Image Wisely and Image Gently

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Thank you for coming back after the break…
Radiation

We Are Giving Ourselves Cancer

By NATI J. ZEINBERG and REBECCA SMITH-BROWN

JAN. 30, 2014

DESPITE great strides in prevention and treatment, cancer rates remain stubbornly high and may soon surpass heart disease as the leading cause of death in the United States. Increasingly, we and many other experts believe that an important culprit may be our own medical practices: We are silently irradiating ourselves to death.

The use of medical imaging with high-dose radiation — CT scans in particular — has soared in the last 20 years. Our national exposure to medical radiation

Neither doctors nor patients want to return to the days before CT scans. But we need to find ways to use them without killing people in the process.

radiation doses of CT scans (a series of X-rays images from multiple angles) are 100 to 1,000 times higher than conventional X-rays.

Of course, early diagnosis thanks to medical imaging can be lifesaving. But there is distressingly little evidence of
January 4, 2016 –

Health & Science

Should you worry about the radiation from CT scans?


Even...

When to question CT scans and X-rays

Radiation from these tests can increase your cancer risk

ConsumerReports.org

American College of Radiology
Ionizing Radiation Exposure of the Population of the US

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>Early 1980s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background (%)</td>
<td>50</td>
<td>83</td>
</tr>
<tr>
<td>Occupational/Industrial (%)</td>
<td>0.1</td>
<td>0.3</td>
</tr>
<tr>
<td>Consumer (%)</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Medical (%)</td>
<td>48</td>
<td>15</td>
</tr>
</tbody>
</table>

Collective effective dose (person-Sv)
Early 1980s: 835,000
2006: 1,870,000

Effective dose per individual in the U.S. population (mSv)
Early 1980s: 3.6
2006: 6.2
Ionizing Radiation Exposure of the Population of the US

Questions We Get

Radiation

We live with 1-3 mSv Bkgd

4000 mSv can kill

“Is there a safe point?”

In medicine, there are risks in everything we do; the job of your doctors and imaging professionals is to make sure the benefit from having the procedure outweighs any small risk.
American College of Radiology White Paper on Radiation Dose in Medicine

E. Stephen Amis, Jr, MD², Priscilla F. Butler, MS³, Kimberly E. Applegate, MD¹,
Steven B. Blimbaum, MD¹, Libby F. Brateman, PhD¹, James M. Hevezi, PhD¹,
Fred A. Mettler, MD², Richard L. Morris, PhD³, Michael J. Pentecost, MD¹,
Geoffrey G. Smith, MD², Keith J. Strauss, MS³, Robert K. Zeman, MD¹

The benefits of diagnostic imaging are immense and have revolutionized the practice of medicine. The increased sophistication and clinical efficacy of imaging have resulted in its dramatic growth over the past quarter century. Although data derived from the atomic bomb survivors in Japan and other events suggest that the expanding use of imaging modalities using ionizing radiation may eventually result in an increased incidence of cancer in the exposed population, this problem can likely be minimized by preventing the inappropriate use of such imaging and by optimizing studies that are performed to obtain the best image quality with the lowest radiation dose. The ACR, which has been an advocate for radiation safety since its inception in 1924, released the ACR Blue Ribbon Panel on Radiation Dose in Medicine to address these issues. This white paper details a proposed action plan for the college derived from the deliberations of that panel.

Key Words: Radiation dose, radiation safety, radiation risk, radiation exposure, radiations, exposure to patients and personnel


The Blue Ribbon Panel’s 33 Recommendations for ACR Covered

- Measurements
- Referring physicians
- Radiologists
- Technologists
- Patients
- Medical physicists
- Vendors
- Reg agencies, accrediting bodies and 3rd party payers

Most recommendations have been implemented!
Meanwhile, New Approaches Implemented to Raise Awareness…

Social Marketing

- Use public media
- Use commercial marketing techniques

“……to promote behavior changes that will improve the health of the population”

Launched 2007

Image Gently 2.0: Out of Adolescence

Coalition of health care organizations dedicated to providing safe, high quality pediatric imaging worldwide. The 1o objective is to raise awareness of the need to adjust radiation dose when imaging children. The ultimate is to change practice.
Image Gently Alliance
Alliance for Radiation Safety in Pediatric Imaging
= Image Gently Alliance
100 organizations (35 international), >1,000,000 Professionals

