

TEST EXPERIMENT OF ANGIOGRAPHY USING A MEDIUM-LENGTH UNDULATOR BEAMLINE.

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Coronary angiography was tried using BL20XU (medium-length undulator beamline). The specimen was a rat heart, which was perfused with oxygenated Tyrode solution in the method of Langendorff's. Coronary vessels were imaged by injecting a contrast agent through the perfusion system using an injector. The x-ray detector was Beam Monitor 2 (with $f=24\text{mm}$ lens) with a fast CCD camera (Hamamatsu Photonics C4880-80-24A with 25-mm lens). A pixel in a recorded image was 10-microns square. The experiment was made in the hutch 2 of BL20XU in the Medical Imaging Center.

Monochromator was adjusted to 18 keV. The undulator gap was set larger than optimum to obtain a larger beam. Horizontally, the beam was larger than the detection area (6.6 mm). In the vertical direction, the beam was apparently 3 mm. However, when imaged at 5-msec time resolution, the beam was narrower (< 200 microns) and moving rapidly in the vertical direction (Figure 1). The field of view was set to 2.4 mm in the vertical direction. At least a part of this area was always illuminated by the beam.

Images were recorded at 20-msec intervals with a shutter opening of 5 msec. The image (Figure 2; the height of the image is 2.4mm) shows very fine vessels, about 20 microns in diameter. Use of a fast shutter

speed seems essential to attain high spatial resolution because the heart is beating at about 6 times per second. The x-ray flux is high enough to record an image in a 5-msec exposure. However, we noticed radiation damage after a few seconds exposure.

