

Cancer Incidence: Are Physicians Any Different?

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In the last two decades cancer has become the leading cause of death in the United States and Europe, probably due to a decline in the rate of mortality from cardiac diseases. A report from the U.S. National Cancer Institute showed that the overall incidence rose from 1975 to 1989, with non-significant changes during the period 1989 to 1998, and a significant decline in incidence from 1998 to 2008 [1]. However, a new report from the IARC (International Agency for Research on Cancer) reported an 8% increase in the incidence of cancer diagnosis between 2008 and 2012, with a specific marked increase in the incidence of breast cancer [2]. The Israel National Cancer Registry reports an upward trend in morbidity among men (8%) and stability among women (1%) in the Jewish population, where as an increase in incidence emerged in the Arab population (64% in men and 76% in women) from 1990 to 2010 [3].

Several studies have reported a lower cancer death rate among physicians as compared to the general population. This possibly reflects the combined effects of their relatively high socioeconomic status and knowledge of the consequences of health-related behaviors such as smoking, unprotected intercourse, alcohol consumption and drug abuse [4,5]. Among both White and Black males, physicians were found to have longer life expectancy [4], although they were also found to lead very stressful lives, and those in the USA

[4] and Britain [6] tend to die more commonly from accidents and suicides.

The study by Klein-Kramer et al. in this issue of *IMAJ* [7] is the first to explore the incidence of cancer among Israeli physicians. Although it is a retrospective cohort study we cannot underestimate its importance, namely because of its remarkable size relative to a small country like Israel (851,469 person-years). The authors divided the physicians into five groups according to specialties and presumed exposure to radiation, with non-specialized general practitioners categorized as one group and potentially at-risk specialists as another. The higher prevalence of breast cancer among specialized physicians can be attributed mainly to radiation exposure. However, there may be other causes, as Klein-Kramer and team suggest, such as working the night shift, higher socioeconomic status, and giving birth at an advanced age – all common factors among hospital physicians, especially in their early years of training. Night-shift work was recognized as a probable carcinogen by the International Agency for Research on Cancer and the World Health Organization [8]. Higher socioeconomic status [9], which is associated with higher level of education and awareness of the dangers of smoking and other risky behavior leading to a reduced prevalence of lung cancer among others [10], is paradoxically associated with a higher prevalence of breast cancer [11]. Assuming that the main cause for the higher prevalence of breast cancer among female physicians is exposure to radiation, I would expect female radiologists to have a higher odds ratio for breast cancer, but this was not the case (0.98). The higher odds ratio for female internists, a group with assumed less exposure to radiation

than surgeons, also does not support the radiation exposure theory.

It would have been interesting to compare the prevalence within the same medical field between physicians who are regularly exposed to contrast material and radiation and physicians with less exposure – such as gastroenterologists who perform endoscopic retrograde cholangiopancreatography regularly as compared to those who do not, cardiologists who perform coronarography routinely compared to non-invasive cardiologists, invasive radiologists compared to general radiologists, and vascular surgeons who tend to perform many angiographies as compared to their colleagues, the non-vascular surgeons. The main limitation of such a comparative study is probably the small size of these groups, too small (at least in Israel) to obtain significant results.

Up to 10% of invasive cancers are related to radiation exposure [4]. Exposure to ionizing radiation increases the future incidence of cancer, particularly leukemia [12]. Scientists believe that the incidence of cancers due to ionizing radiation increases linearly, with effectivity of the radiation dose at a rate of 5.5% per sievert [12]. However, the vast majority of cancers are non-invasive skin tumors. Radiation-induced leukemia and thyroid cancer are the most common radiation-induced cancers [12], neither of which was evaluated in this study although both are related to radiation exposure at a young age. Increased risk of non-chronic leukocytic leukemia has been reported not only in populations with acute high exposure to radiation [13] but also in populations exposed to a low rate dose, e.g., nuclear industry workers [14] and radiology technicians [15], with increased mortality due to multiple myeloma and lymphoma among the latter.

