American Journal of Clinical Nutrition, Vol. 86, No. 5, 1438-1444, November 2007

ORIGINAL RESEARCH COMMUNICATION

Plasma arginine and citrulline concentrations in critically ill children: strong relation with inflammation[1,2]

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Background: The amino acid arginine plays a key role in many metabolic processes in health and disease. Low arginine concentrations are found in various illnesses in children.

Objective: The objective was to investigate the relation between plasma concentrations of arginine (and precursor amino acids) and severity of inflammation in critically ill children.

Design: This was an observational cohort study in children with viral respiratory disease (n = 21; control group), accidental or surgical trauma (n = 19), or sepsis (n = 19) who were admitted to a pediatric intensive care unit.

Results: Plasma arginine and citrulline concentrations were lower in subjects with sepsis and trauma than in those with viral disease (arginine: 33 ± 4, 37 ± 4, and 69 ± 8 μmol/L, respectively, $P < 0.01$ for both; citrulline: 10 ± 1, 14 ± 1, and 23 ± 2 μmol/L, respectively, $P < 0.01$ for both) and correlated strongly and inversely with severity of inflammation as indicated by plasma CRP concentration ($r = -0.645$ and $r = -0.660$, respectively; $P < 0.001$ for both). During recovery, plasma arginine and citrulline concentrations increased and were strongly related to the reduction in inflammation as shown by the inverse correlation between arginine and citrulline concentrations and the CRP concentration on days 3 ($r = -0.832$ and $r = -0.756$, $P < 0.001$ for both) and 7 ($r = -0.784$ and $r = -0.694$, $P < 0.001$ for both).

Conclusions: Plasma concentrations of arginine and citrulline are low during the acute phase of critical illness in children and normalize again during recovery. Plasma arginine and citrulline are strongly related to the severity of inflammation indicated by plasma CRP concentrations.

Key Words: Plasma amino acid concentrations • arginine • citrulline • children • critical illness • inflammation • C-reactive protein • CRP