ECRR Risk Model and radiation from Fukushima

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Radioactivity form the Fukushima Catastrophe is now reaching centres of population like Tokyo and will appear in the USA. Authorities are downplaying the risk on the basis of absorbed dose levels using the dose coefficients of the International Commission on Radiological Protection the ICRP. These dose coefficients and the ICRP radiation risk model is unsafe for this purpose. This is clear from hundreds of research studies of the Chernobyl accident outcomes. It has also been conceded by the editor of the ICRP risk model, Dr Jack Valentin, in a discussion with Chris Busby in Stockholm, Sweden in April 2009. Valentin specifically stated in a videoed interview (available on www.llrc.org and vimeo.com) that the ICRP model could not be used to advise politicians of the health consequences of a nuclear release like the one from Fukushima. Valentin agreed that for certain internal exposures the risk model was insecure by 2 orders of magnitude. The CERRIE committee stated that the range of insecurity was between 10 and members of the committee put the error at nearer to 1000, a factor which would be necessary to explain the nuclear site child leukemia clusters. The ECRR risk model was developed for situations like Fukushima

Since the ECRR 2003 Radiation Risk Model, updated in 2010, was developed for just this situation it can be employed to assess the risk in terms of cancer and other ill health. See www.euradcom.org. It has been checked against many situations where the public has been exposed to internal radioactivity and shown to be accurate.

Using the ECRR 2010 radiation risk model the following guide to the health effects of exposure can be employed.

Take the dose which is published by the authorities. Multiply it by 600. This is the approximate ECRR dose for the mixture of internal radionuclides released from Fukushima. Then multiply this number by 0.1. This is the ECRR 2010 cancer risk.

Example 1 : the dose from exposure to radioactive milk from Fukushima is said by the authorities to be so low that you would have to drink milk for a year to get the equivalent of a CT scan dose. A CT scan dose is about 10 milliSieverts (mSv) Assuming you drink 500ml a day, the annual intake is 180litres so the dose per litre is 0.055mSv. The ECRR dose per litre is at maximum 0.055 x 600 = 33mSv. Thus the lifetime risk of cancer following drinking a litre of such contaminated milk is 0.0033 or 0.33%. Thus 1000 people each drinking 1 litre of milk will result in 3.3 cancers in the 50 years following the intake.
From the results in Sweden and elsewhere following Chernobyl, these cancers will probably appear in the 10 years following the exposure.

Example 2. : External doses measured by a Geiger counter increased from 100nSv/h to 500nSv/h. What is the risk from a weeks exposure? Because the external dose is only a flag for the internal dose we assume that this is the internal ICRP dose from the

range of radionuclides released which include radiodines, radiocaesium, plutonium and uranium particles, tritium etc. A weeks exposure is thus 400 x 10^{-9} x 24 x 7days or 6.72 x 10^{-5} Sv . We multiply by 600 to get the ECRR dose which is 0.04Sv and then by 0.1 to get the lifetime cancer risk which is 0.4%. Thus in this case, in 1000 individuals exposed for a week at this level, 4 will develop cancer because of this exposure. In 30 million, the population of Tokyo, this would result in 120,000 cancers in the next 50 years. The ICRP risk model would predict 100 cancers from the same exposure. Again we should expect to see a rise in cancer in the 10 years following the exposure. This is due to early clinical expression of pre-cancerous genomes.

Other health effects are predicted, including birth effects, heart disease and a range of other conditions and diseases. For details see ECRR2010.

These calculations have been shown to be accurate in the case of the population of Northern Sweden exposed to fallout for the Chernobyl accident, and also are accurate for the increased in cancer in northern hemisphere countries following the 1960s weapons testing fallout (the cancer epidemic). The public and the Japanese and other authorities would do well to calculate exposure risks on the basis of these approximations and to abandon the ICRP model which does not protect the public. This was the conclusion of a group of international experts who signed the 2009 Lesvos Declaration (this can be found on www.euradcom.org)

Reference:

ECRR 2010. The 2010 Recommendations of the European Committee on Radiation Risk. The health effects of exposure to low doses of ionizing radiation. Regulators Edition. EDs: Chris Busby, Alexey V Yablokov, Rosalie Bertell, Molly Scott Cato, Inge.Schmitze Feuehake, Brussels: ECRR.