Kidney Cancer: Survival Report

Urological Cancers SSCRG

Report Background

This report examines trends in survival of kidney cancer, in England, over the most recent 20 years of data available 1990-2010. This report also endeavours to examine how one and five year survival rates of kidney cancer are influenced by sex, the histological cell type of the tumour, the grade of differentiation and the stage at presentation.

Data used in this report has been sourced from the National Cancer Data Repository 2010 (NCDR).

Survival is calculated using the period survival method. This method takes into account the effect of improved short-term survival when predicting longer-term survival. The survival for each year is calculated using the most recently available data for that year, and then combined. As an example, five-year survival for 2006-10 is calculated using the one-year survival for those diagnosed in 2006-10, two-year survival for those diagnosed 2005-09, and so on. For periods of time before 2002-06 the period method is equivalent to a cohort method. Survival is calculated using the statistical analysis software STATA, using the '*strel*' algorithm written by London School of Hygiene and Tropical Medicine.

Kidney Cancer Background

In England, kidney cancer is the 8th most common malignancy. The age-standardised incidence rate of kidney cancer is almost twice as high in males as in females (p<0.001). The rate in males in 2008-10 was 13.3 per 100,000 compared to 7.1 per 100,000 in females. In 2008-10, there were an average of 4,056 new cases of kidney cancer per year in males and 2,563 per year in females. Kidney cancer is the third most common urological malignancy after prostate cancer and bladder cancer.

For both sexes, the incidence rate has increased from 1990-92 to 2008-10 (p<0.001 for both sexes). During this period the age-standardised rate in males increased from 8.9 per 100,000 (2,179 cases per year on average) to 13.3 per 100,000, while in females the increase was from 4.3 per 100,000 (1,346 cases per year on average) to 7.1 per 100,000 females.

The increase in rates of kidney cancer is thought to be partly explained by the increased use of imaging, resulting in the detection of asymptomatic disease (Cancer Research UK).

Around the world there are around 210,000 kidney cancers diagnosed annually, approximately 2% of all cancers. The highest rates of the disease are found in North America and Europe, the Czech Republic has an annual incidence rate of 20.2 per 100,000. The rates are lowest in sub-Saharan Africa. Kyadondo County, Uganda has an annual incidence rate of 0.5 per 100,000 (GLOBOCAN 2002).

From 1995-97 to 2008-10, mortality rates from kidney cancer in England did not change significantly for either males or females. In males, the age-standardised mortality rate for 2008-10 was 5.6 per 100,000 (1,801 deaths per year on average). In females the age-standardised mortality rate for 2008-10 was 2.8 per 100,000 (1,157 deaths per year on average). Thus the mortality rate in women is half that in men (p<0.001).

The most common histological subtype of kidney cancer is renal cell carcinoma (RCC) accounting for just over 80% of cases. The next most common type of kidney cancer is transitional cell carcinoma (TCC), also known as urothelial cell carcinoma (UCC). TCC type tumours account for just over 10% of diagnosed kidney cancers.

The different histologies (forms) of kidney cancer develop in different ways and have different outcomes and survival rates. Different treatment pathways may be appropriate to give the best chance of survival.

Other, less common, forms of kidney cancer include:

- Squamous cell carcinomas
- Juxtaglomerular cell tumour
- Mesoblastic nephroma
- Wilm's tumour (generally occurring children under five years old)

Risk Factors:

- As with many other cancers, smoking is strongly associated with an increased risk of developing kidney cancer. It is thought that smoking may double the risk of developing kidney cancer (Sasco, 2004).

- Obesity. In conjunction with smoking, obesity is thought to contribute to between 20-30% of renal cell carcinomas (Berstrom, 2001).

- Existing kidney conditions can also increases risk e.g. kidney disease/failure and patients requiring dialysis (Stewart 2003).

- Infection with hepatitis C (Stuart 2010).

- Regular, long term use of Non-Steroidal Anti Inflammatory Drugs, more commonly referred to as NSAIDs, for example ibuprofen, have been implicated in increasing risk of developing kidney cancer by over 50% (Cho, 2011). However other research has not found convincing evidence that use of this class of drugs alters an individual's risk of developing the disease (Lipworth 2006).

- Hypertension (Cho 2000).

- Genetic factors and a family history of kidney cancer has been associated with between a 2 to 3 fold increased risk of developing renal cell carcinoma (Henrion 2012).


Protective Factors:

- The only consistently reported protective factor against kidney cancer is regular consumption of vegetables and fruit (Lee 2009).

One and five-year total survival

One and five-year survival rates from kidney cancer have improved in both males and females. From 1990-94 to 2006-10, one-year relative survival improved from 58% to 72% in males and 54% to 71% in females (p<0.001 for both).

The five-year relative survival rate also improved from 1990-94 to 2006-10: from 39% to 55% in males and from 37% to 55% in females (p<0.001 for both).

Figure 1: One-year relative survival rate (%) for kidney cancer, for males and females, England 1990–2010
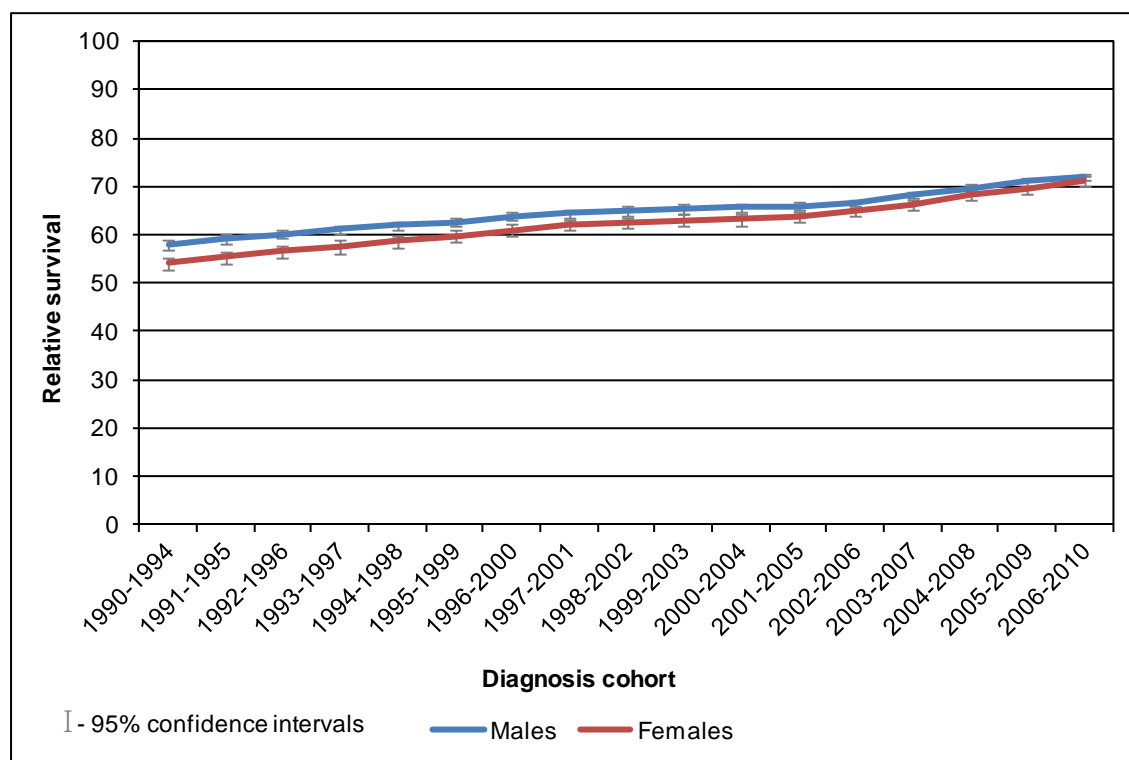
Source: National Cancer Data Repository; Office for National Statistics

