

An X-ray diffraction study on rat cardiac muscles.

* Hiroyuki Suga	(3731)
Junichi Araki	(3732)
Hiroshi Okuyama	(3737)
Katsuhiko Tsujioka	(3736)
Naoto Yagi	(1129)
Hiroyuki Iwamoto	(1369)
Takeshi Mikane	(3733)
Satoshi Mohri	(3734)
Yi Syuu	(3735)

Okayama University

X-ray diffraction experiments were made on rat cardiac muscle at the BL45XU small-angle station. A papillary muscle was dissected from the right ventricle and mounted in a specimen cell equipped with a tension transducer. The cell had two Kapton windows to pass the X-ray beam. It was perfused with an oxygenated Tyrode solution. The X-ray energy was 12.4 keV and the beam size was approximately 0.6 mm horizontally, 0.3 mm vertically. Experiments were made with a ring current of 40-25 mA. The X-ray detector was an X-ray image intensifier with a beryllium window (Hamamatsu Photonics V5445P) and a fast CCD camera (Hamamatsu Photonics C4880-82). Time resolution was 36 msec. In preliminary experiments with a long exposure (1-2 sec), the diffraction pattern from the papillary muscle showed not only the equatorial reflections but the myosin meridional reflections at $1/21.4$ and $1/14.3$ nm⁻¹.

However, as these reflections are rather weak, only the equatorial reflections were measured in time-resolved experiments. Using these setups, it was possible to record the intensity of the equatorial reflections in a single twitch at a time resolution of 36 msec. Results in previous X-ray diffraction studies on cardiac muscles were obtained by summing data in more than 100 twitches, even when they were done using synchrotron radiation. Thus this is a big advance which was made possible by the high flux density of SPring-8 and high detection efficiency of the X-ray image intensifier.