An Assurance Organization:

Assurance: “positive declaration that is intended to give confidence; a promise” (Oxford)

through a positive message

The Message:
Direct, clear

One size does NOT fit all
Image Gently Campaigns (& Nora)

- CT (The original “Image Gently” campaign)
- Fluoroscopy (“Pause and Pulse”)
- Interventional Radiology (“Step Lightly”)
- Nuclear Medicine (“Go with the Guidelines”)
- Digital Radiography (“Back to Basics”)

Digital Radiography (“Back to Basics”)

- It's not just pretty posters...
  - Tools
  - Educational resources
  - Downloadable PowerPoint presentations
  - Papers

**BASICS: Image Analysis Tool**

- **Beam:**
  - Was the x-ray beam centered on the area of interest?
  - Was the tube angled correctly?
  - Was equipment properly aligned to body part?

- **Artifacts:**
  - Are there any artifacts obscuring the area of interest?
  - Are any artifacts obscuring the anatomy?
  - Is there excess quantum mottle?

- **Shielding:**
  - Was general protection (including proper attire) utilized?
  - Was 2nd medical opinion documented when appropriate?

- **Immobilization and Indicators:**
  - Was the selected technique based on measured body size?
  - Are the Exposure Indicators/Deviation Index (EDI) in the appropriate range?
  - How can you adjust for the most similar patient?
  - Are anchors, ABC, or field level changing the EDI?
  - Could the baby, toddler, or child follow instructions?
  - Could immobilization be used more effectively?
  - Should our facility seek immobilization advice and training from a pediatric imaging facility?

- **Collimation:**
  - Was collimation appropriate?
  - Was digital electronic post-collimation avoided?

- **Structures:**
  - Is all necessary anatomy included?
  - Is there motion present?
  - Was the distance used appropriate?
  - Was there evidence of patient motion?
  - Were markers used correctly?
  - Were grids used appropriately?
For Parents

- “Think A-Head” – campaign for use of head CT under development – Nov 2016
- “Have a Heart” – campaign for pediatric cardiology - May 2017
- Mini campaigns being considered
- Website review
- Industry partnership
  - MITA collaboration for pediatric equipment design
  - IEC working group for SSDE standard; global impact
Image Gently

Publications:

Since 2007: 40 papers in peer review journals

Image Gently: Does It Make a Difference?

- **Global awareness**
  - Importance of radiation protection during imaging of children
  - Unique considerations for children
  - Importance of expertise: pediatric radiologists, MPs, technologists
  - Content

- **Inspiration and template for other organizations**
  - Including Image Wisely and Choosing Wisely

- **Guidance**
  - Regulatory, advisory, accrediting bodies

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**Image Gently Website: Google Analytics**

A. 2012 Lancet: “CTs cause cancer in children”
B. 2012 Digital Radiography campaign
C. 2014 Dental Campaign

Arrow: website redesign
The Image Gently Alliance has developed a successful and adaptable model for dissemination of information relevant to medical radiation protection for children.

Image Wisely
Launched RSNA 2010

Image Wisely® is an initiative developed by the ACR, RSNA, AAPM and ASRT to raise awareness and provide up-to-date educational resources for radiology professionals and referring clinicians regarding the use of ionizing radiation in adult medical imaging examinations.
Image Wisely Executive Committee - ALL volunteers

- Richard Morin, PhD, FACR (Mayo Clinic-Jacksonville)
- William Mayo-Smith, MD, FACR (Brigham and Women’s)
- Eric Gingold, PhD (Thomas Jefferson University Hospital)
- Greg Morrison, MA, RT (R) (ASRT)
- Kimberly Applegate, MD, MS, FACR (Emory University)
- Laura Bancroft, MD (Radiology Specialists of Florida)
- Robert Dixon, MD (University of North Carolina)
- Donald Frush, MD, FACR (Duke University Medical Center)
- Amy Hara, MD (Mayo Clinic-Scottsdale)
- Mary Mahoney, MD, FACR (University of Cincinnati)
- Jay Pahade, MD (Yale University)
- Pari Pandharipande, MD (Massachusetts General)
- Don Yoo, MD (Rhode Island Medical Imaging Inc)

