Within the last 10 years, prostate cancer has become the most common malignancy among men in England and Wales. The age-standardised incidence rate exceeded that for colorectal cancer by 1993, and overtook the (declining) rate for lung cancer in 1999, (Quinn et al, 2001). By the early 2000s, approximately 29,000 men were diagnosed each year with prostate cancer, accounting for one in four of all new cancers in men (excluding nonmelanoma skin cancer). Prostate cancer is rare under the age of 50 years, but incidence rises steeply with age, reaching nearly 1000 cases per 100,000 per year (1% annual risk) in men aged 85 years and more. Each year, there are some 9000 deaths from prostate cancer, approximately one in eight of all cancer deaths in men (Office for National Statistics, 2003).

The causes of prostate cancer are not well known. Family history in first-degree relatives is a risk factor, and incidence is 60% higher in African Americans and 38% lower in Asian Americans than in US Whites (Platz and Giovannucci, 2006), but possible risk factors related to nutrition, environment, lifestyle, sexual history, occupation and ethnicity have not been conclusively identified. The natural history of prostate cancer is poorly understood, ranging from clinically indolent cancers to highly aggressive and often fatal disease (Breslow et al, 1977). Treatment in the 1990s included various combinations of surgery, radiotherapy, chemotherapy and endocrine therapy, but early disease was sometimes managed by 'watchful waiting', and other modalities, such as cryotherapy, ultrasound and laser treatment have also been used for local disease control (Kirby, 1996a,b).

Age-standardised incidence of prostate cancer rose slowly from 1971 up to the late 1980s, but tripled during the 1990s to more than 90 cases per 100,000 per year. This rapid increase is largely attributable to the increasingly widespread use of prostate-specific antigen (PSA) testing, which has led to an increase in the recorded incidence of localised prostate cancer (Evans and Moller, 2003; Pashayan et al, 2006a,b).

Prostate cancer is now more common among the affluent. In the early 1980s, incidence was 35–40 cases per 100,000 per year in all deprivation groups. In the decade up to the mid-1990s, however, incidence increased more than two-fold among the most affluent men, more rapidly than among the most deprived men, and is now about 40% higher in the most affluent groups (Quinn et al, 2001).

Age-standardised mortality rates remained stable from 1950 to the 1980s before rising gradually, reaching a peak of 31 cases per 100,000 per year in 1993, then declining slightly thereafter.

We analysed the data for over 201,000 men diagnosed with a first, primary, malignant neoplasm of the prostate in England and Wales during the 14-year period 1986–1999 and who were followed up to the end of 2001, some 86% of the 233,000 men potentially eligible for inclusion. Approximately 9% (19,800 men) had a recorded survival of zero, most of them who were registered solely from a death certificate, but for a further 1.4% (3300) the vital status was unknown on 5 November 2002, when the data were extracted for analysis, and 3.2% (7500) of men were excluded because the prostate cancer was not their first primary cancer.

The vast majority of prostate cancers are adenocarcinoma (Ross and Schottenfeld, 1996). The proportion so described in England and Wales rose from just under 60% of all cases in the early 1990s to approximately 85% by the early 2000s, in parallel with a decline in the proportion coded as epithelial malignancy without further specification, from 28 to approximately 10% (data not shown). This pattern suggests steady improvement in the recording of pathological data, rather than a shift in the type of malignancy.

SURVIVAL TRENDS

For men diagnosed during 1996–1999, 1-year survival rose to 89% from 78% a decade or so earlier. This represents a rapid deprivation-adjusted increase of some 6% every 5 years since 1986–1990 (Table 1, Figure 1).

Five-year survival has increased with extraordinary rapidity from 43% for men diagnosed during 1986–1990 to 68% for men diagnosed during 1996–1999, an average deprivation-adjusted increase of almost 16% (95% CI: 14.8–17.0%) every 5 years.

For men diagnosed during 1991–1995 and followed up to 2001, 10-year survival had risen to 41%, a similarly rapid rate of increase.

Hybrid analysis (Brenner and Rachet, 2004) based on the follow-up of survivors during 2000–2001 suggests that survival will continue to improve, but more slowly than over the previous decade, reaching 90% at 1 year and 70% at 5 years (Table 1).

