

Mortality in the French cohort of AREVA NC workers: extended follow-up 1977-2004

C. Metz-Flamant^a, A. Rogel^b, S. Caër^c, E. Samson^a, D. Laurier^a, B. Quesne^c, A. Acker^c and M. Tirmarche^a

^a*Institut de Radioprotection et de sûreté nucléaire, DRPH/SRBE/LEPID, 92262 Fontenay-aux-roses cedex, France;* ^b*Institut de Radioprotection et de sûreté nucléaire, BP 17, 92262 Fontenay-aux-Roses Cedex, France;* ^c*AREVA NC, 33 rue la Fayette, 75009 Paris, France* camille.metz@irsn.fr

Introduction: This study has been launched in order to evaluate the mortality of nuclear workers employed at the French company specialized in nuclear fuel cycle (AREVA NC ex COGEMA) and exposed to low level of ionizing radiation. The follow-up of the cohort has been extended recently. We present here a new analysis of the mortality based on an extended follow-up of the cohort by 10 years.

Methods: Administrative data, vital status and causes of death were reconstructed for each worker. Standardized Mortality ratios (SMR) were computed using national mortality rates as external reference adjusted for sex, age and calendar year. Trend tests were computed to assess the association between different causes of death and radiation exposure considering adjustment on socioeconomic status (SES).

Results: About 93% of the 9,285 workers were male workers. They were followed for an average of 22 years, with a total number of person-years of 206,603. The percentage of subjects lost to follow-up was less than 1%. During the total follow-up period, 1,052 deaths occurred with 98% of the causes of death identified. Mean age at end of follow-up was 56 years. As expected, a strong deficit was observed for all causes of death (SMR=0.64; 90% confidence interval CI : 0.60-0.67) and all cancer mortality (SMR=0.77; 90% confidence interval CI : 0.71-0.83). No significant excess was found for any of the considered causes of death. The all-causes and all-cancers SMRs increased significantly with cumulative dose, but after adjusting on SES, these positive trends were no longer statistically significant. Among the 30 causes of deaths studied, significant trends were observed for colon, liver cancer and for non-cancer respiratory diseases.

Conclusion: AREVA NC workers exposed to ionizing radiation have a lower mortality than the French national population, partly due to the Healthy Worker Effect. It is important to adjust on SES in the dose-effect relationship analysis. Although follow-up has been extended by 10 years, statistical power is still low. Isolated significant trends of one or two causes of deaths have to be carefully interpreted, in regard of the large number of trend tests performed. A larger cohort, including other French nuclear workers, is planned in near future; AREVA NC workers will be part of it.