EXCESS CANCER BURDEN IN MEN

January 2013

Cancer Statistics REPORT

Contents

1 INTRODUCTION

In general, men are at significantly greater risk of both developing and dying from nearly all of the common cancers that occur in both sexes (with the exception of breast cancer).[1-6]

The current overall burden of cancer among males in the UK, and an outline of the extent of the differences between the sexes, are presented here.

All figures and calculations in this report are based on data prepared for[7] or compiled by Cancer Research UK's Statistical Information Team[8] using official national sources.[9-16]

More on Cancer Inequalities

- Men's Cancer Briefing 2013 (report)
- Cancer Incidence and Survival by Major Ethnic Group, England, 2002-2006 (report)

Both are available from cruk.org/cancerstats

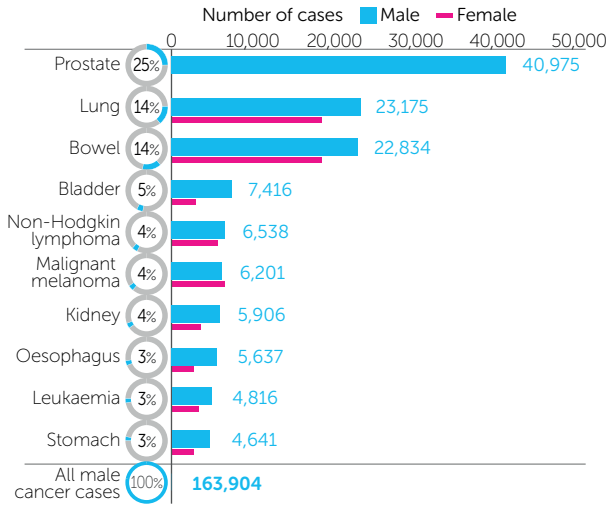
2 INCIDENCE AND MORTALITY

In 2010, there were 163,904 new cases of cancer diagnosed in males in the UK excluding non-melanoma skin cancer (NMSC) compared with 160,675 cases in females. The corresponding European age-standardised incidence rates for 2010 were 425.5 per 100,000 males and 374.0 per 100,000 females (incidence rate ratio equals 1.14, or 14% higher risk of developing cancer for men). Although the number of cases in males and females is similar, the rates are higher in males because there are more older women in the population.

There were 82,481 cancer deaths in males and 74,794 cancer deaths in females in the UK in 2010, accounting for 31% of total male mortality and 26% of total female mortality. As with the incidence figures, when translated into European age-standardised rates, the contrast between the sexes is more marked; the death rates in 2010 were 201.6 per 100,000 in males and 146.8 per 100,000 in females, respectively (mortality rate ratio equals 1.37 or 37% higher risk of death from cancer for men). This difference results from a combination of different life expectancy (as for incidence) and an increased likelihood of males having more fatal cancers than females.

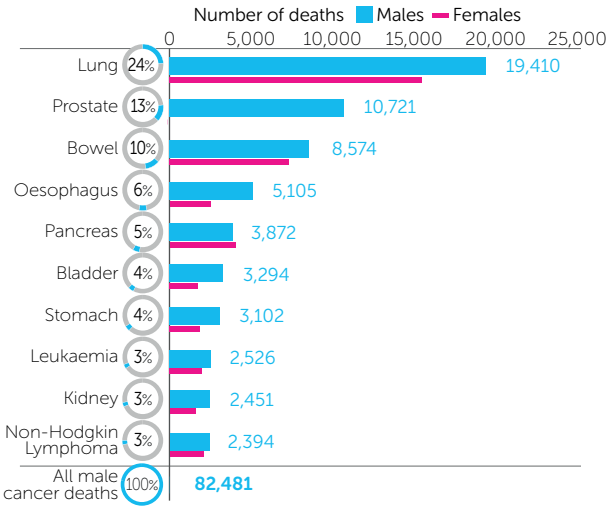
The European age-standardised incidence rate for all cancers combined (excluding NMSC) in Great Britain increased by 22% in males during the period 1975-1977 to 2008-2010, from 351.8 per 100,000 to 429.8 per 100,000. For the same period, however, the mortality rate (for the UK and including NMSC) decreased by 27% from 280.7 per 100,000 in 1975-1977 to 205.0 per 100,000 in 2008-2010. For females, the figures rose by 42% from 263.3 to 375.1 per 100,000 over the same period for incidence, and for mortality they decreased by 16% from 176.5 to 148.7 per 100,000 over the same period. The female trends are mostly likely due to the high incidence of breast cancer, and that lung cancer incidence and mortality is still increasing for females.

