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> *Day1, July 25, 2014* Symposium 1:

Scientific Risk Communication and STS (Science, Technology, and Society)

# The experience of risk communication and role of scientist in the Fukushima nuclear accident

Kenji Kamiya<sup>1,2</sup>, Seiji Yasumura<sup>2</sup>, Shunichi Yamashita<sup>2,3</sup>, Keiya Fujimori<sup>2</sup>, Tetsuo Ishikawa<sup>2</sup>, Tetsuya Ohira<sup>2</sup>, Akira Ohtsuru<sup>2</sup>, Hirooki Yabe<sup>2</sup>, Akira Sakai<sup>2</sup>, Shinichi Suzuki<sup>2</sup>, Mitsuaki Hosoya<sup>2</sup>, Tetsuji Okamoto<sup>1</sup>,Koichi Tanigawa<sup>1</sup> and Masafumi Abe<sup>2</sup>

<sup>1</sup> Hiroshima University,<sup>2</sup>Radiation Medical Science Center for the Fukushima Health Management Survey, Fukushima Medical University, <sup>3</sup>Nagasaki University

## Local news papers reported the residents' fears and harmful rumors about radiation



#### The 6th Exploratory Committee of Dated on Apr. 26, 2012 Fukushima Health Management (FHM) Survey

Research on maternal : survey slips:15,954 Responses 8,886 ( collection rate 55.7% ) Dated on Mar. 31, 2012



Knowing about radiation exposure situation and contamination level in Fukushima from public information sources

- Situation of food contamination
- Evaluation of Internal exposure dose by WBC
- Evaluation of external exposure dose
- Measurement by personal dosimeter

#### Coop Fukushima HP: Measurement of radioactivity in daily diet

http://www.fukushima.coop/kagezen/2011.html



## Fukushima status report of internal exposure evaluation by whole body counter (Jun. 27, 2011 ~ Feb. 28, 2014)

http://www.pref.fukushima.lg.jp/uploaded/attachment/55290.pdf

Area	Total number of objects (%)	Deposit execution dosage equivalent			
		less than 1 mSv	1 mSv	2mSv	3mSv
Northern	41,371	41,638	2	1	0
	(100%)	(99.993)	(0.005)	(0.002)	(0.000)
middle	41,912	41,912	0	0	0
	(100 <b>%</b> )	(100.000)	(0.000)	(0.000)	(0.000)
Southern	27,648	27,648	0	0	0
	(100%)	(100.000)	(0.000)	(0.000)	(0.000)
Aizu	29,172	29,172	0	0	0
South Aizu	(100%)	(100.000)	(0.000)	(0.000)	(0.000)
SoSo area	24,629	24,606	12	9	2
	(100 <b>%</b> )	(99.907)	(0.049)	(0.037)	(0.008)
Iwaki district	19,476	19,476	0	0	0
	(100 <b>%</b> )	(100.000)	(0.000)	(0.000)	(0.000)
Fukushima	184,208	184,182	14	10	2
whole area	(100 <b>%</b> )	(99.986)	(0.008)	(0.005)	(0.001)



The 15th Exploratory Committee of Fukushima Health Management (FHM) Survey

#### **Fukushima Opinion Polls**

Subjects:1,300 Responses: 803 (collection rate 61.8%) Period of survey: Aug. 21~Sep. 4, 2013



## Gaps between resident needs and supply of information

Over 60 % of the residents want to know the more information about health effects of radiation, radiation risk, and foods contamination



Radiation related information is available from public information sources

The collection rate of Fukushima Health Management (FHM) Survey is less than 30% (as of Sep. 30, 2013)

#### Subjects of radiation information

- The information of measurements doesn't reach the residents sufficiently, so they are in a state of anxiety.
- Further systematization and enhancement of the radiation measurement is needed



- Need "Common Platform" to show an overview of the monitoring to ascertain the situation of exposure and food contamination
- The lack of uniformity in the individal radiation monitoring should be integrated to establish "Common Platform" for each exposure dose estimation.
- Estimation of external radiation dose by Fukushima Health Management Survey
  Estimation of internal radiation dose using WBC by municipalities and so on.
- 3) Measurement of personal exposure dose by schools, municipalities and so on.
- Need to establish a system in response to the anxieties of residents and link it up to Risk Communication

## Precondition of Risk communication

Risk perception is subjective.

It is subjective matter what kind of risk one places emphasis on; there is no correct answer on prioritization for risks.

