Centre for Cancer Control Research
Monograph Series

South Australian Cancer Statistics

Monograph No 7

Cancers of the Prostate, Testis, and Urological Organs

The Cancer Council South Australia

September 2003

INTRODUCTION TO

CANCERS OF THE PROSTATE, TESTIS AND UROLOGICAL ORGANS

This monograph, the seventh in our information series, addresses an important group of cancers that account for about a fifth of all cancer deaths in males in South Australia. Moreover, around 50 South Australian females die from urological cancers of the bladder and kidney each year.

No proven means exist for preventing prostate cancer, the most commonly reported male cancer in South Australia. Screening of asymptomatic men through PSA (Prostate Specific Antigen) testing offers the potential to improve cure rates, but it is a controversial screening test and likely will remain so until results of field trials presently underway in the USA and Europe become available.

By comparison, good opportunities exist to reduce the death toll from cancers of the bladder and kidney. Indeed, the World Health Organization's International Agency for Research on Cancer has estimated that between 30% and 70% of bladder cancers and around a third of kidney cancers in western populations could be prevented if tobacco smoking were eliminated. Preventive benefits also could follow if the fruit and vegetable content of the western diet were increased.

Dr Roder has used publicly available data sources, listed in Appendix A, to draw comparisons between South Australian cancer incidence rates and those of other countries. These comparisons show how South Australia is faring in an international context and highlight the importance of placing a greater emphasis on the prevention and control of these cancers.

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September 2003

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ACKNOWLEDGEMENTS

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The following people also are acknowledged for providing advisory input in the preparation of this monograph: Professor Ian Olver, Professor Villis Marshall, Dr Alan Stapleton, Ms Ellen Kerrins, Ms Peta Conor, and Associate Professor Kerry Kirke.

Previous monographs in this series

- South Australian Cancer Statistics. Monograph No 1. *Cancers of the digestive system*. November, 2001.
- South Australian Cancer Statistics. Monograph No 2. *Sun-related cancers of the skin and lip*. January, 2002.
- South Australian Cancer Statistics. Monograph No 3. *Cancers of the respiratory organs, throat and mouth*. May, 2002.
- South Australian Cancer Statistics. Monograph No 4. *Cancers of the female breast and gynaecological organs*. July, 2002.
- South Australian Cancer Statistics. Monograph N. 5. *Lymphomas, myelomas and leukaemias*. January, 2003.
- South Australian Cancer Statistics. Monograph No. 6. *The cancer experience - the time after treatment*. September, 2003.

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What is happening and what can we do better?

Each year, approximately 1,490 South Australians are diagnosed with cancers of the prostate, testis and urological organs, and around 400 deaths occur annually as a result. These cancers account for about 20% of all cancer deaths in males and 4% of those in females. They can be sub-divided into cancers of the male reproductive organs and urinary tract cancers of both sexes.

Each year in South Australia, about 1,100 cancers are diagnosed in the male reproductive organs, 95% of them prostate cancers (*Figure 1*). They represent about 27% of all cancers reported to the South Australian Cancer Registry, which underlines their public health importance. The annual death toll from these cancers approximates 240, of which 99% are due to prostate cancer.

Figure 1: % of cancers of male organs by cancer type; South Australian males, 1997-2001

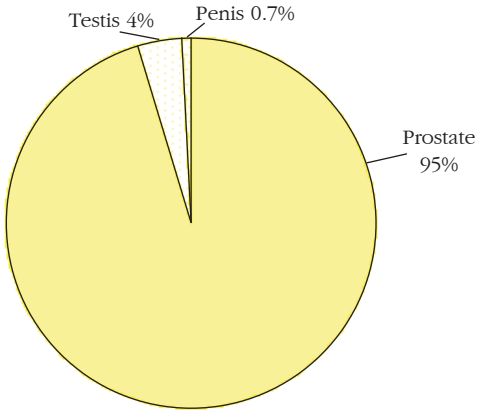
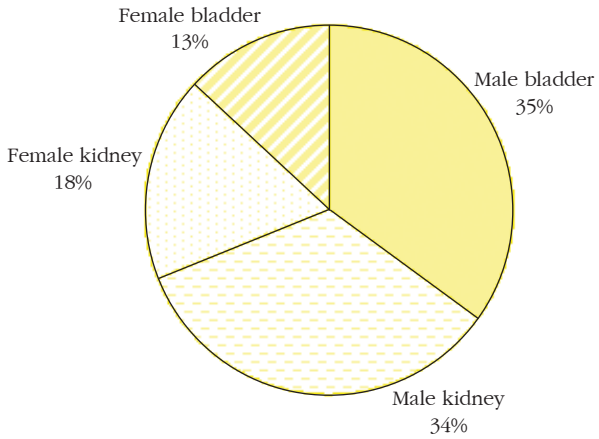


Figure 2: % of bladder and kidney cancers by sex and cancer type; South Australia, 1997-2001



Meanwhile, **about 385 urinary tract cancers are diagnosed in the bladder and kidney annually**, approximately 70% of them in males. The distribution by organ site and sex is shown in *Figure 2*. Approximately 155 deaths occur annually from these cancers, two thirds of them in males.

