

## Feature Article

# Cancer Mortality in the Elderly, 1960–1998: A Worldwide Approach

By Carlo La Vecchia, MD, Franca Lucchini, BSc, Eva Negri, ScD, and Fabio Levi, MD

## ABSTRACT

Mortality from 13 principal cancer sites, plus total cancer mortality at age 65–84 in 22 European countries, the United States, and Japan was analyzed. After earlier increases, total cancer mortality at age 65–84 has been declining between the late 1980s and the late 1990s in the European Union (-5.5% in males, -4.5% in females), in United States males (-2.3%), but not females (+4.4%), and in Japanese females (-5.6%), but not males (+6.3%). Cancer mortality in the elderly rose for both sexes in Eastern Europe between the late 1980s and the late 1990s. Gastric cancer mortality steadily declined in all the areas considered. Lung cancer rates at age 65–84 declined over the last decade by 8.5% in males in the European Union, and by 0.9% in the United States. Rates increased in Eastern Europe, in Japanese males, and in females in all areas. In women, an approximately threefold difference was evident between lung cancer rates of 67–77 per 100,000 in Japan and Europe in the late 1990s, and the rates of 212 per 100,000 in the United States. Likewise, pancreatic cancer mortality rates increased in the elderly of both sexes in the European Union and Japan up to the late 1980s, and in Eastern Europe up to the 1990s, whereas these rates decreased for United States males over more recent calendar periods, thus again reflecting the different spread of the tobacco-related cancer epidemic. After earlier increases in most areas, female breast cancer mortality in elderly women declined over the last decade by 8% in the United States and by 3% in the European Union, whereas it increased in Eastern Europe and Japan. Prostate cancer mortality declined in the European Union and the United States, whereas it rose in Eastern Europe and Japan. Most rates for breast, prostate, and ovarian cancers in the elderly remained comparatively low in Japan. Leukemia mortality in the

elderly was stable in most areas, with some evidence of leveling off in the European Union. Mortality from multiple myeloma steadily increased by 10–20% over the last decade in both sexes in all geographic areas considered, and mortality from lymphomas increased, but improved diagnosis and certification may have played a relevant role in these trends.

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## INTRODUCTION

Between the 1950s and the early 1990s, there was a tendency towards increasing cancer mortality, and towards a leveling of differences in certified cancer mortality in the elderly population in various areas of the world.<sup>1,2</sup> These trends were interpreted by some authors as indicators of an ongoing generalized cancer epidemic.<sup>3,4</sup> However, there were substantial limitations and uncertainties in the reliability and validity of cancer death certification and trends in the elderly, and changes in certified mortality for several sites may well reflect improved ascertainment, increased use of screening and diagnostic techniques in the elderly, and in general, changes in medical practice. There was no widespread and generalized rise in cancer mortality in the elderly, with the principal exception of lung and other tobacco-related neoplasms.

Some decline in overall cancer mortality from the late 1970s onwards has been reported in the United States<sup>5-7</sup> and Western Europe.<sup>8-10</sup> However, trends in the elderly population up to the early 1990s tended to be less favorable.<sup>2,4,11</sup> This may be due to a different cohort pattern of cancer mortality across various generations and hence age groups,<sup>12</sup> more substantial changes in diagnosis and certification accuracy in the elderly,<sup>2,13</sup> a lower impact of earlier diagnosis and improved treatment in the elderly,<sup>14,15</sup> or a combination of various factors.

## EDUCATIONAL OBJECTIVE

Obtain a global perspective of decreases and increases in cancer mortality rates among the elderly.

### TALKING POINTS

Physicians

Pharmacy

Formulary

Cancer Nurses

Lung cancer mortality rates in the elderly population reflect the end of a long-term increase for both sexes, and the beginning of a measurable fall in males.

Improved treatment may have favorably influenced breast cancer, prostate cancer, and leukemia rates worldwide.

Decreases in breast cancer mortality for elderly women reflect advancements in screening, early diagnosis, and treatment.

Comprehensive intervention for cancer control among the elderly population is a public health priority.

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Given their particular health relevance, the monitoring of recent trends in cancer mortality in the elderly is important. Along this line, we considered mortality from six principal cancer sites plus total cancer mortality up to 1998 at ages 65–84 in Europe, the United States, and Japan.

**MATERIALS AND METHODS**

Official death certification numbers for 22 European countries (the 15 countries of the European Union, plus 7 others), excluding Albania and a few countries with a population of <1 million (ie, Andorra, Liechtenstein), the United States, and Japan were derived from the World Health Organization (WHO) database. During the calendar period considered (1960–1998), three different revisions of the International Classification of Diseases (ICD) were used.<sup>16–18</sup> Classification of cancer deaths were thus recoded for all the calendar periods according to the ninth revision (ICD-9).<sup>17</sup> To improve comparability of data throughout different countries and calendar periods, we pooled all intestinal sites, including rectum, all non-Hodgkin’s lymphomas, and all leukemias.

