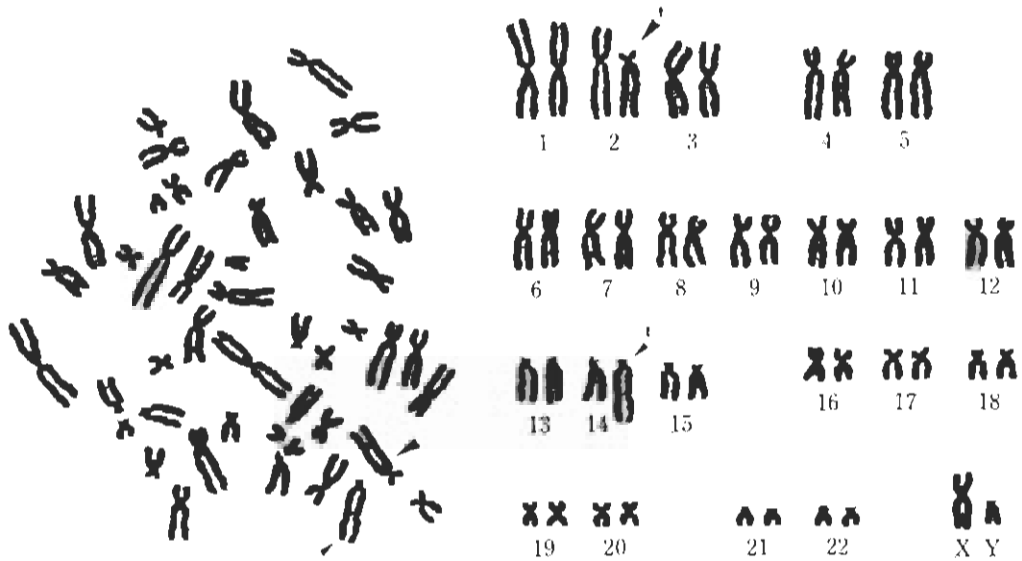


7

Chromosomal aberrations

Case of translocational chromosome aberration (male)



t = translocated chromosome (indicated by arrow) (AWO)

1. Peripheral blood lymphocytes

Even apparently healthy atomic bomb survivors exhibit chromosomal aberrations in peripheral blood lymphocytes which are characterized by the following:

