Magnetic Field Effects on Radiation Damage to *Saccharomyces cerevisiae*

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During the past 75 years, several hundred research reports have detailed the search for evidence that cellular processes are somehow influenced by magnetic fields. In general, the results have been regarded with skepticism. An extensive bibliography of these reports was published as a supplement to Federation Proceedings (Davis, 1962). More recently it has been discovered that magnetic fields modify radiobiological effects. Barnothy (1963) reported that when mice are placed in a 4,200 oersted magnetic field prior to irradiation, a decrease in relative mortality of 21 per cent occurs when there is no delay between the termination of magnetic treatment and irradiation with Co^{60} gamma rays. An additional modification of radiation effects with magnetic fields has been demonstrated on the course of wing development in *Tribolium confusum* (Amer, 1964) irradiated as pupae with 250 KVP X-rays.

At the present time, however, little work has been reported on the effects of a magnetic field imposed on a biological system during irradiation. Since biological damage resulting from ionizing radiation is related to linear energy transfer (LET), and LET can be modified by a magnetic field, it is reasonable to expect a difference in the damaging effect of X-rays with and without a magnetic field. Accordingly, this laboratory

initiated a preliminary study in 1964 to determine if any synergistic effect existed under such conditions.

Physical measurements, using an Avco LET sensor, have demonstrated changes in the effective LET of X-rays as a function of magnetic field strength. The hypothesis that these changes can be demonstrated in a biological system was tested by irradiating a haploid strain of *Saccharomyces cerevisiae* with 200 KVCP X-rays with and without a 1,700 oersted magnetic field. The organisms were diluted in saline and plated on Sabourdaud's agar. Results of one experiment showed a 27 per cent decrease in colony counts for those samples irradiated in a magnetic field compared with those irradiated to the same dose in the absence of a magnetic field. Another experiment showed a decrease in surviving colonies by 33 per cent.

This preliminary work is now being extended to include bacteria and animals.

Literature Cited

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Barnothy, M. F. 1963. Biological effects of magnetic fields on small mammals. Biomed. Sci. Inst. Vol. I.

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