

SUMMARY OF PRODUCT CHARACTERISTICS

1. NAME OF THE MEDICINAL PRODUCT

Duofen 10 mg/ml + 3 mg/ml solution for infusion

2. QUALITATIVE AND QUANTITATIVE COMPOSITION

One ml contains 10 mg paracetamol and ibuprofen sodium dihydrate corresponding to 3 mg ibuprofen. One 100 mL vial contains 1000 mg paracetamol and ibuprofen sodium dihydrate corresponding to 300 mg ibuprofen.

Excipient with known effect:

Sodium 35 mg per 100 ml (0.35 mg/ml).

Sodium 1.52 mmol per 100 ml (0.0152 mmol/ml).

For the full list of excipients, see section 6.1.

3. PHARMACEUTICAL FORM

Solution for infusion.

Clear, colourless solution, free from visible particles, with a pH of 6.3-7.3 and an osmolality of 285-320 mOsmol/kg.

4. CLINICAL PARTICULARS

4.1 Therapeutic indications

Duofen is indicated in adults for the short-term symptomatic treatment of acute moderate pain, where an intravenous route of administration is considered clinically necessary and/or when other routes of administration are not possible.

4.2 Posology and method of administration

Posology

For intravenous administration and short-term use only for a maximum of two days. Undesirable effects may be minimised by using the lowest effective dose for the shortest duration necessary to control symptoms (see section 4.4).

Adults (weighing >50 kg)

Administer one vial (100 ml) Duofen as a 15-minute infusion every 6 hours, as necessary. Do not exceed a total daily dose of four vials (400 ml), which equates to 4000 mg (4 g) paracetamol and 1200 mg ibuprofen.

Adults (weighing ≤50 kg)

Adults weighing 50 kg or under should be dosed according to their weight, at a dosage of 1.5 ml/kg (15 mg/kg paracetamol + 4.5 mg/kg ibuprofen), as a 15-minute infusion every 6 hours, as necessary. This equates to a maximum single dose of 75 ml (discard remaining medicine in vial), and a total daily dose of 3000 mg (3 g) paracetamol and 900 mg ibuprofen.

Paediatric population

Duofen is contraindicated in patients under the age of 18 years (see section 4.3).

Special populations***Elderly***

Dose selection for an elderly patient should be cautious, usually starting at the low end of the dosing range, reflecting the greater frequency of decreased hepatic, renal, or cardiac function, and of concomitant disease or other drug therapy.

The elderly are at increased risk of the serious consequences of adverse reactions. If an NSAID is considered necessary, the lowest effective dose should be used for the shortest possible duration. Treatment should be reviewed at regular intervals and discontinued if no benefit is seen or intolerance occurs. The patient should be monitored regularly for gastrointestinal bleeding during NSAID therapy.

Renal impairment

Caution should be taken with ibuprofen dosage in patients with renal impairment. This medicinal product is contraindicated in patients with severe renal failure (see section 4.3).

The dosage should be assessed individually. The initial dose should be reduced in patients with mild to moderate renal impairment. The dose should be kept as low as possible and be used for the shortest possible duration necessary to control the symptoms. Renal function should be monitored (see sections 4.3 and 4.4).

Hepatic impairment

The use of paracetamol at higher than recommended doses can lead to hepatotoxicity and even hepatic failure and death. In patients with additional risk factors for hepatotoxicity, like hepatocellular insufficiency, chronic alcoholism, chronic malnutrition (low reserves of glutathione in the liver), or dehydration, a total daily dose of 3000 mg (3 g) paracetamol should not be exceeded.

This medicinal product is contraindicated in patients with severe hepatic failure (see section 4.3). A patient with symptoms and/or signs suggesting liver dysfunction, or with abnormal liver test values, should be evaluated for evidence of the development of a more severe hepatic reaction while on therapy with ibuprofen and Duofen should be discontinued. If clinical signs and symptoms consistent with liver disease develop, or if systemic manifestations occur (e.g. eosinophilia, rash, etc.), Duofen should be discontinued.

Method of administration

Duofen should be administered as a 15-minute intravenous infusion.

As for all solutions for infusion presented in glass vials, it should be remembered that close monitoring is needed notably at the end of the infusion, regardless of administration route. This monitoring at the end of the infusion applies particularly for central route infusion, in order to avoid air embolism.

4.3 Contraindications

This product is contraindicated for use:

- in patients with known hypersensitivity to paracetamol, ibuprofen, other NSAIDs or to any of the excipients listed in section 6.1;
- in patients with severe heart failure (NYHA Class IV);
- in patients with active alcoholism, as chronic excessive alcohol ingestion may predispose patients to hepatotoxicity (due to the paracetamol component);
- in patients who have experienced asthma, urticaria, or allergic-type reactions after taking acetylsalicylic acid or other NSAIDs;
- in patients with a history of gastrointestinal bleeding or perforation related to previous NSAID therapy;
- in patient with active, or a history of, recurrent peptic ulceration/haemorrhage (two or more distinct episodes of proven ulceration or bleeding);
- in patients with severe hepatic failure or severe renal failure (see section 4.4.);
- in patients with cerebrovascular or other active bleeding;
- in patients with blood clotting disorders and conditions involving an increased tendency to bleed;
- in patients with severe dehydration (caused by vomiting, diarrhoea or insufficient fluid intake);
- during the third trimester of pregnancy (see section 4.6);
- in patients under the age of 18 years.

4.4 Special warnings and precautions for use

Undesirable effects may be minimised by using the lowest effective dose for the shortest duration necessary to control symptoms. This medicine is for short term use and is not recommended for use beyond 2 days.

The use of Duofen with concomitant NSAIDs, including cyclooxygenase-2 selective inhibitors, should be avoided.

In order to avoid the risk of overdose,

- check that other medicinal products do not contain paracetamol or NSAIDs,
- observe the maximum recommended doses (see section 4.2).

Cardiovascular thrombotic events

Clinical studies suggest that use of ibuprofen, particularly at a high dose (2400 mg/day) may be associated with a small increased risk of arterial thrombotic events (for example myocardial infarction or stroke). Overall, epidemiological studies do not suggest that low dose ibuprofen (e.g. 1200 mg/day) is associated with an increased risk of arterial thrombotic events.

Patients with uncontrolled hypertension, congestive heart failure (NYHA II-III), established ischaemic heart disease, peripheral arterial disease, and/or cerebrovascular disease should only be treated with ibuprofen after careful consideration and high doses (2400 mg/day) should be avoided.

