NCRP Overview
Program Area Committee 4
Radiation Protection in Medicine

Jerrold T. Bushberg Ph.D., DABMP
Scientific Vice-President
National Council on Radiation
Protection and Measurements
Bethesda, Maryland

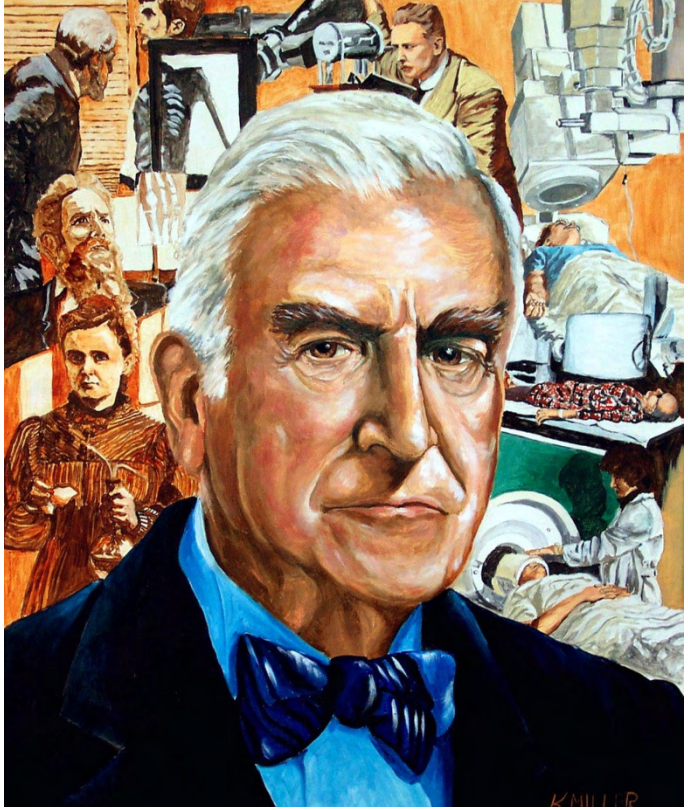
World Health Organization Meeting
Radiation Risk Communication in Pediatric Imaging
WHO, Geneva, Switzerland
September20-22 2010

NCRP History

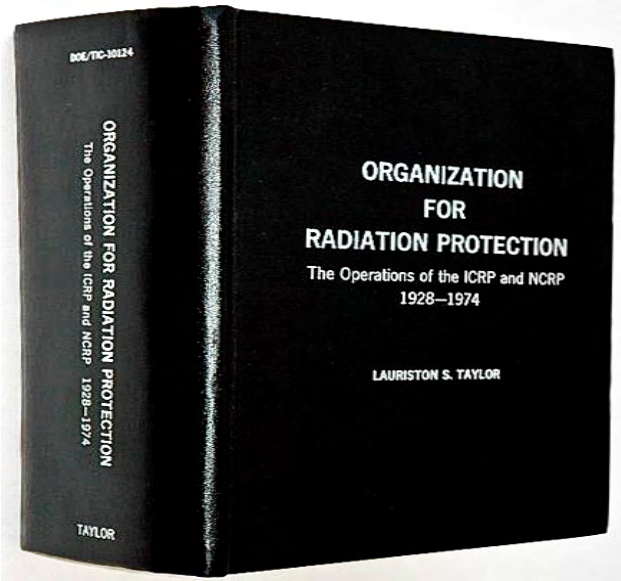
1929: U.S. Advisory Committee on X-ray and Radium Protection.

1946: U.S. National Committee on Radiation Protection.

1964: National Council on Radiation Protection and Measurements (NCRP) chartered by U.S. Congress (Public Law 88-376).



Dr. Lauriston Taylor
June 1, 1902 – Nov. 26, 2004



Key Elements of NCRP's Charter Under 1964 U.S. Public Law 88-376

- **Cornerstones of radiation protection:**
  1) **Collect, analyze, develop and disseminate in the public interest information and recommendations about:**
     a) **protection against radiation; and**
     b) **radiation measurements, quantities and units.**
  2) **Develop basic concepts of radiation protection and their applications;**
  3) **Facilitate effective use of combined resources of organizations concerned with radiation protection; and**
  4) **Cooperate with National and International Organizations on Radiation Protection Issues.**

NCRP Organization

- **Located in WDC Area (Bethesda)**
- **Full Time Staff: President (Dr. Tenforde); Exec. Director Dr. Schauer, 10 other staff members**
- **100 Scientific council members & 48 Distinguished Emeritus members (~ 20 scientific disciplines)**
- **Members elected by the council based upon**
  - widely recognized expertise in their scientific field
  - need to fill Council vacancies & expertise required for current and planned report subject matter

NCRP Medical Reports and Conferences

- Over 160 NCRP documents that directly address medical radiation safety and health protection
  - 30 reports
  - 3 commentaries
  - 4 annual meeting proceedings
  - 1 special symposium (CT)
  - 4 Taylor lectures
- Many other reports related to medical radiation exposures, operational safety, radiation quality, dosimetry, and exposure limitations are of relevance to the safety of medical facilities and procedures
- Reports must have 98% council member approval before they can be published (i.e., no more than 2 unresolved negative votes)

Radiation Protection in Medicine,

Jerrold T. Bushberg, *Vice President*

- E. Stephen Amis
- James A. Brink
- John F. Cardella
- Cindy C. Cardwell
- Marc Edwards
- Donald P. Frush
- Ronald E. Goans
- Linda A. Kroger
- Edwin M. Leidholdt
- Fred A. Mettler, Jr.
- Theodore L. Phillips
- J. Anthony Seibert
- Stuart C.White
- Shiao Y. Woo

