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Towards a deeper understanding of the mechanisms of interaction between acryl amide and key body-fluid thiols

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Exposure to acrylamide (AA) or its metabolite glycidamide (GA), in foodstuffs, is a major concern today. This paper communicates recent developments concerning the role that AA and its metabolite GA, potentially toxic food contaminants, produced on frying, steaming (heat treatments above 100°C) carbohydrate-based foodstuff via Maillard reaction involving asparagine and reducing sugars. It has been proposed that detoxification of AA and GA occurs primarily via conjugation with thiols via the Michael-addition reaction. Recent investigations to study the reactivity of thiols towards AA and GA included the use of: glutathione (GSH), L-cysteine (CySH) and captopril (CapSH). GSH and CySH are naturally occurring in the body while CapSH is synthetic and usually administered in the form of a drug used for the treatment of congestive heart failure. The kinetic rates of conjugation reactions follow: CySH>GSH>CapSH as opposed to CySH>CapSH>GSH expected based on molecular sizes. Preliminary comparative DFT (density functional theory) calculations on AA and thiols provide information that close hydrogen interactions between GSH and AA; which is absent in CySH and CapSH explains the observed rate trend. Furthermore, preliminary DFT calculations show that there is an open question of H-transfer via intra-molecular GSH or H-transfer via solvent water molecules.

Biography

Grace-Anne Bent has received PhD from University of the West Indies. She is a Lecturer of Analytical Chemistry in the Department of Chemistry at The University of the West Indies, St. Augustine Campus, Trinidad and Tobago. Her research interests include food safety and security, investigating the chemistry of food and food related toxins in an effort to minimize human exposure by understanding their mechanisms of interaction (*in vivo* and *in vitro*). She has published a book and 7 journal articles. She is also the recipient of several research awards.

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