Kidney Cancer Trends: Incidence, Mortality, Progression, Funding, Comparison to Other Cancers

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Abstract #LB-61

INTRODUCTION

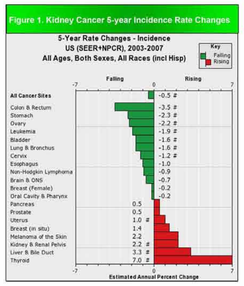
Kidney cancer, although it ranks 8th among all cancer types, is one of only four that have experienced a greater than 2% increase in incidence per year, and, unlike either cancers, it has not had a significant decline in mortality rate. According to the National Cancer Institute (NCI), kidney cancer incidence has been increasing for the last 65 years and ranks third among all cancers in rate of increase. It is unclear what accounts for the rise in incidence, although the increase in imaging, usually done for purposes other than kidney cancer screening, probably doesn't account for the rise in incidence. Evidence shows that the disease is being diagnosed at earlier stages and with less tumor size than in the past, which might account for keeping the mortality rate from rising.

To put kidney cancer in perspective, we compared its incidence and mortality trends with those of prostate and breast cancer and looked at possible reasons for the drop in mortality rates for the latter two diseases. The mortality rates for both prostate and breast cancers have fallen. This improvement is due to early detection via cancer screening tests, improved surgical techniques, and medical advances. Kidney cancer has no early screening test, and, until recently, has lagged in the development of medical therapies to treat metastatic disease. We believe that the lack of progress in kidney cancer is due to the absence of significant research funding for the disease, especially as compared to the funding for prostate and breast cancers.

Action to Cure Kidney Cancer (ACKC) is a grassroots advocacy organization that was founded in 2003 to advocate for increased funds for kidney cancer research, both public and private. Since 2004, we have mounted national campaigns, via Dear Colleague letters, to have Congress appropriate funding for kidney cancer research at the Department of Defense's Congressionally Directed Medical Research Programs (CDMRP). We have not yet obtained the $15 million in funding that we are requesting, however, our efforts have led Congress to appropriate $2.7 million, under the Peer Reviewed Medical/Cancer Research Program (PRMRP), over the past four years, to four kidney cancer researchers. In addition, we have awarded researchers over $200,000 in grants to support innovative work in kidney cancer.

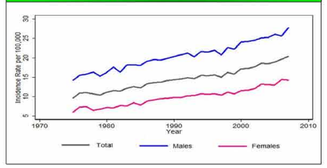
ACKC does not accept funding from pharmaceutical companies, which has allowed us to initiate campaigns to encourage drug companies to develop therapies for metastatic kidney cancer treatment.

Figure 1. Kidney Cancer 5-year Incidence Rate Changes



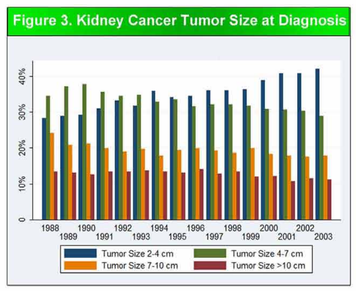
- The annual percentage change is significantly different from zero. All age categories are included (other charts for kidney cancer relate only to adults (20+). Source: National Program of Cancer Registries.

Figure 2 Kidney Cancer Incidence Rates



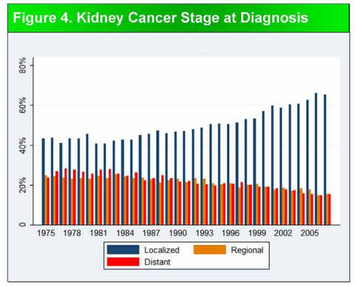
Tumor size at diagnosis, as evidenced by the following chart, decreased for the years 1988 through 2003, and stage at diagnosis, from 1975 through 2007, also declined. These data imply that diagnosis of kidney cancer is being done earlier and possibly incidentally.

Figure 3. Kidney Cancer Tumor Size at Diagnosis



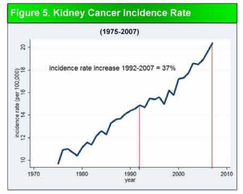
NB: The NCI SEER group had different standards of measurement, pre-1988 and post-2003 for tumor size at diagnosis. Therefore, in order to maintain consistency, only 1988-2003 were charted.

Figure 4. Kidney Cancer Stage at Diagnosis



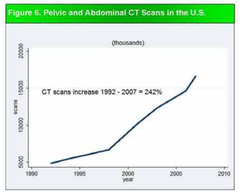
The kidney cancer incidence rate has been steadily increasing, as we have seen. Some people say that this is due to increased imaging. From 1992-2007, the incidence rate increased by 37%. However, during the previous 15-year period, 1977-1992, the rate increased by 35%, Source: SEER 9.