Figure 2: Five-year relative survival rate (%) for kidney cancer, for males and females, England 1990–2010
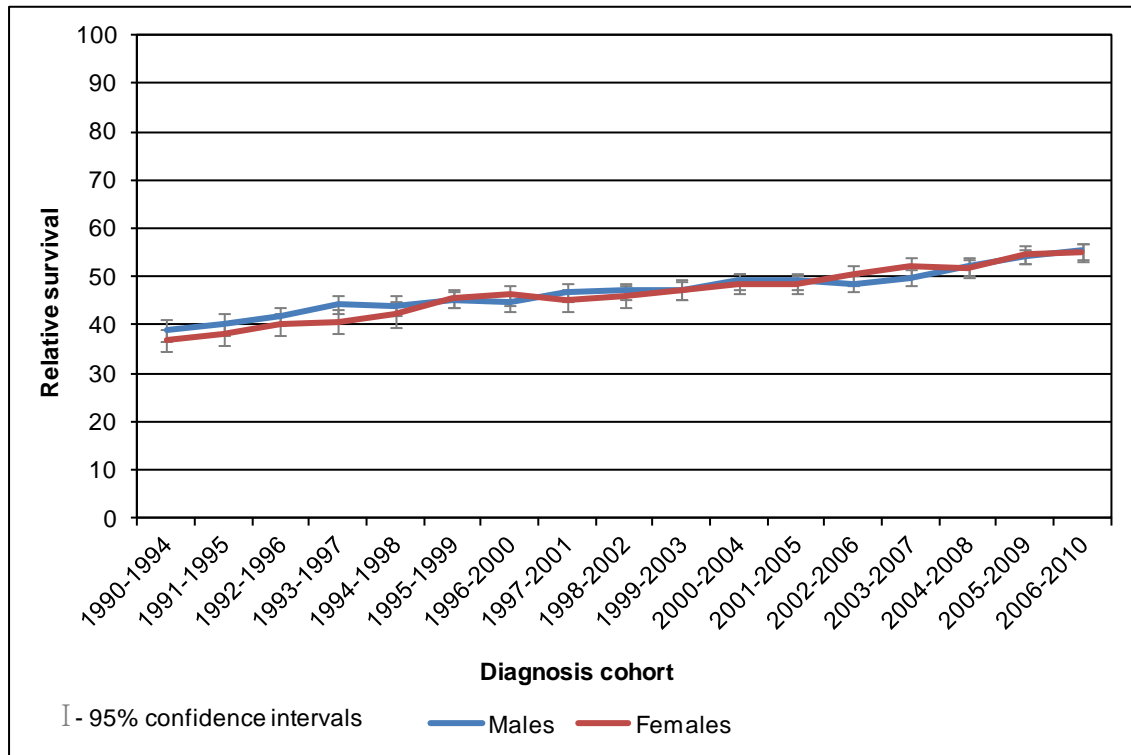
Source: National Cancer Data Repository; Office for National Statistics

Survival analysis: by grade

There are two grading systems in use for Kidney cancer. The Fuhrman grading system is used for renal cell carcinoma (RCC), which account for 80% of cases. Because the grading for other kidney cancers is not compatible they are excluded from the grade analysis shown here.

In males, from 1990-94 to 2006-10, one-year relative survival improved for all grades of tumours. Grade 1 improved from 87% to 95%, grade 2 from 85% to 95%, grade 3 from 45% to 86% and grade 4 from 34% to 75% (all p<0.001).

In females, from 1990-94 to 2006-10, one-year relative survival improved for all grades of tumours. Grade 1 improved from 87% to 97% (p<0.001), grade 2 from 83% to 96% (p=0.02), grade 3 from 46% to 87% (p<0.001) and grade 4 from 32% to 78% (p<0.001).

In males, from 1990-94 to 2006-10, five-year relative survival improved for all grades of tumours. Grade 1 improved from 75% to 87%, grade 2 from 68% to 88%, grade 3 from 30% to 72% and grade 4 from 7% to 46% (all p<0.001).

In females, from 1990-94 to 2006-10, five-year relative survival improved for all grades of tumours. Grade 1 improved from 73% to 92%, grade 2 from 62% to 90%, grade 3 from 29% to 68% and grade 4 from 5% to 45% (all p<0.001).