1. The frequency of aberrant cells shows a significant correlation with dose.

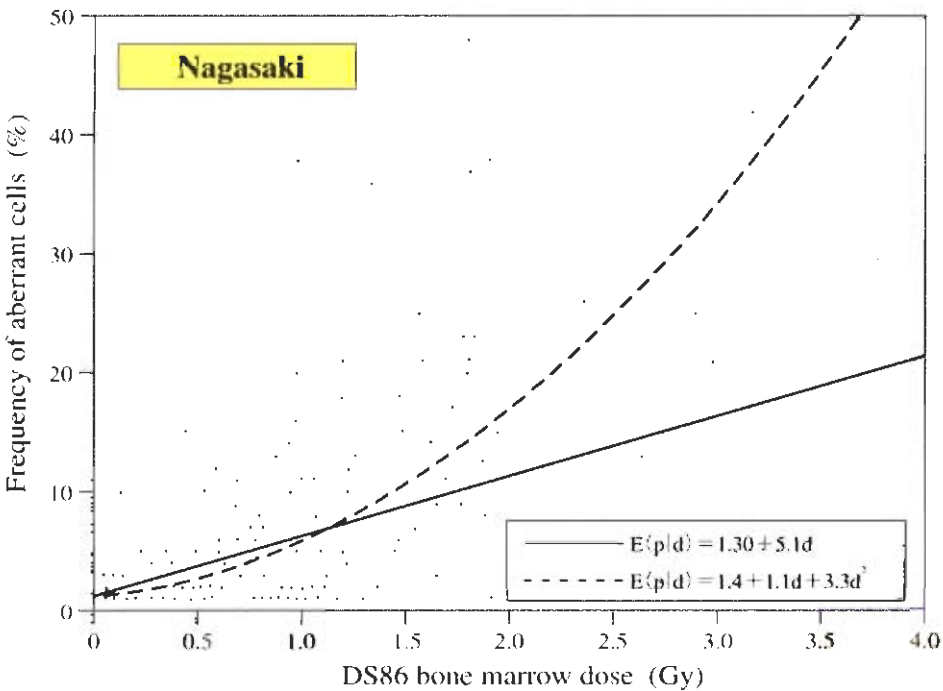
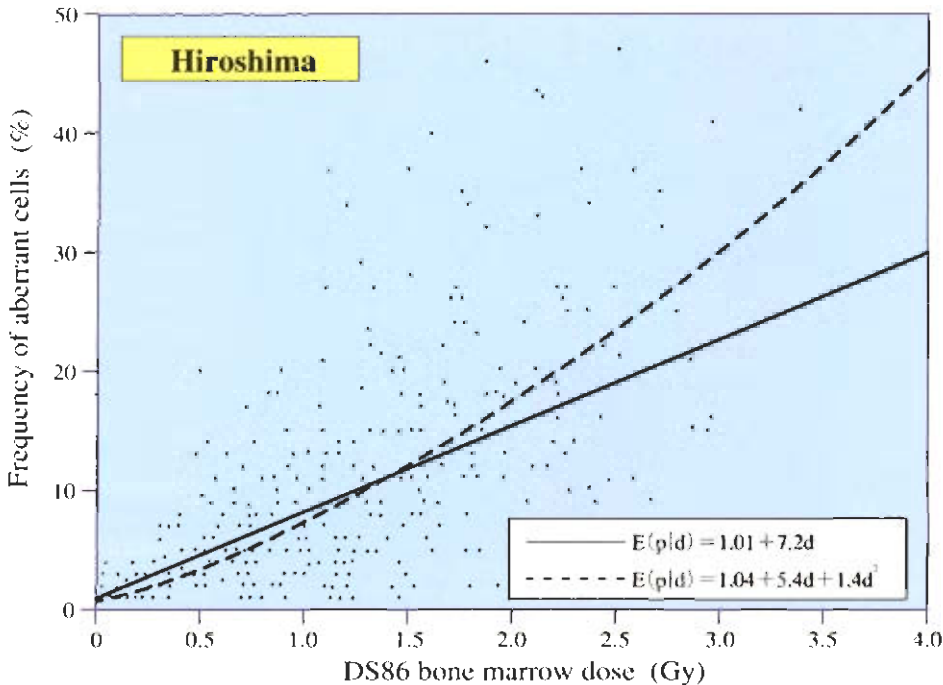
2. In studies performed 30 - 45 years after exposure, over 90% of the chromosomal abnormalities were stable aberrations; in heavily exposed survivors translocations were predominant.

3. Chromosomal aberrations were detected in the T- and B-lymphocytes of peripheral blood, myeloid cells (including stem cells), and dermal fibroblasts.

