1. Name of the Medicinal Product

1.1 Name of the Medicinal Product

EMBAMOX (Amoxicillin Sodium for Injection BP)

1.2. Strength

Amoxicillin Sodium BP eq. to Amoxicillin 500 mg

1.3. Pharmaceutical Dosage Form

Parenteral Dosage Form: Dry powder for Injection

2. Qualitative And Quantitative Composition

Qualitative Declaration

The EMBAMOX Injection contains Amoxicillin Sodium BP eq. to Amoxicillin 500 mg.

Quantitative Declaration

Each Vial contains:

Amoxicillin Sodium BP

Eq. to Amoxicillin 500 mg

3. Pharmaceutical Form

Dry powder for Injection

4. Clinical Particulars

4.1 Therapeutic Indications

EMBAMOX is indicated for the treatment of the following infections

Amoxicillin is a broad spectrum antibiotic indicated for the treatment of commonly occurring bacterial infections such as:

Upper respiratory tract infections

Otitis media

Acute and chronic bronchitis

Chronic bronchial sepsis

Lobar and bronchopneumonia

Cystitis, urethritis, pyelonephritis

Bacteriuria in pregnancy

Gynaecological infections including puerperal sepsis and septic abortion

Gonorrhoea

4.2 Posology and Method of Administration

Posology

The dose of Amoxicillin that is selected to treat an individual infection should take into account:

• The expected pathogens and their likely susceptibility to antibacterial agents.

• The severity and the site of the infection

• The age, weight and renal function of the patient; as shown below

The duration of therapy should be determined by the type of infection and the response of the patient, and should generally be as short as possible. Some infections require longer periods of treatment.

Adults and children ≥ 40 kg

Indication*	**Dose***
Severe infections of the ear, nose and throat (such as mastoiditis peritonsillar infections, epiglottis and sinusitis when accompanied by severe systemic signs and symptoms	750 mg to 2 g every 8 hours, or 2 g every 12 hours, maximum of 12 g/day
Acute exacerbations of chronic bronchitis	
Community acquired pneumonia	
Acute cystitis	
Acute pyelonephritis	
Severe dental abscess with spreading cellulitis	
Prosthetic joint infections	750 mg to 2 g every 8 hours, or 2 g every 12 hours, maximum of 12 g/day
Prophylaxis of endocarditis	2 g single dose 30 to 60 minutes before procedure.
Treatment of endocarditis	1 g to 2 g every 4 to 6 hours, maximum of 12 g/day
Bacterial meningitis	1 g to 2g every 4 to 6 hours, maximum of 12 g/day
Lyme disease	Late stage (systemic involvement): 2 g every 8 hours
Bacteraemia that occurs in association with, or is suspected to be associated with, any of the infections	1 g to 2 g every 4, 6 or 8 hours, maximum of 12 g/day
*Consideration should be given to the official treatment guidelines for each indication.	

Intramuscular

Maximum daily dosage: 4 g/day.

Maximum single dose: 1 g.

Children < 40 kg

Infants and toddlers >3 months and children < 40 kg Indication*	**Dose***
Severe infections of the ear, nose and throat (such as mastoiditis peritonsillar infections, epiglottis and sinusitis when accompanied by severe systemic signs and symptoms	20 to 200 mg/kg/day given in 2 to 4 equally divided doses of up to 25 mg/kg or infusions of up to 50 mg/kg
Community acquired pneumonia	
Acute cystitis	
Acute pyelonephritis	

Severe dental abscess with spreading cellulitis	
Prophylaxis of endocarditis	50 mg/kg single dose 30 to 60 minutes before procedure
Treatment of endocarditis	200 mg/kg/day in 3 to 4 equally divided does of up to 25 mg/kg or infusions of up to 50 mg/kg
Bacterial meningitis	100 to 200 mg/kg/day in 3 to 4 equally divided doses of up to 25 mg/kg or infusions of up to 50 mg/kg
Lyme disease	Early stage: 25 to 50 mg/kg/day in three divided doses for 10 days (range 10 to 21 days) Late stage (systemic involvement): 50 mg/kg/day in three divided doses
Bacteraemia that occurs in association with, or is suspected to be associated with, any of the infections	50 to 150 mg/kg/day given in 3 equally divided doses of up to 25 mg/kg or infusions of up to 50 mg/kg
*Consideration should be given to the official treatment guidelines for each indication.	

