Introduction: After BEIR VII

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BEIR VII: Statement of Task

"The primary objective of the study is to develop the best possible risk estimate for exposure to low-dose (<100mGy), low-LET radiation in human subjects."

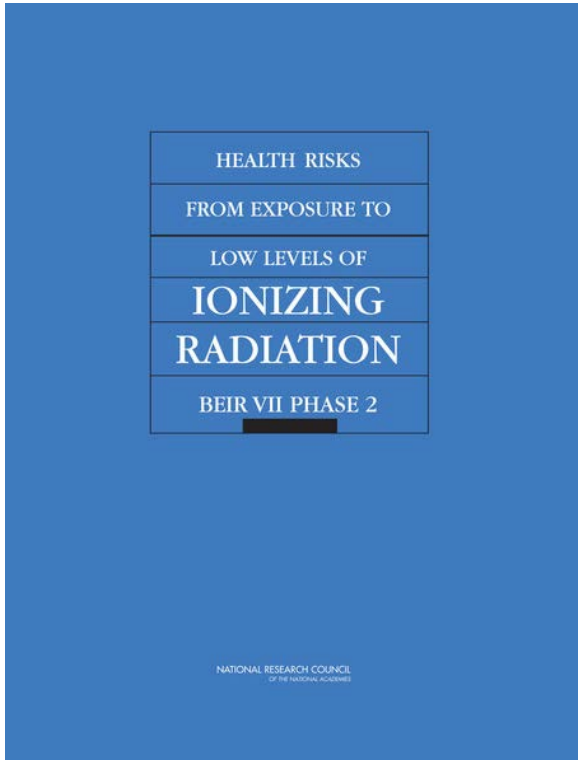
Review all low-dose, low-LET epidemiological data

Review relevant biologic data

Develop risk models for all cancer sites and other outcomes with adequate data

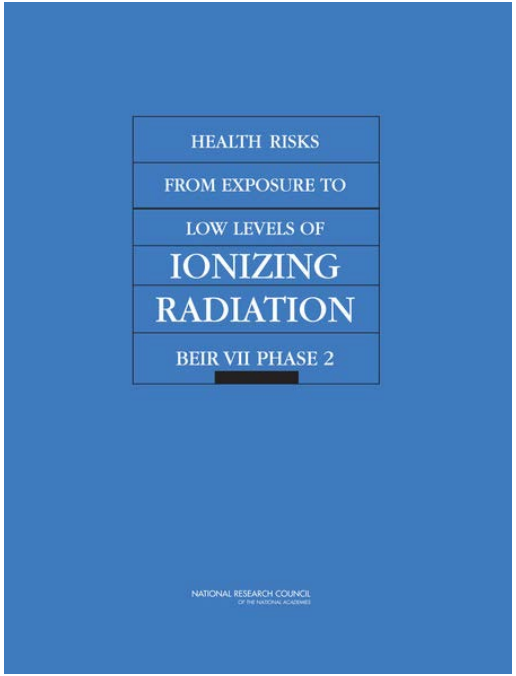
Consider recent evidence regarding genetic effects not related to cancer