Broad Base of Experience & Expertise

- Presidents ACR, ARR, CRCPD, ASTRO, AAPM, RRS
- 5 Chairs of Radiology / Radiation Oncology
- Experts in CV & IR Radiology, Pediatric Radiology, Radiation Oncology, Nuc Med, Dentistry & Occup med
- Experts in Dx, Nuc Med & Therapy Physics
- Members of Image Gently & Image Wisely
- Experts in Hospital Radiation Safety State & Fed Regulatory
- Experts on acute & chronic effects of medical radiation.
- Members & Advisors to ICRP, IAEA, FDA, WHO, UNSCEAR, IOM…

Over 300 person-yrs of experience in Radiation Protection in Medicine

Radiation Protection in Medicine

- NCRP –Scientific Committee (SC) ***Reports in preparation***:
  - SC 2-3: "Radiation Dose Management for Fluoroscopically-Guided Interventional Medical Procedures" (in final preparation for publication as NCRP Report No. 168)
  - SC 1-17: "Second Cancers and Cardiovascular Effects After Radiotherapy" (entering Council review stage and to be published in 2010)
  - SC 4-3: "Diagnostic Reference Levels in Medical Imaging: Recommendations for Application in the United States" (drafting stage)

Radiation Protection in Medicine

Reports in preparation (cont.):

- Scientific Committee 4-4: *Adverse Effects of Radiation on the Gonads, Embryo, and Fetus* (publication expected in 2011)
- Summary of Workshop on *Computed Tomography in Emergency Medicine: Ensuring Appropriate Use* (September 23-24, 2009); basis for 2010 consensus paper on "Guidelines for Application of Computed Tomography in Emergency Medicine"

Conference on Control of CT Doses in Conventional Imaging and Applications in Emergency Medicine September 2009. Consensus guidance publication (to be issued in 2010)

CELEBRATE 50 YEARS AAPM

American College of Emergency Physicians®

ACR® AMERICAN COLLEGE OF RADIOLOGY

SAEM Society for Academic Emergency Medicine
To improve patient care by advancing research and education in emergency medicine

NCRP National Council on Radiation Protection & Measurements

SC 4-3: *Diagnostic Reference Levels (DRLs) in Medical Imaging Recommendation for Application in the U.S.*

- ICRP introduced the concept of DRLs in Report No. 60 (1990), and subsequently recommended their use in ICRP Report No.73 (1996).
- DRLs serve as a means to investigate and identify practices where the level of patient dose or administered activity is unusually high, relative to benchmark data.
- The goal is to *optimize the dose and image quality*
- DRLs are not intended for regulatory or commercial purposes or to establish a legal standard of care.

SC 4-3: *Diagnostic Reference Levels (DRLs) in Medical Imaging Recommendation for Application in the U.S.*

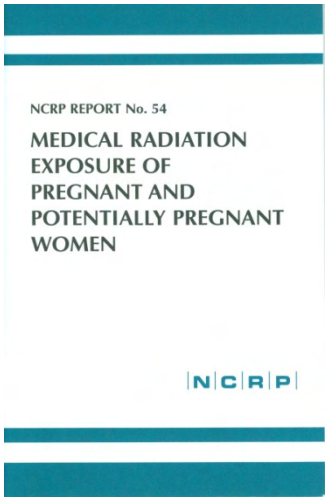
- DRLs are defined, developed and utilized in different way around the world.
- The NCRP report will contain a comprehensive discussion of the history and applications of DRLs in the U.S., Europe, and elsewhere.
- The report will consolidate and recommend DRLs in adults & children for a number of examinations: Radiography, Fluoroscopy, CT, Interventional Procedures, Dental and Nuclear Medicine.

SC 4-4: *Risks of Ionizing Radiation to the Developing Embryo, Fetus and Nursing Infant*

- **Supersedes:**

  --1977 NCRP Report 54
  Medical Radiation Exposure of Pregnant and Potentially Pregnant Women

  --1994 Commentary No. 9
  Considerations Regarding the Unintended Radiation Exposure of the Embryo, Fetus or Nursing Child



SC 4-4: *Risks of Ionizing Radiation to the Developing Embryo, Fetus and Nursing Infant*

The report will provide a comprehensive update and discussion of:

- Birth defects and developmental abnormalities that can result from *ionizing and non-ionizing* (US and RF & Magnetic Fields-MRI) exposures of an embryo, fetus, or nursing infant
- Dose to embryo, fetus, from a variety of medial imaging procedures including the dose to nursing infants from radiopharmaceuticles administered to the mother

SC 4-4: *Risks of Ionizing Radiation to the Developing Embryo, Fetus and Nursing Infant*

- Effective methods of communicating the risks & responding to FAQs from patients
- Conveying the scientific basis that effect the decisions on whether and when diagnostic or therapeutic radiological procedures can be performed with minimal risk to the developing embryo or fetus.

