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### **Short Communication**

# Up-to-date estimates of long-term cancer survival in England and Wales

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Cancer survival in England and Wales has improved over the last 30 years. However, cohort survival estimates delay recognition of these improvements. Here we show that period survival estimates, based on survival in a recent time period, suggest a more optimistic pattern for England and Wales than cohort-based measures for most cancers. British Journal of Cancer (2003) 89, 74-76. doi:10.1038/sj.bjc.6600976 www.bjcancer.com © 2003 Cancer Research UK

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Cancer survival in England and Wales has generally improved over the last 30 years. However, conventional survival estimates, based on following-up patient cohorts, delay identification of these improvements. Period analysis is a method of obtaining more upto-date estimates of survival, calculated using only survival experience in a recent time period (Brenner and Gefeller, 1996). US and European data have shown these estimates to be good predictors of long-term survival (Brenner and Hakulinen, 2001; Brenner, 2002). Here cancer registry data are used to compare 5and 10-year relative survival estimates for England and Wales using standard cohort methods and period analysis.

#### MATERIALS AND METHODS

Data were analysed from the public-use data set of all England and Wales registrations for 1 January 1981 to 31 December 1990 of the 26 most common cancers (Coleman et al, 1999) (followed until 31 December 1995). We present 5- and 10-year relative survival estimates for all ages using conventional cohort-based methods and period analyses. Results are presented for males and females combined, apart from results for prostate, testis and gynaecological cancers.

A cohort-based analysis is defined by the time interval in which patients are diagnosed. These patients (and only these) are followed up for 5 or 10 years and survival estimates are calculated. Here cohort estimates for 5 and 10 years are based on patients diagnosed between 1986-1990 and 1981-1985, respectively, and followed up until 1995 (see Table 1). In contrast, period analyses are defined by a recent time interval in which patients' survival experience is observed. It excludes short-term survival of patients diagnosed before the start of the period but includes their long-term survival within the period. Short-term survival of more recently diagnosed patients is included (see Brenner and Gefeller (1996)). Period estimates for 5 and 10 years are based on patients diagnosed between 1986-1990 and 1981-1990, respectively, but only include survival experience from 1990 to 1995 (Table 1).

Survival rates presented here are relative survival rates, adjusting for the general population background mortality. We calculated the expected survival using Hakulinen's (1982) method with 95% confidence intervals. A publicly available macro was used to calculate both cohort and period estimates (Brenner et al., 2002).

#### **RESULTS**

Table 2 shows that period estimates were higher than cohort estimates for 22 (85%) of the 26 cancers for 10-year survival and 18 (69%) of the 26 cancers for 5-year survival. This indicates recent changes in survival that are not detected by standard cohort analyses. At 10 years, period estimates exceeded cohort estimates by over 4% for colon, melanoma of the skin, breast, cervix, thyroid and Hodgkin's disease. Differences at 5 years were less marked but largest differences were seen for thyroid and Hodgkin's disease. Larger differences between cohort and period estimates were seen among cancers with better outcomes (10-year survival > 50%). In contrast, where survival was poor (10-year survival <10%), differences between the estimates were smaller and for four of these six cancers, survival estimates were lower for period analysis.

#### **DISCUSSION**

These results provide the most up-to-date estimates of cancer survival in England and Wales. Period survival estimates suggest a more optimistic pattern of cancer survival than cohort-based measures for the majority of cancers despite variations in survival. These differences appear greater for cancers with better outcomes. Our results show similar increases in survival estimates using period analysis as seen in the USA (Brenner, 2002), but with differing site-specific patterns.

Period estimates are similar to cohort estimates where cancer survival patterns have not changed over time. Where survival has changed, period estimates are more up-to-date. Cohort estimates are more influenced by short-term survival of patients diagnosed earlier in a study. If short-term survival changes over time, period analysis allows for these differences.

**Table I** Intervals of diagnosis and follow-up included in estimates of 5- and 10 year relative survival for cohort and period analysis

	Cohort analysis		Period analysis		
Survival	Diagnosis	Follow-up	Diagnosis	Follow-up	
5 years	1986–1990	1986–1995	1986-1990	1990–1995	
10 years	1981 – 1985	1981 – 1995	1981 – 1990	1990-1995	

Since these data represent cancers diagnosed a decade ago, patterns of cancer survival are likely to have changed further. Period analyses of more recent data, when available, are likely to provide the earliest estimates of these developing patterns.