Figure 5. Kidney Cancer Incidence Rate



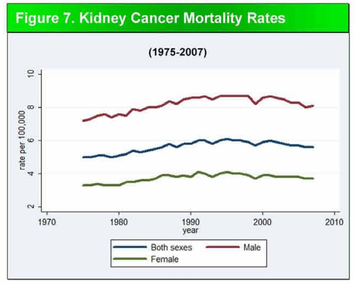
Over the period 1992-2007, CT scans increased from 4.9 million to 16.6 million, an increase of 242%. Therefore, there must be other contributing factors to explain the increase in incidence rate. Source: IMV Medical Information Division.

Figure 6. Pelvic and Abdominal CT Scans in the U.S.



Although incidence rates have been rising, kidney cancer mortality rates have leveled off since 1990. Source: National Center for Health Statistic (NCHS), Center for Disease Control (CDC).

Figure 7. Kidney Cancer Mortality Rates



Prostate and breast cancer mortality rates are much higher than kidney cancer since their incidence rates are higher. However, the mortality rate for prostate cancer fell by 40% from its high in 1993 to its low point in 2007, and breast cancer mortality fell by 31% from its high in 1989 to its low in 2007. Kidney cancer mortality has remained flat. Source CDC/NCHS.

Figure 8. Prostate, Breast and Kidney Cancer Mortality Rates

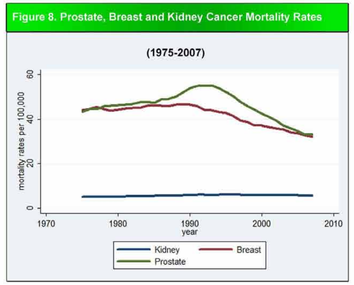
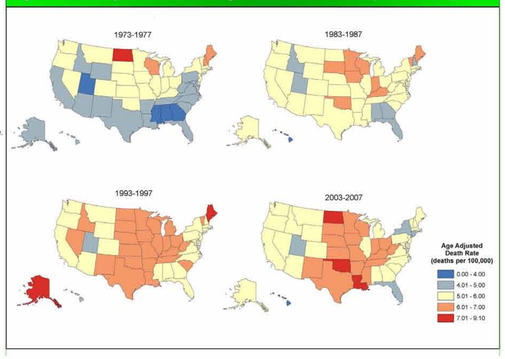
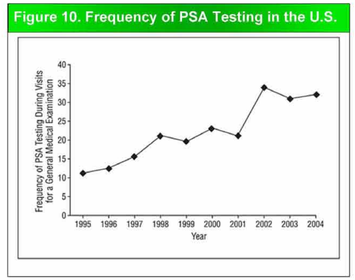


Figure 9. Kidney Cancer Mortality Rates - State Level (Adults 20+)



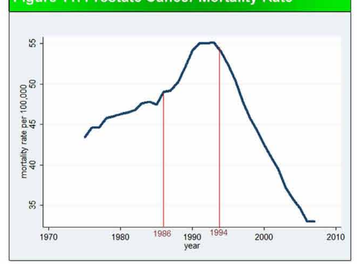
The FDA approved the PSA test in 1986 for monitoring already diagnosed prostate cancer patients and as a screening test in 1994. The frequency of PSA testing increased by 32% from 1995 to 2004. Prostate cancer mortality dropped by 35% from its high in 1993 to 2004. There is still some controversy about whether PSA screening reduces mortality rates or whether the rate drop is due to more effective surgical techniques and medical treatment. Nevertheless, prostate cancer mortalities have dropped precipitously in the PSA era.

Figure 10. Frequency of PSA Testing in the U.S.



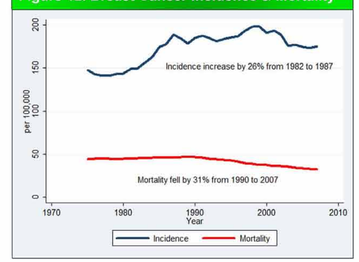
Source: "Trends in Prostate-Specific Antigen Testing from 1995 Through 2004" Arch Int Med 2007; reprinted by permission.

Figure 11. Prostate Cancer Mortality Rate



After widespread use, in the 1980s, of mammograms as a screening tool in the U.S., breast cancer incidence rates increased precipitously. Most of the increase in incidence ia an artifact of increased mammogram screening[1]. A few years after the incidence increase, breast cancer mortality fell significantly. The time lag between incidence increase and mortality decrease is understandable given that most of the mammograms picked up breast cancer at an early stage before onset of metastatic spread. See Daniel Kopans' article[2] for a discussion of mammograms and the falling mortality rate.

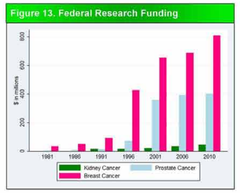
Figure 12. Breast Cancer Incidence & Mortality



[1]See Wisconsin study: Mammography Screening and Increased Incidence of Breast Cancer in Wisconsin. J Natl Cancer Inst 1991;83:1540-1546.
[2]Why the Critics of Screening Mammography Are Wrong. http://www.diagnosticimaging.com/breast/content/article/113619/1493126.