Figure 3: One-year relative survival rate (%) for renal cell kidney cancer, by grade, for males, England 1990–2010
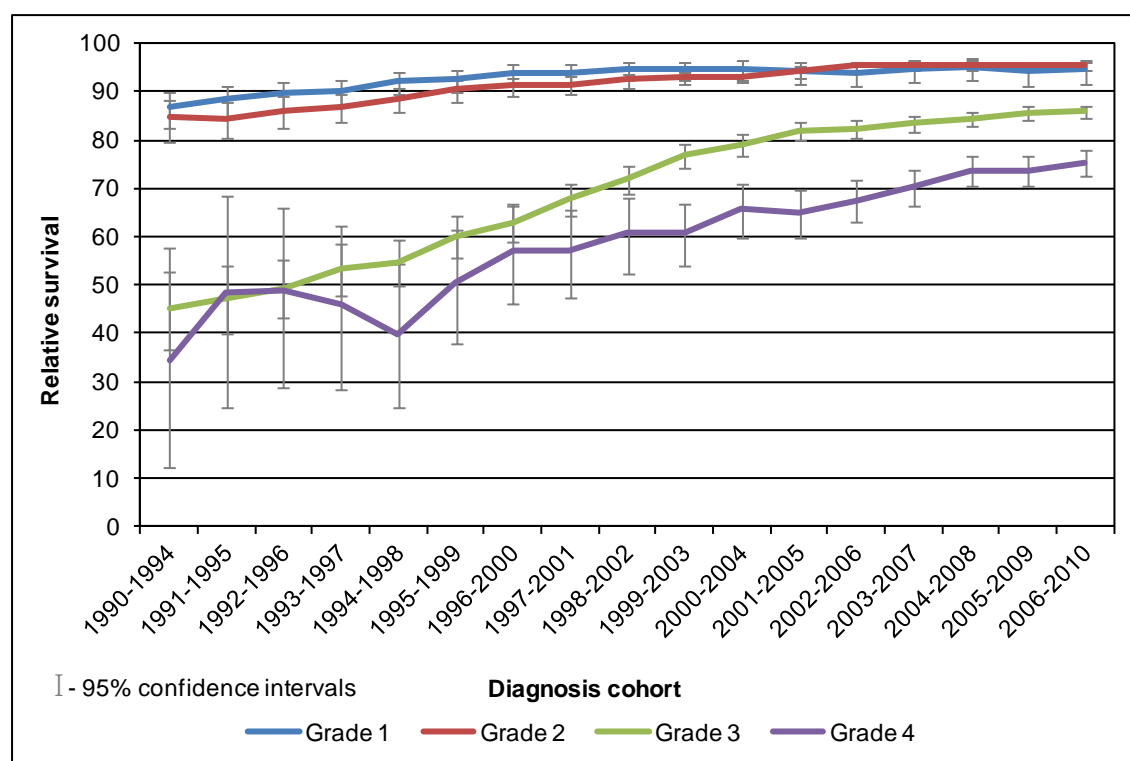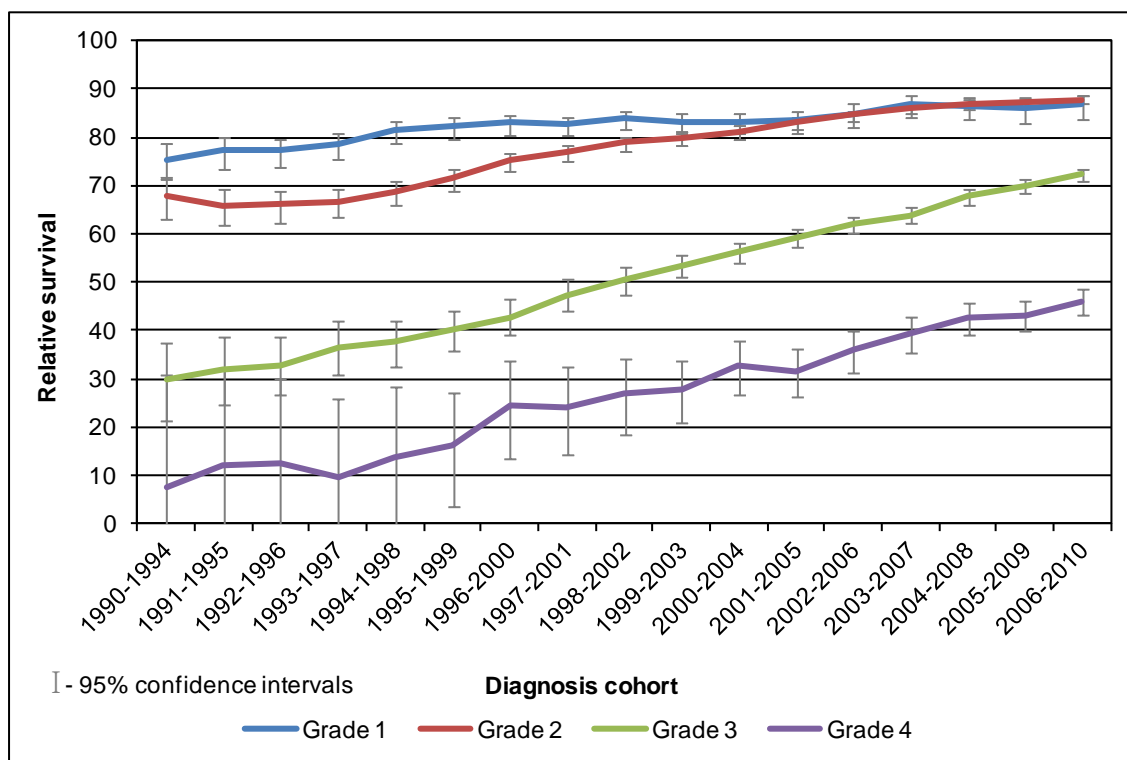

