SUMMARY OF PRODUCT CHARACTERISTICS

1 NAME OF THE MEDICINAL PRODUCT

Nitrofurantoin 100 mg hard capsules

2 QUALITATIVE AND QUANTITATIVE COMPOSITION

Each hard capsule contains 100 mg of Nitrofurantoin in macrocrystalline form.
For the full list of excipients, see section 6.1.

3 PHARMACEUTICAL FORM

Hard capsule,

Hard gelatin capsules of size ‘2’ with yellow opaque body imprinted with ‘100’ and yellow opaque cap imprinted with ‘NMC’ with black ink, filled with yellow to light yellow granular powder.

Capsule Size: 17.9 mm

4 CLINICAL PARTICULARS

4.1 Therapeutic indications

For the treatment of and prophylaxis against acute or recurrent, uncomplicated lower urinary tract infections or pyelitis either spontaneous or following surgical procedures. It is indicated in adults, children and infants over 3 months old.

Nitrofurantoin is specifically indicated for the treatment of infections when due to susceptible strains of *Escherichia coli*, enterococci, staphylococci, *Citrobacter, Klebsiella and Enterobacter.*

4.2 Posology and method of administration

Posology

Adults

Acute Uncomplicated Urinary Tract Infections (UTIs): 50 mg four times daily for seven days.

Severe chronic recurrence (UTIs): 100 mg four times daily for seven days.

Long term suppression: 50-100 mg once a day.

Prophylaxis: 50 mg four times daily for the duration of procedure and for three days thereafter.

Paediatric population

Children and Infants over three months of age

Acute Urinary Tract Infections: 3mg/kg day in four divided doses for seven days.

Suppressive - 1mg/kg, once a day.

For children under 25 kg body weight consideration should be given to the use of Nitrofurantoin Suspension.

Elderly

Provided there is no significant renal impairment, in which Nitrofurantoin is contraindicated, the dosage should be that for any normal adult. See precaution and risks to elderly patients associated with long-term therapy (see section 4.8).

Renal impairment

Nitrofurantoin is contraindicated in patients with renal dysfunction and in patients with an eGFR of less than 45 ml/minute (see sections 4.3 & 4.4).

Method of administration

For oral use

This medicine should always be taken with food or milk. Taking Nitrofurantoin with a meal improves absorption and is important for optimal efficacy.

4.3 Contraindications

- Hypersensitivity to the active substance, other nitrofurans or to any of the excipients listed in section 6.1.
- Patients suffering from renal dysfunction with an eGFR of below 45 ml/minute.
- G6PD deficiency (see also Section 4.6)
- Acute porphyria.
- In infants under three months of age as well as pregnant patients at term (during labour and delivery) because of the theoretical possibility of haemolytic anaemia in the foetus or in the new born infant due to immature erythrocyte enzyme systems.

4.4 Special warnings and precautions for use

Nitrofurantoin is not effective for the treatment of parenchymal infections of unilaterally non-functioning kidney. A surgical cause for infection should be excluded in recurrent or severe cases.

Nitrofurantoin may be used with caution as short-course therapy only for the treatment of uncomplicated lower urinary tract infection in individual cases with an eGFR between 30-44 ml/min to treat resistant pathogens, when the benefits are expected to outweigh the risks.

Since pre-existing conditions may mask adverse reactions, Nitrofurantoin should be used with caution in patients with pulmonary disease, hepatic dysfunction, neurological disorders, and allergic diathesis.

Peripheral neuropathy and susceptibility to peripheral neuropathy which may become severe or irreversible has occurred and may be life threatening. Therefore, treatment should be stopped at the first signs of neural involvement (paraesthesia).

Nitrofurantoin should be used in caution with patients with anaemia, diabetes mellitus, electrolyte imbalance, debilitating conditions and vitamin B (particularly folate) deficiency.

Pulmonary adverse reactions

Acute, subacute and chronic pulmonary reactions have been observed in patients treated with nitrofurantoin. If these reactions occur, nitrofurantoin should be discontinued immediately. Signs of pulmonary damage include difficulty and or pain when breathing, shortness of breath and coughing up blood or mucus.

Chronic pulmonary reactions

Chronic pulmonary reactions (including pulmonary fibrosis and diffuse interstitial pneumonitis) can develop insidiously and may occur commonly in elderly patients. Close monitoring of the pulmonary condition of patients receiving long-term therapy is warranted (especially in the elderly).

Acute pulmonary reactions

Pulmonary reactions may be acute and usually occur within the first week of treatment. Increased vigilance for respiratory symptoms in patients who have just started therapy is warranted (especially in the elderly).

