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## ELECTRON MICROSCOPIC OBSERVATIONS ON THE ABERRANT CHROMOSOMES IN L CELLS EXPOSED TO X-RAYS

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The present study was undertaken with the hope of obtaining some critical information on the fine structure of aberrant chromosomes induced by X-irradiation with the aid of an electron microscope. L cells originally derived from mouse connective tissue were employed as material.

In order to selectively observe mitotic cells, an improved method was developed. Cell monolayers cultured on cover slips in flasks were fixed with glutaraldehyde and osmium tetroxide. Then they were dehydrated in alcohol series and propylene oxide, and finally replaced with Epon mixture. After the removal of the cover slips from the flasks, vinyl tubes about 2 mm in diameter and 5 mm in length were placed on the areas containing mitotic cells under a light microscope. The tubes were filled with Epon mixture and kept at 52°C. About two days later, the cover slips with the vinyl tubes were cooled with liquid nitrogen. The tubes in which the mitotic cells were embedded were pried off from the cover slips, and cut about 1 mm in length. The Epon blocks thus prepared were sectioned for electron microscopy.

1) The fine structure of unirradiated chromosomes in the L cells were observed. It was demonstrated that fibers 600~1000 Å in diameter appeared to be formed by coiling of 200~300 Å fibers. The 600~800 Å fibers formed a chromonema or chromosome which was visible with a light microscope.

2) Chromosomes in the cells exposed to X-rays of 1000 R at prophase or metaphase were incubated at 37°C for 20 minutes, and metaphasic cells were fixed. Apparent coiling structure was not demonstrated in metaphasic chromosomes, seemingly due to an increase of stickiness of the fibers forming chromosomes. In addition, some areas of the metaphasic chromosomes represented a lower electron density than other parts of the chromosomes. Some vacuoles at various sizes were also found in affected chromosomes.

Though the data at hand are insufficient for a final conclusion, the present electron microscopic studies following irradiation reveal the fine alterations of chromosomes, being difficult to observe them by light microscopy.