Multiple reaction monitoring mass spectrometry method for authentication of animal-origin gelatin

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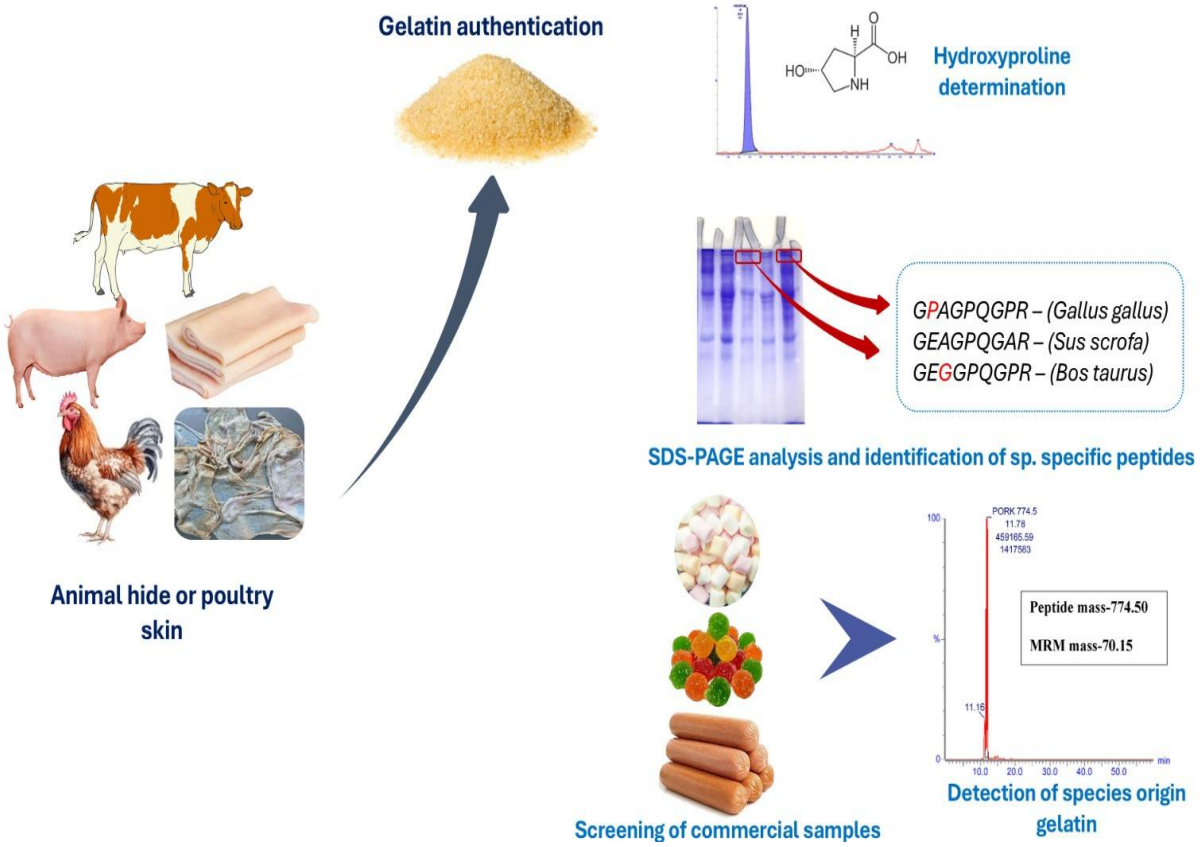
Brief description about the technology

Gelatin, derived through selective hydrolysis of collagen of food animal skin/hide, has been widely utilized in food, pharmaceutical, and cosmetic industries. Currently there are no methods to authenticate water buffalo skin derived gelatin. The rapid monitoring of hydroxyproline (a signature amino acid) can be used as a preliminary screening tool for detection of animal derived gelatin. Ultra-performance liquid chromatography-tandem mass spectrometry (UPLC-MS/MS) is used and 5 unique peptide biomarkers derived from water buffalo hide (BHG) and pork skin gelatin (PSG) are identified. The developed LC-MS/MS Multiple Reaction Monitoring (MRM) method can successfully detect BHG/PSG in commercial products up to a 0.5% (w/w). The developed LC-MS/MS MRM based-method provides an efficient and sensitive authentication and traceability of gelatin-containing highly processed food and bakery products. The limit of detection (LOD) for peptide markers and hydroxyproline is as low as 0.5% (w/w) and 0.975 pmol/µl, respectively. Further, the Multiple peptide transitions allow for selective identification of bovine and porcine gelatin even in thermally processed foods.

The developed methodology is first-of-its kind for authentication of water buffalo hide derived gelatin. The developed MRM-MS method is highly efficient and uniquely capable of detecting and quantifying animal-origin gelatin in complex, processed foods. Unlike PCR and immunoassay-based methods (ELISA), it offers excellent specificity, thermal stability tolerance, and precise quantitation through species-specific peptide markers. This makes the current method a superior choice for routine regulatory screening and food authentication.



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