#### 1. NAME OF THE MEDICINAL PRODUCT

**Avroton Capsule** 

## 2. QUALITATIVE AND QUANTITATIVE COMPOSITION

Each capsule contains:

Ginseng Extract 50mg

Ferrous Fumarate 50mg (Equivalent to 16.7mg of elemental iron)

Vitamin A 1000I.U

Vitamin B1 1.0mg

Vitamin B2 1.5mg

Vitamin B6 1.5mg

Vitamin B12 5mcg

Vitamin C 30.0mg

Folic Acid 2.0ma

Nicotinamide 20.0mg

Calcium Pantothenate 7.0mg

Zinc (as Zinc Sulphate) 5.0mg

For full list of excipients, see section 6.1.

### 3. Pharmaceutical form

Hard capsule.

The hard gelatin capsule has a red body and cap. The capsule size is no. 0.

#### 4. CLINICAL PARTICULARS

## 4.1 Therapeutic indications

- Restores vitality and vigour in cases of fatigue and stress
- Quickens the appetite in cases of anorexia (lack of appetite)
- Improves mental capacity and efficiency by restoring memory and enhancing concentration.
- Aids recovery from illness like Typhoid and malaria fever
- Restores normal vitamin levels in cases of dietary deficiency or insufficient supply of vitamins
- For the prevention and treatment of iron deficiency due to blood loss from surgery, injury or menstrual flow.

## 4.2 Posology and method of administration

## **Posology**

Adults(18 years and above):

One capsule daily with meal or as directed by the physician.

#### Children

There is not enough scientific information available to recommend the safe use of ginseng in children.

<u>NOTE:</u> It is recommended that after using Avroton Capsules continuously for two to three weeks, patients should take a break for one or two weeks.

## Method of administration

For oral administration.

## 4.3 Contraindications

- Cases of known allergy to any of the ingredients including allergy to plants in the Araliaceae family and in disturbances of iron metabolism
- · Should not be administered within one hour of administration of Antacids or Tetracyclines
- Stomach ulcers or other intestinal diseases.
- Patients with hormone-sensitive conditions, such as breast cancer, uterine cancer or endometriosis
- Individuals with high blood pressure should only take Avroton under the supervision of a qualified practitioner

- During pregnancy and breastfeeding
- Since ginseng may act as a blood thinner, discontinue use of Avroton capsules at least seven days before surgery.
- Cases of acute asthma or acute infections
- Do not use in patients with disturbances of iron metabolism.
- Do not give to patients receiving repeated blood transfusions or to patients with anaemia not produced by iron deficiency unless iron deficiency is also present.
- Do not use in patients receiving parenteral iron therapy.
- Avroton is contra-indicated in children under 18 years of age.

## 4.4 Special warnings and precautions for use

- As is general to all iron-containing formulations, care should be taken in patients with iron-storage or iron-absorption diseases such as haemochromatosis, haemoglobinopathies or existing gastrointestinal diseases such as inflammatory bowel disease, intestinal strictures and diverticulae and in anaemias associated with ineffective erythropoieses.
- Caution is advised in patients with bleeding disorders or taking drugs that may affect the risk of bleeding or blood clotting. Dosing adjustments may be necessary.
- Caution is advised in patients with diabetes or hypoglycemia, and in those taking drugs, herbs, or supplements that affect blood sugar.

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

Do not use Avroton without first talking to your practitioner or healthcare provider if you are taking any of the following medications:

- Calcium and magnesium-containing products, including antacids and mineral supplements, if treatment of both drugs is required, a time interval of about 2 to 3 hours should be allowed between them.
- Bicarbonates, carbonates or phosphates, tetracycline, trientine, ascorbic acid, citric acid and Zinc salts.
  Chloramphenicol, bisphosphonates, entacapone, fluoroquinolones, levodopa, methyldopa, mycophenolate mofeti, penicillamine and levothyroxine.
- Blood thinning medications such as aspirin and warfarin.
- Caffeine or other substances that stimulate the central nervous system.
- Morphine.
- Monoamine Oxidase Inhibitors MAOIs (antidepressant medication) especially Phenelzine.
- Diabetes medications (medication adjustments may be necessary).
- Heart disease medications (Including calcium channel blockers such as nifedipine).
- The effects of the cardiac glycoside drug digoxin may be increased when used with ginseng in patients with heart failure.
- Diuretics (Furosemide in particular).