Careful consideration should also be exercised before initiating long-term treatment of patients with risk factors for cardiovascular events (e.g. hypertension, hyperlipidaemia, diabetes mellitus, and smoking), particularly if high doses of ibuprofen (2400 mg/day) are required.

Hepatic impairment

The use of paracetamol at higher than recommended doses can lead to hepatotoxicity and even hepatic failure and death. Also, patients with impaired liver function or a history of liver disease, and who are on long term ibuprofen therapy or paracetamol treatment, should have hepatic function monitored at regular intervals, as ibuprofen has been reported to have a minor and transient effect on liver enzymes. Dose reduction is recommended in patients showing signs of worsening hepatic function. Treatment should be stopped in those patients who develop severe liver failure (see section 4.3).

Severe hepatic reactions, including jaundice and cases of fatal hepatitis, though rare, have been reported with ibuprofen as with other NSAIDs. If abnormal liver tests persist or worsen, or if clinical signs and symptoms consistent with liver disease develop, or if systemic manifestations occur (e.g. eosinophilia, rash, etc.), ibuprofen should be discontinued. Both active drugs have been reported to cause hepatotoxicity and even hepatic failure, especially paracetamol.

Renal impairment

Paracetamol can be used in patients with chronic renal disease without dosage adjustment. There is minimal risk of paracetamol toxicity in patients with moderate to severe renal failure. However, for the ibuprofen component of this product, caution should be used when initiating treatment with ibuprofen in patients with dehydration. The two major metabolites of ibuprofen are excreted mainly in the urine and impairment of renal function may result in their accumulation. The significance of this is unknown. NSAIDs have been reported to cause nephrotoxicity in various forms: interstitial nephritis, nephritic syndrome and renal failure. Renal impairment from ibuprofen use is usually reversible. In patients with renal, cardiac or hepatic impairment, those taking diuretics and ACE inhibitors, and the elderly, caution is required since the use of NSAIDs may result in deterioration of renal function. The dose should be kept as low as possible and renal function should be monitored in these patients. Treatment should be stopped in those patients who develop severe renal failure (see section 4.3).

Combination use of ACE inhibitors or angiotensin receptor antagonists, anti-inflammatory drugs and thiazide diuretics

The use of an ACE inhibiting drug (ACE-inhibitor or angiotensin receptor antagonist), an anti-inflammatory drug (NSAID or COX-2 inhibitor) and thiazide diuretic at the same time increases the risk of renal impairment. This includes use in fixed-combination products containing more than one class of drug. Combined use of these medications should be accompanied by increased monitoring of serum creatinine, particularly at the institution of the combination. The combination of drugs from these three classes should be used with caution particularly in elderly patients or those with pre-existing renal impairment.

Elderly

The dose should be kept as low as possible and be used for the shortest possible duration necessary to control the symptoms. Caution should be taken with regard to the use of ibuprofen as it should not be taken by adults over the age of 65 without consideration of co-morbidities and co-medications because of an increased risk of adverse effects, in particular heart failure, gastrointestinal ulceration and renal impairment.

Haematological effects

Blood dyscrasias have been rarely reported. Patients on long-term therapy with ibuprofen should have regular haematological monitoring.

Anaphylactoid reactions

As standard practice during intravenous infusion, close patient monitoring is recommended, especially at the beginning of the infusion to detect any anaphylactic reaction caused by the active substance or the excipients.

Severe acute hypersensitivity reactions (e.g. anaphylactic shock) are very rarely observed. At the first signs of a hypersensitivity reaction following the administration of Duofen, therapy must be stopped and symptomatic treatment must be established. Medically required measures, in line with the symptoms, must be initiated by specialist personnel.

Coagulation defects

Like other NSAIDs, ibuprofen can inhibit platelet aggregation. Ibuprofen has been shown to prolong bleeding time (but within the normal range), in normal subjects. Because this prolonged bleeding effect may be exaggerated in patients with underlying haemostatic defects, products containing ibuprofen should be used with caution in persons with intrinsic coagulation defects and those on anti-coagulation therapy. Patients with coagulation disorders or those undergoing surgery should be monitored. Special medical vigilance is required for use in patients immediately after undergoing major surgery.

Gastrointestinal events

Gastrointestinal (GI) bleeding, ulceration or perforation, which can be fatal, have been reported with all NSAIDs at any time during treatment, with or without warning symptoms or a previous history of serious GI events.

The risk of GI bleeding, ulceration or perforation is higher with increasing NSAID doses, in patients with a history of ulcer, particularly if complicated with haemorrhage or perforation (see section 4.3), and in the elderly. These patients should commence treatment on the lowest dose available.

Combination therapy with protective agents (e.g. misoprostol or proton pump inhibitors) should be considered for these patients, and also for patients requiring concomitant low dose acetylsalicylic acid, or other medicinal products likely to increase gastrointestinal risk (see below and section 4.5). Patients with a history of GI toxicity, particularly when elderly, should report any unusual abdominal symptoms (especially GI bleeding) particularly in the initial stages of treatment.

Caution should be advised in patients receiving concomitant medications which could increase the risk of ulceration or bleeding, such as oral corticosteroids, anticoagulants such as warfarin, selective serotonin-reuptake inhibitors or anti-platelet agents such as acetylsalicylic acid (see section 4.5).

Due to the ibuprofen component, Duofen should be given with care to patients with a history of GI disease (ulcerative colitis, Crohn's disease) as well as in patients with porphyria.

The elderly have an increased frequency of adverse reactions to NSAIDs, especially gastrointestinal bleeding and perforation which may be fatal (see section 4.2).

This product should be discontinued if there is any evidence of gastrointestinal bleeding or ulceration.

Hypertension

NSAIDs may lead to onset of new hypertension or worsening of pre-existing hypertension and patients taking antihypertensive medicines with NSAIDs may have an impaired anti-hypertensive response. Caution is advised when prescribing NSAIDs to patients with hypertension. Blood pressure should be monitored closely during initiation of NSAID treatment and at regular intervals thereafter.

Heart failure

Fluid retention and oedema have been observed in some patients taking NSAIDs, therefore caution is advised in patients with fluid retention or heart failure.

Severe skin reactions

NSAIDs may very rarely cause serious cutaneous adverse events such as exfoliative dermatitis, toxic epidermal necrolysis (TEN) and Stevens-Johnson syndrome (SJS), which can be fatal and occur without warning. Acute generalised exanthematous pustulosis (AGEP) has been reported in relation to ibuprofen-containing products. Patients appear to be at highest risk for these reactions early in the course of therapy, the onset of the reaction occurring in the majority of cases within the first month of treatment.

