

malignant melanoma of the skin (SMR = 1.42, 95% CI = 0.17 – 5.11). Only 1, 6, and 2 cases were observed, respectively. The SMR for prostate cancer in this group was 0.86 (95% CI = 0.28 – 2.02) (n = 5).

There were no notable excesses in SMRs in the non-exposed group, except for cancer of the bladder and other urinary organs. Four cases were observed and only 1.89 were expected (95% CI = 0.58 – 5.40).

The excess in prostate cancer deaths that was observed in the first study was not as strong in this updated cohort. Only 1 death was reported in the definite exposure group while 5 were observed in the probable exposure group. It is difficult to interpret these results since the exposure categories were modified since the last study. However, all of the employees in either group were assumed to have some exposure to PFOA. The new delineation of exposures further defined the chemical plant employees of the first study and placed them into 2 groups, while the film plant employees still remained in the non-exposed group. The number of years that these employees worked at the plant and/or were exposed to PFOA was not reported for prostate cancer.

The excess mortality in cerebrovascular disease noted in employees in the definite exposure group was further analyzed based on number of years of employment at the plant. Three of the 5 deaths occurred in workers who were employed in jobs with definite PFOA exposure for more than 5 years but < 10 years (SMR = 15.03, 95% CI = 3.02 – 43.91). The other 2 occurred in employees with less than 1 year of definite exposure. The SMR was 6.9 (95% CI = 1.39 – 20.24) for employees with greater than 5 years of definite PFOA exposure. When these deaths were further analyzed by cumulative exposure (time-weighted according to exposure category), workers with 27 years of exposure in probable PFOA exposed jobs or those with 9 years of definite PFOA exposure were 3.3 times more likely to die of cerebrovascular disease than the general population. A dose-response relationship was not observed with years of exposure.

**Study strengths/weaknesses:** It is difficult to compare the results of the first and second mortality studies at the Cottage Grove plant since the exposure categories were modified. Although the potential for exposure misclassification was certainly more likely in the first study, it may still have occurred in the update as well. It is difficult to judge the reliability of the exposure categories that were defined without measured exposures. Although serum PFOA measurements were considered in the exposure matrix developed for the update, they were not directly used. In the second study, the chemical plant employees were sub-divided into PFOA-exposed groups, and the film plant employees essentially remained in the “non-exposed” group. This was an effort to more accurately classify exposures; however, these new categories do not take into account duration of exposure or length of employment. Another limitation to this study is that 17 death certificates were not located for deceased employees and therefore were not included in the study. The inclusion or exclusion of these deaths could change the analyses for the causes of death that had a small number of cases. Follow up of worker mortality at Cottage Grove (and Decatur) needs to continue. Although there were more than 200 additional deaths included in this analysis, it is a small number and the cohort is still relatively young. Given the results of studies on fluorochemicals in both animals and humans, further analysis is warranted.

**Research sponsors:** University of Minnesota

**Consistency of results:** The excess in prostate cancer deaths that was observed in the first study was not as strong in this updated cohort. Only 1 death was reported in the definite exposure group while 5 were observed in the probable exposure group. It is difficult to interpret these results since the exposure categories were modified since the last study. However, all of the employees in either group were assumed to have some exposure to PFOA. The new delineation of exposures further defined the chemical