

Role and Responsibility of Medical Staff in Nuclear Accident

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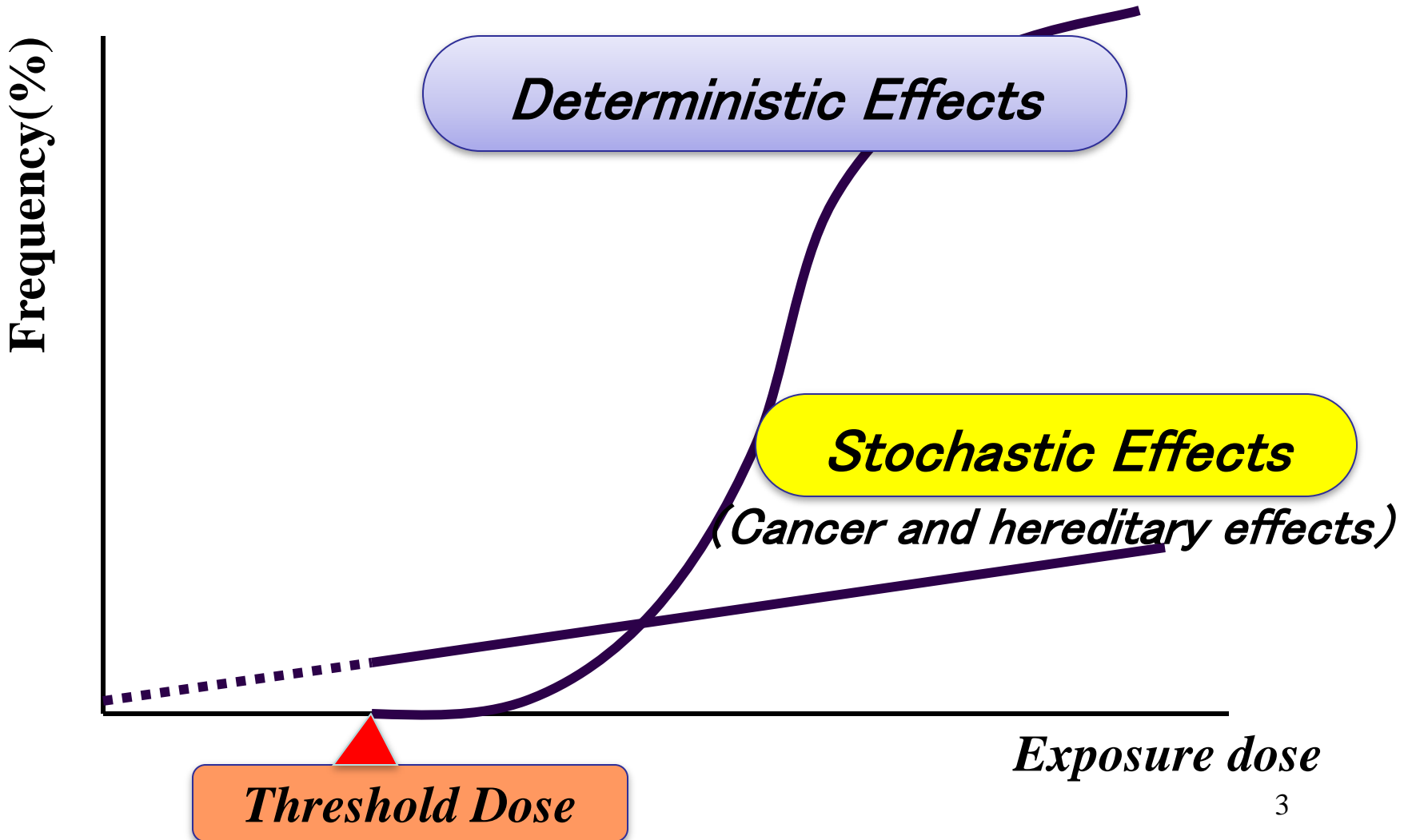
Roles of Medical Staff in Nuclear Accident

