## The burden of cancer in Austria

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**ABSTRACT**
The aim of this study was to assess the overall progress against cancer in Austria by analysing changes in age-adjusted mortality rates from 1970 to 1996. For the years 1970 to 1996, age-adjusted rates for all malignant neoplasms and for selected sites were calculated for men and women, according to year, age and sex. The number of cancer deaths were obtained from the Austrian Central Statistical Office--age-adjusted mortality rates of all malignant neoplasms decreased in men between 1971 and 1996 by 13% (from 289.1 to 251.4 deaths per 100,000), and in women between 1970 and 1996 by 19.1% (from 276.6 to 223.7 deaths per 100,000). Among older people (> or = 55 years) the mortality decreased by 13% in men and by 17% in women; among younger people (< 55 years) by 12% and 30%, respectively. The decrease in total cancer mortality is promoted by three tumour sites (the leading causes of cancer deaths in 1970). In both sexes, the decrease of stomach cancer mortality had the major impact, followed by colorectal cancer in women and by lung cancer in men. The observed changes in mortality are primarily related to changing incidence and early detection, rather than improvements in treatment. Unfortunately, there is evidence that prevention is losing ground in Austria. The implementation of the well-established knowledge of cancer prevention and the strengthening of preventative research is urgently needed.

**Key words:** Austrian cancer epidemiology, future aspects, mortality trends, prevention

## Introduction

In Austria, cancer ranks second in the mortality statistics, exceeded only by diseases of the heart, as observed in other industrialized countries (La Vecchia *et al.*, 1992). In 1996 a total of 18819 cancer deaths (23.3% of all deaths) was recorded (heart diseases 30426 deaths; 37.7%). Although not the leading cause of death, cancer is the disease most feared by the public. In a representative cross-sectional study conducted by the Austrian Cancer Society in 1995 (Haidinger *et al.*, 1998a), 41% of Austrians named cancer as 'the most feared of all diseases', with traffic accidents second (38%) and heart disease third (36%). The public is very concerned about all aspects of cancer research and gives more support to this than to other areas in medicine.

In the past decades the magnitude of resources and efforts has increased in cancer research, and has provided promising new therapies, better techniques for early detection, and the verification of major causes of cancer. It is expected that this progress will have an impact on cancer morbidity and mortality. The aim of this study was the assessment of the overall progress against cancer in Austria by analysing changes in age-adjusted mortality rates from 1970 to 1996. Mortality is the best measure of progress against cancer, rather than incidence and survival, because it is most reliably reported and not as subject to changes in diagnostic procedures, practices in screening and early detection and compliance of the reporting institutions (Bailar and Gronik, 1997).

## Materials and methods

The number of cancer deaths (following ICD-9 codes) according to year, age, sex and tumour site, and population data, were obtained from the Austrian Central Statistical Office. Age-adjusted rates (1970 to 1996) for all malignant neoplasms and for selected sites were calculated ('direct' method) for men and women using the Austrian population in the 1991 census as the standard population. The data of selected tumour sites are shown only when age-adjusted rates exceed ten deaths per 100 000 population at least once during the years under study. Trends were also analysed in two broad age groups (0–54 years and $\geq$ 55 years) for all malignant neoplasms together, and for the leading causes of death in men (lung cancer) and women (breast cancer).

## Results

Age-adjusted mortality rates of all malignant neoplasms combined has decreased continuously in men and women since 1970 (Figure 1). In men, the mortality decrease between 1971 (year with the highest rate ever observed) and 1996 was 13% (from 289.1 to 251.4 deaths per 100 000 persons/year), corresponding to an annual decrease of 0.56%. In women mortality decrease between 1970 and 1996 was 19.1% (from 276.6 to 223.7 deaths per 100 000 persons/year), corresponding to an annual decrease of 0.81%.

Figure 2 shows the mortality trends of all malignant neoplasms in men and women for two broad age groups as percentages of the mortality rates in 1970 (100%). Among older persons ($\geq$55 years), mortality decreased continuously by 13% in men and by 17% in women. Among younger men, mortality increased for the initial few years of the study, followed by an approximate 12% decrease since 1985. Among younger women, mortality decreased continuously by 30%.

