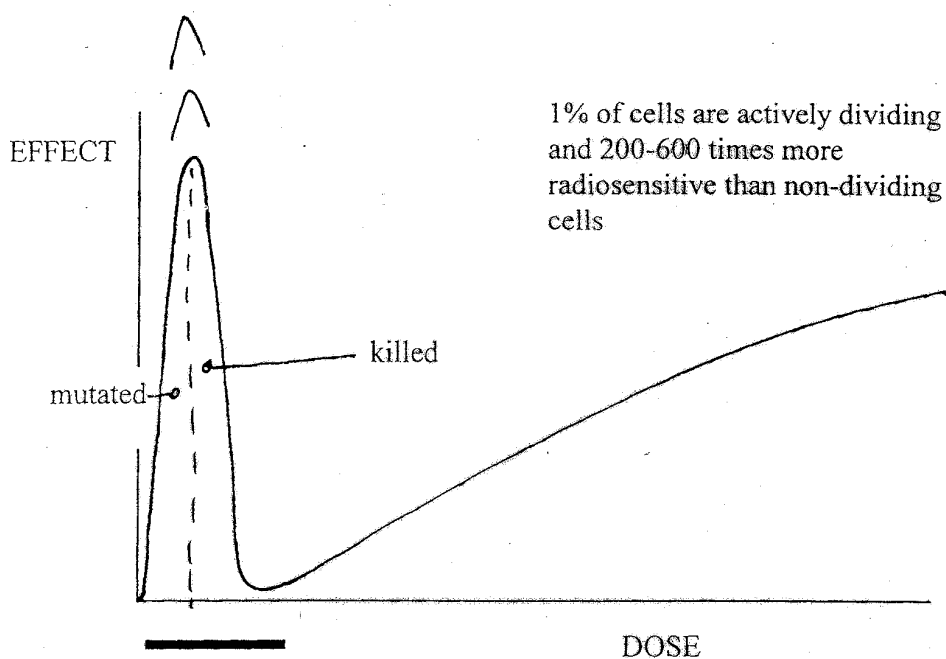


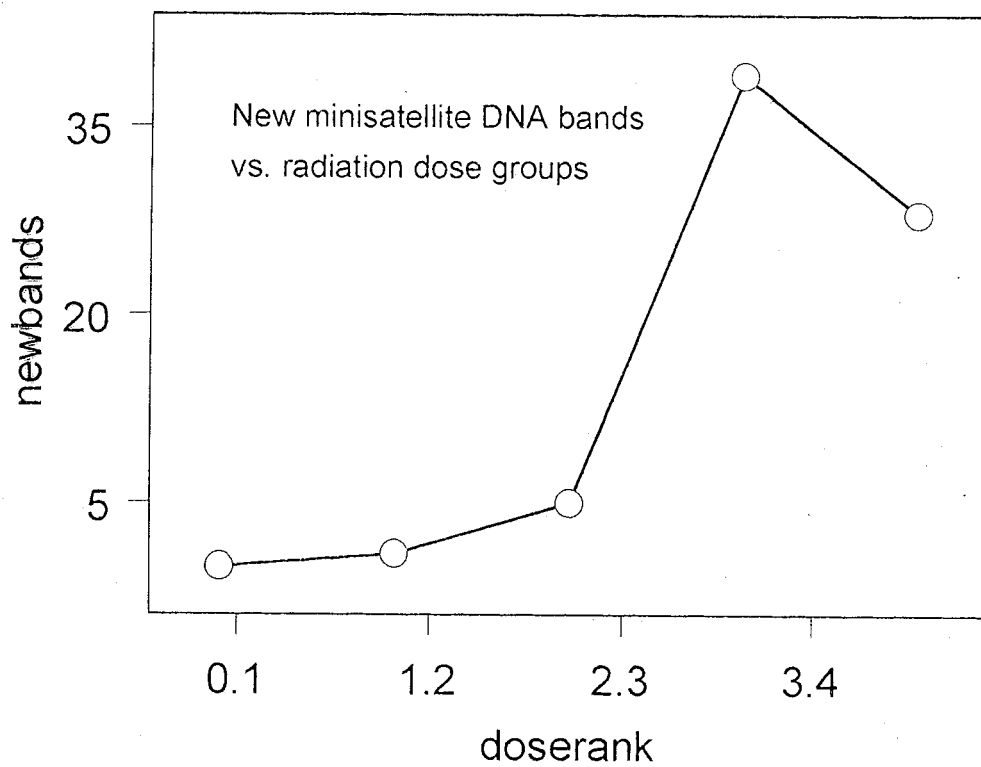
TALK 5 OVERHEAD 1

Figure 8



Predicted dose-response relationship for mutation in animal with two types of cell sensitivity sub classes: high sensitivity replicating cells and low sensitivity quiescent cells. Sensitive sub-class are first mutated then killed as dose increases.

