ANALYSIS OF CANCER RISKS IN POPULATIONS NEAR NUCLEAR FACILITIES: PHASE 1

KEVIN D. CROWLEY, STUDY DIRECTOR
OURANIA KOSTI, PROGRAM OFFICER

PUBLIC OUTREACH FOR ERWIN, TENNESSEE
(Meeting organized by the U.S. Nuclear Regulatory Commission)

Erwin, Tennessee
September 8, 2011

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

TOPICS TO BE ADDRESSED

- National Academies organization and processes
- Study request
- Study task
- Study schedule
- Committee expertise and membership
- Work plan
- History of the concern
- Study designs and challenges

NATIONAL ACADEMIES ORGANIZATION

The National Academies

- National Academy of Sciences
- National Academy of Engineering
- Institute of Medicine
- National Research Council

Congressionally chartered (1863)

Private & nonprofit

“Advisors to the Nation on Science, Engineering, and Medicine”

NATIONAL ACADEMIES PROCESSES

Experts

- Volunteer-driven (pro bono public service)
- Free of conflicts of interest
- Balanced views

Information gathering

- Open to the public
- Public input encouraged

Analyses

- Rigorous, objective and even-handed
- Free of inappropriate “outsider” influences and “insider” special pleadings

Report review and release

STUDY REQUEST

U.S. Nuclear Regulatory Commission (U.S.NRC) approached the Academies to update the 1990 National Cancer Institute study which:

- Compared rates of cancer deaths in counties with a nuclear facility to those without
- Had no data on radiation exposures
- Included only facilities that were operational as of 1982

The Academies agreed to carry out a two-phase study

- Phase 1: Scoping study to identify scientifically sound approaches for carrying out the cancer risk assessment
- Phase 2: Cancer risk assessment informed by Phase 1 results

STATEMENT OF TASK

Methodological approaches for assessing
(1) off-site radiation dose and
(2) cancer epidemiology

including consideration of:

- Availability, completeness, and quality of information
  - ❖ on gaseous and liquid radioactive releases
  - ❖ cancer occurrence and cancer death data
- Different epidemiological study designs
- Approaches for characterizing and communicating uncertainties

COMMITTEE EXPERTISE

- Biostatistics
- Contaminant fate and transport
- Environmental exposure monitoring
- Epidemiology
- Public health and medicine
- Radiation dosimetry
- Radiobiology
- Social science/risk communication
- Toxicology

COMMITTEE MEMBERSHIP

John E. Burris, Chair, Burroughs Wellcome Fund

John C. Bailar, III, University of Chicago (retired)

Harold L. Beck, Environmental Measurements Laboratory (retired)

Andre Bouville, National Cancer Institute (retired)

Phaedra S. Corso, University of Georgia

Patricia J. Culligan, Columbia University

Paul M. DeLuca, Jr., University of Wisconsin

Raymond A. Guilmette, Lovelace Respiratory Research Institute

George M. Hornberger, Vanderbilt Institute for Energy and Environment

Margaret Karagas, Dartmouth University

Roger E. Kasperson, Clark University (retired)

James E. Klaunig, Indiana University

Timothy Mousseau, University of South Carolina

Sharon B. Murphy, University of Texas Health Science Center (retired)

Roy E. Shore, Radiation Effects Research Foundation

Daniel O. Stram, University of Southern California

Margot Tirmarche, Institute of Radiation Protection and Nuclear Safety

Lance Waller, Emory University

Gayle E. Woloschak, Northwestern University

Jeffrey J. Wong, California Environmental Protection Agency

WORK PLAN

- Meetings:
  - #1 Washington, DC (February 24-25)
  - #2 Chicago, IL (April 18-19)
  - #3 Atlanta, GA (May 23-24)
  - #4 Irvine, CA (July 20-21)
  - #5 Washington, DC (October 20-21)
- Final report to be released: December 31, 2011
- Public comments on Phase 1 report: January-February 2012

HISTORY OF THE CONCERN

- 1983, UK: television documentary reports an excess of childhood leukemia around Sellafield reprocessing plant
- 1984, UK: government Advisory Group confirms the observation but also reports that the estimated discharges could not account for the observed excess cancers
- 1983-today: ~ 50 independent studies, >10 countries, different epidemiologic study designs

Cancer in Populations Living Near Nuclear Facilities

A Survey of Mortality Nationwide and Incidence in Two States

Seymour Jablon, MA; Zdenek Hrubec, ScD; John D. Boice, Jr, Sc

Br. J. Cancer (1989), **59**, 476–485.
© The Macmillan Press Ltd., 1989

Geographical variation in mortality from leukaemia and other cancers in England and Wales in relation to proximity to nuclear installations, 1969–78

P.J. Cook-Mozaffari[1], S.C. Darby[2], R. Doll[2], D. Forman[2], C. Hermon[2], M.C. Pike[3] & T. Vincent[2]

British Journal of Cancer (2006) 94, 1342 – 1347
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www.bjcancer.com

Childhood leukaemia incidence around French nuclear installations using geographic zoning based on gaseous discharge dose estimates

A-S Evrard[1,2], D Hémon[1,2], A Morin[3], D Laurier[4], M Tirmarche[4], J-C Backe[3], M Chartier[3] and J Clavel[*,1,2]