Source: National Cancer Data Repository; Office for National Statistics

Figure 4: One-year relative survival rate (%) for renal cell kidney cancer, by grade, for females, England 1990–2010
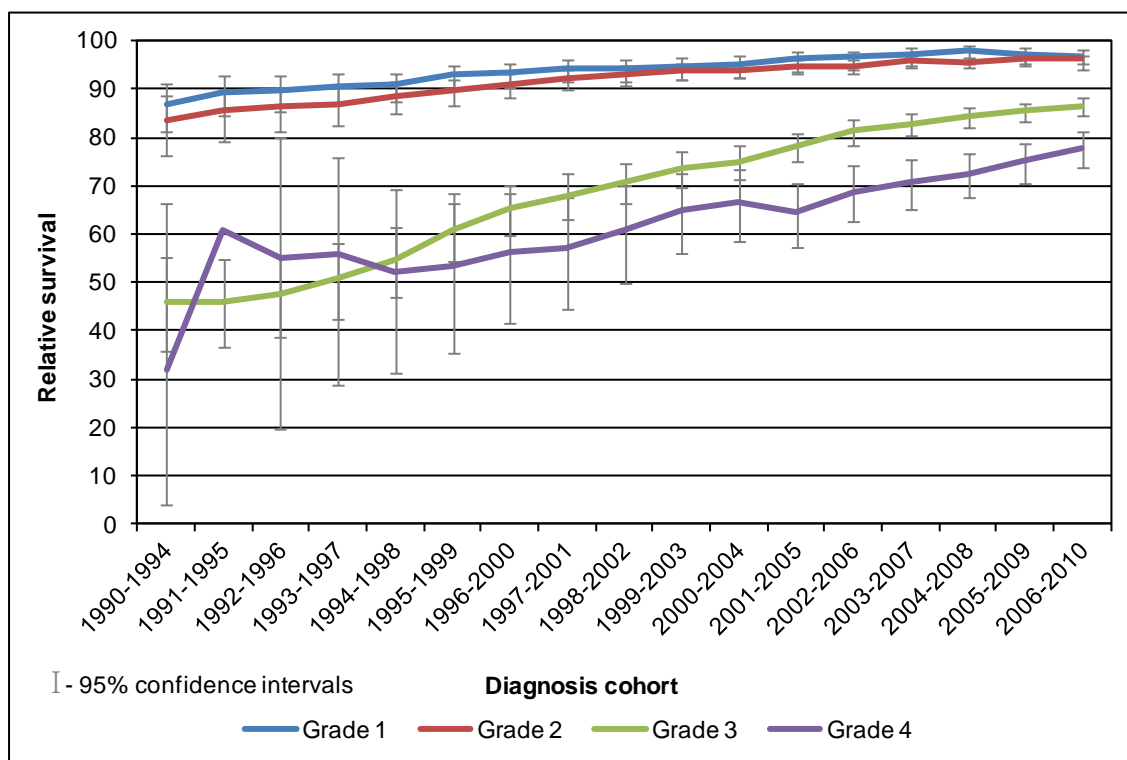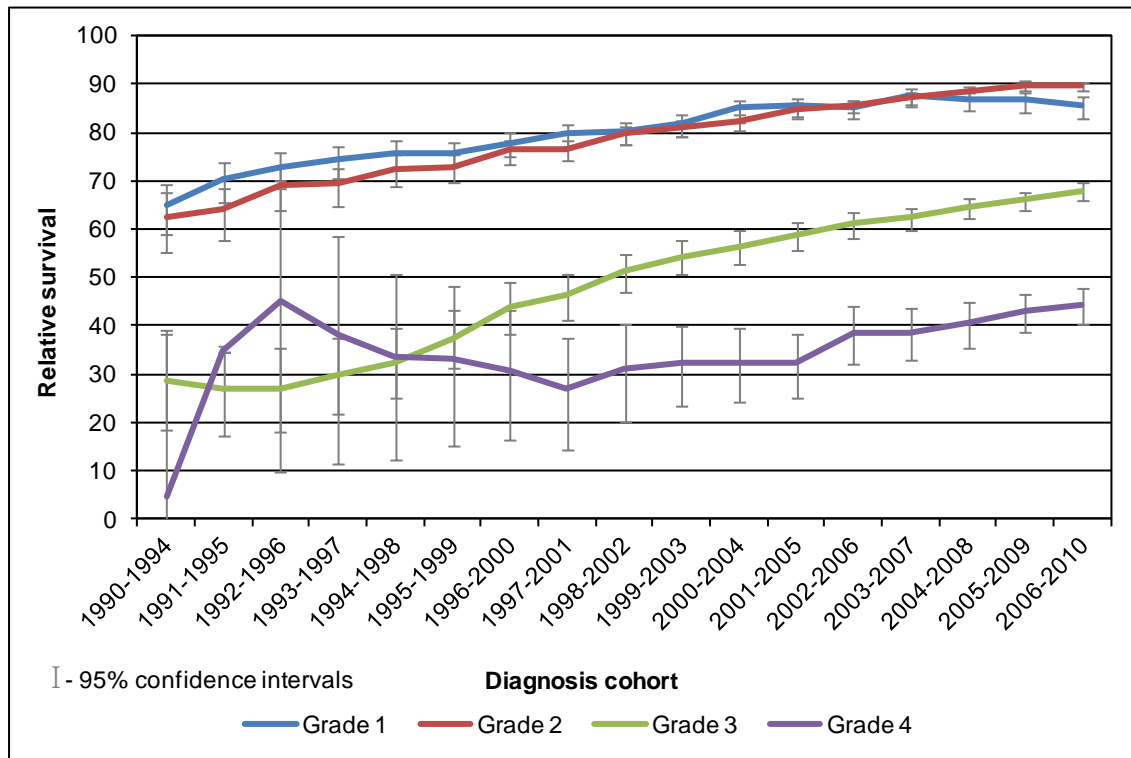

Source: National Cancer Data Repository; Office for National Statistics

Figure 5: Five-year relative survival rate (%) for renal cell kidney cancer, by grade, for males, England 1990–2010

Source: National Cancer Data Repository; Office for National Statistics

Figure 6: Five-year relative survival rate (%) for renal cell kidney cancer, by grade, for females, England 1990–2010

Source: National Cancer Data Repository; Office for National Statistics

Survival analysis: by histological subtype

In males, from 1990-94 to 2006-10, renal cell carcinoma one-year relative survival rates have improved from 65% to 78% (p<0.001). There was no statistically significant difference in one-year relative survival for transitional cell carcinoma. For the 'Other' histologies group, survival rates improved from 42% to 47% (p<0.001).

In females, from 1990-94 to 2006-10, renal cell carcinoma, survival rates have improved from 62% to 79% (p<0.001). There was no statistically significant difference in one-year relative survival for transitional cell carcinoma. For the 'Other' histologies group, survival rates improved from 39% to 44% (p=0.001).

In males, from 1990-94 to 2006-10, renal cell carcinoma five-year relative survival rates have improved from 46% to 64% (p<0.001). There was no statistically significant difference in five-year relative survival for transitional cell carcinoma. For the 'Other' histologies group, survival rates improved from 27% to 31% (p<0.001).

In females, from 1990-94 to 2006-10, renal cell carcinoma five-year relative survival rates have improved from 44% to 65% (p<0.001). There was no statistically significant difference in five-year relative survival for transitional cell carcinoma. For the 'Other' histologies group, survival rates improved from 26% to 30% (p=0.02).

