Medical and Radioecological Consequences of the Chernobyl Catastrophe in Western Europe

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SAKHAROV READING 2016
ENVIRONMENTAL PROBLEMS OF THE XXI CENTURY
May 19-20, 2016, Minsk Republic of Belarus
26.04.1986 After the explosion at the Chernobyl nuclear power plant, a huge amount of radionuclides was distributed over large parts of Europe.
The International Chernobyl Project
Assessment of Health Consequences

Organized by UN-Organisation IAEA with support of UNSCEAR, WHO, FAO and Countries of EC, USA, Japan etc.

The study were perfomed by 200 scientists from 25 western countries and 500 Soviet scientists in the period January 1990 - February 1991.

The data and results were evaluated by an International Advisory Committee of the IAEA.

Presented at the
International Conference in Vienna, May 1991
The International Chernobyl Project
May 1991 - IAEA, WHO, UNSCEAR, FAO, EC, USA, Japan etc.

General Conclusions

There were significant non-radiation-related health disorders in the populations of both surveyed contaminated and surveyed control settlements studied under the Project, but no health disorders that could be attributed directly to radiation exposure. The accident had substantial negative psychological consequences in terms of anxiety and stress due to the continuing and high levels of uncertainty, the occurrence of which extended beyond the contaminated areas of concern. These were compounded by socioeconomic and political changes occurring in the USSR.

The official data that were examined did not indicate a marked increase in the incidence of leukaemia or cancers. However, the data were not detailed enough to exclude the possibility of an increase in the incidence of some tumour types. Reported absorbed thyroid dose estimates in children are such that there may be a statistically detectable increase in the incidence of thyroid tumours in the future.

On the basis of the doses estimated by the Project and currently accepted radiation risk estimates, future increases over the natural incidence of cancers or hereditary effects would be difficult to discern, even with large and well designed long term epidemiological studies.
The International Chernobyl Project
May 1991 - IAEA, WHO, UNSCEAR, FAO, EC, USA, Japan etc.

„...but no health disorders that could be attributed directly to radiation exposure …“

This statement of IAEA, UNSCEAR etc. was wrong and a trivializing pretension due to the fact that a large number of thyroid cancer cases in children in Belarus and Ukraine has been verified already until December 1990.

Soil contamination $^{137}$Cs.
The situation in Belarus after the Chernobyl catastrophe
Distribution of Chernobyl-Fallout (Cs-137) in Belarus

EU-Atlas 1998

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In Belarus the number of thyroid cancer cases in children in 1990 due to radioactive iodine from Chernobyl was nearly 30 times higher than in 10 years before the accident.
Incidence of Thyroid Cancer in Belarus 1976 - 2004

Quelle: Nationales Schilddrüsenzentrum Belarus und Otto Hug Strahleninstitut - MMH

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What about the consequences in Western Europe?
South Bavaria
a part of the Federal Republic of Germany
Chernobyl-Fallout in Germany and Switzerland

1998 EU-Atlas: Official Report of the European countries: distribution of Cs-137 by the Chernobyl fallout in Germany and Switzerland

Soil contamination $^{137}\text{Cs}$

South Bavaria
Radiation cartography in South Bavaria
(Gamma dose rate)

- Summer 1987
- 3 teams of the Radiobiology Institute of University of Munich
- 3749 measured plots
- mean distance: 4 km

The scientists of these teams founded the Otto Hug Strahleninstitut in 1990
South Bavaria:
more than 1000 km distance to Chernobyl Nuclear Power Plant

Very inhomogeneous deposition of 134 Cs and 137 Cs

Very low Gamma dose rate before Chernobyl
Higher background in East Bavaria due to granite in the ground

Gamma dose rate after Chernobyl, max. 0.30 μSv/h

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Nuklides depositions correspond to rain precipitation April 30 until May 11 in South Bavaria

Map of gamma dose rate – Summer 1987

Rain precipitation on April 30, 1986
Concentration of I-131, Te-132, Cs-137 in air in Munich after Chernobyl


30.04.1986

2016: Bundesamt für Strahlenschutz
Bavaria 1986

Cs-137 contamination on a district level

1999: Scherb et al.
Television show (03.02.1987)
Alfred Dick,
Minister of Environment
of the Bavarian Government,
eating highly contaminated milk
powder (ca. 8000 Bq/kg)
"Des tut mir nix!"
„This does‘nt harm me“