## 4.6 Fertility, pregnancy and lactation

## Pregnancy and Breastfeeding

Ginseng has been used traditionally in pregnant and breastfeeding women. Animal studies and preliminary human research suggest possible safety, although safety has not been clearly established in humans. Therefore, ginseng use cannot be recommended during pregnancy or breastfeeding. There is a report of neonatal death and the development of male characteristics in a developing baby girl after exposure of a pregnant mother to ginseng.

## 4.7 Effects on ability to drive and use machines

Not relevant.

#### 4.8 Undesirable effects

Avroton capsule is well tolerated when taken within the recommended dose. When taken in excess amount or above the recommended dosage, gastro-Intestinal disturbances such as abdominal cramp, nausea and vomiting and either diarrhoea or constipation may occur. These effects can be reduced by giving the drug with or after food. Therapy with iron salts may darken the faeces of patients taking them.

There is preliminary evidence that formulations containing ginseng may increase the QTC interval (thus increasing the risk of abnormal heart rhythms) and decrease diastolic blood pressure two hours after ingestion in healthy adults.

Based on limited evidence, long-term use of formulations containing ginseng may be associated with skin rash or spots, itching, diarrhea, sore throat, loss of appetite, excitability, anxiety, depression, or insomnia. Less common reported side effects include headache, fever, dizziness/vertigo, blood pressure abnormalities (increases or decreases), chest pain, difficult menstruation, heart palpitations, rapid heart rate, leg swelling, nausea/vomiting, or manic episodes in people with bipolar disorder.

Based on human research, ginseng may lower blood sugar levels. This effect may be greater in patients with diabetes than in non-diabetic individuals. Caution is advised in patients with diabetes or hypoglycemia, and in those taking drugs, herbs, or supplements that affect blood sugar. Serum glucose levels may need to be monitored by a healthcare provider, and medication adjustments may be necessary.

A severe life-threatening rash known as Stevens-Johnson syndrome occurred in one patient and may have been due to contaminants in a ginseng product. A case report describes liver damage (cholestatic hepatitis) after taking a combination product containing ginseng.

Ginseng may have estrogen-like effects, and has been associated with reports of breast tenderness, loss of menstrual periods, vaginal bleeding after menopause, breast enlargement (reported in men), difficulty developing or maintaining an erection, or increased "sexual responsiveness." Ginseng may produce manic symptoms, based on a case report.

### 4.9 Overdose

### **Symptoms**

Ingestion of 20 mg/kg elemental iron is potentially toxic and 200-250 mg/kg is potentially fatal. No single method of assessment is entirely satisfactory - clinical features as well as laboratory analysis must be taken into account. The serum iron taken at about 4 hours after ingestion is the best laboratory measure of severity.

Serum Iron	Severity
< 3 mg/L (55 micromol/L)	Mild toxicity
3-5 mg/L (55-90 micromol/L)	Moderate toxicity
> 5 mg/L (90 micromol/L)	Severe toxicity

Early signs and symptoms include nausea, vomiting, abdominal pain and diarrhoea. The vomit and stools may be grey or black. In mild cases early features improve but in more serious cases there may be evidence of hypoperfusion (cool peripheries and hypotension), metabolic acidosis and systemic toxicity. In serious cases, there can be recurrence of vomiting and gastrointestinal bleeding, 12 hours after ingestion. Shock can result from hypovolaemia or direct cardiotoxicity. Evidence of hepatocellular necrosis appears at this stage with jaundice, bleeding, hypoglycaemia, encephalopathy and positive anion gap metabolic acidosis. Poor tissue perfusion may lead to renal failure. Rarely, gastric scarring causing stricture or pyloric stenosis (alone or in combination) may lead to partial or complete bowel obstruction 2-5 weeks after ingestion.