Estimates of the resident population, generally based on official censuses, were

obtained from the same WHO databank. From the matrices of certified deaths and resident populations, age-specific rates for each 5-year age group considered (65–69 to 80–84) and calendar period were computed. Age-standardized rates were based on the world standard population.<sup>19</sup>

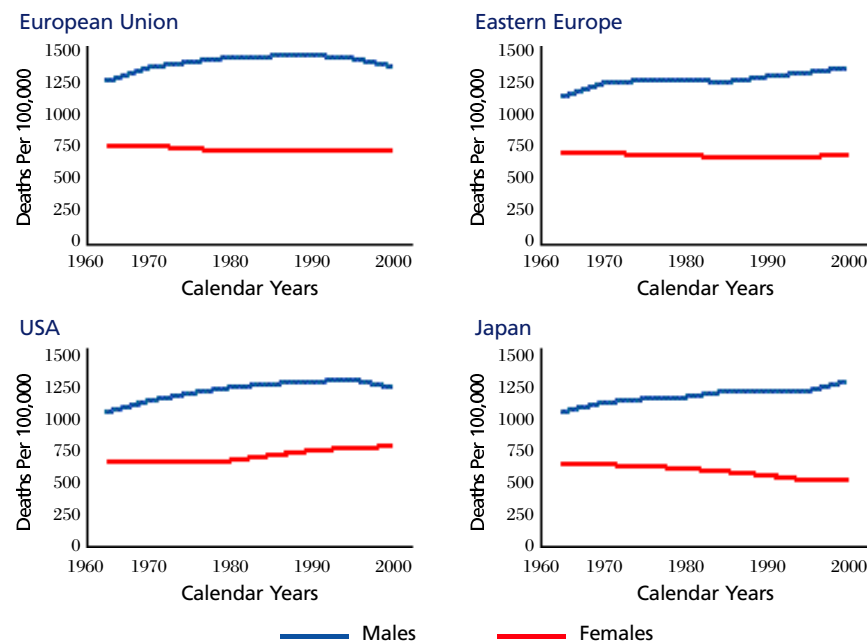
**RESULTS**

Figure 1 gives trends in age-standardized mortality at age 65–84 from all cancers and selected cancer sites in the European Union, selected eastern European countries (Bulgaria, Czech Republic, Hungary, Poland, Romania, and Slovakia), the United States, and Japan over the period 1960–1997. Most of the following comments, however, refer to the trends observed over the last decade, that is, between 1985–1989 and 1995–1998.

After earlier increases, total cancer mortality at age 65–84 has been declining in the European Union (from 1,457 per 100,000 in 1985–1989 to 1,378 per 100,000 males in 1995–1998, -5.5%; from 712 to 690 per 100,000 females, -4.5%), in United States males (from 1,266 to 1,237 per 100,000, -2.3%), but not females (from 732 to 764 per 100,000, +4.4%), and in Japanese females

“Some decline in overall cancer mortality from the late 1970s onwards has been reported from the United States and Western Europe. However, trends in the elderly population up to the early 1990s tended to be less favorable.”

