

# Risks and Effects of Radiation: Putting Fukushima in Context

March 1, 2012  
National Press Club  
Washington, DC

**Howard Dickson, CHP, CSP, CIH**  
**Past President, HPS**

**Robert Peter Gale, MD, PhD,  
DSc (Hon)  
Imperial College, London**

# Japan Deaths



Fukushima 0

# Atmospheric Release (PBq)

	$^{131}\text{I}$	$^{137}\text{Cs}$
Chernobyl	1,800	80
Fukushima	130-160	6-15

# Fukushima External Doses (10,000 people)

5,800	< 1 mSv
4,100	1-10 mSv
71	> 10-< 20 mSv
2	20-23 mSv

# Effective Collective Dose (personSv)

Chernobyl	225,000
Fukushima	3,000-8,000



# Marshall Ferdinand Foch



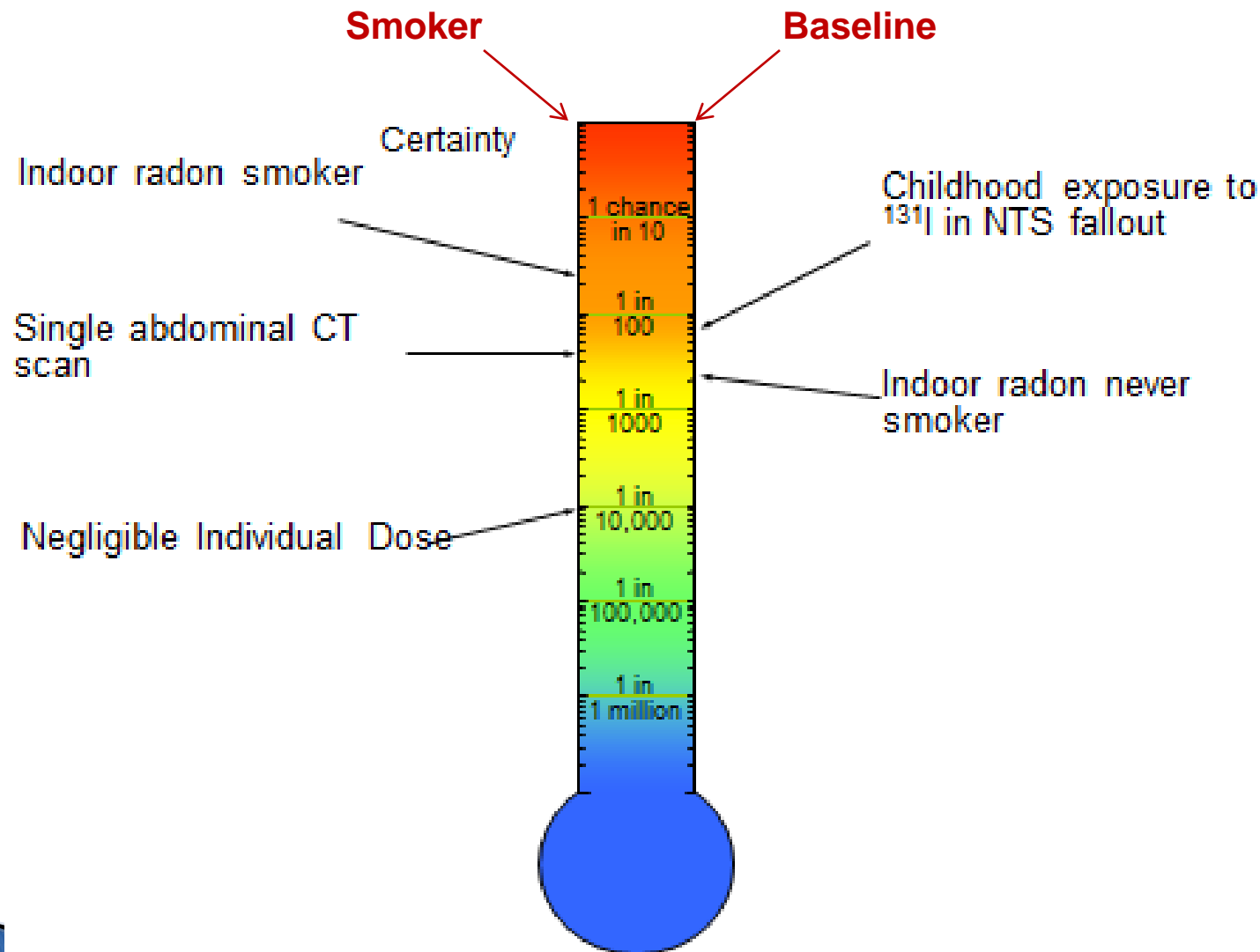
“Airplanes are interesting toys but of no military value.”



