

## **Reducing the Cancer Burden in the Population: Epidemiologic Evidence to Support Policies, Systems, and Environmental Changes**

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The underlying goal of most cancer epidemiology is to reduce the cancer burden, and the current volume of *Epidemiologic Reviews* comprises eleven reviews across a range of topics including cancer surveillance, risk factor identification, and the evaluation of approaches to care of patients and predictors of prognosis and death.

Cancer is the leading cause of death in nearly 50 high income countries and is now the second most common cause of death in another 40 countries undergoing socio-economic transition (1). Piñeros et al. (2) make the case for population-based cancer registries to provide a global cancer surveillance framework nested within surveillance for other major non-communicable diseases. This Global Initiative for Cancer Registry Development has been endorsed by the World Health Organization and will enhance the capacity for cancer surveillance and the monitoring of cancer control in low and middle income countries.

Cancer registries are also essential for epidemiology in high income countries, and Tai et al. (3) explain how registry data are used by Cancer Centers in the USA to evaluate their success in reducing the cancer burden in their catchment areas. In a case study in a defined catchment area in San Francisco analyses included incidence trends, prevalence of risk factors such as smoking, inequalities by race/ethnicity and sex, economic costs, and evaluation of local research projects, providing information essential for reducing the cancer burden in the population served. LeHew et al. (4) also used cancer registry data in the USA in their assessment of the changing epidemiology of “oral cancer”, highlighting the difference between cancers of the anterior oral cavity and those of the oropharynx; the former are strongly related to tobacco and high intakes of alcohol, and the incidence in the USA has declined, whereas the latter are associated with the human papillomavirus and the incidence has recently increased. Their review covers risk factors for both types of oral cancer, approaches to prevention and early detection, disparities, and the cost of care.

Four papers in this volume present systematic reviews of putative risk factors for various cancers. Focussing on early life, Clarke et al. (5) consider the relevance of exposures *in utero*, in childhood and in adolescence in relation to lifetime cancer risk, including the epidemiological evidence, methodological strategies and policies. They report that while tobacco in adolescence is an established cause of lung cancer, the

evidence for the other exposures considered such as obesity, diet and physical activity is so far inconclusive, and they recommend that the evidence base needs to be expanded with more use of approaches such as life course frameworks and Mendelian randomisation. Reviewing the risk of cancer in transgender people, Braun et al. (6) consider particular exposures such as high dose cross-sex hormones and sexually transmitted infections, as well as smoking, alcohol and access to screening; they conclude that there are several biologically plausible concerns and some data suggesting differences in risk of hormone-related cancers, but that there are as yet insufficient high quality epidemiological data to draw any firm conclusions on cancer risk. Michaud et al. (7) review and meta-analyse the possible effect of periodontal disease on cancer risk. They conclude that the existing data provide support for a positive association between periodontal disease and the risk for oral, lung and pancreatic cancers, but that further prospective studies of this topic are needed, with large sample sizes and careful adjustment for smoking and other risk factors which may confound the associations observed. In a systematic review of vitamin D in relation to both cancer risk and mortality, Mondul et al. (8) report that higher circulating vitamin D appears to be associated with a reduced risk of cancers of the colorectum and bladder, but with a higher risk for cancer of the prostate. They also address the possible relationship of vitamin D with cancer in African Americans, and consider the available epidemiological literature on vitamin D supplementation and genetic variants that influence vitamin D metabolism, identifying gaps in scientific knowledge and concluding that, although there has been recent enthusiasm for vitamin D supplements, current evidence does not support vitamin D supplementation for primary or secondary prevention of cancer at any site.

Another four papers review more clinical aspects of cancer epidemiology, including the health of cancer patients. McFerran et al. (9) evaluated the effectiveness and cost-effectiveness of personalised surveillance following removal of colorectal adenomatous polyps. Their conclusions were tentative due to the small number of relevant studies, but they suggested that for patients with a relatively low risk of developing colorectal cancer less intensive surveillance using approaches such as fecal immunochemical tests, perhaps combined with chemoprevention using aspirin, may be more appropriate than colonoscopy. The role of exercise in cancer patients was assessed by Cormie et al. (10) in a systematic review of evidence from observational studies and randomised controlled trials. The evidence showed that, in observational studies, patients who exercised following a diagnosis of cancer had a lower risk of both recurrence and death, although this finding may be affected by reverse causality and few data were available from trials. More data from trials were available on the other endpoints examined and showed that exercise interventions during and after treatment improve cancer related fatigue for several cancer types, and improve psychological health in patients with breast cancer. The topic of treatment related symptoms in cancer patients was also considered by Atkinson et al. (11), who reviewed questionnaires used to capture patient-reported outcomes concerning physical function, describing the characteristics of the three measures in widespread use. Finally, Isenberg et al. (12) reviewed the recently updated guidelines on palliative care in oncology published by the American Society of Clinical Oncology. These recommend that more people should be referred to interdisciplinary palliative care teams and that more specialists are needed; the review paper considers the implementation of the guidelines and the need for

support across the health system, shifting cultural norms to reduce stigma towards palliative care, and changes in the financing of health care.

The current volume of *Epidemiologic Reviews* consolidates and interprets the accumulating knowledge in several areas, and also highlights gaps in the evidence and priorities for future research. Smoking remains important as a cause of many types of cancer and as a mediator of inequalities in health; more research is needed both on the effects of smoking and on smoking cessation. Other recurring themes are the difficulty in drawing conclusions on causality from observational studies, and the need for other types of evidence such as randomised trials and genetic approaches. There is also a paucity of evidence for many topics, such as the effects of physical activity on health in cancer patients, and risk factors for cancer in minority groups. Perhaps the most important recommendation for future work is the call by Piñeros et al. (2) for global cancer surveillance; most of the analytical epidemiology reviewed in the other papers is from high-income countries, and much more epidemiological research is needed in low and middle income countries to reduce the global burden due to cancer.

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