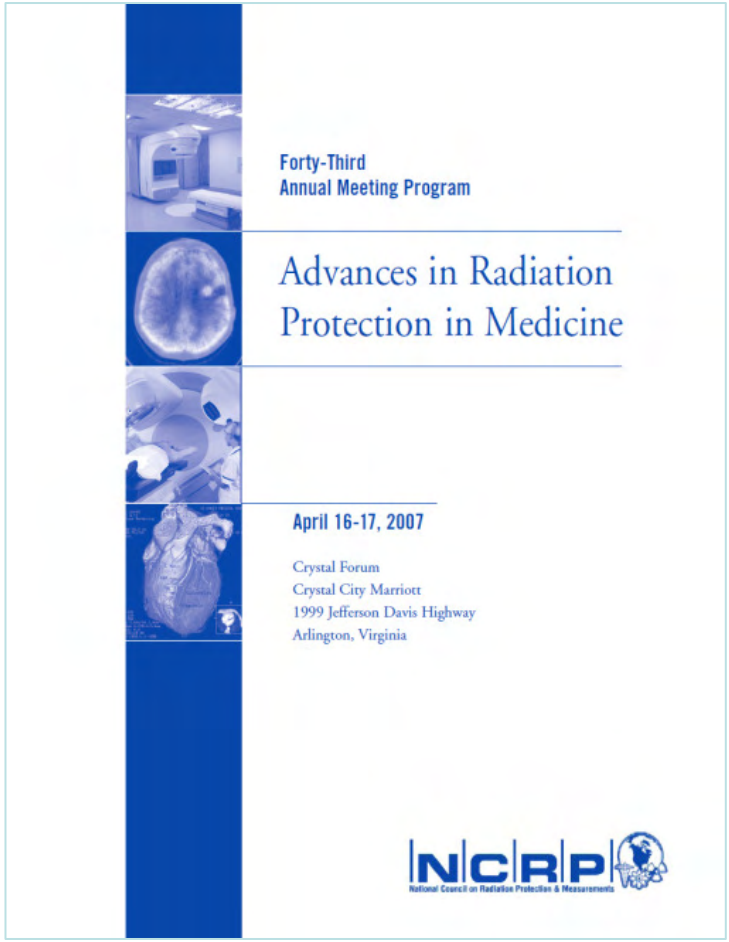
Future NCRP Activities
Radiation Protection in Medicine

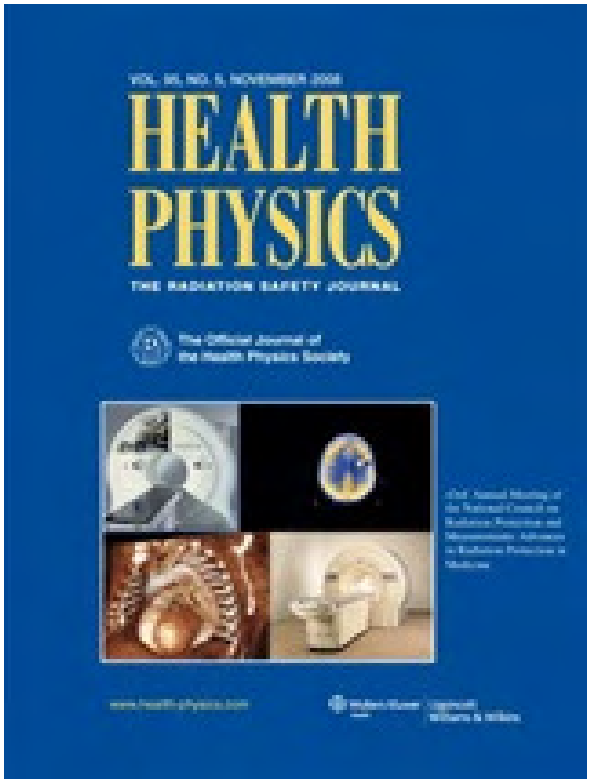
- **Update of NCRP Report No. 68 (1978): Radiation Protection in Pediatric Radiology. Chair: Donald Frush. New report activity of from 2011-2014**

- **Quality Management for Radiological Medical imaging. Chair: Donald L. Miller. New commentary activity of from 2012-2014.**

- **Guidance for Institutional Review Boards on Evaluating Radiation Risks for Studies Involving Human Subjects. Chair: Julie E. K. Timins. New commentary activity of from 2011-2013**

