

**1. NAME OF THE MEDICINAL PRODUCT**

Macrochantin® Capsules 100mg

**2. QUALITATIVE AND QUANTITATIVE COMPOSITION**

Macrochantin capsules containing 100 mg Nitrofurantoin Ph Eur in macrocrystalline form.

**3. PHARMACEUTICAL FORM**

The 100 mg hard gelatin capsule has an opaque yellow cap and opaque white body with the Logo 'Macro-Dantin 100' divided between the body and the cap.

**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.

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**

**Dosage:**

*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.

*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 Furadantin® 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 (Section 4.8).

### **4.3. Contra-Indications**

Patients suffering from renal dysfunction with a creatinine clearance of less than 60 ml/minute or elevated serum creatinine.

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 newborn infant due to immature erythrocyte enzyme systems.

Patients with a known hypersensitivity to nitrofurantoin or other nitrofurans.

### **4.4. Special Warnings and Special 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.

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

Chronic pulmonary reactions can develop insidiously, and may occur more commonly in elderly patients. Close monitoring of pulmonary conditions of patients receiving long-term therapy is warranted.

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

Gastrointestinal reactions may be minimised by taking the drug with food or milk, or by adjustment of dosage.

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

For long-term treatment, monitor patients closely for evidence of hepatitis or pulmonary symptoms or other evidence of toxicity.

#### **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 sulphapyridine.
4. Decreased anti-bacterial activity by carbonic anhydrase inhibitors and urine alkalinisation.
5. Anti-bacterial antagonism by quinolone anti-infectives.
6. Interference with some tests for glucose in urine

#### **4.6. Pregnancy and Lactation**

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. Caution should be exercised while breast feeding an infant known or suspected to have an erythrocyte enzyme deficiency, since Nitrofurantoin is detected in trace amounts in breast milk.

#### **4.7. Effects on Ability to Drive and Use Machines**

Nitrofurantoin should not affect the ability of patients to drive or use machinery.

#### **4.8. Undesirable Effects**

##### **Respiratory**

If any of the following reactions occur the drug should be discontinued.

*Acute pulmonary reactions* usually occur within the first week of treatment and are reversible with cessation of therapy.

*Subacute reactions* may take several months to resolve once the drug has been stopped.

*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. Minor symptoms such as fever, chills, cough and dyspnoea may be significant. Collapse and cyanosis have seldom been reported. The severity of chronic pulmonary reactions and their degree of resolution appear to be related to the duration of therapy after the first clinical signs appear. It is important to

recognise symptoms as early as possible. Pulmonary function may be impaired permanently, even after cessation of therapy.

### **Hepatic**

Hepatic reactions including cholestatic jaundice and chronic active hepatitis occur rarely. Fatalities have been reported. Cholestatic jaundice is generally associated with short-term therapy (usually up to two weeks). Chronic active hepatitis, occasionally leading to hepatic necrosis is generally associated with long-term therapy (usually after six months). The onset may be insidious. Treatment should be stopped at the first sign of hepatotoxicity.

### **Neurological**

Peripheral neuropathy (including optical neuritis) with symptoms of sensory as well as motor involvement, which may become severe or irreversible, has been reported infrequently. Less frequent reactions of unknown causal relationship are depression, euphoria, confusion, psychotic reactions, nystagmus, vertigo, dizziness, asthenia, headache and drowsiness. Treatment should be stopped at the first sign of neurological involvement.

### **Gastrointestinal**

Nausea and anorexia have been reported. Emesis, abdominal pain and diarrhoea are less common gastrointestinal reactions.

### **Haematological**

Agranulocytosis, leucopenia, granulocytopenia, haemolytic anaemia, thrombocytopenia and megaloblastic anaemia, glucose-6-phosphate dehydrogenase deficiency anaemia, and eosinophilia have been reported. Aplastic anaemia has been reported rarely. Cessation of therapy has generally returned the blood picture to normal.

### **Hypersensitivity**

Allergic skin reactions manifesting as angioneurotic oedema, maculopapular, erythematous or eczematous eruptions, urticaria, and pruritus have occurred.

Lupus-like syndrome associated with pulmonary reaction to Nitrofurantoin has been reported.

Exfoliative dermatitis and erythema multiforme (including Stevens-Johnson Syndrome) have been reported rarely.

Other hypersensitivity reactions include anaphylaxis, sialadenitis, pancreatitis, drug fever, and arthralgia.

### **Miscellaneous**

Transient alopecia and benign intracranial hypertension. As with other antimicrobial agents, superinfections by fungi or resistant organisms such as *Pseudomonas* may occur. However, these are limited to the genito-urinary tract because suppression of normal bacterial flora does not occur elsewhere in the body.

#### **4.9. Overdose**

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

Macrochantin 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 of Macrochantin are specially formulated. The controlled crystal size is designed to control the speed of absorption and thus reduce the incidence of nausea. Clinical and animal studies indicate that Macrochantin therapy decreases the likelihood of nausea in patients who might experience these symptoms on Nitrofurantoin therapy. This special formulation of Nitrofurantoin had not caused any decrease in antibacterial efficacy.

Orally administered Macrochantin 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 with an elimination half-life of about 30 minutes or less.

Maximum urinary excretion usually occurs 4-5 hours after administration of macrocrystalline Nitrofurantoin. Urinary drug dose recoveries of about 25-30% are obtained.

#### **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**

The capsule fill contains lactose monohydrate, maize starch and purified talc. The capsule shell contains quinoline yellow (E104), titanium dioxide (E171), gelatin, sodium lauryl sulphate. The printing ink contains shellac and black iron oxide (E172).

### **6.2. Incompatibilities**

Not known.

### **6.3. Shelf-Life**

Three years

### **6.4. Special Precautions for Storage**

Storage temperature must not exceed 30°C.

### **6.5. Nature and Content of Container**

Macrochantin 100 mg capsules are supplied in a PVC/aluminium foil blister pack of 30. Each pack comprises 3 blister cards containing 10 capsules on each card.

### **6.6. Instructions for Use, Handling and Disposal**

Macrochantin should be used as directed by physician.

A patient information leaflet is provided with details of use and handling of the product.

## **7. MARKETING AUTHORISATION HOLDER**

Goldshield Pharmaceuticals Ltd  
NLA Tower  
12-16 Addiscombe Road  
Croydon  
CR0 0XT  
United Kingdom

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

PL 12762/0049

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

31<sup>st</sup> March 2000.

**10. DATE OF (PARTIAL) REVISION OF THE TEXT**

January 2002