**FIGURE 1A. TRENDS IN AGE-STANDARDIZED (65–84 YEARS) MORTALITY FROM ALL NEOPLASMS, 1960–1998**

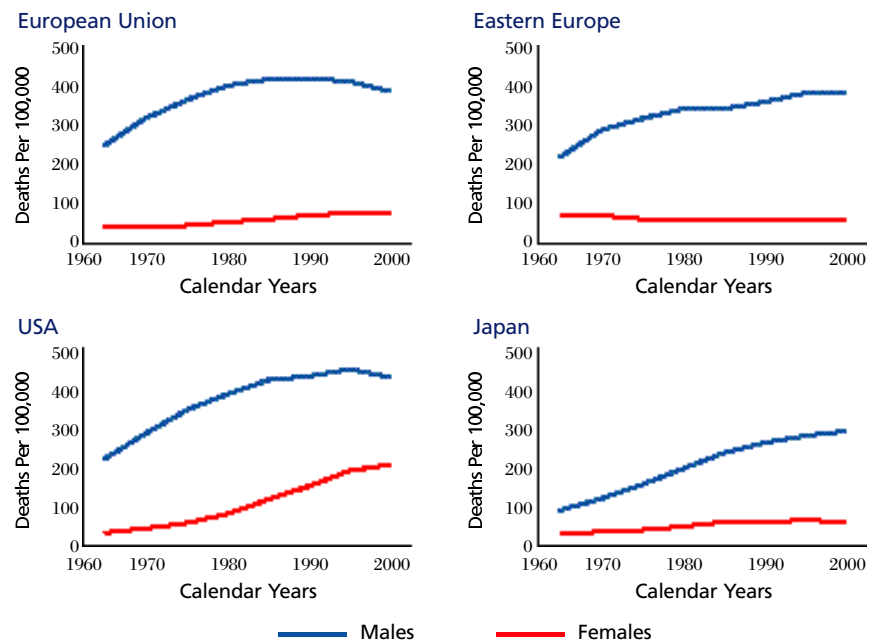


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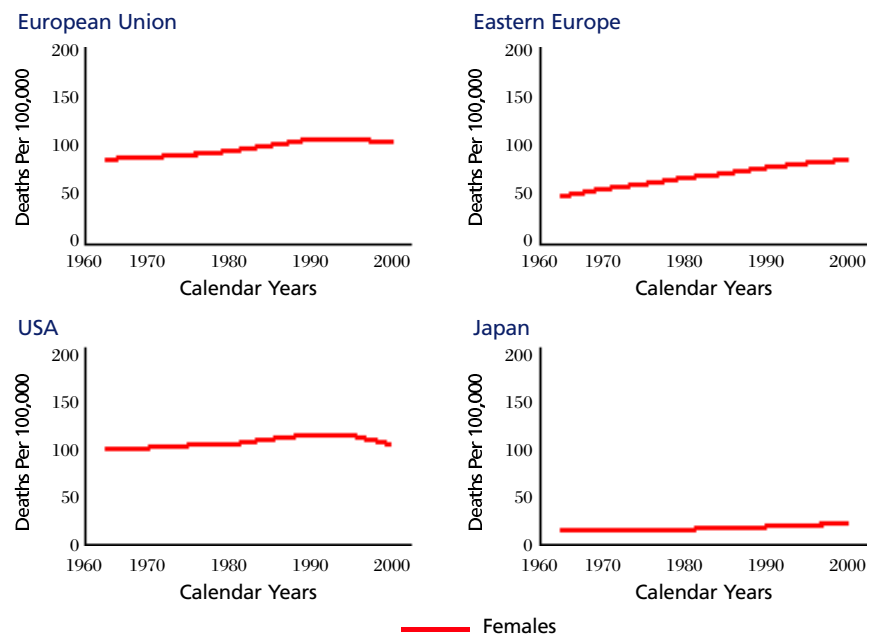
“After earlier increases, total cancer mortality at age 65–84 has been declining in the European Union... in United States males...and in Japanese females.”

**FIGURE 1B. TRENDS IN AGE-STANDARDIZED (65–84 YEARS) MORTALITY FROM LUNG CANCER, 1960–1998**



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**FIGURE 1C. TRENDS IN AGE-STANDARDIZED (65–84 YEARS) MORTALITY FOR BREAST CANCER**



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(from 557 to 526 per 100,000, -5.6%), but not males (from 1,218 to 1,295 per 100,000, +6.3%). Cancer mortality in the elderly rose for both sexes in Eastern Europe (from 1,294 to 1,359 for males, + 5.1%; from 669 to 688 per 100,000 for females, + 2.7%).

Oral cancer mortality in the elderly was roughly stable in the European Union, with rates around 30 per 100,000 males and 5 per 100,000 females. Rates steadily rose for males in Eastern Europe, to reach 32 per 100,000 in the late 1990s. In the United States, rates decreased for males since the late 1970s, and moderately increased for females up to the late 1990s. An appreciable increase was observed for Japanese males over the last few years. These reflect the pattern of tobacco and alcohol consumption in the two sexes and various areas of the world.

No consistent trend was observed for esophageal cancer, although rates increased during the last decade in males from Eastern Europe, the United States, and Japan.

Gastric cancer mortality steadily declined in all the areas considered, and the fall over the last decade was proportionally larger in the European Union (about 30% in both sexes) as compared to Eastern Europe (-23%), the United States (-20% in males, -17% in

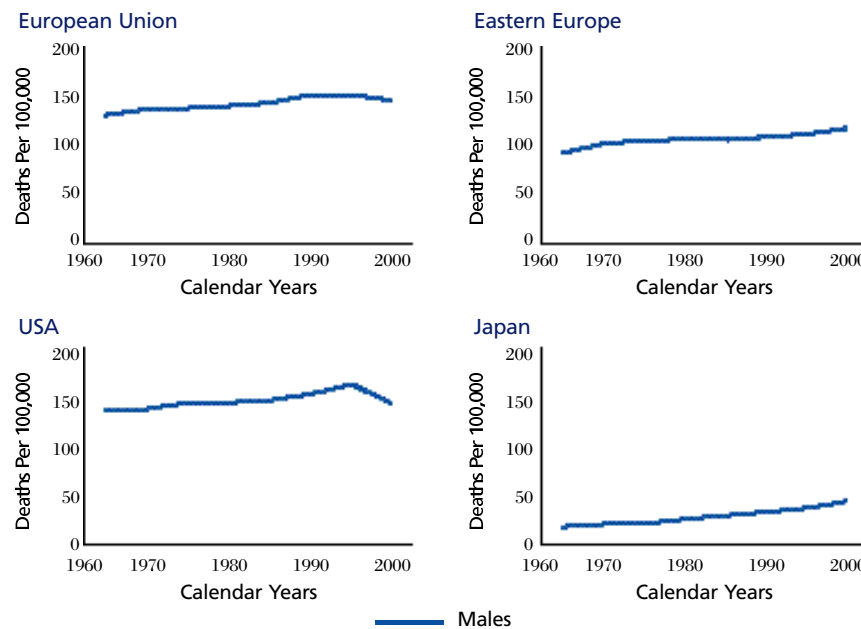
females), or Japan (-19% in males, -31% in females). Rates in Japan, moreover, were six to eight times higher than in the United States, and were intermediate in Europe.

