New method for making human-based gelatin

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Scientists are reporting development of a new approach for producing large quantities of human-derived gelatin that could become a substitute for some of the 300,000 tons of animal-based gelatin produced annually for gelatin-type desserts, marshmallows, candy and innumerable other products. Their study appears in ACS's *Journal of Agriculture and Food Chemistry*.

Jinchun Chen and colleagues explain that animal-based gelatin, which is made most often from the bones and skin of cows and pigs, may carry a risk of infectious diseases such as "Mad Cow" disease and could provoke immune system responses in some people. Animal-based gelatin has other draw-backs, with variability from batch to batch, for instance, creating difficulties for manufacturers. Scientists thus have sought alternatives, including development of a human-recombinant gelatin for potential use in drug capsules and other medical applications.

To get around these difficulties, the scientists developed and demonstrated a method where human gelatin genes are inserted into a strain of yeast, which can produce gelatin with controllable features. The researchers are still testing the human-yeast gelatin to see how well it compares to other gelatins in terms of its viscosity and other attributes. Chen and colleagues suggest that their method could be scaled up to produce large amounts of gelatin for commercial use.

More information: “New Strategy for Expression of Recombinant Hydroxylated Human-Derived Gelatin in Pichia pastoris KM71” J. Agric. Food Chem., 2011, 59 (13), pp 7127–7134 DOI:

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Abstract

Gelatin is a well-known biopolymer, and it has a long history of use mainly as a gelling agent in the food industry. This paper reports a new method for producing recombinant hydroxylated human-derived gelatin in Pichia pastoris KM71. Three independent expression cassettes encoding for specific length of gelatin, prolyl 4-hydroxylase (P4H, EC 1.14.11.2), α-subunit (αP4H), and protein-disulfide isomerase (PDI) were individually cloned in one expression vector, pPIC9K. The modified gelatin gene and two subunit genes of P4H were under the control of two different inducible promoters, namely, alcohol oxidase 1 promoter (PAOX1) and formaldehyde dehydrogenase 1 promoter (PFLD1), respectively. The results of sodium dodecylsulfate-polyacrylamide gel electrophoresis show that a recombinant gelatin was successfully expressed in P. pastoris KM71 by methanol induction. Liquid chromatography coupled with tandem mass spectrometry analysis indicates that the expressed gelatin was hydroxylated with approximately 66.7% of proline residues in the Y positions of Gly-X-Y triplets. The results of nuclear magnetic resonance spectroscopy of recombinant gelatin test show that the 1H and 13C spectra have many corresponding characteristic displacement peaks, and amino acids composition analysis shows that it contains hydroxyproline and its UV absorption is consistent with the characteristics of gelatin.

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