43rd Annual NCRP Meeting (2007):
Advances in Radiation Protection in Medicine

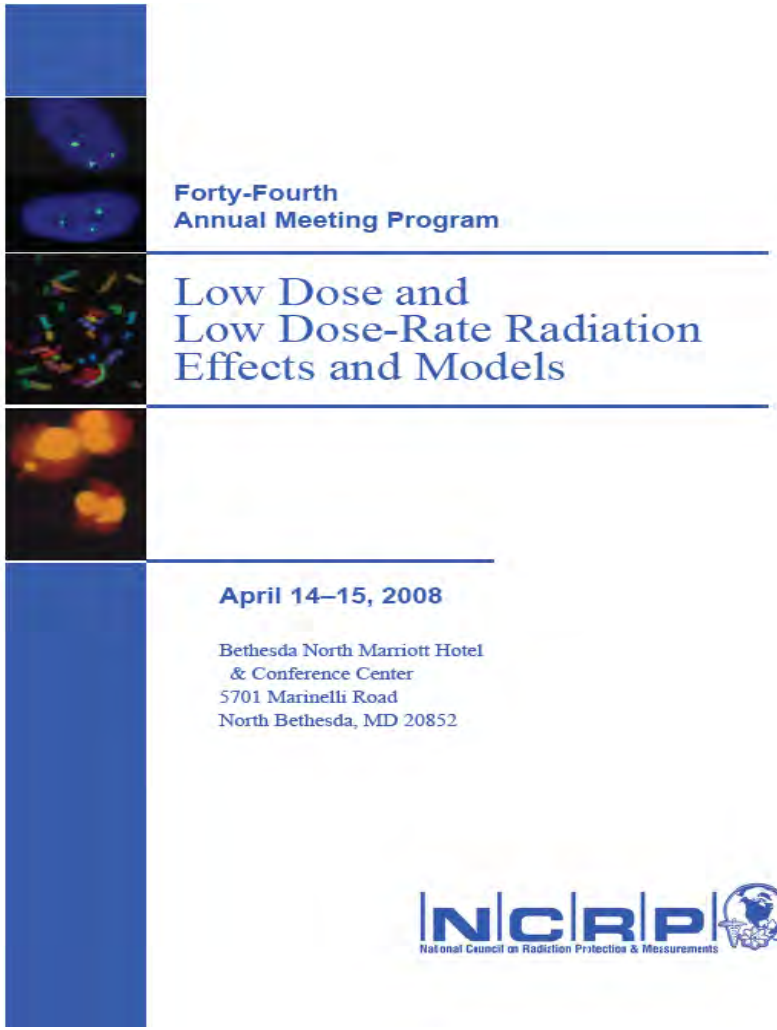


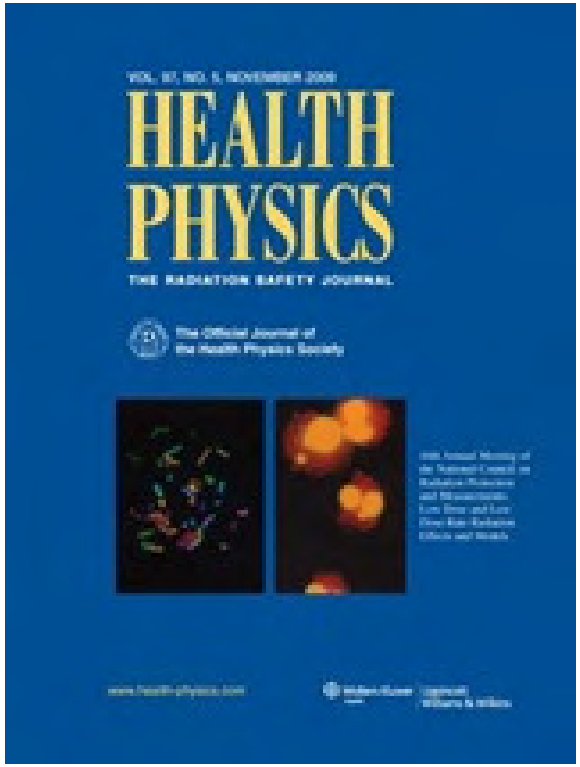


Proceedings of the 43rd Annual NCRP Meeting (2007): *Advances in Radiation Protection in Medicine* published in *Health Physics*, Vol. 95(5), 2008

44th Annual NCRP Meeting (2008)

Analysis of Biological and Human Health Impacts of Low- Dose Radiation Exposures





Proceedings of 2008 Annual Meeting published in Health Physics, Vol. 97(5), 2009

NCRP Web Site Main Page

NCRP

National Council on Radiation Protection & Measurements

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http://www.ncrponline.org

About NCRP | Our Mission | Current Program | News & Events | Publications | Members | Related Organizations

OUR MISSION

To support radiation protection by providing independent scientific analysis, information, and recommendations that represent the consensus of leading scientists.

Congressional Charter >

Message from the President >

NCRP Publications

A Guide to Mammography and Other Breast Imaging Procedures

Mammography, in conjunction with physical examination, is the method of choice for early detection of breast cancer. Other methods should not be substituted but may be useful adjuncts in specific diagnostic situations.

Browse NCRP Publications >

News & Events

Elections

Council elections held during the NCRP Business Meeting, March 9, 2010 >

2010 Annual Meeting, *Communication of Radiation Benefits and Risks in Decision Making*, March 8-9, 2010, Bethesda, Maryland

Program >

Press release >

Presentations >

Photographs >

34th Lauriston S. Taylor Lecturer, Charles E. Land, "*Radiation Protection in an Uncertain World*" >

Presentation >

7th Warren K. Sinclair Keynote Speaker, Vincent T. Covello, "*Effective Risk Communication Before, During and After a Radiological Emergency: Challenges, Guidelines, Strategies and Tools*" >

Did You Know?

2010 Canadian Association of Radiologists (CAR) International Guidelines Symposium, *Pooling International Knowledge on Appropriateness in Diagnostic Imaging*. CAR has been actively implementing and promoting the use of evidence-based guidelines to support appropriate use of imaging services in Canada >

World Health Organization: Medical imaging specialists call for global medical imaging referral guidelines >

NCRP Report No. 142, *Operational Radiation Safety Program for Astronauts in Low-Earth Orbit: A Basic Framework*, is now available in Japanese. NCRP worked with the Japan Aerospace Exploration Agency (JAXA) to make this Report available to Japanese scientists and administrators. **Contact NCRP's Executive Director, Dr. David Schauer** for additional information >

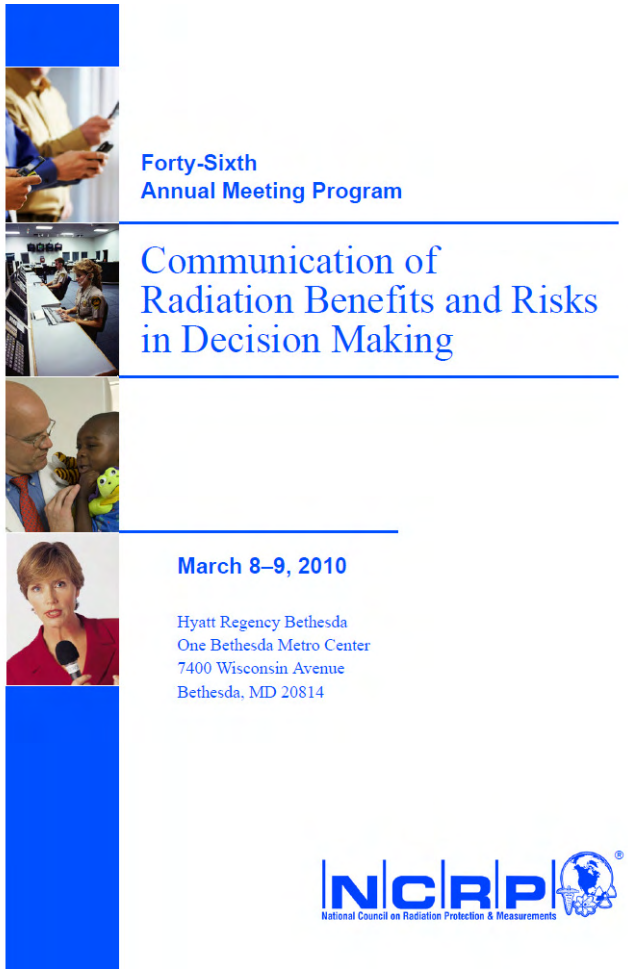
Update of NCRP Report No. 65: NCRP Report No. 161, ***Management of Persons Contaminated With Radionuclides: Handbook***, available now >

