

A MATHEMATICAL MORPHOLOGY BASED METAPHASE FINDER FOR THE BIOLOGICAL DOSIMETRY BY CHROMOSOME ABERRATIONS

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For biological dosimetry by counting chromosome aberrations, automation technique has been required to process large number of sample preparations at low dose radiation exposure. The metaphase finder is an automated optical microscope system, which automatically scans and finds metaphase cells on the slide glass, and relocates metaphase cells to the center of the field of view of the microscope to observe chromosomes in high magnification.

We have constructed a cost-effective metaphase finder system by assembling commercially available components, such as microscope, motorized sample stage, personal computer and general purpose image analysis software package, instead of special dedicated system which we have made previously (1). The new system has high flexibility in adapting to the new staining methods.

We have utilized the mathematical morphology based image processing to the algorithm to find metaphase cells. Especially, the morphology for the gray-image was used for the newest version.

We tested the performance of this metaphase finder system. The scanning speed was 18 min/cm². The recent improvement enabled metaphase finding in the center and peripherals of the images which were differently illuminated.

We have distributed this metaphase finder systems to 6 laboratories nationwide in Japan, which are known as The Chromosome Network for Biodosimetry in Japan (2), for the testing the new algorithm for the practical use.

(1) Furukawa, A., Hayata, I., Yamamoto, M., Furuta, S., Tsunoda, M., Okabe, N., Automation of chromosome analysis (in Japanese). *Cytometry Res.* 7, 1–8 (1997).

(2) M. A. Yoshida, I. Hayata, H. Tateno, K. Tanaka, S. Sonta, S. Kodama, Y. Kodama and M. S. Sasaki, The chromosome network for biodosimetry in Japan. *Radiat. Meas.* 42, 1125–1127 (2007).