Figure 1: Most Common Cancers in Men



Notes
10 most commonly diagnosed cancers in males, percentages (rounded) of all cancer cases excluding NMSC (C00-97 excl. C44), UK, 2010.
Bowel excludes anus (C18-20).
35,765 (22%) cases diagnosed in men were cancers of other sites.

Figure 2: Most Common Causes of Male Cancer Death



Notes
10 most common causes of cancer death in males, percentages (rounded) of all cancer deaths including NMSC (C00-97), UK, 2010.
Bowel excludes anus (C18-20).
21,032 (25%) deaths in men were from cancers of other sites.

NCIN national cancer intelligence network
MHF MEN'S HEALTH FORUM
leeds metropolitan university
CANCER RESEARCH UK

The difference between the incidence and mortality trends is because despite more people being diagnosed with cancer a combination of earlier diagnosis, improved diagnostic techniques and advances in care and treatment means that more people are surviving their cancers than previously.[7]

Of the different types of cancer experienced by males in the UK, prostate cancer is the most common (Figure 1) but lung cancer is still the greatest contributor to cancer deaths in males (Figure 2). These two cancers, along with bowel cancer, jointly account for over half (53%) of cancer cases in males and nearly half (47%) of all cancer deaths and, understandably, have received most attention from policy makers; however, all the other cancers which comprise the other 53% of deaths in males should not be disregarded.

Sex differences exist in other sites, such as oral cancer and mesothelioma,[8] but these are not discussed in this report.

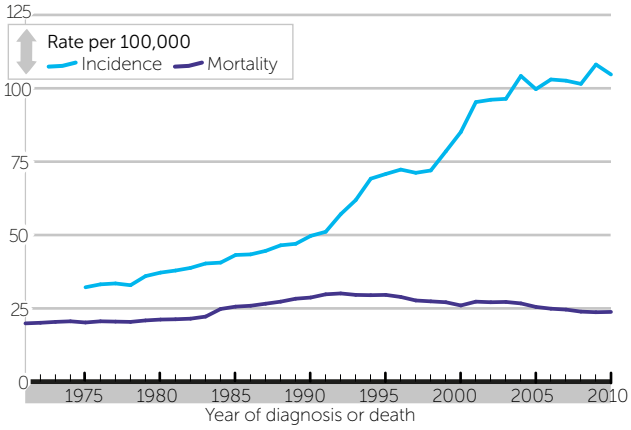
MALE-SPECIFIC CANCERS

3.1 Prostate Cancer

The introduction of Prostate Specific Antigen (PSA) testing combined with the increasingly ageing population caused a rapid increase in the diagnosis of prostate cancer, with incidence rates rising from 32.9 per 100,000 in 1975-1977 to 104.8 per 100,000 in 2008-2010 in Great Britain.

In line with increasing incidence rates, prostate cancer mortality rates have also increased slightly in the UK since the early 1970s, although this includes both an increase and decrease in rates during that time. Mortality rates were fairly stable (around 20 deaths per 100,000 males) during the 1970s, but increased during the 1980s to reach a peak at around 30 per 100,000 males in the early 1990s and have since fallen by 18% (to around 24 deaths per 100,000 males in 2008-2010) (Figure 3).

Figure 3: **Prostate Cancer Incidence and Mortality**



Notes: Prostate cancer (C61): European age-standardised incidence rates, Great Britain, 1975-2010 and European age-standardised mortality rates, UK, 1971-2010.

3.2 Testicular Cancer

There were 2,286 cases of testicular cancer in the UK in 2010. Incidence rates increased steadily from 3.3 per 100,000 in 1975-1977 to 7.3 per 100,000 males in Great Britain in 2008-2010. Mortality rates for testicular cancer decreased from 1.1 per 100,000 males in the UK in the 1970s until 2005-2007 where they stabilised at 0.2 per 100,000 males. There were 75 deaths from testicular cancer in the UK in 2010.

