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Bikini Book

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410045

Cancer + Birth Defects Risk Calculations

R

For Envestak the following coefficients were used from BEIR I

Cancer: 2% inc./5rem or 0.0004% / mrem increase

Birth Defects: 9% inc./5rem at equil.
1st year - 1% / 5rem or 0.0002% / mrem

For cancer the bone marrow dose was used

For birth defects the whole body dose was used.

For Platin:

Platin

| | Cancer | Birth Defects |
|------------------|-------------------|----------------|
| BEIR I | 0.0004% / mrem | 0.0002% / mrem |
| BEIR III linear | 0.00014% / mrem ? | |
| linear quadratic | 0.0005% / mrem | |

Assume spontaneous incidence rates of
15% for cancer

10% for birth defects (BEIR III - 10.7% of all live births)

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Abeslut

1 run/yr (15% Ca rate)

$$1.95 \times .15 = .2925, 15.2925$$

$$14.35 \times .15 = 2.1525, 17.1525$$

$$\underline{3 \text{ runs/yr for } 30 \text{ yr}} = \frac{90}{70} = 1.286 \text{ run/yr}$$

$$1.95 \times 1.286 = 2.51\% \times .15 = .38 + 15\% = \underline{15.38\%}$$

$$14.35 \times 1.286 = 18.45\% \times .15 = 2.77 + 15 = \underline{17.77}$$

$$\underline{0.6 \text{ runs/yr for } 30 \text{ yr}} = \frac{18}{70} = 0.257 \text{ run/yr}$$

$$1.95 \times 0.257 = .50\% \times .15 = .075 + 15 = \underline{15.075}$$

$$14.35 \times 0.257 = 3.69\% \times .15 = .55 + 15\% = \underline{15.55}$$

Emerg - 100%

30 year dose - 3000 man-rem

pop - 550

Total Man-rem = 1,650,000 man-rem = 1650 person-rem

| Risk Coefficients | Relation | Absolutes |
|-------------------------|------------------------------|------------------|
| BEIR - I | $\sqrt{310/10^6}$ person-rem | 95/10 person-rem |
| BEIR - I (from BEIR II) | 568 | 115 |
| BEIR - III | 182 | 67 |

Cancer Deaths

| | | |
|--------|--|--|
| BEIR I | $\frac{310 \times 1650}{10^6} = \frac{511,500}{10^6} = 0.5$ | $\frac{95 \times 1650}{10^6} = \frac{156,750}{10^6}$ |
| | $\frac{166 \times 1650}{10^6} = \frac{273,900}{10^6} = 0.27$ | (0.16) |
| | $\frac{458 \times 1650}{10^6} = \frac{755,700}{10^6} = 0.76$ | |

a. Band on 15%
 Cancer incidence
 (3 rem - 30%)
 $83 \times 0.004 \times 3 = 0.996$

b. Band on 10%
 Cancer Deaths
 $55 \times 0.004 \times 3 = 0.66$

| | | |
|------------------------|---|---|
| BEIR I (from BEIR III) | $\frac{568 \times 1650}{10^6} = 0.937200$ | $\frac{115 \times 1650}{10^6} = 0.189750$ |
| BEIR III | $\frac{182 \times 1650}{10^6} = 0.300300$ | $\frac{67 \times 1650}{10^6} = 0.110550$ |

for their life time

15.79%

17.15%

Cancer deaths in persons who
receive 3rem each year for
30 years

Risk increases from
natural of 15% to
15.4%

Risk increases from
natural of 15%
to 18%

Cancer deaths in persons who
receive 0.6rem each year
for 30 years

Risk increases from
natural of 15% to
15.1%

Risk increases from
natural of 15%
to 15.8%

REPOSITORY PNNL
COLLECTION Marshall Islands
BOX No. 5684
FOLDER Untitled

DOCUMENT DOES NOT CONTAIN ECI

Reviewed by J. Schmitt Date 4/30/97