Information Resource - www.imagewisely.org
Top 3 Image Wisely Features

1. Content
2. Pledge
3. Case

Content Routinely Updated

One of our most popular

How to Understand and Communicate Radiation Risk

Donald Peck, PhD, FACR, Henry Ford Health System, Detroit, MI
Ehsan Samei, PhD, Duke University Medical Center, Durham, NC
(Updated March 2017)

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Top 3

1. Content
2. Pledge
3. Case

Pledges

Take the pledge
Select the pledge most appropriate to your individual role and, if appropriate, for your entire group or society.

I am an imaging professional who wishes to pledge to IMAGE WISELY

I am a referring practitioner that wishes to pledge to IMAGE WISELY

My imaging facility would like to demonstrate radiation safety awareness

My association or educational program wishes to pledge on behalf of our members

Honor Roll
Honor roll of organizations that have pledged to image wisely.
Effective January 1, 2017:

- All pledges must be renewed annually
- Response has been very promising

**Image Wisely Pledges - 2017**

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**Pledge for Imaging Professionals**

Yes, I want to image wisely.

I wish to optimize the use of radiation in imaging patients and thereby pledge:

1. To put my patients’ safety, health, and welfare first by optimizing imaging examinations to use only the radiation necessary to produce diagnostic-quality images;
2. To convey the principles of the Image Wisely program to the imaging team in order to ensure that my facility optimizes its use of radiation when imaging patients;
3. To communicate optimal patient imaging strategies to referring physicians, and to be available for consultation;
4. To routinely review imaging protocols to ensure that the least radiation necessary to acquire a diagnostic-quality image is used for each examination.
5. To monitor examination radiation dose indices to enable comparison to established diagnostic reference levels.

Annual pledge required – this pledge expires December 31
Who is Pledging?

Practice Type

Who is Pledging?

Pledgers Outside of US
Who is Pledging?

Only 111 medical physicists have pledged in 2017

My “Ask”

- If you haven’t done so this year, please pledge to Image Wisely
- Right now
- That’s right, pull out you iPhone or Galaxy Note
- Go to www.imagewisely.org
- Click on then,
Facility Pledge Includes:

- All professionals have taken the Image Wisely pledge
- Earn accreditation from an organization that directly evaluates the following:
  - Radiation dose indices and compliance with accreditation pass/fail thresholds
  - Clinical image quality (peer-reviewed by an external, qualified interpreting physician)
  - Phantom image quality (peer-reviewed by an external, qualified medical physicist)
  - Personnel (qualifications set by the accrediting organization)
- Participate in a local, regional or national dose index registry that includes routine evaluation of procedures and dose indices
ACR Dose Index Registry (DIR)

- A tool for quality improvement so facilities can review dose indices and optimize protocols
  - Collects and compares dose index information across facilities
  - Fully automated; uses standard methods of data collection and processing (DICOM SR, IHE REM Profile, RadLex)
  - Will help to develop size-specific reference levels
  - CT DIR launched in May 2011
The ACR Computed Tomography Dose Index Registry: The 5 Million Examination Update

Mythreyi Bhargavan-Chatfield, PhD, Richard L. Morin, PhD

- Raises awareness of nuances in practice variation across facilities and different challenges each faces
- Standardized comparisons allow facilities to make meaningful comparisons and implement improvements customized to their own unique circumstances
- Will help implement DIRs for Computed Radiography/Digital radiography (CRDR), fluoroscopy, and nuclear medicine

Participation from a Variety of Practice Types in US

- Jul 2017
  - Over 1900 active facilities
  - Over 45 million exams
Diagnostic Reference Levels (DRLs) & Achievable Doses (ADs)

U.S. Diagnostic Reference Levels and Achievable Doses for 10 Adult CT Examinations

July 2017

Purpose: To develop diagnostic reference levels (DRLs) and achievable doses (ADs) for the 10 most common adult computed tomography (CT) examinations in the United States as a function of patient size by using the CT Dose Index Registry.

