Thermal Gelation Mechanisms of Fish Meat Paste - How Does Myosin Molecule Participate?

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We analyzed changes in the rheological properties of white croaker (*Pennahia argentata*) meat paste made from surimi added with 0.5 M NaCl during the following two-step heating procedure: first preheating at 0-70 ℃ with 5 or 10 ℃ intervals and subsequent secondary main heating at 85 ℃. Changes in the breaking strength were hardly observed for both preheating and main-heating gels in the preheating temperature range of 0–30 ℃. In the range of 35-45 ℃, however, a marked increase was observed for the two gels with the increase of preheating temperature where the protein solubility in the SDS-urea solution and myosin heavy chain monomer content therein were rapidly decreased in a preheating temperature-dependent manner. Changes in viscoelastic properties such as storage modulus (G'), loss modulus (G") and tangent delta (G'/G") during preheating in the range of 35-45 ℃ and subsequent main heating were also markedly different from those during preheating in other temperature ranges and subsequent main heating. Interestingly, white croaker meat paste also showed prominent changes of viscoelastic properties at 35-45 ℃ in the temperature sweep analysis. We previously reported that the myosin molecule of white croaker is unfolded mainly at 34.8 and 44.1 ℃ due to the disruption of alpha helix and/or coiled-coil structure[1]. The rod part of the myosin molecule has a unique coiled-coil structure with heptad repeats of amino acid residues where hydrophobic residues are buried inside the coiled-coil structure of two alpha-helices. Thus, it is likely that the unfolding of the myosin molecule at 35-45 ℃, especially in the rod part, is important to rearrange myosin molecules in order to provide elastic thermal gels.

Reference:

1. Hideto Fukushima, Yoshie Satoh, Misako Nakaya, Shoichiro Ishizaki, and Shugo Watabe: Thermal effects on fast skeletal myosins from walleye pollack, white croaker and rabbit in relation to gel formation. *J. Food Sci.*, **68**(5), 1573-1577 (2003).

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