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The System of Radiological Protection: A Medical and Public Health Perspective

World Health Organization

Outline

- Introduction
- The system of Radiological Protection in medicine
- Areas of improvement
  - Implementation issues
  - Scientific and ethical issues
  - Dissemination potential
- Conclusion

World Health Organization

- **Function**: act as the UN directing and coordinating authority on international health work
- **Objective**: attainment by all peoples of the highest possible level of health
- **Definition**: "HEALTH is a state of COMPLETE physical, mental and social well-being and not merely the ABSENCE of disease or infirmity" (*Constitution, 1948*)

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Ministries of Health (193 Member States)

PEOPLE

Last but not least, WHO is people. Over 8000 public health experts including doctors, epidemiologists, scientists, managers, administrators and other professionals from all over the world work for WHO in 147 country offices, six regional offices and at the headquarters in Geneva, Switzerland.

When diplomats met in San Francisco to form the United Nations in 1945, one of the things they discussed was setting up a global health organization. WHO's Constitution came into force on 7 April 1948 – a date we now celebrate every year as World Health Day.

Delegates from 53 of WHO's 55 original member states came to the first World Health Assembly in June 1948. They decided that WHO's top priorities would be malaria, women's and children's health, tuberculosis, venereal disease, nutrition and environmental sanitation – many of which we are still working on today. WHO's work has since grown to also cover health problems that were not even known in 1948, including relatively new diseases such as HIV/AIDS.

1948

International Classification of Disease

WHO took over the responsibility for the International Classification of Disease (ICD), which dates back to the 1850s and was first known as the International List of Causes of Death. The ICD is used to classify diseases and other health problems and has become the international standard used for clinical and epidemiological purposes.

1952 Dr Jonas Salk (US) develops the first successful polio vaccine.

1967 South African surgeon Christiaan Barnard conducts the first heart transplant.

1974 The World Health Assembly adopts a resolution to create the Expanded Programme on Immunization to bring basic vaccines to all the world's children.

1977 The first Essential Medicines List appeared in 1977, two years after the World Health Assembly introduced the concepts of "essential drugs" and "national drug policy". 156 countries today have a national list of essential medicines.

1952–1964

Global yaws control programme

One of the first diseases to claim WHO's attention was yaws, a crippling and disfiguring disease that afflicted some 50 million people in 1950. The global yaws control programme, fully operational between 1952-1964, used long-acting penicillin to treat yaws with one single injection. By 1965, the control programme had examined 300 million people in 46 countries and reduced global disease prevalence by more than 95%.

1974

Onchocerciasis control programmme

WHO worked for 30 years to eliminate onchocerciasis – or river blindness – from West Africa. 600 000 cases of blindness have been prevented and 18 million children spared from the disease. Thousands of farmers have been able to reclaim 25 million hectares of fertile river land that had been abandoned because of the risk of infection.

Mr Ali Maalin (left), from Somalia, was the last person known to be infected with smallpox. Here he stands with the doctor who treated him more than 25 years ago. Ali has since worked on polio eradication campaigns.

1979

Eradication of smallpox

The eradication of smallpox – a disease which had maimed and killed millions – in the late 1970s is one of WHO's proudest achievements. The campaign to eradicate the deadly disease throughout the world was coordinated by WHO between 1967 and 1979. It was the first and so far the only time that a major infectious disease has been eradicated.

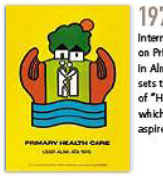
1983 Institut Pasteur (France) identifies HIV.

2003

WHO Framework Convention on Tobacco Control

21 May 2003 was a historic day for global public health. After nearly four years of intense negotiations, the World Health Assembly unanimously adopted WHO's first global public health treaty. The treaty is designed to reduce tobacco-related deaths and disease around the world.

2004 Adoption of the Global Strategy on Diet, Physical Activity and Health.



1978 The International Conference on Primary Health Care, in Alma-Ata, Kazakhstan sets the historic goal of "Health for All" – to which WHO continues to aspire.

1988

Global Polio Eradication Initiative established

Since its launch in 1988, the Global Polio Eradication Initiative has reduced the number of cases of polio by more than 99% – from more than 350 000 per year to 1956 in 2006. Spearheaded by national governments, WHO, Rotary International, the US Centers for Disease Control and Prevention and UNICEF, it has immunized more than two billion children thanks to the mobilization of more than 20 million volunteers and health workers. As a result, five million children are today walking, who would otherwise have been paralysed, and more than 1.5 million childhood deaths have been averted.