Neonates ≥ 4kg and infants up to 3 months Indication*	**Dose***
Most infections	Usual daily dose of 20 to 150 mg/kg/day given in 3 equally divided doses of up to 25 mg/kg or infusions of up to 50 mg/kg
Treatment of endocarditis	150 mg/kg/day given in 3 equally divided doses of up to 25 mg/kg or infusions of up to 50 mg/kg
Bacterial meningitis	150 mg/kg/day given in three divided doses
Lyme disease	Early stage: 25 to 50 mg/kg/day in three divided doses for 10 days (range 10 to 21 days) Late stage (systemic involvement): 50 mg/kg/day in three divided doses
Bacteraemia that occurs in association with, or is suspected to be associated with, any of the infections listed in section 4.1	Usual daily dose of 50 to 150 mg/kg/day given in 3 equally divided doses of up to 25 mg/kg or infusions of up to 50 mg/kg
*Consideration should be given to the official treatment guidelines for each indication.	

Premature Neonates < 4kg Indication*	**Dose***
Most infections	Usual daily dose of 20 to 100 mg/kg/day given in 2 equally divided doses of up to 25 mg/kg or infusions of up to 50 mg/kg
Treatment of endocarditis	100 mg/kg/day given in two divided doses
Bacterial meningitis	100 mg/kg/day given in two

	divided doses
Lyme disease (see section 4.4)	Early stage: 25 to 50 mg/kg/day in two divided doses for 10 days (range 10 to 21 days) Late stage (systemic involvement): 50 mg/kg/day in two divided doses
Bacteraemia that occurs in association with, or is suspected to be associated with, any of the infections listed in section 4.1	Usual daily dose of 50 to 100 mg/kg/day given in 2 equally divided doses of up to 25 mg/kg or infusions of up to 50 mg/kg
*Consideration should be given to the official treatment guidelines for each indication.	

Intramuscular:

Maximum daily dosage: 120 mg/kg/day as 2 to 6 equally divided doses.

Elderly

No adjustment needed; as for adults.

Renal impairment

	Adults and children ≥ 40 kg		**Children < 40 kg**	
GFR (ml/min)	**Intravenous**	**Intramuscular**	**Intravenous**	**Intramuscular**
greater than 30	No adjustment	No adjustment	No adjustment	No adjustment
10 to 30	1g stat, then 500 mg to 1 g twice day	500 mg every 12 hours	25 mg/kg twice daily	15 mg/kg every 12 hours
less than 10	1 g stat, then 500 mg/day	500 mg/day given as a single dose	25 mg/kg/day given as a single dose	15 mg/kg/day given as a single dose

Method of Administration

For I.M./I.V. use

The reconstituted solution should be used immediately after preparation.

4.3 Contraindications

Hypersensitivity to the active substance, to any of the penicillins

History of a severe immediate hypersensitivity reaction (e.g. anaphylaxis) to another beta-lactam agent (e.g. a cephalosporin, carbapenem or monobactam).\

4.4 Special Warning and Precautions for Use

Hypersensitivity reactions

Before initiating therapy with amoxicillin, careful enquiry should be made concerning previous hypersensitivity reactions to penicillins, cephalosporins or other beta-lactam agents.

Serious and occasionally fatal hypersensitivity reactions (including anaphylactoid and severe cutaneous adverse reactions) have been reported in patients on penicillin therapy.

These reactions are more likely to occur in individuals with a history of penicillin hypersensitivity and in atopic individuals. If an allergic reaction occurs, amoxicillin therapy must be discontinued and appropriate alternative therapy instituted.

