1 The global cancer burden

As far as we know, cancer has always afflicted humans, although for centuries its relative impact was overshadowed by early death from infectious diseases. Until recently, information on the global distribution of cancer was limited for certain communities and countries. We now have a reasonable basis for estimating the global cancer burden. For several tumour types – colorectal, prostate, and breast cancer – high incidence rates were once restricted to North America, western Europe, and Australia, but now incidence rates are rising in many other countries. Lung cancer, for which high incidence was initially restricted to high-income countries, has long been recognized as a global scourge. Previously, low-income countries primarily had a relatively high incidence of stomach, liver, and cervical cancer, but changes in incidence over time for these and other cancer types illustrate variation between countries. Finally, there are marked differences between countries or regions in cancer mortality, with an increasing burden in low- and middle-income countries, attributable both to less-than-optimal implementation of preventive measures and to diagnosis at a later, rather than an early, stage of cancer development.

2 Causes of cancer, including hazardous circumstances

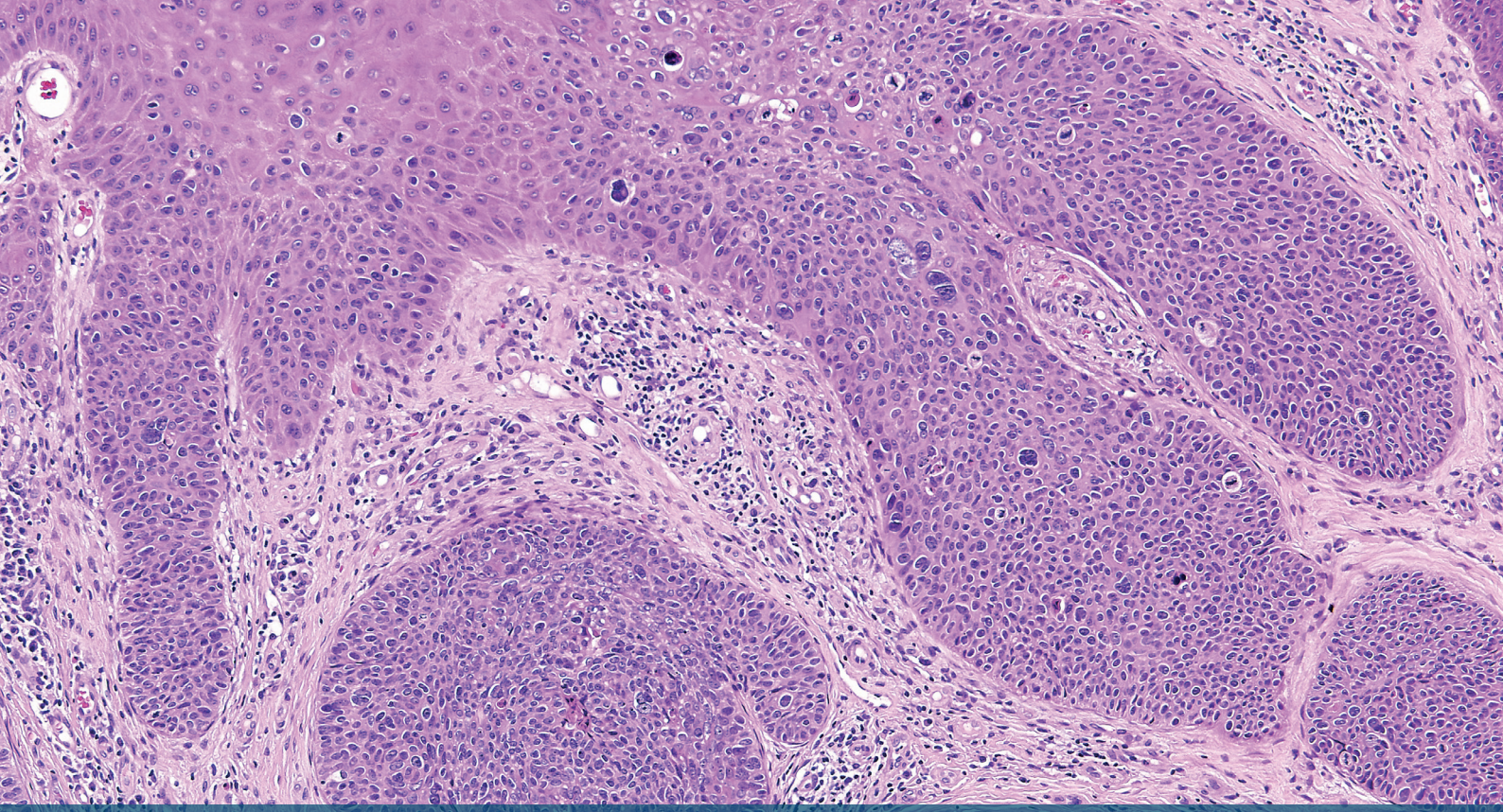
At the community or national level, causes are established for a proportion of all cancers – a proportion that differs markedly between tumour types. Tobacco smoking was once prevalent mostly among men in high-income countries but is now much more prevalent, involving women in many countries, and tobacco use is highest in Asia, Africa, and South America. Cancers attributable to unhealthy diet and lack of exercise are often correlated with the increasing prevalence of overweight and obesity worldwide. Previously, the cancer types most common in low-income countries were those caused by human papillomavirus (HPV) infection or mediated by chronic inflammatory diseases caused by infectious agents. These patterns are changing, particularly with industrialization. The highest exposures are often those of workers near industrial sources of pollution. Emissions from factories and vehicles contribute to air pollution, a cause of lung cancer. Identifying the causes of cancer indicates a potential means of prevention.