THE GOAL IS TO ERADICATE POLIO WORLDWIDE SO THAT NO CHILD WILL EVER AGAIN BE PARALYZED BY THIS DISEASE.

2003 Severe Acute Respiratory Syndrome (SARS) first recognized and then controlled.

2005 World Health Assembly revises the International Health Regulations.

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WHO's core functions

1. Articulate **ethical and evidence-based** policy positions
2. Setting **norms and standards**, and promoting and monitoring their implementation
3. Shaping the **research agenda**, and stimulating the generation, translation and dissemination of valuable knowledge
4. Providing **technical support**, catalysing change and developing sustainable institutional capacity
5. **Monitoring** the health situation and **assessing** health trends
6. Providing leadership on matters critical to health and engaging in **partnerships** where joint action is needed

These core functions encompass Radiation Protection

1. Articulate **ethical and evidence-based** policy positions
2. Setting **norms and standards**, and monito their implementation
3. Shaping the **research agenda**, translation and dissemination o
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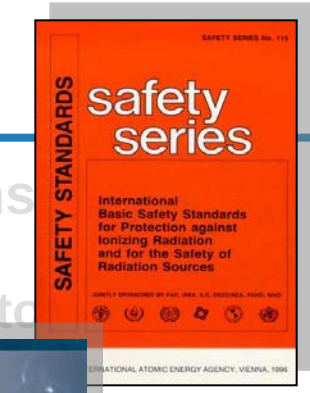

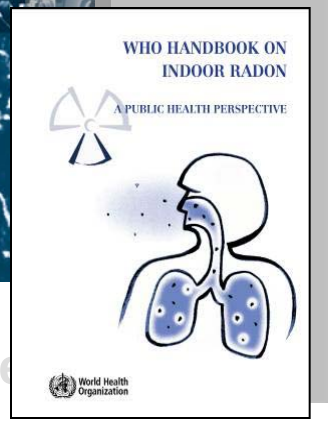

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WHO Partners in Radiation Protection

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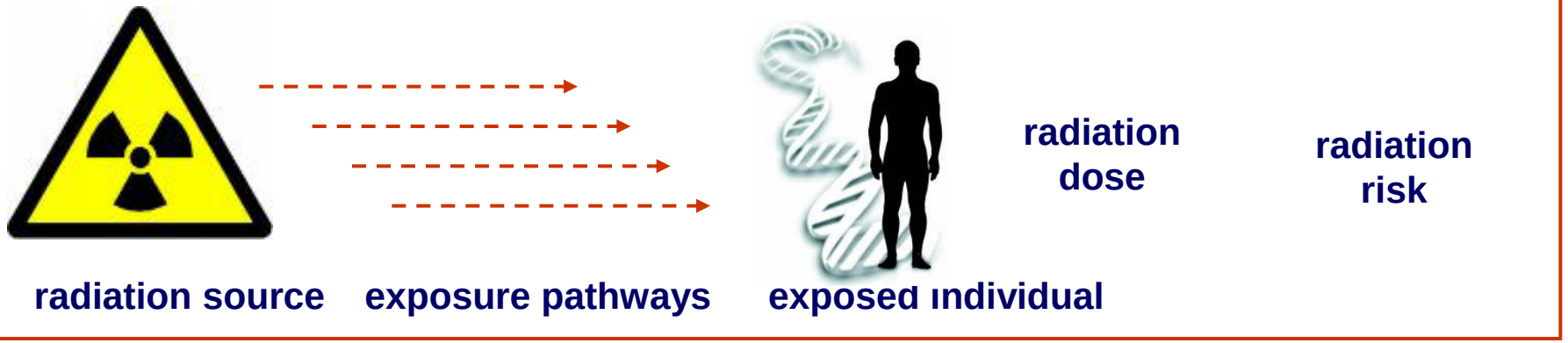
ICRP collaboration with WHO

- ICRP in official relations with WHO since 1956
- Joint plan of work, approved by the WHO Executive Board
- Several current and recent activities (Hinari access, translation of ICRP documents, collaboration in scientific meetings, …)

The System of Radiological Protection (RP)

- Purpose
  - To provide an appropriate level of protection for people and the environment against the detrimental effects of radiation exposure without unduly limiting the benefits that may be associated with such exposure.

