ISOE-Asia

# Do We Need Another Category of Consented Exposure ?

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# Current System for Exposure Control
( ICRP 103 )

| Exposure Situations | Occupational exp. | Public exp. | Medical exp. |
|---|---|---|---|
| | Workers | Public | Patients |
| Planned | Dose limits + Constraints | Dose limits + Constraints | RL(Diagnostic) |
| Emergency | Ref. levels | Ref. levels* | - |
| Existing | - | Ref. levels | - |

*Questionable: to be discussed

Occupational & Medical: consented

Public: Unconsented

# Consented Exposure?

- Informed & Consented exposure
- How come?
  - Radiation exposure accompanies risk
  - A person has right not to be exposed
  - The right is compromised when he/she gets benefits in return
  - The responsible party for the exposure should inform the exposure level and associated risk: a necessary condition
  - Consent of exposed persons is their decision

# Rationale Behind

- The level of risk taking: roughly proportional to the value of returning benefit
  - Precise proportionality is difficult to achieve
- The exposed person is in capacity of decision making
- Taking increased exposure to a certain level is justifiable

# Consented Exposures

- Occupational exposure
  - Normal exposure: job
  - Emergency exposure: special return
- Medical exposure
  - Health return to themselves
  - Mass screening: public health return
  - Carers and comforts, subjects of biomedical research: medical exposure?

# Un-consented Exposure

- Neither informed nor consented
- Full right of not to be exposed
  - But minimal obligation as a comtemporary citizen to accept exposure from common sources
    - Already widespread radioactivity (fallout from nuclear test or nuclear accidents)
    - Effluent release from facilities dealing with radioactive material (nuclear facilities, hospitals, NORM facilities)
    - Consumer products (particularly containing NORM)

# Unconsented exposure = Public exposure?

- Yes, in basic concept
- No, because not defined so

***Public exposure encompasses all exposures of the public other than occupational exposures and medical exposures* (ICRP 103)**

- Pose problems in understanding public exposures

# Which of these people are members of the public ?

1. Air passengers exposed to elevated cosmic radiation
2. Air passengers undergoing security x-ray screening
3. Current residents living in the city of Fukushima
4. Evacuees returning their home when the restriction lifted
5. Residents near an operating nuclear power plant
6. Citizens of Prypiat city at the time of Chernobyl accident
7. Monks insisting remain in the temple against evacuation recommendation
8. Housewives buying foodstuffs with elevated activity for cheaper price
9. Pet owners holding the pet while x-ray imaging at a veterinary
10. Residents in radon-prone home

# Questions in Aftermath of the Fukushima Accident

- Is not the 20 mSv reference level too high when compared with the dose limit 1 mSv ?
- How about the children ?
- Is bearing a child not
  contaminated
  annual
- What will happen after exposure exceeding
  ?
- What are the safe criteria for foodstuff?

Problems caused by misconception of public exposure

# What is Public Exposure?

公众成员

일반인

公衆の構成員

# Members of the Public ?

- Never defined in ICRP recommendations
- What should that mean legally?

Members of the public in the context of RP

- Individuals who have a right to refuse significant radiation exposure
- Exposed individuals without informed consent

# When does the right not to be exposed weaken ?

- Having benefit in return (job, healthcare, compensation, fame, safety, comfort, convenience, . . . )
- Own faults
- Sacrifice with free-will

Weak right → Certain obligation to take additional risk

**Trade-off of radiation risk with benefit or other risk**

# Sometimes No Right Intrinsically

- No doers the right to be claimed
  - Normal background radiation
- Existing exposure situations (fateful) : No right de facto
  - Residents in high background areas (including radon): own responsibility
  - Legacy of past activities (weapon fallout)
  - Exposure at early phase of a radiological event (no time to claim the right)

# Informed Consent

- For informed (prerequisite of consent)
  - Got sufficient information needed to understand the exposure situation and associated health risk: prior education
  - More than simple explanation in one-way
- For consent
  - Need a written document in principle
  - Implicit consent may be recognized for minor and general exposure

# Now what are public exposures ?

1. Air passengers exposed to elevated cosmic radiation
2. Air passengers undergoing security x-ray screening
3. Current residents living in Fukushima city
4. Evacuees returning their home when the restriction lifted
5. Residents near an operating nuclear power plant
6. Citizen of Prypiat city at the time of Chernobyl accident
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# What are the affected population from a nuclear accident ?

