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### MORTALITY AMONG RADIOLOGIC TECHNOLOGISTS IN THE UNITED STATES (1926-1997): 2<sup>nd</sup> FOLLOW UP

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**PURPOSE:** To evaluate risk for all-cause and cause-specific mortality in a large, primarily female (73%) cohort of radiologic technologists.

**METHODS:** The study consists of 145,915 radiation technologists, certified in the American Registry of Radiologic Technologists (1926-1982) and followed through 1997. Causes of death were obtained from death certificates or, more recently, through NDI *Plus*. Standardized Mortality Ratios (SMR) were computed and tests of homogeneity were performed to detect differences in mortality among causes. Poisson models were used to estimate risks using an internal comparison group.

**RESULTS:** Significantly low SMRs were observed for all causes (0.76), all cancers (0.82), and diseases of circulatory system (0.69). Compared to U.S. women, the risk for breast cancer mortality bordered around unity (SMR 1.01, 95% CI 0.94-1.09). However, relative to all other cancers, breast cancer mortality was significantly increased (RSMR 1.24,  $p < 0.01$ ). Elevated risk for breast cancer was associated with certification before 1940 (SMR 1.55, 95% CI 1.24-1.91), and duration of certification of 20-29 (SMR 1.21, 95% CI 1.06-1.37) and 30+ years (SMR 1.77, 95% CI 1.54-2.02). A 35% increase in leukemia risk was evident for women certified for a duration of 20-29 years and a 36% increase among women certified for 30+ years. Poisson analysis revealed a significant increase in breast cancer risk with increasing number of years certified among women first certified before 1940 ( $p < 0.001$ ) and during 1940-49 ( $p = 0.05$ ) compared to women first certified in 1950 or later.

**CONCLUSIONS:** Preliminary findings of this study suggest increased breast cancer risk associated with occupational radiation exposures prior to 1950 and with long-term cumulative exposures. However, potential confounding by reproductive and other risk factors needs to be evaluated.

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### ENDURING SOCIAL AND BEHAVIORAL EFFECTS OF EXPOSURE TO MILITARY COMBAT IN VIETNAM

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**PURPOSE:** To assess current social and behavioral outcomes among Vietnam veterans up to 35 years after exposure to military combat.

**METHODS:** A cohort of 1,315 American Legion members whose combat experiences were assessed with a standard quantitative

measure in 1984 were followed-up through 1998 for current health and psychosocial status. Another 2,260 Legionnaires who served outside Vietnam during the same period were used as a comparison group. Outcomes included smoking and drinking habits as health risk indicators, income, measures of marital and general happiness and life satisfaction, and the Columbia University PERI (Psychiatric Epidemiology Research Instrument) scales for psychological well-being: anxiety, depression, helplessness/hopelessness, anger and irritation, and physical symptoms of depression. Combat intensity was classified as high, medium, and low.

**RESULTS:** Income was significantly lower in the high-combat group by \$4,000 per year compared to the low- and medium-combat groups and the non-Southeast Asia veterans, whose incomes were similar to each other. Marital happiness, life happiness, general life satisfaction, decreased with increasing combat, while smoking prevalence increased with combat score. The PERI scale components were strongly dose-related to combat intensity. Furthermore, the anger/irritation score for the low-combat group was significantly higher than for the non-SEA group.

**CONCLUSIONS:** Although practically all veterans in this study last saw combat prior to 1971, the detrimental effects of having experienced combat which were strongly apparent when this group was surveyed in the 1980s continue to exert an adverse effect on many aspects of their lives almost three decades after the war.

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### A NESTED CASE-CONTROL STUDY OF STOMACH CANCER MORTALITY AMONG AUTOMOBILE MACHINISTS EXPOSED TO METALWORKING FLUID

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**PURPOSE:** In a nested case-control study of 140 stomach cancer deaths (1941-1984) among 46,384 automobile workers, we examined risk in relation to lifetime exposure to metalworking fluid (MWF) in machining and grinding operations.

**METHODS:** Exposure was defined during varying windows of biologic time (<10 years before death, 10-20 years before death, and > 20 years before death) and evaluated using a nonparametric smoothing technique and conditional logistic regression. Exposure was measured by duration, intensity ( $\text{mg}/\text{m}^3$ ), and cumulative exposure ( $\text{mg}/\text{m}^3\text{-years}$ ) to each MWF type (straight, soluble, or synthetic), as well as by duration of exposure to selected metals, additives, and components of the fluids.

**RESULTS:** When data from three plants were combined, grinding with water-based synthetic or soluble MWF increased the risk of stomach cancer mortality. Those grinding with synthetic MWF with more than  $1.3 \text{ mg}/\text{m}^3\text{-years}$  exposure during the 10 years just prior to death experienced a 4.4-fold risk of stomach cancer (95% CI 1.5-13.1). Increased risk was also observed among those in the highest category of soluble grinding grading exposure (OR 1.9; 85% CI 1.0-3.6). In plant-specific analysis, there was