

Occupational Energy Research Program Priorities for Future Research

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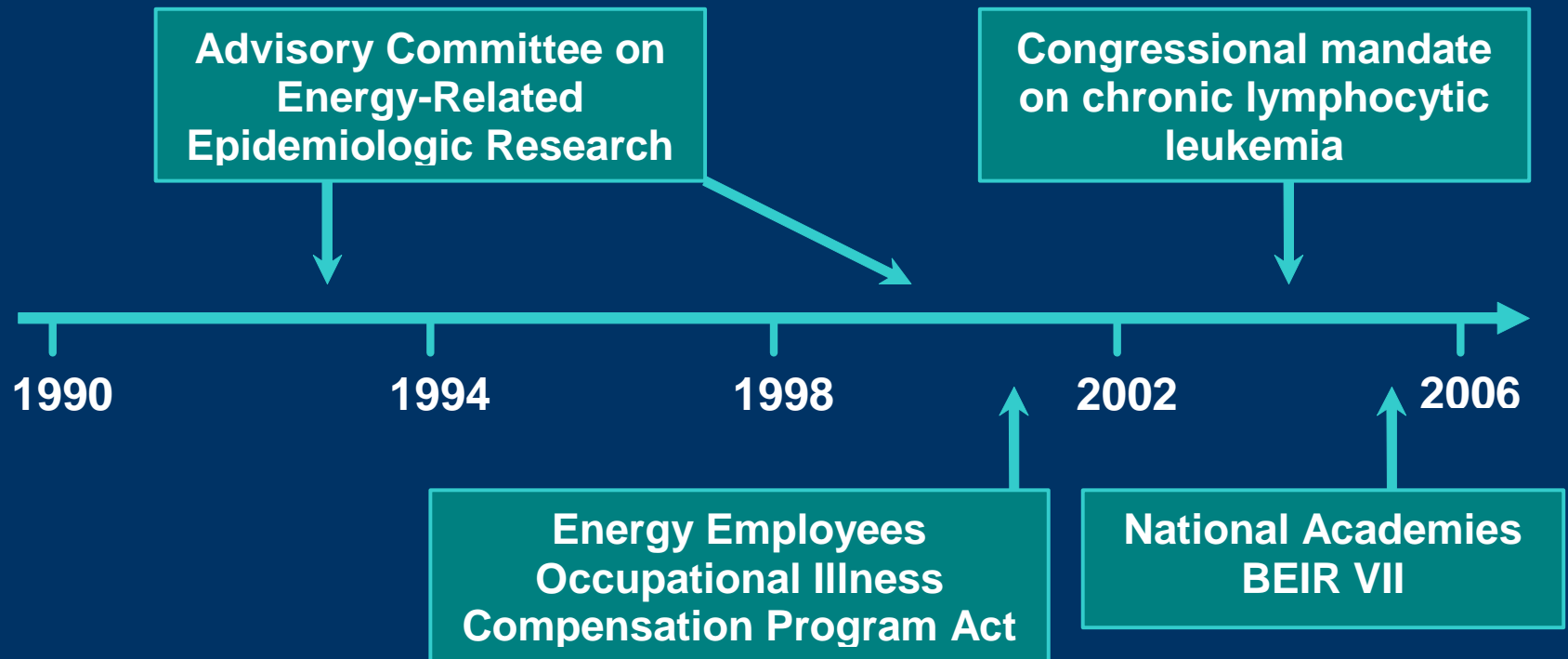