The mortality trends for selected cancer sites are shown in Figure 3 for men and in Figure 4 for women. Most striking is the sharp and parallel decline in cancer of the stomach in both sexes, by more than 60%. The decrease is not well understood, but usually explained by improvements in diet. However, the risk factor diet must have changed decades ago because the decrease started well before

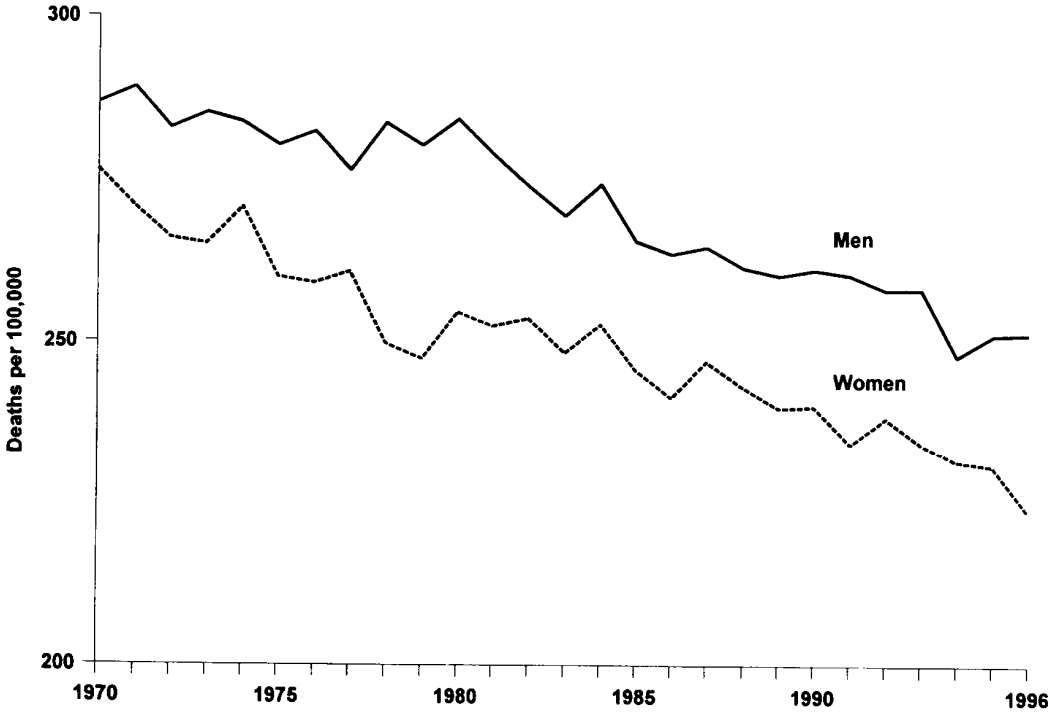


**Figure 1.** Mortality from all malignant neoplasms, males and females, Austria 1970 to 1996 (rates adjusted to the Austrian population of 1991).

