

A Study on the Interaction between Permeation of Salt and Changes in Myofibrillar Protein during Soaking of Fish Meat in NaCl Solution

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Summary

Sodium chloride (NaCl) added to fish meat plays essential roles in processing seafood. Therefore, it is important to study on the permeability of NaCl into fish meat for controlling the concentration. In this study, the effects of the biochemical changes in myofibrillar protein during soaking on permeation of NaCl and distribution of moisture in the meat were investigated. Firstly, the solubilization and the denaturation of myofibrillar protein induced by NaCl treatment were studied by using myofibril preparation. As results, more than 0.2 M of NaCl solubilized myofibrillar protein accompanied with increase in water holding capacity. On the other hand, high concentration of NaCl (2.0 M) caused the denaturation of myosin S-1 including ATPase active site rather than myosin rod portion. Accordingly, Ca-ATPase activity was used as an index of protein denaturation during soaking of NaCl solution.

During soaking of fish meat in NaCl solution, myofibrillar Ca-ATPase activity decreased with the increase in the concentration of NaCl of meat and the prolongation of soaking period. Among three species of fish used in this study, most significant Ca-ATPase decrease during soaking occurred in horse mackerel followed by yellowtail and yellow sea bream.

Permeation of NaCl was relative to osmotic pressure of soaking solution. Addition of sorbitol to soaking solution to prevent the protein denaturation gave no effect on the relationships between permeation of NaCl and osmotic pressure. Moreover, in spite of the deference in the extent of the Ca-ATPase decrease during soaking, osmotic pressure dependency of permeation of NaCl into horse mackerel meat was similar to that into yellow tail meat.

Moisture content in external part of fish meat increased whereas that in internal one decreased during soaking. The increase of water holding capacity accompanied with solubilization of myofibrillar protein of the external part was thought to be a cause of heterogeneous distribution of moisture in the meat. It was, therefore, suggested that the biochemical changes in myofibrillar protein during soaking affected distribution of moisture in the meat rather than permeation of NaCl.