Clarify of Radiation Induced Health Effects

Setting and Accountability of Criteria of Radiological Protection and Safety

Response to Radiation Injuries and Health Risks

Classification of Health Effects of Radiation –from View Points of Radiation Protection–



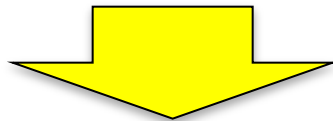
Cancer and Hereditary Effects of Radiation

-Results of epidemiological studies-

Exposed dose is about 100 mSv :

Possible observable increase of cancer , if the exposed group is large (perhaps greater than about 100,000 people).

There is no statistical significant increase of hereditary effects



*Low dose area (towards 100 mSv) :
There are large uncertainty in epidemiological studies.*

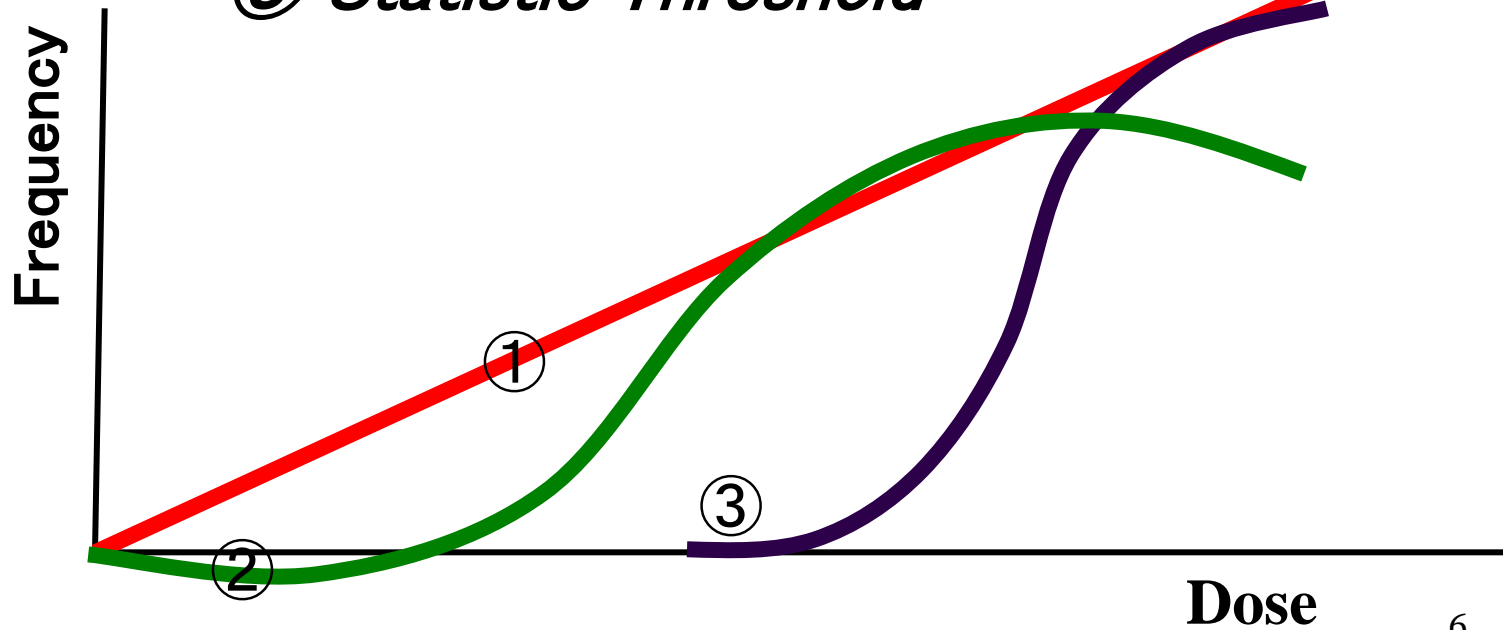
Summary of Radiation Induced Health Effects

