

Million Person Study: review of archived historical records supporting radium dial worker dosimetry

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The radium dial workers (RDW) comprise a well-known and influential cohort of primarily young women occupationally exposed to radium through the painting of dials and gauges with radioluminescent paint. The last epidemiological follow-up of this cohort was over 30 years ago, as the Radium Studies program at Argonne National Laboratory (ANL) was terminated in the early 1990s. The study of the RDW is being revisited to include updated dosimetric analyses as part of the Million Person Study (MPS) of low-dose health effects in healthy American workers and veterans. An informative and fairly unique source of data and data contextualization is the availability of extensive (>500 GB) electronic (i.e., scanned) records from existing microfilm (roll or reel of film) and microfiche (flat sheets/cards). When the radium program at ANL was canceled, tissue samples were transferred to the United States Transuranium and Uranium Registries (USTUR) at Washington State University to be stored at the National Human Radiobiology Tissue Repository. Surprisingly there was a lingering debate on whether the written records and radiographs would be scanned/copied and preserved. Advocates for archiving persevered, and the foresight and dedication of that team has provided our current team incredible insight into the program and processes involved in the extensive prior work related to RDW. Although the type, extent, and quality (e.g., legibility) of record(s) varies between individuals, examples include in vivo radiation measurements (e.g., radon breath, whole body counts), autopsy results, medical records (including copies of radiographs), and various correspondence. Of particular dosimetric interest are details of radiation measurements. For example, there are some instances where hand-written and transcribed values are both available, along with notes providing context for why a particular measurement in a time series of measurements was chosen to assign an intake, or if there were concerns about a particular measurement. Taking care to preserve anonymity and dignity of the workers, we review herein typical information available in the aforementioned microfiche and microfilm, highlighting some historically interesting finds, and discuss the relevance to current and ongoing work related to revisiting the dosimetry of the RDW in the MPS. The availability of tissues from RDWs at the USTUR will supplement the archival written record. This has been one of the seminal and influential epidemiological studies ever conducted and the current follow-up with modern dosimetry will provide new information on the lifetime risks associated with ingestion of radium.

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