- Source-related approach and individual-related approach



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ICRP System of Radiological Protection

- Three **principles**
  - Justification
  - Optimization
  - Limitation
- Three **categories of exposure**
  - Public
  - Occupational
  - Medical
- Three **exposure situations**
  - Planned
  - Existing
  - Emergency

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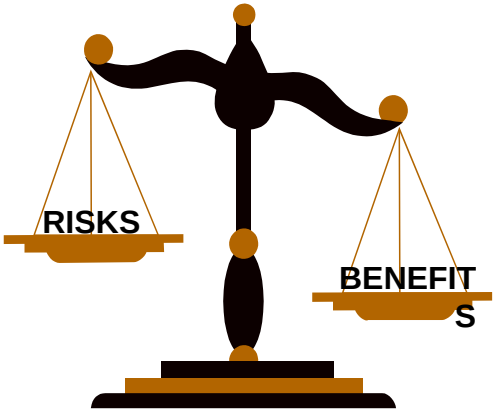
Radiation in health care

- Medicine represents the largest contribution to the exposure of the population from artificial sources of IR (**95%**)
- Only exceeded worldwide by natural background as a source of exposure
  - Almost equal to natural background as a source of exposure to the population in US (NCRP Report 160)
  - Similar trend in other countries

Challenges in RP in health care

- To control and minimize health **risks**, while maximizing the **benefits**
- Achieving this balance is particularly challenging in medicine
- Preventing adverse effects / unintended exposures is also a big challenge



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Radiological protection of patients

- RP of patients has **unique considerations** that affect how the fundamental principles are applied

  - The **same person** receives the **benefits** and the **risks** associated with the procedure
  - The exposure is **intentional**
    - in radiotherapy, the delivery of radiation is the very purpose of the procedure
    - in medical imaging, the delivery of radiation is not the aim, but it is also intentional to obtain a diagnosis, to guide an intervention or to follow the course of a disease already diagnosed and/or treated

System of Radiological Protection in Medicine

- **Exposure situations**
  - Planned
  - Existing
  - Emergency
- **Principles**
  - Justification
  - Optimization
  - Limitation
- **Categories of exposure**
  - Medical
  - Occupational
  - Public

Justification in medicine

Applies at three levels in the use of radiation in medicine

1. Do more good than harm to the patient
2. A **specified procedure** with a specified objective is defined and justified to improve diagnosis or treatment
3. The application of a procedure to an **individual** should be justified

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Optimization in medicine

- The dose to the patient should be managed to ensure that it is commensurate with the medical purpose
- The goal is to use the appropriate dose to obtain the desired image or to deliver an effective therapy (not more nor less)
- Optimization is linked to justification

ICRP System of Radiological Protection: Is it fit for Purpose?

Overall, the RP system is fit for purpose

but ….

could be improved in several areas

- Education
- Implementation
- Scientific points
- Ethical considerations

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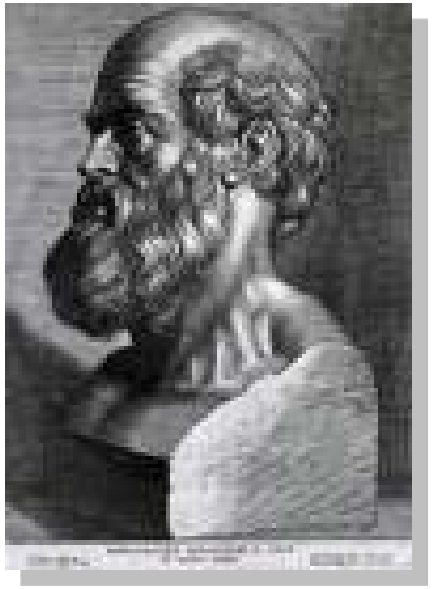
Awareness issues

- The two principles of RP for medical exposures (justification and optimization) are implicit in the concept of "First do no harm"

" Primum non nocere"



Hippocrates (460 BC-377 C)

- But in general, health professionals are not familiar with these principles and have a low awareness of radiation doses and risks

- Education and training are needed

Implementation Issues

- **Complex setting**
  - The health care facility encompasses all three categories of exposure (medical, occupational, public)
  - The RP system includes patients, fetus, carers, comforters and biomedical research volunteers

