Risk communication in the field of low dose irradiation:

Medical exposure vs. the Fukushima Prefecture post accidental area

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Why this topic ?

Background:

- State Office for Nuclear Safety in Prague

  Regulator of radiation protection - an inspector of RP focusing on medical exposures

- IAEA

  Project on Cooperation between FK Prefecture and the IAEA in the Area of Radiation Monitoring and Remediation (2013-2017) following the FK Daiichi Nuclear Power Plant Accident – a consultant

- University of South Bohemia in České Budějovice

  Institute of Radiology, Toxicology and Civil Protection

  a lecturer + cooperation with prof. Friedo Zölzer, the director of IRTCV

Introduction

What we consider as low dose?

- ICRP: < 100 mSv.
- UNSCEAR 2010, Report: *"Summary of low-dose radiation effects on health" :* < 200 mGy;

  0,6 mGy/h for gamma and X- rays dose rate
- also other values can be found in the literature depending on the purpose for which such specification is introduced

"Low Dose" does not automatically imply negligible attention.

Compare

A few mSv/y?
It has NO (?)
health effect

Can not be identified

Low doses
< 100 mSv/y
It MIGHT have
a health effect

The probability of death caused by cancer in the population is 25%. If individuals are exposed to 100 mSv, then the probability of his death caused by cancer will increase to 25.5%.

>100 mSv/year

It has a health effect

Apply the precautionary principle

I. Medical diagnostic exposures

fall into the low-doses area

10 mSv/ CT Abdomen

6,9 mSv/ CT Chest (source: HPA)

3,4, mSv/y Natural background in CZ

1 mSv/y Public dose limit
added dose from other activities except medical exposure

2 mSv/CT Head (HPA)

345 x higher

0,02 mSv/ X-ray of Chest (single PA on film, HPA)

0,01 mSv/ panorama teeth (HPA)

0,01mSv/y - Dose considered to be off No Regulatory Concern (IAEA)

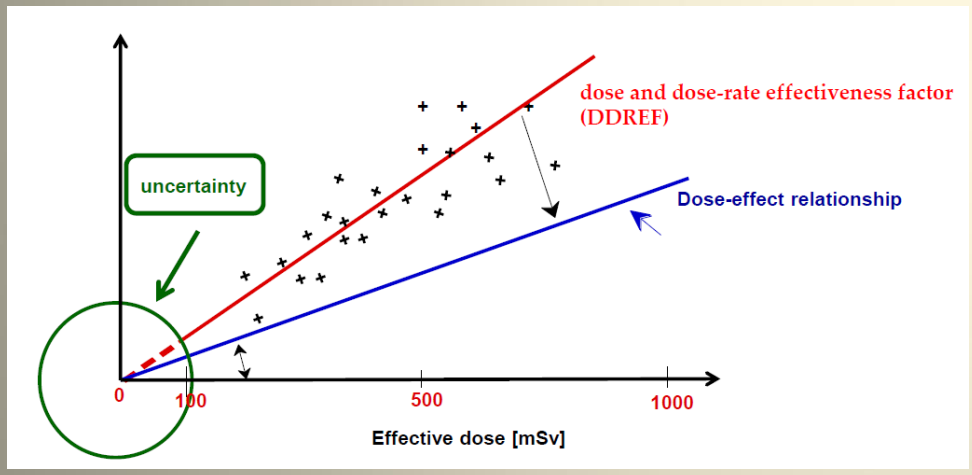
Common patient`s questions

1) Is it safe?

➢ A wrong question ☹

We cannot say YES or NO

2) What are the risks?



➢ LNT model: A single particle hitting a single DNA in a single cell CAN initiate a damage (cancer)

3) Are the risks negligible?

➢ A wrong question ☹

We must consider whether the benefits outweigh the risks

Is the patient wiser and satisfied?

Probably NOT ☹ ……..BUT LOOK:

WE do everything according the best practice.

We use all principles of RP

- Justification and Optimization
- Not limits, but so-called DRL to regulate patients doses
- We define radiological standards
- We introduce internal and external clinical audits
- Regular testing of sources is required…..