Patients should be advised of the signs and symptoms of serious skin reactions and to consult their doctor at the first appearance of a skin rash or any other sign of hypersensitivity.

Exceptionally, varicella can cause serious cutaneous and soft tissues infectious complications. To date, the contributing role of NSAIDs in the worsening of these infections cannot be ruled out. Thus, it is advisable to avoid use of Duofen in case of varicella.

Pre-existing asthma

Products containing ibuprofen should not be administered to patients with acetylsalicylic acid-sensitive asthma and should be used with caution in patients with pre-existing asthma.

Ophthalmological effects

Adverse ophthalmological effects have been observed with NSAIDs; accordingly, patients who develop visual disturbances during treatment with products containing ibuprofen should have an ophthalmological examination.

Aseptic meningitis

For products containing ibuprofen, aseptic meningitis has been reported only rarely, usually but not always in patients with systemic lupus erythematosus (SLE) or other connective tissue disorders.

Potential laboratory test interferences

Using current analytical systems, paracetamol does not cause interference with laboratory assays. However, there are certain methods with which the possibility of laboratory interference exists, as described below:

Urine tests

Paracetamol in therapeutic doses may interfere with the determination of 5-hydroxyindoleacetic acid (5HIAA), causing false-positive results. False determinations may be eliminated by avoiding paracetamol ingestion several hours before and during the collection of the urine specimen.

Masking of symptoms of underlying infections

Duofen can mask symptoms of infection, which may lead to delayed initiation of appropriate treatment and thereby worsening the outcome of the infection. This has been observed in bacterial community acquired pneumonia and bacterial complications to varicella. When Duofen is administered for pain relief in relation to infection, monitoring of infection is advised. In non-hospital settings, the patient should consult a doctor if symptoms persist or worsen.

Prolonged use of analgesics

On prolonged use of analgesics, headache may occur which must not be treated by increasing the dose of the medicinal product.

High anion gap metabolic acidosis (HAGMA) due to pyroglutamic acidosis

Cases of high anion gap metabolic acidosis (HAGMA) due to pyroglutamic acidosis have been reported in patients with severe illness such as severe renal impairment and sepsis, or in patients with malnutrition and other sources of glutathione deficiency (e.g. chronic alcoholism) who were treated with paracetamol at therapeutic dose for a prolonged period or a combination of paracetamol and flucloxacillin. If HAGMA due to pyroglutamic acidosis is suspected, prompt discontinuation of paracetamol and close monitoring is recommended. The measurement of urinary 5-oxoproline may be useful to identify pyroglutamic acidosis as underlying cause of HAGMA in patients with multiple risk factors.

Special precautions

There is some evidence that drugs which inhibit cyclo-oxygenase/prostaglandin synthesis may cause impairment of female fertility by an effect on ovulation. This is reversible on stopping the medicine.

Ibuprofen should be used only after strict assessment of the benefit/risk in patients with congenital disorder of porphyrin metabolism (e.g. acute intermittent porphyria).

Through concomitant consumption of alcohol, active substance-related undesirable effects, particularly those that concern the gastrointestinal tract or the central nervous system, may be increased on use of NSAIDs.

Caution is required in patients with certain conditions, which may be made worse:

- In patients who react allergically to other substances, as an increased risk of hypersensitivity reactions occurring also exists for them on use of this medicinal product.
- In patients who suffer from hay fever, nasal polyps or chronic obstructive respiratory disorders as an increased risk exists for them of allergic reaction occurring. These may present as asthma attacks (so-called analgesic asthma), Quincke's oedema or urticaria.

This medicinal product contains 35.06 mg sodium per 100 mL vial, equivalent to 1.75% of the WHO recommended maximum daily intake of 2 g sodium for an adult.

4.5 Interaction with other medicinal products and other forms of interaction

This medicinal product should not be taken with other medicinal products containing paracetamol, ibuprofen, acetylsalicylic acid, salicylates or with any other anti-inflammatory drugs (NSAIDs) unless under a doctor's instruction.

Ibuprofen:

As with other ibuprofen-containing products, the following combinations with /.../ should be avoided:

- *The dicumarol group:* NSAIDs may increase the effect of anticoagulants such as warfarin. Experimental studies show that ibuprofen reinforces the effects of warfarin on bleeding time. NSAIDs and the dicumarol group are metabolised by the same enzyme, CYP2C9.
- *Antiplatelet agents:* NSAIDs should not be combined with antiplatelet agents such as ticlopidine due to the additive inhibition of the platelet function (see below).
- *Methotrexate:* NSAIDs inhibit the tubular secretion of methotrexate and some metabolic interaction with reduced clearance of methotrexate may also occur as a result. The risk of a potential interaction between an NSAID and methotrexate should also be taken into account in connection with low-dose treatment with methotrexate, especially in patients with renal impairment. Whenever combination treatment is given, renal function should be monitored. Caution should be exercised if both an NSAID and methotrexate are given within 24 hours, as the plasma levels of methotrexate can increase, resulting in increased toxicity. Accordingly, in high-dose treatment with methotrexate one should always avoid prescribing NSAIDs.
- *Acetylsalicylic acid:* Concomitant administration of ibuprofen and acetylsalicylic acid is not generally recommended because of the potential of increased adverse effects. Experimental data suggest that ibuprofen may competitively inhibit the effect of low dose acetylsalicylic acid on platelet aggregation when they are dosed concomitantly. Although there are uncertainties regarding extrapolation of these data to the clinical situation, the possibility that regular, long-term use of ibuprofen may reduce the cardioprotective effect of low-dose acetylsalicylic acid cannot be excluded. No clinically relevant effect is considered to be likely for occasional ibuprofen use (see section 5.1).
- *Lithium:* Ibuprofen reduces the renal clearance of lithium, as a result of which serum lithium levels may rise. The combination should be avoided unless frequent checks of serum lithium can be carried out and a possible reduction in the dose of lithium made.
- *Cardiac glycosides:* NSAIDs can exacerbate heart failure, reduce glomerular filtration and increase plasma cardiac glycoside (e.g. digoxin) levels.
- *Mifepristone:* A decrease of the efficacy of the medicinal product can theoretically occur due to the antiprostaglandin properties of non-steroidal anti-inflammatory drugs (NSAIDs) including acetylsalicylic acid. Limited evidence suggests that co-administration of NSAIDs on the day of prostaglandin administration does not adversely influence the effects of mifepristone or the prostaglandin on cervical ripening or uterine contractility and does not reduce the clinical efficacy of medical termination of pregnancy.
- *ACE inhibitors and angiotensin-II antagonists:* There is an increased risk of acute renal failure, usually reversible, in patients with renal impairment (e.g. dehydrated and/or elderly patients) when treatment with ACE inhibitors or angiotensin-II antagonists is given at the same time as NSAIDs, including selective cyclooxygenase-2 inhibitors. The combination should, therefore, be given with care to patients with renal impairment, especially elderly patients. Patients should be adequately hydrated and a check of renal function should be considered after the initiation of combination treatment and at regular intervals during treatment (see section 4.4).
- *Beta-blockers:* NSAIDs counteract the antihypertensive effect of beta-adrenoceptor blocking drugs.
- *Sulphonylureas:* There are rare reports of hypoglycaemia in patients on sulphonylurea medications receiving ibuprofen.
- *Zidovudine:* There is evidence of an increased risk of haemarthroses and haematoma in HIV(+) haemophiliacs receiving concurrent treatment with zidovudine and ibuprofen.