Figure 7: One-year relative survival rate (%) for kidney cancer, by histology, for males, England 1990–2010
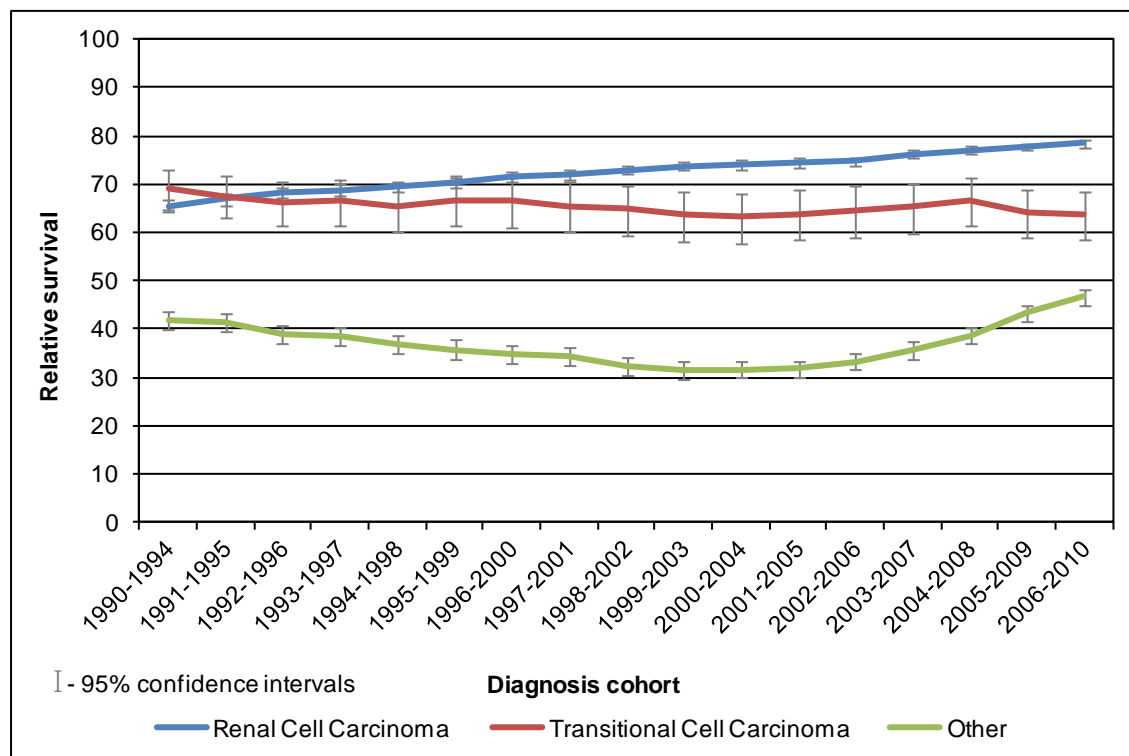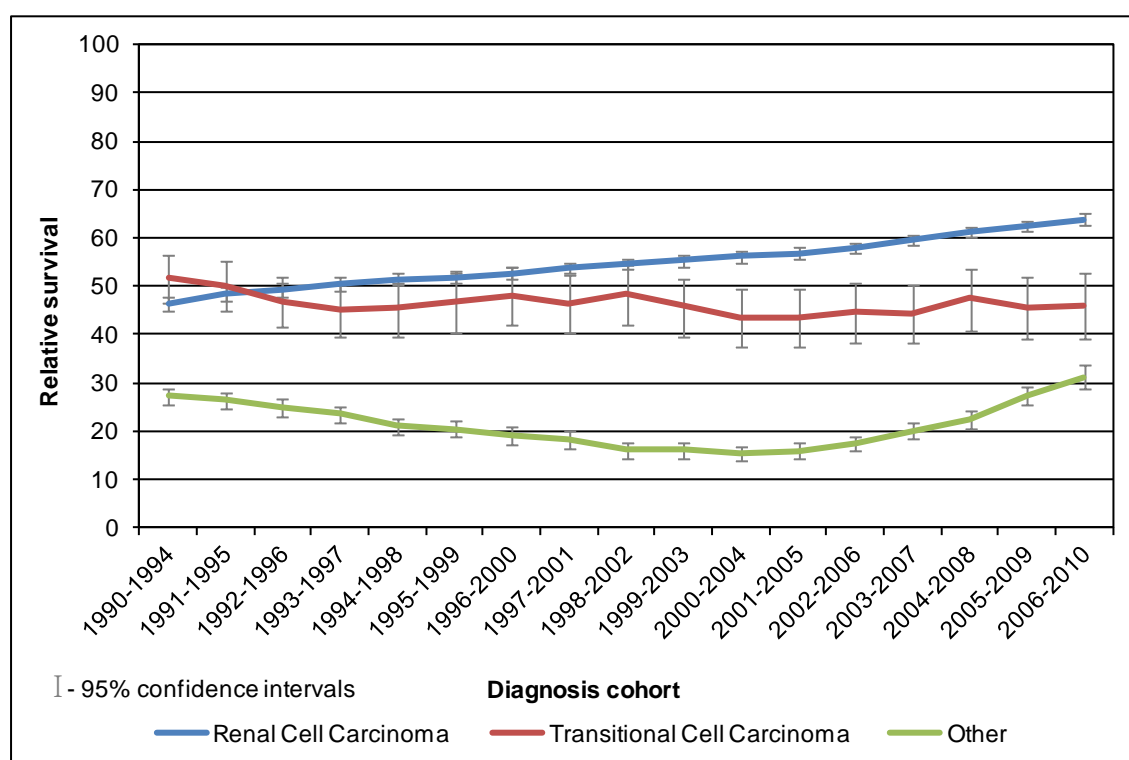

Source: National Cancer Data Repository; Office for National Statistics

Figure 8: One-year relative survival rate (%) for kidney cancer, by histology, for females, England 1990–2010
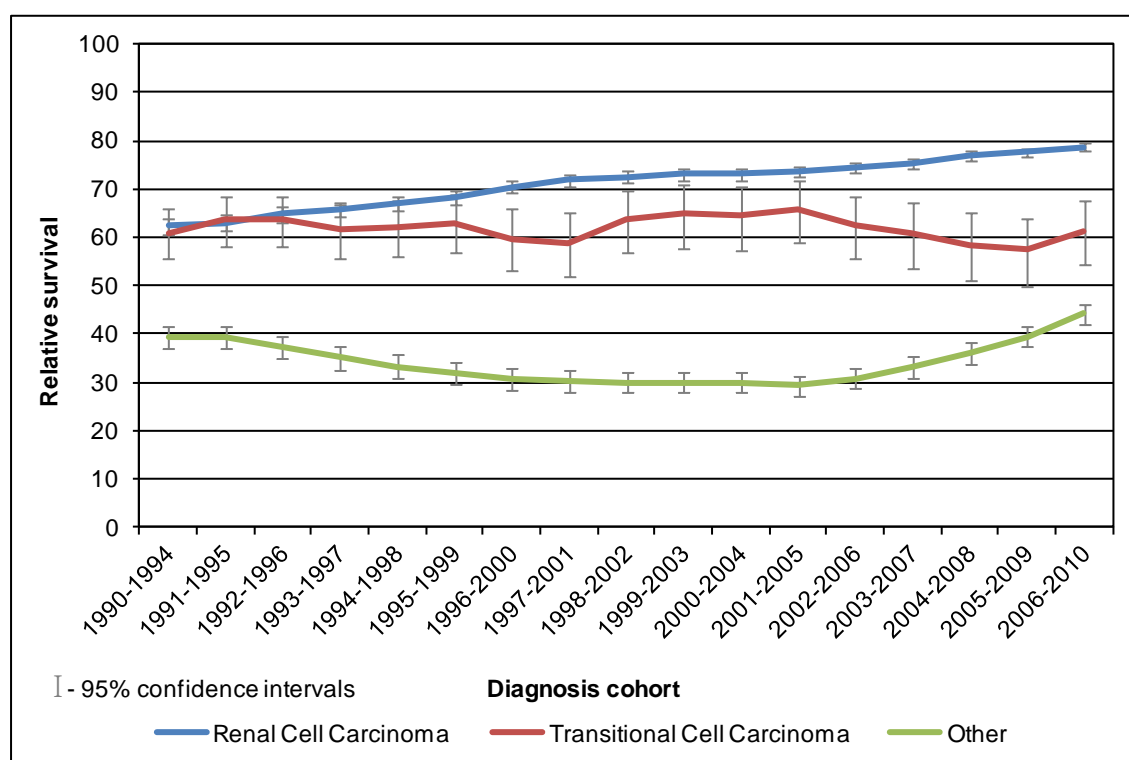
Source: National Cancer Data Repository; Office for National Statistics