All this is for the purpose of achieving

„As Low (exposures) as Reasonably Achievable" (ALARA) while maintaining the required diagnostic information

→ minimizing cancer risk

…and how can you say that the benefit is greater than the risks if you can not quantify it and do not know much about the low dose effects?

- The examination must be justified = it is necessary for your treatment and we have no other means to determine your diagnosis
- Do you understand now?

  ☺ YES, when I have no other choice. To get the diagnosis right is an obvious benefit

What's going on?

- ✓The patient began to trust the doctor ☺
- ✓He can be treated on the basis of a diagnosis

It's best to be sure NOW with my diagnosis than to worry about what will be IN MANY YEARS due to the low dose effect.

BUT we have a hidden ethical problem in JUSTIFICATION

Why ?

What rational justification tools we have:

It relies heavily on prescribing physician`s decision-making

Prescribing criteria

Are they practically updated with the development of the technique?

Is the doctor really using them?

Has he a possibility to use rather MR ?

CDS – computer decision SW

Not all workplaces are equipped with it.

Is the doctor willing to learn to work with it?

Does he have time to decide by SW?

Justification seems to be a weak segment of RP

Activities which call for managing this problem:

- ICRP Task Group 94: Ethics of Radiological Protection

Established in October 2013 to present the ethical foundations of the RP system.

- IRPA work on Public Understanding of Radiation Risk

Established in 2014 to support associated societies in developing effective means for public information to understand radiation risk

- **IAEA: Training on Justification in 2016; IAEA standards**
- **HERCA: Action Week on Justification in Medical Irradiation**
- RICOMET associaton
- and many other workshops and publications of UNSCEAR, WHO, IAEA, NEA/OECD, ICRP, EU

- The low-dose risks

are often ignored

by some practitioners.

- They even warn against the “misuse” of risk factors used to calculate potential deaths from medical exposure and argue, that such a process unnecessarily causes fear, which can lead to the refusal of vital examinations and thus to much greater risk and harm than is associated with the low radiation dose in the given examination.

We maintain that assessing whether irradiation is

"necessary = justified"

in every cases is a fundamental ethical requirement,

there has to be adequate risk communication with patients.

Components of the RP system

Optimization; As Low (doses) as Reasonably Achievable

Responsibility for Justification

Minimization of perceieved risk

Facts:

Scientific and dosimetric data

Testing of sources

DRLs

Clinical audits

Radiodiagn. standards

AN ETHICAL COMPONENT OF RP

It relies heavily on prescribing physician`s decision-making

☺ He will either consistently justify his prescription in every individual case

☹ Or he will perform it routinely with a certain "medical alibism", in the sense of "in order to be on the safe side, we always perform this examination, even better repeatedly"

Risk communication with patients:

Adequately to the low dose risk - not to raise fears but not to underestimate

Easily, non-technical words

Uderstandable

Requirements and conclusion

- The balance of pros and cons of medical irradiation has to be sophisticated
- At the same time understandable for the patients
- Not only real, but also their perceived risks must be minimized
- This is an ethical issue of RP, because we have no legislative boundaries, what is little and what is sufficient for individual patient.

It remains a permanent challenge to find a suitable way of communicating principles of RP in an understandable way to the public.

II. The Fukushima Prefecture

Risk communication after the nuclear accident

The International Community of RP experts adopted the principles of open and transparent communication – however it was found that we cannot explain our "science" to the public so that it understands the principles of decision-making in Emergency situations.

In the FK, the public has taken from all extensive debates the view that 1mSv/year is a safe dose in every circumstance and public has been demanding it even where it was not justified and acceptable to achieve it.

In the FK post accidental situation higher irradiation values were justified and acceptable (still in the interval of LDs)

The Optimization principle was not understood .....

Some regulators, assuming that the public needs understandable information, would like to establish a Safe Dose (in interval of LDs for which no health effect is to be expected).

