# Radiation Screening/Decontamination

Angela Leek
Bureau Chief, Radiological Health
Iowa Department of Public Health

**National Academies of Sciences, Engineering, and Medicine**

**CHALLENGES IN INITIATING AND CONDUCTING LONG-TERM HEALTH MONITORING OF POPULATIONS FOLLOWING NUCLEAR AND RADIOLOGICAL EMERGENCIES IN THE UNITED STATES**

Workshop
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# Purpose of Screening for Radiation Contamination


- Identify individuals whose health is in immediate danger and need immediate medical attention or decontamination.
- Identify people who may need further evaluation or short-term health monitoring.
- Register potentially affected populations for long-term health monitoring.
- Advise those who are advised to shelter in place or not visiting an established screening location on how to self-decontaminate and record information

Photo credit: https://www.cdc.gov/nceh/radiation/energy.html

CDC Population Monitoring Guide https://emergency.cdc.gov/radiation/pdf/population-monitoring-guide.pdf

# Considerations for Screening for Radiation Contamination

How will initial screening of those who are/believe they are contaminated be handled?.

What agencies will be responsible for the initial screening and determination of thresholds for actions?

What agency will be responsible for long-term health monitoring?

How will registration information be transferred to those responsible for long-term health monitoring?

Who will have access to this data?

Do processes differ for tracking emergency workers vs public?

Photo credit: https://www.cdc.gov/nceh/radiation/energy.html

# Screening Thresholds for Decontamination

- Jurisdictions will establish set level for screening thresholds requiring decontamination or follow up
  - based on wide range of guidance from FEMA, NCRP, IAEA, CRCPD, and EPA.

- Long term assessment needs to translate operational unit recorded back into estimated concentration and duration to allow for dose estimation.
  - Need to know what assumptions were used when determining operation units and procedures for screening and documentation.

$$= \frac{cpm_{measured} - cpm_{background}}{efficiency}$$

$$= \frac{activity}{15\ cm^2}$$

Image Credit: Steinmeyer, PR, RSO Magazine, Vol. 10, No. 5, 2005

# Screening for External Radiation Contamination

- External Contamination
  - Responders are provided operational units (cpm) that correspond to an established contamination concentration determined by assumptions on equipment efficiency for radionuclide and screening techniques.
  - For more modern (non CD V-700) instruments with pancake detectors, thresholds can range from 1,000 cpm to 100,000 cpm for fixed and loose-plus-fixed.
  - For example,
    - Fixed contamination criterion, which is typically the more restrictive number, and is applied to people who have showered and changed clothes.

Photo credit https://training.fema.gov/emiweb/downloads/is302/ss_modo8_sg.pdf

# Screening for Internal Radiation Contamination

- Estimates of internal contamination can be made from:
  - tracing the physical location of individuals during the incident
  - measuring the extent of external contamination prior to washing can be helpful indicators of the likelihood and magnitude of internal contamination.
  - Elevated external measurements after multiple decontamination efforts.
- Laboratory results are necessary to provide definitive internal dose information, especially for alpha-emitting radionuclides.

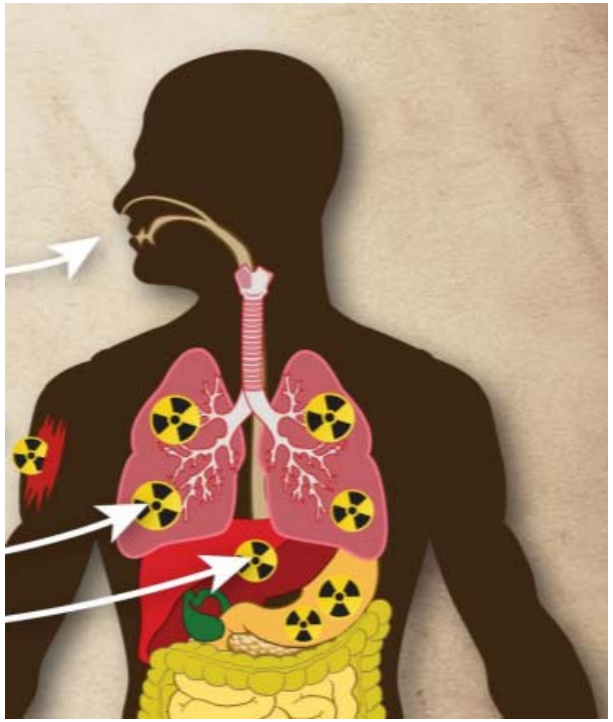


Image adapted from CRC infographic
https://emergency.cdc.gov/radiation/pdf/infographic_contamination_versus_exposure.pdf