Outline of Presentation on OERP Future Research

- 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



OERP Research Agenda

External Influences

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

2002

2006

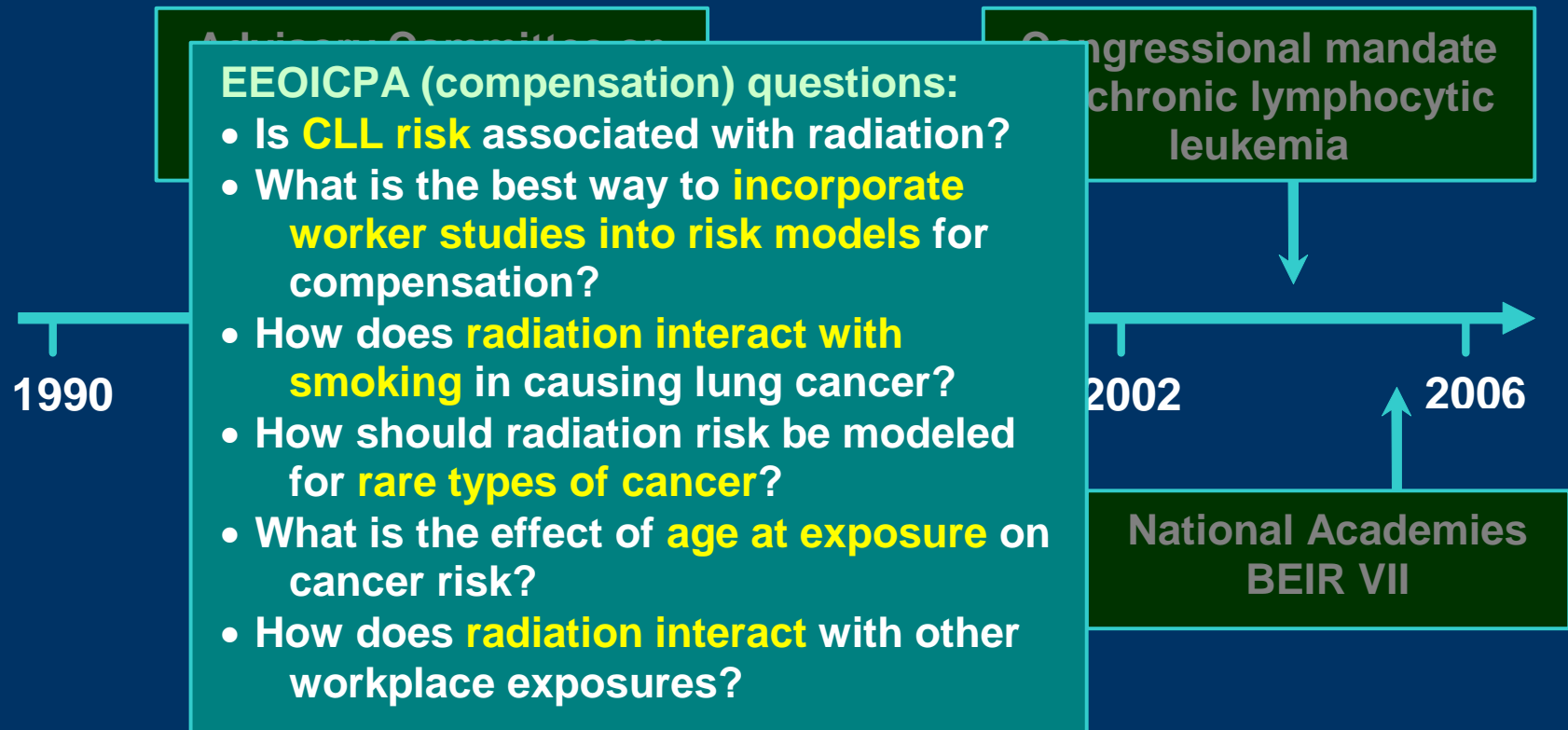
Energy Employees
Occupational Illness
Compensation Program Act