3.3 Penile Cancer

Penile cancer is relatively rare, with 515 cases and 92 deaths in 2010 in the UK. More than 80% of cases and more than 90% of deaths occurred in men aged 50 years and over.

4 MORTALITY RATE RATIOS (MRRs)

Deaths from NMSC are excluded from these mortality rate ratios (MRR). Unlike most cancer mortality statistics, the 320 male and 226 female deaths in 2010 are excluded for consistency with the incidence rate ratios (IRR) (Section 5).

Rate ratios of the mortality European age-standardised rates for males and females for all ages, and truncated into two age groups are shown in Table 1 and Figure 4.

All of the rate ratios were found to be statistically significant at the 95% confidence level except for the rate ratio for 15-64 year olds when NMSC and lung cancer were excluded from all cancers. The MRR shows a significantly higher rate of cancer death (1.37) in men of all ages. This ratio is lower in the 15–64 age range (1.06) but is substantially larger (1.55) for those men aged 65 and over.

The mortality rate for lung cancer is substantially higher in men than women because of differences in smoking prevalence in the two sexes, with men always having higher use, although the gap between the numbers of smokers has reduced and almost disappeared (Figure 5). The MRR calculated after excluding lung cancer (to examine the influence on the burden of cancer in the two sexes after excluding the main cancer caused by smoking) shows the ratio (for all ages) reduces slightly to 1.33, with corresponding reductions to 1.01 (non significant) for 15-64 year olds and 1.52 for those aged 65 and over. This could suggest that younger males have higher overall cancer mortality because of their excess rate of lung cancer (Table 1 and Figure 4).

The increased risk in mortality rates for males compared with females is seen across a broad range of cancer sites (Table 1).

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Table 1: Male-to-Female Mortality Rate Ratios (MRRs)

Cancer Site	ICD-10 code/s	Mortality Rate Ratios: All ages	15-64	65+
All cancers excl. NMSC	C00-97 excl C44	1.37	1.06	1.55
All cancers excl. NMSC and lung	C00-97 excl. C44, C33-34	1.33	1.01	1.52
All cancers excl. NMSC, breast and sex-specific	C00-97 excl C44, C50, C51-58, C60-63	1.67	1.58	1.71
All cancers excl. NMSC, breast, lung and sex-specific	C00-C97 excl C44, C33-34, C50, C51-58, C60-63	1.72	1.72	1.73
Bladder	C67	2.89	2.08	3.09
Bowel	C18-20	1.65	1.58	1.67
Brain and CNS	C70-72	1.58	1.61	1.56
Kidney	C64-66, C68	2.01	2.30	1.87
Leukaemia	C91-95	1.70	1.64	1.77
Liver	C22	1.92	2.06	1.86
Lung	C33-34	1.53	1.27	1.66
Malignant melanoma	C43	1.62	1.31	1.96
Myeloma	C90	1.42	1.46	1.41
Non-Hodgkin lymphoma	C82-85	1.54	1.64	1.49
Oesophagus	C15	2.89	3.89	2.53
Pancreas	C25	1.27	1.45	1.20
Stomach	C16	2.21	1.86	2.36

Notes

Mortality rate ratios are European age-standardised, of male to female cancer mortality (excluding NMSC), UK, 2010.

All of the above mortality rate ratios were statistically significant at the 95% confidence level except "All cancers excl. NMSC and lung" (C00-97 excl. C44 and C33-34) in 15-64 year olds.

Bowel excludes anus (C18-20).

Brain and CNS includes all invasive cancers of the brain and central nervous system only.

When MRRs are calculated excluding breast and sex-specific cancers, a different picture emerges, with 58% higher mortality rates in men aged 15–64 than in women for cancers which may affect the sexes equally. Thus, a greater effect seems to be mainly because many cancer deaths that occur in younger women are for breast and genital organs (36% of cancer deaths in those aged 15–64; and 49% in those aged 35–44; Table 2). In contrast, there are relatively few deaths from a sex-specific cause for males in younger age groups (5% deaths in ages 15–64 are for male-specific cancers).