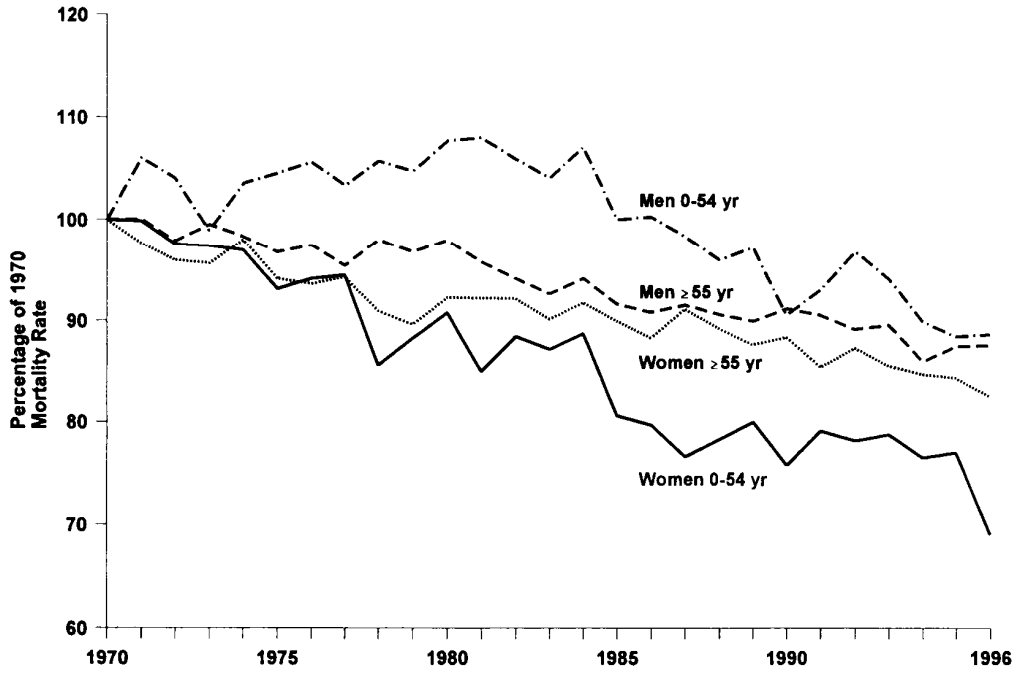


**Figure 2.** Mortality from all neoplasms as a percentage of the rate in 1970, men and women, Austria 1970 to 1996 (rates adjusted to the Austrian population of 1991).

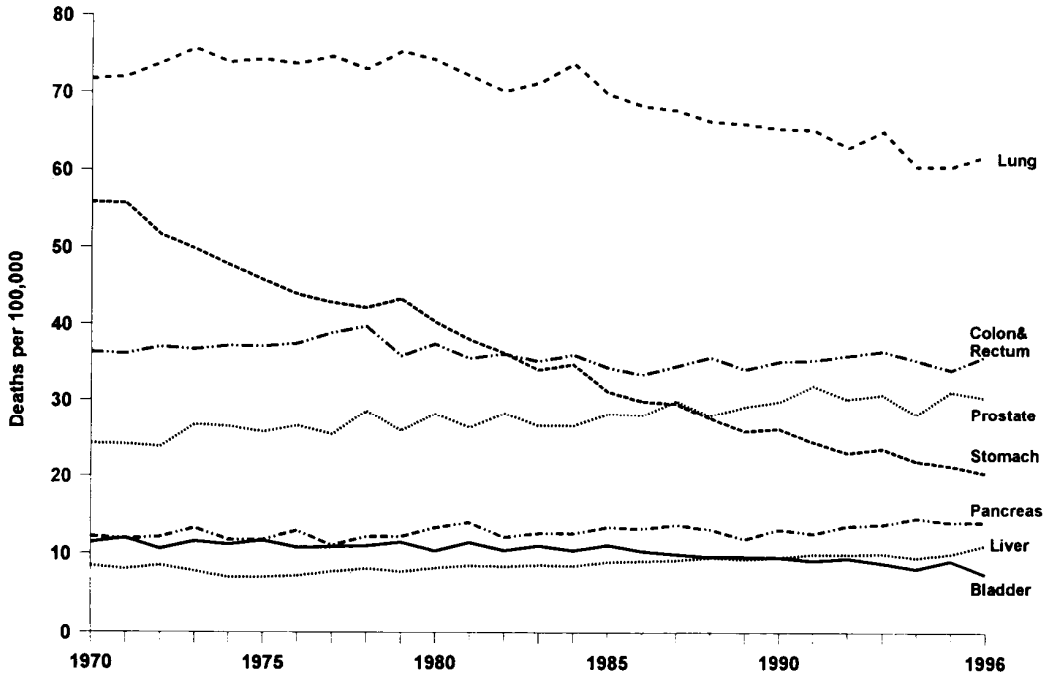


**Figure 3.** Men: mortality from cancer at selected sites, Austria 1970 to 1996 (rates adjusted to the Austrian population of 1991).