National Academies
BEIR VII

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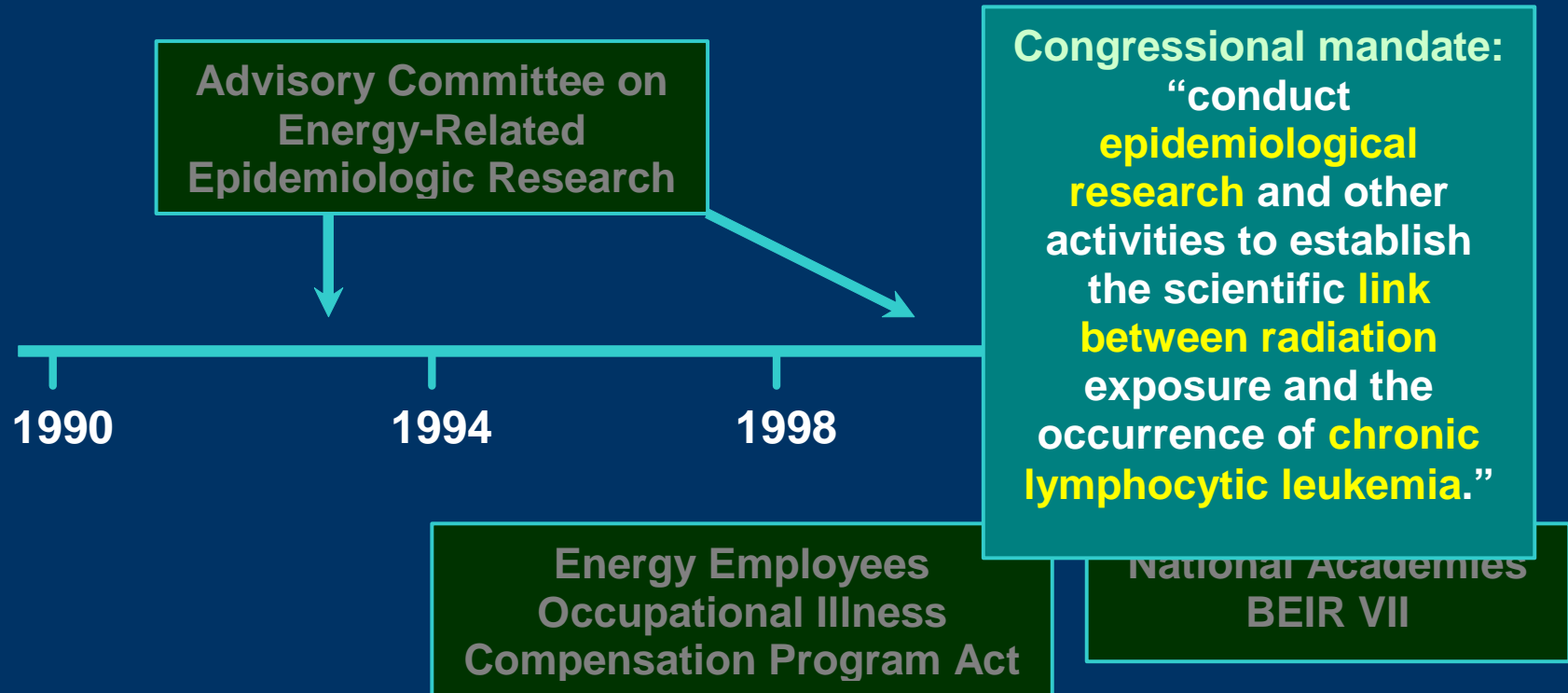
OERP Research Agenda