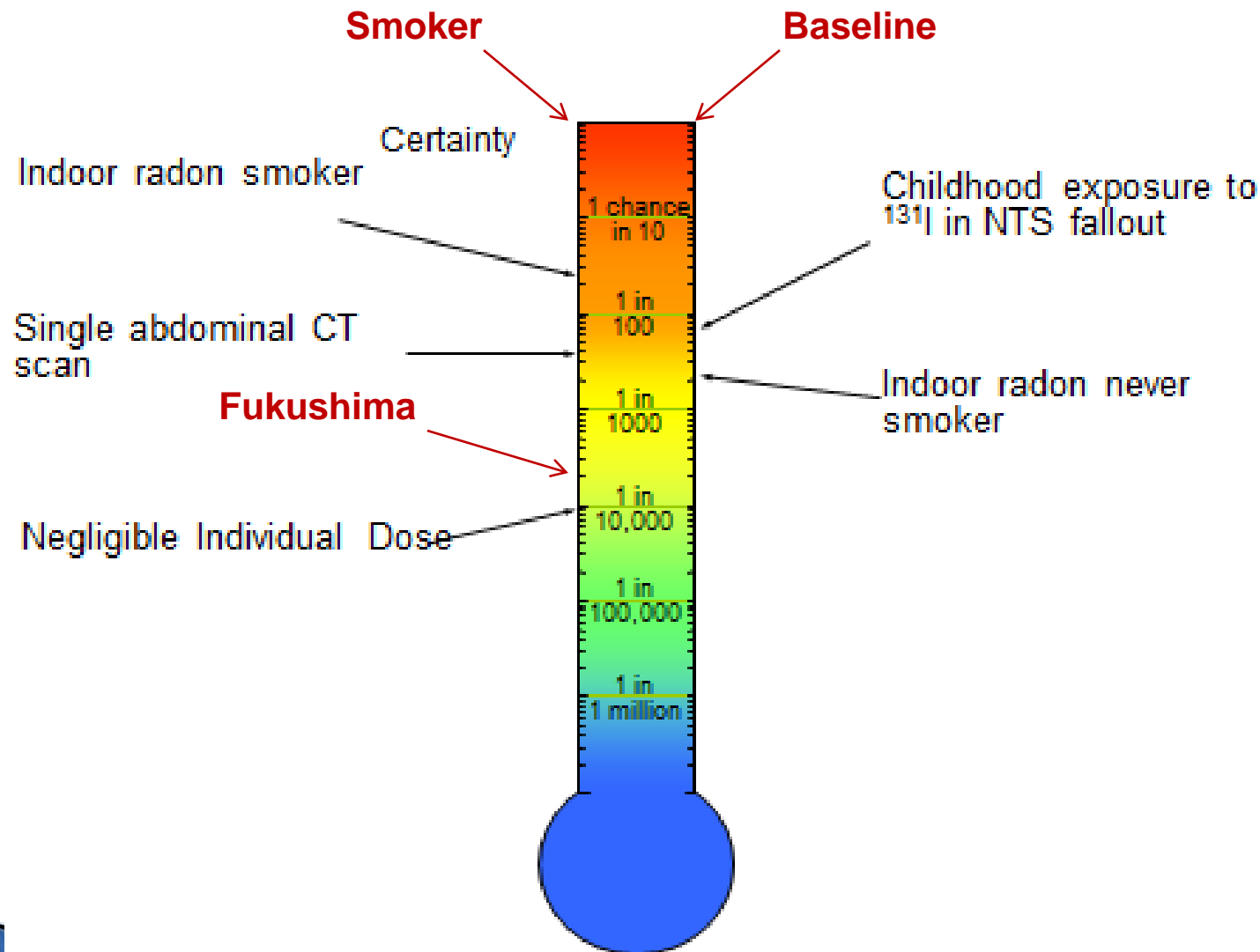
# Increased Fukushima Cancer Risk

Incidence	0.002%
Deaths	0.001%

# Lifetime Cancer Risk



# Lifetime Cancer Risk



# **1 in 100,000 Chance of Death**

Smoking 14 cigarettes

Eating 25 cups of peanut butter

Spending 20 days in New York

Driving 600 km in a car

Flying 40,000 km in a plane

Kayaking 15 minutes

Receiving 1 mSv radiation



**John Boice, ScD**  
**Vanderbilt–Ingram Cancer Center**



# Health Physics Society Panel on Risks and Effects of Radiation following Fukushima National Press Club

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## Ongoing Health Effects Surveys National and International Initiatives

John D. Boice Jr.  
National Council on Radiation Protection and Measurements  
Vanderbilt University Medical Center  
[john.boice@vanderbilt.edu](mailto:john.boice@vanderbilt.edu)  
March 1, 2012

# Population Exposure

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- 1,080 children examined for thyroid dose – lower than the screening level.