Implementation Issues

- **Complex notions and terminologies**
  - Not easy to be interpreted and implemented by health policy-makers…and even less by health care providers…

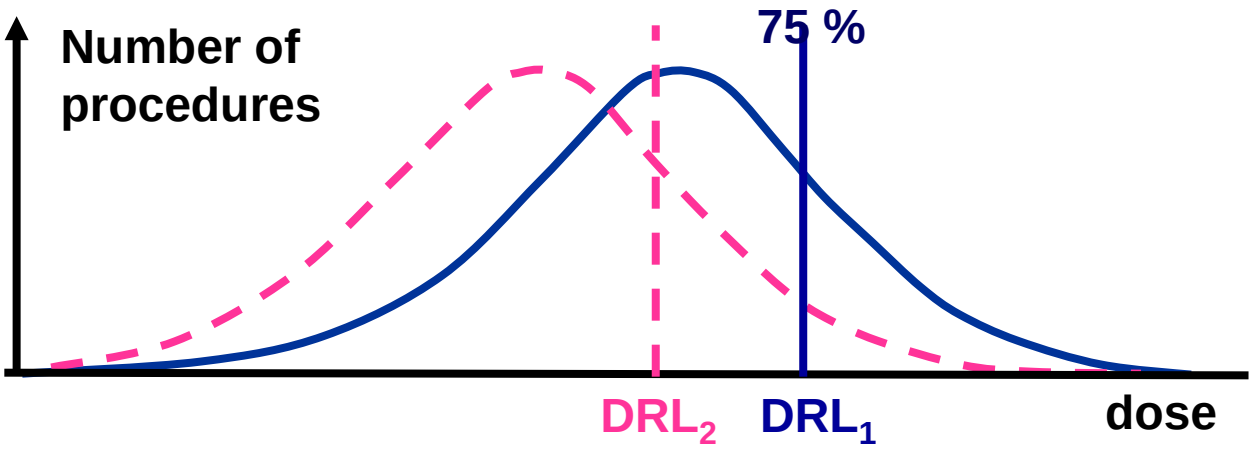
Dose limits

Dose constraints

Diagnostic reference levels

Scientific questions

- **Diagnostic Reference Levels (DRLs)**
  - to identify situations where the levels of patient dose or administered activity are unusually **high or low**
  - **DRL**s are often misinterpreted and/or misused…
  - Further guidance is needed for health professionals



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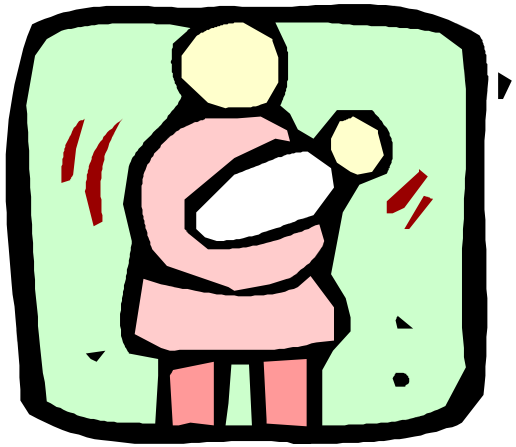
Scientific questions (cont'd)

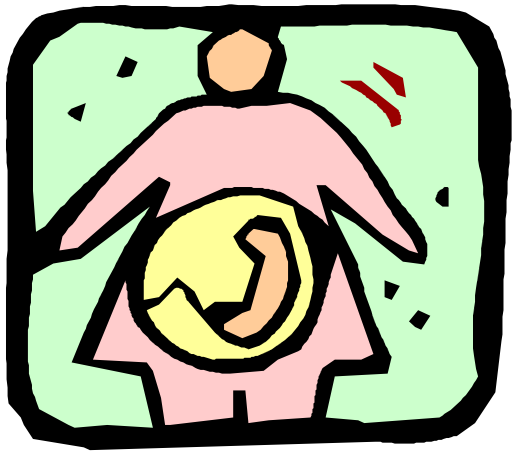
- **Concept of effective dose in medicine**
  - Effective dose can be of practical value for comparing the relative doses related to stochastic effects
  - But **only** if the patient populations are similar with regard to age and sex

- **…is it enough?**

Guidance on implementation

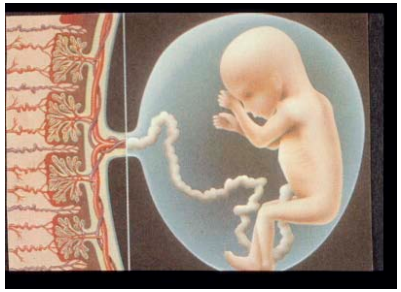
- **Example**: Nuclear medicine procedures
  - **Breastfeeding patients**: the breastfed infant is a member of the public (limit of 1 mSv). Further guidance needed on how to proceed depending on the radionuclide & administered activity
  - **Women of reproductive age**: how long pregnancy should be avoided?





