

**CENTER FOR DRUG EVALUATION AND  
RESEARCH**

*APPLICATION NUMBER:*

**21-625**

**APPROVED LABELING**

XXXXXX-XX

REV: XX/XX

## **M.V.I.ADULT™**

*(Multi-Vitamin Infusion)*

For dilution in intravenous infusions only.

Rx only

### **DESCRIPTION**

M.V.I. Adult™ is available in 2 packaging configurations. (Dual Vial and Unit Vial).

Dual Vial: A sterile product consisting of two vials labeled Vial 1 (5mL) and Vial 2 (5 mL). Both vials to be used for a single 10 mL dose.

Unit Vial: A sterile product in a two-chambered single-dose vial that must be mixed just prior to use. The mixed solution will provide one 10 mL dose.

Adult Formulation (intended for ages 11 and above)

#### **Vial 1 or Lower Chamber of Unit Vial\***

<b>Ingredient</b>	<b>Amount per Unit Dose (10 mL)</b>
<b>Fat Soluble Vitamins**</b>	
Vitamin A (retinol)	1 mg <sup>a</sup>
Vitamin D (ergocalciferol)	5 µg <sup>b</sup>
Vitamin E (d $\alpha$ -tocopheryl acetate)	10 mg <sup>c</sup>
Vitamin K (phylloquinone)	150 µg
<b>Water Soluble Vitamins</b>	
Vitamin C (ascorbic acid)	200 mg
Niacinamide	40 mg
Vitamin B <sub>2</sub> (as riboflavin 5-phosphate sodium)	3.6 mg
Vitamin B <sub>1</sub> (thiamine)	6 mg
Vitamin B <sub>6</sub> (pyridoxine HCl)	6 mg
Dexpanthenol (d-pantothenyl alcohol)	15 mg

\*With 30% propylene glycol and 2% gentisic acid ethanolamide as stabilizers and preservatives; sodium hydroxide for pH adjustment; 1.6% polysorbate 80; 0.028% polysorbate 20; 0.002% butylated hydroxytoluene; 0.0005% butylated hydroxyanisole.

\*\*Fat soluble vitamins A, D, E and K are water solubilized with polysorbate 80.

(a) 1 mg vitamin A equals 3,300 USP units.

(b) 5 µg ergocalciferol equals 200 USP units.

(c) 10 mg vitamin E equals 10 USP units.

#### **Vial 2 or Upper Chamber of Unit Vial\***

Biotin 60 µg

Folic acid 600 µg

B<sub>12</sub> (cyanocobalamin) 5 µg

\* With 30% propylene glycol; and citric acid, sodium citrate, and sodium hydroxide for pH adjustment.

#### **“Aqueous” multivitamin formula for intravenous infusion:**

M.V.I. Adult (Multi-Vitamin Infusion) makes available a combination of important fat-soluble and water-soluble vitamins in an aqueous solution, formulated specially for incorporation into intravenous infusions. Through special processing techniques, the liposoluble vitamins A, D, E, and K have been solubilized in an aqueous medium with polysorbate 80, permitting intravenous administration of these vitamins.

### **INDICATIONS AND USAGE**

Adults and Children Aged 11 and Above: This formulation is indicated as daily multivitamin maintenance dosage for adults and children aged 11 years and above receiving parenteral nutrition. It is also indicated in other situations where administration by the intravenous route is required. Such situations include surgery, extensive burns, fractures and other trauma, severe infectious diseases, and comatose states, which may provoke a “stress” situation with profound alterations in the body’s metabolic demands and consequent tissue depletion of nutrients. M.V.I. Adult (administered in intravenous fluids under proper dilution) contributes toward the intake of these vitamins that are necessary toward maintaining the body’s normal resistance and repair processes.

The physician should not await the development of clinical signs of vitamin deficiency before initiating vitamin therapy.