WHO's International Agency for Research on Cancer has emphasised for many years the opportunities that exist to prevent bladder and kidney cancers. For example, in 1990, the Agency indicated that elimination of tobacco smoking would reduce numbers of bladder cancers in western populations by between 30% and 70%, and numbers of kidney cancers by about a third. The Agency also has underscored the potential for additional preventive benefits from adopting diets rich in fruit and vegetables. Apart from these opportunities, scope for further prevention exists for individual cancer types, which is highlighted in the respective sections of this monograph.

Population screening of men without symptoms has been proposed by some health professionals as a public health strategy to reduce deaths from prostate cancer. The benefits of screening asymptomatic men for prostate cancer through PSA (Prostate Specific Antigen) blood testing are being evaluated in field trials, but the results are not yet available. The prevalence of occult lesions with a low potential for growth and spread is thought to be about 15% to 30% in men over 50 years of age. While PSA testing will detect potentially lethal lesions, with the potential to increase cure rates, it also will reveal substantial numbers of non-lethal lesions, leading to unnecessary treatment and treatment side effects.

Most Australian health authorities remain uncertain about the respective benefits and side effects and are

reluctant to advocate population screening for prostate cancer in advance of the results of field trials. They are promoting educational programs, however, to increase levels of understanding about this cancer and to reduce confusion about testing options.

While screening for testicular cancer also has been advocated in some settings, the benefits are yet to be evaluated in field trials. Already treatment has a high cure rate, with fewer than two deaths occurring annually from this cancer in South Australia.

This monograph provides answers to the following key questions:

- *How common are each of these cancers in South Australia and are they becoming more or less common?*
- *How common are they in South Australia compared with other parts of the world?*
- *What are the prospects for cure in South Australia compared with prospects elsewhere, and how is this changing?*
- *What are the opportunities to make a difference through prevention or by improving the potential for curative treatment?*

Source data were obtained from public documents listed in Appendix A and supplementary outputs from the South Australian Cancer Registry.

What is happening and what can we do better?

About 1,100 cancers of male reproductive organs are diagnosed in South Australia each year, comprising cancers of the prostate (95%), testis (4%) and penis (<1%). These cancers account for around 240 deaths per annum, 99% of them due to prostate cancer. Meanwhile, about 385 bladder and kidney cancers are diagnosed annually, approximately 70% of them in males. These urinary tract cancers contribute about 155 deaths annually.

It is estimated that eliminating tobacco smoking would reduce numbers of bladder cancers in western populations by 30-70% and numbers of kidney cancers by about a third. Additional preventive benefits could be achieved by increasing fruit and vegetable consumption.

While there is the potential for PSA (Prostate Specific Antigen) screening to increase cure rates from prostate cancer through earlier detection, the results of field trials are not yet available. Meanwhile, uncertainty remains about the respective benefits and side effects. For this reason, most Australian health authorities are not advocating population screening for prostate cancer ahead of the results of these trials.

Prostate cancer

Introduction:

Prostate cancer is the most common cancer reported in males by cancer registries in western countries, although it is a less frequent occurrence in the developing world. **It is the most commonly reported cancer in South Australian males, accounting for about 26% of all cases.**

The prostate is a small organ located just below the bladder. It produces fluid to transport and provide nutrient to sperm. With age, the prostate may enlarge, leading to a non-cancerous condition known as benign prostatic hyperplasia. This condition, and less frequently encountered prostate cancers, can produce similar symptoms, such as impaired urine flow, frequent urination (particularly at night), pain or burning upon urinating, and the presence of blood in the urine. Advanced cancers may also cause persistent pain in the back, hips or pelvis.

Undiagnosed prostate cancer is common in older men. Notably, about 15% to 30% of males over 50 years of age are thought to have prostate cancers with a low potential for growth and spread. PSA testing (testing blood samples for Prostate Specific Antigen) can disclose many of these lesions, as well as more lethal varieties, leading to major increases in numbers of *diagnosed* cancers.