- Neither workers, volunteers nor patients with informed consent
- Not members of the public having a right not to be exposed

My answer:

It depends on the *informed consent*

# If informed consent not expected

- At Higher dose levels, short term, above reference levels
- They are just natural persons getting an existing exposure
  - Like residents in a high background area or a radon prone home
  - No relation to the right not to be exposed
- Subject to intervention to reduce dose
  - Do all reasonable actions to lower the dose below reference levels

# If informed consent is assumed

- At lower dose below reference level, prolonged term
- If continue living in the area, they are informed individuals (voluntary exposure)
  - Like radon exposure of typical levels
  - Eg. citizens of Iidate city in Fukushima
- If leave the area with their own account, they are nobody (out of radiation protection)
  - Compensation/reparation is not a matter of RP

# Gap

| | | |
|---|---|---|
| ‘Public’ put under unconsented exposure (Radiation protection) | ≠ | ‘Public’ in common Understanding (Everyday life) |

- People exposed to domestic radon are not members of the public?
- Expected difficulty in communication
- Use another term instead of *public*?

# Control of Consented Exposure

可以接受

acceptable

용인가능

容認可能

risk

# Gaps

- There are people exposed neither occupationally nor as a member of the public
  - Trainees (?)
  - Pet owners helping imaging at a veterinary (?)
  - Carers/comforts (medical)
  - Volunteer subjects of biomedical research (medical)
  - Air passengers (public)
  - Visitors to a radiation facility (?)
  - Residents rehabilitated (public)
  - Informed consumer (public)
  - Radon spa users (public)
  - Cave tourists (public)

*current classification in ICRP 103

Let's call them volunteers

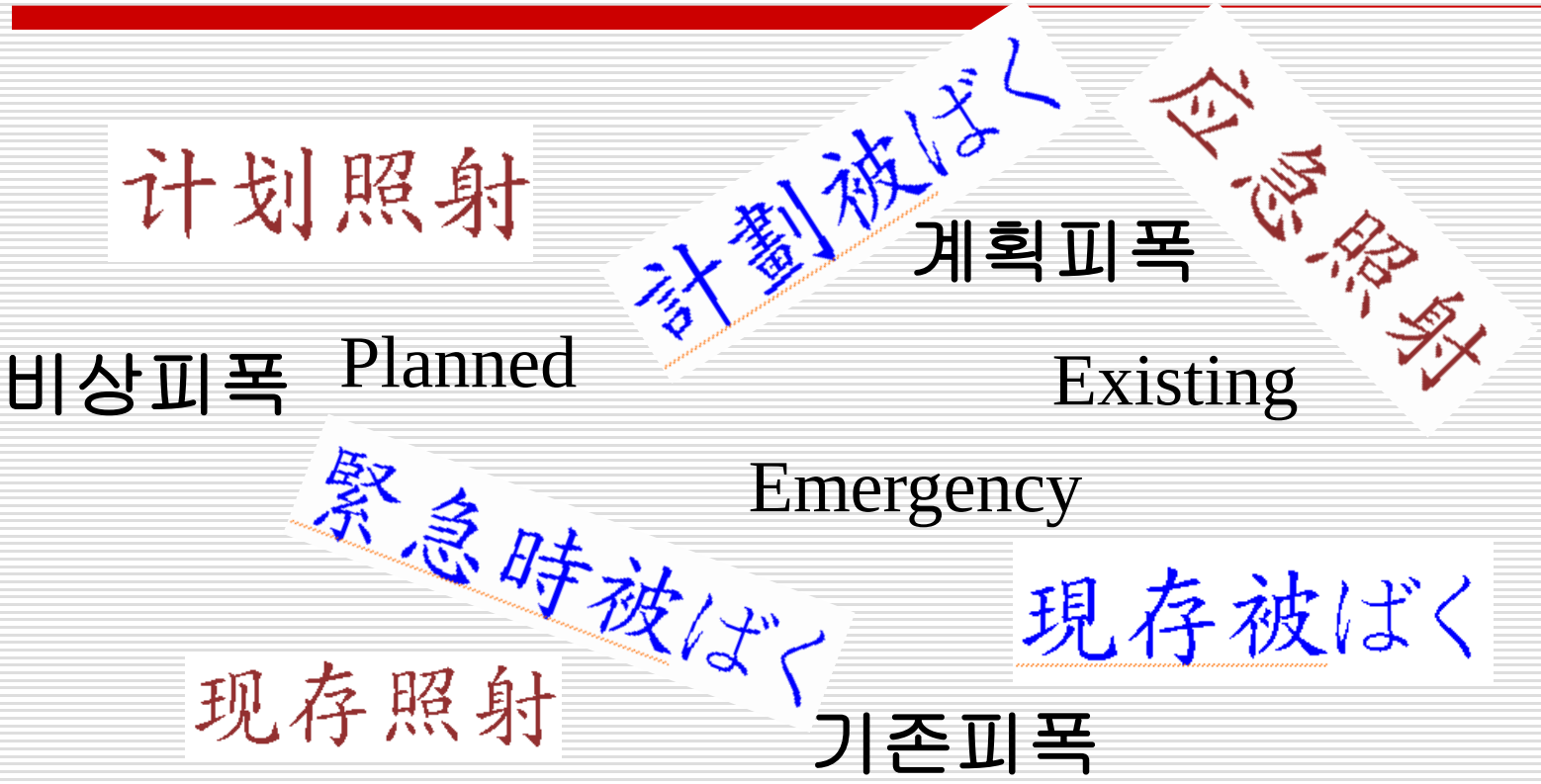
# Dose Restriction for Volunteers?