DEPRIVATION

Despite high overall survival, there is a significant deprivation gap in survival, which increased significantly during the 1990s.
Deprivation gap (%) 95% CI

Table 1  Trends in relative survival (%) by time since diagnosis and calendar period of diagnosis: England and Wales, men (15–99 years) diagnosed during 1986–1999 and followed up to 2001

| Time since diagnosis | Calendar period of diagnosis* | Average change (%) every 5 yearsb | Predictionc for patients diagnosed during 2000–2001 |
|----------------------|------------------------------|----------------------------------|--------------------------------------------------|
|                      | 1986–1990                    | 1991–1995                        | 1996–1999                                       |
|                      | Survival (%) 95% CI          | Survival (%) 95% CI             | Survival (%) 95% CI                             |
| 1 year Men           | 78.3 (77.9, 78.7)            | 82.5 (82.2, 82.8)               | 88.9 (88.6, 89.2)                               |
| 5 years Men          | 42.7 (42.1, 43.3)            | 55.1 (54.6, 55.6)               | 68.4 (67.7, 69.0)                               |
| 10 years Men         | 28.2 (27.3, 28.8)            | 41.1 (40.2, 41.9)               | 54.0 (52.8, 55.2)                               |
|                      | 6.2** (5.5, 6.8)             | 15.9** (14.8, 17.0)             | 16.4** (13.8, 19.0)                             |
|                      | (89.9, 90.3)                 | (69.9, 70.6)                    | (54.0, 55.2)                                   |

CI = confidence interval. aSurvival estimated with cohort or complete approach (see Rachet et al., 2008). **Mean absolute change (%) in survival every 5 years, adjusted for deprivation (see Rachet et al., 2008). bSurvival estimated with hybrid approach (see Rachet et al., 2008). **P<0.01.

Table 2  Trends in the deprivation gap in relative survival (%) by time since diagnosis and calendar period of diagnosis: England and Wales, men (15–99 years) diagnosed during 1986–1999 and followed up to 2001

| Time since diagnosis | Calendar period of diagnosis* | Average change (%) every 5 yearsb | Predictionc for patients diagnosed during 2000–2001 |
|----------------------|------------------------------|----------------------------------|--------------------------------------------------|
|                      | 1986–1990                    | 1991–1995                        | 1996–1999                                       |
|                      | Deprivation gap (%) 95% CI   | Deprivation gap (%) 95% CI      | Deprivation gap (%) 95% CI                       |
| 1 year Men           | -3.0** (-4.2, -1.8)          | -4.2** (-5.1, -3.3)             | -4.1** (-4.9, -3.3)                             |
| 5 years Men          | -1.2 (-2.9, 0.4)             | -6.0** (-7.4, -4.6)             | -7.2** (-9.0, -5.5)                             |
| 10 years Men         | 0.0 (-1.9, 1.8)              | -4.9** (-7.3, -2.5)             | -4.9** (-7.9, -1.8)                             |
|                      | -0.6 (-1.3, 0.2)             | -3.2** (-4.5, -2.0)             | -7.3** (-9.2, -5.3)                             |
|                      | -4.4** (-5.5, -3.3)          | -7.3** (-9.9, -3.6)             |                                                  |

CI = confidence interval. aSurvival estimated with cohort or complete approach (see Rachet et al., 2008). **Mean absolute change (%) in the deprivation gap in survival every 5 years, adjusted for the underlying trend in survival (see Rachet et al., 2008). bSurvival estimated with hybrid approach (see Rachet et al., 2008). **P<0.01.

Figure 1  Relative survival (%) up to 10 years after diagnosis by calendar period of diagnosis: England and Wales, adults (15–99 years) diagnosed during 1986–1999 and followed up to 2001. Survival estimated with cohort or complete approach (1986–1990, 1991–1995, 1996–1999) or hybrid approach (2000–2001) (see Rachet et al., 2008).

Figure 2  Trends in the deprivation gap in 5-year relative survival (%) by calendar period of diagnosis: England and Wales, adults (15–99 years) diagnosed during 1986–1999 and followed up to 2001.

COMMENT

The recent trends in prostate cancer survival are remarkable. Survival improved by approximately 5–6% every 3 years between 1971–1975 and 1981–1985, but it did not change at all between the early and late
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Table 3 Incidence per 100 000 per year and cumulative risk (%) between sixtieth and eightieth birthdays, England and Wales, 1982–2000

| Year of diagnosis | Age (years) | 1982 | 1985 | 1990 | 1995 | 2000 |
|-------------------|------------|------|------|------|------|------|
| 60–64             | 57         | 65   | 96   | 129  | 202  |
| 65–69             | 136        | 130  | 172  | 253  | 384  |
| 70–74             | 226        | 233  | 292  | 416  | 539  |
| 75–79             | 375        | 382  | 487  | 610  | 706  |

Cumulative risk (%) 3.86 3.97 5.10 6.80 8.75

REFERENCES

Berrino F, Esteve J, Coleman MP (1995) Basic issues in the estimation and comparison of cancer patient survival. In Survival of Cancer Patients in Europe: the EUROCARE Study (IARC Scientific Publications No. 132), Berrino F, Sant M, Verdecchia A, Capocaccia R, Hakulinen T, Esteve J (eds), pp 1–14. International Agency for Research on Cancer: Lyon.

Brenner H, Quinn MJ, Sloggett A, De Stavola BL (1999) Incidence trends of prostate cancer in England and Wales 1971–1995: Deprivation and NHS Region. Studies on Medical and Population Subjects No. 61. The Stationery Office: London.