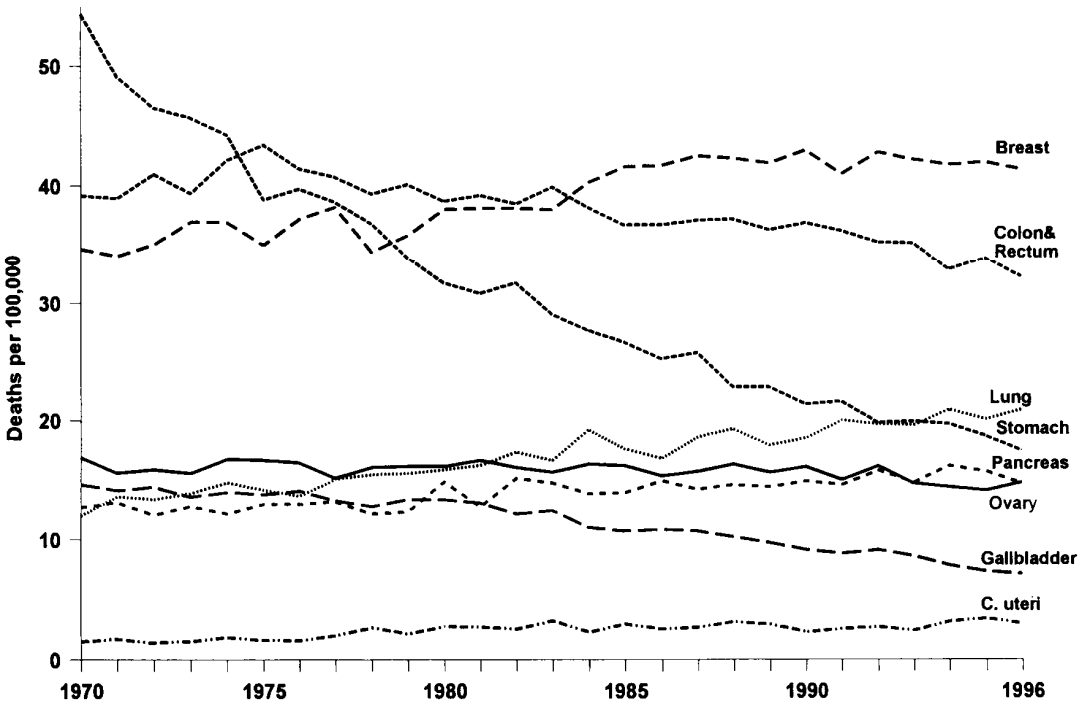


**Figure 4.** Women: mortality from cancer at selected sites, Austria 1970 to 1996 (rates adjusted to the Austrian population of 1991).

1970 and is observed in all age groups, with a steep decrease towards the younger birth cohorts (Vutuc and Gredler, 1984).

In men, lung cancer is by far the leading cause of cancer death (25.8% of all cancer deaths) (Figure 3). However, lung cancer mortality decreased substantially, after a plateau, by 16% post-1984. This overall decrease is exclusively related to a 16% decrease in men 55 years and older since 1984 (Figure 5); whereas the 12% increase in the younger age groups, with some downward tendency since 1980, has had no impact on total mortality because of the small number of deaths. These trends reflect changes in male smoking habits started in the early 1970s; the tendency to stop smoking and a significant reduction in tar yields is documented since 1960 by Vutuc and Gredler (1986). In women, lung cancer mortality increased by approximately 75% (Figure 4). Above all, this increase was caused by the rising lung cancer mortality in women $\geq$55 years (68%) (Figure 5). However, the steep increase (130%) in younger women has already had some impact on the total mortality, indicating that a steeper increase of total mortality due to lung cancer is to be expected in the near future. These trends reflect the growing prevalence of the smoking habit among women (Haidiger *et al.*, 1998b).

