

Measuring the beneficial actions of the nitric oxide and amino acid neurotransmitters in chronic and acute pain in humans : A comparative study

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Abstract

Chronic pain although triggered by an injury or tissue damage, may be perpetuated by factors other than the cause of the pain itself thus becoming out of proportion to the original injury itself. Continual and prolonged stimulation by these neurotransmitters can result in chronic persistent pain. Acute pain is biologically useful as a warning system and subsides as healing signs of progress while chronic pain is more challenging, does not spontaneously resolve and serves no useful biological function. The amino acids are known to be involved in chronic pain mechanisms per se, the differential roles of these amino acid neurotransmitters and modulators in acute and chronic pain states have not been compared so far.

A standard amino acid mixture was prepared and tabulated each time with the CSF samples and analyzed using HPLC. After HPLC separation, the amounts of the different compounds in the CSF samples were calculated by comparing the peak areas in the HPLC run of the CSF sample with the corresponding peak areas in the desolated Std AA, which was also run on the same day. A duplicate analysis was performed for each CSF sample to minimize the variance.

All these three studies have consistently reported a positive correlation between age and CSF concentrations of aspartate, isoleucine, leucine, phenylalanine and valine. These amino acids were all reported to be significantly increased in CSF of elderly patients. In addition, Ferraro and Hare suggested that GABA and serine in CSF significantly decreased in elderly patients. Hence when evaluating the differential roles of these amino acids in chronic and acute pain states, the influence of age of the patients in these groups cannot be neglected.

These results highlight the important role of aspartate in unrelenting chronic pain and thus could be a signal for chronification of pain conditions. Hence this amino acid could also be a possible chronic pain indicator and thus support the role of NMDA receptor antagonists as reasonable targets for designing new effective drugs for chronic pain.

Key Words: standard amino acid mixture, chronic pain, antagonists, minimize the variance, prolonged stimulation