Risk factors:

- **Increasing age.** In South Australia in 2001, 88% of prostate cancers were diagnosed in men aged 60 years or more and 61% in those aged 70 years or more.
- **A positive family history of prostate cancer**, such as an affected father or brother.
- Possibly a western diet characterised by a high content of fat, red meat and milk and dairy products, and a low content of vegetables.
- Possibly a low intake of lycopene, selenium, vitamin E, phyto-oestrogens and fish oil.

There is also evidence that male hormone levels may affect the risk of prostate cancer, although the nature of these effects requires further research. Meanwhile, a recent Australian study has suggested that a higher frequency of semen ejaculation, especially in young adulthood, may be linked to a lower risk of this cancer.

Occurrence:

In South Australia:

Each year from 1997 to 2001:

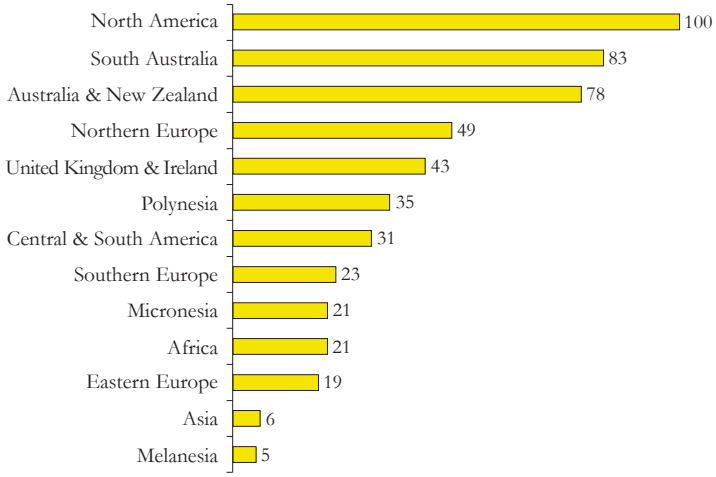
- **An average of 1,054 men were diagnosed with prostate cancer.**
- **An average of 240 men died from this cancer.**
- **About 14% of cancer deaths in males were due to prostate cancer.**

The great majority of these deaths (97%) occurred in men over 60 years of age, with only about seven taking place annually in men in their fifties or younger. Based on current incidence rates, it is expected that around *1 in 10* South Australian males would be diagnosed with a prostate cancer at some time before 75 years of age.

In the world:

Figure 3 shows that **incidence estimates for *diagnosed* prostate cancers have been highest for**

Figure 3: Prostate cancer incidence estimates for the year 2000, with North America used as the reference category* (reference set at "100")

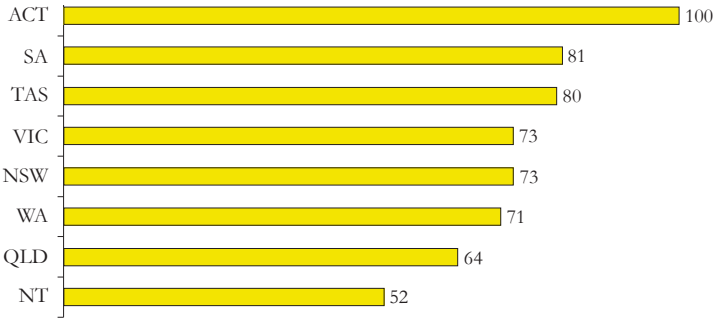


*Age standardized (World Population).

North America, followed by South Australia and Australia & New Zealand collectively. Much lower estimates have applied elsewhere in the world, with the lowest applying to Melanesia and Asia. The worldwide variation has been about 20-fold. Much of this would be due to variable disease disclosure through different exposures to PSA testing. Another contributor may be diet, with elevated incidence rates resulting from western diets characterised by a high content of fat, red meat, milk and dairy products, and a low content of vegetables.

South Australia had a similar incidence of prostate cancer to Tasmania in 1995-1999. While both states had a lower incidence than the Australian Capital Territory, their incidence rates were higher than those of other states and territories (*Figure 4*). A particularly low incidence applied to the Northern Territory, which likely was affected by low incidence rates in Aboriginal residents.

Figure 4: Annual incidence of prostate cancer; Australia, 1995-1999*
ACT rate set as the reference at "100"



*Age standardized (1991 Australian Population).

