

ENVIRONMENTAL RADIATION AND HUMAN HEALTH

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1. Introduction

The present paper will address itself to the evidence that low level radiation from nuclear fission products in the environment such as are released by nuclear explosions and power reactors may already have produced serious effects on the health of the world's population far beyond those ever believed possible when our present radiation standards were originally formulated and adopted, especially for the case of the young infant.

Before discussing the latest evidence in some detail, I should like to review very briefly the nature of the early discovery that low level radiation can produce not only genetic but also serious somatic effects in man both at high and low dose rates.

2. Historical background

The earliest indication that low level radiation could produce serious effects in man came from the studies of Alice Stewart at Oxford University in 1958 showing that mothers who had received a series of three to five pelvic X-rays during pregnancy had children who were almost twice as likely to develop leukemia and other cancers before age ten than mothers who had had no pelvic X-ray examinations [1].

This work was independently confirmed in 1962 in a major epidemiological study involving close to 800,000 children born in New York and New England Hospitals by Brian MacMahon of the Harvard School of Public Health [2]. Using these two sets of data, it was possible to show that there appears to exist a direct, straight line relationship between the number of X-ray films given to a pregnant woman and the probability that the child will subsequently develop leukemia, and that there is therefore no evidence for the existence of a safe "threshold level" below which no additional cancers are produced, down to the relatively small dose from a single X-ray. Furthermore, the magnitude of the X-ray dose to the developing fetus *in utero* from one such X-ray was comparable with the dose normally received in the course of two to three years of natural background radiation, or from the fallout produced in the course of the 1961-1963 test series, namely 0.2-0.3 rad [3].

These early findings have since been confirmed by the most recent results of