Strahlenschutzkommission

Geschäftsstelle der
Strahlenschutzkommission
Postfach 12 06 29
D-53048 Bonn

http://www.ssk.de

Current Questions Concerning the Assessment of the Radiation Cancer Risk

Summary Assessment and Recommendations of the Commission on Radiological Protection as a Result of the Discussions at its Closed Meeting in 1987

Recommendation of the German Commission on Radiological Protection

Adopted at the 81st session of the Commission on Radiological Protection on February 4, 1988

The German original of this English translation was published in Volume 15
of the series “Publications by the Commission on Radiological Protection”
under the title:

Aktuelle Fragen zur Bewertung des Strahlenkrebsrisikos
Zusammenfassende Bewertung sowie Empfehlungen der Strahlenschutzkommission
aufgrund ihrer Beratungen auf der Klausurtagung 1987

Empfehlung der Strahlenschutzkommission

In the event of any doubts about the meaning,
the German original as published shall prevail.

Table of Contents

Introduction

At its closed meeting at Bad Münstereifel on November 5 and 6, 1987, within the frame of its 79th meeting, the Commission on Radiological Protection gathered information, among other things, on the following subjects:

1. New dose determinations /Ro 87/ and new data on the cancer mortality of the atomic bomb survivors of Hiroshima and Nagasaki and its dependence on the survivors' age at the time of the exposure /Pr 87; Si 87; IC 87.1/.

2. Models and assumptions contained in the epidemiological tables of the U.S. National Institutes of Health (NIH) /NIH 85/ for the estimation of the probability of cancer causation by a preceding exposure to ionizing radiation, as well as the possibilities and difficulties of an application of these tables to the Federal Republic of Germany.

3. Results of epidemiological studies of occupationally exposed persons at nuclear facilities and medical institutions as well as groups of the public in the vicinity of nuclear facilities.

4. Recent findings concerning the causation of lung cancer by radon such as they have been included in ICRP (International Commission on Radiological Protection) Publication 50 /IC 87.2/ and in Report IV – not yet published – of the National Academy of Sciences Committee on Biological Effects of Ionizing Radiation (BEIR)[1]; moreover, on recommendations and measures of other states aiming at a reduction of the concentration of radon indoors.

The Commission on Radiological Protection (hereinafter referred to as "SSK") discussed the results of the closed meeting in detail and submits the following summary assessment and recommendations with respect to the various items:

1 New Dose Determinations and new Data on the Cancer Mortality of the Atomic Bomb Survivors of Hiroshima and Nagasaki

The SSK discussed the new estimates for the risk factors of the carcinogenic effects of ionizing radiation and approved the following recommendation with respect to occupational radiation exposure /BA 88/:

"Recent dose determinations for the atomic bomb survivors of Hiroshima and Nagasaki and the results of the follow-up of the epidemiological studies indicate that higher estimates are likely to result than have hitherto been assumed for the risk factors of the carcinogenic effects of ionizing radiation. Although the results are still of a preliminary nature, they led to an international discussion of the limits in occupational radiation exposure.

---

[1] The report has meanwhile been published:
National Academy of Sciences: Health Risks of Radon and other Internally Deposited Alpha Emitters, National Academy Press, Washington, D.C., 1988

At its meeting in Como in 1987, the ICRP made it clear that it is at present in the process of reviewing its basic recommendations as published in ICRP Publication 26 in 1977.

At present, the SSK sees no necessity for a change of the dose limit of 50 mSv a year for occupationally exposed persons which is valid in the Federal Republic of Germany. A decision on a possible change of this limit should not be made before the international discussion has come to an end. The ICRP expects its results to be available by 1990.

In order to take into account the recent state of scientific findings and the emerging trend, and without prejudicing future international recommendations, the SSK recommends to proceed in an even more stringent way than hitherto with the minimization of the radiation exposure of occupationally exposed persons. Besides the dose limit, the minimization requirement has always been the basis for the limitation of occupational radiation exposure. The statistics of occupational radiation exposure in the Federal Republic of Germany show that this principle has been successful.

Taking into consideration the minimization requirement, the SSK recommends to proceed as follows in future:

- *Retaining the annual dose limit as contained in the Radiological Protection Ordinance, the overall dose of 400 mSv should not be exceeded in the course of an individual's working life.*

The specification of this dose limit is considered by the SSK as another measure to maintain the risk of occupational radiation exposure at a level comparable with that of other safe occupations, and as a concretization of its recommendation – already made after the closed meeting in 1985 – concerning occupational radiation exposure, i.e. to avoid any higher exposure of individuals during a number of years in succession."

2 Epidemiological Tables

The epidemiological tables are intended as a tool for the experts who, when a disease occurs, have to consider whether and/or with which probability the disease can be traced back to a radiation exposure. The tables refer to conditions as they prevail in the United States. They do not constitute an original source of scientific findings but an application of the respective state of knowledge that is assumed to be valid with regard to risk factors and risk models and therefore have to be reviewed at regular intervals.

The SSK feels that similar tables should be prepared for the Federal Republic of Germany. In this country, too, they could be helpful for the experts dealing with insurance matters or testifying in lawsuits.

The closed meeting made it clear that the epidemiological tables which are available for the United States cannot be applied right away to the Federal Republic of Germany. Therefore, to begin with, the SSK recommends to use – as a first approximation – tables such as they were prepared for Phase B of the Risk Study. These tables are based on more recent epidemiological data. The risks data contained in the tables of Phase B of the Risk Study, still based on the old dose estimates, could be increased in line with the new dose estimates.