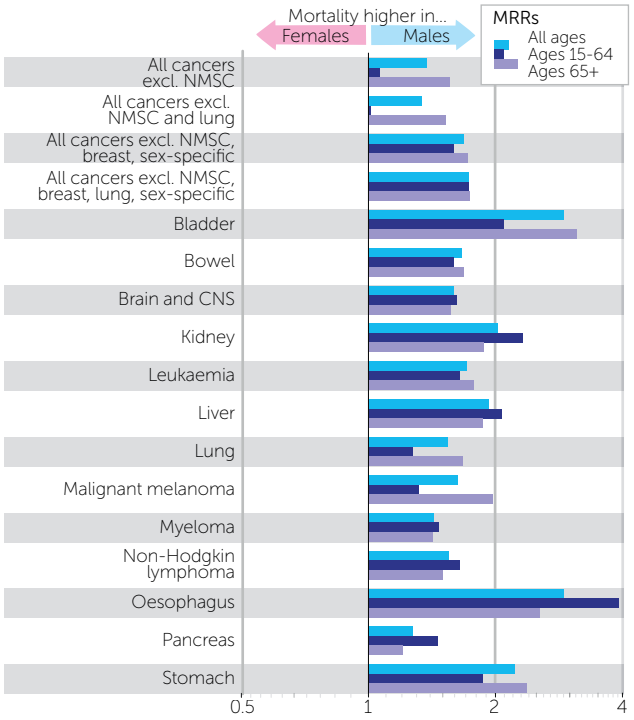
Table 2: Deaths From Breast or Sex-Specific Cancers

	Males		Females	
All ages	**10,978**	**13.4%**	**19,222**	**25.8%**
1-14 years	-	0.0%	-	0.0%
15-64 years	837	4.6%	6,190	35.6%
65+ years	10,141	15.8%	13,032	22.8%
35-44 years	21	1.9%	776	49.2%

Notes

Total numbers of deaths from breast or sex-specific cancers and the percentage of these cancers out of all cancers (excluding NMSC), by age group, UK, 2010.

Figure 4: Male-to-Female Mortality Rate Ratios (MRRs)



Notes

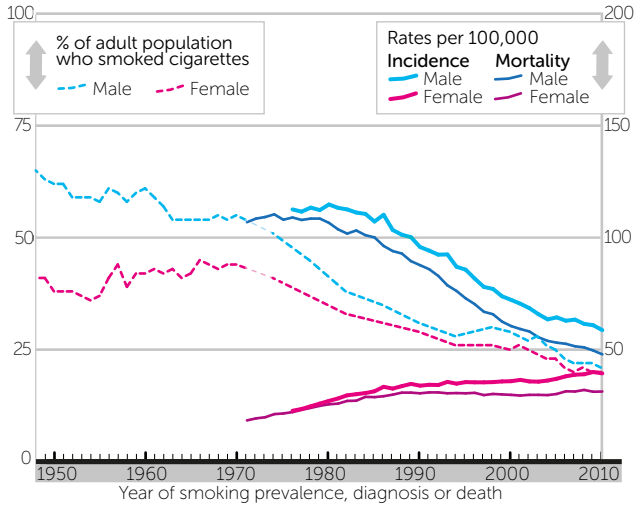
Mortality rate ratios are European age-standardised, of male to female cancer mortality (excluding NMSC), UK, 2010.

All of the above mortality rate ratios were statistically significant at the 95% confidence level except "All cancers excl. NMSC and lung" (C00-97 excl. C44 and C33-34) in 15-64 year olds.

Bowel excludes anus (C18-20).

Brain and CNS includes all invasive cancers of the brain and central nervous system only.

Figure 5: Smoking and Lung Cancer Trends



Notes

Smoking prevalence, Great Britain, 1948-2010 (smoking data weighted after 1998).

Lung cancer (C33-34): European age-standardised incidence rates, Great Britain 1975-2010, and European age-standardised mortality rates, UK, 1971-2010.

Created by Cancer Research UK's Statistical information Team from multiple sources. [9-15,17-18]

5 INCIDENCE RATE RATIOS (IRRs)

The age-standardised incidence rate ratios (IRRs) show that males have a higher risk of getting cancer than females (IRR 1.14), for all ages (Table 3 and Figure 6). This ratio is larger when breast and sex-specific cancers are excluded (IRR 1.56). In contrast, males aged 15-64 have a lower risk of developing cancer (IRR 0.80) and this group also has a lower risk when lung cancer is excluded (IRR 0.77). However, males in this age group have an increased risk when cancers of the breast and genital organs are excluded (IRR 1.39), again reflecting the predominance of breast and sex-specific cancers in younger women.

