

THE EFFECT OF LOW LEVELS OF IONIZING RADIATION ON  
PERIPHERAL BLOOD CHROMOSOMES

J. Pohl-Ruling, E. Pohl, P. Fischer  
Division of Biophysics, University of Salzburg,  
A-5020 Salzburg, Austria

G. Obe (Institute of Genetics, Free University of Berlin, FRG)  
O. Haas (St. Anna Childrens Hospital, Vienna, Austria)

ABSTRACT

The shapes of various dose-effect curves for the frequency of chromosome aberrations induced by low doses (up to 0.05 Gy) of ionizing radiation turned out to be not linear, as usually expected by theory, but rather revealed a plateau in a certain dose range. A review will be given of several in-vitro and in-vivo investigations hitherto published. Regarding the rising environmental radioactive burden of man information on low dose effects and especially of alpha irradiation, e.g. due to radon inhalation, is becoming more and more important. Since the possibilities of in-vivo studies on people exposed to elevated levels of alpha emitters are limited, in-vitro experiments have to be carried out. The induction of chromosome aberrations with alpha particles causes, however, many difficulties regarding the chemical toxicity of the radionuclides and the uniform dose distribution within the blood sample. To avoid these problems we developed out a novel method to expose human blood lymphocytes in-vitro to Rn 222 decay products. Preliminary results confirmed the nonlinearity of the dose-effect relationship at very low doses. In concordance with our former in-vivo investigations on a population living in an elevated radioactive environment the aberration rates increase sharply with dose at very low doses and allow us to obtain a more accurate dose effect curve in this important dose range.