Colorectal cancer rates in the elderly, after earlier increases, declined over the last decade in both sexes in the European Union (-11% for males, -20% for females), and the United States (-16% for males, -18% for females), but rose in Eastern Europe (+16% in males; +4% in females), and in Japan, mostly in males (+23% for males, +4% for females). In 1995–1998, intestinal cancer rates for Japanese males (135 per 100,000) were higher than in the United States (124 per 100,000), whereas the rate in the European Union was 152 per 100,000, and that in Eastern Europe 175 per 100,000.

Pancreatic cancer mortality increased in the elderly of both sexes in the European Union and Japan up to the late 1980s, and leveled off thereafter—at higher levels (70 per 100,000)—for males in Japan. Rates steadily increased for both sexes in Eastern Europe, and moderately increased in women, but decreased in males in the United States, reflecting various phases of the tobacco-related cancer epidemic in various areas of the world.

**“Colorectal cancer rates in the elderly... declined over the last decade in both sexes in the European Union and the United States, but rose in Eastern Europe...and Japan.”**

**FIGURE 1D. TRENDS IN AGE-STANDARDIZED (65–84 YEARS) MORTALITY FROM PROSTATE CANCER, 1960–1998**



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After substantial increases between 1960 and 1985, lung cancer rates at age 65–84 declined for the first time over the last decade by 8.5% in males in the European Union, and by 0.9% in the United States. Rates increased in Eastern European (+6%) and Japanese males (+12%) and in females in all areas (+16% in the European Union, +24% in

Eastern Europe, +36% in the United States, but only +1.2% in Japan). Although in elderly men the differences in lung cancer rates across broad geographic areas were relatively limited, in women an approximately threefold difference was evident between the rates of 67–77 per 100,000 in Japan and Europe, and the rates of 212 per 100,000 in the United States.

**TABLE 1. TRENDS IN AGE-STANDARDIZED (65–84 YEARS, WORLD STANDARD) DEATH CERTIFICATION RATES PER 100,000 MEN FROM FIVE MAJOR CANCERS PLUS TOTAL MORTALITY IN VARIOUS COUNTRIES BETWEEN 1985–89 AND 1995–98 (UNLESS OTHERWISE NOTED IN PARENTHESIS)**

| COUNTRY                    | STOMACH |         |          | INTESTINES |         |          | LUNG    |         |          |
|----------------------------|---------|---------|----------|------------|---------|----------|---------|---------|----------|
|                            | 1985–89 | 1995–98 | % CHANGE | 1985–89    | 1995–98 | % CHANGE | 1985–89 | 1995–98 | % CHANGE |
| Czech Republic             | 170.7   | 111.6   | -34.6    | 305.5      | 292.8   | -4.2     | 520.9   | 468.1   | -10.1    |
| Finland (95–96)            | 124.2   | 78.9    | -36.5    | 113.0      | 101.1   | -10.5    | 457.3   | 385.9   | -15.6    |
| France (95–97)             | 81.9    | 56.2    | -31.4    | 187.5      | 143.6   | -23.4    | 323.6   | 326.6   | 0.9      |
| Germany                    | 137.7   | 95.2    | -30.9    | 187.9      | 175.9   | -6.4     | 387.4   | 368.0   | -5.0     |
| Hungary                    | 204.4   | 156.6   | -23.4    | 229.6      | 293.3   | 27.7     | 460.6   | 534.3   | 16.0     |
| Italy (95–96)              | 163.0   | 113.0   | -30.7    | 160.6      | 137.3   | -14.5    | 439.2   | 441.0   | 0.4      |
| Norway (95–96)             | 104.0   | 76.8    | -26.2    | 169.1      | 168.6   | -0.3     | 251.2   | 278.6   | 10.9     |
| Poland (95–96)             | 205.2   | 151.9   | -26.0    | 115.2      | 143.4   | 24.5     | 435.5   | 508.9   | 16.9     |
| Russian Federation (95–97) | 309.2   | 247.9   | -19.8    | 135.3      | 153.1   | 13.2     | 445.3   | 457.3   | 2.7      |
| Spain (95–97)              | 123.8   | 95.3    | -23.0    | 119.7      | 139.1   | 16.2     | 328.6   | 365.5   | 11.2     |
| Sweden (95–96)             | 84.7    | 55.8    | -34.1    | 131.4      | 123.4   | -6.1     | 199.2   | 191.8   | -3.7     |
| Switzerland (90–94)        | 88.3    | 73.6    | -16.6    | 167.4      | 154.8   | -7.5     | 384.3   | 358.2   | -6.8     |
| United Kingdom (95–97)     | 122.2   | 80.5    | -34.1    | 178.6      | 151.7   | -15.1    | 550.8   | 414.5   | -24.7    |
| European Union (95–97)     | 126.9   | 90.1    | -29.0    | 170.5      | 151.7   | -11.0    | 423.8   | 387.6   | -8.5     |
| USA (95–97)                | 40.6    | 32.7    | -19.5    | 147.8      | 123.9   | -16.2    | 440.6   | 436.7   | -0.9     |
| Japan (95–97)              | 304.5   | 245.9   | -19.2    | 109.6      | 135.1   | 23.3     | 273.4   | 305.2   | 11.6     |