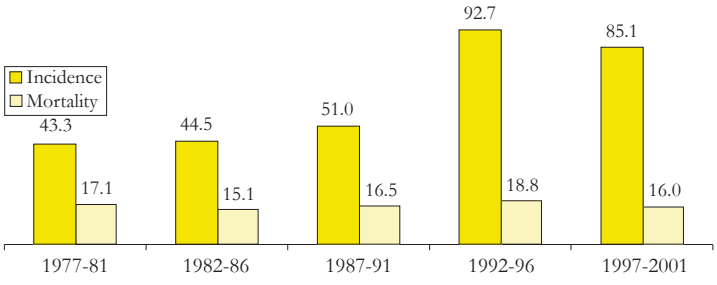
Time trends:

The incidence of *diagnosed* prostate cancer increased more than two fold in South Australia during 1977-96, mostly due to increases in the 1990s that were linked to increased PSA testing (*Figure 5*). The incidence increase was more pronounced in 50-69 year olds than other age ranges. The 9% reduction in incidence between 1992-96 and 1997-2001 may reflect a lower yield of cancers from repeat than initial PSA tests, plus less widespread testing. Meanwhile, **there was not a clear upward or downward trend in mortality during 1977-2001** (*Figure 5*).

Population screening of asymptomatic men for prostate cancer by PSA (Prostate Specific Antigen) testing is controversial. The process can detect lethal cancers, with the potential to improve cure rates, but also others that would not pose a health threat if left undetected. There are negative side effects from treatment that need to be weighed against uncertain benefits of early detection.

Research is presently underway to gain the evidence needed to weigh up the positive and negative aspects, but the results are not yet available. Meanwhile, some countries have reported a recent downturn in death rate that may be screening related. Similar findings have been indicated for New South Wales. While the

Figure 5: Annual incidence and mortality rates for prostate cancer per 100,000 males; South Australia, 1977-2001*



*Age standardized (World Population).

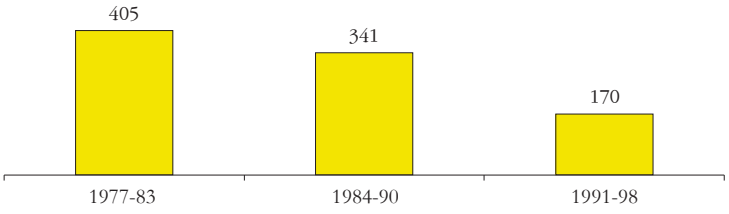
death rate in South Australia was lower in 1997-2001 than for 1992-96 (*Figure 5*), it would be too early to assume that this was screening-related and the beginning of a more sustained decrease.

Case outcomes:

The proportion of South Australian patients dying of prostate cancer within five years of diagnosis decreased from 41% for the 1977-83 diagnostic period to 17% for 1991-98 (*Figure 6*). This is attributed to increased disclosure and earlier diagnosis of these cancers. However, it is not possible with the available evidence to be sure whether there has been a treatment gain or whether the number of deaths is unchanged and whether they simply represent a smaller proportion of a greater number of *diagnosed* cases.

The 83% five-year survival from prostate cancer in South Australia in 1991-98 was the same as recorded for all Australian cases in 1992-97. While the USA reported figures of over 90% in the 1990s, the

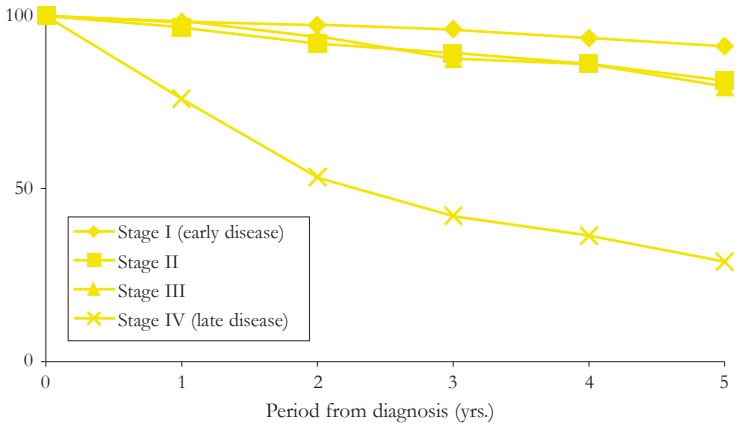
Figure 6: Numbers per 1,000 cases dying from prostate cancer within five years of diagnosis; South Australia, 1977-98*



Period of diagnosis

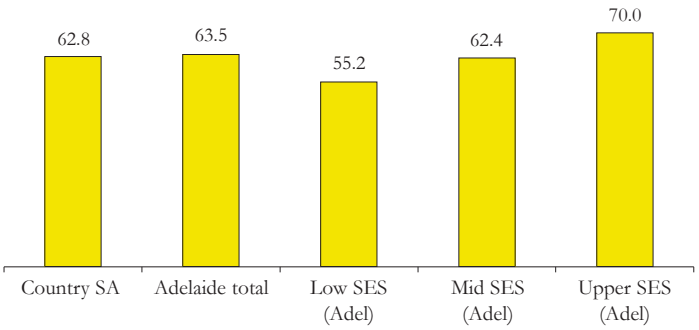
*Date of censoring: 31 December 1998.