In women, breast cancer became the leading cause of cancer deaths in 1984 (Figure 4). Over the whole period since 1970, breast cancer mortality increased by about 20%. However, mortality reached a plateau at the end of the 1980s, followed by a slight decrease in the 1990s. The increase in breast cancer mortality occurred earlier for women younger than 55 years of age (Figure 6). The slightly decreasing rates in recent years may indicate the beginning of a downward trend in both age groups. We believe that the observed trend can be related partially to mammography, as increased survival after early detection of breast cancer is scientifically well supported (Vutuc *et al.*, 1998).

Colorectal cancer is the second leading cause of cancer deaths in both sexes (Figures 3 and 4). After years of increase, mortality rates are decreasing; in men by 10% since 1977 and in women substantially by 26% since 1975. The question is: what could be related to a decline in the incidence other than dietary risk factors (American Institute of Cancer Research, 1997). In Austria, eating habits are still characterized by high intake of animal fat, meat and

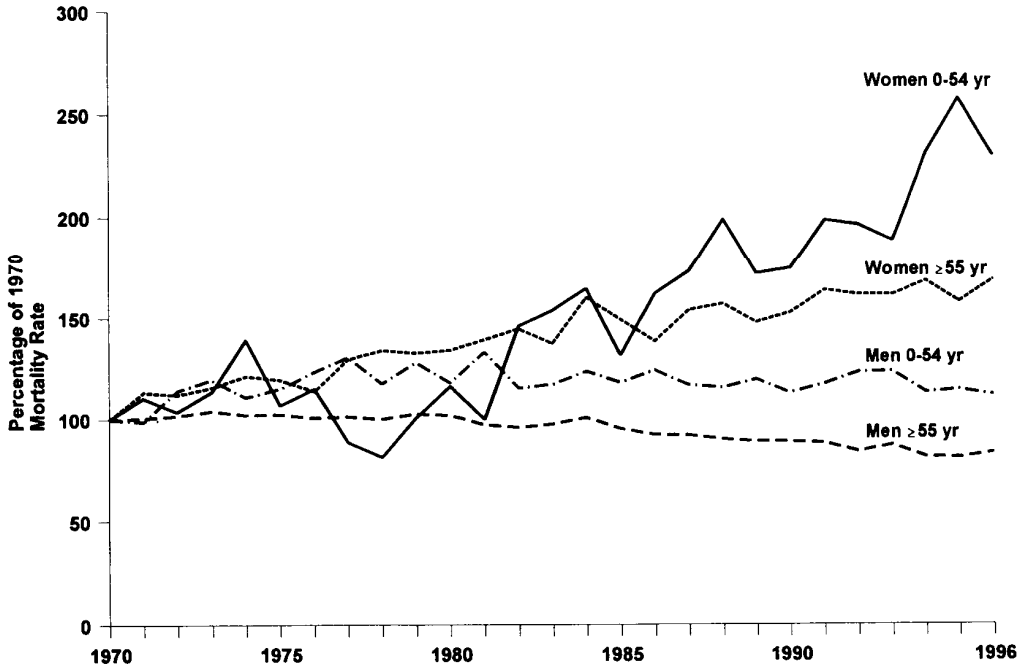


**Figure 5.** Men and women: mortality from lung cancer as a percentage of the rate in 1970, Austria 1970 to 1996 (rates adjusted to the Austrian population of 1991).

