The Annual NASA Space Radiation Summer School
2010 Slide Competition
For The Health Risks of Extraterrestrial Environments (THREE)

Honorable Mention

Manuela Buonnano

University of Medicine and Dentistry of New Jersey

Submission on

Cell Survival

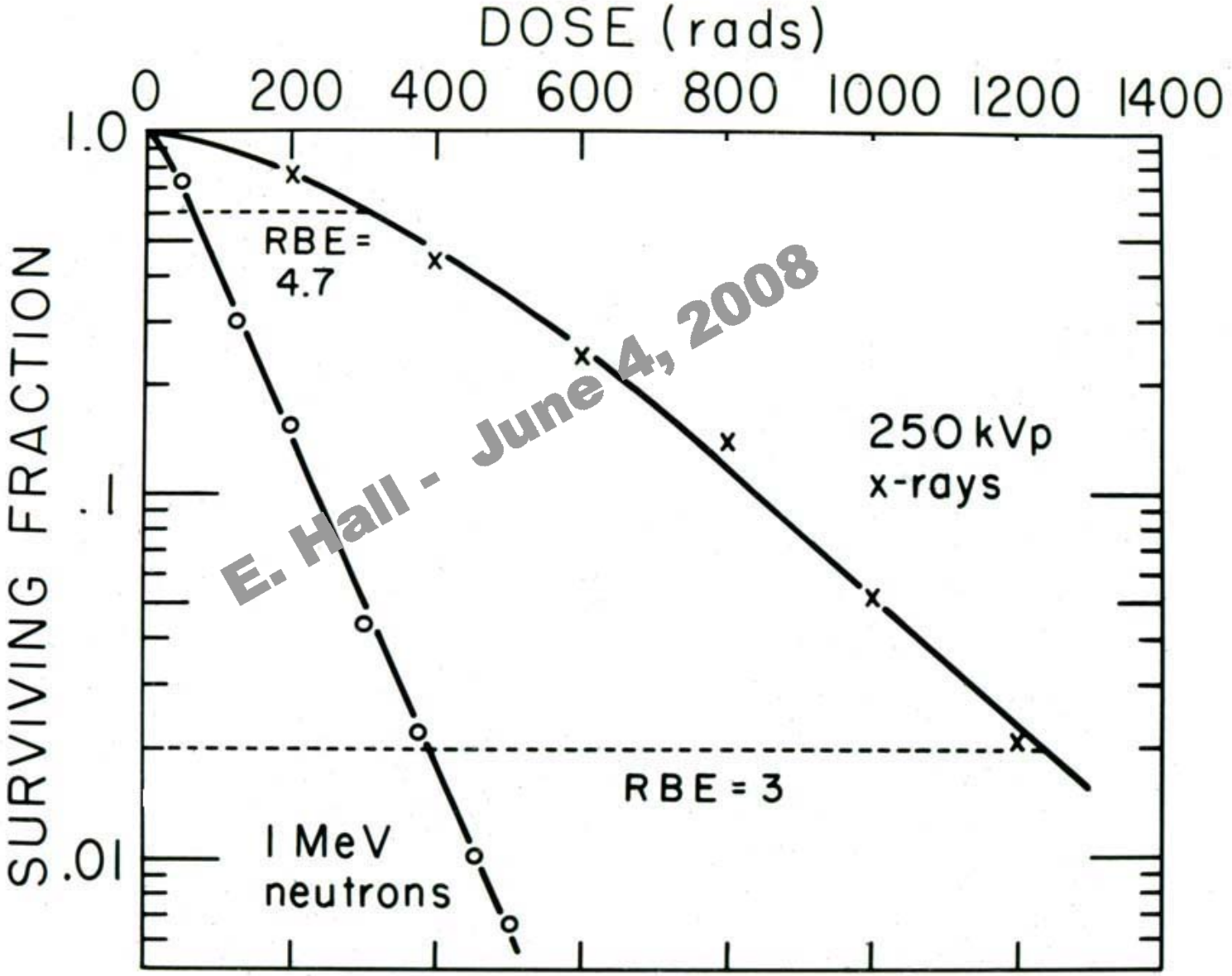
from

Eric Hall (2008)

Cellular Radiobiology: Biological Responses to High LET Radiation

NASA Space Radiation Summer School

Cell Survival and The Concept of Relative Biological Effectiveness



When comparing biological effects induced by different types of ionizing radiation the Relative Biological Effectiveness or RBE of a radiation for a specific endpoint can be calculated.

The following slide illustrates the survival curves of mammalian cells exposed to a range of doses of fast neutrons or 250-kVp X rays. Because the X rays and neutron survival curves have different shapes, the RBE depends on the dose (or the level of biological damage) chosen.

If the endpoint chosen for comparison is the dose required to produce a surviving fraction of 0.015, then the dose of neutrons necessary is 400 rad whereas the corresponding dose of X rays is ~ 1200 rad. Therefore,

$$RBE_{0.015} = 1200/400 = 3$$

If the comparison is made for a surviving fraction of 0.6, the neutron dose required is 63 rad and the corresponding X ray dose is 300 rad. Therefore,

$$RBE_{0.6} = 300/63 = 4.7$$