Figure 9: Five-year relative survival rate (%) for kidney cancer, by histology, for males, England 1990–2010
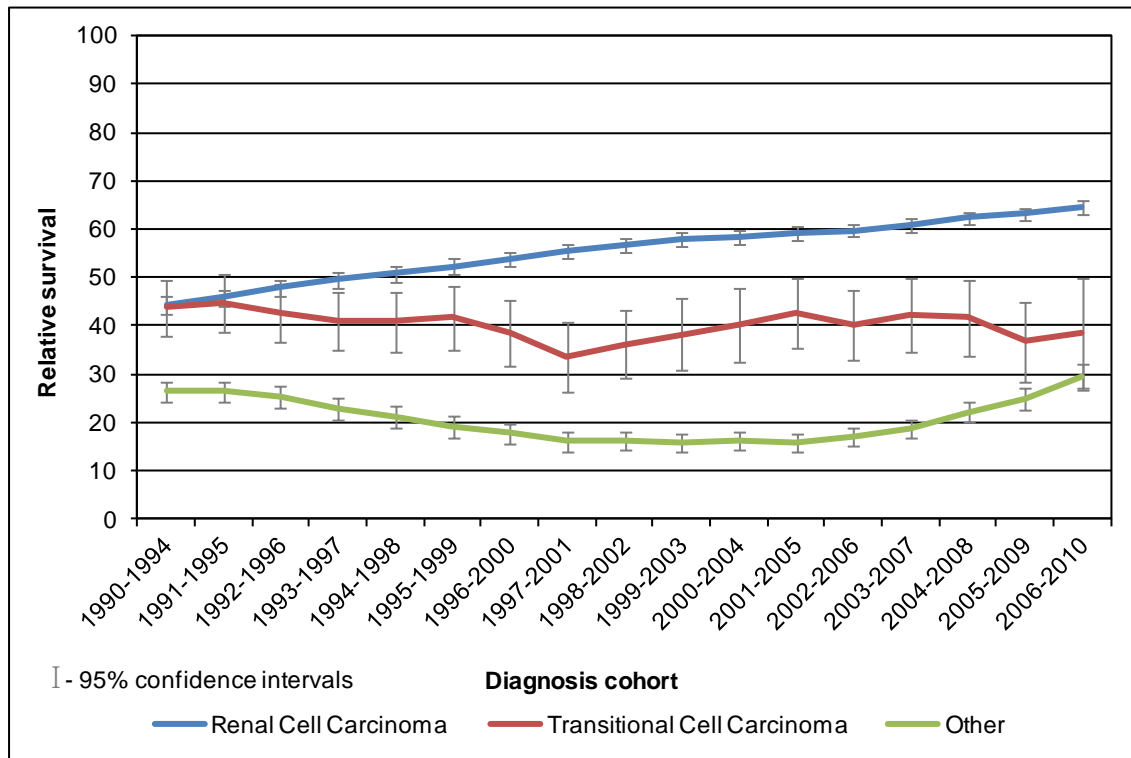

Source: National Cancer Data Repository; Office for National Statistics

Figure 10: Five relative survival rate (%) for kidney cancer, by histology, for females, England 1990–2010

Source: National Cancer Data Repository; Office for National Statistics

Survival analysis: by stage at diagnosis

Stage at diagnosis has not been well recorded in cancer registries, although the situation is improving rapidly. Since the year 2000 there have been enough cancers with a valid TNM stage to derive survival at an England-wide level, albeit with larger uncertainty. The TNM system for renal cell cancer differs from that for transitional cell cancer, the data shown here relate to renal cell cancer only.

In males, from 2000-04 to 2006-10, stage III one-year relative survival rates have increased from 80% to 87% (p=0.01). There was no statistically significant difference in one-year relative survival for any other stage of kidney cancer

In females, from 1990-94 to 2006-10, there was no statistically significant difference in one-year relative survival for any stage of kidney cancer

In males, from 2000-04 to 2006-10, stage III five-year relative survival rates have increased from 54% to 66% (p=0.001). There was no statistically significant difference in one-year relative survival for any other stage of kidney cancer

In females, from 1990-94 to 2006-10, there was no statistically significant difference in five-year relative survival for any stage of kidney cancer

