魚類器官中のアンセリナーゼの分布

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Short Paper

Distribution of Anserinase in Organs of Several Fish

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Jones[1] has reported the presence of anserinase (aminoacylmethylhistidine dipeptidase, EC 3.4.13.5), which catalyzes the hydrolysis of anserine to β-alanine and π-methylhistidine, in cod muscle. However, the distribution and characterization of anserinase were not enough elucidated. As a part of studies on anserine metabolism in fish, anserinase activity in organs of several marine and fresh water fish was surveyed in this paper.

Heart, liver, spleen, intestinal tract, kidney, ordinary muscle, and dark muscle of the following species were used as testing materials; sardine *Sardinops melanostictus*, Pacific cod *Gardus macrocephalus*, Alaska pollack *Theragra chalcogramma*, bluefin tuna *Thunnus thynnus*, stone flounder *Kareius bicoloratus*, sweet smelt *Plecoglossus altivelis*, rainbow trout *Salmo gairdneri*, and carp *Cyprinus carpio*. Each organ was homogenized with 5 volumes of 0.1 M Tris-HCl, pH 7.7, and centrifuged at 10,000×g for 60 min. The supernatant fluid was dialyzed overnight against the same buffer, and used as a crude enzyme.[2] In the preliminary experiment using preparations of Pacific cod and rainbow trout kidney, the activity was found to be high at about 45°C and at pH 7.7 in the presence of 10^{-5} M Zn^{2+}. Thus, for the assay of anserinase activity, 1 m*l* of the dialyzed supernatant and 1 m*l* of 2 mM anserine in 0.1 M Tris-HCl, pH 7.7, containing 2×10^{-5} M Zn^{2+} was incubated at 37°C, and after 3 h, the reaction was stopped by the addition of 1 m*l* of 15% perchloric acid, and the amounts of anserine and π-methylhistidine in the solution were measured by high performance liquid chromatography.[3]

Table 1 shows anserinase activity in the organs of eight species of marine and fresh water fish, where the results are expressed as μmol of anserine reduced per h per g of organ. Pacific cod and Alaska pollack (Gadidae family) showed occurrence of the enzyme in all organs tested. The liver and kidney of the former exhibited the highest anserinase activity (31.1 and 30.2 μmol/h per g), and heart, kidney, spleen, dark muscle, ordinary muscle, liver, and intestinal tract of the latter displayed considerably high activity, although the gall bladder and testis showed low activity. Sweet smelt and rainbow trout (Salmonidae family) showed the presence of the enzyme in the kidney, liver, and heart, but no detectable activity in the muscle. On the other hand, no activity was found in the organs of the sardine, bluefin tuna, stone flounder, and carp materials which were tested.

Table 1. Anserinase activity in fish organs (μmol/h·g)

	Heart	Liver	Spleen	Intestinal tract	Kidney	Ordinary muscle	Dark muscle
Sardine	0	0	—	0	0	0	0
Pacific cod	—	31.1	19.6	—	30.2	12.7	—
Alaska pollack	23.8	5.3	14.1	4.4	16.7	5.7	8.9
Bluefin tuna	0	0	0	0	0	0	0
Stone flounder	0	0	0	0	0	0	—
Sweet smelt	1.0	0.5	—	—	9.5	0	—
Rainbow trout	3.3	2.4	0	—	8.7	0	—
Carp	0	0	—	0	0	0	0

—: not analyzed.

Concerning fish muscle, cod is known to have high anserinase activity.[1,4] Konagaya,[2] however, reported the presence of much higher activity in lamprey than in cod, and he also described that no activity was detected in carp, sardine, and leopard shark, whereas very low activity in yellowfin tuna. In brain and ocular fluid, Lenney *et al.*[4] described that cod exhibited high activity, and tuna had only low activity. From these findings and the present results, the viscera and muscle of gadoid fish seem to possess high anserinase activity. An investigation of the properties of purified fish anserinase has been initiated in this laboratory.

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