The project of another low-cost metaphase finder

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Study Goal: The goal of this research is to complete the project of another low-cost metaphase finder, which the author presented in EPR Biodose 2013.

Abstract: Biological dosimetry is used to estimate one's dose by biological phenomena. The most popular and “gold standard” phenomenon is the appearance of dicentric chromosomes in metaphase in white blood cells. The metaphase finder is a tool for biological dosimetry that finds metaphase cells on slide glasses. It consists of an automated microscope, auto-focus system, X-Y stage, camera, and computer. It does the image diagnosis of the microscopic images of the slide glasses, and displays the positions of metaphase cells. The metaphase finder was used for the personnel worked at Fukushima nuclear plant to know how much dose they irradiated. The author has already reported another new low-cost metaphase finder system at EPR Biodose 2013. The author and a software company were using new special software which was faster than conventional systems. We used a Nikon Eclipse Ni-E microscope with motorized X-Y stage, 4x objective lens and 1920 x 1024 pixels color camera for hardware. The software uses mathematical morphology filters, and the new function to compare the color of the image. The new system was compact and low-priced. And the remarkable point is, this system can applicable for not only human blood, but also non-human samples. Now, the system has been completed and the author determined its speed. It was 13 minutes and 56 seconds per slide, while capturing 1,333 images, which achieved the aim of the project. The next goals are to implement a new automated dicentric counter and then obtain a dose-response relationship for the new dicentric counter.

Conclusion: The metaphase finder system was completed and its speed determined. It was 13 minutes and 56 seconds per slide, while capturing 1,333 images. This accomplished the aim of the project.

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