Care is also necessary if large doses of sodium (as amoxicillin sodium) are given to patients with impaired renal function or heart failure. Renal and haematological status should be monitored during prolonged and high-dose therapy.

Amoxicillin should preferably not be given to patients with undiagnosed pharyngitis (who may have mononucleosis) or patients with lymphatic leukaemia or possibly HIV infection who may also be at increased risk of developing skin rashes with amoxicillin.

There is a potential for increased serum levels of amoxicillin in the newborn or in young infants due to reduced renal excretion.

Non-susceptible microorganisms

Amoxicillin is not suitable for the treatment of some types of infection unless the pathogen is already documented and known to be susceptible or there is a very high likelihood that the pathogen would be suitable for treatment with amoxicillin. This particularly applies when considering the treatment of patients with urinary tract infections and severe infections of the ear, nose and throat.

Convulsions

Convulsions may occur in patients with impaired renal function or in those receiving high doses or in patients with predisposing factors (e.g. history of seizures, treated epilepsy or meningeal disorders.

Renal impairment

In patients with renal impairment, the dose should be adjusted according to the degree of impairment.

Skin reactions

The occurrence at the treatment initiation of a feverish generalised erythema associated with pustula may be a symptom of acute generalised exanthemous pustulosis. This reaction requires amoxicillin discontinuation and contra-indicates any subsequent administration.

Amoxicillin should be avoided if infectious mononucleosis is suspected since the occurrence of a morbilliform rash has been associated with this condition following the use of amoxicillin.

Jarisch-Herxheimer reaction

The Jarisch-Herxheimer reaction has been seen following amoxicillin treatment of Lyme disease. It results directly from the bactericidal activity of amoxicillin on the causative bacteria of Lyme disease, the spirochaete Borrelia burgdorferi. Patients should be reassured that this is a common and usually self-limiting consequence of antibiotic treatment of Lyme disease.

Overgrowth of non-susceptible microorganisms

Prolonged use may occasionally result in overgrowth of non-susceptible organisms.

Antibiotic-associated colitis has been reported with nearly all antibacterial agents and may range in severity from mild to life threatening. Therefore, it is important to consider this diagnosis in patients who present with diarrhoea during, or subsequent to, the administration of any antibiotics. Should antibiotic-associated colitis occur, amoxicillin should immediately be discontinued, a physician consulted and an appropriate therapy initiated. Anti-peristaltic medicinal products are contra-indicated in this situation.

Prolonged therapy

Periodic assessment of organ system functions; including renal, hepatic and haematopoietic function is advisable during prolonged therapy. Elevated liver enzymes and changes in blood counts have been reported.

Anticoagulants

Prolongation of prothrombin time has been reported rarely in patients receiving amoxicillin. Appropriate monitoring should be undertaken when anticoagulants are prescribed concomitantly. Adjustments in the dose of oral anticoagulants may be necessary to maintain the desired level of anticoagulation.

Crystalluria

In patients with reduced urine output, crystalluria has been observed very rarely, predominantly with parenteral therapy. During the administration of high doses of amoxicillin, it is advisable to maintain adequate fluid intake and urinary output in order to reduce the possibility of amoxicillin crystalluria. In patients with bladder catheters, a regular check of patency should be maintained.

Interference with diagnostic tests

Elevated serum and urinary levels of amoxicillin are likely to affect certain laboratory tests. Due to the high urinary concentrations of amoxicillin, false positive readings are common with chemical methods.

It is recommended that when testing for the presence of glucose in urine during amoxicillin treatment, enzymatic glucose oxidase methods should be used.

The presence of amoxicillin may distort assay results for oestriol in pregnant women.

Amoxicillin sodium 250mg, 500mg and 1g powder for solution for injection contains 0.65mmol (14.9mg), 1.3mmol (29.7mg) and 2.6mmol (59.4mg) of sodium per dose, respectively. To be taken into consideration by patients on a controlled sodium diet.

