

KIDS 1 session RP Science

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Critical issues

- ❑ Non-cancer disease
 - ❑ Cardiovascular disease
 - ❑ Cataract
 - ❑ Other? (respiratory, digestive, CNS effects)
- ❑ How should these be taken into account in regulatory framework?
- ❑ Is there low dose risk?
 - ❑ Shape of dose response?
 - ❑ DDREF?
- ❑ Interactions with other lifestyle factors/agents, e.g., cigarette smoking, alcohol, stress, cholesterol

Dose response for circulatory disease in A-bomb survivors

(Shimizu *et al. Br. Med. J.* 340:b5349;2010)

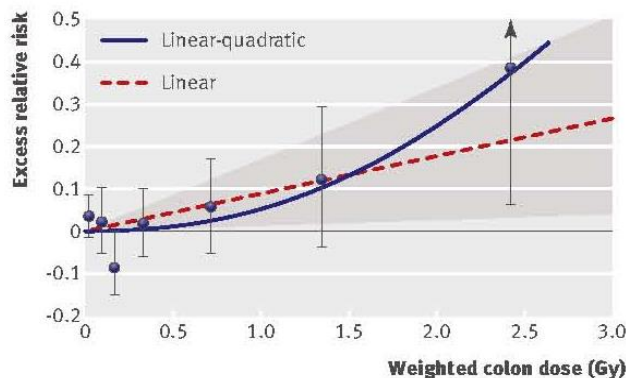


Fig 1 | Radiation dose-response relation (excess relative risk per Gy) for death from stroke, showing linear and linear-quadratic functions. Shaded area is 95% confidence region for fitted linear line. Vertical lines are 95% confidence intervals for specific dose category risks. Point estimates of risk for each dose category are indicated by circles

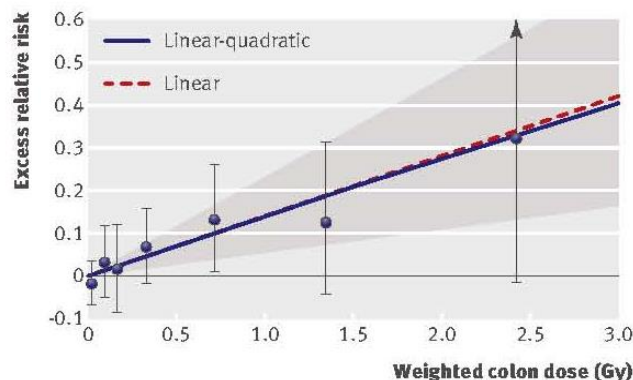


Fig 2 | Radiation dose-response relation (excess relative risk) for death from heart disease, showing linear and linear-quadratic functions. Shaded area is 95% confidence region for fitted linear line. Vertical lines are 95% confidence intervals for specific dose category risks. Point estimates of risk for each dose category are indicated by circles

ERR/Sv heart (ICD9 393-400,402,404,406-429) 0.18 (95% CI 0.11, 0.25)

ERR/Sv stroke (ICD9 430-438) 0.12 (95% CI 0.05, 0.19)

ERR/Sv other circulatory (ICD9 393-459 - above) 0.58 (95% CI 0.45, 0.72)

Dose response same if adjusted (using RR model) for smoking, alcohol intake, education, household type, obesity (BMI), diabetes mellitus (implies interaction may be multiplicative)

Shape of dose-response uncertain: weak indications ($p=0.17$) of upward curvature for stroke, none ($p>0.5$) for heart disease

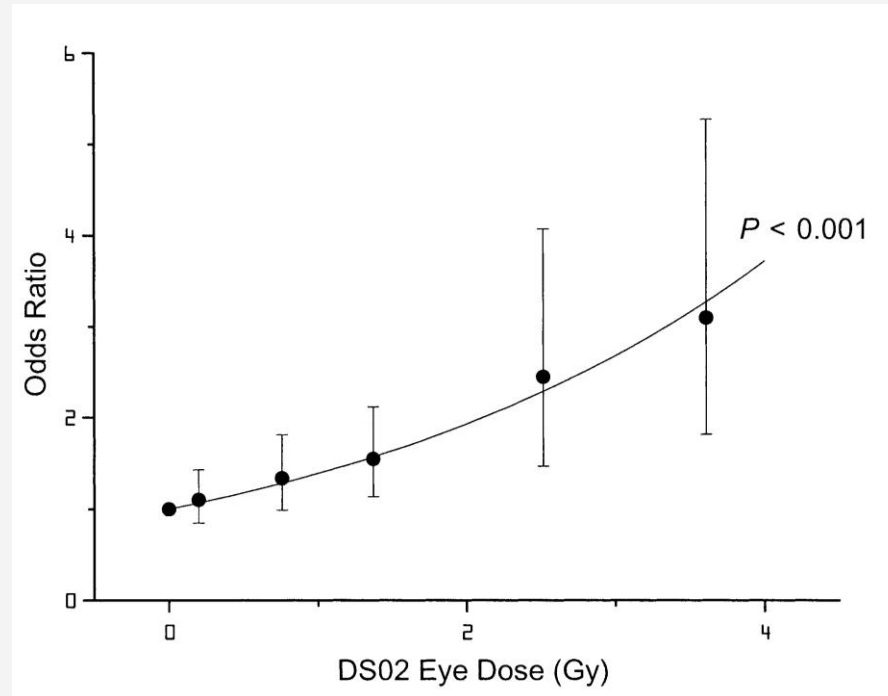
Circulatory disease risks *vs* dose rate

Study	ERR / Sv (+95% CI)	
	All heart	Stroke
LSS (Shimizu <i>et al.</i> 2010)	0.18 (0.11, 0.25)	0.12 (0.05, 0.19)
All occupational (random effects)	0.13 (0.06, 0.19)	0.30 (0.05, 0.54)



Little evidence of dose rate effects, but substantial uncertainties

Cataract in A-bomb survivors: (surgical removal) (Neriishi *et al. Radiat. Res.* **168**:404-8; 2007)



Significant increase in all surgically removed cataract

EOR/Gy = 0.39 (95% CI 0.24, 0.55)

No indication of curvature in dose response ($p=0.99$), or threshold, but this and other data cannot rule out threshold <0.6 Gy