- Informed & consented (explicitly or implicitly)
- Apply the same dose limits as workers?
  - Probably No
  - Occupational limits are derived by comparing with acceptable risk at work (for job)
  - Benefit return for volunteers: less
  - Should apply reduced limits

# Dose Limits for Volunteers

- At what level?
- Traditional practice of 3/10 approach
  - Concept of occasional worker (Korean & Japanese regulations)
  - Working condition B in previous ICRP recommendations
  - Code of practice for protection of minors
- 6 mSv/y of effective dose

# Problems in Categorizing Exposure Situations



# Current Categories

- Planned situations
  - Related to deliberately introduced sources
- Emergency situations
  - Require urgent actions
- Existing situations
  - Already exist at the time of decision

# Confusions

- Planned
  - Include potential exposure?
- Emergency
  - Exposure of emergency workers is *planned*
  - Exposure of residents under nuclear accidents?
  - Include all the occupational exposures in Fukushima in March 2011?
- Existing
  - Radon exposure at work?
  - Cosmic radiation exposure of air crew?

# Planned Exposure or Planned Source?

- Categorizing Exposure situations, not the source
  - A planned source can cause all 3 exposure situations
- Sources exist but exposure is planned
  - Rn exposure at work
  - Cosmic radiation exposure of air crew
  - Recovery workers at Fukushima

# Problem with term *Emergency*

- Wide spectrum of emergency
  - Form a spill at a laboratory to severe accident at an NPP
- Wrong lead to encompassment of all exposures under an accident
- My understanding
  - Key concept of emergency exposure: intentional exposure of higher doses to save great value (sacrifice of the Braves)

# A Better System

| Exposure situations | Planned | | | | Unplanned | |
|---|---|---|---|---|---|---|
| | Consented | | | | | Unconsented |
| Category | Missional | Occupation. | Voluntary | Medical | Existing | Public |
| Exposed individuals | Braves | Workers | Volunteers | Patients | Natural person | Members of the public |
| Dose restriction | Ref. levels | Limits + constraint | Reduced limits + constraint | Ref. levels (diag.), prof. judgment | Ref. levels | Limits + constraint |
| Examples | Fighters(res cuer), space crew | Ordinary workers, air crew | Residents rehabilitated, carers, air passengers, biomedical subjects, visitors, informed consumers | Patients under diag., nuclear medicine, therapy procedure | Residents in radon prone home, affected people at early phase | Residents near nuclear facility |

# Conclusion

- Current categorization of exposed persons and exposure situations in ICRP 103 suffers significant conceptual gaps
  - Mis-interpreted or misleading in part
- Need a reform of the system of Radiological Protection
  - Re-wording
  - Potential addition of exposure categories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Thanks