High doses of ginseng have been associated with rare cases of temporary inflammation of blood vessels in the brain (cerebral arteritis), abnormal dilation of the pupils of the eye, confusion or depression, nervousness and may lead to problems sleeping.

#### Management

Supportive and symptomatic measures include ensuring a clear airway, monitor cardiac rhythm, BP and urine output, establishing IV access and administering sufficient fluids to ensure adequate hydration. Consider whole bowel irrigation. If metabolic acidosis persists despite correction of hypoxia and adequate fluid resuscitation, an initial dose of 50 mmol sodium bicarbonate may be given and repeated as necessary, for adults guided by arterial blood gas monitoring (aim for a pH of 7.4). Consider the use of desferrioxamine, if /the patient is symptomatic (other than nausea), serum iron concentration is between 3-5 mg/L (55-90 micromol/L) and still rising. Haemodialysis does not remove iron effectively but should be considered on a supportive basis for acute renal failure as this will facilitate removal of the iron-desferrioxamine complex.

## **5. PHARMACOLOGICAL PROPERTIES**

## 5.1 Pharmacodynamic properties

Pharmacotherapeutic group: Iron bivalent, oral preparations

ATC code: B03AA02

### Ginseng

Panax Ginseng, also known as Korean Ginseng is part of the Araliaceae plant family. Panax means "all heal" in Greek and for centuries it has been used as a cure-all in many different cultures, particularly Chinese medicine. Korean Ginseng is classified as an adaptogen. An adaptogen works to strengthen and normalize body functions.

The main active ingredients of Korean ginseng are ginsenosides. These steroid-like phytochemicals have adaptogenic properties, which give ginseng property to counter the effects of stress. The glycosides act on the adrenal glands, helping to prevent adrenal hypertrophy and excess corticosteroid production in response to stress. Ginsenosides increase protein synthesis and activity of neurotransmitters in the brain. Ginseng stimulates the formation of blood vessel and improves blood circulation in the brains, thereby improving memory and cognitive abilities. Ginseng is also used for diabetes, migraine, infections, radiation and chemotherapy protection, to aid in sleep, and to stimulate the appetite.

Korean ginseng contains steroids such as panaxtriol. The steroids are remarkably similar in structure to anabolic steroids found naturally in our body. This makes Korean ginseng ideal for athletes and body builders looking for a natural alternative to anabolic steroid. Korean ginseng is also used by women for treatment of post-menopausal symptoms.

#### Iron

Iron is an essential constituent of the body, being necessary for haemoglobin formation and for the oxidative process of living tissues. The body contains about 4g of iron most of which is present as haemoglobin. The remainder is present in the storage forms, ferritin or haemosiderin, in the reticuloendothetial system or as myoglobin with smaller amount occurring in haem-containing enzymes or in plasma bound to tranferrin.

Iron and iron salts should only be given for the treatment of other types of anaemia except where iron deficiency is also present. Iron deficiency anaemia should be determined and treated.

Compound of iron are used in the treatment of microcytic anaemia, including simple achlorhydric anaemia, simple anaemia of pregnancy, the nutritional anaemia of infants, anaemia due to excessive haemorhage and anaemia associated with infections and malignant disease.

Externally, some iron salts are powerfully astringent and stypic. Iron therapy should be continued after the haemoglobin concentration has returned to normal, to replenish the body stores of iron.

