

## Important Facts About Parenteral Selenium (Selenious Acid)

### Who needs selenium in their parenteral nutrition (PN)?

ASPEN recommends that selenium be routinely added to PN formulations, either in a multiple trace element (TE) product (if available) or as a separate entity.<sup>1</sup> Selenium is not included in any pediatric or neonatal multiple TE products currently available in the U.S. Specifically, use with patients on PN who are NPO and/or cannot ingest or absorb nutrients via their GI tract.

### Which products include parenteral selenium?

- Adult multi-trace element products
- Selenious acid injection

### How much selenium do patients receiving PN need?

TABLE 1. DAILY TE REQUIREMENTS FOR ADULTS

Trace Element	Standard Daily Requirement
Chromium	<1 mg
Copper	0.3-0.5 mg
Manganese	55 mcg
Selenium	60-100 mcg
Zinc	3-5 mg

\* Prescribe full daily dose unless patient able to ingest or absorb orally/enterally.

Note: These requirements are different than the multi-trace element products currently available in the US.

TABLE 2. DAILY TE REQUIREMENTS FOR PEDIATRIC AND NEONATAL PATIENTS

Trace Element	Preterm Neonates	Term Neonates 3-10 kg	Children 10-40 kg	Adolescents Greater than 40 kg
Zinc	400 mcg/kg	250 mcg/kg	50 mcg/kg (max 5000 mcg/d)	2-5 mg
Copper	20 mcg/kg	20 mcg/kg	20 mcg/kg (max 500 mcg/d)	200-500 mcg
Manganese	1 mcg/kg	1 mcg/kg	1 mcg/kg (max 55 mcg/d)	40-100 mcg
Chromium	0.05-0.3 mcg/kg	0.2 mcg/kg	0.2 mcg/kg (max 5 mcg/d)	5-15 mcg
Selenium	2 mcg/kg	2 mcg/kg	2 mcg/kg (max 100 mcg/d)	40-60 mcg

\*Note: These requirements are different than the multi-trace element products currently available in the US.

### What is the role/function of selenium?

Selenium is an essential nutrient that serves important functions including antioxidative defense through actions of glutathione peroxidase, an enzyme that catalyzes the breakdown of hydroperoxides and has metabolic interrelationships with vitamin E, an antioxidant. It also participates in enzymatic conversion of thyroxine to its more active metabolite, triiodothyronine and is a cofactor for protein and DNA synthesis.<sup>1</sup>

### What does a selenium deficiency look like?

Signs and symptoms of selenium deficiency include cardiomyopathy, myalgias, myositis, anemia, hemolysis, and impaired cellular immunity. Keshan disease is an endemic cardiomyopathy associated with selenium deficiency in China.<sup>1-4</sup>

### Recommendations

It is not recommended to decrease or exclude the dose of selenious acid in PN due to cost or access to the product such as reducing the nutrient to only three times per week.

Monitor trace element levels in long term parenteral nutrition patients.

### References

1. Vanek VW, Borum P, Buchman A, et al. A.S.P.E.N. position paper: recommendations for changes in commercially available parenteral multivitamin and multi-trace element products. *Nutr Clin Pract.* 2012; 27(4):440-491.
2. Vanek VW, Borum P, Buchman A, et al. A call to action to bring safer parenteral micronutrient products to the U.S. market. *Nutr Clin Pract.* 2015; 30(4): 559-569.
3. Jensen GL and Binkley J. Clinical manifestations of nutrient deficiency. *JPEN J Parenter Enteral Nutr.* 2002; 26:S29-S33.
4. Shenkin A. Selenium in intravenous nutrition. *Gastroenterology.* 2009; 137:S61-S69.