# Shelter in place or more complex flow matrix

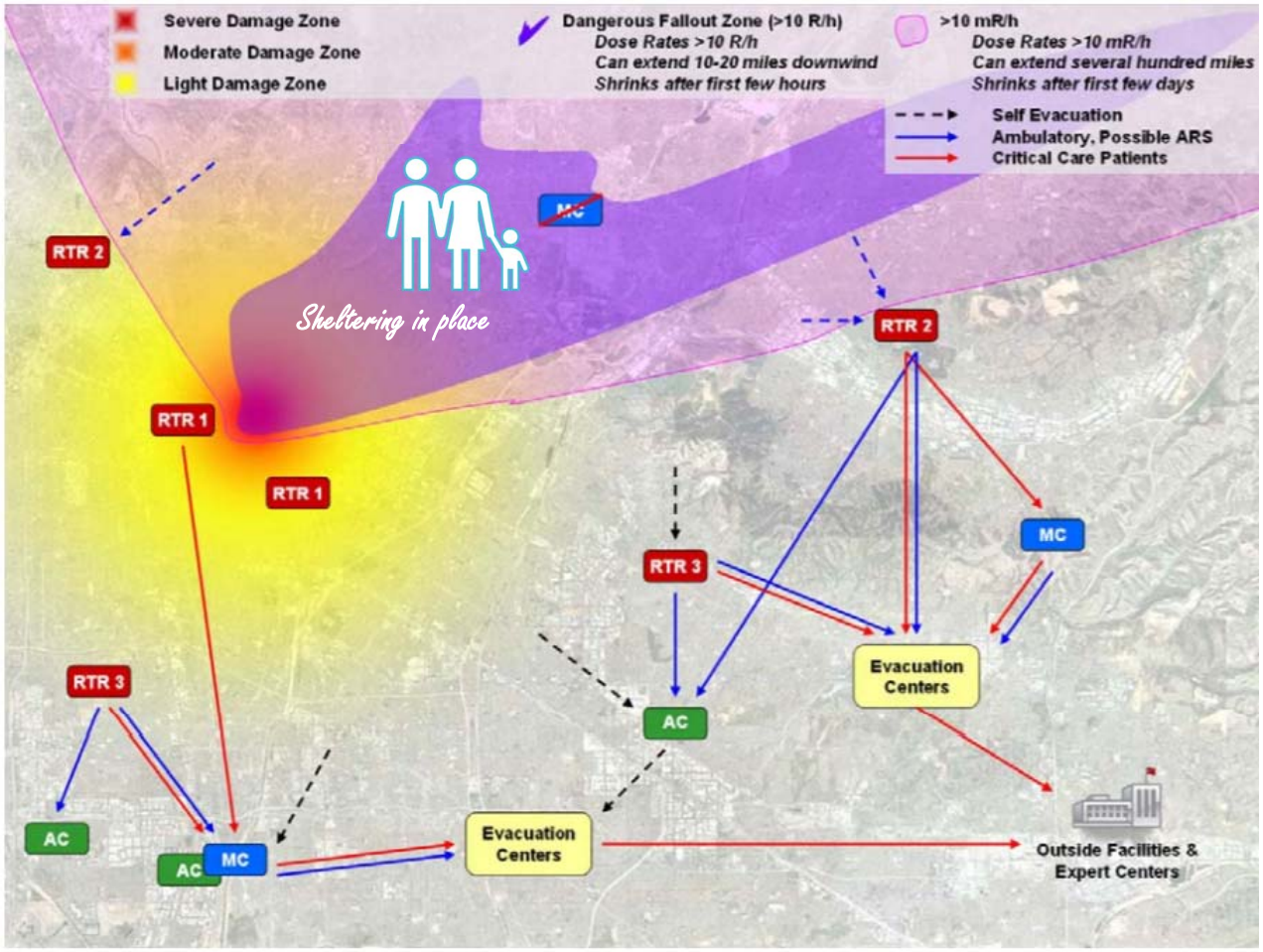



**Figure 4.1: The RTR system for a nuclear detonation response; theoretical zones in a 10 KT nuclear explosion at ground level**