Patient should be monitored closely for signs of hepatitis (particularly in long term use). Urine may be coloured yellow or brown after taking Nitrofurantoin. Patients on Nitrofurantoin are susceptible to false positive urinary glucose (if tested for reducing substances).

Nitrofurantoin should be discontinued at any sign of haemolysis in those with suspected glucose-6-phosphate dehydrogenase deficiency.

Discontinue treatment with Nitrofurantoin if otherwise unexplained pulmonary, hepatic, haematological or neurological syndromes occur.

Hepatotoxicity

Hepatic reactions, including hepatitis, autoimmune hepatitis, cholestatic jaundice, chronic active hepatitis, and hepatic necrosis, occur rarely. Fatalities have been reported. The onset of chronic active hepatitis may be insidious, and patients should be monitored periodically for changes in biochemical tests that would indicate liver injury. If hepatitis occurs, the drug should be withdrawn immediately and appropriate measures should be taken.

Excipient

This medicine contains less than 1 mmol sodium (23 mg) per each hard capsule, that is to say essentially ‘sodium-free’.

4.5 Interaction with other medicinal products and other forms of interaction

1. Increased absorption with food or agents delaying gastric emptying.
2. Decreased absorption with magnesium trisilicate.
3. Decreased renal excretion of Nitrofurantoin by probenecid and sulfinpyrazone.
4. Decreased anti-bacterial activity by carbonic anhydrase inhibitors and urine alkalisation.
5. Anti-bacterial antagonism by quinolone anti-infectives.
6. Interference with some tests for glucose in urine.
7. As Nitrofurantoin belongs to the group of Antibacterials, it will have the following interactions:

- Typhoid Vaccine (oral): Antibacterials inactivate oral typhoid vaccine.

4.6 Fertility, pregnancy and lactation

Pregnancy

Animal studies with Nitrofurantoin have shown no teratogenic effects. Nitrofurantoin has been in extensive clinical use since 1952, and its suitability in human pregnancy has been well documented. However, as with all other drugs, the maternal side effects may adversely affect course of pregnancy. The drug should be used at the lowest dose as appropriate for a specific indication, only after careful assessment.

Nitrofurantoin is however contraindicated in infants under three months of age and in pregnant women during labour and delivery, because of the possible risk of haemolysis of the infants' immature red cells.

Breast-feeding

Breast feeding an infant known or suspected to have an erythrocyte enzyme deficiency (including G6PD deficiency), must be temporarily avoided, since Nitrofurantoin is detected in trace amounts in breast milk.

Fertility

No data available

4.7 Effects on ability to drive and use machines

Nitrofurantoin may cause dizziness and drowsiness and the patient should not drive or operate machinery if affected this way.

4.8 Undesirable effects

A tabulated list of undesirable effects is outlined below:

The undesirable effects are listed according to organ systems and following frequencies:

Rare (≥1/10,000 to <1/1,000)
Not known (cannot be estimated from the available data)

System organ class	Frequency	Adverse reaction
Infections and infestations	Not known	Superinfections by fungi or resistant organisms such as Pseudomonas. However, these are limited to the genitourinary tract
Blood and lymphatic system disorders	Rare	Aplastic anaemia
	Not known	Agranulocytosis, leucopenia, granulocytopenia, haemolytic anaemia, thrombocytopenia, glucose-6-phosphatedehydrogenase deficiency anaemia, megaloblastic anaemia and eosinophilia
Immune system disorders	Not known	Anaphylaxis, angioneurotic oedema and allergic skin reactions
Psychiatric disorders	Not known	Depression, euphoria, confusion, psychotic reactions
Nervous system disorders	Not known	Benign intracranial hypertension, peripheral neuropathy including optic neuritis (sensory as well as motor involvement), nystagmus, vertigo, dizziness, headache and drowsiness.
Cardiac	Rare	Collapse and cyanosis
Respiratory, thoracic and mediastinal disorders	Not known	Pulmonary fibrosis; possible association with lupus erythematous-like syndrome. acute pulmonary reactions, * subacute pulmonary reactions, * chronic pulmonary reactions, * cough, dyspnoea
Gastrointestinal disorders	Not known	Sialadenitis, pancreatitis, nausea, anorexia, emesis, abdominal pain and diarrhoea.