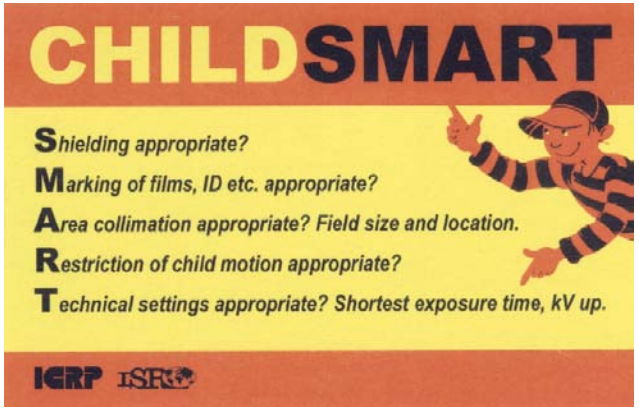
Ethical considerations

- **Example: Pregnant women**
  - **Pregnant health workers**: embryo/fetus is considered a member of the public (limit of 1 mSv)
  - **Pregnant patients**: the *risk* to the mother of not doing the procedure vs. the radiation-induced potential *harm* to the embryo/fetus
  - ICRP 103, 105, 84
  - Radiation safety and ethical issues



Potential for Dissemination

- Efforts are needed to improve the **dissemination of ICRP recommendations in the health sector**
- Messages need to be tailored for health authorities in order to facilitate the application of the system of RP in health care settings
  - *Users of radiation in health care*
  - *Referrers*
  - *Patients, public*



- Provision of ICRP publications to countries
  - Translation of ICRP documents in other languages
  - Free or discounted electronic access for developing countries

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Conclusion

- The current system of RP does fit the purpose
- Improving **radiation safety culture** of medical practice is crucial to
  - ensure that patients benefit from the use of radiation in health care,
  - contribute to a more cost-effectively allocation of health resources
  - empower the health profession by encouraging an **appropriate use** of radiation
- WHO advocates the application of **ICRP** recommendations in health care settings
- This is particularly relevant to support the implementation of the International Basic Radiation Safety Standards (**BSS**)

Further opportunities

- … to integrate RP in global Public Health agendas

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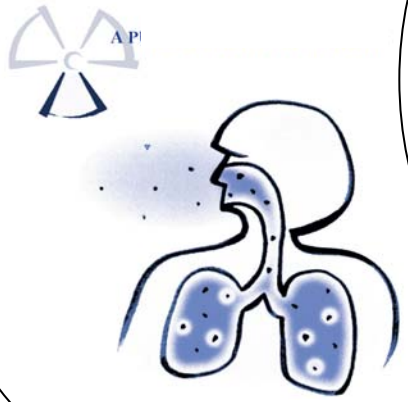
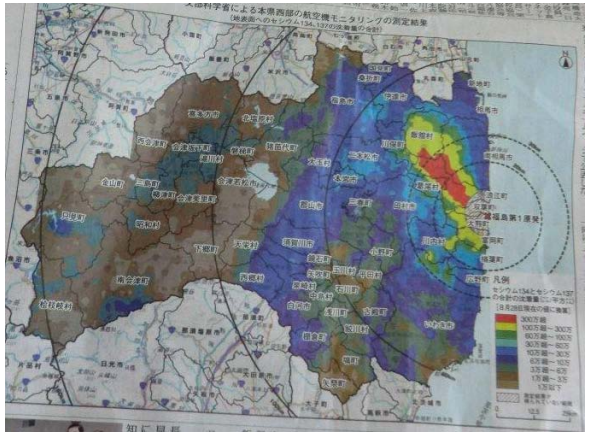
Energy Efficie
Indoor air poll



Energy Policies
Extractive industries

Health Security



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Thank you…

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