

Work of the WHO's Expert Group "Health" for the UN Chernobyl Forum (2003-2005)

World Health Organization

WHO Objectives

Under the UN Chernobyl Forum, WHO was responsible:

- To nominate internationally recognized experts and researchers on health effects of the Chernobyl accident to participate in Expert Groups
- To organize expert group meetings
- To facilitate the production of scientific reports on the results of the expert meetings
- To produce a simple report for the people most affected by the accident

EGH Objectives (1)

- To assess the best available scientific evidence to produce authoritative consensus statements on health effects:
  - directly related to radiation exposure
  - attributable to the accident but not related to radiation exposure

EGH Objectives (2)

- to identify gaps in knowledge and suggest areas where further research is required
- to provide advice on special health care programs
- to provide information to stakeholders

WHO/EGH Meetings

- Thyroid studies — Dec 2003
- Cancer and leukaemia — April 2004
- Non-cancer effects and special health care programmes — Sept 2004
- Editorial Meeting — Jan 2005

EGH Report: Contents

- General and methodological issues
- Summary of UNSCEAR-2000 report
- Dosimetry (thyroid and whole body)
  - Emergency workers
  - General population
- Specific outcomes (continued)

EGH Report: Contents (2)

- Specific Outcomes
  - Thyroid diseases
  - Leukaemia
  - Solid cancers
  - Non-cancer health effects
    - Cardiovascular, reproductive, immune, genetic, cataract studies, mental health and psychological effects
    - Mortality
- Health care programs

Sources

- UNSCEAR-2000 report
- Peer-review scientific journals
- PubMed search
- Proceedings of international conferences
- National reports
- Personal communication

Methodological Issues

- Two types of epidemiologic studies:
  - Descriptive (ecological, population, cross-sectional, etc) – less informative
  - Analytical (cohort and case-control) – best evidence
- Good dosimetry is must-have for a radiation epidemiological study
- Biological studies (histopathology, molecular biology, immunology, citogenetics, etc)

Dosimetry

- Thyroid doses (ingestion, inhalation, and external)
  - Direct individual measurements
    - done on 25,000 people (BY and UA), with median dose ~ 0.3 Gy, (for 20% of cohort more than 1 Gy)
    - Bryansk cohort –
  - Reconstructed population doses are available in national catalogues for general public and in dose registries for emergency workers, good for descriptive studies

Dosimetry (2)

- Whole body doses (internal and external)
  - Recovery operations workers
    - Emergency workers (not considered in the report)
    - Clean-up workers (mean doses ~250 mGy in 1986, 50 mGy in 1988)
  - General population
    - Those evacuated in 1986
    - Those evacuated after 1986
    - Residents of contaminated areas

Recommendations on Dosimetry

- Inter-compare the methods for dose estimation
- assess the reliability of the interviews
- estimate the doses received *in utero*
- derive absorbed doses from the effective doses available in the national catalogues
- estimate the doses resulting from intakes of ^{90}Sr and ^{239}Pu

EGH-1: Thyroid studies

- Summary of current state of the Chernobyl thyroid research
- Identification of major scientific debate issues and gaps in knowledge on thyroid disease after Chernobyl
  - effects of age at exposure
  - screening effect
  - dose estimates
  - role of short-lived isotopes
  - histopathology of Chernobyl thyroid cancer
  - benign thyroid disease
- Recommendations for future research on thyroid cancer
- Radiation and thyroid cancer: risk communication and need to inform the general public

Thyroid Studies: Conclusions

- Huge increase in thyroid cancer incidence in children, especially younger than 15 at the time of the accident
- Dose-response – association of childhood thyroid cancer risk with thyroid dose
- Molecular biology – specific genetic mutations in thyroid cells which is consider a fingerprint of radio-iodine exposure
- Treatment is very successful – survival 99%
- Continuous monitoring is needed

Gaps in knowledge

- Magnitude and shape of dose response curve
- Risk in adults
- Risk form exposure in utero
- Life-time risk projection (plateau – no decrease is expected for next 15 years)
- Role of iodine deficiency and thyroid blocking by KI
- Role of screening and net benefit
- Quality of life in people treated for childhood thyroid cancer

