

AMINO ACID ALTERATIONS FOLLOWING HEAD INJURY, J. C. Goodman, Ching-Nan Ou, C.S. Robertson, and S. Bejot (Depts. Path. and Neurosurg., Baylor Col. Med., Houston, TX 77030)

Sepsis, multiple organ injury or failure, hepatic encephalopathy, and severe burns are associated with elevated plasma aromatic and sulfur containing amino acids and decreased branched chain amino acids. Correction of the amino acid profile by infusion of branched chain amino acid rich solutions may correct the negative nitrogen balance and mental status alterations seen in these conditions. Similar amino acid profile alterations have been described in patients with isolated brain injury.

We measured amino acids in arterial and internal jugular whole blood in 12 patients with injuries confined to the brain using gradient HPLC with post-column ninhydrin derivatization. Measurement of arterial and venous blood permitted cerebral amino acid balance analysis; whole blood was used due to carriage of amino acids by red blood cells. Whole blood amino acid values differ from plasma values in that aspartic and glutamic acid are increased, and cystine is decreased due to binding to cellular proteins.

All of our patients had elevated aromatic (phenylalanine and tyrosine) and sulfur containing (methionine) amino acids. Cystine levels were variable reflecting protein binding. 75% of the patients had decreased branched chain (valine, leucine, isoleucine) amino acid levels. Gamma-aminobutyric acid (GABA), a powerful inhibitory amino acid neurotransmitter implicated by some in hepatic encephalopathy, was not elevated. All of the patients were in negative cerebral amino acid balance at some point their course, in contrast to the normal state of continuously positive amino acid balance.

We conclude that amino acid alterations following isolated head injury resemble those seen in sepsis, multiple organ failure, and hepatic encephalopathy; and cerebral amino acid balance studies may provide insights into brain metabolism following head injury. (Supported by grants from the Moran Foundation, Lane Neurosurgical Research Fund, and Ross Laboratories)

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