

**National Academy of Sciences, Engineering and DHHS.
Developing a Long-Term Strategy for
Low-Dose Radiation Research in the United States**

**MEETING #3 (Virtual)
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Disclaimer: This is the personal opinion of the presenter with input from RRP colleagues
It is not opinion or policy of the DCTD, NCI, NIH or DHHS

NCI Radiation Research Program, Division of Cancer Treatment and Diagnosis (1/6)

- Please introduce the mission of your agency/organization and the specific role of your Division/Program.
 - The Division of Cancer Treatment and Diagnosis (DCTD) focuses its activities on developing novel diagnostics and therapies for cancer.
 - The Radiation Research Program (RRP) is responsible for management of NCI's research support for radiation science spanning clinical trials, combined modality radiotherapy, experimental therapeutics, radiation treatment planning, radiobiology, physics and technology.
- Did your agency/organization coordinate research with the previous DOE low-dose program? If yes, please describe the main coordinated projects and how this coordination was achieved.
 - No formal collaboration. Interaction at scientific meetings, e.g., Radiation Research Society
- Please provide examples of this coordination that have resulted in multi-authored presentations or publications. Are you tracking the extent to which this occurs?
 - N/A for low dose.

NCI Radiation Research Program, Division of Cancer Treatment and Diagnosis (2/6)

- What structures do you use in your organization to promote coordination/collaboration across both government and academic researchers?
 - Coordination through meeting announcements and at professional society meetings.
- Do you currently conduct research on low dose radiation? If yes, please describe the main focus areas. If not, please explain why this type of research is outside scope.
 - Not specifically at doses in the 0.1 <Gy range. Some grants use the term “low dose” in context with the cancer therapy which is generally at least 1-2 Gy per fraction of 50-80Gy for a treatment course.
 - A project close to but still above 0.1 Gy is noted below which is 0.25 – 2Gy per fraction*
- Are you tracking low-dose radiation publications separately within radiation research?
 - No; however, it is included in journals we routinely follow, e.g., Radiation Research

*R01 CA221150-01A1 : Woloschak, *Radiation induced cancer risk reduction as a function of dose protraction: interspecies comparison*

NCI Radiation Research Program, Division of Cancer Treatment and Diagnosis (3/6)

- Is your organization involved in radiation training (e.g., hosting courses, lectures, issuing grants/fellowships, other)? If yes, please describe. Do you address low-dose radiation issues?
 - The NCI organizes and hosts/co-hosts topical courses the topics of which are selected by the various Programs often in partnership with professional societies.
 - NCI experts are frequently invited to participate as lecturers, panelists, discussants, etc. in national/international meetings, professional societies, academic institutions, etc.
 - There is a broad range of training grants (https://grants.nih.gov/grants/funding/funding_program.htm)
 - “Low dose” for radiation oncology program is in the lower end of the therapeutic range (generally 2 Gy or more per treatment)
- Please describe low dose and low dose rate knowledge gaps that you would like to see addressed.
 - I have included topics that are my **personal opinion** in a subsequent slide. The knowledge gaps are generally of the biology that occurs in these dose ranges, how the cell responds to these effects and their relation to general cellular stress response.
 - If any, what are the sustained changes following this exposure that can impact future health or cancer treatment.

NCI Radiation Research Program, Division of Cancer Treatment and Diagnosis (4/6)

- Please provide your perspectives on opportunities for coordination with the new low dose program.
 - In the past iteration of the DOE Low Dose program, there were external advisory groups including members from other agencies which provided useful interactions and critiques.
 - Sharing of workshop announcements and discussions at Society meetings are excellent and timely means of informing one another.
 - The distinct dose ranges between clinical cancer treatment and low dose have limited overlap; however, awareness of the biological changes at the low dose adds information on dose-response.
- What are some possible avenues (e.g., interagency or other agreements) that could be employed to achieve coordination with DOE's low dose program? Please provide your views on successful models of coordination of research.
 - Interagency coordination in specific funding mechanisms would not be likely given the spectrum of research RRP supports for cancer treatment (biology, clinical, physics, types of radiation, other forms of energy, etc).

NCI Radiation Research Program, Division of Cancer Treatment and Diagnosis (5/6)

- What are some impediments that in your view prevent coordination with DOE's low dose program and how can these be overcome?
 - There is strong scientific interest in the low dose radiation research for the underlying biology of cellular and tissue response to radiation. There is strong expertise and critical information in the DCEG epidemiology research that provides information for clinical radiation therapy.
 - Coordination exists with NCI and DOE in sharing science and advisory boards.
- What are some low-dose radiation research areas that your organization sees as high-priority?
 - Understanding the biological processes induced by low dose. These are broadly grouped as (personal opinion)
 - metabolic- stress response without (or with minimal) DNA damage;
 - any damage that produces DNA damage that might produce a clinical risk for patients;
 - any sustained radiation responses from low dose with which future doses from therapy might interact.

Cancer Imaging Program: (Dr. J. Eary) Examples of **research to *lower radiation dose*** in cancer imaging technology development and clinical applications

1. The EXPLORER **whole body PET/CT scanner**

- Can scan the entire human body in one shot and is more than an order of magnitude more sensitive than regular PET/CT scanners, therefore can scan faster and with lower *radiation dose* (clinical utility of scanning at 1/25th standard practice PET imaging dose is being evaluated)

R01CA249422, Nardo & Badawi, UCLA

2. Reduce imaging dose during radiation therapy

- Radiation dose reduction of CT imaging for quantitative measurement of cancer therapy response
- Multi-layer imager for advanced on-board radiation therapy imaging

R01CA181156, McNitt-Gray et al, UCLA

R01CA188446, Berbeco & Morf, DFCI and Varian Medical System

NCI Radiation Research Program, Division of Cancer Treatment and Diagnosis (6/6)

- What advice do you have for the committee related to any of the aspects of its statement of task? (Personal opinion)
 - **The importance of understanding the biology and impact** of low dose involves diagnostic imaging, disease-risk epidemiology, energy policy, space flight and, to a lesser extent, cancer care as the latter uses radiation dose in a much higher range.
 - **Recognizing and pointing out to the public the challenge** faced by scientists given the various models and the heterogeneity of the exposed individuals that increases uncertainty in the consequence of biological changes. **This communication would be helpful in conveying information to people** and the appropriate use, if any, of **mitigators**. The latter may produce their own set of issues.
 - Whether or not the use of the LNT model can be modified based on data would be extraordinarily helpful, as is obvious. **The effort by this panel to address the low dose radiation issue is evidence of interest in the scientific community toward addressing issues of public concern.**

Thank you!

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