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FAST TRACK

Leukaemia in young children living in the vicinity of German nuclear power plants

Peter Kaatsch*, Claudia Spix, Renate Schulze-Rath, Sven Schmiedel and Maria Blettner

Results of case-control study of leukaemia and lymphoma among young people near Sellafield nuclear plant in West Cumbria

Martin J Gardner, Michael P Snee, Andrew J Hall, Caroline A Powell, Susan Downes, John D Terrell

Childhood leukaemia incidence below the age of 5 years near French nuclear power plants

British Journal of Cancer (1996) 73, 672–679
© 1996 Stockton Press All rights reserved 0007–0920/96 $12.00

Leukaemia and non-Hodgkin's lymphoma in young persons resident in small areas of West Cumbria in relation to paternal preconceptional irradiation

R Wakeford[1] and L Parker[2]

Childhood cancer and nuclear power plants in Switzerland: a census-based cohort study

Ben D Spycher,[1,2†] Martin Feller,[1†] Marcel Zwahlen,[1] Martin Röösli,[3,4] Nicolas X von der Weid,[5] Heinz Hengartner,[6] Matthias Egger,[1,2] Claudia E Kuehni,[1*] for the Swiss Paediatric Oncology Group[‡] and the Swiss National Cohort Study Group[‡]

Population mixing and leukaemia in young people around the La Hague nuclear waste reprocessing plant

O Boutou[*,1,2], A-V Guizard[3], R Slama[2], D Pottier[4] and A Spira[2]

CHALLENGES OF RADIATION CANCER EPIDEMIOLOGY STUDIES

Cancer Biology

- one cancer site has many risk factors, but not all cancers can be attributed to a risk factor
- no available marker for etiology

Radiation Biology

- health effects at “low radiation level” are poorly understood

Population characteristics

- Personal habits, migration

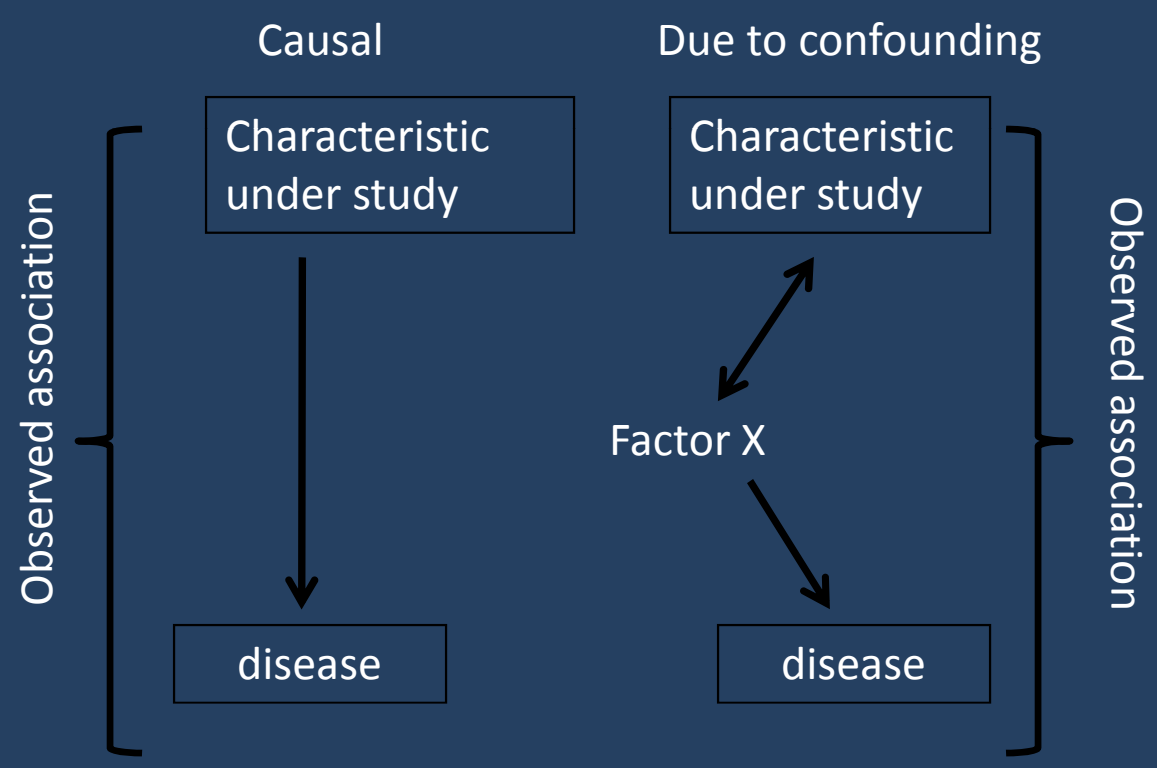
Data availability and collection

- No centralized system of recording cancer and collecting other relevant information

Data interpretation

INTERPRETTING OBSERVED ASSOCIATIONS

- If an association is observed, is it real?
- If an association is real, is it causal?



QUESTIONS, COMMENTS OR SUGGESTIONS?

Please contact us:

Dr. Kevin D. Crowley, study director
kcrowley@nas.edu

Dr. Ourania (Rania) Kosti, program officer
okosti@nas.edu

Phone: 202-334-3066
Website: http://NationalAcademies.org/cancerriskstudy