagonise effect of non-depolarising muscle relaxants.

*Sympathomimetics:*
bambuterol enhances effect of suxamethonium.

**4.6 Fertility, pregnancy and lactation**

No studies of the effect of suxamethonium on female fertility or pregnancy have been performed.

Pregnancy
Suxamethonium has no direct action on the uterus or other smooth muscle structures. In normal therapeutic doses it does not cross the placental barrier in sufficient amounts to affect the respiration of the infant. The benefits of the use of suxamethonium as part of a rapid sequence induction for general anaesthesia normally outweighs the possible risk to the foetus. Plasma cholinesterase levels fall during the first trimester of pregnancy to about 70 to 80% of their pre-pregnancy values; a further fall to about 60 to 70% of the pre-pregnancy levels occurs within 2 to 4 days after delivery. Plasma cholinesterase levels then increase to reach normal over the next 6 weeks. Consequently, a high proportion of pregnant and puerperal patients may exhibit mildly prolonged neuromuscular blockade following suxamethonium injection. Suxamethonium is not embryotoxic or teratogenic in two animal species. The use of suxamethonium may be considered during pregnancy, if necessary.

Breast-feeding
It is not known whether suxamethonium or its metabolites are excreted in human milk. However, because the drug is rapidly hydrolyzed by plasma cholinesterase (pseudocholinesterase) to an inactive metabolite, no effects on the breastfed newborns/infants are anticipated.

Fertility
There is no data from the use of suxamethonium on fertility. However, because the drug is rapidly hydrolyzed by plasma cholinesterase (pseudocholinesterase) to an inactive metabolite, no effects on fertility are anticipated once the pharmacological effect is over.

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

This precaution is not relevant to the use of suxamethonium injection. Suxamethonium will always be used in combination with a general anaesthetic and therefore the usual precautions relating to performance of tasks following general anaesthesia apply.

**4.8 Undesirable effects**

Adverse reactions are listed below by system organ class and frequency. Estimated frequencies were determined from published data. Frequencies are defined as follows: very common (≥1/10); common (≥1/100 to <1/10), uncommon (≥1/1,000 to <1/100); rare (≥1/10,000 to <1/1,000); very rare (<1/10,000).

| | |
|---|---|
| *Immune system disorders* | |
| Common | Anaphylactic reactions.<br>Anaphylactic shock |
| *Eye disorders* | |
| Common | Increased intraocular pressure. |
| *Cardiac disorders* | |
| Common | Bradycardia, tachycardia. |
| Rare | Arrhythmias (including ventricular arrhythmias), cardiac arrest[1] |
| *Vascular disorders* | |
| Common | Skin flushing. |
| Not known | Hypertension and hypotension |
| *Respiratory, thoracic and mediastinal disorders* | |
| Rare | Bronchospasm, prolonged respiratory depression[2], apnoea[2] |
| *Gastrointestinal disorders* | |
| Very common | Increased intragastric pressure |
| Unknown | Excessive salivation |
| *Skin and subcutaneous tissue disorders* | |
| Common | Rash |
| *Musculoskeletal and connective tissue disorders* | |
| Very common | Muscle fasciculation, post-operative muscle pains |
| Common | Myoglobinaemia[3], myoglobinuria[3] |
| Rare | Trismus |

| | |
|---|---|
| *General disorders and administration site conditions* | |
| Very rare | Malignant hyperthermia |
| *Investigation* | |
| Common | Transient blood potassium increase |

1 There are case reports of hyperkalaemia-related cardiac arrests following the administration of suxamethonium to patients with congenital cerebral palsy, tetanus, Duchenne muscular dystrophy, and closed head injury. Such events have also been reported rarely in children with hitherto undiagnosed muscular disorders.

2 Individuals with decreased plasma cholinesterase activity exhibit a prolonged response to suxamethonium. Approximately 0.05% of the population has an inherited cause of reduced cholinesterase activity (please refer to section 4.4).

3 Rhabdomyolysis has also been reported

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

HPRA Pharmacovigilance
Website: www.hpra.ie

**4.9 Overdose**

Profound, prolonged muscle paralysis with respiratory depression are manifestations of a suxamethonium overdose. Ventilatory support is required.

The use of neostigmine and other cholinesterase inhibitors should be avoided, as these prolong the depolarising effect of suxamethonium chloride.

The decision to use neostigmine to reverse a Phase II suxamethonium-induced block depends on the judgement of the clinician in the individual case. Valuable information in regard to this decision will be gained by monitoring neuromuscular function. If neostigmine is used, its administration should be accompanied by appropriate doses of an anticholinergic agent such as atropine.

