**Prescription for Radon**

September 19, 2013

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**Evaluations**

Nursing Contact Hours, CME and CHES credits are available. Please visit [www.phlive.org](http://www.phlive.org) to fill out your evaluation and complete the post-test.

*Thank you!*

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**Featured Speakers**

- **Paul A. Locke, JD, DrPH**  
  Associate Professor in the Department of Environmental Health Sciences  
  Director, DrPH Program in Environmental Health Sciences  
  Johns Hopkins Bloomberg School of Public Health

- **Gloria Linnertz**  
  Radon Activist and Advocate

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**Disclosure Statements**

The planners and presenters do not have any financial arrangements or affiliations with any commercial entities whose products, research or services may be discussed in this activity.

No commercial funding has been accepted for this activity.

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**Thank You to Our Sponsors:**

- University at Albany School of Public Health
- NYS Department of Health
Radiation Risks and Benefits: Where Does Radon Fit?

Paul A. Locke, JD, DrPH
Associate Professor, Johns Hopkins Bloomberg School of Public Health
Department of Environmental Health Sciences
Baltimore, MD USA

Objectives of This Presentation

- Describe and discuss typical radiation exposure sources for US residents
- Compare radon to other radiation exposures
- Discuss radon health risk
- Discuss communicating radon risk to patients

Typical Radiation Exposures in the US

NCRP Report No. 160, Ionizing Radiation Exposure of the Population of the United States

U.S. annual per capita effective radiation dose from various sources for (a) 1980 and (b) 2006 for using NCRP 1980 value of 2.4 mSv for natural background. Data from NCRP 2009 estimated value, 2.4 mSv for NCRP 2009 estimated value, 2.4 mSv. Data from NCRP 2009, Estimated Dose to the Population of the United States from Natural and Medical Background. - NCRP Report No. 131, Radiation Dose and Impact of Other Radiation Sources. - 2002 – 2007. - NCRP Report No. 130 (December 2009)

Annual per capita effective radiation dose from various sources for (a) 2007 and (b) 2008, which is estimated to be 2.0 mSv. Data from NCRP 2009, Estimated Dose to the Population of the United States from Natural and Medical Background. - NCRP Report No. 131, Radiation Dose and Impact of Other Radiation Sources. - 2002 – 2007. - NCRP Report No. 130 (December 2009)
Radon Compared to Other Radiation Exposures

NCRP Report 160 – Ionizing Radiation Exposure of the Population of the United States

<table>
<thead>
<tr>
<th>Category of Exposure (exposure in mSv)*</th>
<th>Early 1980s</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>BACKGROUND</td>
<td>3.0</td>
<td>3.11</td>
</tr>
<tr>
<td>BACKGROUND FROM RADON AND THORON</td>
<td>2.0</td>
<td>2.28</td>
</tr>
<tr>
<td>MEDICAL</td>
<td>.13</td>
<td>.6</td>
</tr>
<tr>
<td>OCCUPATIONAL/INDUSTRIAL</td>
<td>.010</td>
<td>.008</td>
</tr>
<tr>
<td>CONSUMER</td>
<td>.05 - .13</td>
<td>.13</td>
</tr>
<tr>
<td>EFFECTIVE DOSE PER INDIVIDUAL</td>
<td>3.6</td>
<td>6.2</td>
</tr>
</tbody>
</table>

* Effective dose per individual in the US population.

Estimated Collective Effective Dose from Various Sources in the United States

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>678</td>
<td>1050</td>
</tr>
<tr>
<td>Natural background</td>
<td>552</td>
<td>720</td>
</tr>
<tr>
<td>Medical procedures</td>
<td>154</td>
<td>899</td>
</tr>
<tr>
<td>Radiologic procedures</td>
<td>92</td>
<td>668</td>
</tr>
<tr>
<td>Radiographic and fluoroscopic procedures</td>
<td>86.3</td>
<td>130</td>
</tr>
<tr>
<td>CT scanning</td>
<td>3.7</td>
<td>443</td>
</tr>
<tr>
<td>Interventional procedures</td>
<td>4.2</td>
<td>138</td>
</tr>
<tr>
<td>Dental radiographic examinations</td>
<td>NA</td>
<td>2.5</td>
</tr>
<tr>
<td>Nuclear medicine studies</td>
<td>32</td>
<td>231</td>
</tr>
<tr>
<td>Occupational exposures</td>
<td>2.3</td>
<td>1.4</td>
</tr>
<tr>
<td>Nuclear power</td>
<td>0.136</td>
<td>0.1</td>
</tr>
<tr>
<td>Consumer products and miscellaneous origins</td>
<td>. . . . .</td>
<td>39</td>
</tr>
</tbody>
</table>