| COUNTRY                    | PROSTATE |         |          | MULTIPLE MYELOMA |         |          | TOTAL, ALL SITES |         |          |
|----------------------------|----------|---------|----------|------------------|---------|----------|------------------|---------|----------|
|                            | 1985–89  | 1995–98 | % CHANGE | 1985–89          | 1995–98 | % CHANGE | 1985–89          | 1995–98 | % CHANGE |
| Czech Republic             | 162.9    | 166.9   | 2.5      | 15.2             | 18.9    | 24.3     | 1749.2           | 1674.8  | -4.3     |
| Finland (95–96)            | 162.7    | 181.1   | 11.3     | 25.6             | 20.5    | -19.9    | 1330.0           | 1234.0  | -7.2     |
| France (95–97)             | 170.1    | 142.3   | -16.3    | 17.2             | 17.7    | 2.9      | 1479.2           | 1370.2  | -7.4     |
| Germany                    | 158.5    | 155.9   | -1.6     | 16.4             | 19.6    | 19.5     | 1420.1           | 1345.3  | -5.3     |
| Hungary                    | 164.5    | 177.5   | 7.9      | 11.2             | 15.6    | 39.3     | 1636.8           | 1835.1  | 12.1     |
| Italy (95–96)              | 121.2    | 107.2   | -11.6    | 16.2             | 18.1    | 11.7     | 1498.5           | 1437.9  | -4.0     |
| Norway (95–96)             | 218.7    | 229.9   | 5.1      | 31.7             | 28.8    | -9.1     | 1230.2           | 1251.6  | 1.7      |
| Poland (95–96)             | 102.3    | 120.8   | 18.1     |                  |         |          | 1380.5           | 1511.6  | 9.5      |
| Russian Federation (95–97) | 66.1     | 78.0    | 18.0     |                  |         |          | 1426.5           | 1531.6  | 7.4      |
| Spain (95–97)              | 131.5    | 131.5   | 0.0      | 13.4             | 17.2    | 28.4     | 1258.1           | 1306.7  | 3.9      |
| Sweden (95–96)             | 199.4    | 221.1   | 10.9     | 22.1             | 23.2    | 5.0      | 1082.3           | 1051.6  | -2.8     |
| Switzerland (90–94)        | 217.4    | 220.7   | 1.5      | 21.7             | 24.8    | 14.3     | 1434.8           | 1365.2  | -4.9     |
| United Kingdom (95–97)     | 160.6    | 161.5   | 0.6      | 21.8             | 21.1    | -3.2     | 1536.5           | 1375.3  | -10.5    |
| European Union (95–97)     | 155.1    | 149.5   | -3.6     | 17.8             | 19.6    | 10.1     | 1457.2           | 1377.5  | -5.5     |
| USA (95–97)                | 158.4    | 148.9   | -6.0     | 21.8             | 23.9    | 9.6      | 1265.5           | 1236.7  | -2.3     |
| Japan (95–97)              | 36.3     | 48.1    | 32.5     | 10.2             | 12.5    | 22.5     | 1218.0           | 1294.7  | 6.3      |

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Again, after earlier increases in most areas, breast cancer mortality in women aged 65–84 declined by 8% in the United States and by 3% in the European Union, to reach 106 per 100,000 in both areas, whereas it rose from 80 to 90 per 100,000 in Eastern Europe, and from 19 to 24 per 100,000 in Japan.

Ovarian cancer mortality in elderly women was steadily upwards both in the European

Union and in Eastern European countries. Trends tended to level off in the United States and Japan over the last few years, although mortality rates were high in the United States and much lower in Japan.