Males have a higher risk for most individual cancers except for malignant melanoma (where they have the same risk as females across all ages combined and for young males, where they have a significantly lower risk of 0.80).

Table 3: Male-to-Female Incidence Rate Ratios (IRRs)

Cancer Site	ICD-10 code/s	Incidence Rate Ratios: All ages	15-64	65+
All cancers excl. NMSC	C00-97 excl C44	1.14	0.80	1.54
All cancers excl. NMSC and lung	C00-97 excl. C44, C33-34	1.10	0.77	1.53
All cancers excl. NMSC, breast and sex-specific	C00-97 excl C44, C50, C51-58, C60-63	1.56	1.39	1.71
All cancers excl. NMSC, breast, lung and sex-specific	C00-C97 excl C44, C33-34, C50, C51-58, C60-63	1.59	1.42	1.75
Bladder	C67	3.29	2.74	3.52
Bowel	C18-20	1.58	1.46	1.65
Brain and CNS	C70-72	1.50	1.49	1.62
Kidney	C64-66, C68	1.87	1.87	1.91
Leukaemia	C91-95	1.65	1.58	1.81
Liver	C22	2.23	2.46	2.10
Lung	C33-34	1.46	1.21	1.60
Malignant melanoma	C43	0.99	0.80	1.47
Myeloma	C90	1.51	1.39	1.59
Non-Hodgkin lymphoma	C82-85	1.36	1.35	1.37
Oesophagus	C15	2.71	3.52	2.34
Pancreas	C25	1.27	1.40	1.21
Stomach	C16	2.28	1.97	2.44

Notes

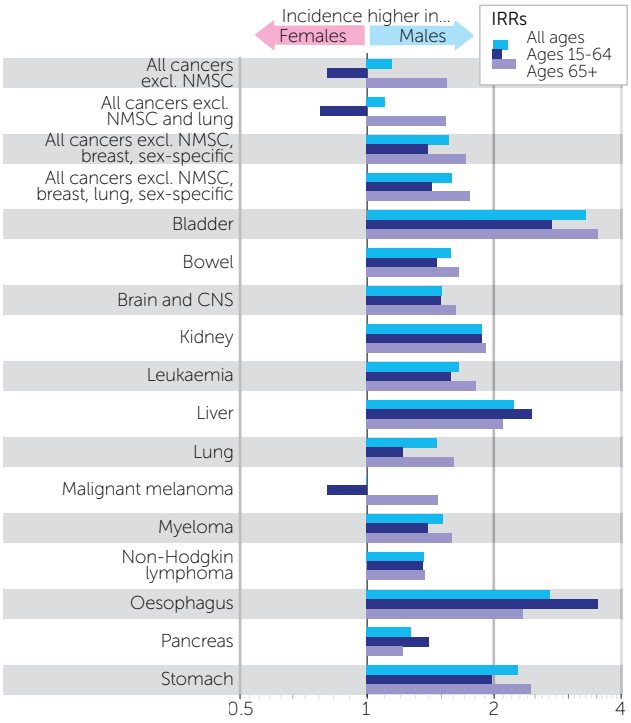
Incidence rate ratios are European age-standardised, of male to female cancer incidence (excluding NMSC), UK, 2010.

All of the above incidence rate ratios were statistically significant at the 95% confidence level except "Malignant melanoma" (C43) at all ages.

Bowel excludes anus (C18-20).

Brain and CNS includes all invasive cancers of the brain and central nervous system only.

Figure 6: Male-to-Female Incidence Rate Ratios (IRRs)



Notes

Incidence rate ratios are European age-standardised, of male to female cancer incidence (excluding NMSC), UK, 2010.

All of the above incidence rate ratios were statistically significant at the 95% confidence level except "Malignant melanoma" (C43) at all ages.

Bowel excludes anus (C18-20).

Brain and CNS includes all invasive cancers of the brain and central nervous system only.

6 LIFETIME RISK

The lifetime risk (Table 4) of a new born baby in 2010 being diagnosed with any form of cancer (excluding NMSC) during their lifetime is 44% for baby boys and 40% for baby girls (or more than 1 in 3 for both sexes). When lung cancer is excluded as well as NSMC, the difference in lifetime risk remains roughly the same, but there is a wider gap when breast and sex-specific cancers are removed from the calculation (35% for males, 26% for females). When examining the lifetime risk figures across those cancers which can occur in both sexes, males show a higher lifetime risk for most cancers except malignant melanoma and pancreas, and only slightly higher risk for myeloma and brain and CNS (Table 4).