4.5 Interaction with Other Medicinal Products and Other Forms of Interaction

Probenecid

Concomitant use of probenecid is not recommended. Probenecid decreases the renal tubular secretion of amoxicillin. Concomitant use of probenecid may result in increased and prolonged blood levels of amoxicillin.

Allopurinol

Concurrent administration of allopurinol during treatment with amoxicillin can increase the likelihood of allergic skin reactions.

Tetracyclines

Tetracyclines and other bacteriostatic drugs may interfere with the bactericidal effects of amoxicillin.

Oral anticoagulants

Oral anticoagulants and penicillin antibiotics have been widely used in practice without reports of interaction. However, in the literature there are cases of increased international normalised ratio in patients maintained on acenocoumarol or warfarin and prescribed a course of amoxicillin. If co-administration is necessary, the prothrombin time or international normalised ratio should be carefully monitored with the addition or withdrawal of amoxicillin. Moreover, adjustments in the dose of oral anticoagulants may be necessary.

Methotrexate

Penicillins may reduce the excretion of methotrexate causing a potential increase in toxicity.

4.6 Fertility, Pregnancy and Lactation

Pregnancy

Animal studies do not indicate direct or indirect harmful effects with respect to reproductive toxicity. Limited data on the use of amoxicillin during pregnancy in humans do not indicate an increased risk of congenital malformations. Amoxicillin may be used in pregnancy when the potential benefits outweigh the potential risks associated with treatment.

Breast-feeding

Amoxicillin is excreted into breast milk in small quantities with the possible risk of sensitisation. Consequently, diarrhoea and fungus infection of the mucous membranes are possible in the breast-fed infant, so that breast-feeding might have to be discontinued. Amoxicillin should only be used during breast-feeding after benefit/risk assessment by the physician in charge.

Fertility

There are no data on the effects of amoxicillin on fertility in humans. Reproductive studies in animals have shown no effects on fertility.

4.7 Effects on Ability to Drive and Use Machines

No studies on the effects on the ability to drive and use machines have been performed. However, undesirable effects may occur (e.g. allergic reactions, dizziness, convulsions), which may influence the ability to drive and use machines.

4.8 Undesirable Effects

The most commonly reported adverse drug reactions (ADRs) are diarrhoea, nausea and skin rash. Severe allergic reactions, including angioneurotic oedema, anaphylaxis, serum sickness and hypersensitivity vasculitis are rare reaction.

5.0 Pharmacological Properties

5.1 Pharmacodynamic Properties

Pharmacotherapeutic Group:

Pharmacotherapeutic group: Penicillins with extended spectrum, ATC code: J01CA04

Pharmacodynamic effects

Mechanism of action

Amoxicillin is a semisynthetic penicillin (beta-lactam antibiotic) that inhibits one or more enzymes (often referred to as penicillin-binding proteins, PBPs) in the biosynthetic pathway of bacterial peptidoglycan, which is an integral structural component of the bacterial cell wall. Inhibition of peptidoglycan synthesis leads to weakening of the cell wall, which is usually followed by cell lysis and death.

Amoxicillin is susceptible to degradation by beta-lactamases produced by resistant bacteria and therefore the spectrum of activity of amoxicillin alone does not include organisms which produce these enzymes.

Pharmacokinetic/Pharmacodynamic relationship

The time above the minimum inhibitory concentration (T>MIC) is considered to be the major determinant of efficacy for amoxicillin.

Mechanisms of resistance

The main mechanisms of resistance to amoxicillin are:

• Inactivation by bacterial beta-lactamases.

• Alteration of PBPs, which reduce the affinity of the antibacterial agent for the target.

Impermeability of bacteria or efflux pump mechanisms may cause or contribute to bacterial resistance, particularly in Gram-negative bacteria.

5.2 Pharmacokinetic properties

The pharmacokinetic results for studies in which amoxicillin was administered to groups of healthy volunteers given as a bolus intravenous injection are presented below.