Quick action taken to minimize adverse health consequences

- Evacuation
- Recommend to stay indoors
- Food restrictions
- Monitoring, masks
- Extensive population screening (200,000)





# Worker Exposure

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- Number of workers (30 Nov 2011) 17,671
- Average effective dose ~ 9 mSv
- Number > 100 mSv (none > 200) (external) 37
- Number > 100 mSv (external + internal) 99
- Number > 250 mSv (external + internal) 6
- Lifetime risk of developing cancer may be increased 1-2% for those > 100 mSv (external)

Above 50 mSv (external + internal)	410
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# U.S. Military Exposure

## Internal Monitoring Preliminary

- Number monitored (2 Aug) 7,740 of 61,000
- Number > MDA 183 (2.4%)
- Average internal dose .04 mSv
- Highest internal dose 0.25 mSv



# Population exposures appear low -- but

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- To show compassion, provide assurance, and reduce anxiety, health surveys are being conducted
- Provide medical care
- Mental health problems most likely consequence



# Health Survey – Fukushima Residents

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## BASIC STUDY

- 2 million residents sent 10-page questionnaire
- To learn location, intake of food, baseline data
- 30 year follow-up planned, first year to cost 96 billion yen
- Purpose stated to alleviate anxiety

KOSHU EISEI JOHO (Public Health Information) 41(6):18-21, Sep 2011

Normile D. Newsmaker interview: Seiji Yasumura. Science 333:685, 2011





# 県民健康調



提言案について真剣な議論を交わす専門家会議の参加者

12日、福島医大

国際専門家  
門家が住民が

分

2日間にわた  
で行われた国際  
県民健康管理課  
山下俊一福島医  
概要を説明、意  
われた。終了後  
下副学長は「県  
調査が国際基準  
しい方向に進ん  
が確認できた。  
盾を受けた」と  
低線量の被ば  
ついて明確な  
中、県民の放射  
は依然として強  
身や子どもの被

Google: Nippon Foundation Fukushima Symposium ...

Boice, Mettler, T Walker (UK Health Safety Exec. D Wegman Global Security

<http://www.ustream.tv/channel/international-symposium-in-fukushima-radiation-and-health-risks>

# Health Survey – Fukushima Residents

## DETAILED STUDIES

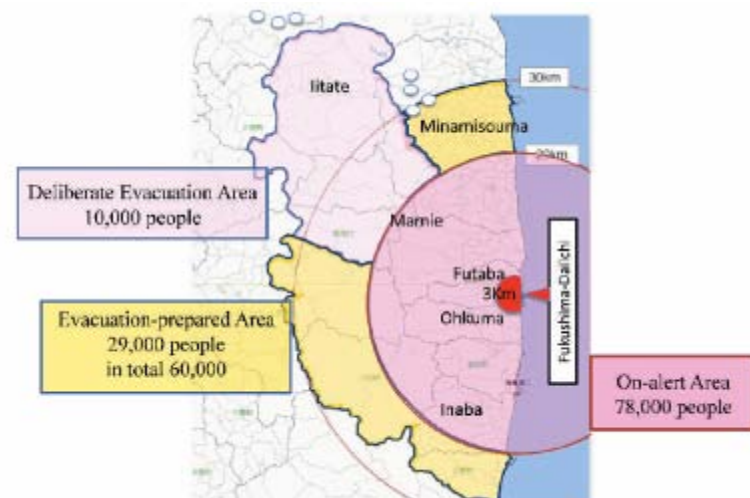
- (1) Thyroid study of 360,000 < 18y, 2½ y started Oct 2011
- (2) Health exam, including blood samples of ~ 80,000 in the evacuation zone
- (3) Mental health, counseling of those in evacuation zone
- (4) Pregnant women and nursing mothers ~ 20,000

KOSHU EISEI JOHO (Public Health Information) 41(6):18-21,

Sep 2011

Normile D. Newsmaker interview: Seiji Yasumura.

Science 333:684-5, 2011









# Task Group 84 of the ICRP Main Commission

## Initial Lessons Learned from the NPP Accident in Japan vis-à-vis the ICRP System of Radiological Protection

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- This Task Group (TG) will compile lessons learned related to the efforts carried out to protect people against radiation exposure during and after the emergency exposure situation caused by the Nuclear Power Plant accident in Japan.
- A report is expected within a year, as are recommendations to the ICRP Main Commission on any other follow-up actions including potential improvements to the system of radiological protection.
- Approximately half of the members of the Task Group are experts from Japanese authorities, operators, and nongovernmental organizations.