Table 4: Risk of Being Diagnosed with Cancer

Cancer Site	ICD-10 code/s	By age 65 %		Lifetime risk %		Lifetime risk 1 in X	
		Male	Female	Male	Female	Male	Female
All cancers excl. NMSC	C00-97 excl. C44	12.2	14.9	43.9	40.1	3	3
All cancers excl. NMSC and lung cancer	C00-97 excl. C44, C33-C34	10.9	13.8	37.8	35.5	3	3
All cancers ex. NMSC, breast and sex-specific	C00-97 excl. C44 C50, C51-58, C60-63	9.3	6.9	34.5	25.8	3	4
All cancers ex. NMSC, breast, lung and sex-specific	C00-97 excl. C44, C33-34, C50, C51-58,C60-63	8.0	5.8	27.8	20.6	4	5
Bladder	C67	0.3	0.1	2.6	0.9	40	107
Bowel	C18-20	1.6	1.1	7.2	5.4	14	19
Brain and CNS	C70-72	0.4	0.3	0.8	0.6	124	170
Kidney	C64-66, C68	0.6	0.3	1.8	1.1	56	90
Leukaemia	C91-95	0.5	0.3	1.5	1.0	66	96
Liver	C22	0.2	0.1	0.9	0.5	117	214
Lung	C33-34	1.4	1.2	7.6	5.8	14	18
Malignant melanoma	C43	0.7	0.9	1.8	1.8	55	56
Myeloma	C90	0.2	0.1	0.8	0.7	119	154
Non-Hodgkin lymphoma	C82-85	0.7	0.5	2.0	1.7	51	61
Oesophagus	C15	0.5	0.1	1.8	0.9	56	110
Pancreas	C25	0.3	0.2	1.4	1.4	73	74
Prostate	C61	2.5		13.2		8	
Stomach	C16	0.3	0.1	1.6	0.8	64	120

Notes

Risk for newborn babies born in 2010 being diagnosed with selected cancers by age 65 and over a lifetime, UK, 2010.

Figures for liver cancer in females are based on 2008-2010 data, due to having fewer than 2,000 cases.

Myeloma, pancreas and prostate cancer figures have been calculated using the Current Probability method. The AMP method was used for all other cancer sites.[19,20]

Bowel excludes anus (C18-20).

Brain and CNS includes all invasive cancers of the brain and central nervous system only.

7 SURVIVAL

Inequalities between the sexes are also present for cancer survival data.[21] However, the pattern of survival differences between the sexes in England and Wales is less clear (Table 5). For many cancers, males have poorer survival than females, but for several cancers, there is no difference between the sexes, and for a few types of cancer, males have better survival than females. The largest inequality is for malignant melanoma, with males having considerably lower survival than females (11% lower ten-year survival). In contrast, however, males have substantially higher survival from bladder cancer (around 10%) than females (Table 5).

Overall, for all cancers combined, 39% of men are expected to survive their cancer for at least 10 years after their diagnosis compared with 51% of women. However, this survival gap is likely to be driven by there being around 9,000[8] more females getting breast cancer with a good prognosis (10-year survival of 77%) than there are males getting prostate cancer (with 10-year survival of 69%).[7]

Table 5: Survival (%) for Selected Common Cancers

Cancer Site	ICD-10 code/s	1 Year, 2005-2009		5 Year 2005-2009		10 Year 2007	
		Male	Female	Male	Female	Male	Female
Bladder	C67	78.4	68.2	58.2	50.2	51.5	42.4
Brain	C71	41.5	41.5	14.5	16.1	9.3	9.6
Colon	C18	73.0	72.2	54.4	55.1	50.1	50.8
Kidney	C64-66, C68	71.5	71.4	53.3	54.8	43.0	44.3
Leukaemia	C91-95	64.5	63.5	44.0	44.4	32.9	33.6
Lung	C33-34	29.4	33.0	7.8	9.3	4.9	5.9
Malignant melanoma	C43	95.7	97.7	83.6	91.6	76.7	88.0
Myeloma	C90	70.4	72.3	37.1	37.1	19.0	14.9
Non-Hodgkin lymphoma	C82-85	76.0	78.9	61.5	65.7	50.3	51.3
Oesophagus	C15	40.2	39.9	13.4	12.6	10.2	9.7
Pancreas	C25	17.4	19.1	3.6	3.8	2.9	2.7
Prostate	C61	93.5		81.4		68.5	
Rectum	C19-20, C21.8	78.8	78.8	54.6	57.5	47.3	52.1
Stomach	C16	42.2	41.7	17.7	17.5	13.7	13.1
All cancers combined						39.3	51.0