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**Table 2** Five and 10- year **relative survival estimates** (and 95% confidence intervals) for England and Wales, by cancer site using cohort and period survival methods

	10 years		5 years	
Diagnosed Followed up	Cohort 1981–1985 1981–1995	Period 1981–1990 1990–1995	Cohort 1986-1990 1986-1995	Period 1986 – 1990 1990 – 1995
Cancer site				
Oral cavity and pharynx	29.4%	30.3%	37.6%	37.7%
Gran carrey and priarying	28.1%,30.7%	28.7%,31.9%	36.4%,38.8%	35.9%,39.5%
Oesophagus	6.2%	5.3%	7.3%	5.8%
	5.7%,6.7%	4.8%,5.8%	6.9%,7.7%	5.3%,6.3%
Stomach	9.1%	9.4%	11.1%	10.2%
	8.7%,9.5%	8.9%,9.9%	10.8%,11.4%	9.7%,10.7%
Colon	34.8%	39.2%	40.3%	42.0%
Б	34.3%,35.3%	38.5%,39.9%	39.8%,40.8%	41.3%,42.7%
Rectum	32.3%	34.6%	38.7%	39.5%
Liver	31.7%,32.9% <b>3.1%</b>	33.8%,35.4% <b>2.7%</b>	38.1%,39.3% <b>3.6%</b>	38.7%,40.3% <b>3.0%</b>
Liver	2.3%,3.9%	1.9%,3.5%	2.9%,4.3%	2.2%,3.8%
Gallbladder	7.5%	<b>8.2%</b>	10.5%	9.2%
Ganbiaddei	6.5%,8.5%	6.9%,9.5%	9.5%,11.5%	7.8%,10.6%
Pancreas	2.7%	1.4%	3.1%	1.6%
	2.4%,3%	1.2%,1.6%	2.8%,3.4%	1.4%,1.8%
Larynx	54.8%	55.5%	62.3%	63.0%
,	53.2%,56.4%	53.6%,57.4%	61%,63.6%	61.2%,64.8%
Lung	5.5%	4.4%	6.4%	5.2%
	5.3%,5.7%	4.2%,4.6%	6.3%,6.5%	5%,5.4%
Melanoma of the skin	65.4%	72.7%	77.3%	77.4%
_	64.2%,66.6%	71.5%,73.9%	76.5%,78.1%	76.3%,78.5%
Breast	50.6%	56.4%	67.1%	68.7%
	50.2%,51%	56%,56.8%	66.8%,67.4%	68.3%,69.1%
Cervix	54.2%	60.4%	63.1%	64.6%
Uterus	53.4%,55%	59.3%,61.5%	62.3%,63.9%	63.5%,65.7%
Oterus	<b>68.6%</b> 67.6%,69.6%	<b>69.9%</b>	<b>71.2%</b> 70.3%,72.1%	<b>71.7%</b> 70.4%,73%
Ovary	26.1%	68.5%,71.3% <b>27.4%</b>	30.2%	30.4%
Ovary	25.4%,26.8%	26.4%,28.4%	29.5%,30.9%	29.4%,31.4%
Vagina and vulva	49.0%	49.2%	<b>52.4%</b>	51.7%
vagina and vuiva	46.8%,51.2%	46.3%,52.1%	50.6%,54.2%	49%,54.4%
Prostate	27.9%	28.6%	42.0%	42.3%
estate	27.2%,28.6%	27.9%,29.3%	41.4%,42.6%	41.6%,43%
Testis	87.7%	91.0%	90.6%	91.6%
	86.5%,88.9%	89.7%,92.3%	89.7%,91.5%	90.3%,92.9%
Bladder	55.0%	56.2%	62.1%	62.4%
	54.2%,55.8%	55.3%,57.1%	61.5%,62.7%	61.6%,63.2%
Kidney	31.4%	34.0%	38.5%	39.7%
	30.3%,32.5%	32.7%,35.3%	37.6%,39.4%	38.4%,41%
Brain	9.5%	10.5%	15.4%	14.1%
	8.9%,10.1%	9.7%,11.3%	14.7%,16.1%	13.1%,15.1%
Thyroid	66.6%	75.3%	72.4%	76.2%
	64.4%,68.8%	72.3%,78.3%	70.6%,74.2%	73.4%,79%
Non-Hodgkin's lymphoma	35.4%	38.7%	45.5%	<b>46.4%</b>
Hadakin's disassa	34.5%,36.3%	37.6%,39.8%	44.8%,46.2%	45.3%,47.5%
Hodgkin's disease	<b>63.2%</b>	<b>71.3%</b> 69.3%,73.3%	<b>73.9%</b>	<b>76.1%</b> 74.2% 78%
Multiple myeloma	61.7%,64.7% <b>8.0%</b>	69.3%,/3.3% <b>9.4%</b>	72.6%,75.2% <b>20.0%</b>	74.2%,78% <b>21.0%</b>
Multiple myeloma	7.3%,8.7%	<b>7.4%</b> 8.6%,10.2%	19.1%,20.9%	19.8%,22.2%
All leukaemias	16.4%	19.6%	<b>27.8%</b>	29.1%
/ III TOGRACITIIGS	15.7%,17.1%	18.6%,20.6%	27%,28.6%	28%,30.2%

Rates derived from England and Wales data for patients diagnosed 1981-1990 (Coleman et al, 1999).



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