Patients with multiple vitamin deficiencies or with markedly increased requirements may be given multiples of the daily dosage for two or more days as indicated by the clinical status. Clinical testing indicates that some patients do not maintain adequate levels of certain vitamins when this formulation is recommended amounts is the sole source of vitamins.

## **CONTRAINDICATIONS**

Known hypersensitivity to any of the vitamins in this product or a pre-existing hypervitaminosis. Allergic reaction has been known to occur following intravenous administration of thiamine and vitamin K. This formulation is contraindicated prior to blood sampling for detection of megaloblastic anemia, as the folic acid and the cyanocobalamin in the vitamin solution can mask serum deficits.

## **WARNINGS**

**WARNING:** This product contains aluminum that may be toxic. Aluminum may reach toxic levels with prolonged parenteral administration if kidney function is impaired. Premature neonates are particularly at risk because their kidneys are immature, and they require large amounts of calcium and phosphate solutions, which contain aluminum.

Research indicates that patients with impaired kidney function, including premature neonates, who receive parenteral levels of aluminum at greater than 4 to 5  $\mu\text{g}/\text{kg}/\text{day}$  accumulate aluminum at levels associated with central nervous system and bone toxicity. Tissue loading may occur at even lower rates of administration.

## **PRECAUTIONS**

Caution should be exercised when administering this multivitamin formulation to patients on warfarin sodium-type anticoagulant therapy. In such patients, vitamin K may antagonize the hypoprothrombinemic response to anticoagulant drugs, therefore requiring dosage adjustment of the warfarin sodium-type anticoagulant therapy. Periodic monitoring of prothrombin time is essential in determining the appropriate dosage of anticoagulant therapy.

Studies have shown that vitamin A may adhere to plastic, resulting in inadequate vitamin A administration in the doses recommended with M.V.I. Adult.

Where long-standing specific vitamin deficiencies exist, it may be necessary to add therapeutic amounts of specific vitamins to supplement the maintenance vitamins provided in M.V.I. Adult.

In patients receiving parenteral multivitamins, blood vitamin concentrations should be periodically monitored to determine if vitamin deficiencies or excesses are developing.

M.V.I. Adult should be aseptically transferred to the infusion fluid.

### **Drug-Drug Interactions:**

#### *Physical Incompatibilities:*

M.V.I. Adult (Multi-Vitamin Infusion) is not physically compatible with DIAMOX<sup>®</sup> (acetazolamide) 500 mg, DIURIL<sup>®</sup> Intravenous Sodium (chlorothiazide sodium) 500 mg, or aminophylline 125 mg, ampicillin 500 mg or moderately alkaline solutions. ACHROMYCIN<sup>®</sup> (tetracycline HCl) 500 mg may not be physically compatible with M.V.I. Adult. It has been reported that folic acid is unstable in the presence of calcium salts such as calcium gluconate. Some of the vitamins in M.V.I. Adult may react with vitamin K bisulfite. Direct addition of M.V.I. Adult to intravenous fat emulsions is not recommended. Consult appropriate references for listings of physical compatibility of solutions and drugs with the vitamin infusion. In such circumstances, admixture or Y-site administration with vitamin solutions should be avoided.

Several vitamins have been reported to decrease the activity of certain antibiotics. Thiamine, riboflavin, pyridoxine, niacinamide, and ascorbic acid have been reported to decrease the antibiotic activity of erythromycin, kanamycin, streptomycin, doxycycline, and lincomycin. Bleomycin is inactivated in vitro by ascorbic acid and riboflavin.

Some of the vitamins in M.V.I. Adult may react with vitamin K bisulfite or sodium bisulfite; if bisulfite solutions are necessary, patients should be monitored for vitamin A and thiamine deficiencies.

#### *Clinical Interactions*

A number of interactions between vitamins and drugs have been reported which may affect the metabolism of either agent. The following are examples of these types of interactions.