Some Properties of Radon

- A noble radioactive gas
- Does not chemically combine
- Floats through cracks in floors
- Alpha emitter
- Half-life = 3.8 days
- Naturally occurring – uranium decay chain
- Odorless, colorless and tasteless
Radon Causes Lung Cancer

Biological Effects of Ionizing Research (BEIR)

National Academy of Sciences

Summarizes radon science risk estimates provided

1988 BEIR IV study of 22,190 Miners with 360 Lung Cancers

<table>
<thead>
<tr>
<th>Lifetime average pCi/L</th>
<th>Expected lung cancer</th>
<th>Observed lung cancer</th>
<th>Relative increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>17</td>
<td>21</td>
<td>No change</td>
</tr>
<tr>
<td>1.2</td>
<td>39</td>
<td>46</td>
<td>No change</td>
</tr>
<tr>
<td>2.5</td>
<td>19</td>
<td>41</td>
<td>Double</td>
</tr>
<tr>
<td>5-10</td>
<td>13</td>
<td>40</td>
<td>Triple</td>
</tr>
<tr>
<td>10-20</td>
<td>11</td>
<td>39</td>
<td>3.5 times</td>
</tr>
<tr>
<td>36-96</td>
<td>15</td>
<td>66</td>
<td>Four times</td>
</tr>
<tr>
<td>96-200</td>
<td>5</td>
<td>45</td>
<td>Nine times</td>
</tr>
</tbody>
</table>
Lifetime Relative Risk -- BEIR VI (1999)

Table 2.1: Estimated lifetime relative risk (LRR) of lung cancer for lifetime indoor exposure to radon.

<table>
<thead>
<tr>
<th>Radon (pCi/L)</th>
<th>Site</th>
<th>Sex</th>
<th>LRR Risk Ratio Compared to Non-Smokers</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>0.005</td>
<td>20</td>
<td>0.001</td>
<td>1</td>
<td>1.000</td>
</tr>
<tr>
<td>0.10</td>
<td>0.015</td>
<td>30</td>
<td>0.100</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>0.30</td>
<td>0.050</td>
<td>50</td>
<td>0.300</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>0.50</td>
<td>0.100</td>
<td>70</td>
<td>0.500</td>
<td>1.000</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Environmental Protection Agency, EPA Assessment of Risks From Radon in Homes, EPA report number 402-R-03-003 (June 2003).

Communicating Radon Risk to Patients

Table 5: Estimated number of lung cancer deaths in the U.S. in 1990 attributable to indoor residential radon progeny exposure (BEIR VI).

<table>
<thead>
<tr>
<th>Smoking Status</th>
<th>Lung Cancer Deaths</th>
<th>Lung Cancer Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>95,400</td>
<td>10,200</td>
</tr>
<tr>
<td>Ever smokers</td>
<td>95,400</td>
<td>11,300</td>
</tr>
<tr>
<td>Never smokers</td>
<td>4,400</td>
<td>1,200</td>
</tr>
<tr>
<td>Total</td>
<td>99,800</td>
<td>11,500</td>
</tr>
</tbody>
</table>

Are there risks to the use of ionizing radiation in medicine?

"There obviously are some risks. The magnitude of risk from radiation is dose-related with higher amounts of radiation being associated with higher risks. The undisputed health benefits of diagnostic X-ray and nuclear medicine diagnostics may be accompanied by a generally small risk (probability) of deleterious effects. This fact has to be taken into account while using ionising radiation sources in diagnosis. Since large amounts of radiation are required in radiation therapy, the risk of radiation-related adverse effects is measurably higher."

Optimization

“The aim of managing radiation exposure is to minimise the putative risk without sacrificing, or unduly limiting, the obvious benefits in the prevention, diagnosis and also in effective cure of diseases (optimisation).”

