サメ類普通筋およびウサギ速筋のミオシン軽鎖の比較

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Short Paper

Comparison of Myosin Light Chains between Shark Ordinary and Rabbit Fast Muscles

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The myosin from fish ordinary muscle gives rise to four light chains of three kinds, two moles of alkali light chains A1 and A2, and two moles of 5,5′-dithiobis-2-nitrobenzoic acid (DTNB) light chain per mole of myosin, just like the fast muscle myosin of higher vertebrates. We reported previously the species-specificity of ordinary muscle myosins from fish in molecular weight and stoichiometry of light chain components.[1] Among the fishes examined, however, the myosin light chains from requiem shark *Triakis scyllia* exhibited a similar composition to that of rabbit. In both myosins, apparent molecular weights of A1, DTNB and A2 light chains were 25,000, 18,000 and 14,000, respectively, and their molar ratios 1.3–1.4: 2.0–2.2: 0.5–0.6, which were remarkably different from those of teleosts.[1,2] The said similarity between the elasmobranch and rabbit seemed rather curious, since elasmobranch is situated taxonomically in the lower place than teleost fishes. The present paper deals with further comparative studies on myosin light chains from shark and rabbit.

Myosins were prepared from the ordinary muscle of requiem shark and rabbit fast muscle, and light chains were isolated from them by ion-exchange chromatography by the method reported previously.[3]

The amino acid compositions of requiem shark and rabbit myosin light chains were analyzed. All light chains were rich in aspartic and glutamic acids, lysine and alanine, and poor in histidine, methionine, tyrosine (data not shown), in a good agreement with light chains from other skeletal myosins so far reported. The star diagrams of corresponding light chains were very much similar between requiem shark and rabbit, and clearly differed from those of teleost myosin light chain counterparts, though amino acid profiles of fish myosin light chains generally showed a significant species-specificity as reported previously.[3]

Both myosins were analyzed for light chain pattern by two dimensional gel electrophoresis according to the method of Mikawa *et al.*[4] (Fig. 1). When they were run together, the corresponding light chains appeared at similar positions, although they differed significantly in isoelectric points. In connection with this, myosins were similarly isolated from the ordinary muscle of the gummy shark *Mustelus manazo* and the great blue shark *Prionace glaucas*, and subjected to two dimensional gel electrophoresis, affording essentially the quite similar patterns to that of requiem shark myosin (data not shown). Therefore, the similarity and difference in physicochemical properties against rabbit

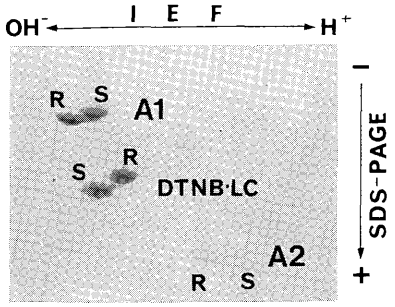

Fig. 1. Two dimensional gel electrophoresis of requiem shark and rabbit myosins. First dimension, isoelectric focusing (IEF) in 3% gel; second dimension, SDS-PAGE in 15% gel. Abbreviations used: R, rabbit; S, requiem shark.

myosin light chains seem to be consistent through elasmobranchs.

Finally, these light chains were digested with *Staphylococcus aureus* protease,[5] and analyzed by SDS-polyacrylamide gel electrophoresis (SDS-PAGE). The peptide maps of alkali light chains of requiem shark were clearly different from those of rabbit, whereas those of their DTNB light chains were quite similar to each other (data not shown). These results coincide well with the degree of species-specificity of the three light chains as evaluated by the physicochemical properties.[3]

As described above, shark myosin showed a strong resemblance to that of rabbit myosin in the molecular weight, stoichiometry and amino acid composition of light chains. The corresponding light chains of both animals, however, seem clearly different in primary structure, as suggested by two dimensional gel electrophoresis and peptide map.

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