- *Quinolone antibiotics*: animal data indicate that NSAIDs can increase the risk of convulsions associated with quinolone antibiotics. Patients taking NSAIDs and quinolones may have increased risk of developing convulsions.
- *Thiazides, thiazide-related preparations and loop diuretics*: NSAIDs can counteract the diuretic effect of furosemide and bumetanide, possibly through inhibition of prostaglandin synthesis. They can also counteract the antihypertensive effect of thiazides.
- *Potassium sparing diuretics*: The concomitant use may lead to hyperkalaemia.
- *Aminoglycosides*: NSAIDs may reduce the excretion of aminoglycosides.
- *Selective serotonin re-uptake inhibitors (SSRIs)*: SSRIs and NSAIDs each entail an increased risk of bleeding, e.g. from the gastrointestinal tract. This risk is increased by combination therapy. The mechanism may possibly be linked to reduced uptake of serotonin in the platelets (see section 4.4).
- *Cyclosporine*: The concomitant administration of NSAIDs and cyclosporine is thought to be capable of increasing the risk of nephrotoxicity due to decreased synthesis of prostacyclin in the kidney. Accordingly, in the event of combination treatment, renal function must be monitored closely.
- *Captopril*: Experimental studies indicate that ibuprofen counteracts the effect of captopril on sodium excretion.
- *Tacrolimus*: Concomitant administration of NSAIDs and tacrolimus is thought to be capable of increasing the risk of nephrotoxicity due to decreased synthesis of prostacyclin in the kidney. Accordingly, in the event of combination treatment, renal function should be monitored closely.
- *Corticosteroids*: Concomitant treatment gives rise to an increased risk of gastrointestinal ulceration or bleeding.
- *CYP2C9 Inhibitors*: Concomitant administration of ibuprofen with CYP2C9 inhibitors may increase the exposure to ibuprofen (CYP2C9 substrate). In a study with voriconazole and fluconazole (CYP2C9 inhibitors) an increased S(+)-ibuprofen exposure by approximately 80 to 100% has been shown. Reduction of the ibuprofen dose should be considered when potent CYP2C9 inhibitors are administered concomitantly, particularly when high-dose ibuprofen is administered with either voriconazole or fluconazole.
- *Phenytoin*: Plasmatic levels of phenytoin may be increased in the concomitant treatment with ibuprofen and therefore the risk of toxicity may increase.
- *Probenecid and sulfinpyrazone*: Medicinal products that contain probenecid or sulfinpyrazone may delay the excretion of ibuprofen.
- *Herbal extracts*: Ginkgo biloba may potentiate the risk of bleeding with NSAIDs.

Paracetamol:

- Probenecid inhibits the binding of paracetamol to glucuronic acid, thus leading to a reduction in paracetamol clearance by a factor of approximately 2. In patients concurrently taking probenecid, the paracetamol dose should be reduced.
- Enzyme-inducing drugs such as certain antiepileptics (phenytoin, phenobarbital, carbamazepine) decreased plasma AUC of paracetamol to approximately 60% in pharmacokinetic studies. Other substances with enzyme-inducing properties (i.e. rifampicin, *Hypericum*) could also result in decreased concentrations of paracetamol. In addition, the risk of liver damage during treatment with the maximum recommended dose of paracetamol is probably higher in patients who receive enzyme-inducing drugs.
- Zidovudine may affect paracetamol metabolism and vice versa, which may add to the toxicity of both.

- Anticoagulant drugs (warfarin) - dosage may require reduction if paracetamol and anticoagulants are taken for a prolonged period of time.
- Severe hepatotoxicity at therapeutic doses or moderate overdoses of paracetamol has been reported in patients receiving isoniazid alone or with other drugs for tuberculosis
- Paracetamol may affect the pharmacokinetics of chloramphenicol. Monitoring of chloramphenicol plasma levels is recommended if combining paracetamol with chloramphenicol injection treatment.
- Ethyl alcohol potentiates paracetamol toxicity, possibly by inducing hepatic production of paracetamol-derived hepatotoxic products.
- Caution should be taken when paracetamol is used concomitantly with flucloxacillin as concurrent intake has been associated with high anion gap metabolic acidosis due to pyroglutamic acidosis, especially in patients with risks factors (see section 4.4)

Effects on laboratory tests

Intake of paracetamol can affect tests for uric acid using phosphotungstic acid and blood sugar tests using glucose-oxidase-peroxidase.

Paediatric population

Interaction studies have only been performed in adults.

4.6 Fertility, pregnancy and lactation

Pregnancy

There is no experience of use of this product in humans during pregnancy. Because of the ibuprofen-component Duofen is contraindicated during the third trimester of pregnancy (see below).

For ibuprofen

Inhibition of prostaglandin synthesis may adversely affect the pregnancy and/or the embryo/foetal development. Data from epidemiological studies suggest an increased risk of miscarriage and of cardiac malformation and gastroschisis after use of a prostaglandin synthesis inhibitor in early pregnancy. The absolute risk for cardiovascular malformation was increased from less than 1%, up to approximately 1.5 %. The risk is believed to increase with dose and duration of therapy. In animals, administration of a prostaglandin synthesis inhibitor has been shown to result in increased pre- and post-implantation loss and embryo-foetal lethality. In addition, increased incidences of various malformations, including cardiovascular, have been reported in animals given a prostaglandin synthesis inhibitor during the organogenetic period.