Prostate cancer mortality in males aged 65–84 declined by 4% in the European Union and 6% in the United States, to reach the same value of 149 per 100,000 for both areas. In

**TABLE 2. TRENDS IN AGE-STANDARDIZED (65–84 YEARS, WORLD STANDARD) DEATH CERTIFICATION RATES PER 100,000 WOMEN FROM FIVE MAJOR CANCERS PLUS TOTAL MORTALITY IN VARIOUS COUNTRIES BETWEEN 1985–89 AND 1995–98 (UNLESS OTHERWISE NOTED IN PARENTHESIS)**

| COUNTRY                    | STOMACH |         |          | INTESTINES |         |          | LUNG    |         |          |
|----------------------------|---------|---------|----------|------------|---------|----------|---------|---------|----------|
|                            | 1985–89 | 1995–98 | % CHANGE | 1985–89    | 1995–98 | % CHANGE | 1985–89 | 1995–98 | % CHANGE |
| Czech Republic             | 81.4    | 52.8    | -35.1    | 167.8      | 140.9   | -16.0    | 54.9    | 78.4    | 42.8     |
| Finland (95–96)            | 63.3    | 40.4    | -36.2    | 78.0       | 67.6    | -13.3    | 50.2    | 54.5    | 8.6      |
| France (95–97)             | 32.0    | 20.1    | -37.2    | 101.1      | 74.6    | -26.2    | 32.4    | 41.0    | 26.5     |
| Germany                    | 66.0    | 45.9    | -30.5    | 135.9      | 113.3   | -16.6    | 50.3    | 66.8    | 32.8     |
| Hungary                    | 86.0    | 65.8    | -23.5    | 151.3      | 154.9   | 2.4      | 80.3    | 113.7   | 41.6     |
| Italy (95–96)              | 74.3    | 54.9    | -26.1    | 102.4      | 75.5    | -26.3    | 52.7    | 60.8    | 15.4     |
| Norway (95–96)             | 43.9    | 32.8    | -25.3    | 110.9      | 113.5   | 2.3      | 57.5    | 95.6    | 66.3     |
| Poland (95–96)             | 74.3    | 56.9    | -23.4    | 79.6       | 92.3    | 16.0     | 57.2    | 71.8    | 25.5     |
| Russian Federation (95–97) | 141.8   | 108.4   | -23.6    | 87.2       | 94.9    | 8.8      | 52.3    | 49.3    | -5.7     |
| Spain (95–97)              | 58.8    | 40.0    | -32.0    | 78.3       | 74.9    | -4.3     | 25.5    | 25.7    | 0.8      |
| Sweden (95–96)             | 37.6    | 26.4    | -29.8    | 89.0       | 83.5    | -6.2     | 60.0    | 82.9    | 38.2     |
| Switzerland (90–94)        | 37.3    | 30.1    | -19.3    | 94.2       | 85.0    | -9.8     | 45.8    | 53.9    | 17.7     |
| United Kingdom (95–97)     | 48.7    | 31.7    | -34.9    | 117.1      | 91.7    | -21.7    | 158.1   | 180.7   | 14.3     |
| European Union (95–97)     | 57.0    | 39.2    | -31.2    | 112.0      | 89.9    | -19.7    | 66.5    | 77.4    | 16.4     |
| USA (95–97)                | 17.7    | 14.7    | -16.9    | 98.6       | 80.7    | -18.2    | 155.1   | 211.6   | 36.4     |
| Japan (95–97)              | 118.3   | 81.3    | -31.3    | 67.9       | 70.4    | 3.7      | 66.3    | 67.1    | 1.2      |