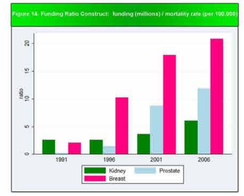
Federal funding includes NCI[1] and CDMRP[2] funding. For the years 1981 and 1986, funding for prostate cancer was less than $10 million, and kidney cancer figures are not available.

Figure 13. Federal Research Funding



[1]National Cancer Institute, Office of Budget and Finance
[2]Congressionally Directed Medical Research Program, Department of Defense

The following construct, which is equal to the NCI and CDMRP funding, in millions, divided by the mortality rate per 100,000, is meant to show the funding trend over time.



ACKC Supports Kidney Cancer Research

ACKC was formed in 2003 for the purpose of increasing the monies going for kidney cancer research. To that end, we have raised and have awarded to researchers $230,000 in grants over the last few years. In addition, we lobby Congress for an appropriation for kidney cancer research at the Department of Defense's Congressionally Directed Medical Research Programs. Due to our efforts, in the last four years, the DoD awarded $2.7 million in grants as part of their Peer Reviewed Medical/Cancer Research Program for three kidney cancer research projects.

FY2006 $932,900 Maria F. Czyzyk-Krzeska
University of Cincinnati
Project: Identification of Genes in Kidney Cancer Oncogenesis

FY2008 $721,800
Geoffrey Clark
University of Louisville
Project: The Role of RASSF1A Tumor Suppressor in Kidney Cancer

FY2009 $503,600
Alexander Parker
Mayo Clinic, Jacksonville

and

FY2009 $602,700
Richard Drake
Eastern Virginia Medical College
Project: Tissue and Metabolic Markers for Recurrent Kidney Cancer

DISCUSSION

The NCI, using SEER and National Program of Cancer Registries data, estimates that kidney cancer increased at an annual percentage change (APC) of 2.2% per year for the latest years that data is available (2003-2007). Although only ranking 8th in incidence rate among all cancers, kidney cancer is 5th for African American males and 6th for Latino males, according to the American Cancer Society. It is also increasing among both men and women (see Figure 2). Some people infer that the increase in imaging, CT scans and MRIs, has contributed to the increase in incidence. However, as Figures 5 and 6 indicate, kidney cancer was increasing before imaging became commonplace and has not tailed off at all, which would be expected. Smoking is a major risk factor for kidney cancer, but smoking has been decreasing. Of the top ten states with respect to prevalence of smokers, only Kentucky and Louisiana also rank among the top ten states for incidence of kidney cancer. Obesity is another major risk factor for kidney cancer, but again only Louisiana and Kentucky make the top ten list for both. Note that Kentucky leads the nation in smoking prevalence and is 2nd in obesity while ranking 5th in kidney cancer incidence (these are CDC data). There are a number of chemicals that are possible carcinogens for kidney cancer and they also pollute the nation's water supply, e.g. trichloroethylene. But few studies have been conducted on carcinogens and kidney cancer.

Figures 3 and 4 indicate that kidney cancer is being diagnosed at earlier stages with concomitant smaller tumor size. This keeps the mortality rate from rising despite the increase in incidence. Possibly, that's an artifact of increased imaging. Looking at Figures 5 and 6, there seems to be no increase in incidence that can be attributed to increased imaging.

By contrast, the mortality rates, measured in 2007, for both prostate and breast cancer have steeply declined, prostate cancer by 40% from its high in 1993 and breast cancer by 31% from its high in 1989. Certainly, early detection plays a big role in both diseases as both cancers have diagnostic screening tests. Improvement in surgical techniques and advances in medical therapy, both adjuvant and otherwise, have also helped. Kidney cancer has no screening test and no adjuvant therapy.

Funding for research surely plays a major role in diagnosing and treating cancer. T. Ming Chu, who led a team of 20 researchers at Roswell Park Cancer Institute in developing the PSA test for prostate cancer, said that the test would not have been developed were it not for government funding.

As Figure 13 shows, Federal funding for prostate and breast cancer far outstrips that of kidney cancer and the gap is widening. Of course, many more people get prostate and breast cancers than kidney cancer, so we created a construct of dollars spent divided by mortality rate, which illustrates the major disparity in funding – see Figure 14. The government investment in research does not even take into account private funding. The two leading cancer organizations for for prostate and breast, the Prostate Cancer Foundation and Komen for the Cure, expended $40 million and $59 million, respectively, on research projects in 2010. Kidney cancer private sector funding is negligible.

ACKC calls on the Federal government to increase its investment in kidney cancer research in order to develop a screening test, adjuvant therapies, and effective treatment for metastatic kidney cancer, a disease that claims the lives of over 13,000 Americans every year.