Figure 7: % surviving prostate cancer by TNM stage; South Australian teaching hospitals, 1990-97*



*Date of censoring: 31 December 1998.

Figure 8: Annual incidence of prostate cancer per 100,000 males by residential area; South Australia, 1977-2000*



*Age standardized (World Population).

corresponding five-year survival reported for European cases in 1985-89 was only 56%. It is likely that these marked differences included artificial effects from variations in screening coverage.

Five-year survivals are strongly related to stage of progression of the cancer at diagnosis, with over 90% with stage I (early disease) surviving five years or more from diagnosis, as compared with less than 30% surviving this duration for stage IV (late disease) (*Figure 7*).

The management of prostate cancer differs around the world. Options range from simply monitoring early lesions (often referred to as *watchful waiting*) to radical surgery or radiotherapy for localised disease, and hormone therapy for disseminated cancers.

Other trends:

Prostate cancer generally is detected more frequently in upper than lower socio-economic areas. This also applies in Adelaide where, compared with the lower socio-economic suburbs, the upper socio-economic suburbs have had an incidence about 27% higher (*Figure 8*). This may be partly a result of greater disclosure of cancers through more extensive PSA testing among upper socio-economic (upper SES) groups. Meanwhile, similar incidence rates have applied to country and Adelaide residents.

South Australians born in Australia had an incidence in 1977-2000 about a third higher than residents from other countries (*Figure 9*). In particular, low rates were evident for residents born in Asia, Southern Europe, and Eastern Europe.

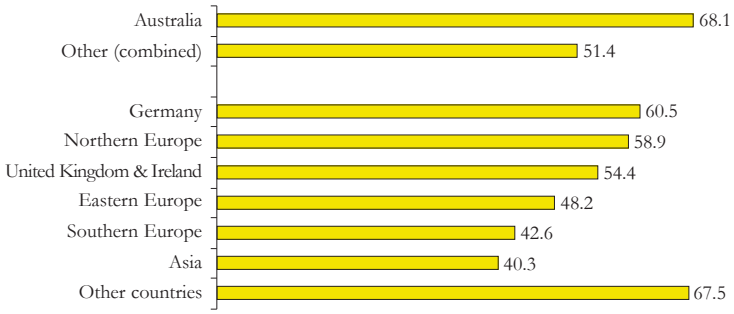
The incidence also varied by race (*Figure 10*), with **Aboriginal residents having a rate just over a half that of other residents.**

Reducing the impact of prostate cancer:

- **Proven means of preventing this cancer do not exist**, although the typical western diet, high in fat, red meat, milk and dairy products, and low in vegetables, is a possible risk factor for prostate cancer.

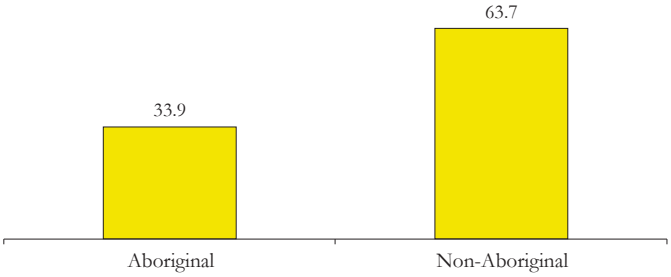
- **Population-based screening of asymptomatic men by PSA testing is not being advocated by most Australian health authorities** in advance of the results of current field trials, due to uncertainties about benefits and side effects.
- **The National Cancer Control Initiative has recommended an educational program for Australia that includes:**
  - The development and promotion of peer-reviewed educational materials for doctors on prostate cancer and urinary symptoms.
  - The development and promotion of decision aids for doctors to use with patients when PSA testing is requested or discussed.
  - A national community education program summarising the current knowledge of potential benefits and risks of PSA testing.

Figure 9: Annual incidence of prostate cancer per 100,000 males by country of birth; South Australia, 1977-2000*



*Age standardized (World Population).

Figure 10: Annual incidence of prostate cancer per 100,000 Aboriginal and non-Aboriginal residents; South Australia, 1977-2000*



*Age standardized (World Population).