**5 PHARMACOLOGICAL PROPERTIES**

**5.1 Pharmacodynamic properties**

Pharmacotherapeutic group: Peripherally acting muscle relaxants, choline derivatives
ATC code M03AB01"

Suxamethonium is closely related in structure to acetylcholine. Suxamethonium is quickly hydrolysed by plasma cholinesterase. Suxamethonium acts on the skeletal muscle motor endplate just like acetylcholine as an agonist, to cause flaccid paralysis of muscle (phase 1 block). Suxamethonium diffuses slowly to the endplate and the concentration at the endplate persists for long enough to cause loss of electrical excitability. The depolarization of the muscle endplate establishes a voltage gradient and this causes opening of voltage-dependent ion channels of the muscle leading to transient contraction of the muscle. Although the end-plate stays depolarised, the muscle membrane accounts for this depolarization and remains flaccid. If suxamethonium is kept continuously present during infusion, the junctional membrane slowly regains its resting potential with the return of neuromuscular transmission; to maintain the effect, a higher infusion rate is required (tachyphylaxis). With continued infusion, neuromuscular transmission will fail again (phase 2 block) even though the membrane potential of the end-plate stays unchanged and normal or near normal. A phase 2 block has clinical characteristics of a non-depolarizing block. A phase 2 block may be associated with prolonged neuromuscular blockade and apnoea. The mechanism of this block is not known but channel blocking by penetration of suxamethonium into the sub-end plate cytoplasm, intracellular accumulation of calcium and sodium, the loss of intracellular potassium, and activation of Na,K-ATPase all contribute.

Neuromuscular-blocking drugs are used mainly in anaesthesia to produce muscle relaxation. Although complete relaxation can be produced by anaesthetic drugs alone, the concentrations needed to obliterate spinal reflexes are high and it is much more

satisfactory to produce paralysis by blocking neuromuscular transmission. The drugs are given intravenously, and act within about 30 to 60 seconds. Suxamethonium acts for about 2 to 6 minutes, being hydrolysed by plasma cholinesterase (pseudocholinesterase).

**5.2 Pharmacokinetic properties**

After intramuscular or intravenous injection, suxamethonium chloride is rapidly distributed in the extracellular fluids throughout the body.

Suxamethonium chloride is rapidly hydrolyzed by plasma cholinesterase to succinylmonocholine (a 20 - 80 x less active non-depolarizing muscle relaxant) and choline. Succinylmonocholine is then slowly hydrolyzed to succinic acid and choline. Less than 10% of an administered dose is excreted unchanged in the urine. The plasma half-life of suxamethonium chloride is approximately 3 minutes. Small amounts of suxamethonium chloride crosses the placenta. It is not known if suxamethonium chloride is excreted in human milk.

**5.3 Preclinical safety data**

Genotoxicity: No bacterial mutation assays have been conducted. There are some data to suggest a weak clastogenic effect in mice, but not in patients who had received suxamethonium chloride.

Carcinogenicity:-Carcinogenicity studies have not been performed.

Embryo-foetal development:-Animal reproduction studies have not been conducted with suxamethonium. It is also not known whether suxamethonium can affect reproductive capacity or cause foetal harm when administered to a pregnant woman.

**6 PHARMACEUTICAL PARTICULARS**

**6.1 List of excipients**

Hydrochloric Acid ( for pH adjustment)
Water for Injections

**6.2 Incompatibilities**

Suxamethonium Chloride must not be mixed with other medicinal products except those mentioned in section 6.6..
Suxamethonium Chloride is acidic and should not be mixed with highly alkaline solutions, e.g. barbiturates.

**6.3 Shelf life**

18 months.
Once opened, use immediately.

**6.4 Special precautions for storage**

Store in a refrigerator, between 2 and 8°C. Do not freeze.

Store in the original package to protect from lightFor storage conditions after first opening of the medicinal product see section 6.3.

**6.5 Nature and contents of container**

Type I clear glass 2 ml ampoule. 10 ampoules are packed in one carton.

**6.6 Special precautions for disposal and other handling**

Use once and discard any remaining solution.

Suxamethonium Chloride may be given by intravenous infusion as a 0.1% to 0.2% solution, diluted in 5% glucose solution or sterile isotonic saline solution, at a rate of 2.5 to 4mg per minute. The infusion rate should be adjusted according to the response of individual patients.

**7 MARKETING AUTHORISATION HOLDER**

Ethypharm
194 Bureaux de la Colline - Bâtiment D
92213 Saint-Cloud Cedex
France

**8 MARKETING AUTHORISATION NUMBER**

PA0549/014/001

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

Date of first authorisation: 31st May 2019
Date of last renewal: 21st January 2024

**10 DATE OF REVISION OF THE TEXT**

June 2025