- has not been adopted at an international level as a consensus
- discussions are continuing between its proponents and opponents

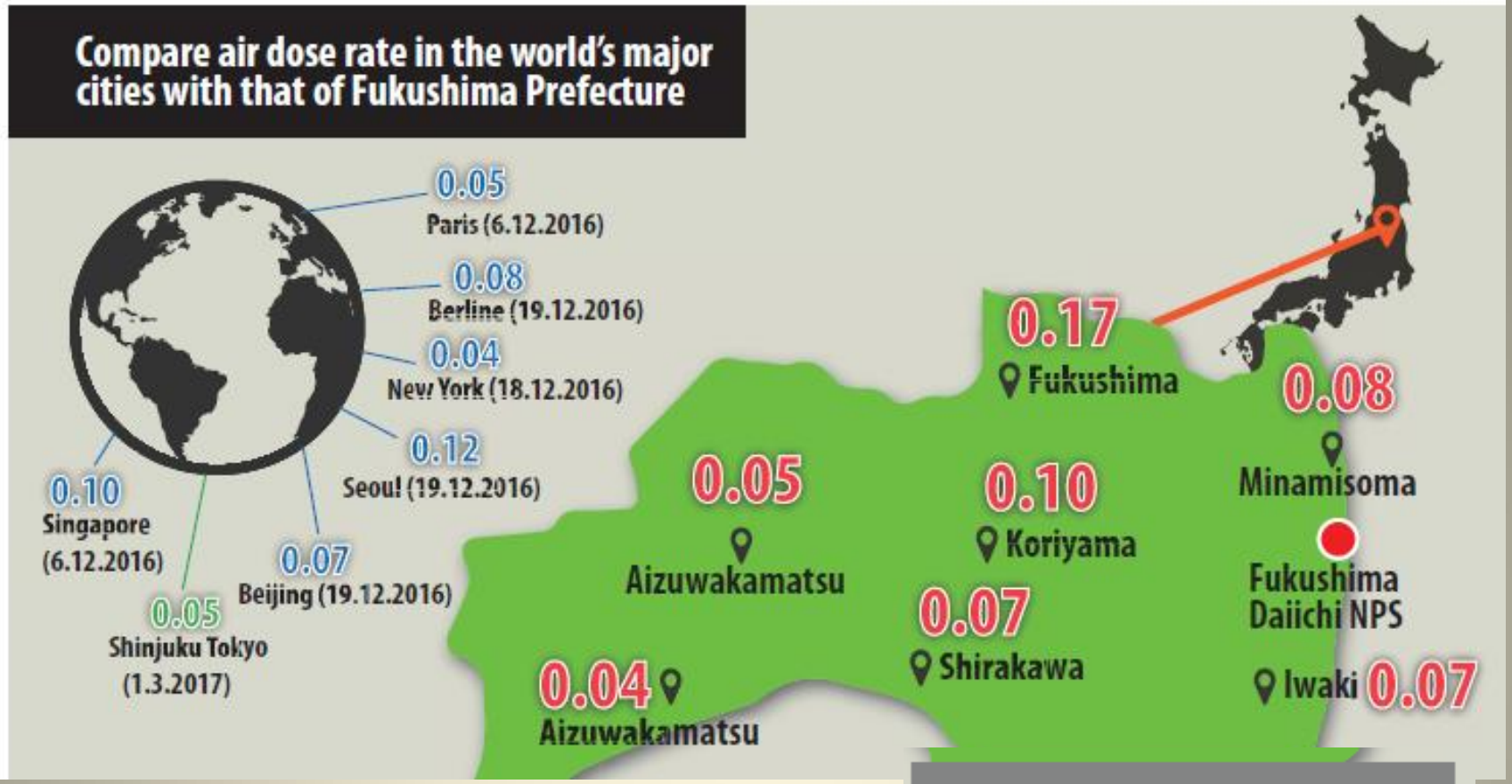
The government‘s goal in FK is 1 mSv/y from deposit after decontamination

5 Years of Cooperation between IAEA and Fukushima Prefecture in the Area of Monitoring and Remediation (2013-2017)

- The project is prolonged ….