3 Biological processes in cancer development

Knowledge of how normal cells become cancerous – the process of malignant transformation – may underpin cancer prevention. Changes evident in premalignant tissues or at the earliest stage of tumour development are key to improve screening and to monitor people with an increased risk of cancer because of their genetic makeup, and also have implications for cancer treatment. Two scenarios are covered: cancer that develops after exposure to carcinogens, including hazardous chemicals, radiation, or infectious organisms, and cancer that is categorized as sporadic, for which no such exposure is evident. Cancer development after exposure includes the induction of carcinogen-related mutations; critical mutations may also occur spontaneously. DNA repair may be protective, epigenetic events may be as important as mutations, and chronic inflammation plays a key role. Malignant transformation is marked by metabolic, immunological, and hormonal changes. Knowledge of such biological processes has contributed to reducing cancer incidence and mortality.

4 Inequalities that affect cancer prevention

This is the first time that a section primarily concerned with inequalities and cancer is being included in a *World Cancer Report*. Inequalities that affect cancer prevention include those determined by educational attainment and by limitations on circumstances; examples are nutrition and housing, which are determined by financial income. Such inequalities may perturb the efficacy of almost all initiatives that are aimed at reducing the burden of cancer. The relevant factors may be specific to particular countries or regions. Recently, there have been improvements in the methods for investigating associations between inequalities and cancer as well as the ways in which adverse outcomes may be minimized. Typically, data are available on variations within a particular country, and the chapters in this section describe such data for certain countries.



5 Preventing particular tumour types

Cancer is not a single disease but a multiplicity of variously related diseases. This understanding is as applicable and relevant to cancer prevention as it is to the clinical management of cancer. Broad knowledge about cancer causation, development, detection, and avenues to prevention must be qualified according to the tumour type or subtype being considered. Descriptions of causation and prevention cannot be given uniformly for all cancer types. For example, exogenous causes of prostate cancer are not evident; for now, prevention of prostate cancer must focus on sporadic disease and detection of precancerous lesions. Screening procedures can be meaningfully explored only with respect to particular cancer sites. For many cancer types, there are no recognized population-based screening procedures. However, success with respect to any research aspect of tumour development or a preventive measure for one tumour type often indicates a possible way to approach the same challenge for at least one other tumour type and perhaps many other tumour types.

6 The basis for, and outcomes from, prevention strategies

The burden of death from the multiple different cancer types can be decreased in all communities and countries. Cancer incidence can be reduced by decreasing or eliminating exposure to carcinogens in multiple contexts. Success in reducing the incidence of smoking-related cancers in some countries indicates a range of measures that may be researched for their efficacy in other situations. Interventions to change behaviour related to nutrition, exercise, and weight gain are being actively researched. Vaccination is effective for some cancers caused by infectious agents. Deaths from sporadic cancer may be decreased through chemoprevention and diagnosis of early-stage disease by screening and emerging molecular methods of early diagnosis. An increased risk of cancer may be indicated by family history and can be addressed by monitoring the affected individuals. The extent to which the options summarized here are realized across national boundaries warrants continuing research.