### Vitamin A

Vitamin A, a fat-soluble vitamin, is essential for growth, for the development and maintenance of epithelial tissue, and for vision, particularly in dim light. Vitamin A deficiency develops when the dietary intake is inadequate. Prolonged deficiency leads to xeropthalmia or 'dry eye' the initial symptoms of which is night blindness, which may progress to severe eye lesion and blindness. Other symptoms include changes in the skin and mucous membranes.

Vitamin A has also been used alone to treat various skin disorders including acne and Psoriasis.

# Vitamin B<sub>1</sub> (Thiamine)

Thiamine is practically devoid of pharmacodynamic actions when given in usual therapeutic doses; even large doses produce no discernible effects. Isolated clinical reports of toxic reaction to the long-term parenteral administration of Thiamine probably represent rare instances of hypersensitivity.

The only established therapeutic use of Thiamine is in the treatment or the prophylaxis of Thiamine deficiency. The syndromes of Thiamine deficiency seen clinically can range from beriberi through wernicke's encephalopathy and korsakoff's syndrome to alcoholic polyneuropathy. Thiamine, a water-soluble vitamin, is an essential coenzyme for carbohydrate metabolism. Thiamine deficiency develops when the dietary intake is inadequate; severe deficiency leads to chronic beriberi characterized by peripheral neuritis, bradycardia, muscle weakness and paralysis.

### Vitamin B<sub>2</sub> (Riboflavin)

Riboflavine, a water-soluble vitamin, is essential for the utilization of energy from food. The active, phosphorylated forms, flavine mononucleotide and flavine adenine dinucleotide are involved as coenzymes in oxidative/reductive metabolic reactions.

Riboflavine deficiency develops when the dietary intake is inadequate. Deficiency leads to the development of a well-defined syndrome known as ariboflavinosis, characterized by cheilosis, angular stomatitis, glossitis and seborrhoeic keratosis of the nose and ano-genital region. There may be ocular symptoms including itching and burning of the eyes, photophobia and corneal vascularisation. Riboflavine deficiency may occur in association with other vitamin B complex deficiency states such as pellagra.

Riboflavine is used in the treatment and prevention of Riboflavine deficiency.

## Vitamin B<sub>6</sub> (Pyridoxine)

Pyridoxine, a water—soluble vitamin is involved principally in amino acid metabolism, but is also involved in carbohydrate and fat metabolism. It is also required for the formation of haemoglobin.

Deficiency of Pyridoxine is rare in humans due to its wide spread distribution in foods. Pyridoxine deficiency may however be drug induced and can occur, for instance, during isoniazid therapy. Inadequate Pyridoxine deficiency in adults lead to the development of peripheral neuritis, deficiency in children also affect the CNS. Pyridoxine is used in the treatment and prevention of Pyridoxine deficiency states. Pyridoxine has also been used to treat seizure due to hereditary syndromes of Pyridoxine deficiency or dependency in infants. Pyridoxine has also been tried in a wide variety of other disorders, including the treatment of depression

Pyridoxine has also been tried in a wide variety of other disorders, including the treatment of depression and other symptoms associated with the premenstrual syndrome and the use of oral contraceptives.

## Vitamin B<sub>12</sub> (Cyanocobalamin)

Vitamin  $B_{12}$ , water-soluble vitamins occur in the body mainly as methylcobalamin and as adenosylcobalamin and hydroxycobalamin. It act as coenzyme in nucleic acid synthesis.

Vitamin  $B_{12}$  deficiency may occur in strict vegetarians with an inadequate dietary intake, in patients with malabsorption syndromes or metabolic disorder, nitrous oxide induced megaloblastosis or following anaemias and neurological damage.

Vitamin  $B_{12}$  preparations are used in the treatment and prevention of Vitamin  $B_{12}$  deficiency. It is desirable to identify the cause of deficiency before commencing therapy. Treatment usually results in rapid haematological improvement and a striking clinical response.