Prostate cancer

This is the most common cancer reported in males to the South Australian Cancer Registry. Each year, about 1,050 males are diagnosed with prostate cancer and around 240 die as a result. Based on present incidence rates, around *1 in 10* South Australian males would be diagnosed with prostate cancer at some time between birth and 75 years of age. The only known risk factors are increasing age and a positive family history, although western diets high in fat, red meat and milk and dairy products, and low in vegetables, are a possible risk factor.

South Australia and Australia & New Zealand collectively have a relatively high incidence of *diagnosed* prostate cancer, although not as high as North America. Much of this elevated incidence has been attributed to increased disclosure of cancers through PSA (Prostate Specific Antigen) testing, although a truly elevated incidence also may apply. Numbers of diagnosed cancers increased abruptly in South Australia in the 1990s when increases in PSA testing took place. Meanwhile the death rate from this cancer has not increased and there is the suggestion of a recent downturn.

Prostate cancer is diagnosed more frequently in upper than lower socio-economic areas of Adelaide and more frequently in residents born in Australia as compared with other countries. Aboriginal residents have a relatively low incidence of diagnosed prostate cancer.

While there are no proven means of preventing this cancer, adoption of a healthy diet rich in vegetables may be beneficial. Population-based PSA screening has the potential to increase cure rates, although this screening is not being advocated by most Australian health authorities in advance of results of field trials, due to uncertainties about benefits and side effects.

Testicular cancer

Introduction:

Although rare in older men, **testicular cancer is the most common cancer reported worldwide in males under 50 years**. For reasons unknown, the incidence has risen progressively in many countries since the early 20th century.

The testes are the male genital glands that produce sperm and the male hormone testosterone. They are located in the scrotum, a loose fibrous bag located below the penis. Testicular cancers are classified by cell type as seminomas and non-seminomas. They generally present as a painless swelling, although there may be pain or discomfort, or an aching sensation in the lower abdomen. There also may be a feeling of heaviness in the scrotum.

Risk factors:

- **Undescended testes**. The testes develop during foetal life in the lower abdomen and then descend into the scrotum before birth. If this descent does not occur properly, the risk of testicular cancer may be increased.
- **Genetic disorders** such as Klinefelter's syndrome, male pseudohermaphroditism, testicular feminisation, and Down's syndrome. These conditions are often associated with undescended testes or other disorders of sexual maturation.
- **A family history**, although it has been difficult to distinguish in these instances between genetic causes and common environmental influences.

A range of other *possible* risk factors include:

- Infertility or reduced fertility.
- Low birth-weight or a pre-term birth.
- Neonatal jaundice.
- Immunosuppression.
- Early age at onset of puberty (eg, when under 13 years).
- Having had an inguinal hernia repair.
- Prenatal exposure to oestrogen and oestrogen-like agents.
- Prenatal irradiation.
- Viral infections, such as mumps or infection with Epstein-Barr virus or cytomegalovirus.
- Occupational exposures, as may occur in aircraft maintenance and the petroleum industry, and among metal workers, printers and leather workers.

Some researchers have questioned whether the routine use of tight underwear might predispose to cancer by increasing body temperature around the testes.

Occurrence:

In South Australia:

Each year from 1997 to 2001:

- **An average of 45 males were diagnosed with testicular cancer.**
- **An average of less than two males died from these cancers.**

Deaths from testicular cancer usually occur at a relatively young age. For example, only two of eight deaths from this cancer affected men aged 60 years or more in 1997-2001. Approximately *1 in 250* Australian males are likely to be diagnosed with testicular cancer at some time before 75 years of age.

In the world:

Figure 11 indicates **a relatively high incidence of testicular cancer in Northern and Eastern Europe, South Australia, and Australia & New Zealand collectively**. By comparison, low incidence estimates apply to Africa, Melanesia, Asia, and Central & South America. A more than 12-fold variation in incidence is evident worldwide. This suggests strong environmental influences, although the reasons for these variations are not known.

South Australia had a relatively high incidence of testicular cancer by Australian standards during

1995-1999, exceeded only by the Australian Capital Territory (*Figure 12*). By comparison, a low incidence applied to the Northern Territory.

Time trends

The incidence of testicular cancer increased by about a half in South Australia during 1977-2001 (*Figure 13*). This occurred mostly in the 1990s. Previous analyses showed the increase to be most pronounced in 15-49 year olds. Similar trends have been reported in other western populations. While the causes are not known, some researchers have suspected earlier age at onset of puberty, whereas others have pointed to sedentary lifestyles.

Despite the incidence increase, a reduction in death rate of about 70% took place between 1977-81 and 1997-2001 (*Figure 13*). Most of this reduction occurred between 1977-81 and 1982-86. Reductions in deaths have been reported in other countries and mostly attributed to treatment advances, including chemotherapy as an adjunct to surgery.