<i>Exposed Dose (mSv)</i>	<i>Acute Effects</i>	<i>Cancer Risks</i>
<i>10 mSv</i>	<i>No acute effects</i>	<ul style="list-style-type: none"><i>▪ No observable increase of cancer, Even in a large exposed group</i>
<i>100 mSv</i>	<i>No acute effects</i>	<ul style="list-style-type: none"><i>▪ Possible observable increase of cancer, if the exposed group is greater than about 100.000 people</i><i>▪ Cancer risk of 0.55 %</i>
<i>1000 mSv</i>	<ul style="list-style-type: none"><i>▪ Nausea, vomiting Possible</i><i>▪ Mild bone marrow depression</i>	<ul style="list-style-type: none"><i>▪ Probable observable increase of cancer, if the exposed group is more than a few 100 people</i><i>▪ Cancer risk of 5.5 %</i>

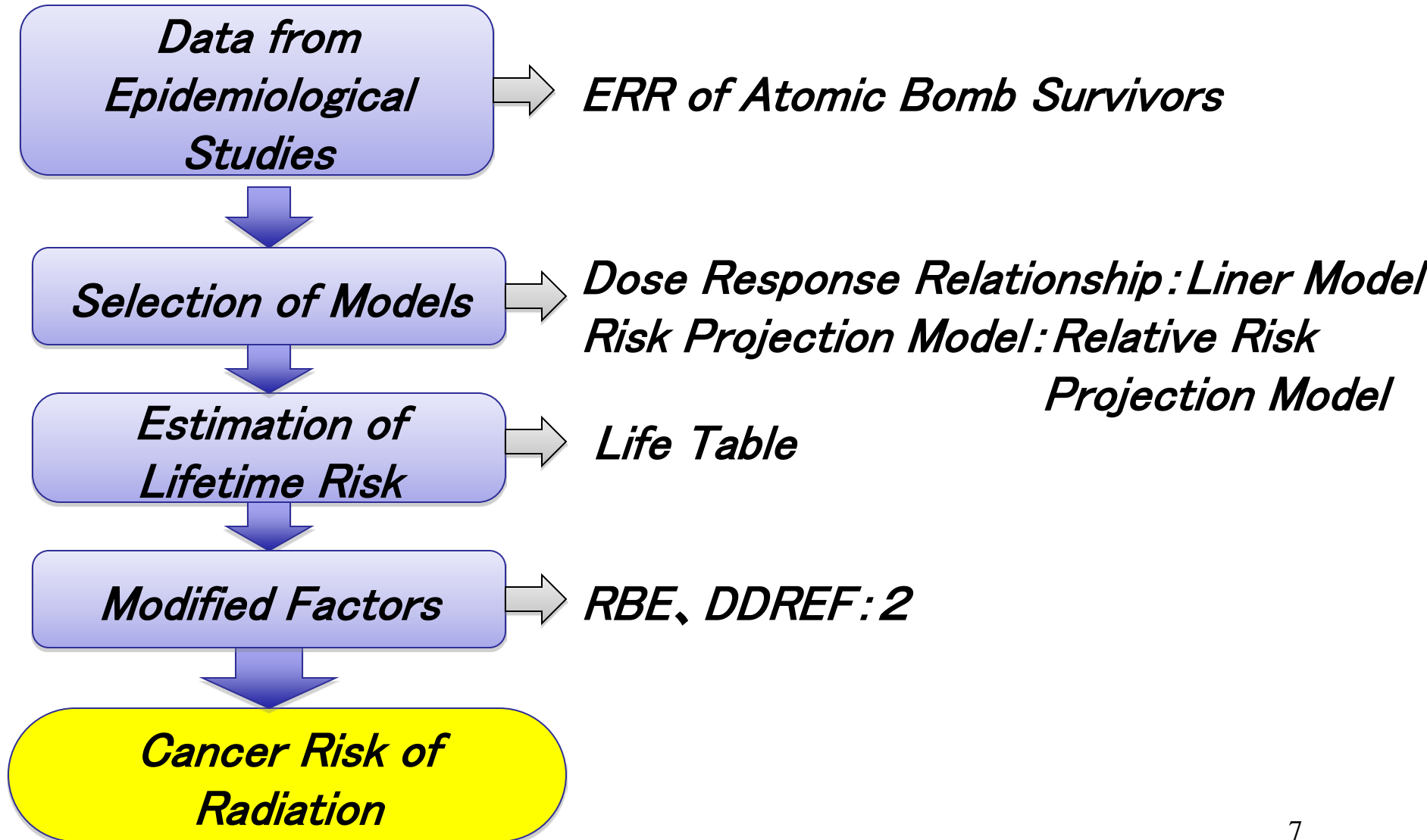
(Modified ICRP Publication 96, 103)

