Natural Radiation and Public Perception of Radiation and Associated Risks

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When unplanned releases of large amounts of radionuclides into the environment occur in nuclear plant accidents such as in Chernobyl in 1986 and more recently in Fukushima in 2011 fear and confusion are generated in public mind.*2,3 There are many reasons for this such as the lack of public knowledge concerning radiation and its effects and the legacy of the use of nuclear weapons. In addition to this in the immediate aftermath of a nuclear accident misinformation on the associated radiation risks may be disseminated either unwittingly or sometimes intentionally by sections of the media, the nuclear industry and anti-nuclear groups. In such situations it makes it very difficult for objective guidance from radiation protection agencies to be understood or accepted by the public. In the case of radiation accidents radiation protection professionals generally and properly focus on future radiation induced cancer rates in the exposed population estimated on the basis of measured contamination of the environment and food. It is now becoming clear, however, that increased rates of stress may have a significant long term public health impact on the mental and social well-being of a society even when projected radiation induced cancer rates are estimated to be insignificant. In the case of the Fukushima accident as pointed out in the UNSCEAR 2013 report non-cancerous health effects such as depression and post-traumatic stress symptoms have already been reported.*3 These problems will never be fully prevented but they might be ameliorated somewhat by raising public understanding of radiation and its effects as part of a long term educational strategy. In particular making the public aware of the exposures they continually receive from natural radiation sources may help to put exposures from accidental releases into perspective. It is of relevance here to note that while the global mean dose from the ingestion of natural radionuclides is estimated by UNSCEAR (2008) to be about 0.3 mSv/year in Japan it is more than three times higher at approx. 1.00 mSv/year.*4 This is mainly due to the large component of seafood in the Japanese diet.*4,5 Seafood, whose consumption is undoubtedly beneficial to health, does however contain higher than the average concentrations of the natural radionuclides $^{210}$Pb and $^{210}$Po that are present in land based foodstuffs. The radiation doses received from natural radiation in the environment could with good effect be presented as a benchmark or yardstick against which other doses such as those from medical procedures and from accidental releases could be compared. Prior to and following the Fukushima accident a number of initiatives by official agencies in Japan on educating the public on radiation and its effects have taken place and are in the course of revision. For example the production in 2011 (prior to the accident in Fukushima) of an information booklet on radiation by the Japanese Ministry of Education, Culture, Sport, Science and Technology for use in high

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*3 UNSCEAR Report 2013. “Levels and effects of radiation exposure due to the nuclear accident after the 2011 great east-Japan earthquake and tsunami”
schools is to be welcomed. The information it contains on natural radiation exposures could, however, be improved in future revised editions. For the general population some natural radiation exposures can present a significant health risk as according to the World Health Organisation exposure to indoor radon is considered to be the second cause of lung cancer globally after smoking. In Japan fortunately the mean dose received from indoor radon is low but Japanese scientists in institutions, most notably in NIRS, Chiba and the University of Hirosaki have a considerable international reputation in the field of the metrology of the two main isotopes of radon ($^{222}\text{Rn}$) and thoron ($^{220}\text{Rn}$). They have also in recent years carried out research in collaboration with scientific colleagues in other Asian countries most notably in India, China and Thailand on high levels of natural radiation including radon. In North America and Europe associations exist to address the reduction of the health burden due to indoor radon exposure by practical means and this year (2015) a number of them have formed an international coalition called COIRA (Coalition of International Radon Associations). In view of the public health importance of reducing indoor radon exposures globally as highlighted by UN bodies such as the WHO and IAEA the formation of an association of Asian scientists to address this and other problems due to natural radiation is long overdue. If an Asian Natural Radiation Association were formed an application from it to join COIRA would, I think, be very favourably received.

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Recent activities:
4) Consultant to International Atomic Energy Agency (IAEA) and Member of IAEA Technical Cooperation radon missions to Bulgaria, Iran and Indonesia 2009–2012.
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