## 1.3.1 SUMMARY OF PRODUCT CHARACTERISTICS (SMPC)

### 1. Name of medicinal product

Vitamin C (Ascorbic acid) 100 mg chewable tablets

### 2. Composition:

Each uncoated chewable tablet contains:

Ascorbic acid BP 100 mg

Excipients…..... Q.S.

Color: sunset yellow.

### 3. Pharmaceutical Form:

Solid Oral

### 4. Clinical Particulars

### 4.1 Indication

Treatment of vitamin C deficiency diseases.

### 4.2 Posology and Administration

The therapy duration depends on the physiological need (e.g. in case of increased physical strain) and on condition associated with vitamin C deficiency (e.g. burns, alcoholism or scurvy).

Vitamin C should be administered over the period of the physiological need or until the symptoms abate.

The maximum therapeutic dose of 1000 mg (1 tablet/day) should not be exceeded.

### 4.3 Contraindication

Hypersensitivity to the active substance(s) or to any of the excipients listed.

### 4.4 Special Warning & precautions for use

Due to the intake of high doses of vitamin C ( 4 g per day) by patients with an erythrocytic

glucose-6-phosphate dehydrogenase deficiency, partly serious haemolyses have beenobserved in single cases. Therefore, exceeding the given dosing recommendations must be avoided.

Increased intake of ascorbic acid over a prolonged period may result in an increase in renal clearance of ascorbic acid and deficiency may result, if it is withdrawn.

In case of the susceptibility to renal calculi, there is the risk of the formation of calcium oxalate calculi due to the intake of high doses of vitamin C. Patients with recurring formationof renal calculi are recommended not to exceed a daily vitamin-C-uptake of 100 to 200 mg.

For patients with extreme or terminal renal insufficiency (patients of dialysis), respectively, a

daily vitamin-C-uptake of 50 to 100 mg of vitamin C should not be exceeded, because otherwise, there is the risk of hyperoxalataemia and crystallisations of oxalate in the kidneys.

High dose vitamin C therapy should be avoided in patients with underlying renal insufficiency or urinary oxalate should be monitored in patients. Nephrotoxic symptoms can occur in patients with renal failure and patients who concomitantly use medicinal products with negative effect on the renal function, e.g. iron overload due to an enhanced iron reabsorption.

This medicinal product contains 321 mg sodium per dose and has to be taken carefully in

patients following salt restricted diet (e. g. hypertensive patients).

The administration of gram doses can elevate the ascorbic acid concentration in the urine to such a degree that the measurement of various clinical-chemical parameters (glucose, uric acid, creatinine, inorganic phosphate) is impaired.

Likewise, gram doses can lead to false-negative results in the attempted detection of occult blood in the stools.

Generally, chemical detection methods which are based on colour reactions can be affected.

This medicinal product contains sorbitol and therefore patients with rare hereditary problems of fructose intolerance should not take this medicine.

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

Although the following interactions between vitamin C and other drugs have been described,

their relevance at the proposed dosage is not documented:

Vitamin C in a dosage of 1 g daily increases the bioavailability of oral contraceptives (oestrogens).

Corticosteroids increase the oxidation of ascorbic acid. Calcitonin increases the rate of vitamin C consumption.

Salicylates inhibit active transportation through the intestine.

Tetracyclines inhibit intracellular metabolism and reabsorption from the renal tubes.

Acetylsalicylic acid, barbiturates and tetracyclines increase vitamin C excretion in the urine.

Several cases have been reported, in which ascorbic acid appeared to reduce the effect of

warfarin.

Ascorbic acid can decrease the therapeutic effect of phenothiazines.

The concentration of fluphenazine may also be reduced.

High doses of vitamin C taken together with iron may cause an iron overload due to an enhanced iron reabsorption.

High doses of vitamin C taken together with aluminium may cause increased aluminium reabsorption.

Cyclosporine A bioavailability can be decreased by vitamin C. One case has been reported, in which the risk of cyanide toxicity has been increased by co-ingestion of mega doses of vitamin C and amygdalin.

Chronic use of high doses of ascorbic acid may interfere with disulfiram – alcohol interaction when used concurrently.

Alcohol reduces ascorbic acid levels.

**4.6 Fertility, Pregnancy and lactation**

It is not advisable to exceed the given dosage during pregnancy and lactation.

Ascorbic acid is secreted into breast milk and crosses the placental barrier by means of simple diffusion.

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

Not known.

**4.8 Undesirable effects**

Respiratory and cutaneous hypersensitivity reactions have been observed in isolated cases.

**4.9 Overdose**

Temporary osmotic diarrhoea occasionally occurs after single doses of 3 g, and almost always after more than 10 g, accompanied by respective abdominal symptoms.

**5. Pharmacological properties**

**5.1 Pharmacodynamic properties**

Vitamin C is essential to humans. Its components, ascorbic acid and dehydroascorbic acid, form an important redox system.

Vitamin C acts as a cofactor in numerous enzyme systems due to its redox potential (collagen formation, catecholamine synthesis, hydroxylation of steroids, tyrosine and exogenous substances, biosynthesis of carnitin, regeneration of tetrahydrofolic acid and alpha-amidisation of peptides, e.g. ACTH and gastrin).

Further, a deficiency of vitamin C affects the immune defence reactions, particularly chemotaxis, complement activation and interferon production. The molecular biological functions of vitamin C have not yet been fully explained.

Ascorbic acid improves the resorption of iron salts by reducing ferric ions and by forming iron chelates. It blocks the chain reactions in aqueous body compartments triggered by oxygen radicals.

The antioxidative functions produce biochemical interactions in close relation to those of vitamin E, vitamin A and carotinoids. As yet it has not been proven entirely that ascorbic acid causes a reduction of potentially carcinogenic substances in the gastrointestinal tract.

**5.2 Pharmacokinetic properties**

Ascorbic acid is absorbed in the proximal small intestine in a dose-dependent manner. The

bioavailability drops with increasing dosage to 60 - 75% after 1 g, to approx. 40% after 3 g and approx. 16% after 12 g. The portion which is not absorbed is broken down by the large intestinal flora into CO2 and organic acids.

The maximal metabolic turnover of 40 to 50 mg/day in healthy adults is reached at plasma concentrations of 0.8 to 1.0 mg/dl. The total daily turnover is about 1 mg/kg BW. Brief plasma concentrations of up to 4.2 mg/dl are achieved about three hours after applying extremely high oral doses.

Under these circumstances ascorbic acid is eliminated in the urine by up to 80%. The half-life constitutes 2.9 hours on average. Renal elimination ensues via glomerular filtration and subsequent reabsorption in the proximal tubule. The upper limits given for healthy adults are 1.34 ± 0.21 mg ascorbic acid/dl plasma in men and 1.46 ± 0.22 mg in women, respectively.

The total body content of ascorbic acid is at least 1.5 g following a high dose of about 180 mg daily. Ascorbic acid is concentrated in the pituitary gland, adrenal glands, lenses of the eye and white blood cells.

**6. Shelf Life**
24 months

**7. Special precaution for Storage**

Do not store above 30°C.

**8. Nature and contents of container**
Tablets are available in Jar pack packed in carton along with insert.

**9. Marketing Holder**

**First Vadis Pharmaceutical Industries Limited**
Plot IN/2 Phase 2 Extension, Emene Industrial Layout Enugu state

**10. Manufacturer**

**First Vadis Pharmaceutical Industries Limited**
Plot IN/2 Phase 2 Extension, Emene Industrial Layout Enugu state