From the 20th week of pregnancy onward, Duofen use may cause oligohydramnios resulting from foetal renal dysfunction. This may occur shortly after treatment initiation and is usually reversible upon discontinuation. In addition, there have been reports of ductus arteriosus constriction following treatment in the second trimester, most of which resolved after treatment cessation. Therefore, during the first and second trimester of pregnancy, Duofen should not be given unless clearly necessary. If Duofen is used by a woman attempting to conceive, or during the first and second trimester of pregnancy, the dose should be kept as low and duration of treatment as short as possible. Antenatal monitoring for oligohydramnios and ductus arteriosus constriction should be considered after exposure

to Duofen for several days from gestational week 20 onward. Duofen should be discontinued if oligohydramnios or ductus arteriosus constriction are found.

During the third trimester of pregnancy, all prostaglandin synthesis inhibitors may expose the foetus to:

- cardiopulmonary toxicity (premature constriction/closure of the ductus arteriosus and pulmonary hypertension);
- renal dysfunction (see above);

the mother and the neonate, at the end of pregnancy, to:

- possible prolongation of bleeding time, an anti-aggregating effect which may occur even at very low doses;
- inhibition of uterine contractions resulting in delayed or prolonged labour.

Consequently, Duofen is contraindicated during the third trimester of pregnancy (see section 4.3 and 5.3).

For paracetamol

A large amount of data on pregnant women using paracetamol indicate neither malformative, nor foeto/neonatal toxicity. Epidemiological studies on neurodevelopment in children exposed to paracetamol in utero show inconclusive results. If clinically needed, paracetamol can be used during pregnancy however it should be used at the lowest effective dose for the shortest possible time and at the lowest possible frequency.

Breastfeeding

Paracetamol is excreted in breast milk but not in a clinically significant amount and available published data do not contraindicate breastfeeding as long as the recommended dosage is not exceeded.

Ibuprofen and its metabolites can pass in very small amounts into breast milk. With therapeutic doses during short term treatment the risk for influence on infant seems unlikely.

In light of the above evidences it is not necessary to interrupt breastfeeding for short-term treatment with the recommended dose of this product.

Fertility

The use of the product may impair female fertility and is not recommended in women attempting to conceive. In women who have difficulties conceiving or who are undergoing investigation of infertility, withdrawal of the product should be considered.

4.7 Effects on ability to drive and use machines

Undesirable effects such as dizziness, drowsiness, fatigue and visual disturbances are possible after taking NSAIDs. If affected patients should not drive or operate machinery.

4.8 Undesirable effects

Clinical trials with Duofen and paracetamol 500 mg/ibuprofen 150 mg film-coated tablets have not indicated any other undesirable effects other than those for paracetamol alone or ibuprofen alone.

The adverse reactions are listed below as MedDRA preferred term by system organ class and absolute frequency:

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 ($< 1/10,000$); Frequency not known (cannot be estimated from the available data)

Infections and infestations	Very rare: Exacerbation of infection-related inflammations (e.g. development of necrotising fasciitis) coinciding with the use of NSAIDs has been described.
Blood and lymphatic system disorders	Uncommon: Decrease in haemoglobin and haematocrit. Although a causal relationship has not been established, bleeding episodes (e.g. epistaxis, menorrhagia) have been reported in during therapy with the drug. Very Rare: Haematopoietic disorders (agranulocytosis, anaemia, aplastic anaemia, haemolytic anaemia leucopenia, neutropenia, pancytopenia and thrombocytopenia with or without purpura) have been reported following ibuprofen use, but were not necessarily causally related to the drug.
Immune system disorders	Very Rare: Hypersensitivity reactions including skin rash and cross-sensitivity with sympathomimetics have been reported. Uncommon: Other allergic reactions have been reported but a causal relationship has not been established: Serum sickness, lupus erythematosus syndrome, Henoch-Schönlein vasculitis, angioedema.
Metabolic and nutrition disorders	Very Rare: Metabolic side effects have included hypokalaemia. Uncommon: Gynaecomastia, hypoglycaemic reaction. Not known: High anion gap metabolic acidosis
Nervous system disorders	Common: Dizziness, headache, nervousness. Uncommon: Depression, insomnia, confusion, emotional lability, somnolence, aseptic meningitis with fever and coma. Rare: Paraesthesia, hallucinations, dream abnormalities. Very Rare: Paradoxical stimulation, optic neuritis, psychomotor impairment, extrapyramidal effects, tremor and convulsions.
Eye disorders	Uncommon: Amblyopia (blurred and/or diminished vision, scotomata and/or changes in colour vision) have occurred but is usually reversed after cessation of therapy. Any patient with eye complaints should have an ophthalmological examination which includes central vision fields.
Ear and labyrinth disorders	Very Rare: Vertigo. Common: Tinnitus (for medicines containing ibuprofen).
Cardiac disorders	Common: Oedema, fluid retention; fluid retention generally responds promptly to discontinuation of the drug.

	Very Rare: Palpitations; tachycardia; arrhythmia and other cardiac dysrhythmias have been reported. Hypertension and cardiac failure have been reported in association with NSAID treatment.
Respiratory and thoracic and mediastinal disorders	Uncommon: Thickened respiratory tract secretions. In children undergoing tonsillectomy, stridor has been reported. Hypoxemia has been reported. Very Rare: Respiratory reactivity including: asthma, exacerbation of asthma, bronchospasm and dyspnoea.
Gastrointestinal Disorders	Common: Abdominal pain, diarrhoea, dyspepsia, nausea, stomach discomfort and vomiting, flatulence, constipation, slight gastrointestinal blood loss that may cause anaemia in exceptional cases. Uncommon: Peptic/gastrointestinal ulcer, perforation or gastrointestinal haemorrhage, with symptoms of melaena haematemesis sometimes fatal, particularly in the elderly. Ulcerative stomatitis and exacerbation of colitis and Crohn's disease have been reported following administration. Less frequently gastritis has been observed and pancreatitis reported. Acid peptic disease has been reported. Very rare: Oesophagitis, formation of intestinal diaphragm-like strictures.
Hepatobiliary disorders	Very Rare: Hepatic damage, especially during long-term treatment, hepatic failure. Abnormal liver function, hepatitis and jaundice. In overdose paracetamol can cause acute hepatic failure, hepatic failure, hepatic necrosis and liver injury.
Skin and subcutaneous tissue disorders	Common: Rash (including maculopapular type), pruritus. Very Rare: Alopecia. Hyperhidrosis, purpura and photosensitivity. Exfoliative dermatoses. Bullous reactions including erythema multiforme, Stevens Johnson Syndrome and Toxic Epidermal Necrolysis. Very rare cases of serious skin reactions have been reported. In exceptional cases, severe skin infections and soft-tissue complications may occur during varicella infection. Not known: Drug reaction with eosinophilia and systemic symptoms (DRESS syndrome), acute generalised exanthematous pustulosis (AGEP).
Renal and urinary disorders	Uncommon: Urinary retention Rare: Kidney tissue damage (papillary necrosis), particularly in long-term therapy. Very Rare: Nephrotoxicity in various forms, including interstitial nephritis, nephrotic syndrome, and acute and chronic renal failure. Adverse renal effects are most often observed after overdose, after chronic abuse (often with multiple analgesics), or in association with paracetamol-related hepatotoxicity. Acute tubular necrosis usually occurs in conjunction with liver failure, but has been observed as an isolated finding in rare cases. A possible increase in the risk of renal cell carcinoma has been associated with chronic paracetamol use as well.