Folic acid may lower the serum concentration of phenytoin resulting in increased seizure frequency. Conversely, phenytoin may decrease serum folic acid concentrations and, therefore, should be avoided in pregnancy. Folic acid may decrease the patient's response to methotrexate therapy.

Pyridoxine may decrease the efficacy of levodopa by increasing its metabolism. Concomitant administration of hydralazine or isoniazid may increase pyridoxine requirements.

In patients with pernicious anemia, the hematologic response to vitamin B<sub>12</sub> therapy may be inhibited by concomitant administration of chloramphenicol.

Vitamin K may antagonize the hypoprothrombinemic effect of oral anticoagulants (see bolded statement above).

Consult appropriate references for additional specific vitamin-drug interactions.

### **Drug-Laboratory Test Interactions**

Ascorbic acid in the urine may cause false negative urine glucose determinations.

### **Carcinogenesis, Mutagenesis, and Impairment of Fertility:**

Carcinogenicity studies have not been performed.

### **PREGNANCY:**

Pregnant women should follow the U.S. Recommended Daily Allowances for their condition, because their vitamin requirements may exceed those of nonpregnant women.

### **Nursing Mothers:**

Lactating women should follow the U.S. Recommended Daily Allowances for their condition, because their vitamin requirements may exceed those of nonlactating women.

### **Pediatric Use:**

Safety and effectiveness in children below the age of 11 years have not been established.

## **ADVERSE REACTIONS**

There have been rare reports of anaphylactoid reactions following large intravenous doses of thiamine. The risk, however, is negligible if thiamine is co-administered with other vitamins in the B group. There have been no reports of fatal anaphylactoid reactions associated with M.V.I. Adult.

There have been rare reports of the following types of reactions:

Dermatologic — rash, erythema, pruritus

CNS — headache, dizziness, agitation, anxiety

Ophthalmic — diplopia

Allergic — urticaria, periorbital and digital edema

## **OVERDOSAGE**

The possibility of hypervitaminosis A or D should be borne in mind. Clinical manifestations of hypervitaminosis A have been reported in patients with renal failure receiving 1.5 mg/day retinol. Therefore, vitamin A supplementation of renal failure patients should be undertaken with caution.

## **DOSAGE AND ADMINISTRATION**

M.V.I. Adult is ready for immediate use in adults and children aged 11 years and above when added to intravenous infusion fluids.

**Directions for Dual Vial:** Dilute the contents of Vial 1 (5mL) and the contents of Vial 2 (5mL) in not less than 500 mL infusion fluid, both vials to be used for a single dose. The Vial 1 and Vial 2 container closures may be penetrated only one time, utilizing a suitable sterile transfer device or dispensing set, which allows measured distribution of the contents.

The withdrawal of container contents should be accomplished without delay. The solution should be administered within 4 hours after dilution.

Use of this product is restricted to a suitable work area, such as a laminar flow hood.

M.V.I. Adult should not be given as a direct, undiluted intravenous injection as it may give rise to dizziness, faintness, and possible tissue irritation.

**Directions for Unit-Vial:** Remove the protective plastic cap, turn the plunger-stopper 90° and press down firmly to force liquid in the upper chamber and the center seal into the lower compartment. Gently agitate to mix solution. Sterilize the rubber stopper in the usual manner and insert needle squarely through the center of the plunger-stopper until tip is just visible. Vial should be mixed just prior to use. Invert vial and withdraw a 10mL dose in the usual manner. The mixed solution is ready for dilution in not less than 500mL of infusion fluid. M.V.I. Adult should not be given as a direct, undiluted intravenous injection as it may give rise to dizziness, faintness, and possible tissue irritation.

#### **Dual Vial**

For intravenous feeding, one daily dose of M.V.I. Adult (5 mL of Vial 1 plus 5 mL of Vial 2) added directly to not less than 500 mL, preferably 1,000 mL, of intravenous dextrose, saline or similar infusion solutions.