### Vitamin C (Ascorbic Acid)

Ascorbic acid, a water-soluble vitamin is essential for the synthesis of collagen and intercellular material. Ascorbic acid deficiency develops when the dietary intake is inadequate. Deficiency leads to the development of a well-defined syndrome known as scurvy characterized by capillary fragility, bleeding (especially from small blood vessel and the gum) anaemia, cartilage and bone lesions and slow healing of wounds.

Ascorbic acid is used in the treatment and prevention of Ascorbic acid deficiency. It completely reverses symptoms of deficiency. Ascorbic acid has been used to acidify urine and has also been tried in the treatment of idiopathic methaemoglobinaemia and many other disorders.

## Calcium Pantothenate

Pantothenic acid is traditionally considered to be a vitamin B substance. It is a component of co-enzyme A which is essential in the metabolism of carbohydrate, fat and protein.

Deficiency of pantothenic acid is unlikely in man because of its wide spread distribution in food. It is administered as a nutritional supplement often as calcium salt and usually in conjunction with other vitamins of the B group.

### Folic Acid.

Folic acid is a member of the vitamin B group. Folic acid is reduced in the body to tetrahydrofolate, which is a co-enzyme for various metabolic processes including the synthesis of DNA. It is also involved in some amino-acid conversions, and in the formation and utilisation of folates. Deficiency, which can result in megaloblastic anaemia, develops when the dietary intake is inadequate, as in malnutrition, from malabsorption, from increased utilization as in pregnancy or condition such as haemolytic anaemia.

Folic acid is used in the treatment and prevention of the folate deficiency state. It does not correct folate deficieny due to dihydrofolate reductase inhibition; Calcium folinate is used for this purpose.

#### Nicotinamide

Nicotinic acid and nicotinamide, the form that occurs naturally in the body are water-soluble vitamin B substances, which are converted to Nicotinanide Adenine Dinucleotide Phosphate (NADP). These coenzymes are involved in electron transfer reactions in the respiratory chain.

Nicotinamide deficiency develops when dietary intake is inadequate. Deficiency leads to the development of a syndrome known as pellagra characterized by skin lesions, especially on areas exposed to sunlight, with hyperpigmentation and hyperkeratinisation. Other symptoms include diarrhoea, abdominal pain, glossitis, stomatitis, and loss of appetite, headache, lethargy and mental and neurological disturbances. Nicotinic acid deficiency may occur in association with other vitamin B complex deficiency states.

Nicotinamide is used in the treatment and prevention of Nicotinic acid deficiency. Nicotinamide is preferred, as it does not cause vasodilatation.

### **Zinc**

Zinc is an essential part element of nutrition and traces are present in a wide range of foods. Zinc is an integral part of at least 70 metalloenzymes including carbonic anhydrase, lactic dehydrogenase, alkaline phosphatase, carboxypeptidase, aminopeptidase and alcoholic dehydrogenase.

It is also a co-factor in the synthesis of DNA and RNA, and it is involved in the mobilization of vitamin A from the liver and in the enhancement of follicle-stimulating hormone and leuteinising hormone. It is essential for normal cellular immune functions and for spermatogenesis and normal testicular function, and it is important in the stabilization of membrane structure.

Zinc salts are used as supplements to correct zinc deficiency.

## 5.2 Pharmacokinetic properties

#### Iron

Iron is irregularly and incompletely absorbed from the gastro-intestinal tract the main sites of absorption being the duodenum and jejunum. Absorption is usually increased in conditions of iron deficiency or when given in the fasting state. Absorption of iron may be reduced in certain disease states.

Apart from haemorhage, iron is mainly lost from the body in the faeces, urine, skin and sweat, but the total loss is small. In healthy men and non-menstruating women the loss is replaced by the absorption of about 1mg of iron daily; about 2mg needs to be absorbed daily by menstruating women.

In childhood and adolescence, the need is proportionately greater because of growth. In pregnancy and lactation 3mg or more must be absorbed daily.