Notes

One- and five-year age-standardised relative survival for adults (aged 15-99 years) diagnosed during 2005-2009 and followed up to 2010: England.

Ten-year age-standardised relative survival for adults (aged 15-99 years) predicted for patients diagnosed in 2007 (using the hybrid approach): England and Wales.

Survival is not age-standardised for cancers of the brain, lung, oesophagus or stomach.

Bowel is shown here separately as colon and rectum (which includes part of anus).

Brain includes invasive cancers of the brain only.

Contents

8 CONCLUSIONS

The reasons why males seem to be so much more prone to developing cancer than females are complex and still only partially understood.[22] There may be a biological component, with women's sex-hormones and immune system being implicated in some of the differences seen, though these have not been fully explored.[23] There may also be factors related to ethnicity and family history of cancer, which increase susceptibility to certain cancers, for instance prostate cancer in African Caribbean men.[24]

The social determinants of cancer risk such as socio-economic status, educational attainment, and living and working conditions, are strongly implicated in increased cancer risk in men.[6,25-27]

Linked to this, it is possible that the incidence of those cancers caused by smoking, and influenced by diet, excessive alcohol consumption, and being overweight reflect sex differences in such behaviours.[28,29] However, there are likely to be a number of other factors that contribute to the inequality between the sexes, including links to infection,[30] lack of physical exercise,[31] differential exposure to the sun,[32] potential differences in symptom awareness[33] and differences in uptake of screening opportunities.[34]

More research is required to unravel these relationships in the hope that avoidable inequalities can be reduced and eventually eliminated. Taking a more proactive approach to the prevention of cancer in men will also be an important step in meeting the first objective of the new NHS Mandate[35], which is to prevent premature death.

9 ACKNOWLEDGEMENTS

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10 REFERENCES

1. White AK, Thomson CS, Forman D, et al. Men's Health and the Excess Burden of Cancer in Men. Eur Urol Suppl 2010; 9(3):467-470.

2. Cook M, McGlynn K, Devesa S, et al. Sex disparities in cancer mortality and survival. Cancer Epidemiol Biomarkers Prev 2011; 20(8):1629-37.

3. Cook MB, Dawsey SM, Freedman ND, et al. Sex Disparities in Cancer Incidence by Period and Age. Cancer Epidemiol Biomarkers Prev 2009; 18(4):1174-82.

4. Wilkins D, Payne S,Granville G, et al. Chapter 7: Cancer prevention, diagnosis, treatment and survival. The Gender and Access to Health Services Study: Final Report. London 2008.

5. Department of Health. Cancer Reform Strategy. London 2007.

6. European Commission. The State of Men's Health in Europe: Extended Report. Luxembourg 2011.

7. Coleman M, et al. Research commissioned by Cancer Research UK, London School of Hygiene and Tropical Medicine. 2010.

8. Cancer Research UK Statistical Information Team. CancerStats Website: http://cancerresearchuk.org/cancer-info/cancerstats

9. Data were provided by the Office for National Statistics on request, June 2012. Similar data can be found here: http://www.ons.gov.uk/ons/rel/vsob1/cancer-statistics-registrations--england--series-mb1-/index.html

10. Data were provided by ISD Scotland on request, April 2012. Similar data can be found here: http://www.isdscotland.org/Health-Topics/Cancer/Publications/index.asp

11. Data were provided by the Welsh Cancer Intelligence and Surveillance Unit on request, April 2012. Similar data can be found here: http://www.wales.nhs.uk/sites3/page.cfm?orgid=242&pid=59080

12. Data were provided by the Northern Ireland Cancer Registry on request, October 2012. Similar data can be found here: http://www.qub.ac.uk/research-centres/nicr/CancerData/OnlineStatistics/

13. Office for National Statistics. Mortality Statistics: Deaths registered in 2010, England and Wales. London 2011.

14. General Register Office for Scotland. Deaths Time Series Data, Deaths in Scotland in 2010. Edinburgh 2011.

15. Northern Ireland Statistics and Research Agency. Registrar General Annual Report - 2010. Belfast 2011.

16. 2005-2009 Office for National Statistics (ONS). Statistical Bulletin: Cancer survival in England: Patients diagnosed 2005-2009 and followed up to 2010. London 2011.