### Membership

Abel González (Chair) (MC)

Makoto Akashi (NIRS)

John Boice (MC)

Masamichi Chino (JAEA)

Toshimitsu Homma (C4) (JAEA)

Nobuhito Ishigure (C2)

Michiaki Kai (C4) (Oita University)

Shizuyo Kusumi (NSC)

Jaiki Lee (MC)

Hans Menzel (MC/C2)

Ohtsura Niwa (MC) (Kyoto University)

Wolfgang Weiss (C4)

Shunichi Yamashita (Nagasaki University and  
Fukushima Medical University)

Yoshiharu Yonekura (NIRS)

# Concerns/Issues to Consider

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- Misuse of Risk Coefficients and Collective Dose
- Confusion over Quantities and Units
- Concern about Internal Doses
- Protection of Rescuers
- Level of Doses for Public Protection
- Radioactivity in Consumer Products



# Concerns/Issues to Consider – 2

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- Protection of Children
- Stigma (disgrace associated with being from Fukushima)
- Disposing Contaminated Rubble and Water
- Monitoring Policy
- What Is “Safe”
- Risk Communication and Perception





United Nations Scientific Committee  
on the Effects of Atomic Radiation

unscear.org



# UNSCEAR Fukushima assessment: an honour and a challenge

Wolfgang Weiss, Chair of UNSCEAR

*1st All-Expert Meeting for UNSCEAR Fukushima Assessment  
30 January 2012*



UNEP



# Four Expert Groups

## A. Data compilation, quality assurance

Compilation, screening, quality assurance, critical review

## B. Radionuclide releases and dispersion

Source term, atmospheric/marine dispersion/deposition

## C. Dose and risk assessment

Doses, effects and risks for public and non-human biota

## D. Worker doses and health effects

Doses for workers and rescuers, and health effects/risks

- March 12-13, 2012 Annual Meeting, Bethesda

## **EMERGING ISSUES IN RADIATION PROTECTION IN MEDICINE, EMERGENCY RESPONSE, AND THE NUCLEAR FUEL CYCLE**



### **Implications of the Fukushima Daiichi Accident for Radiation Protection – 8 Sessions including:**

#### **Childhood Exposure: An Issue from Computed Tomography Scans to Fukushima**

Fred A. Mettler, Jr., *New Mexico Federal Regional Medical Center*

#### **Reference Levels in the Context of Fukushima: Lessons Learned and Challenge to Radiation Protection System**

Kazuo Sakai, *National Institute of Radiological Sciences, Japan*



- March 11-12, 2013 Annual Meeting, Bethesda

## **RADIATION DOSE AND IMPACTS ON EXPOSED POPULATIONS**

Including presentation on:

### **Two Year Results from the Fukushima Health Surveys**

Shunichi Yamashita, *Vice President, Fukushima Medical University*

- ***Scientific Committee 5-1, “Approach to Optimizing Decision Making for Late-Phase Recovery from Nuclear or Radiological Terrorism Incidents”***
  - **Emphasizing lessons being learned from the Fukushima NPP accident**
  - Chair, SY Chen. *Argonne National Laboratory*

**Kathryn Higley, PhD, CHP**  
**Oregon State Univ.**  
**Dept. of Nuclear Engineering**

# Today's Panelists

- ▶ **John Boice, ScD** – Vanderbilt–Ingram Cancer Center
  - Member of the International Commission on Radiation Protection Task Group on Fukushima
  - U.S. delegation to the United Nations Scientific Committee on the Effects of Atomic Radiation
- ▶ **Howard Dickson, CHP, CSP, CIH** – Past President, Health Physics Society
  - Formerly Deputy Director of Technical Planning for TMI 2 Recovery
- ▶ **Robert Emery, DrPH, CHP, CIH** – University of Texas Health Science Center at Houston
  - Appointed member of Texas Radiation Advisory Board
- ▶ **Robert Peter Gale, MD, PhD, DSc (Hon)** – Imperial College, London
  - Medical consultant involved in Chernobyl and Fukushima accidents
- ▶ **Kathryn Higley, PhD, CHP** – Oregon State University, Dept. of Nuclear Engineering
  - Former Reactor Supervisor for the Reed College TRIGA reactor
- ▶ **Richard Vetter, PhD, CHP** – Mayo Clinic, Professor of Radiobiology and Radiation Protection
  - Former Radiation Safety Officer
  - Congressional and Agency Liaison, Health Physics Society

# Thank You

Panelists are available for additional  
comment

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