As far as the application of the data to the Federal Republic is concerned, it might be possible, in line with the approach chosen for the US NIH Study, first to use the absolute increases in incidences with respect to the individual types of tumors and then convert these data into a relative risk in keeping with demographic conditions as they prevail in the Federal Republic of Germany.

However, in the Federal Republic of Germany there are no cancer registers, and consequently no data on spontaneous, age-dependent cancer incidences. It is therefore suggested, to use age-specific incidences from the USA and multiply them by the respective ratio of the age-specific, organ-specific mortalities in the Federal Republic of Germany and in the USA. There are certain indications that such an approach appears to be admissible. A review of the tables and the assumptions on which they are based will given in due time.

3 Epidemiological Studies

In the United Kingdom and in the United States, more extensive epidemiological studies on occupationally exposed persons are being carried out. However, the SSK feels that there is a certain deficit with respect to epidemiological research concerning occupationally exposed persons in the Federal Republic of Germany. In this context, reference is made to the establishment of a central individual dose register as it has been repeatedly demanded by the SSK. On the one hand, such a register would permit epidemiological investigations and on the other, it would be necessary for the detection of radiation-induced occupational illnesses.

In its demand for such a register, the SSK knows that it is in agreement with the industrial compulsary accident institutes (“Berufsgenossenschaften”). It supports the activities of the workmen's compensation associations aiming at the introduction of routine medical examinations of persons who are occupationally involved in the handling of carcinogenic materials or ionizing radiation. Within the scope of this preventive program, the establishment of a register of the mortality and morbidity of occupationally exposed persons is planned as well. The opinion of the SSK is that such a register will make a necessary and important contribution to radiological protection.

4 Radiation Risk from Indoor Exposure to Radon and Radon Daughters

At its 29th meeting on April 24 and 25, 1980 /SSK 85/ and its 62nd meeting on November 6 - 8, 1985 /SSK 87/, the SSK had already issued comments with respect to the subjects of indoor exposure to radon and the induction of lung cancer due to an exposure to radon.

As a supplement to and concretization of its recommendation of 1985, the SSK suggests to prepare a brochure containing clear-cut and understandable information on what radon is, where it comes from, what it can do and how its concentration can be kept low indoors. The brochure should be addressed to persons involved in the building of houses, house and home owners and the interested layman. It should be available at local authorities such as county offices, townhalls, etc. Reference should be made to institutions which might provide further advice beyond what is contained in the brochure, e.g. concerning the rehabilitation of houses. A press release should be used to draw attention to the publication of the brochure.

The SSK will continue to follow the international discussion on the assessment of the risk of lung cancer by radon and radon daughters. In principle, the Commission considers it reasonable to carry out an epidemiological study on the risk of lung cancer by radon in the Federal Republic of Germany, since due to the relatively high number of cases the exposure to radon is the only instance that permits statistically reasonable surveys on the detection of the effects of small doses.

The SSK suggests to further expand the collective of the Federal Republic of Germany in order to plan the study, in particular with respect to higher radiation doses, in such away that the results will be comparable with those of current studies in other countries, above all the United Kingdom, the Scandinavian countries and the USA.

5 References

/BA 88/ Empfehlung zur Begrenzung der beruflichen Strahlenexposition. Empfehlung der Strahlenschutzkommission, verabschiedet auf der 80. Sitzung am 11. Dezember 1987. Bundesanzeiger Nr. 5, S. 64 vom 9. Jan. 1988.

/IC 87.1/ International Commission on Radiological Protection:
Statement from the 1987 Como Meeting of the International Commission on Radiological Protection, ICRP/87/G-05.
Como, September 1987.

/IC 87.2/ International Commission on Radiological Protection:
Publication 50: Lung Cancer Risk from Indoor Exposures to Radon Daughters. Annals of the ICRP, Vo. 17, No. 1, 1987.
Pergamon Press, Oxford.

/NTH 85/ Report of the National Institutes of Health Ad Hoc Working Group to Develop Radioepidemiological Tables.
NIH - Publication No. 85-2748, U.S. Department of Health and Human Services, Washington 1985.

/Pr 87/ D.L. Preston, D.A. Pierce:
The Effect of Changes in Dosimetry on Cancer Mortality Risk Estimates in the Atomic Bomb Survivors.
RERF TR 9-87, Radiation Effects Research Foundation, 5-2 Hijiyama Park, Hiroshima, Japan 1987.

/Ro 87/ W.G. Roesch:
The Dosimetry of the Atomic Bombs at Hiroshima and Nagasaki. RERF - Final Report. Radiation Effects Research Foundation.
Hiroshima, Japan 1987.

/Si 87/ W.K. Sinclair, D.L. Preston:
Revisions in the Dosimetry of the A-bomb Survivors at Hiroshima and Nagasaki and their Consequences.
8th International Congress of Radiation Research,
Edinburgh, 19.-24.7.1987.

/SSK 85/ Veröffentlichungen der Strahlenschutzkommission:
Hrg.: Bundesminister des Innern, Bd. 1.
Empfehlungen der Strahlenschutzkommission zu speziellen Fragen des Strahlenschutzes in den Jahren 1974 - 1984.
Gustav Fischer Verlag, Stuttgart 1985.

/SSK 87/ Veröffentlichungen der Strahlenschutzkommission:
Hrg.: Bundesminister für Umwelt, Naturschutz und Reaktorsicherheit, Bd. 6.
Empfehlungen der Strahlenschutzkommission 1985/1986.
Gustav Fischer Verlag, Stuttgart 1987.