Figure 11: One-year relative survival rate (%) for renal cell kidney cancer, by stage, for males, England 2000–2010
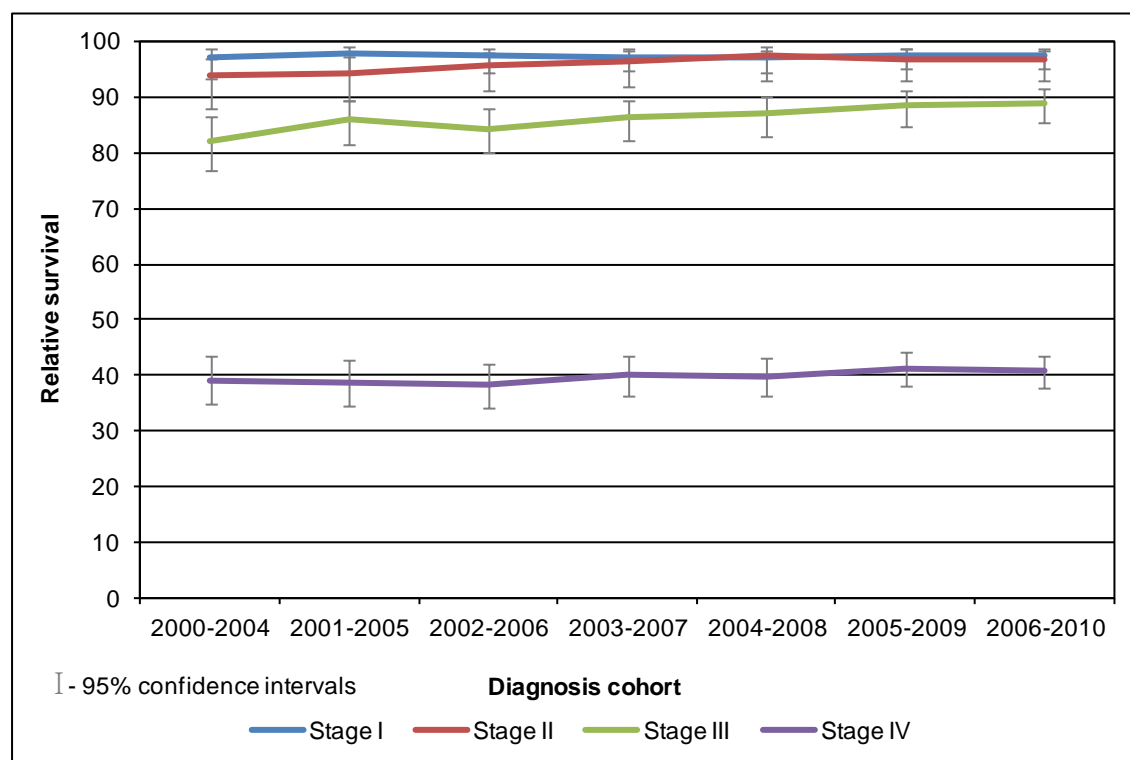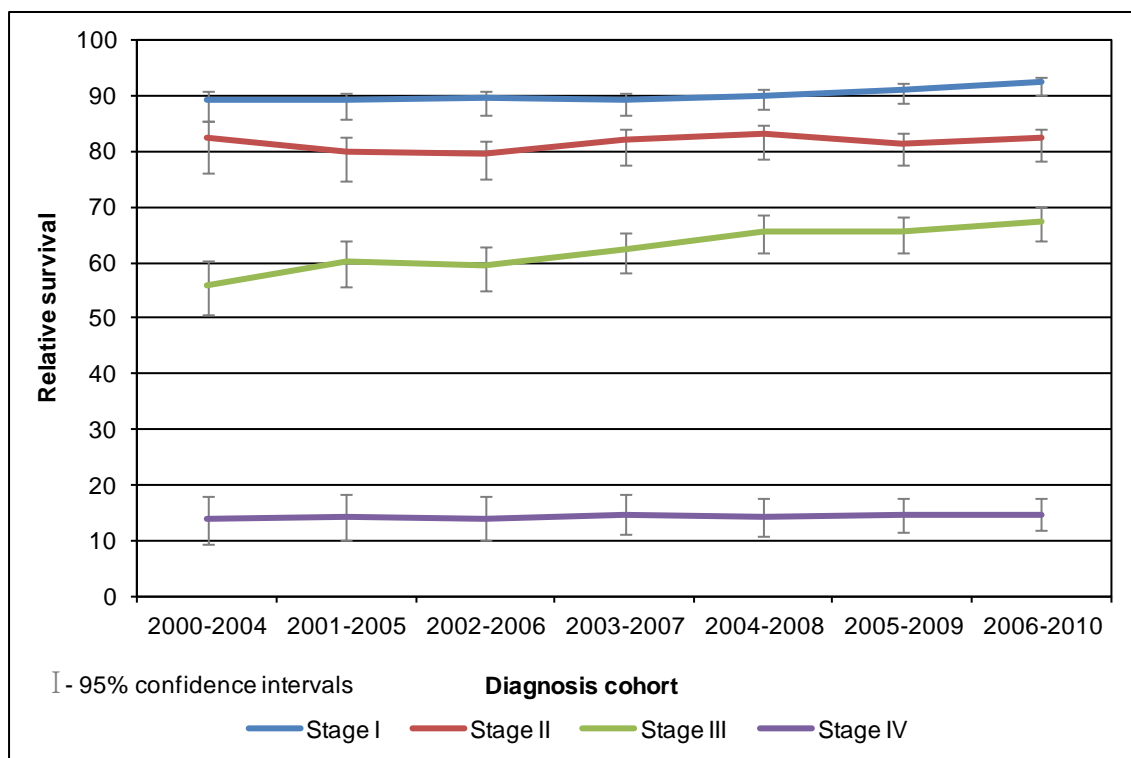

Source: National Cancer Data Repository; Office for National Statistics

Figure 12: One-year relative survival rate (%) for renal cell kidney cancer, by stage, for females, England 2000–2010
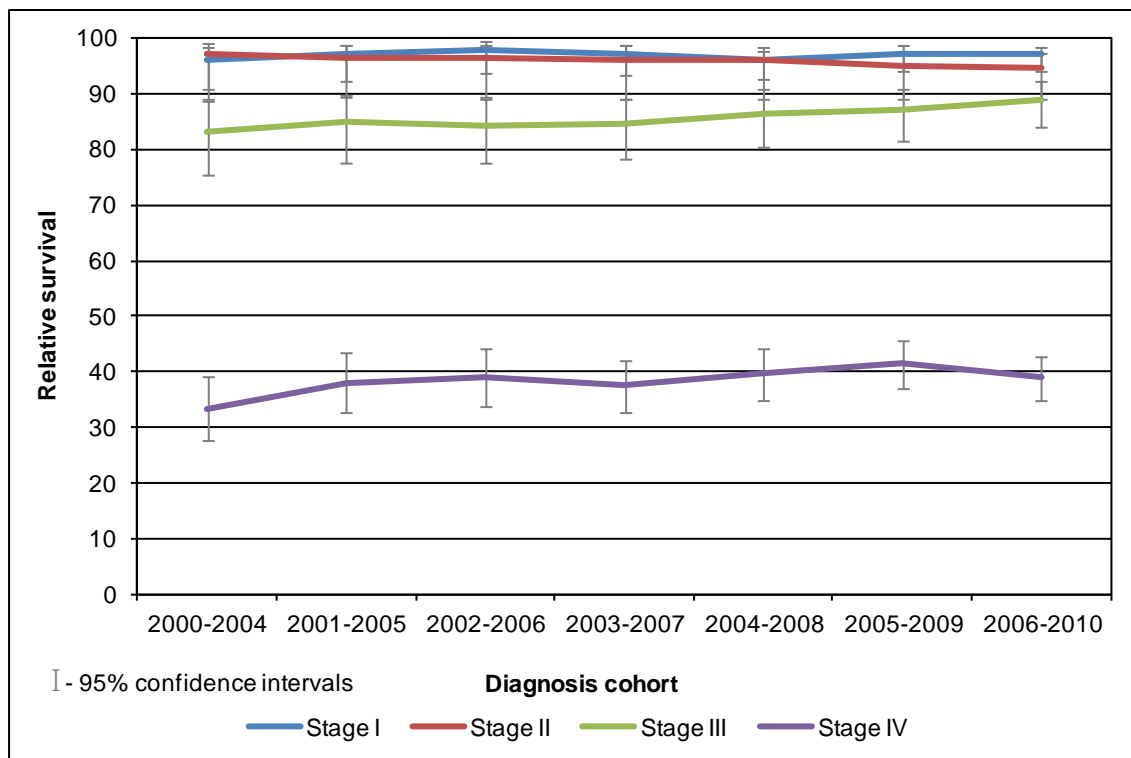
Source: National Cancer Data Repository; Office for National Statistics