#### Vitamin A

Vitamin A is readily absorbed from the gastro intestinal tract but absorption may be reduced in the presence of fat malabsorption, low protein intake, or impaired liver or pancreatic function. Vitamin A esters are hydrolyzed by pancreatic enzymes to retinol, which is then absorbed. Some retinol are stored in the liver. It is released from the liver bound to a specific  $a_1$  – globulin (retinol – binding protein) in the blood. The retinol not stored in the liver undergoes glucuronide conjugation and subsequent oxidation to retinal and retinoic acid, these and other metabolites are excreted in urine and faeces. Vitamin A does not readily diffuse across the placenta but is present in the milk of nursing mothers.

### Vitamin B<sub>1</sub> (Thiamine)

Thiamine is well absorbed from the gastro intestinal tract following oral administration, although the absorption of large doses is limited. It is also rapidly absorbed following intra muscular administration. It is widely distributed to most body tissues and appears in breast milk. Thiamine is not stored to any appreciable extent in the body and amounts in excess of the body's requirements are excreted in the urine as unchanged Thiamine or as metabolites.

Thiamine requirements are directly related to the carbohydrate intake and the metabolic rate. A daily dietary intake of 1 to 1.3mg of Thiamine is recommended for healthy men and 0.7 to 1mg for healthy women.

## Vitamin B<sub>2</sub> (Riboflavin)

Riboflavine is readily absorbed from the gastro intestinal tract. Although Riboflavine is widely distributed to body tissues, little is stored in the body. Riboflavine is converted in the body to the coenzyme Flavine mononucleotide and then to another coenzyme Flavine adenine dinucleotide. About 60% of FMN and FAD are bound to plasma proteins. Riboflavine is excreted in urine, mainly as metabolites. As the dose increases, larger amounts are excreted unchanged. Riboflavine crosses the placenta and is distributed in breast milk.

The Riboflavine requirement is often related to the energy intake but it appears to be more closely related to the resting metabolic requirements. A daily dietary intake of about 1.3 to 1.8mg of Riboflavine is recommended.

#### Vitamin B<sub>6</sub> (Pyridoxine)

Pyridoxine is readily absorbed from the gastro-intestinal tract following oral administration and is converted to the active forms pyridoxal phosphate and pyridoxamine phosphate. They are stored mainly in the liver where there is oxidation to 4-pyridoxic acid, which is excreted in the urine. Pyridoxine crosses the placenta and also appears in the breast milk.

For adults, the daily requirement of Pyridoxine is probably about 2mg and this amount is present in most normal diets. Meats, especially liver, cereals, eggs, fish and certain vegetables and fruits are good source of Pyridoxine.

### Vitamin B<sub>12</sub> (Cyanocobalamin)

Vitamin  $B_{\underline{12}}$  substances bind to intrinsic factor and are then actively absorbed from the gastro intestinal tract. Absorption is impaired in patients with an absence of intrinsic factor, with a malabsorption syndrome or with disease or abnormality of the gut, or after gastrectomy.

Vitamin  $B_{\underline{12}}$  is extensively bound to specific plasma proteins called Transcobalamins, Transcobalamin II appears to be involved in the rapid transport of the cobalamins to tissues. It is stored in the liver, excreted in the bile and undergoes enterohepatic recycling; part of a dose is excreted in the urine, most of it in the first 8 hours. Vitamin  $B_{\underline{12}}$  diffuses across the placenta and also appears in breast milk.

For adults, the daily requirement of Vitamin  $B_{\underline{12}}$  is probably about 1 to  $3\mu g$  and this amount is present in most normal diets.

#### Vitamin C (Ascorbic Acid)

Ascorbic acid is readily absorbed from the gastro intestinal tract and is widely distributed in the body tissues. It is reported to be 25% bound to plasma proteins. The amount of ascorbic acid in the body in health is about 1.5g. The concentration is higher in leucocytes and platelets than in erythrocytes and plasma. In deficiency states the concentration in leucocytes declines later and at a slower rate, and has been considered to be a better criterion for the evaluation of deficiency than the concentration in plasma.