	One case-control study of patients with end-stage renal disease suggested that long term consumption of paracetamol may significantly increase the risk of end-stage renal disease particularly in patients taking more than 1000 mg per day.
General disorders and administration site conditions	Uncommon: Pyrexia Very Rare: Fatigue and malaise.
Injury, poisoning and procedural complications	Uncommon: Post-operative haemorrhage following tonsillectomy has been reported.
Investigations	Common: Alanine aminotransferase increased, gamma-glutamyltransferase increased and liver function tests abnormal with paracetamol. Blood creatinine increased and blood urea increased. Uncommon: Aspartate aminotransferase increased, blood alkaline phosphatase increased, blood creatine phosphokinase increased, haemoglobin decreased and platelet count increased. Rare: elevated uric acid concentrations in the blood.

Description of selected adverse reactions

Clinical studies suggest that use of ibuprofen, particularly at a high dose (2400 mg/day) may be associated with a small increased risk of arterial thrombotic events (for example myocardial infarction or stroke) (see section 4.4).

High anion gap metabolic acidosis: Cases of high anion gap metabolic acidosis due to pyroglutamic acidosis have been observed in patients with risk factors using paracetamol (see section 4.4). Pyroglutamic acidosis may occur as a consequence of low glutathione levels in these patients.

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 <to be completed nationally>.

4.9 Overdose

Symptoms

Paracetamol

Liver injury and even failure can occur following paracetamol overdose. Symptoms of paracetamol overdose in the first 24 hours are pallor, nausea, vomiting, anorexia and abdominal pain. Liver damage may become apparent 12 to 48 hours after ingestion. Abnormalities of glucose metabolism and metabolic acidosis may occur. In severe poisoning, hepatic failure may proceed to encephalopathy, coma and death. Acute renal failure with acute tubular necrosis may develop in the absence of severe liver damage. Cardiac arrhythmias have been reported. Liver damage is possible in adults who have taken 10 g or more of paracetamol, due to excess quantities of a toxic metabolite.

Ibuprofen

Symptoms include nausea, abdominal pain and vomiting, dizziness, convulsion and rarely, loss of consciousness. Clinical features of overdose with ibuprofen which may result are depression of the central nervous system and the respiratory system.

Prolonged use at higher than recommended doses or overdose may result in renal tubular acidosis and hypokalaemia.

In serious poisoning metabolic acidosis may occur.

Treatment

Paracetamol

Prompt treatment is essential in the management of paracetamol overdose even when there are no obvious symptoms, because of the risks of liver injury, which presents after some hours or even days delay. Medical treatment is advised, without delay in any patient who has ingested 7.5 g or more of paracetamol in the preceding 4 hours. Specific therapy to reverse liver injury with an antidote such as acetylcysteine (intravenous), methionine (oral), or activated charcoal should be instituted as soon as possible.

Treatment of paracetamol overdose should be conducted in accordance with national guidelines.

Evidence of serious symptoms may not become apparent until 4 or 5 days following overdose and patients should be carefully observed for an extended period.

Ibuprofen

Treatment should be symptomatic and supportive and include the maintenance of a clear airway and monitoring of cardiac and vital signs until stable. Because the drug is acidic and is excreted in the urine, it is theoretically beneficial to administer alkali and induce diuresis. In addition to supportive measures, the use of oral activated charcoal may help to reduce the absorption and reabsorption of ibuprofen tablets.

5. PHARMACOLOGICAL PROPERTIES

5.1 Pharmacodynamic properties

Pharmacotherapeutic group: Other Analgesics and Antipyretics, Anilides; ATC code: N02BE51.

Mechanism of action

Although the exact site and mechanism of analgesic action of paracetamol is not clearly defined, it appears that it induces analgesia by elevation of the pain threshold. The potential mechanism may involve inhibition of the nitric oxide pathway mediated by a variety of neurotransmitter receptors including N-methyl-D-aspartate and substance P.

Ibuprofen is a propionic acid derivative with analgesic, anti-inflammatory and anti-pyretic activity. The drug's therapeutic effects as an NSAID result from its inhibitory effect on the enzyme cyclo-oxygenase, leading to reduction in prostaglandin synthesis.

Experimental data suggest that ibuprofen may competitively inhibit the effect of low dose acetylsalicylic acid on platelet aggregation when they are dosed concomitantly. Some pharmacodynamic studies show that when single doses of ibuprofen 400 mg were taken within 8 h before or within 30 min after immediate release acetylsalicylic acid dosing (81 mg), a decreased effect of acetylsalicylic acid on the formation of thromboxane or platelet aggregation occurred. Although there are uncertainties regarding extrapolation of these data to the clinical situation, the possibility that regular, long-term use of ibuprofen may reduce the cardioprotective effect of low-dose acetylsalicylic acid cannot be excluded. No clinically relevant effect is considered to be likely for occasional ibuprofen use (see section 4.5).

Clinical trials

Clinical studies of Duofen did not include subjects 65 years of age and over to determine whether they respond differently to younger subjects.

