Occupational Energy Research Program
Priorities for Future Research

Mary Schubauer-Berigan, PhD
NIOSH Public Meeting
Washington Court Hotel
October 27, 2005
Outline of Presentation on OERP

Future Research

- Research setting of OERP
  - External research influences
  - Primary research questions
  - Proposed future projects

- Other factors
  - Public and stakeholder input
  - National Academies review of program
  - Resource issues
  - Potential future impact
OERP Research Agenda
External Influences

- Advisory Committee on Energy-Related Epidemiologic Research
- Congressional mandate on chronic lymphocytic leukemia
- Energy Employees Occupational Illness Compensation Program Act
- National Academies BEIR VII

ACERER questions:
- Are current exposure limits adequate?
- Do health risks vary for gamma, neutron and internal radiation types?
- Are fractionated exposure risks similar to acute exposure risks?
- Can confounding by other factors be controlled in nuclear worker studies?
- Can interaction of effects of radiation and workplace chemicals be measured?

Congressional mandate on chronic lymphocytic leukemia

Energy Employees Occupational Illness Compensation Program Act

National Academies BEIR VII
EEOICPA (compensation) questions:
• Is CLL risk associated with radiation?
• What is the best way to incorporate worker studies into risk models for compensation?
• How does radiation interact with smoking in causing lung cancer?
• How should radiation risk be modeled for rare types of cancer?
• What is the effect of age at exposure on cancer risk?
• How does radiation interact with other workplace exposures?
OERP Research Agenda
External Influences

Congressional mandate: “conduct epidemiological research and other activities to establish the scientific link between radiation exposure and the occurrence of chronic lymphocytic leukemia.”

Advisory Committee on Energy-Related Epidemiologic Research

Energy Employees Occupational Illness Compensation Program Act

National Academies BEIR VII
OERP Research Agenda
External Influences

Advisory Committee on Energy-Related Epidemiologic Research

Energy Employees Occupational Compensation Program

BEIR VII report:
- Does chronic, low-level radiation exposure cause cancer?
- Is there a smaller effect at low dose rates?
- How do other factors (sex & exposure age) affect cancer risk from radiation?
- How does radiation interact with other exposures?
- Do people differ in their susceptibility to the effects of radiation?
- Are there valid biomarkers of exposure to radiation?
Main Questions for OERP

1. Does low-level workplace exposure to radiation cause cancer (what kinds, and what is risk)?
2. What are the relative effects of different types of radiation?
3. Does dose rate affect the level of cancer risk?
4. How does radiation interact or combine with other exposures in causing cancer?
5. Do workers vary in their sensitivity to radiation?
6. Does radiation cause CLL? (and if so, what is the dose-response?)
High-Priority Future Research Projects

- DoE-wide exposure-based cohort studies
  - External sources: Gamma, Neutron
  - Internal sources: Plutonium, Uranium
  - HEDS will be used to identify workers with minimal confounding
  - Latest follow-up will be used for mortality studies
  - May include additional nuclear naval shipyards

- Pooled analysis incorporating other occupational cohorts exposed to ionizing radiation (e.g., follow-up to IARC study)
  - Chronic lymphocytic leukemia
  - Other cancers

- Cancer incidence study (malignant melanoma, prostate or breast)

- Current worker exposures and health effects
1) Does low-level workplace exposure to radiation cause cancer?

<table>
<thead>
<tr>
<th><strong>OERP interpretation</strong></th>
<th><strong>Future studies addressing question</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Establish occupational “gold standard” for gamma-radiation cancer risks</td>
<td>Combined-cohort (HEDS-based) research</td>
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<tr>
<td></td>
<td><em>Pooled analysis of OERP and other studies</em></td>
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<td>Incorporate uncertainty in dosimetry of cohorts</td>
<td><em>Malignant melanoma incidence study</em></td>
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<td><em>Prostate cancer incidence study</em></td>
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### Research Questions and OERP Studies

2) What are the relative effects of different types of radiation?

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<tr>
<td>Direct assessment of risk from exposure to internal radiation and/or neutrons</td>
<td>Neutron or internally-exposed cohort feasibility study</td>
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<td>Combined-cohort research</td>
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<tr>
<td>Improved assessment of organ doses from internal radiation exposure</td>
<td>Nested case-control studies within combined cohorts</td>
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<td>Characterize neutron organ dose</td>
<td>Neutron-exposed cohort feasibility study</td>
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3) Does the dose rate affect the level of cancer risk?

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<td>Occupational studies of gamma-exposed cohorts</td>
<td><em>Combined nuclear naval shipyard cohort</em>&lt;br&gt;<em>Combined-cohort research</em>&lt;br&gt;<em>Pooled analysis of OERP and other studies</em></td>
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Research Questions and OERP Studies

4) How does radiation interact or combine with other exposures in causing cancer?

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<td>What are the effects of joint exposures to radiation and other physical and chemical agents in the workplace?</td>
<td>Case-control studies nested within combined cohorts</td>
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Research Questions and OERP Studies

5) Do workers vary in their sensitivity to radiation?

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<td>Risks of cancer in female nuclear workers</td>
<td>Meta-analysis or structured review of OERP and other studies</td>
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Research Questions and OERP Studies

6) Is chronic lymphocytic leukemia associated with radiation?

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<td>What is the nature of the association between radiation and chronic lymphocytic leukemia?</td>
<td>Combined-cohort research with increased follow-up</td>
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## Research Questions and OERP Studies

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<td>2) Neutron &amp; internal effects</td>
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<td>3) Dose-rate effects</td>
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<td>✓</td>
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<td>4) Interactions</td>
<td>✓</td>
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<td>✓</td>
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<tr>
<td>5) Different sensitivity</td>
<td>✓</td>
<td>✓</td>
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<td>6) CLL radiogenicity</td>
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**Issues Regarding Current Workers**

- “Decommissioning and decontamination”-era workers may face different hazards and health effects
- Adequacy of radiation and health monitoring
- Information quality supporting future epidemiologic research and compensation practice is of concern
- NIOSH has recommended improvements to DoE on information systems for workers involved in clean-up
- What are the most important health issues?
OERP Stakeholder Input

- Public Health agenda updated annually (comment by Nov 2005)
- Public meetings to garner input on research agenda (Oct 2005 and beyond)
- Periodic partners’ meetings
- Periodic RFPs for potential grantees
- Input from compensation program
Other Factors

- DoE has called for a National Academies review of the three CDC programs funded under MoU: Nov 3-4, 2005
- OSHA has indicated potential interest in rulemaking
- Resource limitations and funding cycle a perennial problem
Expected Impact of OERP Research

- Information to support risk assessment for radiation standards
  - Dose-response models and dose-rate effects
  - Standards applicable to workers and general public

- Compensation program
  - “Probability of causation” risk models
  - Effects of mixed exposures to radiation and other workplace agents

- Health hazard evaluations to reduce worker exposures
Summary: Future of OERP

- Many of the most challenging initial research questions still await resolution
- Occupational radiation studies are operating near the “limits of epidemiology”
- Excellent exposure assessment and epidemiology methodology critical to success
- Scientific and policy implications of OERP studies have increased in recent years
- OERP research agenda is addressing highly relevant public health questions
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- Current worker studies?