Mean pharmacokinetic parameters *Bolus intravenous injection*				
Dose administered	Peak serum conc (µg/ml)	T 1/2 (h)	AUC (µg.h/ml)	Urinary recovery (%, 0 to 6 h)
500 mg	32.2	1.07	25.5	66.5
1000 mg	105.4	0.9	76.3	77.4

Distribution

About 18% of total plasma amoxicillin is bound to protein and the apparent volume of distribution is around 0.3 to 0.4 l/kg.

Following intravenous administration, amoxicillin has been found in gall bladder, abdominal tissue, skin, fat, muscle tissues, synovial and peritoneal fluids, bile and pus. Amoxicillin does not adequately distribute into the cerebrospinal fluid.

From animal studies there is no evidence for significant tissue retention of drug-derived material. Amoxicillin, like most penicillins, can be detected in breast milk.

Biotransformation

Amoxicillin is partly excreted in the urine as the inactive penicilloic acid in quantities equivalent to up to 10 to 25% of the initial dose.

Elimination

The major route of elimination for amoxicillin is via the kidney

Amoxicillin has a mean elimination half-life of approximately one hour and a mean total clearance of approximately 25 l/hour in healthy subjects. Approximately 60 to 70% of the amoxicillin is excreted unchanged in urine during the first 6 hours after administration of a single 250 mg or 500 dose of amoxicillin. Various studies have found the urinary excretion to be 50 to 85% for amoxicillin over a 24 hour period.

Concomitant use of probenecid delays amoxicillin excretion.

Gender

Following oral administration of amoxicillin to healthy males and female subjects, gender has no significant impact on the pharmacokinetics of amoxicillin.

Age

The elimination half-life of amoxicillin is similar for children aged around 3 months to 2 years and older children and adults. For very young children (including preterm newborns) in the first week of life the interval of administration should not exceed twice daily administration

due to immaturity of the renal pathway of elimination. Because elderly patients are more likely to have decreased renal function, care should be taken in dose selection, and it may be useful to monitor renal function.

Renal impairment

The total serum clearance of amoxicillin decreases proportionately with decreasing renal function.

Hepatic impairment

Hepatically impaired patients should be dosed with caution and hepatic function monitored at regular intervals.

5.3 Preclinical Safety Data

Non-clinical data reveal no special hazard for humans based on studies of safety pharmacology, repeated dose toxicity, genotoxicity and toxicity to reproduction and development.

Carcinogenicity studies have not been conducted with amoxicillin.

6. Pharmaceutical Particulars

6.1 List of excipients

- ✓ Water for Injections BP

6.2 Incompatibilities

Amoxicillin should not be mixed with blood products, other proteinaceous fluids such us protein hydrolysates or with intravenous lipid emulsions. If prescribed concomitantly with an aminoglycoside, the antibiotics should not be mixed in the syringe, intravenous fluid container or giving set because of loss of activity of the aminoglycoside under these conditions.

Amoxicillin and aminoglycoside injections should be administered at separate sites.

Amoxicillin should not be mixed with ciprofloxacin.

Amoxicillin solutions should not be mixed with infusions containing dextran or bicarbonate.

6.3 Shelf Life

<24 Months>

6.4 Special Precautions for Storage

Store in a cool (below 30°C) & dry place. Protect from light.

Keep all medicines out of reach of the children.

6.5 Nature and Contents of Container

A clear glass vial with 5ml water for injections packed in unit carton along with patient information leaflet.

6.6 Special Precautions for Disposal and Other Handling

No special requirements.

7. Registrant/Sole Agent

EMBASSY PHARMACEUTICAL & CHEMICALS LTD.

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8. Manufacturer

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9. Date of Revision of Text

To be given after approval of product

10. Dosimetry (If applicable)

Not applicable

11. Instructions for Preparation of Radiopharmaceuticals (If applicable)

Not applicable