The One Million U.S. Radiation Worker Study

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The single most important unanswered question in radiation epidemiology is the level of risk associated when exposures are experienced over prolonged periods of time. The One Million U.S. Radiation Worker study is designed to provide information on risk following low dose rate exposures. The study focuses on five occupational groups with differing radiation exposure patterns, including intakes of radionuclides: (1) uranium workers at multiple Department of Energy locations; (2) nuclear weapons test participants (atomic veterans); (3) nuclear power plant workers; (4) industrial radiographers, radiologists and other medical practitioners; and (5) Department of Energy plutonium workers. The study is cost efficient because it builds on the investments made and foundations laid by investigators and government agencies over the past 30-40 years, which have established early worker cohorts that can now provide answers to questions on the lifetime human health risks associated with low-level radiation exposures.

The study populations are briefly described as follows. Nearly 360,000 early Department of Energy workers are being evaluated for late effects with comprehensive dose reconstructions, including internal intakes of radionuclides. Over 120,000 military participants at nuclear weapons tests at the Nevada test site and the Bikini Islands are being evaluated for potential late effects associated with exposures received during any of the 230 above-ground atmospheric tests. Over 212,000 early nuclear power plant workers with dosimetry information are being evaluated for late effects. In the early years, allowable occupational exposures were higher than today and some workers did receive more than 100 rem cumulative dose. Over 300,000 industrial radiographers, early radiologists and medical workers are also being evaluated on the basis of dosimetry registry information.

The significance of the research is considerable because it applies directly to existing concerns about and standards for chronic radiation exposure. Much knowledge has been gained from the study of atomic bomb survivors, but exposure was acute and

among a Japanese population living in a war-torn country. Scientific and medical committees continue to grapple with how best to estimate risks associated with the gradual exposures received from environmental, medical and occupational radiation. Governmental agencies must deal with the complex issues faced with the expanding use of nuclear energy, and associated radiation waste, and of compensating workers, veterans and citizens potentially harmed by past exposures. Protection committees deliberate over how best to estimate and apply a "dose and dose-rate effectiveness factor" to scale the risks from the Japanese atomic bomb survivor data for relevant and current circumstances in Western populations. The remarkable increase in population exposures to medical CT scans and other imaging technologies has raised concerns of future health consequences. Knowledge of the effects of internal exposures to radioactive substances takes on increased importance in light of the possibility of terrorist attacks with nuclear devices (Radioactive Dispersal Devices, Improvised Nuclear Devices). Most recently, the Fukushima reactor accident has generated renewed public and scientific interest in understanding radiation risks when exposures are prolonged and over a period of months or years. The One Million U.S. Worker study will also be a service to American workers and veterans and their families.

Specific results will be presented on the second follow-up of Rocketdyne and Mound radiation workers, and a summary of the status for each of the study populations will be provided. Recent publication: Boice JD, Cohen SS, Mumma MT, Ellis ED, Eckerman KF, Leggett RW, Boecker BB, Brill AB, Henderson BE. Updated Mortality Analysis of Radiation Workers at Rocketdyne (Atomics International), 1948-2008. Radiat Res. 2011 Mar 7. [Epub ahead of print]