Assumption of Dose Response Relationship of Stochastic Effects in Low dose

- ① *Linear Non Threshold*
- ② *Adoptive Response*
- ③ *Statistic Threshold*



Process of the Estimation of Radiation Induced Cancer Risk (Lifetime Probability of Cancer)



Risk Estimation of Stochastic Effects

Assumption of dose response relationship of radiation induced cancer and hereditary effects

Linear Non Threshold (LNT)

Nominal Probability Coefficients for Stochastic Effects (ICRP Publ.103)

<i>Fatal Cancer(100 mSv)</i>	<i>0.55 %</i>
<i>Sever Hereditary effects (100 mSv)</i>	<i>0.02 %</i>

(ICRP Publ.103)

Radiation Injuries and Radiological Protection

Radiation injuries occurred immediately after beginning of artificial use of X-ray(1895) and natural radioactive materials

International activities of radiological protection started at 1928 (The predecessor of ICRP was established)

Standards/Criteria of Radiological Protection

***Recommendations on International Commission
on Radiological protection***



***Regulations of radiation protection
in each country***

***• The ICRP was established at International Society
of Radiology at 1928.***

***However, concern of radiation exposure and adiation
effects in medical stuff are shortage***

Fundamental Education for Medical Staff

For Medical doctor

***☐Radiology
Radiation Biology***

For Nursing Staff

There is no subject regarding with radiation

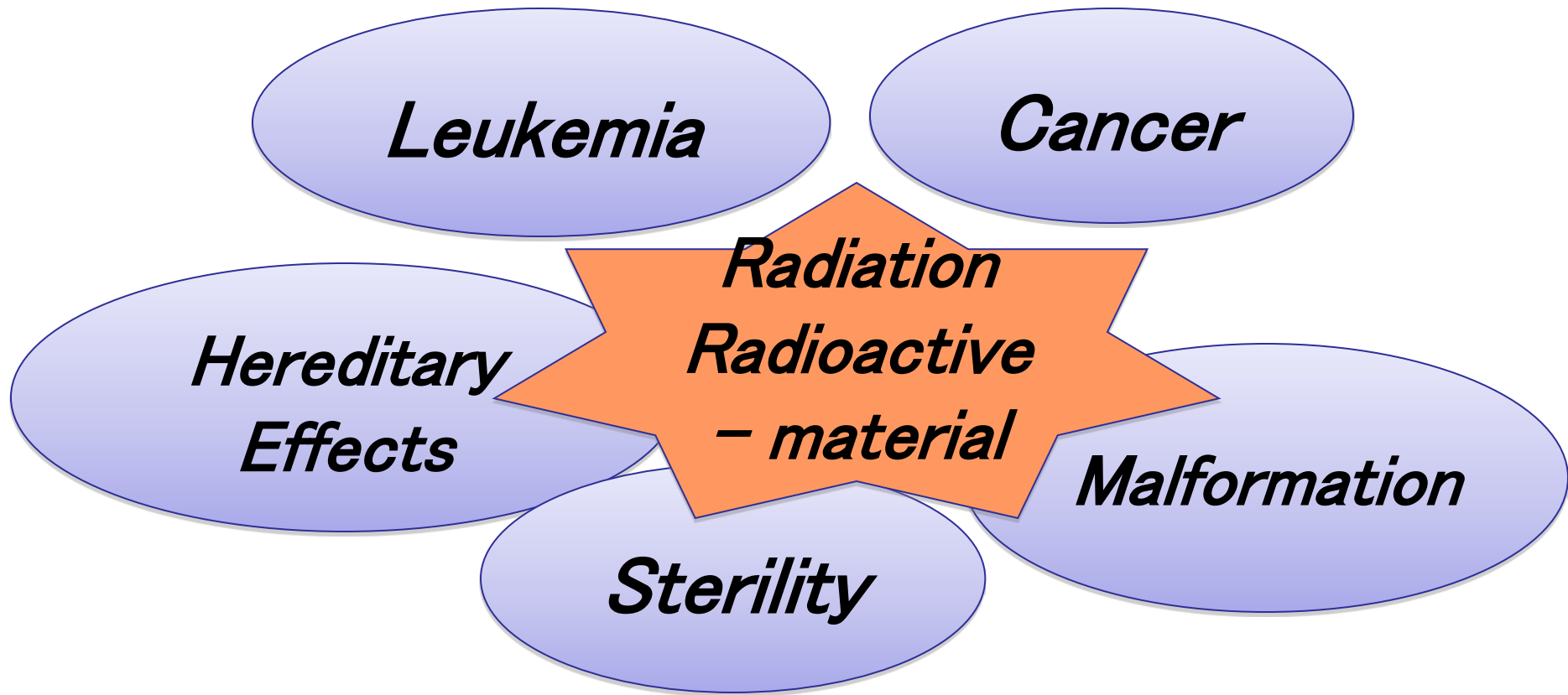


Introduction of Curriculum of Radiological Protection (include Biological Effects of Radiation) in Medical Education

Practical Role of Medical Staff in Nuclear Accident

- *Radiation Emergency Medicine