The thyroid is among the most radiation-sensitive tissues in the body, with excess cancers occurring at doses as low as 100 mGy (10 rad). The risk of thyroid cancer is especially high in patients exposed to radiation before age 15 years [16]. A study on the incidence of thyroid cancer and non-CLL among physicians, especially those with higher exposure to radiation, may produce interesting results. Such a study will most likely be limited due to the large number of subjects needed in view of the relative rarity of thyroid cancer.

Melanoma is a common malignancy whose incidence has increased in the last few decades (the lifetime probability of developing melanoma in the U.S. is estimated to be 1 in 37 for men and 1 in 56 for woman [17]). Melanoma has a relatively high incidence in Israel, probably due to the country's subtropical location. I believe that the increased odds ratio for melanoma in all groups of physicians in Israel should be attributed to the Ashkenazi* ethnic origin of most physicians, which seems to correlate with a higher prevalence of melanoma [18], and perhaps to the higher-than-average socioeconomic status of physicians [19]. Physicians are probably more alert to new suspicious skin lesions than the general population. Vardi and co-authors [20] found melanoma to be less common among Orthodox religious Jews, probably due to their traditional clothing that covers most of the body. However, the higher prevalence of melanoma, which is consistent in most groups of both specialized and non-specialized physicians (not only in this study but in others as well), is interesting and warrants further investigation. We expect physicians to practice better sun-protective behavior and to perform self-skin examinations more frequently than the general population. It is important to analyze the prevalence of different stages of melanoma, with an expectation for higher prevalence of thin melanoma lesions among physicians.

Physicians in Israel comprise a unique population that experiences stressful work

and night shifts (usually in their third to fourth decade); most of them are of Eastern European origin and have a high socioeconomic status. As Klein-Kramer and collaborators suggest, comparing this group to the regular Israeli population may not be suitable, and it may be more appropriate to compare them to a group with greater similarities, such as university teaching staff.

A significant observation is the remarkable decrease in the prevalence of malignancy among Arab physicians compared to the general Arab population. This observation may be related to healthier living habits (less smoking, healthier food choices, etc.), as Klein-Kramer and colleagues suggest. If this is the case the question to be asked is: "why don't we see this trend among Jewish physicians?" Is it because the difference in lifestyle modification between Jewish physicians and the Jewish population is not that significant (less smoking, more physical activity than the Arab population, etc.)? This may well be the explanation since, for example, the rate of smoking is much higher among Arab males than Jewish males. Another conclusion that can be drawn from this finding is that radiation exposure may not be the cause of excessive malignancy since we can easily assume that Arab physicians are exposed to the same level of radiation as Jewish physicians. An interesting study would be to compare the rate between Arab and Jewish physicians, as I suggested earlier, for example, among gastroenterologists who perform ERCP regularly as compared to those who do not. Such a study, although problematic due to the small number of physicians in these subgroups, may demonstrate the real impact of both radiation exposure and ethnicity on malignancy. Radiation exposure cannot be blamed for most adenocarcinomas, since these were found to be as common among physicians as in the general population especially with regard to colorectal and prostatic cancer.

Last but not least is the importance of preventive medicine in both cardiology

and oncology. Physicians are expected to control their blood pressure and lipid levels and engage in more exercise than the rest of the population. Physicians are more likely than the average patient to undergo coronary angiography and brain CT immediately when coronary or neurologic symptoms appear and reach the emergency room for percutaneous coronary investigation or tissue plasminogen intervention. This assumed behavior will reduce the rate of cardiac and stroke-related death and therefore increase the incidence of death due to malignancy in physicians. However, as physicians age, they are expected to undergo screening tests like mammographies and colonoscopies, a fact that may reduce mortality from malignancy and increase the incidence of early-diagnosed malignancy, thereby improving their overall prognosis.

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CLL = chronic leukocytic leukemia

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ERCP = endoscopic retrograde cholangiopancreatography

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