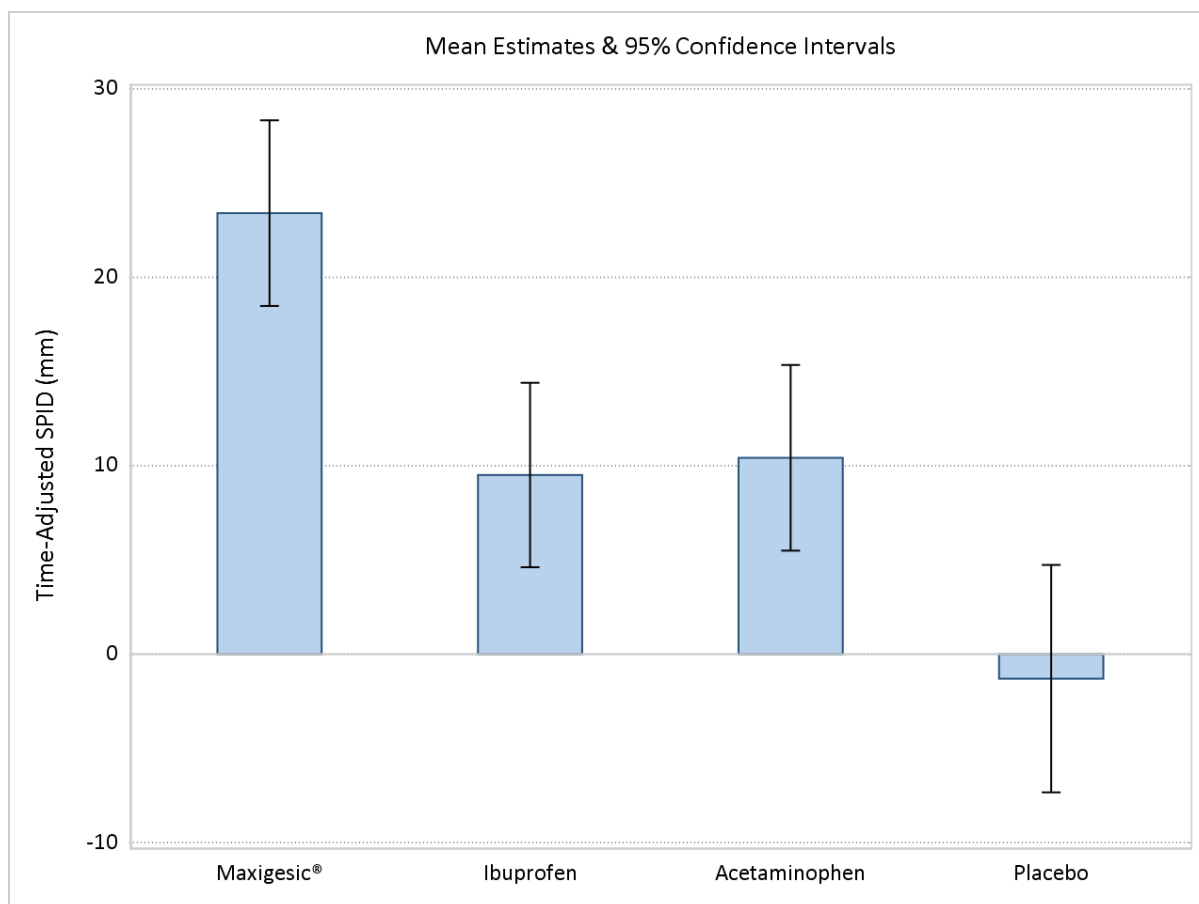
In a phase III efficacy study in 276 patients with mild to moderate pain following bunionectomy surgery, Duofen provided greater pain relief than placebo or comparable doses of paracetamol or ibuprofen alone.

The analysis of time-adjusted Summed Pain Intensity Difference (SPID) 0-48 hours demonstrated that Duofen (mean=23.41, SE=2.50) provided more effective pain relief than placebo (mean= -1.30, SE=3.07), paracetamol (mean=10.42, SE=2.50) or ibuprofen (mean=9.51, SE=2.49), with a high level of statistical significance ($p<0.001$).

Table 1: Summary of Time-adjusted SPID (0-48 hours) by Treatment Group.

	Duofen	Ibuprofen	Paracetamol	Placebo
	N=75	N=76	N=75	N=50
N	75	76	75	50
Mean (SE)	23.41 (2.89)	9.51 (2.53)	10.42 (2.49)	-1.30 (2.08)
Median	23.10	5.40	3.45	-4.00
Min ; Max	-34.08 ; 74.17	-30.68 ; 79.98	-26.78 ; 65.43	-22.42 ; 47.50
Mean Estimate (SE)	23.41 (2.50)	9.51 (2.49)	10.42 (2.50)	-1.30 (3.07)
95% Confidence Interval	18.48 ; 28.34	4.61 ; 14.40	5.49 ; 15.35	-7.33 ; 4.74
Difference Estimate (SE)	-	13.90 (3.53)	12.99 (3.54)	24.71 (3.96)
95% Confidence Interval	-	6.95 ; 20.85	6.02 ; 19.96	16.92 ; 32.50
p-value	-	<0.001	<0.001	<0.001

Figure 1: Time-adjusted SPID₄₈ up to first dose of rescue medication.



Note: Acetaminophen = paracetamol.

5.2 Pharmacokinetic properties

Absorption

Duofen is administered as a 15-minute infusion, and the peak plasma concentration of each drug is reached at the end of the infusion. The two active drugs in Duofen reach peak plasma levels in the same time frame and have similar plasma half-lives (paracetamol 2.39 ± 0.27 hours, ibuprofen 1.88 ± 0.28 hours).

The pharmacokinetic parameters of Duofen, as determined by a study in 29 healthy volunteers, are presented in Table 2.

Table 2: Mean (SD) pharmacokinetic parameters of paracetamol and ibuprofen in each treatment group.

	Treatment (Mean $\pm$ SD)			
<i>Paracetamol</i>	Duofen IV infusion, 15 min	Paracetamol IV infusion, 15 min	Duofen Half dose IV infusion, 15 min	Paracetamol/Ibuprofen Tablets Oral tablet
$C_{\max}$ (ng/mL)	26709.57 $\pm$ 5814.74	26236.06 $\pm$ 5430.52	12880.39 $\pm$ 2553.15	14907.16 $\pm$ 6255.10
AUC_{0-t} (ng.h/mL)	37553.97 $\pm$ 9816.96	35846.20 $\pm$ 8734.15	18327.40 $\pm$ 4758.34	34980.80 $\pm$ 9430.21

