

Colon Cancer Mortality Among Workers At The Savannah River Site

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Background: Associations between radiation exposures and colon cancer mortality were quantified among workers at the Savannah River Site (SRS), a facility located near Aiken, South Carolina that was constructed in 1950 to produce materials for the US nuclear weapons program.

Methods: 18,883 workers hired at SRS between 1950 and 1986 were followed through 2002 to ascertain causes of death. Estimates of radiation doses from external sources and internal tritium uptakes were derived from dosimetry records through 1999. Radiation dose-cancer mortality trends were evaluated via time-windows, spline latency models, and fitting of the Armitage-Doll multistage model.

Results: A positive association was observed between colon cancer mortality and cumulative radiation dose, primarily due to associations with doses accrued between 3 and 15 years prior to death or control selection. There was evidence of effect modification by social class, with somewhat different temporal patterns of radiation-associated excess risk for hourly-paid versus salaried workers. Fitting of a multistage model suggested that the best fitting model included 8 or 9 stages with radiation acting on the penultimate stage.

Conclusions: There is suggestive evidence of radiation dose-colon cancer associations in this cohort. There are social class mortality differentials in the cohort that parallel socioeconomic differentials in colon cancer mortality observed in the general US population; and, these analyses provide intriguing evidence that these differences modify the occupational radiation-mortality associations, with longer lags in the higher socioeconomic group of workers. Application of a multistage model also provides supportive evidence of positive associations between radiation dose and colon cancer mortality among workers at SRS.