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Analysis of Advanced Glycation End-Products by High-Performance Liquid Chromatography Coupled with Ultraviolet Detection and Mass Spectrometry Characterization

Advanced glycation end-products, or AGEs, are a diverse group of complex, heterogenous molecules formed by the Maillard reaction between a reducing sugar and an amine. They are produced endogenously in various cells and tissues in the body as well as in heat treatment of foods during non-enzymatic browning, also giving flavour and colour to the food. AGEs have been linked to aging and health complications including diabetes, renal disease, cataracts, and cardiovascular disease. They are difficult to analyze as they are hydrophilic, have limited ultraviolet absorbance, and have substantial diversity in their size and structure. Chemical derivatization adds a chromophore moiety and increases hydrophobicity, allowing for reverse-phase liquid chromatography (LC) separation coupled with UV or mass spectrometry (MS). In this study, reaction conditions were optimized for in vitro synthesis of AGEs in an aqueous solution of glucose, lysine, and a metal catalyst with conventional heating, and an analytical method developed for LC-UV detection of the resulting AGEs with derivatization by N-benzoyloxy succinimide (N-BOS). Seven AGE compounds were identified by HPLC with UV detection at 280 nm, and their identities were confirmed by LC-MS. The method developed was successful in separating and identifying the AGEs produced in vitro from glucose and lysine and is a promising first step for future studies into AGE formation from various sample compositions.

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