Adapted from Planning Guidance for Response to a Nuclear Detonation
https://www.fema.gov/media-library-data/20130726-1821-25045-3023/planning_guidance_for_response_to_a_nuclear_detonation___2nd_edition_final.pdf

# General flow of public through screening pathways

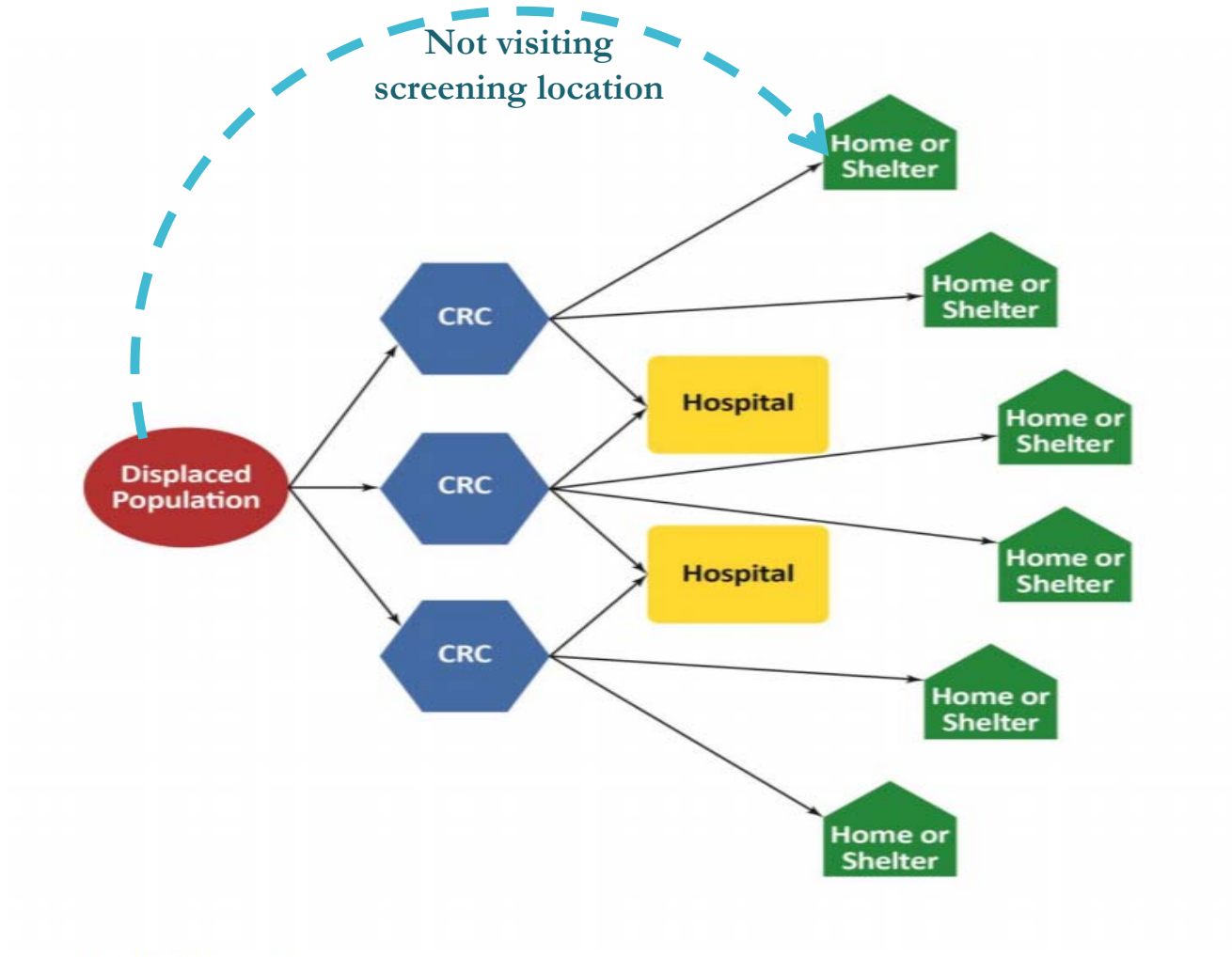
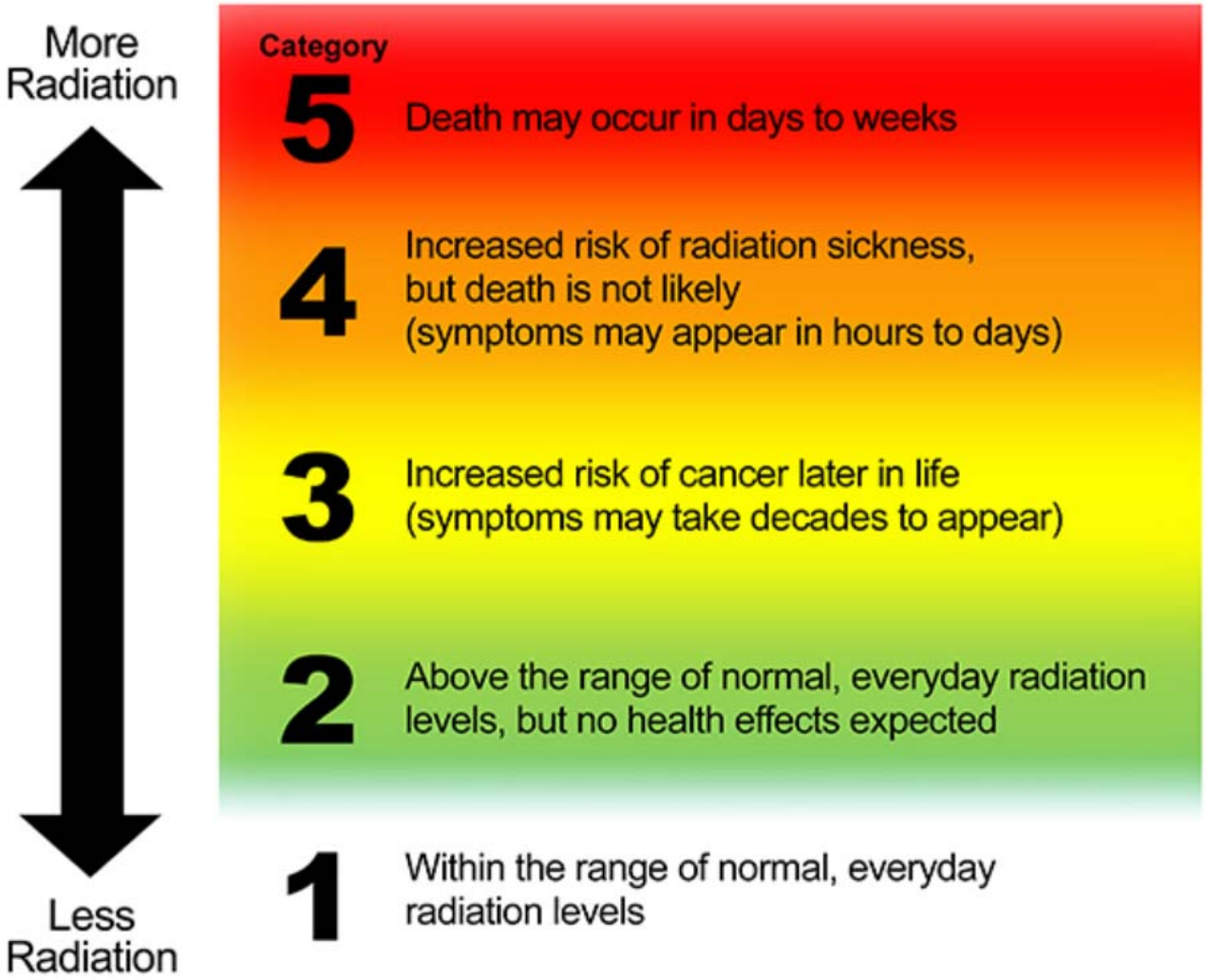