| COUNTRY                    | BREAST  |         |          | MULTIPLE MYELOMA |         |          | TOTAL, ALL SITES |         |          |
|----------------------------|---------|---------|----------|------------------|---------|----------|------------------|---------|----------|
|                            | 1985–89 | 1995–98 | % CHANGE | 1985–89          | 1995–98 | % CHANGE | 1985–89          | 1995–98 | % CHANGE |
| Czech Republic             | 115.3   | 116.6   | 1.1      | 11.7             | 12.9    | 10.3     | 871.9            | 851.5   | -2.3     |
| Finland (95–96)            | 84.8    | 79.1    | -6.7     | 17.4             | 19.3    | 10.9     | 654.1            | 611.6   | -6.5     |
| France (95–97)             | 99.0    | 98.9    | -0.1     | 12.2             | 12.3    | 0.8      | 602.7            | 567.2   | -5.9     |
| Germany                    | 109.5   | 110.3   | 0.7      | 11.0             | 13.8    | 25.5     | 767.4            | 722.5   | -5.9     |
| Hungary                    | 111.7   | 122.5   | 9.7      | 9.3              | 11.9    | 28.0     | 855.3            | 900.7   | 5.3      |
| Italy (95–96)              | 100.2   | 100.0   | -0.2     | 11.7             | 13.0    | 11.1     | 682.3            | 646.2   | -5.3     |
| Norway (95–96)             | 99.7    | 98.8    | -0.9     | 19.0             | 18.4    | -3.2     | 667.8            | 709.7   | 6.3      |
| Poland (95–96)             | 70.3    | 77.8    | 10.7     |                  |         |          | 674.7            | 706.2   | 4.7      |
| Russian Federation (95–97) | 50.0    | 67.7    | 35.4     |                  |         |          | 605.7            | 639.3   | 5.5      |
| Spain (95–97)              | 71.7    | 77.3    | 7.8      | 9.8              | 12.8    | 30.6     | 540.9            | 522.0   | -3.5     |
| Sweden (95–96)             | 93.1    | 89.0    | -4.4     | 15.7             | 17.2    | 9.6      | 673.5            | 685.9   | 1.8      |
| Switzerland (90–94)        | 138.0   | 131.1   | -5.0     | 15.4             | 15.7    | 1.9      | 695.0            | 669.4   | -3.7     |
| United Kingdom (95–97)     | 144.0   | 123.4   | -14.3    | 14.9             | 14.5    | -2.7     | 850.9            | 835.7   | -1.8     |
| European Union (95–97)     | 109.6   | 106.0   | -3.3     | 12.3             | 13.9    | 13.0     | 712.2            | 680.0   | -4.5     |
| USA (95–97)                | 115.7   | 106.2   | -8.2     | 14.9             | 16.5    | 10.7     | 731.8            | 764.1   | 4.4      |
| Japan (95–97)              | 19.0    | 24.4    | 28.4     | 7.2              | 8.5     | 18.1     | 557.2            | 525.9   | -5.6     |

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## Feature Article

**“Ovarian cancer mortality in elderly women was steadily upwards both in the European Union and in Eastern European countries.”**

Eastern Europe, prostate cancer mortality rose from 113 to 127 per 100,000 (+13%). In Japan, prostate cancer mortality over the last decade rose by 33%, from 36 to 48 per 100,000.

Kidney cancer mortality in the elderly of both sexes steadily and appreciably rose in all geographic areas considered. Absolute rates, however, were considerably higher in Europe, and particularly Eastern Europe (48.4 per 100,000 males, 23.1 per 100,000 females), than in the United States and, mostly, in Japan.

Mortality from non-Hodgkin's lymphomas in the elderly increased in all the geographic areas considered, although the absolute rates were different and the presence of changes in slope suggests that criteria of diagnosis and classification for this heterogeneous group of neoplasms have probably changed over time. In the late 1990s, absolute rates were higher in the United States (47 per 100,000 males, 33 per 100,000 females) than in the European Union (31 per 100,000), and were even lower in Japan and Eastern Europe.

Mortality from leukemia in the elderly tended to rise in Japan—up to the last years—and Eastern Europe, but was relatively stable (45 per 100,000 males; 20 per 100,000 females) in the European Union and the United States (around 45 per 100,000 males; 23 per 100,000 females). Some indication of reversal of trends was apparent in the European Union over the last few years.

Mortality from multiple myeloma at age 65–84 steadily rose by 10–20% in both sexes in all geographic areas considered over the last decade, continuing a long-term and substantial upward trend that had been evident since the early 1960s.

Tables 1 (for males) and 2 (for females) give mortality rates from total cancer mortality and selected cancer sites in different European countries, besides the European Union, the United States and Japan. Declines, although to a different degree, were observed in France, Germany, Italy, and the United Kingdom for total cancer mortality in both sexes, whereas rates increased in most of Eastern Europe, and showed no consistent pattern in Southern Europe. Lung cancer trends were appreciably different across countries in elderly males, with a 25% decrease in the United Kingdom, but not in other principal European countries, and were generally increased, although to a different degree, for elderly females. A similar pattern of trends was observed for pancreatic cancer. A substantial decline in breast cancer

mortality (-14%) was observed in the United Kingdom, where rates were originally higher, but not in other European countries. Ovarian cancer in the elderly increased in most countries, except in Scandinavia. Prostate cancer rates decreased in France and Italy, but increased in most other countries. Kidney cancer mortality increased, and was exceedingly high for both sexes in the Czech Republic, Hungary, Germany, and other central European countries. Mortality from lymphoma and multiple myeloma consistently increased in most European countries, except the United Kingdom, Finland, the Netherlands, and Norway. The pattern was inconsistent across countries for leukemias.

The Russian Federation had the highest total cancer mortality (1,532 per 100,000) in elderly males, and some of the highest rates for most sites, except breast and prostate. Over the last decade, cancer mortality rates increased in elderly Russians by 7.4% in males and 5.5% in females.