External Influences



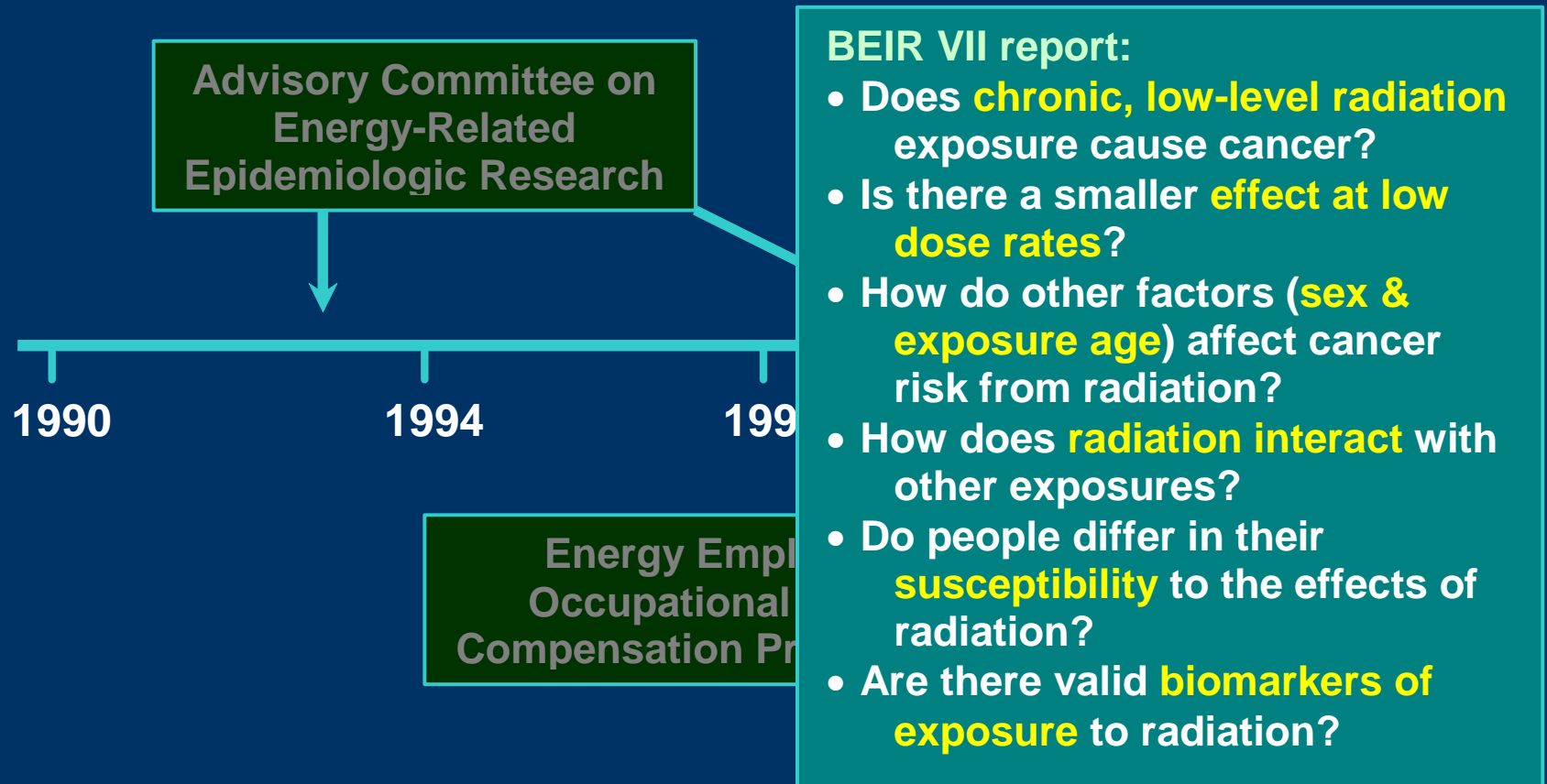
OERP Research Agenda

External Influences



OERP Research Agenda

External Influences



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

Research Questions and OERP Studies

- 1) Does low-level workplace exposure to radiation cause cancer?

<i>OERP interpretation</i>	<i>Future studies addressing question</i>
Establish occupational “gold standard” for gamma-radiation cancer risks	<i>Combined-cohort (HEDS-based) research</i> <i>Pooled analysis of OERP and other studies</i>
Incorporate uncertainty in dosimetry of cohorts	
Estimate risks for cancers with unknown radiogenicity	<i>Malignant melanoma incidence study</i> <i>Prostate cancer incidence study</i> <i>Combined-cohort research</i> <i>Pooled analysis of OERP and other studies</i>

Research Questions and OERP Studies

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

<i>OERP interpretation</i>	<i>Future studies addressing question</i>
Direct assessment of risk from exposure to internal radiation and/or neutrons	<i>Neutron or internally-exposed cohort feasibility study</i> <i>Combined-cohort research</i> <i>Pooled-analysis of OERP and other studies</i>
Improved assessment of organ doses from internal radiation exposure	<i>Nested case-control studies within combined cohorts</i>
Characterize neutron organ dose	<i>Neutron-exposed cohort feasibility study</i>

Research Questions and OERP Studies

3) Does the dose rate affect the level of cancer risk?

<i>OERP interpretation</i>	<i>Future studies addressing question</i>
Occupational studies of gamma-exposed cohorts	<i>Combined nuclear naval shipyard cohort</i> <i>Combined-cohort research</i> <i>Pooled analysis of OERP and other studies</i>

Research Questions and OERP Studies

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

<i>OERP interpretation</i>	<i>Future studies addressing question</i>
What are the effects of joint exposures to radiation and other physical and chemical agents in the workplace?	<i>Case-control studies nested within combined cohorts</i>

Research Questions and OERP Studies

5) Do workers vary in their sensitivity to radiation?

<i>OERP interpretation</i>	<i>Future studies addressing question</i>
Dependence of radiation risk on exposure age	<i>Combined-cohort research</i> <i>Pooled analysis of OERP and other studies</i>
Risks of cancer in female nuclear workers	<i>Meta-analysis or structured review of OERP and other studies</i>

Research Questions and OERP Studies

- 6) Is chronic lymphocytic leukemia associated with radiation?

<i>OERP interpretation</i>	<i>Future studies addressing question</i>
What is the nature of the association between radiation and chronic lymphocytic leukemia?	<i>Combined-cohort research with increased follow-up</i> <i>Pooled analysis of OERP and other occupational cohort studies</i>

Research Questions and OERP Studies

Questions	Combined DOE	Pooled w/other	Cancer incidence
1) Low-dose gamma effects	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2) Neutron & internal effects	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3) Dose-rate effects	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
4) Interactions	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
5) Different sensitivity	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6) CLL radiogenicity	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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

Research Questions and OERP Studies

Questions	Combined DOE	Pooled w/other	Cancer incidence
■ Low-dose gamma effects Dose-rate differences Differential sensitivity	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
■ Neutron & internal effects	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
■ Interactions of radiation & other workplace exposures	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
■ CLL radiogenicity	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
■ Current worker studies?			