**Figure 1: CRC Network Diagram**

Adapted from CDC Population Monitoring Guide https://emergency.cdc.gov/radiation/pdf/population-monitoring-guide.pdf

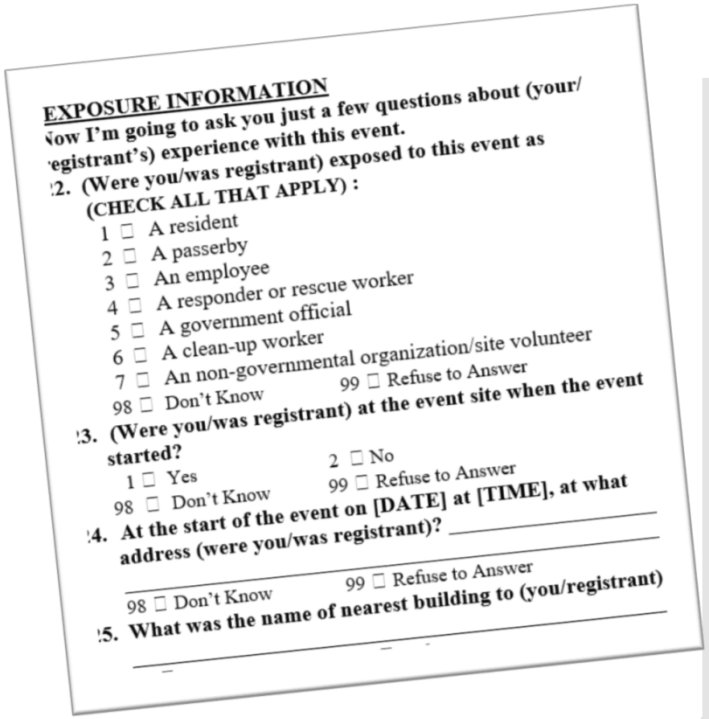
# Communicating to individuals outside established screening pathways




CDC Radiation Hazard Scale https://emergency.cdc.gov/radiation/radiationhazardscale.asp

# Recording important registry information

- Demographics
  - name, age, sex, home address
- Basic Health information
- Exposure information
  - location, duration, and activities in affected areas
  - prior decontamination efforts
  - CRC screening measurements and decontamination
- Exposure-related health effects
- Immediate health and safety needs
- Health insurance



**EXPOSURE INFORMATION**

**Now I'm going to ask you just a few questions about (your/ registrant's) experience with this event.**

**12. (Were you/was registrant) exposed to this event as (CHECK ALL THAT APPLY) :**

1 ☐ A resident
2 ☐ A passerby
3 ☐ An employee
4 ☐ A responder or rescue worker
5 ☐ A government official
6 ☐ A clean-up worker
7 ☐ An non-governmental organization/site volunteer
98 ☐ Don't Know 99 ☐ Refuse to Answer

**13. (Were you/was registrant) at the event site when the event started?**

1 ☐ Yes 2 ☐ No
98 ☐ Don't Know 99 ☐ Refuse to Answer

**14. At the start of the event on [DATE] at [TIME], at what address (were you/was registrant)?** _____

98 ☐ Don't Know 99 ☐ Refuse to Answer

**15. What was the name of nearest building to (you/registrant)**

- Exposure information questions may assist in determining those needing further screening for internal exposure or medical care.
- Communication for individuals not in screening pathways to keep track of their own exposure information and report this when they are relocated (IND/RDD shelter)

# Recording information for long-term monitoring

- Information collection routes:
  - Patient tracking by responders and hospitals
  - Self-moving population – through established triage or CRC
  - Self-moving population – to other locations/homes

- Collected information must be shared to agency managing registry
  - Quickly - if acute exposures possible from contamination to estimate dose and possible need for medical treatment or countermeasures
  - As incident stabilizes – if primarily stochastic risk then information collection is not as time sensitive

# Questions

How can we plan for collection and transfer of information throughout a response to ensure we have adequate information for long-term monitoring?