Risk assessment for the amino acids taurine, L-glutamine and L-arginine


Study purpose:
To present findings of Observed Safe Levels (OSL) for taurine, L-glutamine and L-arginine based on a series of risk assessment studies identified in the Medline database.

Study design:
- The OSL (also called the HOI, or Highest Observed Intake) risk assessment method was used—defined as the highest level of a nutrient studied with convincing evidence of safety for which no toxicity can be identified at any level.
- UF (uncertainty factor) was applied to correct for uncertainty related to the extrapolation of data to the general population; a UF of 1.0 reflects unity (highest intake level that does not require further correction).
- Animal data excluded

Taurine
- 11 randomized, placebo-controlled studies reviewed—healthy and diseased adults (e.g., congestive heart failure, type 2 diabetes).
- N: 11 to 58
- Dosage: 3 g/day to 10 g/day
- Duration: 7 to 180 days
- Administration: oral

Taurine facts:
- Plays a role in bile acid conjugation, retinal and neurological development, modulation of cellular calcium levels and immune function.
- Synthesized endogenously in the liver—nonessential or conditionally essential.
- Present in retina, skeletal and cardiac muscle tissue.
- Dietary sources: breast milk, animal proteins; daily dietary intake: 40-400 mg (adults).

The widely applicable U.S. Food and Nutrition Board’s (FNB) upper limit (UL) risk assessment model was not used in this analysis because no data that established an adverse effect at the lowest intake level in humans were available.
Study results:
- The highest oral intake levels that reflected sufficient confidence in safety were:
  - Taurine, 3 g/day
  - L-glutamine, 14 g/day
  - L-arginine, 20 g/day
- One study of arginine was associated with significant increase in death; subsequent review showed the results appear to be an anomaly
- Among all the other studies reviewed, adverse effects were minimal (eg, GI upset) or absent

L-glutamine
- 9 randomized, placebo-controlled studies reviewed—healthy adults
- N: 6 to 19
- Dosage: 3 g/day to 45 g/day
- Duration: 5 to 56 days
- Administration: oral
- Evaluations: effects on serum levels, metabolic end products, competition/antagonism of other amino acids; effects on liver and kidney function

L-glutamine facts:
- Most abundant free amino acid in skeletal muscle tissue and plasma
- Plays critical roles in nitrogen metabolism; as an anabolic precursor for muscle growth; in acid-base balance in the kidney. An important fuel source for intestine and immune system
- Synthesized primarily in skeletal muscle; also lung, brain, adipose and liver tissues—considered by some to be conditionally essential, especially in critically ill or trauma patients
- Dietary sources: meat, fish, poultry, beans, dairy products; daily dietary intake: 5 g (adults)

L-arginine
- 38 randomized, placebo-controlled studies evaluated—healthy and diseased (eg, cystic fibrosis, stable angina) adults
- N: 6 to 792
- Dosage: 6 g/day to 42 g/day
- Duration: 7 days to 1092 days (3 years)
- Administration: oral
- Evaluations: direct effects on serum levels, metabolic end products, competition/antagonism of other amino acids, effects on liver and kidney function, GI upset

L-arginine facts:
- Considered by many to be conditionally essential; metabolically essential in formation of nitric oxide, urea, creatine, all proteins, and growth hormone release
- Synthesized endogenously, primarily in the kidney and liver
- Dietary sources: soy protein; daily dietary intake: 3 to 6 g (adults)