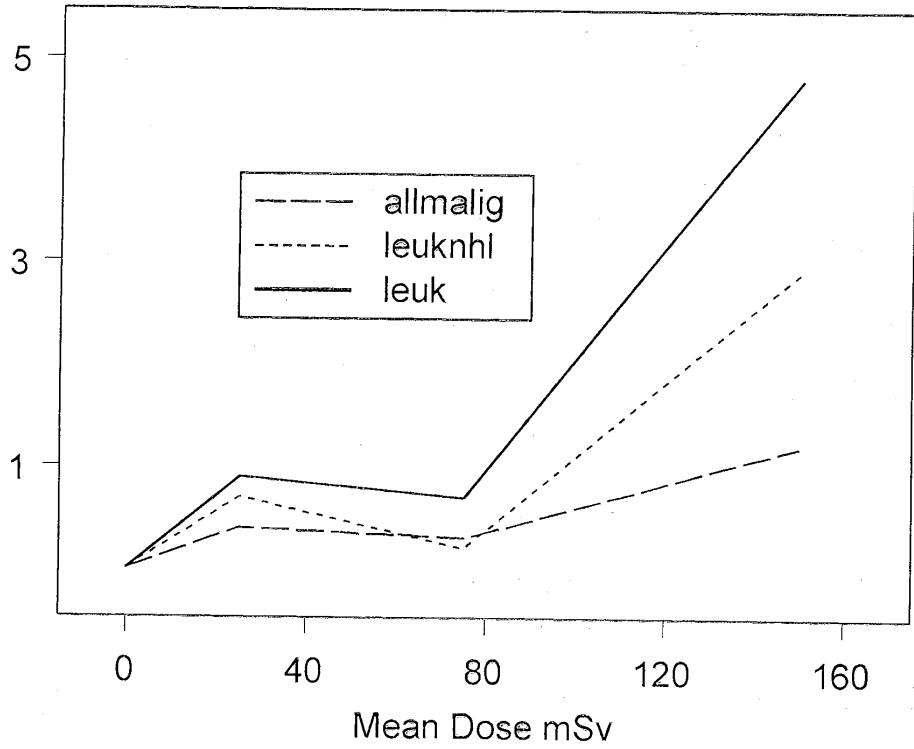
TALK 5 OVERHEAD 2



Weinberg et al, 2001
Minisatellite mutations in
Chernobyl liquidator
children

TALK 5 OVERHEAD 3

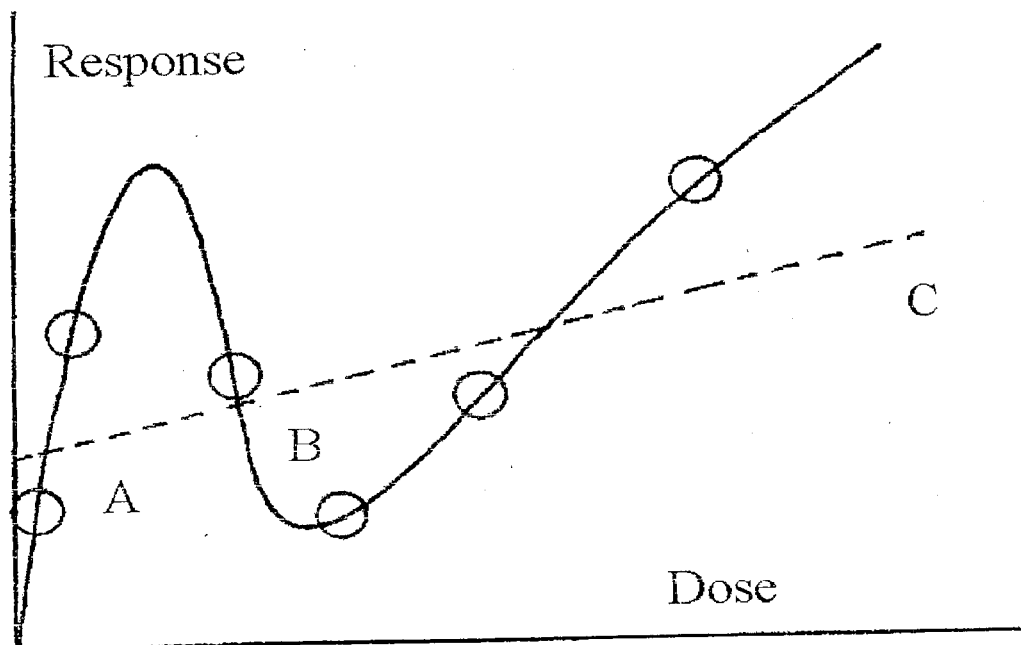
DOSE RESPONSE (ICRP)



Cancer in children of nuclear industry employees.
Nuclear Industry Family Study (Roman et al 1999)
Excess Risk versus paternal cumulative dose group.