Ascorbic acid is reversibly oxidised to dehydroascorbic acid; some is metabolised to ascorbate -2 – sulphate, which is inactive and oxalic acid, which are excreted in the urine. Ascorbic acid in excess of the body's needs is also rapidly eliminated in the urine. Ascorbic acid crosses the placenta and is distributed into breast milk. It is removed by haemodialysis.

A daily dietary intake of about 30 to 60mg Ascorbic acid has been recommended for adults. There is, however, wide variation in individual requirements. Humans are unable to form their own ascorbic acid and so a dietary source is necessary. Most dietary ascorbic acid is obtained from fruit and vegetable sources; only small amounts are present in milk and animal tissues.

### Calcium D-Pantothenate

Pantothenic acid is readily absorbed from the gastro intestinal tract following oral administration. It is widely distributed in the body tissues and appears in breast milk. About 70% of Pantothetic acid is excreted unchanged in the urine and about 30% in the fences.

Pantothenic acid is rapidly absorbed in foods-meat, legumes and whole grain cereals are particularly rich sources. Recommended daily intakes of Pantothenic acid have not been set, but human requirements are adequately met by a daily intake of about 4 to 10mg.

## Folic Acid

Folic Acid is absorbed mainly from the small intestinal. The naturally occurring folate polyglutamates are largely deconjugated and reduced prior to absortion. It is the 5-methyterahydrofolate, which appears in the portal circulation, where it is extensively bound to plasma proteins.

Folic acid is rapidly absorbed from normal diets and is distributed in body tissues. The principal storage site is the liver. There is an enthroheptic circulation for folate, about 4 to  $5\eta$  is excreted in the urine daily. Administration of larger doses of folic acid leads to proportionately more of the vitamin being excreted in the urine. Folate is distributed into breast milk.

Body-store folate in healthy persons have been reported as being between 5 to 10mg, but may be much higher, About 400mg of folate a day is considered a suitable average intake. Folate is present, chiefly combined with several L (+) – glutamic acid moieties in many foods. The vitamin is readily oxidized to unavailable forms and is easily destroyed during cooking.

### Nicotinamide

Nicotinamide is absorbed readily from all portions of the intestinal tract and the vitamin is distributed to all tissues. The principal route of metabolism of Nicotinic acid and nicotinamide is by the formation of N—methylnicotinamide, which in turn is metabolized further. Smmall amounts of the unchanged vitamins appear in the urine following therapeutic doses of nicotinic acid and nicotinamide. The daily adult requirement is probably about 15-20mg.

#### Zinc

Zinc and its salts are poorly absorbed from the gastrointestinal tract; only a small portion of dietary zinc is absorbed. Zinc is distributed widely in the body and is primarily excreted in the faeces with only traces appearing in the urine since the kidneys have little or no role in regulating the content of zinc in the body.

## 5.3 Preclinical safety data

No further data

### 6. PHARMACEUTICAL PARTICULARS

## **6.1 List of excipients**

Methyl Hydroxybenzoate Propyl Hydroxybenzoate Talc Powder Colloidal Silicon Dioxide Tricalcium Phosphate

### 6.2 Incompatibilities

Not applicable.

## 6.3 Shelf Life

3 years

### 6.4 Special precautions for storage

Store below 30°C. Protect from light.

### 6.5 Nature and contents of container

Alu/PVC Blister of 3 x 10 and 12 x 10 capsules

### 6.6 Special precautions for disposal and other handling

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

# 7. APPLICANT/MANUFACTURER

Avro Pharma Limited Daid House Plot 2, Block J, Limca Way, Isolo Industrial Estate, Oshodi-Apapa Expressway, Isolo, Lagos State, Nigeria. Tel: +234(1)2913955 Email: avro@rumon-org.com