Recommendations

- Continue monitoring of those exposed as children
- Continue epidemiologic surveillance and research on those exposed to ^{131}I in childhood
- Conduct studies on those exposed *in utero* and on those exposed as adults
- Conduct cost-benefit analysis to assess the net value of large-scale screening programs

Recommendations (2)

- Continue molecular biology research (Tissue Bank, radiation biomarkers, target genes for new therapeutic approaches)
- Improvement of existing treatments techniques and development of new techniques
- Studies on quality of life of childhood thyroid cancer survivors
- Studies on non-cancer thyroid diseases

EGH-2: Leukaemia and Solid Cancer

- Leukaemia studies
  - in clean-up workers
  - in members of public (adult, children, in-utero studies)
- Non-thyroid solid cancers
  - in clean-up workers
  - in members of public
- Gaps in knowledge
- Recommendations for future research directions

Conclusions - Leukaemia

- In studies on A-bomb survivors and RT patients increase in leukaemia risk occurred during first 10 years after exposure
- Leukaemia risk appeared to be increased in studies on Russian liquidators exposed to high doses (more than 150 mSv)
- No evidence for, or against increase in leukaemia among members of public (adults and children, or in-utero)

Conclusions – Solid cancers

- Solid cancers latency is long (20-25 years)
- So far, no strong evidence for increased risk for solid cancers other than thyroid
- The possibility of such increase cannot be ruled out, and if occurred, it would be greatest in liquidators, especially in those received highest doses
- Large uncertainties in dose estimates call for considerable caution in interpretation of findings

Recommendations

- Continue collecting data on affected populations through national registries
- Conduct analytical studies with individual dose estimations
- Continue large-scale analytical studies on liquidators.
- Registries on three countries should develop and adopt common protocol/standards for comparability
- Consider possibility of combining cohorts in three countries

The 3rd EGH Meeting

- Mortality in clean-up workers
- Cataract studies
- Cardiovascular diseases
- Reproductive health
- Cytogenetic effects
- Neuro-psychiatric effects
- Psychological effects
- Monitoring/Special health care, rehabilitation programs

Specific Questions to Address

1. How many people died as a result of the accident and how many are likely to die in the future?
2. What diseases have already resulted or might occur in the future from the Chernobyl radiation exposure?
3. Have there been or will there be any inherited or reproductive effects?
4. What are psychological or mental health effects of the accident?
5. What can local or national authorities do to alleviate current or future health consequences?

Health care programmes and medical monitoring

- Provision of health care after the accident was extremely difficult due to the wide geographical dispersion of radionuclides, uncertainty about the accident, continuing releases and limited resources.
- Even given these problems, initial medical care was excellent for the highly exposed persons and immediate evacuation of people undoubtedly saved many lives.

Health care programmes and medical monitoring (1)

Three general categories of patients are considered:

- Clinical care
- Medical monitoring of the general population
- Follow-up for "epidemiological" purposes

Health care programmes and medical monitoring (2)

Clinical care

- Persons who receive high doses (>1 Gy whole body, or >5 Gy local) resulting in deterministic health effects (e.g. skin burns, cataracts) should have initial medical care and follow-up

Health care programmes and medical monitoring (3)

Medical monitoring of the general population

- Diagnostics tests for early detection of adverse health outcomes.
- For most radiation-exposed populations monitoring is primarily directed towards detection of neoplasms.
- A subcategory of medical monitoring is follow-up of potentially "sensitive subgroups", e.g. children

Health care programmes and medical monitoring (4)

Follow-up for "epidemiological" purposes

- Studies to relate effects to doses received, primarily for the purposes of scientific advancement but not for directly benefiting the individuals involved

Guidance for health care

This section of the report gives guidance for:

- health care based on radiation doses received
- Monitoring and screening based on cost-effectiveness of the technique used and health outcome
- Usefulness of requiring annual medical examinations of populations at risk
- Identification of sensitive populations
- Potential usefulness of epidemiological studies
- Recommendations for medical monitoring and health care

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WHO EGH meetings in 2003-2005