Title	Loss of Ca^{2+}-dependent regulation in glycerinated skeletal muscle contraction
Sub Title	
Author	中山, 雪麿(Nakayama, Yukimaro) 山口, 正弘(Yamaguchi, Masahiro) 渡辺, 和子(Watanabe, Kazuko) 関根, 隆光(Sekine, Takamitsu)
Publisher	共立薬科大学
Publication year	1983
Jtitle	共立薬科大学研究年報 (The annual report of the Kyoritsu College of Pharmacy). No.28 (1983.) ,p.92- 93
JaLC DOI	
Abstract	
Notes	抄録
Genre	Technical Report
URL	https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=AN00062898-00000028-0092

Loss of Ca^{2+}-dependent Regulation in Glycerinated Skeletal Muscle Contraction*

Yukimaro NAKAYAMA, Masahiro YAMAGUCHI,** Kazuko WATANABE,*** and Takamitsu SEKINE**

中山雪麿，山口正弘,** 渡辺和子,*** 関根隆光**

It has been known that the contraction of skeletal muscle is regulated by Ca^{2+} concentration in myofibrils. Weber et al. found that Ca^{2+} is the most important factor to the contraction of skeletal muscle. Ebashi et al. also reported the same results on the contraction of skeletal muscle, and they found such the regulatory protein as TN-TM system, on the thin filament in myofibrils. The Ca^{2+} information in the myofibril is transmitted to actin and myosin interaction through this system.

However, we found the fact that the Ca^{2+} regulatory protein lost Ca^{2+} sensitivity by digestion of proteolytic enzymes, trypsin or Ca^{2+} activated neutral protease(CaANP), in the physiological condition of rabbit psoas glycerinated muscle. It was designated as Ca^{2+} in-sensitive fiber(CaIS-fiber). Moreover, we studied on the recovery of Ca^{2+} sensitivity in CaIS-fiber, and found that it recovered Ca^{2+} sensitivity by incubation in native TM or TN complex extracted from rabbit back muscle. Then, we proved these facts clearly by using techniques of tension mechanogram and SDS polyacrylamide gel electrophoresis. Normal glycerinated fiber has Ca^{2+} sensitivity(CaS-fiber) and developed tension by addition of Ca^{2+} in the presence of ATP, by contrary, it developed tension by addition of ATP in the presence of Ca^{2+}, too.

Electrophoretic pattern of CaS-fiber mainly contains ten bands from top to bottom, they are myosin heavy chain, actin, TN-T, TM β and α myosin light chain 1, TN-I, TN-C, myosin light chain 2 and 3, respectively.

On the other hand, tryptic CaIS-fiber developed tension by only addition of ATP even in the absence of Ca^{2+}, and addition of Ca^{2+} after ATP has no effect to the more tension development. It was also the same results in Ca^{2+} treated fiber which was added as an activator of CaANP. The discrepancy on the electrophoretic pattern between CaS- and CaIS-fiber is the concentration of bands of TN-TM system. In CaIS-fiber, the concentration of TN-TM each band is becoming faint when it was compared with CaS-fiber. It means that a part of TN-TM system was digested with proteolytic enzymes, such as trypsin or CaANP. In particular, a new band appeared at 30 K daltons peptide on gel in CaIS-fiber. We assumed that this band may be one of the digested products of TN-T (Azanza et al. 1980). Moreover, CaIS-fiber recovered Ca^{2+} sensitivity with

* 本報告は *Jpn. J. Physiol.* 33, 559—566 (1983) に発表

** 順天堂大学

*** 日本大学

incubation in native TM or TN complex. When the tryptic or Ca^{2+} treated CaIS-fiber was incubated in native TM or TN complex for 72 hrs, at 4℃, they recovered Ca^{2+} sensitivity in tension development. SDS polyacrylamide gel electrophoretic pattern of recovered fiber also recovered its concentration gradually to the original level of CaS-fiber on gel.

We had a conclusion from these results that Ca^{2+} in- and re-sensitization is due to exchanging of TN-TM system in myofibrils.