Pennsylvania Department of Environmental Protection Urges Medical Facilities to Take Proper Precautions with X-Ray Equipment to Avoid Health Hazards >

FDA Unveils Initiative to Reduce Unnecessary Radiation Exposure from Medical Imaging. Initiative to focus on three types of procedures with high radiation doses >

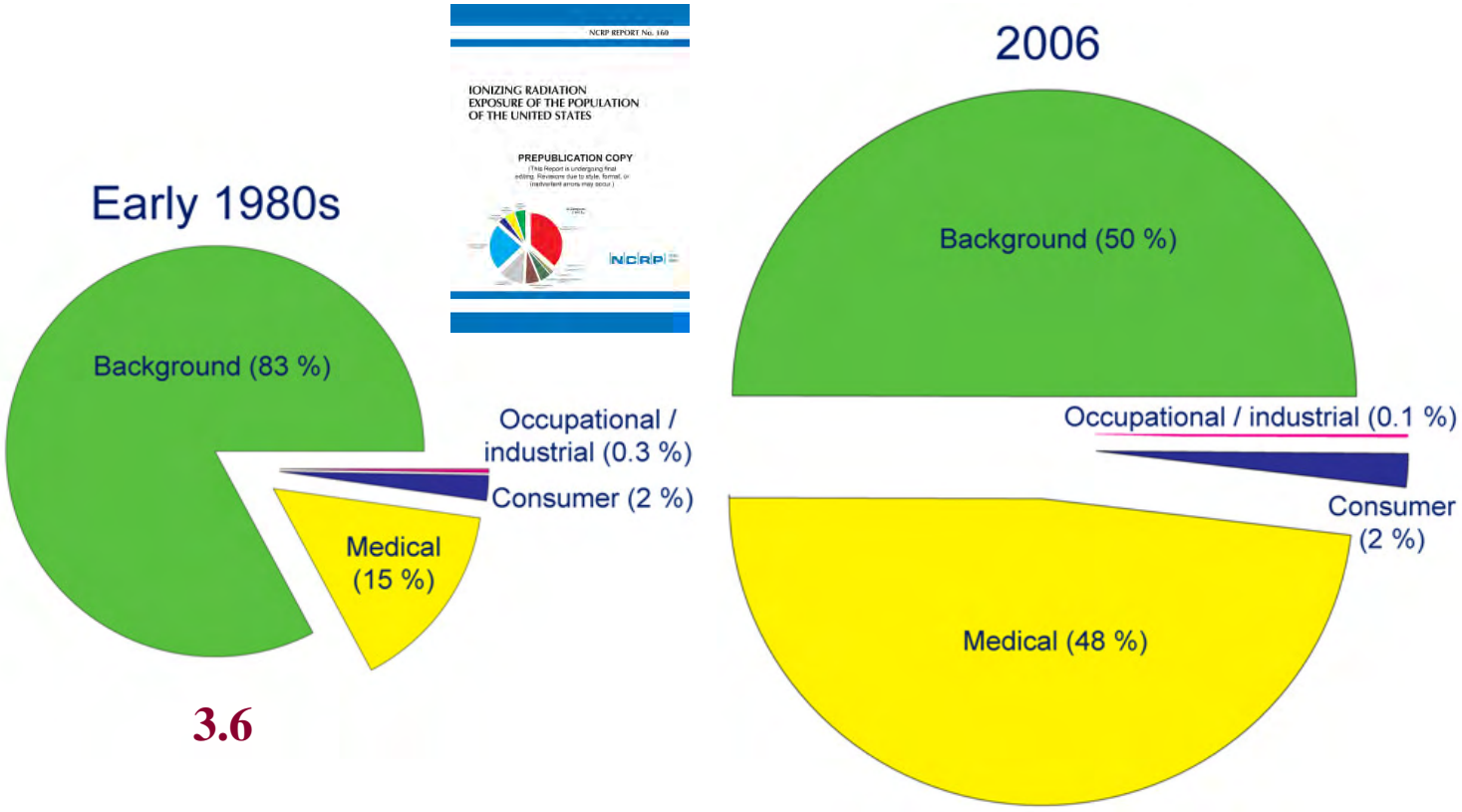
46th Annual NCRP Meeting (2010)

Communication of Radiation Benefits and Risks in Decision Making



Proceedings of 2010 Annual Meeting to be published in Health Physics, 2011

NCRP Report 160: U.S. Average Annual Ionizing Radiation Exposure



Annual Average Effective Dose (mSv)

Example of incomplete (Radiation-focused) message:

NCRP 2007: uses of medical radiation have increased six-fold since 1980 – primarily due to increases in CT and Nuclear Cardiology

Is the message received as

A

or

Example of incomplete (Radiation-focused) message:

NCRP 2007: uses of medical radiation have increased six-fold since 1980 – primarily due to increases in CT and Nuclear Cardiology

Is the message received as:

A

or

B

Choose one:

Yippee! I survived my stroke!

