New Column for Analyzing 50 Physiological Amino Acids

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Demands for analyses of amino acids that induce metabolic errors continue to exist. Recently, a new methodology was created to simultaneously analyze 50 physiological amino acids utilizing a unique column configuration that affords extremely low back-pressure while maintaining the necessary high resolution, thus alleviating much of the stress that traditional columns must endure. The same system configuration also can be used to analyze amino acids related to specific metabolic errors in a shortened time.

Results of New Methodology

A total of 50 amino acids relevant to metabolic errors can be analyzed in a single acquisition using this new methodology (Figure 1). Notable amino acids included are homocysteine, homocitrulline, allo-isoleucine, argininosuccinic acid, cysteine-homocysteine mixed disulfides, homocystine, argininosuccinic acid anhydride, and aminoethylcysteine (internal standard). In addition to excellent separation of key physiological amino acids, extremely low back-pressure is achieved. The back-pressure on the separation column ranges from 370–800 psi over the course of the run.

Using the same system and column configuration, key amino acids related to certain metabolic errors can be targeted and analyzed in a shortened amount of time. For example, in only 26 min, it is possible to analyze eight amino acids that concern maple syrup urine disease (valine, allo-isoleucine, isoleucine, and leucine), phenylketonuria (tyrosine and phenylalanine), hypermethioninemia (methionine), and cystathioninuria (cystathionine). Acetyl-lysine is used as an internal standard (Figure 2). Another common analysis is to target only tyrosine and phenylalanine for the screening of phenylketonuria. This can be accomplished in only 10 min.

Conclusions

Hitachi High Technologies America continually strives to provide the most technologically advanced solutions to the life science industry. Another example of this dedication is evident in this new, low column back-pressure, high-resolution methodology for analyzing 50 physiological amino acids that induce metabolic errors on the Hitachi L-8800 Amino Acid Analyzer. Because all of the above analyses employ the same column, buffers, and reagents, the system can be programmed to switch automatically among them during a series of acquisitions for optimal system flexibility.
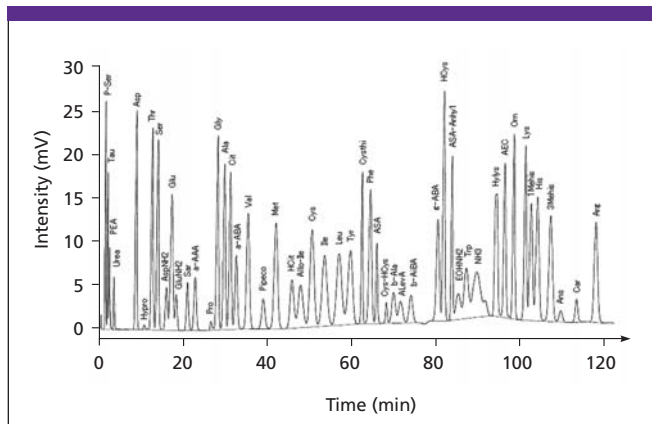

Figure 1: Chromatographic separation of 50 biological fluid amino acids on the Hitachi L-8800 Amino Acid Analyzer using new methodology and column configuration.
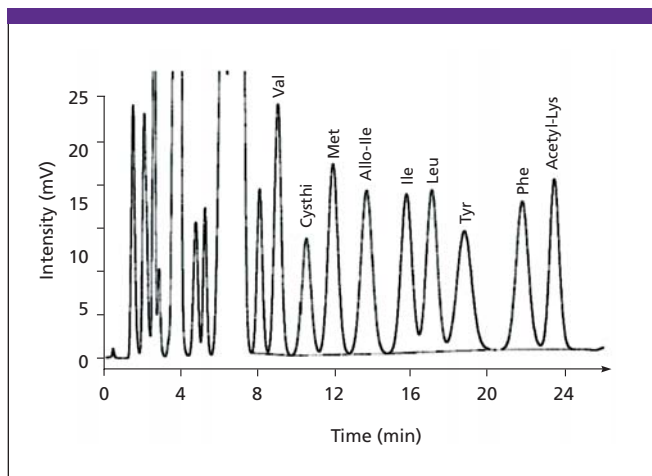

Figure 2: Chromatographic separation of eight key amino acids that concern multiple metabolic errors. Results can be achieved in only 26 min on the Hitachi L-8800 Amino Acid Analyzer.

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