### DISCUSSION

The chief finding of this updated analysis of cancer mortality in the elderly is the observation of a change of trends for males in the United States and for both sexes in the European Union, with the consequent end of a long-term increase and the beginning of a measurable fall in males. Some decline in total cancer mortality was observed also for females in Japan. This is an innovative observation, as declines in total cancer mortality have been registered in the young<sup>20,21</sup> and middle aged, as well as in overall age-standardized rates,<sup>5-10</sup> but rates in the elderly had been rising longer, and have been described as a particularly unfavorable indicator of cancer mortality.<sup>3,4,11</sup>

In all geographic areas considered, a component of the decrease has been the steady decline in gastric cancer.<sup>22</sup> However, in the European Union, and most of the United States, gastric cancer rates were already low in the 1980s, and consequently this was a relatively minor component of the global trends.

Of relevance are the changing trends in lung and other tobacco-related neoplasms—including oral cavity and pharynx, pancreas, and kidney—in the two sexes and various geographic areas. Thus, lung cancer mortality rates in elderly males have started leveling off in the European Union (and substantially in the United Kingdom)<sup>23</sup> and in the United States.<sup>3</sup> This largely reflects the decreased

smoking prevalence in subsequent generations of elderly males,<sup>24,25</sup> and the increased rates of smoking cessation, mostly for males in the United States and Northern Europe. Lung cancer rates, in contrast, have increased by 36% in United States females, reaching a rate of over 210 per 100,000, that is, twice that of breast cancer. The rise was 16% in the European Union, with a rate of 77 per 100,000. These unfavorable trends reflect the increased prevalence of smoking in elderly women in the United States<sup>6</sup> and, to a lesser degree, Europe. In Europe, female rates in Denmark, Iceland, and the United Kingdom approached 200 per 100,000.<sup>26</sup>

An 8% fall in breast cancer mortality for elderly women was registered in the United States, and a 3% decrease in the European Union. These favorable trends reflect advancements in screening, early diagnosis, and treatment of breast cancer,<sup>27-30</sup> although the decreases are smaller than the 15–20% reported for younger women (aged 50 to 70),<sup>31</sup> thus opening the question of modifying diagnosis and treatment approaches of breast cancer for elderly women. A similar line of reasoning applies to prostate cancer in the European Union and United States.<sup>32,33</sup> In any case, the first observation of favorable changes in trends for mortality from these common cancers in the elderly is extremely encouraging. Mortality from breast and prostate cancer in the elderly still increased in Japan, but absolute rates remained comparatively low.<sup>34</sup>

Also, ovarian cancer rates were low, and did not tend to rise in Japan over the last few years, whereas a steady upward trend was evident in Europe. The leveling off in the United States may reflect the favorable impact of oral contraceptives on ovarian cancer risk in the elderly.<sup>35</sup>

It is more difficult to explain the leveling trends and the declines in colorectal cancer mortality, particularly for elderly women. These may be due, at least in part, to earlier diagnosis, but a more favorable pattern of risk factor exposure (including diet and perhaps hormones for women)<sup>36,37</sup> has probably played some role.

Mortality from kidney cancer and multiple myeloma, in contrast, has been steadily rising in most countries considered, with the sole exception of some Northern European countries. Diagnostic improvements and changes in classification partly or largely account for these trends, but it is also possible that some real increase has occurred in the incidence

and mortality from myelomas,<sup>38</sup> as well as for lymphomas,<sup>39</sup> which have also increased in most areas, in the absence, however, of obvious explanations, and of consistent patterns. Liver and brain cancers are other sites that have probably been rising in the elderly, but the WHO database was inadequate to understand and evaluate their trends in various countries.<sup>13,40-42</sup> Mortality from leukemia in the elderly, in contrast, tended to level off over the last decade, possibly reflecting improvements in management and treatment of the disease at elderly age.<sup>43</sup>

It is important to stress the limitations and uncertainties of cancer death certification and trends over time for the elderly. Although the exact influence of changed certification accuracy on trends in cancer rates is undefined, almost certainly this has implied some systematic upward trends over time, following generalized improvement of diagnosis and certification of selected cancer sites, including particularly prostate and multiple myeloma.<sup>2,13,40</sup>

Within Europe, a substantial variation in mortality from several principal cancer sites was observed in the elderly, although for other neoplasms—such as breast or prostate—tendencies towards leveling of trends were also apparent.<sup>44</sup> Most trends remain unfavorable for the elderly population of both sexes in Eastern Europe, reflecting both rising trends in underlying incidence—due to unfavorable patterns in smoking, characteristics of diet and other risk factor exposure—and systematic delays in the adoption of improved diagnosis and treatment approaches.<sup>45</sup> Thus, although stomach cancer rates remain high in these areas of the continent, lung cancer rates in males have reached some of the highest rates observed (over 500 per 100,000 in Hungary or Poland), and breast or prostate cancer rates were on the rise. Comprehensive intervention for cancer control among elderly in all areas of the world, but particularly in Eastern Europe, is therefore a public health priority.<sup>45-49</sup> **OS**

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