17. Wald N, Nicolaides-Bouman A, eds. UK smoking statistics. 2nd ed. Oxford, England : Oxford University Press, 1991.

18. Office for National Statistics. General lifestyle survey overview: A report on the 2010 general lifestyle survey. London 2012.

19. Cancer Research UK Statistical Information Team. Statistics on the risk of developing cancer, by cancer type and age. Calculated using 2010 or 2008-2010 data for the UK using the 'Adjusted for Multiple Primaries (AMP)' method (Sasieni PD, Shelton J, Ormiston-Smith N, et al. What is the lifetime risk of developing cancer?: The effect of adjusting for multiple primaries. Br J Cancer 2011;105:460-65). http://info.cancerresearchuk.org/cancerstats/incidence/risk/.

20. Cancer Research UK Statistical Information Team. Statistics on the Risk of Developing Cancer, By Cancer Type and Age. Calculated using 2010 or 2008-2010 data for the UK using the 'Current probability' method (Esteve J, Benhamou E and Raymond L. Descriptive epidemiology [IARC Scientific Publications No.128], pp67-68: Lyon, International Agency for Research on Cancer; 1994). http://info.cancerresearchuk.org/cancerstats/incidence/risk/.

21. Micheli A, Ciampichini R, Oberaigner W, et al. The advantage of women in cancer survival: An analysis of EUROCARE-4 data. Eur J Cancer. 2009 Apr; 45(6):1017-27.

22. Edgren G, Liang L, Adami H-O, et al. Enigmatic sex disparities in cancer incidence. Eur J Epidemiol 2012; 27(3):187-96.

23. Dorak M, Karpuzoglu E. Gender differences in cancer susceptibility: an inadequately addressed issue. Front Genet 2012; 3:268.

24. Crawford ED. Understanding the epidemiology, natural history, and key pathways involved in prostate cancer. Urology 2009; 73(5 Suppl):S4-S10.

25. White C, Edgar G, Siegler V. Social inequalities in male mortality for selected causes of death by National Statistics Socio-economic classification, England and Wales, 2001-03. Health Statistics Quarterly 2008; 38:19-30.

26. Parkin DM. 15. Cancers attributable to occupational exposures in the UK in 2010. Br J Cancer 2011; 105(S2):S70-S72.

27. Straif K. Estimating the burden of occupational cancer as a strategic step to prevention. Br J Cancer 2012; 19:107 Suppl 1:S1-2.

28. Parkin DM. 1. The fraction of cancer attributable to lifestyle and environmental factors in the UK in 2010. Br J Cancer 2011; 105(S2):S2-S5.

29. Jaggers JR, Sui X, Hooker SP, et al. Metabolic syndrome and risk of cancer mortality in men. Eur J cancer 2009; 45(10):1831-8.

30. Parkin DM. 11. Cancers attributable to infection in the UK in 2010. Br J Cancer. 2011;105(S2):S49-S56.

31. Parkin DM. 9. Cancers attributable to inadequate physical exercise in the UK in 2010. Br J Cancer. 2011;105(S2):S38-S41.

32. Parkin DM, Mesher D, Sasieni P. 13. Cancers attributable to solar (ultraviolet) radiation exposure in the UK in 2010. Br J Cancer. 2011;105(S2):S66-S9.

33. Robb K, Stubbings S, Ramirez A, et al. Public awareness of cancer in Britain: a population-based survey of adults. Br J Cancer 2009; 101(S2):S18-S23.

34. Wilkins D. Slow on the uptake? Encouraging male participation in the NHS Bowel Cancer Screening Programme. London: Men's Health Forum, 2011.

35. Department of Health. The Mandate: a mandate from the Government to the NHS Commissioning Board: April 2013 to March 2015. London 2012.