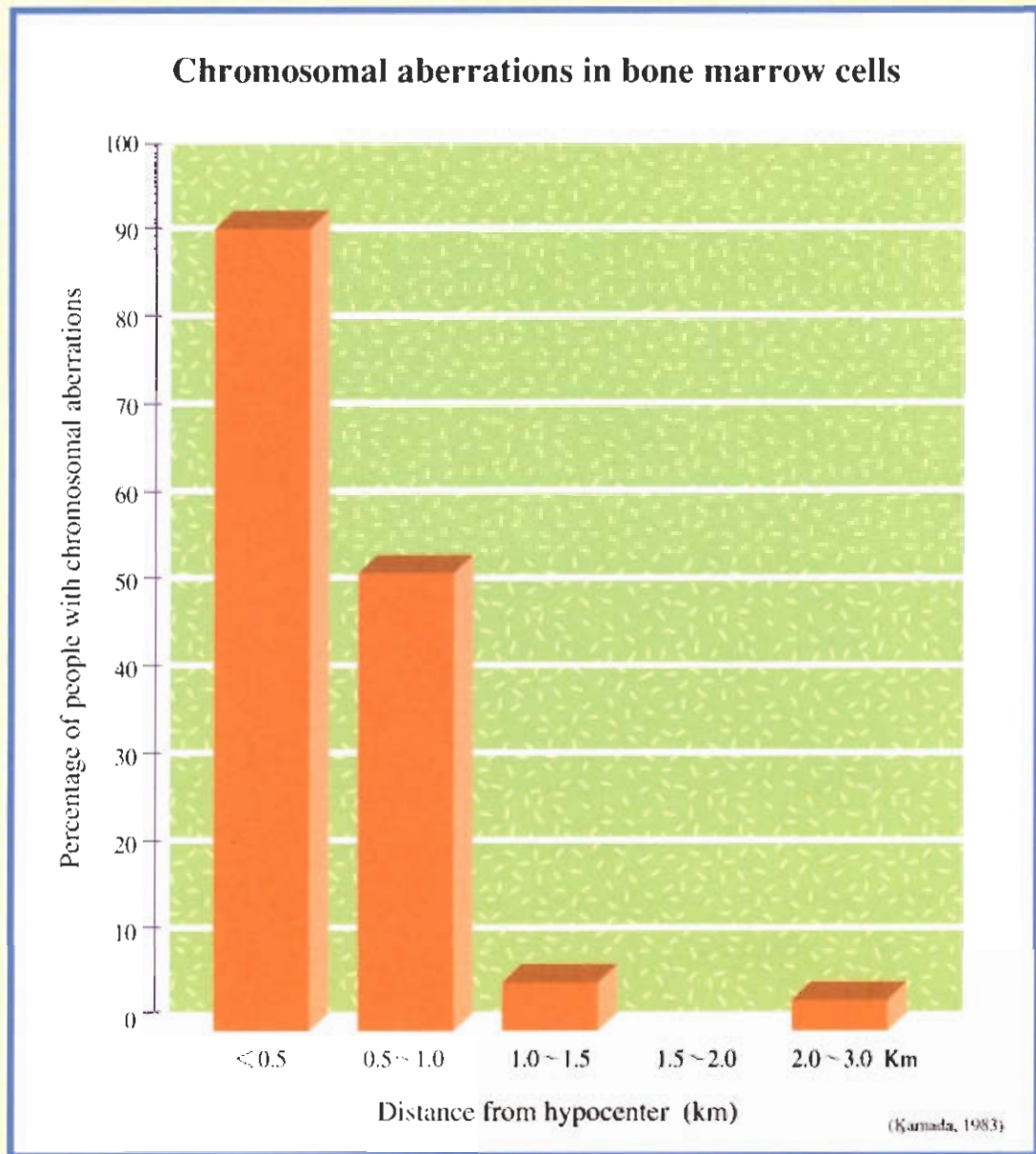
4. The sites of chromosomal breaks vary with individuals and the cells concerned. In some cases clones of aberrant cells have been observed in lymphocytes, myeloid cells and fibroblasts.

5. Hiroshima atomic bomb survivors exhibited a somewhat higher aberration rate per unit dose than Nagasaki survivors.

Frequency of cells with chromosomal aberrations by DS86 bone marrow dose, and application of linear model (solid line) and linear quadratic model (dotted line)



(Preston et al. 1988)



2. Myeloid cells

Chromosomal aberrations are also observed in the myeloid cells of healthy survivors.

The above diagram shows the frequency of people bearing chromosome aberrations by distance from the hypocenter. Characteristics of these abnormalities are:

1. A strong correlation exists between aberration frequency and distance from the

hypocenter, and hence with radiation dose.

2. Virtually all chromosomal aberrations are of stable type, with translocations predominant, followed by inversions.

3. Break points tend to occur in specific chromosomes.

4. In follow-up studies, chromosomal aberrations in the bone marrow act as an important indicator for the development of various hematopoietic diseases (particularly leukemia).