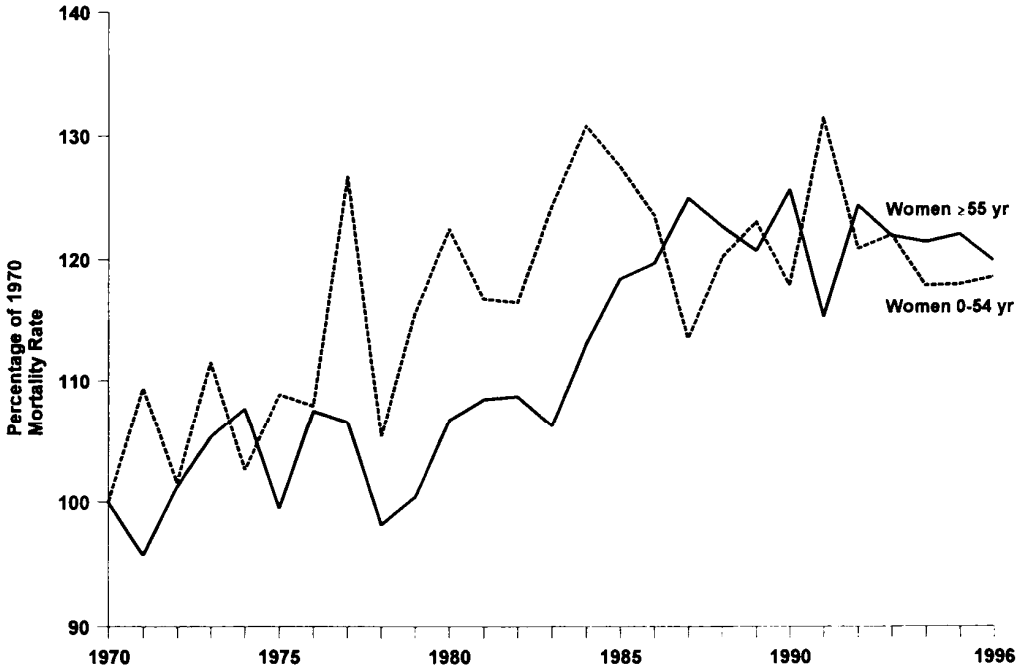


**Figure 6.** Mortality from breast cancer as a percentage of the rate in 1970, Austria 1970 to 1996 (rates adjusted to the female Austrian population of 1991).

total energy (Rohrböck, 1992). Thus, earlier detection and improved treatment may have also contributed. Cancer of the prostate increased substantially by 26% (Figure 3). The constant increase reflects a rising incidence, which may in part be explained by nutritional factors (high animal fat and energy intake) (American Institute of Cancer Research, 1997).

Cancer of the pancreas increased in men and women by 17% (Figures 4 and 6). The increase must be reflected by improved diagnosis; because it coincides with the introduction of non-invasive imaging techniques on a large scale, which improved the documentation of pancreatic cancer on death certificates due to higher diagnostic accuracy (Vutuc *et al.*, 1996).

Mortality has increased for cancer of the liver by 34% in men (Figure 3), but decreased slightly in women (data not shown). The observed trends reflect a changing incidence which can be explained by different risk profiles towards hepatitis B (intravenous drug abuse) between men and women (Vutuc and Kunze, 1992).

Death rates from cancer of the urinary bladder have decreased by 35% in men (Figure 3) as well as in women (data not shown) during the last decade, and may reflect improved survival and a decline in the incidence of smoking-associated cancers in men. Mortality due to cancer of the gallbladder decreased by 50% in women and by 25% in men (data not shown), and due to cancer of the oesophagus by 11% in men and by 26% in women (data not shown), which may reflect a decline in incidence.

Deaths from all cancers of the uterus declined steadily by 58% (data not shown). Deaths from cervical cancer decreased by 42%, reflecting the effectiveness of screening (data not shown). Mortality from cancer of the body of the uterus increased by 99%, but the increase occurred in the 1970s only and rates have stabilized since then (Figure 4). This particular trend was mainly caused by a new nomenclature introduced in 1969, and as a consequence cases previously reported as non-specific cancer of the uterus were registered under position ICD 182, and to a smaller extent under position ICD 180 (Vutuc and Breitenecker, 1985).

Mortality from head and neck cancer has increased among men by 29% but has stabilized in the most recent ten-year period (data not shown). It may reflect improved treatment and shrinking tobacco-related incidence. In women, rates are stable on a level below three per 100 000.

Among men and women, mortality from cancer of the brain has nearly doubled since 1970 (data not shown). The increase, more pronounced in the most recent ten years and in older age groups, must reflect rising incidence.

Mortality from leukaemia has decreased slightly in recent years (data not shown), more in men (20%) than in women (5%). The factor that could be responsible for different trends in male and female incidence remains to be identified. Deaths from malignancies of the lymphatic tissue increased in men by 24%, and substantially in women by 66%, with a levelling off effect in recent years, and may reflect better diagnosis and to some extent rising incidence. Mortality rates from melanoma of the skin increased slightly in both sexes and reflect rising incidence (data not shown).