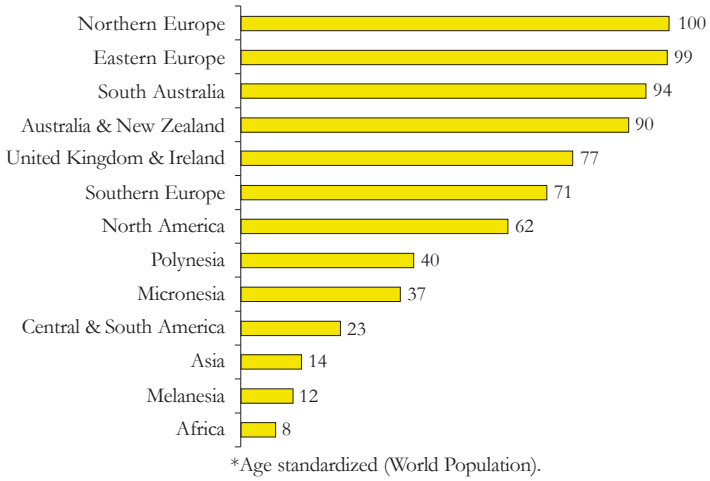
Case outcomes:

The proportion of South Australian patients dying of testicular cancer within five years of diagnosis approximately halved during 1977-98 (*Figure 14*). This has been attributed to treatment advances.

The 94% five-year survival for South Australians diagnosed in 1991-98 is similar to the 96% recorded for Australia collectively in 1992-97 and the USA in 1992-99. By comparison, a lower five-year survival of 90% was reported for European patients diagnosed in 1985-89.

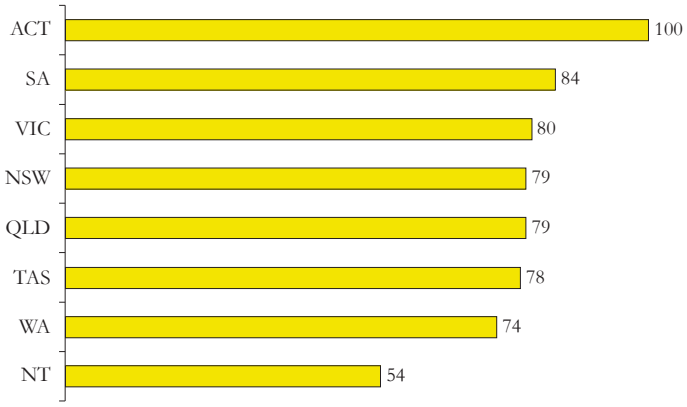
Primary treatment usually involves surgery, although radiotherapy and chemotherapy may be additional therapies, depending on the cell type of the cancer and the extent of spread. In South Australian teaching hospitals during 1990-97, 96% of cases had surgery as part of their primary course of care, 24% had radiotherapy, and 41% had chemotherapy. While surgery would be

Figure 11: Testicular cancer incidence estimates for the year 2000, with Northern Europe used as the reference category* (reference set at "100")



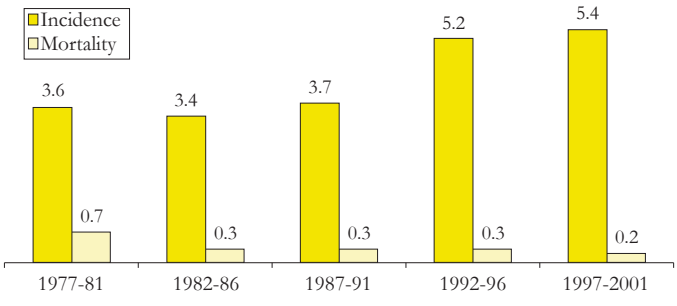
*Age standardized (World Population).

Figure 12: Annual incidence of testicular cancer; Australia, 1995-1999* ACT rate set as the reference at "100"



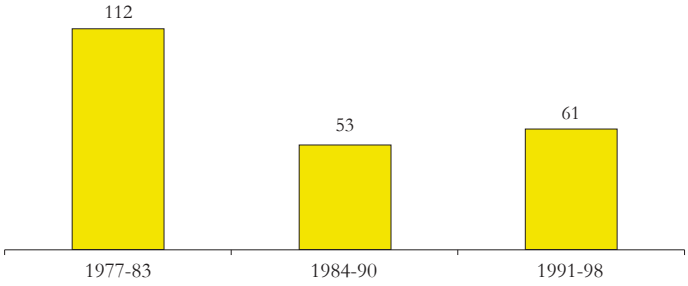
*Age standardized (1991 Australian Population).