A deliberate
deception
of the public!
Bavaria
(Inhabit. 12 Mio, area ca. 70 000 km²)

Bavarians like to eat „fruits“ of the forests e.g. game, mushrooms

More than 65 000 wild pigs shot annually

2013: percentage of measured wild pigs exceeding food limits of 600 Bq/kg (the hunter have to destroy this wild pigs)

max. in 2014: 48 000 Bq/kg
2012: Mushrooms in Bavaria

Maronenpilz (Xerocomus badius) up to 2000 Bq/kg FM - Regen

Pfifferling (Cantharellus cibarius) up to 1500 Bq/kg FM - Hof

Weißer Rasling (Lyophyllum connatum) up to 7380 Bq/kg FM – Garmisch Partenkirchen

Info: Bayerisches Landesamt für Umwelt
Stillbirth rates in Europe after Chernobyl 1980 to 1992

Figure 1 Map of Europe with the countries included in the synoptic model and population-weighted deposition of Cs–137. West – light, Central – medium, East – dark, White – countries excluded for none or incomplete data or unknown or changed stillbirth definition in 1980 to 1992

Scherb et al. 1999
Chernobyl effect: The stillbirth rate in Eastern Europe differs from 1986 on from the expected regression curve significantly

Scherb et al. 2001
Chernobyl effect: The stillbirth rate in affected countries in Europe differs from 1986 on from the expected regression curve significantly (1600 additional cases)
Stillbirth rates in higher contaminated districts in Bavaria

2013: Scherb H., Voigt K.
Stillbirth proportion in Germany 1980 - 1993

Totgeburtlichkeit in Deutschland 1980 - 1993; optimiertes Sprungmodell, Trend mit Krümmungswechsel

2013: Scherb H., Voigt K.
Significant increase in trisomy 21 (mongolism) in West Berlin nine months after the Chernobyl reactor accident

Monthly prevalence

Sperling et al. British Medical J. 1994

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Thyroid cancer after Chernobyl in the Czech Republic

*Figure 1.* Districts of the Czech Republic (CR). West Bohemian districts (light) used for sample validation of the Czech Cancer Registry, and also as a less exposed region of the Czech Republic (2.3–2.8 kBq/m² Cs-137) compared to the remainder (dark) of the Czech Republic (5.3 kBq/m² Cs-137) [17].

Med Sci Monit, 2004; 10(7); CR300-3006
Mürbeth, S; Rousarova, M; Scherb, H; Lengfelder E.

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Thyroid cancer after Chernobyl in the Czech Republic

Analysis based on 247 Mio person years

Figure 2. Crude and directly age-standardized incidence of thyroid carcinoma in females, males and both genders combined in the Czech Republic, change-point (CP) and reduced change-point (CPr) linear logistic regression models (see Table 1).

Med Sci Monit, 2004; 10(7); CR300-3006
Result and Conclusion

Our study shows an additional increase in thyroid cancer incidence in the Czech Republic starting 4 years after the Chernobyl accident.

Additional Comments

• The study was performed in the Czech Republic due to the existence of a complete cancer registry.

• In Bavaria the radioiodine deposition was much higher, but there is no complete cancer registry available.
Thyroid cancer in children and young adults in the North of England. Is increasing incidence related to the Chernobyl accident?*

These temporal and spatial changes in incidence are consistent with a causal association with the Chernobyl accident …

Finnland
an increase of stillbirth – a dose effect?

Scherb et al., 2013
IONIZING RADIATION

United Nations Scientific Committee on the Effects of Atomic Radiation

UNSCEAR 2008
Report to the General Assembly with Scientific Annexes

VOLUME II

Annex D
Health effects due to radiation from the Chernobyl accident

Aktueller Bericht der UN zu Gesundheitsfolgen der Tschernobyl-Katastrophe (März 2011)
UNSCEAR-Report 2011
United Nations Scientific Committee on the Effects of Atomic Radiation

The following statement was adopted by the 157 scientists of the National Delegations of the 27 Member States of UNSCEAR.

70. There is little suggestion of increased thyroid cancer incidence among those exposed as adults in the general population.

This statement is definitely not true !!!
Thank you for your attention