

AbstractID: 7129 Title: The Effect of Magnetic Field on Relative Biological Effectiveness in Yeast Cells

Purpose:

To investigate the effect of a magnetic field on the relative biological effectiveness (RBE) in yeast cells irradiated with γ -rays.

Method and Materials:

A ^{60}Co γ source was used to irradiate *Saccharomyces cerevisiae* (baker's yeast) with and without a modest magnetic field (0.78 T). A set of NdFeB permanent cylindrical magnets and another set of non-magnetized pseudo-magnets were used to obtain data with and without the magnetic field. The cells were located at the center between the pole faces and sandwiched between two layers of non-nutrient agar to maintain lateral electron equilibrium. The variation of the magnetic field in the cell region was less than 1%. The Monte Carlo code PENELOPE was used to simulate the dose distribution in the presence and absence of the magnetic field to ensure the doses delivered were equal in both cases. Another group of cells without irradiation was used as a control for the two groups being irradiated. The cells were sampled and cultivated after irradiation, and colonies representing surviving cells were counted.

Results:

In five out of seven experiments the null hypothesis (no effect) could not be rejected with t-test at $p = 0.05$. Nonetheless, the results still suggest that the survival rate may drop slightly in the presence of the magnetic field. The survival rate decreased by $3.9\% \pm 2.7\%$ at about 50% survival rate. At two standard deviation level the effect was less than 10% at $B = 0.78$ T.

Conclusion:

The effect of a 0.78 T magnetic field on the RBE of *Saccharomyces cerevisiae* is smaller than 10%. Although the indication that a strong magnetic field may increase the RBE of the radiation is not conclusive at 0.78 T, further experiments at higher magnetic field ($B > 2$ T) and larger sample size would reduce the uncertainties in the experiments.