- The protection standards that are considered to have been optimized don't necessarily obtain the consent of the public. The process of being determined should be fully understood by the public.
- Edification with knowledge based on "the defect model" is not enough to solve this matter.
- Growing out of paternalism
- One-sided explanation of the safety based on control policy can lead to mistrust

Referred to and quoted from the paper of Dr. Ichiro Yamaguchi Risk communication for existing exposure situation after the nuclear disaster, Journal of Clinical and Experimental Medicine,239,10, 1050-1055, 2011

#### Gaps between scientists and the general public

#### **Scientists**

Simple criteria based on scientific rationality

- Fall into a "fallacy of mutual agreement" in the discussion among professionals
  - Tend to think that our opinions are correct in general; different opinions are in the minority and wrong.
- Tend to think of objective scientific fact as being everything

#### **General public**

- Criteria is not simple, rich in diversity. It varies depending on what one feels the risk to be.
- Being careful about what they don't know well They think that their risk might be significant since in fact experts could be wrong; there could be factors yet to be found.

Referred to and quoted from the paper of Dr. Ichiro Yamaguchi Risk communication for existing exposure situation after the nuclear disaster, Journal of Clinical and Experimental Medicine,239,10, 1050-1055, 2011

#### Dose Response Relationship of Solid Cancer among A-bomb survivors (RERF Life Span Study, 1958-1998)



*Preston DL et al: Radiat Res 2007; 168: 1-64.* 

### International Commission of Radiation Protection Linear Non-Threshold (LNT model)



### Summary of epidemiological research

- Providing the direct scientific evidence of cancer risk and other disease risk: Indicating the relationship between exposure dose and health effects
- Risks vary depending on age, age at exposure, gender and so on.
- Risk assessment and its accuracy vary depending on the subject groups, since each group has differences of exposure situations, research protocols and analysis methods and so on. Risk assessment consistently involves the problems of its accuracy and confounding factors.
- Epidemiological studies show a variety of data on the cancer risk effected by low-dose, which is still inconclusive.
- No detection of the risk by epidemiological studies doesn't prove there is "no effect". It is necessary to consider the limits of statistical analysis.

## Roles and challenges of scientists and experts in the risk communication

At first, it is basic for scientists to explain scientific knowledge as objectively as possible

Risk of cancer



What is scientific knowledge ?

- Knowledge that has been internationally recognized
- General public are not interested in academic debate

#### Scientific uncertainty still remains

- •The current scientific knowledge has a limit and "range "
- hypothesis and fact LNTmodel
- It can not be said that the current knowledge is absolute

#### Limit of scientists and experts

Risk perception is subjective

## Starting point of risk communication

- Trying to understand the feelings of the residents is the first step in communication.
- Scientists and governments should respect people's anxiety about their risk and share it, which is the starting point of risk communication.
- Response should be not only based on scientific validity but also the feelings of the people
- Residents are forced to face radiation risks. Sharing of accurate knowledge and information about radiation is essential and a basic principle.
- Not only explanations but specific countermeasure for safety and protection should be taken. It should be explained how the significance and effect of countermeasure are estimated and their limitations.

## Phase change of Risk Communication

#### **Early phase**

Immediately after the accident, the general population knew very little about radiation, so they needed general information on radiation and its health effects.

Providing information by lecture style for large number of people is efficient.

### Late phase

At present, the residents have general information on radiation. The residents need "specific answers and information " for questions and anxieties of each individual.

 Providing general information for large number of people is not efficient.

Answers to specific problems of individual residents are required.

- Using specific measured value, explanation of radiation effects on health is required.
- Exchange of opinions by dialog style in small number is effective.

## The keys of risk communication

- Establishment of mutual trust
- Using their own measured values ,

the situation of radiation pollution, exposed dose of residents and health effects must be explained in details to the residents

Providing the necessary information to the specific matters of residents, work together to solve them

## Consensus-building by risk communication

- 1) Residents consult with experts, stakeholders, governments, and NPO's about health and radiation protection sharing the same information of radiation
- 2) The authorities prepares the circumstances for consensus-building through specific collaboration and consultations among residents, experts, governments, and NPO's
- Consideration of social factors for consensusbuilding in the public, not only the judgments based on scientific data

## Necessary efforts in the affected region

 To support the resident's autonomy by developing the circumstances to allow them to voluntarily participate in radiation protection and health surveillance based on the risk communication

1. Establishment of a "Regional Council for Health"

(temp. name)

Health promotion activities: The residents, governments and experts work together and share the information of health risks

2. Establishment of "Radiation Monitoring Center" to help residents find out the status of their exposure

- WBC: Internal exposure
- Germanium measuring instrument : Contamination of foodstuffs
- expert for measurement