TALK 5 OVERHEAD 4

Consequence of increasing dose in a population which contains either (a) cells in two sub populations with different sensitivity e.g. quiescent/ replicating or (b) cells with critical internal elements with different sensitivity e.g. cell membrane/chromosomal DNA



Region B may also occur as a result of induced repair efficiency (hormesis), or alternatively, the observation of hormesis may be due to the positioning of the intercept on the effect axis of an assumed linear trend.

TALK 5 OVERHEAD 5

HORMESIS

1. Empirical evidence of reduced gradient in effect as dose increases for various end points is assumed to be due to induction of repair efficiency.
2. Much of the evidence excluded accurate zero dose points and may thus merely be an artifact of the biphasic 2-population sensitivity issue.
3. This also focuses attention on the cell DNA repair systems and suggests that they have a range of induced variability in efficiency and may be boosted by increasing stress up to the point where the repair systems are overwhelmed as in e.g.. haemoglobin oxygen dissociation curve, sun tanning etc.
4. We distinguish between repair efficiency induction
 - (a) during the experiment continuously and
 - (b) between experiments i.e. small priming dose followed by large study effects dose and
 - (c) natural selection effects in cell populations (radiotherapy etc.) and human populations living in high background/radon areas (selection of radio-resistance due to death at or before reproduction of sensitive individuals).
 - (d) cell killing effects as the dose increases

CONCLUSION

1. Increased repair is associated with increased replication rate and therefore premature ageing of the cell and individual: no such thing as a free lunch. Why do we not have high efficiency repair systems normally? Because there is a downside.
2. Focus on the repair system begs the question of how repair systems may be attacked or bypassed e.g. Second Event, fractionating doses.
3. Increasing the radio-resistance by natural selection, observed in high background regions has ethical implications if applied to nuclear pollution.

TALK 5 OVERHEAD 6

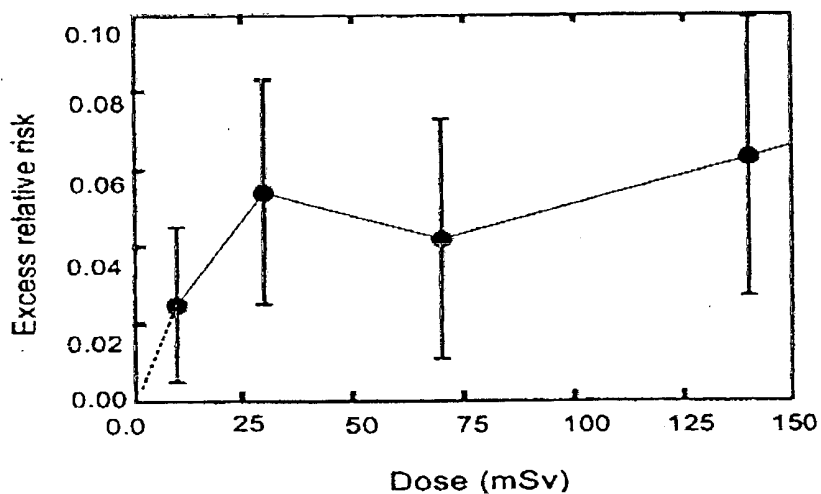


Figure 2. Estimated radiation-related excess relative risk, and standard errors, for solid-cancer related mortality (1950 – 1990) among atomic-bomb survivors⁽⁴⁾. Each data point shows a significant radiation-related increased cancer mortality risk.

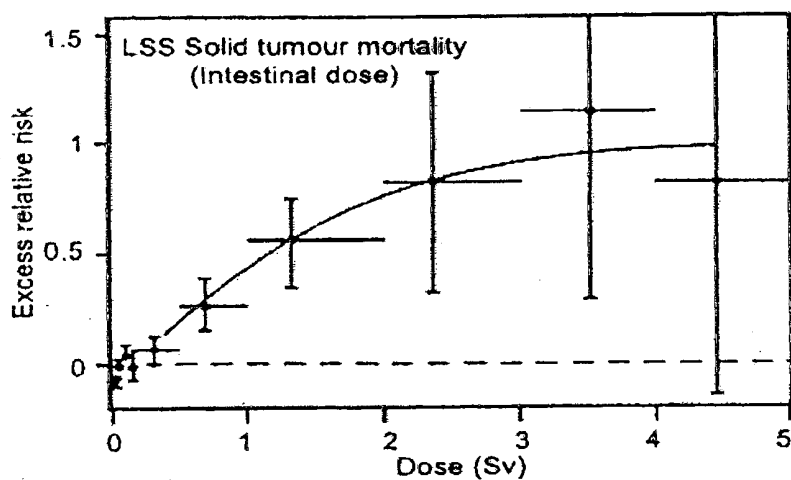


Figure 3. Observed solid tumour mortality excess relative risk (\pm SE) for Japanese 1945 atomic bomb survivors⁽³⁾.