Coordination of Low-Dose Radiation Research with the National Cancer Institute

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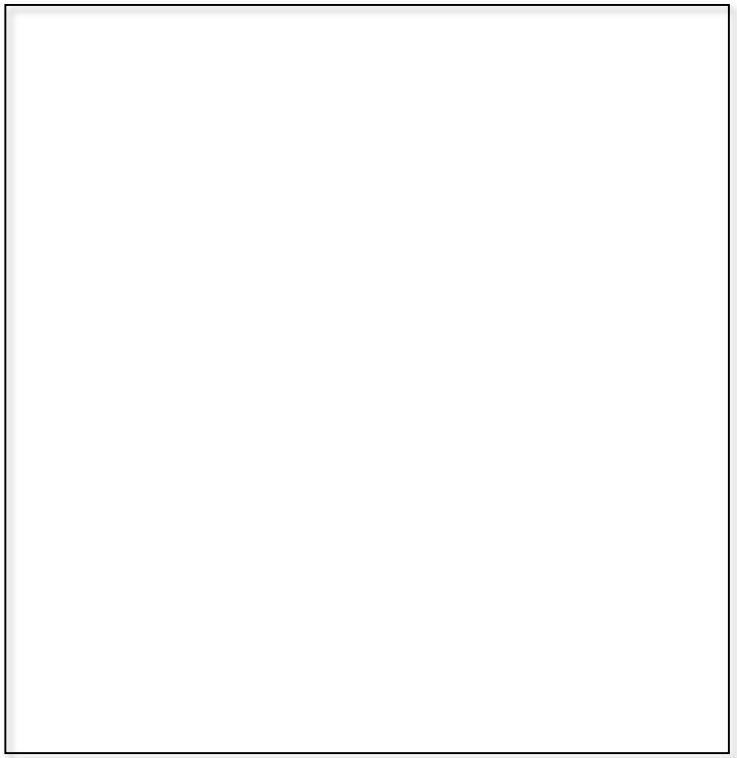
Developing a Long-Term Strategy for Low-Dose Radiation Research in the United States

NAS Meeting Sept 24th 2021

NCI Mission

NCI leads, conducts, and supports **cancer research** across the nation to advance scientific knowledge and help all people live longer, healthier lives.



NCI Divisions: Intramural & Extramural

Intramural

CENTER FOR CANCER RESEARCH

CCR houses a productive community of NCI intramural basic researchers, clinicians, and translational scientists who integrate basic and clinical

DIVISION OF CANCER EPIDEMIOLOGY AND GENETICS

DCEG conducts population and multidisciplinary research to discover the genetic and environmental causes of cancer and ways to prevent

Extramural

DIVISION OF CANCER BIOLOGY

DCB encourages and facilitates continued support of basic research in all areas of cancer biology to provide the research foundation which enables improved understanding of the disease and may lead to new approaches for

DIVISION OF CANCER CONTROL AND POPULATION SCIENCES

DCCPS conducts and supports an integrated program of genetic, epidemiological, behavioral, social, applied, and surveillance cancer research to reduce risk, incidence, and deaths from cancer as well as enhance the quality of life for cancer

DIVISION OF CANCER PREVENTION

DCP conducts and supports research to find ways to prevent and detect cancer, and to prevent or relieve symptoms from cancer and its treatments.

DIVISION OF CANCER TREATMENT AND DIAGNOSIS

DCTD supports the translation of promising research into clinical applications to improve the diagnosis and treatment of cancer in areas of unmet need that are often too risky or difficult for industry or academia

Division of Cancer Epidemiology & Genetics: Mission

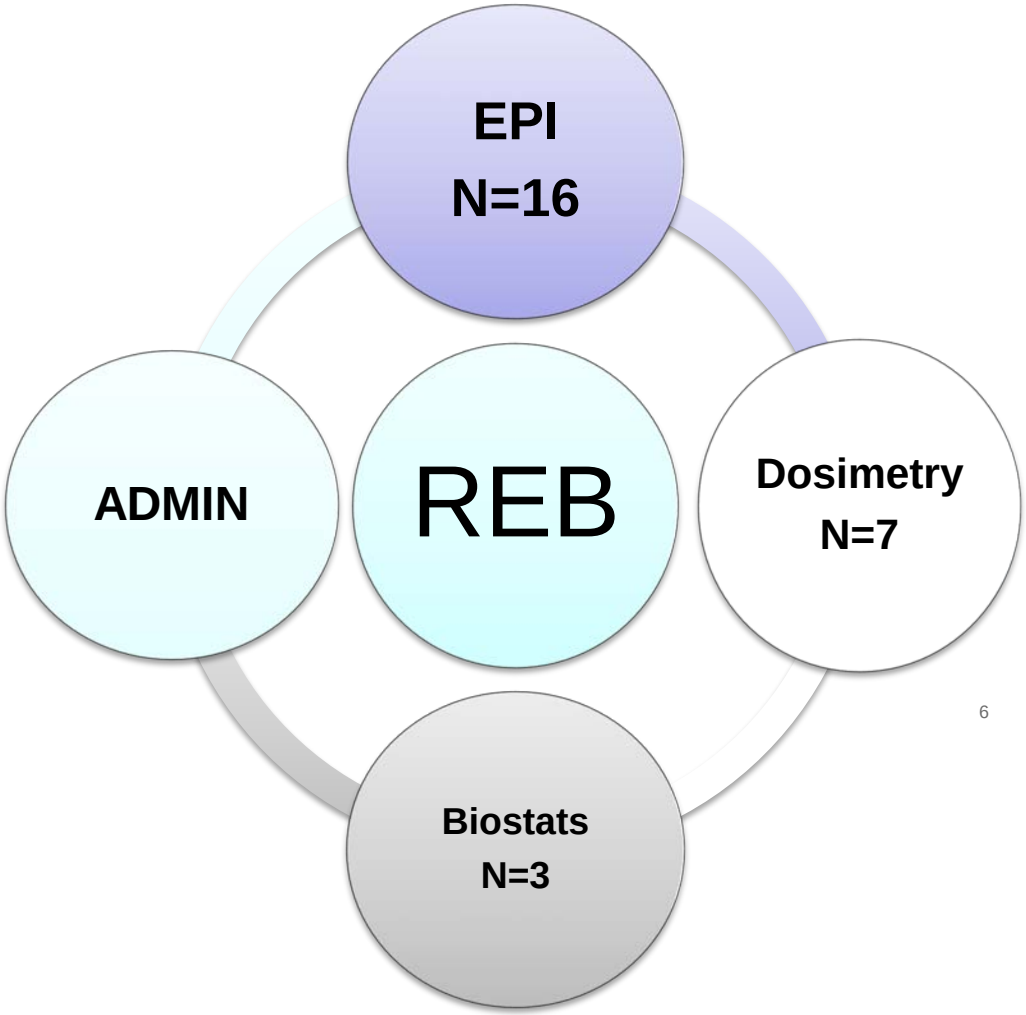
- To discover the causes of cancer and inform the means for prevention by conducting transdisciplinary epidemiological and genetic research.

