PRODUCT MONOGRAPH

SELEPEN®

(Selenium IV Additive for use with TPN)

Trace Element

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NAME OF DRUG

SELEPEN®

(Selenium IV Additive -
Sterile, nonpyrogenic, trace element
additive for IV use after dilution.)

THERAPEUTIC CLASSIFICATION

Trace Element

DESCRIPTION

Selepen® (Selenium) is a sterile, nonpyrogenic solution for use as an additive to solutions for total parenteral nutrition (TPN).

Each mL contains:

Ingredients	Single Dose Preparation	Multiple Dose Preparation
Selenium (as selenious acid)	40 mcg	40 mcg
Benzyl Alcohol	-	0.9%
Water for Injection, USP	q.s.	q.s.
pH (approximately 2.0) adjusted with nitric acid		

CLINICAL PHARMACOLOGY

Selenium is part of glutathione peroxidase which protects cell components from oxidative damage due to peroxides produced in cellular metabolism.

Prolonged TPN support in humans has resulted in selenium deficiency symptoms which include muscle pain and tenderness. The symptoms have been reported to respond to supplementation of TPN solutions with selenium.

Pediatric conditions, Keshan disease, and Kwashiorkor, have been associated with low dietary intake of selenium. The conditions are endemic to geographical areas with low selenium soil content. Dietary supplementation with selenium salts has been reported to reduce the incidence of the conditions among affected children.

Normal blood levels of selenium in different human populations have been found to vary and depend on the selenium content of the food consumed. Results of surveys carried out in some countries as per the attached table:

Country	**No. of Samples**	**SELENIUM (mcg/100 mL)[a]**		
		Whole Blood	**Blood Cells**	**Plasma/Serum**
Canada	254 Adults	(37.9 ± 7.8)	(23.6 ± 6.0)	(14.4 ± 2.9)
England	8[b]	26-37 (32)	-	-
Guatemala & South. USA	10 Adults 9 Children[c]	19-28 (22) (23 ± 5)	- (36 ± 12)	- (15 ± 5)
N. Zealand[d]	113 Adults	(5.4 ± 0.1)	(6.6 ± 0.3)	(4.3 ± 0.1)
Thailand	3 Adults 9 Children[e]	14.4-20.2 (12.0 ± 3.6)[f]	17.8-35.8 (19.5±8.2)	8.1-12.5 (8.3±2.2)
USA	210 Adults	15.7-25.6 (20.6)	-	-

a Mean values with or without standard deviation in parentheses, all other ranges.
b Age group unknown.
c Three children recovered from Kawshiorkor, the other six under treatment for other diseases.
d Low selenium-content soil area.
e Well nourished children, 3 recovered from Kawshiorkor and the other six under treatment for other diseases.
f Mean values from 7 subjects.

Plasma Selenium levels of 0.3 and 0.9 mcg/100 mL have been reported to produce deficiency symptoms in humans.

Selenium is eliminated primarily in urine. However, significant endogenous losses through feces also occur. The rate of excretion and the relative importance of two routes varies with the chemical form of Selenium used in supplementation. Ancillary routes of elimination are lungs and skin.

INDICATIONS AND USAGE

Selepen is indicated for use as a supplement to intravenous solutions given for total parenteral nutrition (TPN). Administration of Selepen in TPN solutions helps to maintain plasma selenium levels and to prevent depletion of endogenous stores and subsequent deficiency symptoms.

CONTRAINDICATIONS

Selepen should not be given undiluted by direct injection into a peripheral vein because of the potential for infusion phlebitis.

WARNINGS

1. Selenium can be toxic if given in excessive amount. Supplementation of TPN solution with selenium should be immediately discontinued if toxicity symptoms are observed. Frequent determination of plasma Selenium levels during TPN support and close medical supervision is recommended.

2. Selepen is a hypotonic solution and should be administered in admixtures only.

PRECAUTIONS

As selenium is eliminated in urine and feces, selenium supplements may be adjusted, reduced or omitted in renal dysfunction and/or gastrointestinal malfunction. In patients receiving blood transfusion contribution from such transfusions should also be considered. Frequent selenium plasma level determinations are suggested as a guideline.

In animals, Selenium has been reported to enhance the action of Vitamin E and decrease the toxicity of mercury, cadmium, and arsenic.

Selepen should be used during pregnancy only if potential benefit justifies the potential risk to the fetus. Presence of selenium in placenta and umbilical cord blood has been reported in humans. Selenium at high dosage levels (15-30 mcg/egg) has been reported to have adverse embryological effects among chicken. There are, however, no adequate and well-controlled studies in pregnant women.

ADVERSE REACTIONS

The amount of selenium present in Selepen is small. Symptoms of toxicity from selenium are unlikely to occur at the recommended dosage level.

OVERDOSAGE

Chronic toxicity in humans resulting from exposure to selenium in industrial environments, intake of foods grown in seleniferous soils, use of selenium-contaminated water, and application of cosmetics containing selenium has been reported in literature. Toxicity symptoms include hair loss, weakened nails, dermatitis, dental defects, gastrointestinal disorders, nervousness, mental depression, metallic taste, vomiting, and garlic odor of breath and sweat. Acute poisoning due to ingestion of large amount of selenium compounds has resulted in death with histopathological changes including fulminating peripheral vascular collapse, internal vascular congestion, diffusely hemorrhagic, congested and edemaotus lungs, brick red color gastric mucosa. The death was preceded by coma.

No effective antidote to selenium poisoning in humans is known. (Animal studies have shown casein and linseed oil in feeds, reduced glutathione, arsenic, magnesium sulfate, and bromobenzene to afford limited protection).

DOSAGE AND ADMINISTRATION

Selepen provides 40 mcg Selenium/mL. For metabolically stable adults receiving TPN, the suggested additive dosage level is 20 to 40 mcg Selenium/day. For pediatric patients, the suggested additive dosage level is 3 mcg/kg/day.

In adults, selenium deficiency states resulting from long-term TPN support, selenium as selenomethionine or selenious acid, administered intravenously at 100 mcg/day for a period of 24 and 31 days, respectively, has been reported to reverse deficiency symptoms without toxicity.

Aseptic addition of Selepen to the TPN solution under a laminar flow hood is recommended. Selenium is compatible with amino-acid/dextrose solution used for TPN. Frequent monitoring of plasma Selenium levels is suggested as a guideline for subsequent administration. The normal whole blood range for selenium is approximately 10 to 37 mcg/100 mL.

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

AVAILABILITY OF DOSAGE FORMS

Product Number:

C88210 Selepen® (Selenium) 40 mcg/mL, single dose preparation. 10 mL flip-top vial in boxes of 25.

C5430 Selepen® (Selenium) 40 mcg/mL, multiple dose preparation. 30 mL flip-top vial in boxes of 10. Preserved with 0.9% Benzyl Alcohol.

Store below 30°C. Protect from freezing.

(Literature available upon request).