Yippee! I survived my heart attack!

Yippee! I survived my injury!

Yippee! They found my cancer early!

Communication Problems: Clinician-Patient

- Asking patients to repeat back what the physician told them, half get it wrong. (Schillinger et al. Arch Intern Med 2003;163:83)
- Asking patients: "Describe how you take this medication" -- 50% don't understand and take it differently than prescribed (Schillinger et al. Medication miscommunication, in Advances in Patient Safety,AHRQ, 2005)
- 50% of patients leave the physician office visit without understanding what the physician said (Roter and Hall. Ann Rev Public Health 1989;10:163)

Social Networks & Partnerships

Where do they go online?

In today's world, the average informed person reads or listens to seven sources of information daily (Pew, 2008)

CDC Goal: Provide information to our target audiences (public, professionals, policymakers) <u>when</u>, <u>where</u>, and <u>how</u> they want and need it to inform healthy and safe decisions

http://www.paintmyweb.com/images/web-logos.jpg

Author: Dr. Jay M. Bernhardt US CDC

Health Communication 2.0

CDC Goal: Provide information to our target audiences when, where, and how they want and need it to inform healthy and safe decisions

Provide information where people are

Provide information that is highly relevant

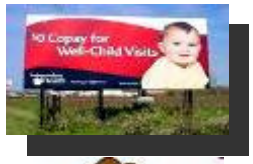
Encourage people to interact with the information

Encourage people to share the information

Author: Dr. Jay M. Bernhardt US CDC

The Power of Social Media

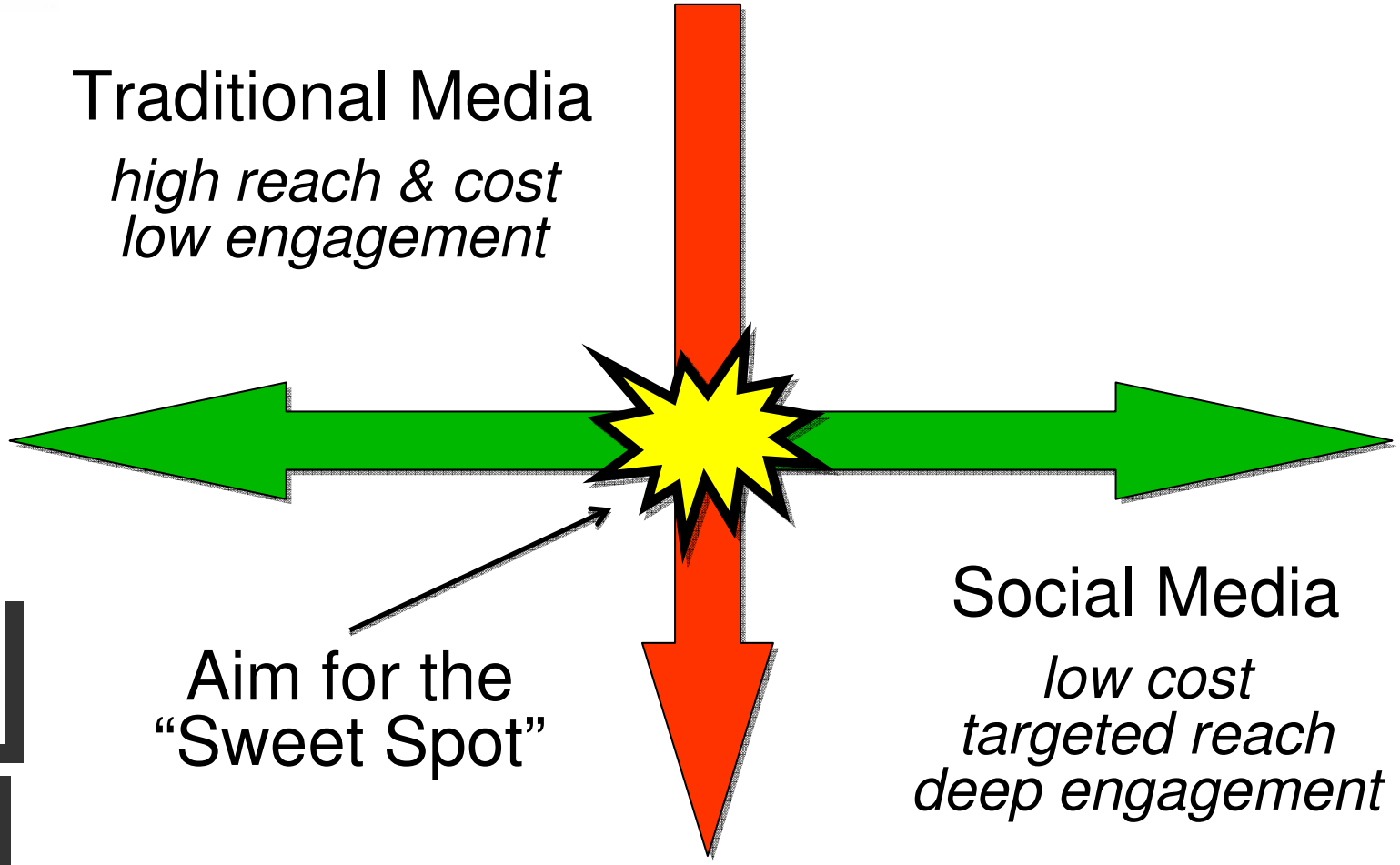
The New York Times



WebMD
Better information. Better health.