Materials and Methods: Data from the 50 most commonly performed adult CT head, neck, and body examinations from 255 facilities were analyzed. For head examinations, the lateral thick.

AD and DRL for Abdomen/Pelvis w/out Contrast - CTDI_{vol}, SSDE & DLP

- CTDI_{vol} AD, CTDI_{vol} DRL
- SSDE AD, SSDE DRL

- DLP AD, DLP DRL

Water Equivalent Diameter (cm)
US DRL & AD Summary for Median-Size Patients

Table 8

<table>
<thead>
<tr>
<th>Examination</th>
<th>CTDI_{p} (mGy)</th>
<th>SSDE (mGy)</th>
<th>DLP (mGy cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>DRL</td>
<td>AD</td>
<td>DRL</td>
</tr>
<tr>
<td>Chest without contrast material</td>
<td>9</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Chest with contrast material</td>
<td>10</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>Chest and pulmonary arteries with contrast material</td>
<td>11</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>Abdomen and pelvis without contrast material</td>
<td>13</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>Abdomen and pelvis with contrast material</td>
<td>12</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Abdomen, pelvis, and kidney without contrast material</td>
<td>12</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>Chest, abdomen, and pelvis with contrast material</td>
<td>12</td>
<td>15</td>
<td>14</td>
</tr>
</tbody>
</table>

Note.—ADs and DRLs are based on the size bin containing median-size patients.

Top 3

1. Content
2. Pledge
3. Case
Radiation Safety Case – FREE ½ credit

- **New! Case 10: Child-sizing CT Dose: Optimizing Patient Care Through Quality Improvement – Pediatric and Adult Imaging (developed by Image Gently®)**
- Case 9: Image Quality & Radiation Dose in Cardiac CT Angiography
- Case 8: C-arm Based Cone Beam CT in Interventional Radiology
- Case 7: Patient Skin Dose with Interventional Fluoroscopy
- Case 6: Optimizing Radiation Use During Difficult IVC Filter Retrieval
- Case 5: Imaging Wisely When Evaluating for Pulmonary Embolism
- Case 4: Technical Errors and Image Quality in Digital Radiography
- Case 3: CT Brain Perfusion Dose Optimization
- Case 2: Dose Management in Image-Guided Neuro-Interventions
- Case 1: CT Dose and Size-Specific Dose Estimate (SSDE)

Ok, I Have Another “Ask”

- We need volunteers to author more Image Wisely Radiation Safety Cases
- If you or your student or a physicist-tech-radiologist team would like to author a case, see me
- I’d be happy to work with you

Topic ideas
- Scenes from a CT suite…OMG, the patient’s pregnant
- Scenes from an interventional fluoro suite…OMG, the nurse is pregnant
- Scenes from the chair’s office around the hall from the hot lab…OMG, the boss’s secretary is pregnant
Radiation Dose Exhibits

This Month’s RSNA Radiation Dose Exhibit


This exhibit offers strategies for optimizing necessary nuclear radiography examinations. It offers information on the use of appropriateness criteria, society guidelines and accreditation, and optimizing techniques for choosing radiopharmaceutical dose along with gamma camera technique.

Authors: D. Elkin, S. Shah, D. Munsat, M. Becker

RSNA Annual Meeting Radiation Dose Exhibits

This curated series from the annual meeting of the Radiological Society of North America highlights a selection of educational exhibits dealing with radiation safety and patient dose. New exhibits are added monthly.

New Page - Sister Initiatives

International Safety Initiatives

Visit AfrOsafe »
Visit Arab Safe »
Visit Canada Safe Imaging »
Visit EuroSafe Imaging »
Visit Latin Safe »
IG and IW Voices are Heard

- US FDA and State Regulators
- The American Board of Radiology
  - New MOC Part 4: Practice Quality Improvement (PQI) guidance specifies that, “Local or national leadership role in a national/international quality improvement program, such as Image Gently, Image Wisely, Choosing Wisely, or other similar campaign.” qualifies as PQI.
- The ACR Diagnostic Imaging Center of Excellence – pledging is required
- The Joint Commission

Why Image Gently and Wisely?

- It’s the right thing to do!
  - And, don’t forget to pledge to Image Gently, too
- Thank You