AUC _{0-∞} (ng.h/mL)	39419.95 ± 10630.63	37651.43 ± 9454.60	19337.01 ± 5146.46	37023.82 ± 10388.31
T _{max} (h)	0.25 (end of infusion)	0.25 (end of infusion)	0.25 (end of infusion)	0.73 ± 0.42
t _{1/2} (h)	2.39 ± 0.27	2.38 ± 0.25	2.44 ± 0.25	2.51 ± 0.33
<i>Ibuprofen</i>	Duofen IV infusion, 15 min	Ibuprofen IV IV infusion, 15 min	Duofen Half dose IV infusion, 15 min	Paracetamol/Ibuprofen Tablets Oral tablet
C _{max} (ng/mL)	39506.69 ± 6874.06	40292.97 ± 7460.04	20352.05 ± 3090.87	19637.38 ± 5178.29
AUC _{0-t} (ng.h/mL)	73492.69 ± 16509.61	72169.59 ± 15608.70	39642.48 ± 9679.16	70417.75 ± 16260.16
AUC _{0-∞} (ng.h/mL)	74743.31 ± 17388.69	73410.65 ± 16500.76	40333.88 ± 10240.30	72202.48 ± 17445.46
T _{max} (h)	0.25 (end of infusion)	0.25 (end of infusion)	0.25 (end of infusion)	1.49 ± 0.89
t _{1/2} (h)	1.88 ± 0.28	1.87 ± 0.27	1.88 ± 0.30	1.99 ± 0.36

Note: **Paracetamol/Ibuprofen** tablets = paracetamol 500 mg/ibuprofen 150 mg film-coated tablets.

Pharmacokinetic parameters were similar following a single dose of Duofen administered either intravenously or orally, except the C_{max} of the intravenous formulation was twice that of the oral formulation and, as expected, the T_{max} following intravenous administration was achieved much faster (in 15 minutes) than with the oral formulation.

Distribution

Paracetamol is distributed into most body tissues. Ibuprofen is highly bound (90-99%) to plasma proteins.

Metabolism

Paracetamol is metabolised extensively in the liver and excreted in the urine, mainly as inactive glucuronide and sulphate conjugates. Less than 5% is excreted unchanged. The metabolites of paracetamol include a minor hydroxylated intermediate which has hepatotoxic activity. This active intermediate is detoxified by conjugation with glutathione; however, it can accumulate following paracetamol overdosage and if left untreated has the potential to cause severe and even irreversible liver damage.

Ibuprofen is extensively metabolised to inactive compounds in the liver, mainly by glucuronidation.

In a single dose clinical study, the effect of ibuprofen on the oxidative metabolism of paracetamol was evaluated in healthy volunteers under fasting conditions. The study results indicated that ibuprofen did not alter the amount of paracetamol undergoing oxidative metabolism, as the amount of paracetamol and its metabolites (mercapturate-, cysteine-, glucuronide- and sulfate-paracetamol) were similar when administered alone, as paracetamol, or with the concomitant administration of ibuprofen (as a fixed combination).

Elimination

Paracetamol elimination half-life varies from about 1 to 3 hours.

Both the inactive metabolites and a small amount of unchanged ibuprofen are excreted rapidly and completely by the kidney, with 95% of the administered dose eliminated in the urine within four hours of ingestion. The elimination half-life of ibuprofen is in the range of 1.9 to 2.2 hours.

5.3 Preclinical safety data

In single and repeat-dose toxicity studies conducted in rats, co-administration of paracetamol and ibuprofen at a ratio matching that in Duofen (i.e., at a paracetamol-to-ibuprofen ratio of 3.3-to-1) and at dose levels approximately equal to those that patients would receive when using Duofen at the maximum recommended dose did not increase the risk of GI or renal toxicity.

The effect of single intravenous or perivenous doses of Duofen in an acute local irritation study in male rabbits showed that Duofen has little potential to produce local irritation when administered intravenously at the recommended dose level. Moreover, when conducting an *in vitro* blood compatibility assessment, no additional haemolysis, plasma protein flocculation/precipitation or platelet aggregation was observed with Duofen than with paracetamol IV or ibuprofen IV alone.

Ibuprofen

The subchronic and chronic toxicity of ibuprofen in animal experiments was observed principally as lesions and ulcerations in the gastro-intestinal tract. *In vitro* and *in vivo* studies gave no clinically relevant evidence of a mutagenic potential of ibuprofen. In studies in rats and mice no evidence of carcinogenic effects of ibuprofen was found. Ibuprofen led to inhibition of ovulation in rabbits as well as disturbance of implantation in various animal species (rabbit, rat, mouse). Experimental studies have demonstrated that ibuprofen crosses the placenta. For maternally toxic doses, an increased incidence of malformations (ventricular septal defects) was observed.

Paracetamol

Paracetamol in hepatotoxic doses showed genotoxic and carcinogenic potential (liver and bladder tumours), in mice and rats. However, it is considered that this genotoxic and carcinogenic activity is related to changes in the metabolism of paracetamol when in high doses/concentrations and does not represent a risk for the clinical use.

Conventional studies using the currently accepted standards for the evaluation of toxicity to reproduction and development are not available.

6. PHARMACEUTICAL PARTICULARS

6.1 List of excipients

Cysteine hydrochloride monohydrate
Disodium phosphate dihydrate
Mannitol (E421)
Hydrochloric acid (for pH adjustment)
Sodium hydroxide (for pH adjustment)
Water for injections

6.2 Incompatibilities

In the absence of compatibility studies, this medicine must not be mixed with other medicines.

6.3 Shelf life

2 years.

6.4 Special precautions for storage

Store below 25°C. Do not refrigerate or freeze. Store in the original carton in order to protect from light.

6.5 Nature and contents of container

Duofen is supplied in 100 mL clear, Type II glass vials, closed with a grey bromobutyl rubber stopper and an aluminium flip-off cap, in pack sizes of 1 vial or 10 vials.

Not all pack sizes may be marketed.

6.6 Special precautions for disposal and other handling

To remove solution, use a 0.8 mm needle (21-gauge needle) and vertically perforate the stopper at the spot specifically indicated.

In patients weighing less than 50 kg for whom a full vial (100 ml) is not required, the correct amount should be infused and the remaining solution discarded.

Visually inspect Duofen for particulate matter and discolouration prior to administration, whenever solution and container permit. If visibly opaque particles, discolouration or other foreign particulates are observed, the solution should not be used.

In the absence of compatibility studies, this medicine should not be mixed with diluents. If less than a full vial is required for a single dose, the correct amount should be infused and the remaining solution discarded (see also section 4.2).

Duofen should be used in one patient on one occasion only. It contains no antimicrobial preservative. Any unused solution should be discarded.

7. MARKETING AUTHORISATION HOLDER

<To be completed nationally>

8. MARKETING AUTHORISATION NUMBER(S)

<To be completed nationally>

9. DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION

<To be completed nationally>

10. DATE OF REVISION OF THE TEXT

2026-03-24