  IAEA assists:

- ➢ in decontamination and management of radioactive waste
- ➢ in the use of radiation monitoring data to develop maps to be made available to the public
- ➢ In safety assessment of radioactive waste (temporary storage, on-site storages)
- ➢ **In production of promotional materials and risk communicaiton**



in µSv/h

	Fukushima City	Aizuwakamatsu City	Iwaki City
Normal times before the earthquake	0.04	0.04 ~0.05	0.05 ~0.06
April, 2011	2.74	0.24	0.66
September, 2011	1.04	0.13	0.18
March, 2012	0.63	0.10	0.17
September, 2012	0.69	0.10	0.10
March, 2013	0.46	0.07	0.09
September, 2013	0.33	0.07	0.09
March, 2017	0.17	0.05	0.07

Source: Fukushima Prefecture Disaster Response Headquarters (provisional values)

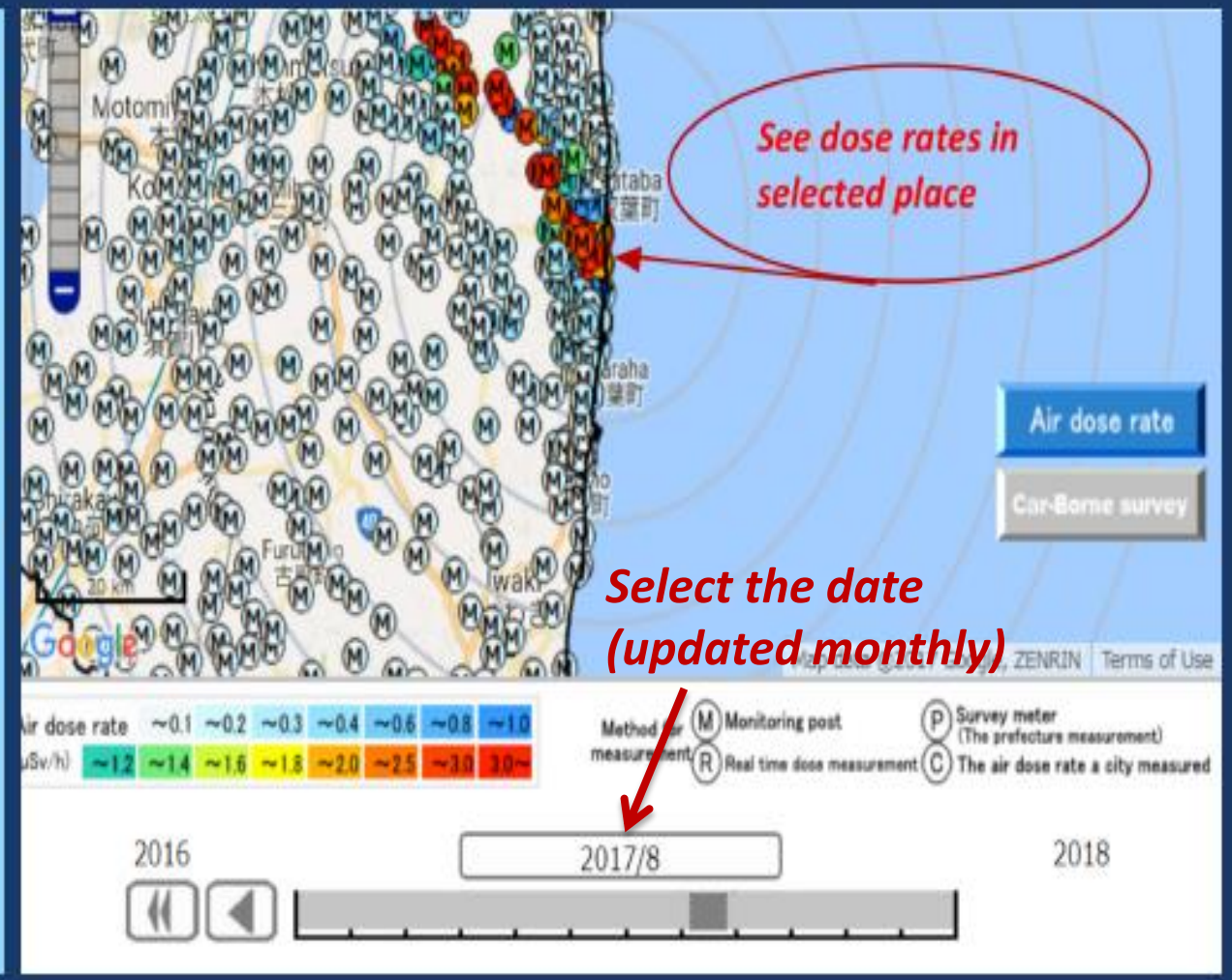
Now 98 % of the residents of Fukushima city receive additional doses from external exposure of less than 1 mSv/year