#### **Unit-Vial**

For intravenous feeding, one daily dose of M.V.I. Adult (10 mL) added directly to not less than 500 mL, preferably 1,000 mL, of intravenous dextrose, saline or similar infusion solutions.

Parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration, whenever solution and container permit.

After M.V.I. Adult is diluted in an intravenous infusion, the resulting solution is ready for immediate use. Some of the vitamins in this product, particularly A and D and riboflavin, are light sensitive, and exposure to light should be minimized.

Store at 2–8°C (36–46°F).

#### **HOW SUPPLIED**

**M.V.I. Adult** — NDC 66591-84-32 Boxes of 10 and cartons of 100. Each box contains two vials — Vial 1 (5 mL) and Vial 2 (5 mL), both vials to be used for a single dose.

**M.V.I. Adult UNIT VIAL** NDC 66591-184-42 Boxes of 10 two-chambered 10mL vials.

**M.V.I. Adult UNIT VIAL**

Sterilized and Filled by:  
Enzon Pharmaceuticals, Inc.  
Indianapolis, IN 46268

Manufactured for: aaiPharma  
Wilmington, NC 28405  
By: AstraZeneca LP  
Westborough, MA



Area For  
Lot & Exp.

NDC 66591-184-32

**M.V.I. ADULT™**  
(Multi-Vitamin Infusion)



FOR DILUTION IN INTRAVENOUS  
INFUSIONS ONLY.

Contents: Vial 1 (5 mL) and Vial 2 (5 mL).  
Both vials to be used for a single dose.  
Store under refrigeration,  
2°-8°C (36°-46°F).

Store Upright  
Rx only

Distributed by:

**aaipharma™**  
aaipharma  
Wilmington, NC 28405



NDC 66591-184-32

**M.V.I. ADULT™**  
(Multi-Vitamin Infusion)

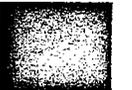
FOR DILUTION IN INTRAVENOUS  
INFUSIONS ONLY.

The contents of both vials should be added  
to not less than 500 mL of infusion fluid.  
Each vial contains a sufficient amount to  
permit withdrawal and administration of 5 mL.  
Consult package insert for dosage and full  
prescribing information.

Oil-soluble vitamins A, D, E, and K in Vial 1  
water solubilized with 1.6% polysorbate 80.

Distributed by:

**aaipharma™**  
aaipharma  
Wilmington, NC 28405



808367-S1  
808367-S1



66591 18432 2

**M.V.I. ADULT SDV Carton (aaipharma)**

Colors  
■ Black  
■ PMS 541 Blue  
Full Varnish

Spec/Plate No.  
**808367-S1**  
Template No.  
**0000044-1**  
CMF No. **N/A**

Plate Date  
04/09/03 4:44 pm JB  
AstraZeneca



808365-S3



Also Refer to the Leaflet & Eye Information Area

Details the contents of this vial and the contents of M.V.I. ADULT Vial 2 in one (one) dose unit. Ensure that, both vials to be used for a single dose. Consult package insert for dosage and full prescribing information. The product contains no preservatives. 115 µg of Selenium or converted into 1 and 2.

Manufactured by  
**aiiPharma**  
aiiPharma  
Wilmington, NC 28405

NDC 6591-184-02  
**M.V.I. ADULT™**  
(Multi-Vitamin Infusion)  
For Intravenous Infusion Only  
Vial 1  
5 ml Single Dose Vial Sterile  
Store under refrigeration,  
2-8°C (36-46°F).  
Rx only