Traditional Media

high reach & cost
low engagement



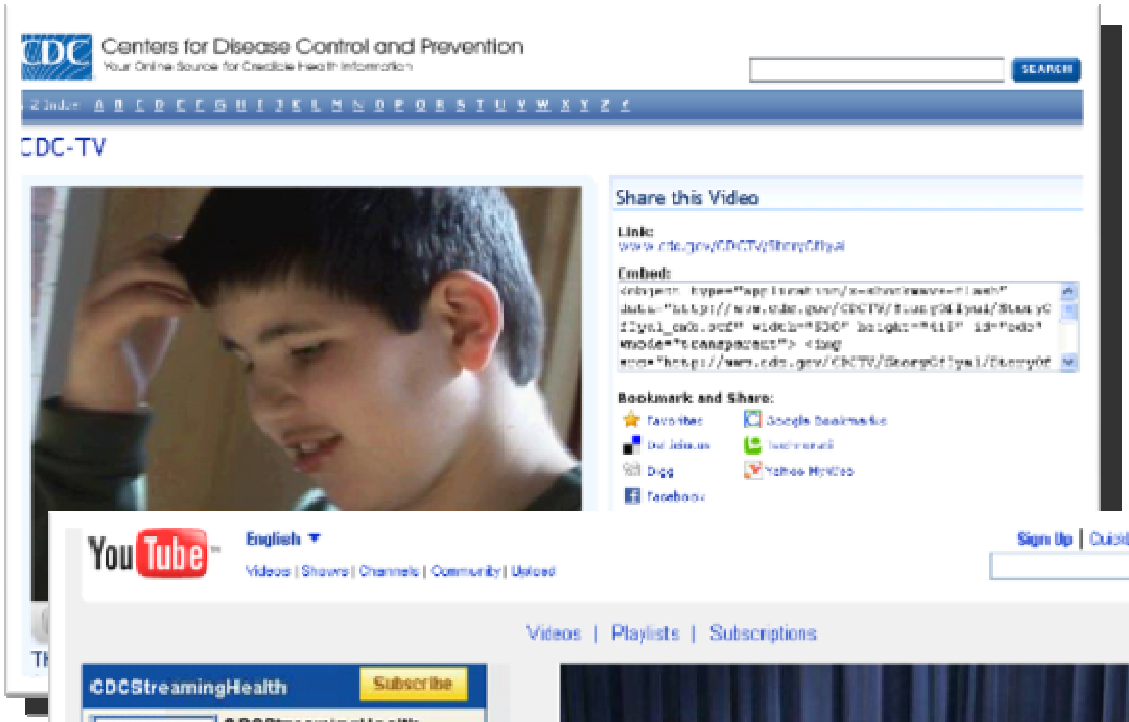
Aim for the
"Sweet Spot"