BEIR VII: Conclusions & Recommendations for Cancer



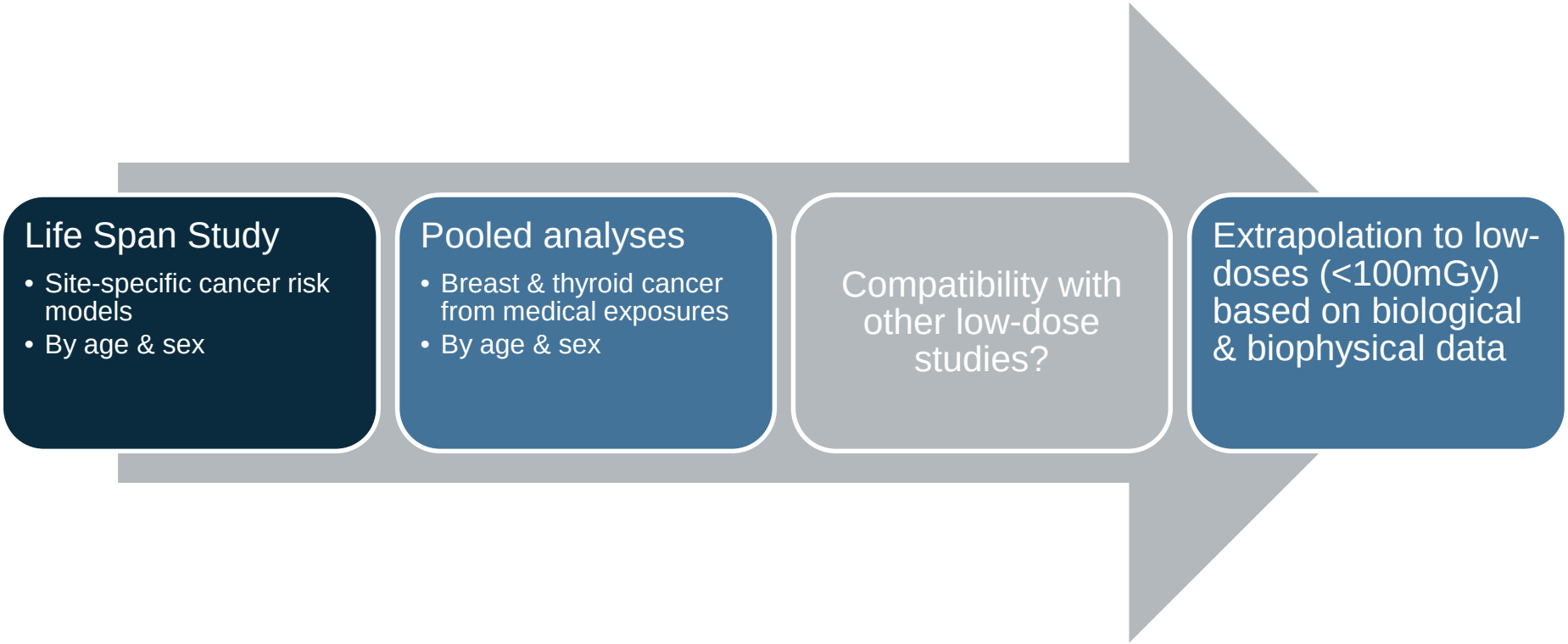
"The BEIR VII report concludes that the current scientific evidence is consistent with the hypothesis that, at the low doses of interest in this report, there is **a linear dose-response relationship** between exposure to ionizing radiation and the development of **solid cancers** in humans."

BEIR VII: Approach to Low-dose Cancer Risk Estimation

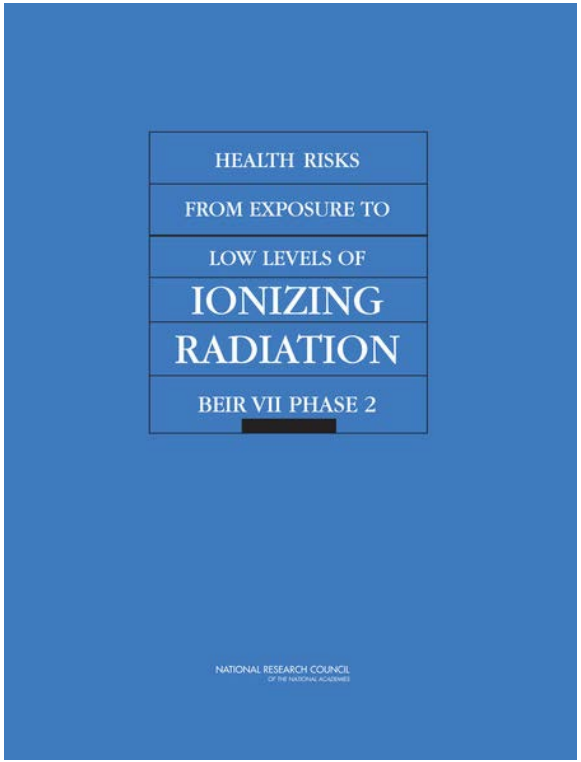


- A **comprehensive review of available biological and biophysical data** supports a “linear-no-threshold” (LNT) risk model—that the risk of cancer proceeds in a linear fashion at lower doses without a threshold and that the smallest dose has the potential to cause a small increase in risk to humans.

BEIR VII: Approach to Low-dose Cancer Risk Estimation



BEIR VII: Conclusions & Recommendations for Non-Cancer



"Other health effects (such as heart disease and stroke) occur at higher radiation doses, but **additional data** must be gathered before an assessment of any possible dose response can be made between **low doses of radiation and noncancer health effects**."

"There is no direct evidence of increased risk of non-cancer diseases at low doses, **and data are inadequate to quantify this risk if it exists**."

BEIR VII: Review of Non-Cancer Data

- “Of particular note, a dose-response relationship with mortality from non-neoplastic disease mortality was demonstrated in 1992 and in subsequent analyses in 1999 and 2003 have strengthened the evidence for this association.”
- “Statistically significant associations were seen for the categories of **heart disease, stroke, and diseases of the digestive, respiratory and hematopoietic systems**. The data were inadequate to distinguish between a linear dose-response, a pure quadratic response, or a dose-response with a threshold as high as 0.5 Sv.”
- Other epidemiological data? Only high-dose medical radiation
- Radiobiology?

15 years later….What do we know about cardiovascular effects at low doses of radiation?

Perspectives from Epidemiology
Perspectives from Radiation Biology
Perspectives for Space Exploration