

Amino Acid composition of human hair: A biometric classifier and investigative lead

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Amino acids are the major constituents of peptides and proteins and are very common targets in biochemical studies. This study established a method of analysis that was optimized for solvent, temperature, and time of the BSTFA derivatization reaction for profiling amino acids in human hair. Hydrochloric acid was used as a hydrolysis agent to liberate free amino acids from hair keratin, and N,O-bis (trimethylsilyl) trifluoroacetamide (BSTFA) was used for derivatization. Conditions were optimized using horse heart myoglobin and human hair. The optimal derivatization conditions were acetonitrile as a reaction solvent, a temperature of 100°C, and a reaction time of 30 min. Products were analyzed by GC/MS. The proposed method provided detection limits for fourteen amino acids in the range of 0.001– 0.094 µmol/mL, quantification limits in the range of 0.002–0.187 µmol/mL, recoveries between 82% and 109%, and good linearity in the tested range from 0.001 to 0.3 µmol/mL. Amino acid composition of scalp hair of 20 subjects (8 males and 12 females) between the ages of 1 and 77 years have already been analyzed, with more anticipated before the presentation. Preliminary data shows the ability to classify the hair donors into three arbitrary age groups; 1-6 years, 26-41 years and 52-77 years, based on multivariate analyses of the abundance of 14 amino acids. Principal component analysis (PCA) was also able to separate groups of donors according to sex. Details regarding the power of discrimination for this objective, instrumental method of analysis for biometric determination will be provided.

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