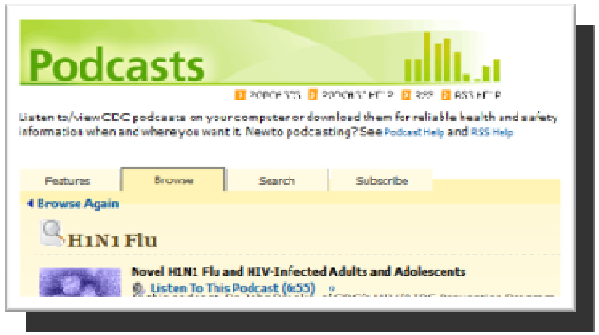
Social Media

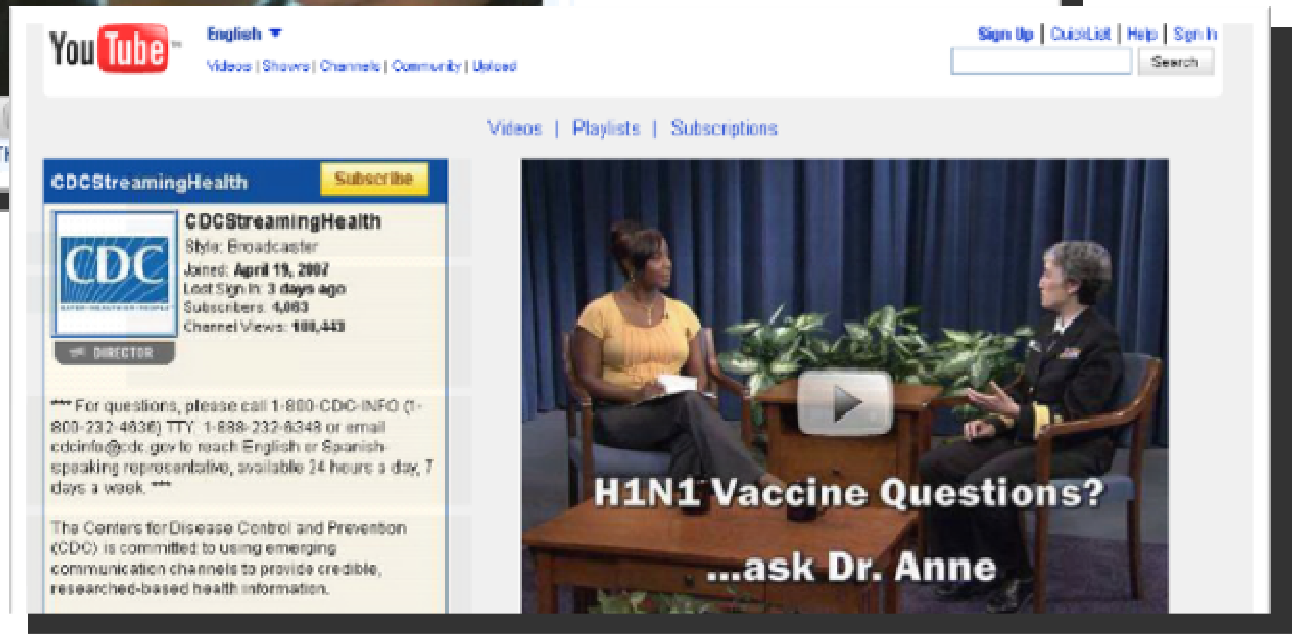
low cost
targeted reach
deep engagement

facebook flickr YouTube Blogger twitter

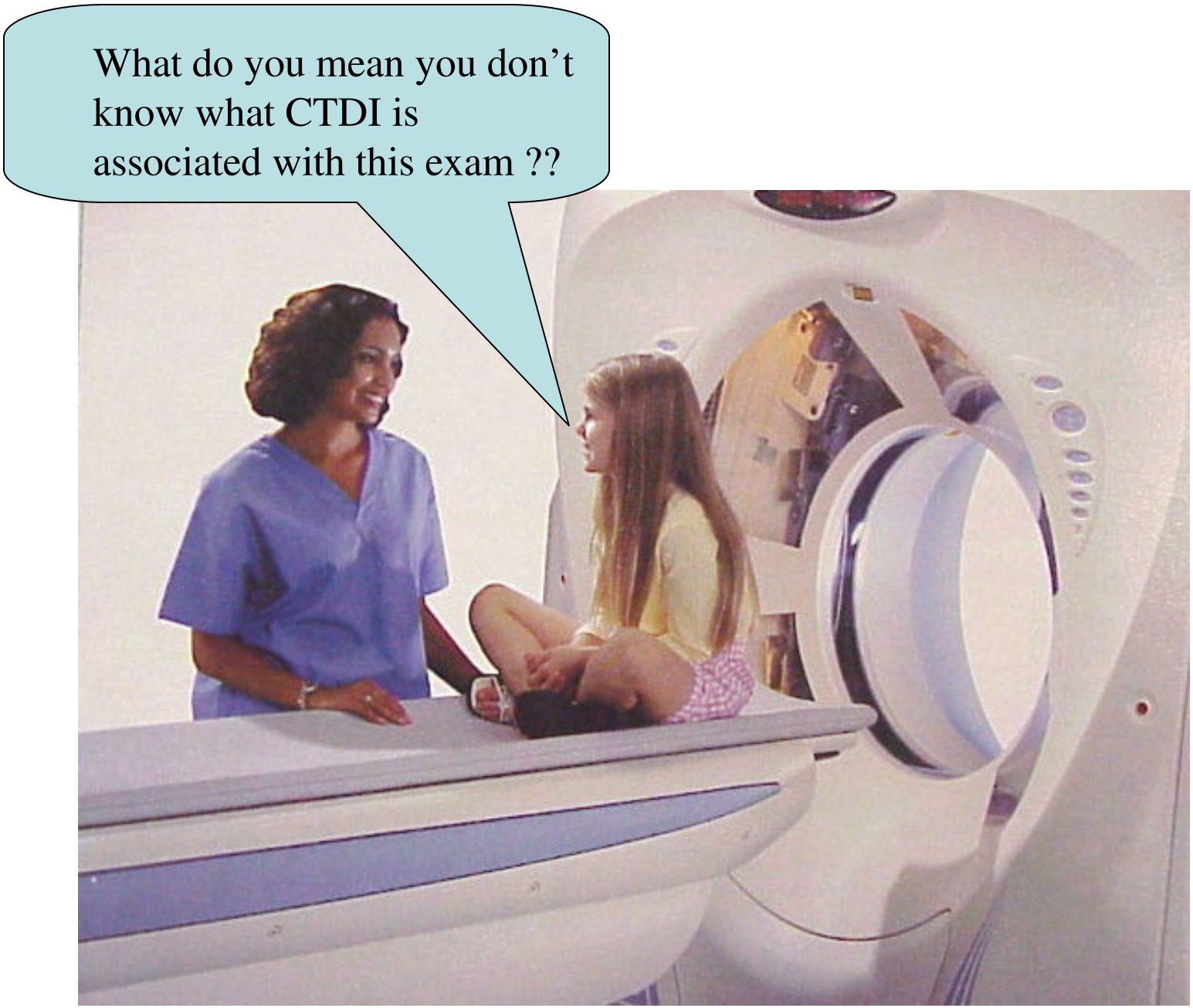
Streaming Video, Audio, Images







Author: Dr. Jay M. Bernhardt US CDC


What do you mean you don't know what CTDI is associated with this exam ??

The message is not necessarily in the words

After a pelvic CT scan of a pregnant woman, which statement delivers the most appropriate message about risk?

A. **the study that you had two weeks ago has perhaps doubled the risk that your child will develop cancer before age 19. [0.6% vs 0.3%]**

B. **the risk of adverse outcome is very small and the likelihood of normal development is nearly the same as it is for any child. [96.7% vs 96.4%]**

Values taken from: ICRP Publication #84

Conclusions

- More Education and Awareness are Needed
  - Referring Clinicians
  - Imaging Specialist
  - Patients
- Further Efforts are Necessary
  - Refine and Communicate Appropriateness Criteria for Dx imaging procedures
  - Expand & Utilize DRLs as part of the QA process
  - Right size the dose for the patient and the Dx objective

Conclusion

- If :
  - We ensure that imaging study performed represents least invasive modality with the highest probability of answering the Dx question.
  - We utilize imaging protocols that optimize image quality & dose relative to the intended diagnostic objective
  - We understand and communicate radiation doses & attendant risks, effectively

We will be able to tell patients with confidence

“Benefits will not just be balanced against the risks”

“Benefits will greatly exceed the risks”