

# Arginine: An Important Conditionally Essential Amino Acid

ROSS PETERSON, PhD,  
Regulatory Science & Innovation, Abbott Nutrition



## SCIENTIFIC OVERVIEW

A diet lacking sufficient intake of high-quality protein will have serious adverse health consequences, including impaired linear growth. Because of an inadequate protein intake, the undernourished child can have a reduced intake of key amino acids important for growth. One of these amino acids is the conditionally essential amino acid arginine. In a clinical study (Figure 1) children with stunting had lower serum concentrations of the conditionally essential amino acid arginine, as well as all nine essential amino acids compared with non-stunted children.<sup>1</sup>

Arginine has multiple metabolic fates, and thus, is one of the most versatile amino acids. It plays a role in many important biological pathways including stimulation and activation of immune mediators and the synthesis of tissue.<sup>2</sup> It has also been shown to promote the acute release of growth hormone and has been proposed to play a role in linear growth.<sup>3-5</sup>

Preclinical data suggest the administration of oral arginine increased the growth plate width of tibia and osteoblast surface of femur, as well as increased serum GH concentration. This suggests oral administration of arginine supports linear growth of long bones in part by inducing GH secretion.<sup>4</sup>

The association between arginine intake and growth velocity were estimated in an observational trial of 261 healthy children between the ages of 7 and 13 years old. The results (Figure 2) showed a dose-dependent physiological role of protein intake, and more specifically arginine intake (until >3.2 g/d), on linear growth velocity in normally growing children. An arginine intake between 2.8 and 3.2 g/d was associated with increased growth velocity when compared to children with an arginine intake lower than 2.2 g/d. These data show that dietary protein intake, and more specifically arginine intake, may be associated with improved linear growth velocity in normal growing children. The benefits of dietary arginine intake in children with or at risk of undernutrition is an area of interest for future research.<sup>5</sup>

Figure 1 SERUM ARGININE LEVELS ARE LOWER IN STUNTED CHILDREN

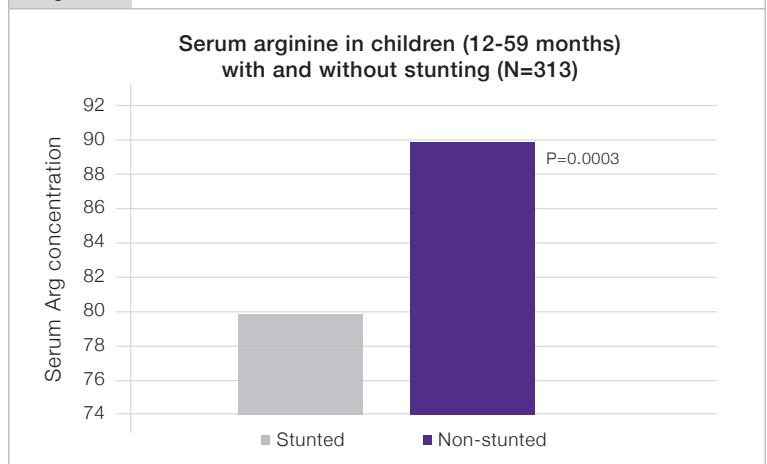
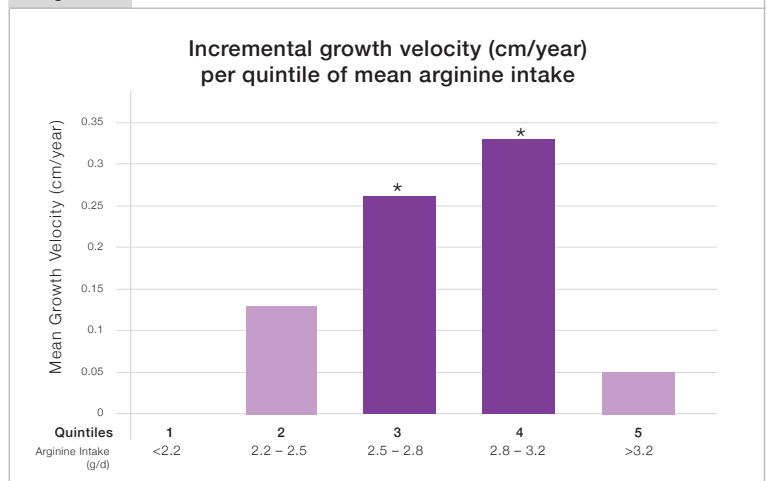


Figure 2 DIETARY ARGININE CONSUMPTION



## APPLYING TO YOUR PRACTICE

- For the undernourished child, a nutrition strategy should emphasize improving the quality and quantity of protein in the diet to support catch up growth and development
- Complete, balanced oral nutrition supplement can be beneficial to help improve overall nutrient intake and support growth

## KEY TAKEAWAYS

- The undernourished child may have reduced intake of key amino acids important for growth and development
- Lower serum concentrations of the conditionally essential amino acid arginine, as well as all nine essential amino acids were observed in stunted children compared with non-stunted children
- Preclinical and clinical data suggest that arginine intake may be associated with improved linear growth

### References:

1. Semba RD, Shardell M, Sakr Ashour FA, et al. Child Stunting is Associated with Low Circulating Essential Amino Acids. EBioMedicine. Apr 2016;6:246-252. 2. Wu G. Arginine and Immunity. In: Calder P, ed. Diet, Immunity and Inflammation: Woodhead Publishing Limited; 2013. 3. Collier SR, Casey DP, Kanaley JA. Growth hormone responses to varying doses of oral arginine. Growth hormone & IGF research: official journal of the Growth Hormone Research Society and the International IGF Research Society. Apr 2005;15(2):136-139. 4. Jiang MY, Cai DP. Oral arginine improves linear growth of long bones and the neuroendocrine mechanism. Neuroscience bulletin. Jun 2011;27(3):156-162. 5. Van Vught AJ, Dagnelie PC, Arts IC, et al. Dietary arginine and linear growth: the Copenhagen School Child Intervention Study. The British journal of nutrition. Mar 28 2013;109(6):1031-1039