on the Fukushima Prefecture website
http://www.pref.fukushima.lg.jp

What you can find there?

- The trend of decreasing dose rate
- The method for measurement

Download it to your smart phone



Effective decontamination is not enough, without gain of public confidence

Outreach and Promotional Material

- Brochures for each topic, leaflets in the folder
- Website, video, facebook
- Visual presentation of results
- Mobile application for radiation monitoring maps

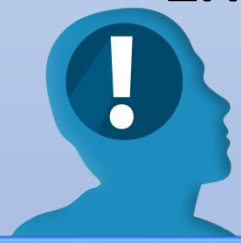
✓ All material should be comprehensible to the public and a non-technical audience

- Limitation of number of words
- Limitation of technical terminologies

Maps in Japan webs and apps = facts

Information for public and for returning evacuees about:

- Radiation data in developed monitoring maps
- Environmental mapping technology with using GPS walking survey, bus-survay, fixed stations
- Explanation of radiation data used in maps



Perceived risk is often greater than the actual based on facts

Risk communication with special consideration for perceived risks

It is an ethical issue towards the public with the responsibility of stakeholders

What is nessary ?

- Activities of communications experts and RP exp.
- To train and prepare these experts for such communications, including on-line transfers, in Japanese language

…. and use of international experts for information verification, education, assistance… (e.g. IAEA assistance and recommendations)

- BUT: most of the native Fukushima people do not speak English.
- Therefore, all information and promotional materials are translated into Japanese and then passed through the government or FP officials to the public.
- It is a question of how much the Japanese speaker can gain the lost public confidence and how the printed or spoken topics are interpreted …

Would you feel safe in Fukushima?

IAEA provide advice on the safety of RW storages

Facts X Feelings

- Public needs to understand the balance between all benefits and LDs risks
- Stakeholders need to understand their perceived fear.

Conclusion – comparison aspects of exposure to LDs

Aspect	In Medical exposure	In Public exposure in FK
Duration of Perception	**Short time:** patient can forget it	**Many years permanently :** people can‘t forget Moreover they still see the monitoring stations around the residences and to much temporary storages of RW
Justification	LDs risk vs. Diagnosis = quite **clear understandable benefit for patient** It relies on the individual prescribing physician`s decision-making **in every individual case= a patient**	LDs risk vs. infrastructure renewal, economic or socioeconomic benefits, return to the original life etc. **Unclear, indeterminate benefit** Is done by the government for the whole site, **not only for individual inhabitants**

Aspect	In Medical Exposure	In public exposure in FK
Confidence	Risk communication: Doctor with Patient: **individually** Assuming sophisticated and empathic communication, the patient has **no reason to doubt.** He has the clear benefit.	Risk communicaiton: Government through stakeholders with Public: **collectively** **Bad experience**: Evacuation risks was much higher than irradiation risks (increasing mortality among nursing home residents, increasing diabetes risk). **People don‘t trust** the decision of the government, they need time to understand the actual LDs risk and to process a perceived risk.

- Acceptance of justification in FK post accidental areas depends not only on objective facts but also on the individual's priorities and trust in the government.
- To gain public confidence, it is necessary to implement a specific component of risk communication.

It means respect for and acceptance of emotions, fear and mistrust.

Thank you for your kind attention !