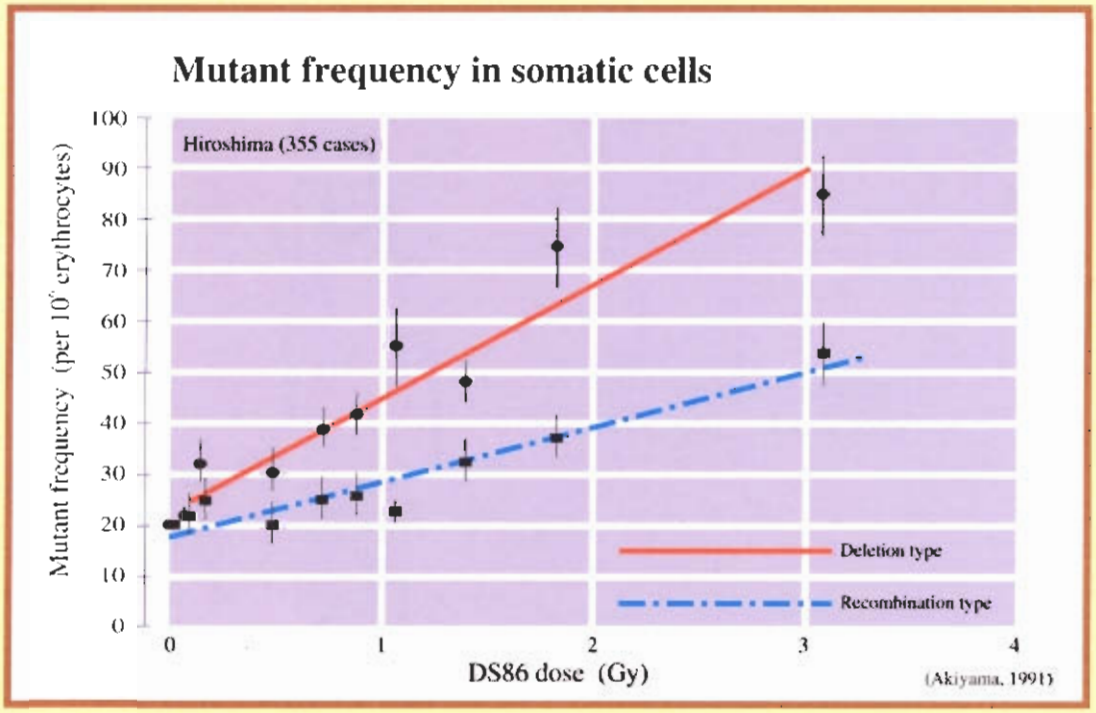
8 Mutations



Frequency of somatic cell mutations

In order to biologically estimate the doses received by atomic bomb survivors, the frequency of mutant cells in their blood cells (lymphocytes and erythrocytes) was determined.

Even now a significant relationship with dose can be observed between the frequency of mutant erythrocyte glycophorin A (GPA) genes and the doses estimated by DS86 dosimetry, thus indicating the value of biological dose estimates. However, no strong correlation exists between dose and the mutant frequencies of T-lymphocyte hypoxanthine guanine phosphoribosyl transferase (HPRT) or T-lymphocyte T-cell receptor (TCR) genes.

This difference in dose response among the genetic loci suggests that *in vivo* selection occurs against mutant cells. That is, the T cells which cause the HPRT and TCR mutations are virtually all eliminated within a relatively short period after exposure (i.e. a few years), whereas long-term persistence is seen in the case of GPA mutants, which is believed due to generation of somatic cell mutations in erythrocyte progenitors (stem cells) within the bone marrow. The GPA mutant frequency assay suffers the disadvantage that the technique is only applicable to individuals with MN blood type (who account for about 50% of the human population); however, this assay is considered valuable since it provides a lifetime biological dose estimate.