

Short Paper

Hydroxyproline Content in the Acid-Soluble Collagen from Muscle of Several Fishes

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It has been demonstrated that the texture of raw and cooked fish meat is significantly affected by the collagen content in muscle.^{1,2)} We have proposed a simplified method for determining the collagen content in fish muscle on the basis of isolation of collagen from fish muscle.³⁾ On the other hand, collagen content in tissues has been determined on the basis of hydroxyproline content in the hydrolyzate of tissues.^{2,4,5)} In some cases, the same factor has been used for different species to convert the hydroxyproline content to collagen content,^{2,4)} although the hydroxyproline content in collagen varies with fish species.⁵⁻⁹⁾ However, the data on the hydroxyproline content in the purified collagen from muscle are very confined. In this report, we describe the hydroxyproline content in the acid-soluble collagen isolated from the muscle of 22 species as listed in Table 1.

Acid-soluble collagen was prepared by the method as described previously³⁾ and was dialyzed thoroughly against distilled water and then lyophilized. The purity of collagen was checked electrophoretically by the method of Laemmli.⁹⁾ The lyophilized acid-soluble collagen was dried in oven at 110°C for 1 hr. The dried material was weighed and hydrolyzed with 6N HCl at 130°C for 3.5 h. Hydroxyproline content in the hydrolyzate was determined by the method of Woessner Jr.¹⁰⁾

As shown in Table 1, the hydroxyproline content in the acid-soluble collagen varied with species in the range from 4.7 to 10.0%, so that the factors for converting the hydroxyproline content to collagen content vary in the range from 10.0 to 21.3. It is obvious that the same factor can not be used for different species to estimate collagen content on the basis of hydroxyproline content.

The simplified method for determining collagen, which was reported previously,³⁾ is based on the isolation of collagen and the determination of the isolated collagen by the method of Lowry *et al.*¹¹⁾ In some cases, it is demanded to determine collagen without the isolation of collagen. In such cases, the collagen content should be estimated on the basis of hydroxyproline content. The present study demonstrates that the hydroxyproline content in the purified collagen of each species must be determined when the collagen content is estimated on the basis of hydroxyproline content.

References

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Table 1. Hydroxyproline content in the acid-soluble collagen from white muscle of various fish species

Species	Body weight (g)	Hydroxyproline* ² (% of collagen)
Smooth dogshark <i>Triakis scyllia</i>	8020	10.0
Carp* ¹ <i>Cyprinus carpio</i>	985	9.4
Spiny dogfish <i>Squalus acanthias</i>	563	8.3
Horse mackerel <i>Trachurus japonicus</i>	245	8.3
Japanese eel* ¹ <i>Anguilla japonica</i>	214	8.1
Striped mullet <i>Mugil cephalus</i>	678	7.9
Red stingray <i>Dasyatis akajei</i>	5500	7.9
Red sea bream <i>Pagrus major</i>	734	7.9
Black scrapper <i>Thamnaconus modestus</i>	82	7.6
Nibbler <i>Girella punctata</i>	320	7.5
Bastard halibut <i>Paralichthys olivaceus</i>	433	7.5
Sea bass <i>Lateolabrax japonicus</i>	343	7.5
Chub mackerel <i>Scomber japonicus</i>	655	7.1
Pike conger <i>Muraenesox cinereus</i>	253	7.0
Rainbow trout* ¹ <i>Salmo gairdneri</i>	168	6.8
Mud dab <i>Limanda yokohamae</i>	175	6.7
Argentine <i>Glossanodon semifasciatus</i>	100	6.7
Conger eel <i>Conger myriaster</i>	120	6.4
Devil stinger <i>Inimicus japonicus</i>	252	6.0
Stone flounder <i>Kareius bicoloratus</i>	305	5.9
Sweet fish <i>Plecoglossus altivelis</i>	152	4.7
Brook masu salmon <i>Oncorhynchus masou</i>	37	4.7

*¹ Cultured fish.*² Average of three determinations.

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