The mortality rate of childhood cancer (children under 15 years of age, data not shown) has dropped by 40% since 1982, due to better diagnostic and therapeutic procedures (Kunze *et al.*, 1997). This trend has no impact on total cancer mortality because childhood cancers account for less than 0.5% of all cancer deaths per year.

## Discussion

In Austria, mortality rates for all cancers combined have been decreasing in men and women for a quarter of a century. A similar early onset of declining death rates in both sexes is observed in Europe, but only in Finland (La Vecchia *et al.*, 1992). This can be interpreted by a decrease in incidence rather than improvements in cancer treatment. It is also supported by the fact that mortality rates have been decreasing in both sexes in older people ($\geq$55 years) from the very beginning (1970–71) (Figure 2), a time when the true curative effect of advances in cancer therapy could not have emerged. In younger men ($<$55 years) mortality started to decrease only after 1984, the same year that the already declining trend in women became more distinct. Assuming that new cancer treatment reduces mortality first among younger people (Cole and Sataren, 1995), an impact of improved treatment on mortality is plausible in younger people since 1984. Younger people represent the greater part of the population, but generate the smaller number of cancer deaths. As a consequence, even a strong impact on mortality of the younger age group has a weak impact on total mortality.

The decrease in total cancer mortality is generated by the trends of just three tumour sites, which were the leading causes of cancer deaths in 1970. In both sexes, the major impact came from the substantial decrease in stomach cancer mortality, and additionally in women, of colorectal cancer, which is almost entirely a result of decreasing incidence. This must be related to mechanisms of primary prevention activated by evolution, and not by human knowledge. In men, a major contribution also came from a decrease in lung cancer mortality following decreasing incidence. This is the result of planned primary prevention (anti-smoking campaigns in the 1970s and 1980s) based on 'historical' epidemiological knowledge of smoking and disease. It is so far the only major positive result in primary prevention of cancer in Austria, unfortunately only successful in men. To a smaller extent, both mechanisms should also have contributed positively to tumour incidence in other sites. Furthermore, slightly decreasing breast cancer mortality as a consequence of secondary prevention (Vutuc *et al.*, 1998) has diminished total cancer mortality in women.

What can we predict about the future trend of cancer mortality? Cancer mortality will further decrease, because it can be expected that the observed downward trends will continue for some years, although we have to be aware that the mortality of gastric cancer will reach a bottom level. In women, the slightly visible decrease in breast cancer mortality is expected to strengthen due to improved mammography screening (Vutuc *et al.*, 1998) and will compensate for the sharp increase in mortality from lung cancer for some time. Though diagnosis and treatment will improve, we still have to wait for the breakthrough in treatment of the most frequent cancers.

However, we should not be too optimistic about the future trend of cancer mortality, because there is evidence that smoking prevention is losing ground. In men, the prevalence of smoking reached its nadir in 1986, slightly increasing since, and in women patterns of smoking (prevalence and cigarettes per day) are now approaching that of men (Haidinger *et al.*, 1998b). From a critical point of view, the rather desolate situation of smoking prevention, and in general that of primary prevention of cancer, does not really surprise when we take into account the complete absence of nation-wide public campaigns funded by the National Department of Health during the last decade. Corresponding activities covering other fields of cancer prevention (e.g. nutrition and cancer) have never been started. Private non-profit organizations such as the Austrian Cancer Society are engaged in primary prevention but do not have the resources to address the public and cannot take the place of the activities and commitment of the Federal Health authorities. It is not the task of basic research to be worried about the implementation of the well-established knowledge of cancer prevention and prevention research, but that is what is needed. In Austria, cancer prevention activities have insignificant manpower and financial support, compared with basic research and cancer treatment activities.

Taking into account that the absolute number of cancer cases will definitely increase in the years to come, due to demographic trends – the population of 60 years and older will increase by 78% from 1 590 000 persons in the year 1996 to 2 830 000 persons in the year 2036 – the prevention of environmental causes is urgently needed to reduce the burden of cancer in the years to come.

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