Figure 13: Five-year relative survival rate (%) for renal cell kidney cancer, by stage, for males, England 2000–2010
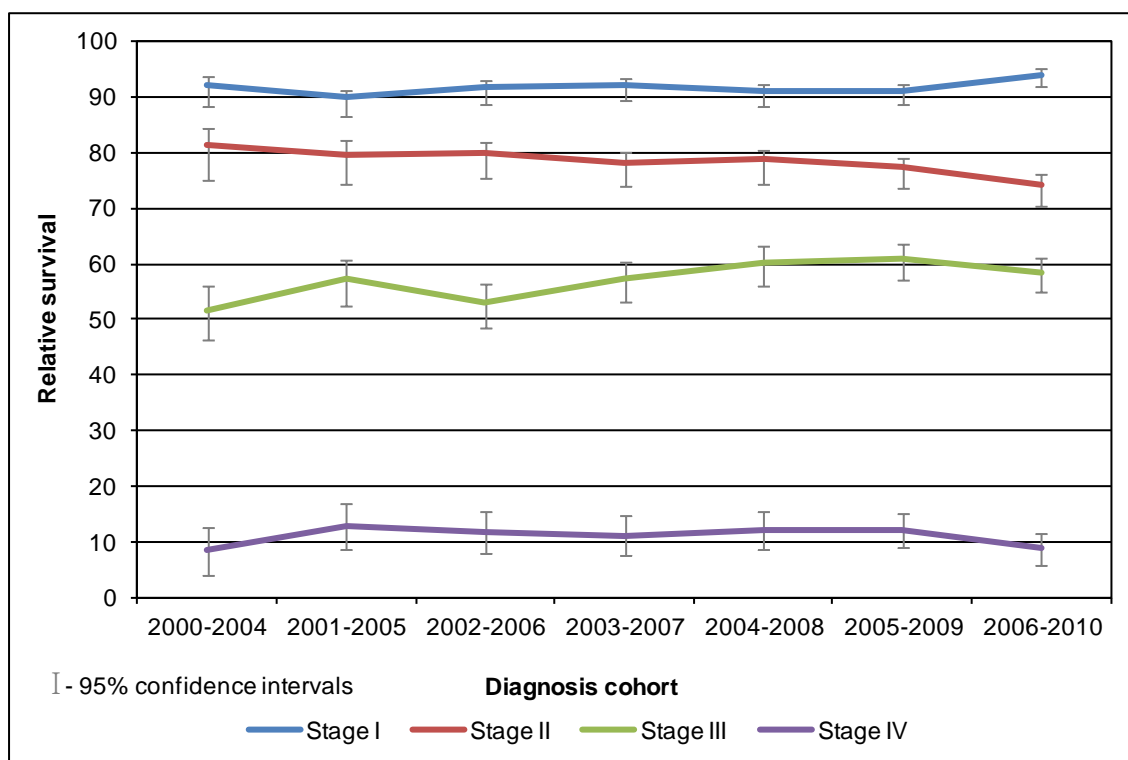

Source: National Cancer Data Repository; Office for National Statistics

Figure 14: Five-year relative survival rate (%) for renal cell kidney cancer, by stage, for females, England 2000–2010

Survival Analysis: Discussion

Kidney cancer survival has improved in males and females. All grades of tumours have shown improvement. Renal cell carcinoma and 'other' kidney cancers survival has improved but there has been no change for transitional cell carcinoma. There has been little change in stage-specific survival but this is hampered by data completeness issues. Incidence of kidney cancer has risen steadily, while mortality has shown little change in females and a slight decrease in males. It could therefore be speculated that a large amount of the increased survival is due to the differential between incidence and mortality rather than a true improvement in prognosis.

The increasing incidence has been attributed to more incidental detection of small kidney cancers due to increased use of medical imaging. If more early-stage kidney cancers are being detected by imaging, this may help explain the increase in survival rates as earlier treatment is more effective. There is, however, the possibility that over diagnosis leads to lead-time and length bias and this explains the observed upward survival. Lead-time bias will lead to an apparent increase in survival, as the cancer is simply detected earlier. Length bias results from detection of cancers with a less aggressive nature, which increases survival figures without improving prospects for those with the most aggressive or advanced form of the disease. This is reinforced by the unchanging stage-specific survival, suggesting that more diagnoses are being made at an earlier stage. However, when analysing survival by grade it was seen that the largest improvement in survival rates was seen in grades 3 and 4.

Survival for those diagnosed with a transitional cell carcinoma has not changed, and is lower than survival from renal cell carcinoma. This is in part a consequence of the differing biology of the disease, it being less easy to detect using simple imaging for early stage disease detection, possibly leading to relative delay in diagnosis, and relatively fewer advances in development of successful systemic therapies.

Despite little change in stage-specific survival, the differences between survival at stages I,II and III and survival at stage IV is marked. This reinforces the continued need to diagnose more kidney cancers at an early stage. Public awareness of signs and symptoms such as haematuria needs to be raised and people encouraged to visit their GP.

It should be noted that for many cancers the mortality rate five years after diagnosis stabilises. Therefore five-year relative survival is often considered as a measure of cure. For kidney cancer, survival rates continue to fall beyond the five year point, and this should be considered in interpretation.

Further Reading

For further information regarding kidney and other urological cancers, please visit the Urology Hub provided by the Public Health England South West Knowledge and Intelligence Team and the National Cancer Intelligence Network. The hub contains information regarding incidence, mortality and survival trends, report and factsheets:

http://www.ncin.org.uk/cancer_type_and_topic_specific_work/cancer_type_specific_work/urological_cancer/urological_cancer_hub/default.aspx

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