Radiation Epidemiology Branch: Mission

- To identify and quantify the risk of cancer in populations exposed to medical, occupational, or environmental radiation, and to advance our understanding of radiation carcinogenesis.

REB's Multidisciplinary Team

Current Staff
6 Investigators
1 Senior Scientist
7 Staff Scientists
2 Research Fellows
10 Pre/Post-Docs
5 Admin Staff



REB's Signature Research Areas

- ✓ Medical Radiation Exposure
  - Diagnostic
  - Therapeutic
  - Occupational
- ✓ Environmental Exposures
  - Nuclear accidents
  - Atomic bomb survivors
  - UV
- X Nuclear Workers
  - Covered by NIOSH

REB Low-dose Priority Research Questions

- What's the magnitude of the cancer risk at low-doses?
- What's the impact of dose and dose rate (DDREF)?
- Who are the most radiosensitive populations?
- Is there a threshold for cardiovascular disease or cataracts?
- What are the mechanisms at low-doses (using epi studies)?

Current REB Low-dose Radiation Research

Study	Key Collaborators
UK-NCI CT scans study	Univ of Newcastle
US Radiologic Technologists (USRT)	Univ of Minnesota
US interventional radiology physician cohort	AMA
Life Span Study	RERF
Ukrainian Trios Study	NRCRM
UkrAm (children & in utero)	IEM
BelAm (children & in utero)	RRCRM
Ukrainian liquidators case-control studies (thyroid/leukemia)	NRCRM
Chernobyl Tissue Bank	IEM
Low-dose pooling projects (leukemia/thyroid/brain cancer)	Multiple
UK Background radiation childhood cancer study	Univ of Oxford
Risk of Bias Assessment Methodology	IARC

Example Collaborations between Government Agencies & DCEG/REB

- NIAID provides funding for REB studies
  - eg RadRAT risk calculator, Belarus *in utero* cohort
- DOE co-funds REB research collaborations
  - eg Mayak workers, Chernobyl, LSS
- NIOSH collaborates on research studies
  - eg US flight attendant cohort
- EPA co-funds events
  - eg NAS Beebe symposium

Opportunities for Coordination with Low-dose Program

- Scientific Coordination
  - Epidemiology and dosimetry experts available to serve on advisory board or provide input as needed
  - Open discussion about research agendas to ensure complimentary efforts
  - Access to study datasets and dosimetry tools

❖ Note: NIH Intramural program does not administer grants (ie, cannot issue calls for proposals and provide funding to external applicants)

Example Publications from REB's Low-dose Program

- Lack of transgenerational effects of ionizing radiation exposure from the Chernobyl accident. Yeager et al (Science 2021)
- Radiation-related genomic profile of papillary thyroid carcinoma after the Chernobyl accident. Morton et al (Science 2021)
- Risk of Prostate Cancer Incidence among Atomic Bomb Survivors: 1958-2009. Mabuchi et al (Radiat Res 2021)
- Epidemiological Studies of Low-Dose Ionizing Radiation and Cancer: Rationale and Framework for the Monograph and Overview of Eligible Studies. Berrington de Gonzalez et al (JNCI Monograph 2020)
- Leukaemia and myeloid malignancy among people exposed to low doses (<100 mSv) of ionising radiation during childhood: a pooled analysis of nine historical cohort studies. Little et al (Lancet hematol, 2018)
- Thyroid Cancer Following Childhood Low-Dose Radiation Exposure: A Pooled Analysis of Nine Cohorts. Lubin et al (JCEM 2017)
- Breast cancer risk and protracted low-to-moderate dose occupational radiation exposure in the US Radiologic Technologists Cohort, 1983-2008. Preston et al (Br J Cancer 2016)
- A record-based case-control study of natural background radiation and the incidence of childhood leukaemia and other cancers in Great Britain during 1980-2006. Kendall et al (Leukemia 2013).
- Systematic review and meta-analysis of circulatory disease from exposure to low-level ionizing radiation and estimates of potential population mortality risks. Little et al (EHP 2012)
- Radiation exposure from CT scans in childhood and subsequent risk of leukaemia and brain tumours: a retrospective cohort study. Pearce et al (Lancet, 2012)

Questions?

Intramural Research Program
Our Research Changes Lives

**ONE PROGRAM,
MANY PEOPLE,
INFINITE POSSIBILITIES**

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