ICRP, Radiation and Your Patient: A Guide for Medical Practitioners
http://www.icrp.org/docs/rad_for_gp_for_web.pdf

New York State Radon Program
-Physicians Campaign-

- Currently 35 participating physicians
- Distributing 3,500 pamphlets per year
- Increasing outreach to all public health professionals

Contacting Me

- 410-502-2525
- plocke@jhsph.edu

New York State Department of Health
Radon Program

518-402-7556
Radon@health.state.ny.us
www.health.ny.gov/radiation

Radon Facts

- Lung cancer: leading cancer killer
- Radon: leading environmental cause of cancer mortality
- Radon: up to 18-20% of lung cancer deaths

CDC Statistics/ Cancer Deaths

per 100,000 men and women

- Men
  - Lung cancer (62.0)
  - Prostate cancer (22.0)
- Women
  - Lung cancer (38.6)
  - Breast cancer (22.2)
88% Not Aware That

• Every home has radioactive radon gas
• Leading Cause of Lung Cancer Among Non-Smokers
• Radon is Found in Every Home Regardless of Type or Age

*Despite the lack of awareness about radon, people are confident in its absence.*

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**Diagnosis: Metastasized non-small cell bronchogenic carcinoma (lung cancer)**

*Taken just 2 weeks before we knew anything was wrong*

*Joe died six weeks after his diagnosis*

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**Connections Made**

• State Radon Program Director
• Testing and Mitigation Experts—
  American Association of Radon Scientists and Technologists (AARST)
• State Home Inspectors Association

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**SURGEON GENERAL’S WARNING**

*Acting Surgeon General said: “People will listen to your story”.*

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**Illinois Representatives**

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**CanSAR: Cancer Survivors Against Radon**

*Dedicated to preventing radon-induced lung cancer and saving lives through education and awareness*

*“I believe all things happen for a reason; I want my life to mean something.” – CanSAR president*
Cancer Survivors Against Radon

Who We Are
Individuals who didn’t know we were living with high levels of radon until the diagnosis of lung cancer invaded our lives.
www.cansar.org

What We Do
• presentations
• visits to local, state and federal governments
• booths
• walks, climbs, and runs

Partners
• AARST
• ALA/other lung associations/LungCan
• University Extension Offices
• EPA Radon Programs/NRAP Participants
• ACS/Relay for Life

Media Connections
• TV
• Radio
• Newspapers
• Facebook
• Website
• Brochures
• Webinars
• Blogs
• Twitter
• Press Releases

Letter To Physicians
Questions for patient history forms
• Have you tested for radon
• What is the level

Gail Orcutt, Lung Cancer Survivor, Radon Advocate

People are Unaware
• Invisible
• Odorless
• Tasteless
• Any type of home
  – Brick/Frame
  – New/old
  – Basement/no basement
  – Crawl space/slab on grade.

Debbie Greenman, Lung Cancer Survivor

CanSAR Member Activities
• We Speak
• We Act
• We Do
### How We Create Change

- National medical forums
- Participation in Lung Health Organizations
- Form coalitions
- Create awareness:
  - Advocacy days, Radon Action Month, health fairs, rides, walks, home shows, presentations

### Young Radon Warriors

![Young Radon Warriors](image1)

### National Radon Action Plan

![National Radon Action Plan](image2)

### US House Appropriations Subcommittee Hearing

![US House Appropriations Subcommittee Hearing](image3)

### What Can I Do?

- A simple test could save a life.
- If the level is between 2-4 pCi/L, retest.
- If high, have a radon mitigation installed professionally.

### How Can Medical Community Help?

- Educate yourselves on radon
- Share your knowledge with patients
- Include radon education in training sessions
- Use the resources of the Federal, State, and Local Radon Outreach Programs
- NYSDOH Radon Program – Physicians Campaign
Breathing Easy—Informational Video

http://www.youtube.com/watch?v=DXn5s7-QCy&feature=youtu.be

World Leader in Radon/Lung Cancer Epidemiology
Dr. Bill Field, University of Iowa
bill-field@uiowa.edu

Help Us Put Together the Pieces

Radon Awareness
Preventive Action
Partnerships
Health Provider Education

Our Faces

Evaluations

Nursing Contact Hours, CME and CHES credits are available. Please visit www.phlive.org to fill out your evaluation and complete the post-test.

Thank you!