(First stage to third stage)*
- *Consultation (Anxiety of radiation effects)*
- *Dose Estimation (internal exposure and biological dose estimation)*
- *Periodical Health Check*
- *Compensation for Radiation Injury*

Anxiety of Radiation Induced Health Effects



Information on Radiation Health Effects from Epidemiological Studies

- ***Atomic Bomb Survivors at Hiroshima/Nagasaki***
- ***Patients to Diagnosis and/or Treatments of Radiation***
- ***Victims of Radiation Accidents***
- ***Workers of Nuclear Industries***
- ***Others***



- ***Dose-Response Relationship (relationship between radiation dose and probability)***
- ***Dose-Effect Relationship (relationship between radiation dose and severities of health effects)***

In the Case of Consideration of Radiation Induced Health Effects

- *Where (Area of irradiation)*
- *How much (Dose of irradiation)*
- *How to (Types of irradiation)*

Sensitive Periods of Embryos/Fetuses Effects

影響	<i>Preimplan- tation</i>	<i>Organogene- sis</i>	<i>Fetus</i>		
	<i>0-9 days</i>	<i>3-8 week</i>	<i>8-15 weeks</i>	<i>15-25 weeks</i>	<i>25 week<</i>
<i>Abortion</i>	<i>+++</i>	<i>+</i>	<i>-</i>	<i>-</i>	<i>-</i>
<i>Mal- formation</i>	<i>-</i>	<i>+++</i>	<i>±</i>	<i>±</i>	<i>±</i>
<i>Growth retardation</i>	<i>-</i>	<i>+</i>	<i>+</i>	<i>+</i>	<i>+</i>
<i>Mental retardation</i>	<i>-</i>	<i>-</i>	<i>+++</i>	<i>++</i>	<i>-</i>
<i>Cancer</i>	<i>-</i>	<i>+</i>	<i>+</i>	<i>+</i>	<i>±6</i>

Problems of Medical Field

Shortage of talented people

Distribution of information on radiation health effects and risk

Precisely, timely, easy to understand

***Collaboration among health physicists,
Bureaucrat and so on***