Hepatobiliary disorders	Not known	Chronic active hepatitis (fatalities have been reported), hepatic necrosis, autoimmune hepatitis, cholestatic jaundice
Skin and subcutaneous tissue disorders	Not known	Drug Rash With Eosinophilia And Systemic Symptoms (DRESS syndrome), Lupus-like syndrome associated with pulmonary reaction, exfoliative dermatitis and erythema multiforme (including Stevens-Johnson Syndrome), maculopapular, erythematous or eczematous eruptions, cutaneous vasculitis, urticaria, rash, and pruritus, transient alopecia
Renal and urinary disorders	Not known	yellow or brown discolouration of urine, interstitial nephritis
General disorders and administration site conditions	Not known	Asthenia, fever, chills, drug fever and arthralgia
Investigations	Not known	False positive urinary glucose

Acute pulmonary reactions are commonly manifested by fever, chills, cough, chest pain, dyspnoea, pulmonary infiltration with consolidation or pleural effusion on chest x-ray, and eosinophilia. In subacute pulmonary reactions, fever and eosinophilia occur less often than in the acute form.

Chronic pulmonary reactions occur rarely in patients who have received continuous therapy for six months or longer and are more common in elderly patients. Changes in ECG have occurred, associated with pulmonary reactions.

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 the Yellow Card Scheme at: www.mhra.gov.uk/yellowcard or search for MHRA Yellow Card in the Google Play or Apple App Store.

4.9 Overdose

Symptoms

Symptoms and signs of overdose include gastric irritation, nausea and vomiting.

Management

There is no known specific antidote. However, Nitrofurantoin can be haemodialysed in cases of recent ingestion. Standard treatment is by induction of emesis or by gastric lavage. Monitoring of full blood count, liver function, and pulmonary function tests

are recommended. A high fluid intake should be maintained to promote urinary excretion of the drug.

5 PHARMACOLOGICAL PROPERTIES

5.1 Pharmacodynamic properties

Pharmacotherapeutic group: Antibacterials for systemic use, nitrofuran derivatives
ATC code: J01XE01

Mechanism of action

Nitrofurantoin is a broad-spectrum antibacterial agent, active against the majority of urinary pathogens. The wide range of organisms sensitive to the bactericidal activity include:

Escherichia coli
Enterococcus Faecalis
Klebsiella Species
Enterobacter Species
Staphylococcus Species, e.g. S.Aureus, S.Saprophyticus, S.Epidermidis
Citrobacter Species

Clinically most common urinary pathogens are sensitive to Nitrofurantoin.
Most strains of proteus and serratia are resistant. All pseudomonas strains are resistant.

5.2 Pharmacokinetic properties

The nitrofurantoin macrocrystals are specially formulated. The controlled crystal size of the active substance nitrofurantoin macrocrystals, alters cthe speed of absorption and thus reduce the incidence of nausea without any decrease in antibacterial efficacy.Clinical and animal studies indicate that Nitrofurantoin macrocrystals therapy decreases the likelihood of nausea in patients who might experience these symptoms on Nitrofurantoin therapy.

Absorption

Orally administered Nitrofurantoin is readily absorbed in the upper gastrointestinal tract at a slower rate and to reduced extent when compared to microcrystalline Nitrofurantoin. Blood concentrations at therapeutic dosage are usually low.

Elimination

Maximum urinary excretion usually occurs 4-5 hours after administration of macrocrystalline Nitrofurantoin. Urinary drug dose recoveries of about 25-30% are obtained. It has an elimination half-life of about 30 minutes or less.

5.3 Preclinical safety data

Carcinogenic effect of nitrofurantoin in animal studies was observed. However, human data and extensive use of nitrofurantoin over 50 years do not support such observations.

6 PHARMACEUTICAL PARTICULARS

6.1 List of excipients

Capsules content:
Cellulose Microcrystalline (Grade 101)
Croscarmellose Sodium
Magnesium stearate

Capsules shell:
Iron oxide yellow (E172)
Titanium Dioxide (E171)
Gelatin

Printing Ink:
Shellac (E904)
Black Iron Oxide (E172)
Potassium hydroxide (E525)

6.2 Incompatibilities

Not applicable

6.3 Shelf life

3 years

6.4 Special precautions for storage

This medicinal product does not require any special storage conditions.

6.5 Nature and contents of container

Nitrofurantoin hard capsules are available in Clear PVC - Aluminium foil blister.

Pack sizes: 30 hard capsules

6.6 Special precautions for disposal

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

7 MARKETING AUTHORISATION HOLDER

Milpharm Limited
Ares Block, Odyssey Business Park
West End Road
Ruislip, HA4 6QD
United Kingdom

8 MARKETING AUTHORISATION NUMBER(S)

PL 16363/0637

9 DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION

13/06/2025

10 DATE OF REVISION OF THE TEXT

03/10/2023