

## X-RAY DIFFRACTION STUDIES ON THE EFFECT OF STRETCH WITH TWO PHASES VELOCITY IN TETANIZED SKELETAL MUSCLE BY A CCD-X RAY DETECTOR

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### Introduction

It is known that when stretch velocity is reduced during moderate velocity stretch in tetanized skeletal muscle fibers, tension which had risen during the first part of stretch, starts to decay (Sugi, 1972). To investigate molecular mechanism underlying the stretch velocity sensitive force response to stretch, we measured the intensity changes of the meridional reflections of the X-ray diffraction with 15ms time resolution, which give information about behavior of actin-myosin linkages.

### Materials and Methods

The sartorius muscle or fiber bundle isolated from the bull frog was mounted isometrically experimental chamber at 2.2  $\mu$ m of sarcomere length and set to monochromatized X-ray beam path of wavelength 0.155nm from beam line 15A of synchrotron radiation. The muscle was tetanized at 20Hz and then the muscle was stretched with moderate fast velocity (1.5%Lo, 0.15Lo/s) followed by slow one (1.5%Lo, 0.015Lo/s) or opposite sequence during steady state of tension by the vibrator. The intensity of the meridional reflections were recorded by the line scan mode of CCD-Xray detector with tension response. All experiments were made at 12°C.

### Results

The intensity changes of 143 and 215 meridional reflection ( $I_{143}$ ,  $I_{215}$ ) with fast stretch followed by slow and opposite sequence are shown Fig.1A and 1B. The  $I_{143}$  suddenly decrease during early phase of isometric tetanus and then recovered to lower level during steady state of isometric tetanus. The  $I_{143}$  further decreased during fast stretch and then slightly decreased during followed slow stretch (Fig. 1A). In contrast, the  $I_{143}$  slightly increased during slow stretch and then suddenly largely decreased during followed fast stretch (Fig. 1B). After completion of stretch the  $I_{143}$  recovered slowly to isometric tetanus level. The

$I_{215}$  decreased monotonically during rising phase of isometric tetanus and then no remarkable changed.

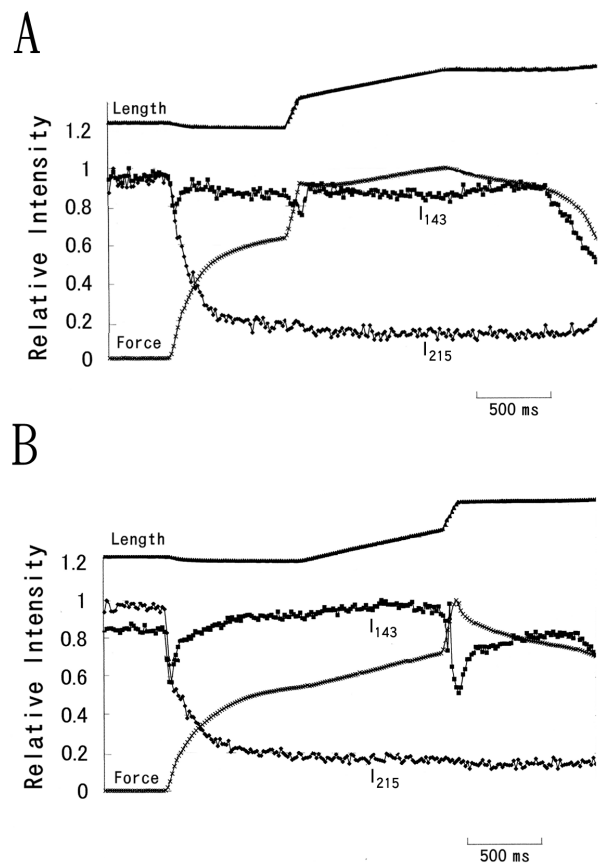


Figure 1. Length, force and intensities changes of 143 and 215 meridional reflection ( $I_{143}$ ,  $I_{215}$ ) during fast stretch followed by slow stretch (A) and opposite case (B).

### References

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