Coleman MP, Babb P, Damiecki P, Grosclaude PC, Honjo S, Jones J, Knerer G, de Koning HJ, Auvinen A, Berenguer Sanchez A, Calais da Silva F, Ciatto S, Brenner H, Rachet B (2004) Hybrid analysis for up-to-date long-term survival rates in cancer registries with delayed recording of incident cases. Eur J Cancer 40: 2494–2501

Breslow N, Chan CW, Dhollander A, Druty RA, Franks LM, Geller B, Lee YS, Lundberg S, Park B, Sternby NH, Tulinisius H (1977) Latent carcinoma of prostate at autopsy in seven areas. The International Agency for Research on Cancer, Lyon, France. Int J Cancer 20: 680–688

Coleman MP, Babb P, Damiecki P, Grosclaude PC, Honjo S, Jones J, Knerer G, Pitard A, Quinn MJ, Sloggett A, De Stavola BL. (1999) Cancer Survival Trends in England and Wales 1971–1995: Deprivation and NHS Region. Studies on Medical and Population Subjects No. 61. The Stationery Office: London.

Coleman MP, Gatta G, Verdecchia A, Esteve J, Sant M, Storm HH, Allemani C, Ciccolallo L, Santanuimi M, Berrino F, EUROCARE Working Group (2003) EUROCARE-3 summary: cancer survival in Europe at the end of the 20th century. Ann Oncol 14(5): 128–149

de Koning HJ, Auvinen A, Berenguer Sanchez A, Calais da Silva F, Ciato S, Denis L, Kohagan JK, Hakama M, Hugosson J, Kransje R, Nelsen V, Prorok PC, Schröder FH (2002) Large-scale randomized prostate cancer screening trials: program performances in the European Randomized Screening for Prostate Cancer trial and the Prostate, Lung, Colorectal and Ovary cancer trial. Int J Cancer 97: 237–244

Evans HS, Møller H (2003) Recent trends in prostate cancer incidence and mortality in southeast England. Eur Urol 43: 337–341

Hakama M, Coleman MP, Alexe DM, Auvinen A (2008) Cancer screening. In Responding to the Challenge of Cancer in Europe, Coleman MP, Alexe DM, Albreht T, McKeen CM (eds), pp 69–92. Institute of Public Health of the Republic of Slovenia: Ljubljana

Horwich A, Waxman J, Schroder FH (1993) Tumours of the prostate. In Oxford Textbook of Oncology, Peckham M, Pinedo HM, Veronesi U (eds) 2 edn, pp 1498–1530. Oxford Medical Publications: New York.

Kirby RS (1996a) Recent advances in the medical management of prostate cancer. Br J Clin Pract 50: 88–93

Kirby RS (1996b) The future management of prostate cancer! Eur Urol 29(Suppl 2): 132–133

Office for National Statistics (2003) Mortality Statistics: Cause, England and Wales, 2002. Series DH2 No. 29. Office for National Statistics: London.

Pashayan N, Powles JW, Brown C, Duffy SW (2006a) Excess cases of prostate cancer and estimated overdiagnosis associated with PSA testing in East Anglia. Br J Cancer 95(3): 401–405

Pashayan N, Powles JW, Brown C, Duffy SW (2006b) Incidence trends of prostate cancer in England and Wales 1950–2000. Br J Cancer 95(3): 398–400

Platz EA, Giovannucci E (2006) Prostate cancer. In Cancer Epidemiology and Prevention. Schottenfeld D, Fraumeni JF (eds) 3 edn, pp 1128–1150. Oxford University Press: Oxford.

Quinn MJ, Babb P, Brock A, Kirby L, Jones J (2001) Cancer Trends in England and Wales 1950–1999. Studies on Medical and Population Subjects No. 66. Office for National Statistics: London.

Racket B, Woods LM, Mitry E, Riga M, Cooper N, Quinn MJ, Stewart J, Brenner H, Esteve J, Sullivan R, Coleman MP (2008) Cancer survival in England and Wales at the end of the 20th century. Br J Cancer 99(Suppl 1): S2–S10

Ross RR, Schottenfeld D (1996) Prostate cancer. In Cancer Epidemiology and Prevention. Schottenfeld D, Fraumeni JF (eds) 2 edn, pp 1180–1206. Oxford University Press: Oxford.

Sant M, Aareleid T, Berrino F, Bielska Lasota M, Carli P-M, Faivre J, Allemani C, Ciccolallo L, Santaquilani M, Berrino F, Sant M, Aareleid T, Berrino F, Bielska Lasota M, Carli P-M, Faivre J, Roazzi P, Lisi D, EUROCARE Working Group (2003) EUROCARE-3: survival of cancer patients diagnosed 1990–94 – results and commentary. Ann Oncol 14(5): 61–118

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