Each ml in the 1 vial contains:  
Ascorbic Acid (C)..... 100 mg  
Vitamin B1 (Thiamine)..... 1 mg  
Vitamin B2 (Riboflavin)..... 2 mg  
Vitamin B3 (Nicotinamide)..... 4 mg  
Vitamin B5 (Pantoic Acid)..... 2.5 mg  
Vitamin B6 (Pyridoxine HCl)..... 1 mg  
Vitamin B12 (Cyanocobalamin)..... 40 µg  
Vitamin C (Ascorbic Acid)..... 15 mg  
Vitamin E (dl-α-tocopherol succinate)..... 10 mg  
Vitamin K3 (Phylloquinone HCl)..... 10 µg  
with 20% polyvinylpyrrolidone (PVP) solution.  
Manufactured at: Farnham and produced in, Japan  
Available for purchase in P. R. (Puerto Rico)  
©2003 AstraZeneca. All rights reserved. 03  
AstraZeneca, 2003 AstraZeneca. All rights reserved. 030003 AstraZeneca

<b>M.V.I. ADULT Vial 1 Label (aiiPharma)</b>	
Spec/Plate No. <b>808365-S3</b>	Colors ■ Black ■ PMS 541 Blue Pattern Varnish
Template No. <b>0000030-1</b>	
CMF No. <b>n/a</b>	
Plate Date <b>12/12/03 11:45 am JB</b>	AstraZeneca



Sterile, Contents: 10 Unit Vials of 10 mL, each to be used as a single dose.

# M.V.I. ADULT™ UNIT VIAL (Multi-Vitamin Infusion)

FOR DILUTION IN INTRAVENOUS INFUSIONS ONLY.

Store under refrigeration, 2°-8°C (36°-46°F).  
Store Upright.  
Each 10 mL of mixed solution contains:

- with 91% propylene glycol and 1% acetic acid ethoxysuccinate as stabilizers and preservatives, and citric acid, sodium citrate, and sodium hydroxide for pH adjustment, 0.8% polyphosphate 86, 0.014% polyphosphate 20, 0.001% butylated hydroxytoluene, 0.0025% butylated hydroxyanisole.
- \*Of soluble vitamins A, D, E and K are solubilized with polyphosphate 86.
- Epinephrine (Vitamin D) ..... 1 mg (4 USP units)
- Thiamine (Vitamin B<sub>1</sub>) (as the hydrochloride) ..... 4 mg (8 USP units)
- Riboflavin (Vitamin B<sub>2</sub>) (as riboflavin-5-phosphate sodium) ..... 3.6 mg (7.2 USP units)
- Pyridoxine HCl (Vitamin B<sub>6</sub>) ..... 6 mg (12 USP units)
- Vitamin K\* (Phylloquinone) ..... 159 µg (3.18 USP units)
- Niacinamide ..... 40 mg (800 USP units)
- Asparagine (D-panthothenyl alcohol) ..... 15 mg (30 USP units)
- Vitamin E (D-α-tocopheryl acetate) ..... 8 mg (16 USP units)
- Biotin ..... 60 µg (60 USP units)
- Folic acid ..... 5 µg (5 USP units)
- Cyanocobalamin (Vitamin B<sub>12</sub>) ..... 5 µg (5 USP units)

Rx only

NDC 66591-184-42

# M.V.I. ADULT™ UNIT VIAL (Multi-Vitamin Infusion)

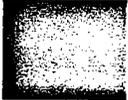
FOR DILUTION IN INTRAVENOUS INFUSIONS ONLY.

NDC 66591-184-42  
Sterile, Contents: 10 Unit Vials of 10 mL, each to be used as a single dose.

# M.V.I. ADULT™ UNIT VIAL (Multi-Vitamin Infusion)

FOR DILUTION IN INTRAVENOUS INFUSIONS ONLY.  
Store under refrigeration, 2°-8°C (36°-46°F). Store Upright.  
Rx only

Distributed by:  
**aiiPharma™**  
aiiPharma  
Wilmington, NC 28405



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**aiiPharma™**  
aiiPharma  
Wilmington, NC 28405



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**This is a representation of an electronic record that was signed electronically and  
this page is the manifestation of the electronic signature.**  
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/s/

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Mary Parks  
1/30/04 02:40:31 PM  
for Dr. Orloff