Figure 13: Annual incidence and mortality rates for testicular cancer per 100,000 males; South Australia, 1977-2001*



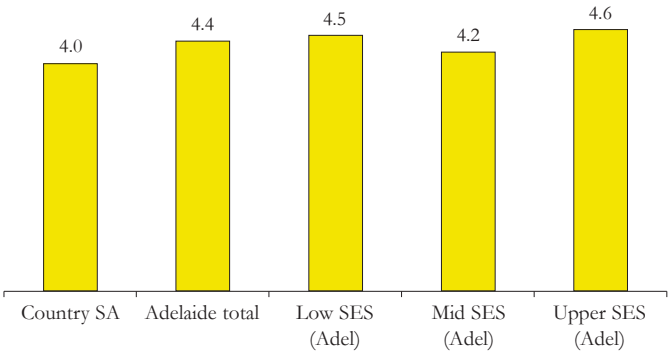
*Age standardized (World Population).

Figure 14: Numbers per 1,000 cases dying from testicular cancer within five years of diagnosis; South Australia, 1977-98*



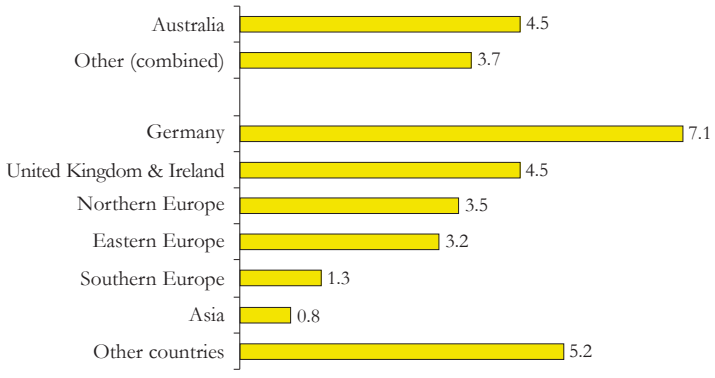
*Date of censoring: 31 December 1998.

Figure 15: Annual incidence of testicular cancer per 100,000 males by residential area; South Australia, 1977-2000*



*Age standardized (World Population).

Figure 16: Annual incidence of testicular cancer per 100,000 males by country of birth; South Austrtalia, 1977-2000*



*Age standardized (World Population).

universal under normal circumstances, this treatment may be delayed or not provided in special circumstances, as for example when the affected person is close to death from another disease.

Other trends:

Testicular cancer is generally more common in upper than lower socio-economic (SES) areas of western populations, although a consistent socio-economic trend was not evident in South Australia in 1977-2000 (*Figure 15*).

Australian-born South Australians tended to have a higher incidence than residents born in other countries, especially Asia and Southern Europe (*Figure 16*). While Aboriginal residents had a lower incidence than other residents, the difference was small and attributable to chance.

Reducing the impact of testicular cancer:

- **No proven means exist for preventing testicular cancers**, although undescended testes should be surgically corrected before puberty, ideally by two years of age, so that they can be readily examined for changes.

- **Medical attention should be sought if symptoms arise**, such as swelling, pain or discomfort, or a feeling of heaviness in the scrotum.

- **Some authorities advocate regular testicular self-examination for early detection**. While this may be beneficial, the benefits are yet to be confirmed in field trials. Already there is a high cure rate, such that an average of less than two deaths occur annually from this cancer in South Australia.

Testicular cancer

Although rare in older men, testicular cancer is the most common cancer reported worldwide in males under 50 years. For reasons unknown, the incidence has risen in many countries. Acknowledged risk factors include undescended testes, certain genetic disorders and a family history, although most testicular cancers have no apparent cause.

An average of 45 South Australian males are diagnosed annually with testicular cancer. Survival prospects are high, with fewer than two males dying annually from this disease. South Australia and Australia & New Zealand collectively have a relatively high incidence of this cancer by international standards, although not as high as Northern and Eastern Europe.

The incidence of testicular cancer increased by about a half in South Australia in 1977-2001. Similar trends have been reported in other western populations. While the causes are not known, some researchers suspect earlier age at onset of puberty, whereas others have suggested increased sedentary lifestyles. South Australians born in Australia tend to have a higher incidence than those born in other countries, especially Asia and Southern Europe.

Treatment advances have greatly increased prospects for survival, with 94% of South Australian patients now surviving testicular cancer five or more years from diagnosis.

No proven means exist to prevent these cancers, although undescended testes should be corrected surgically before puberty, ideally by two years of age.

Penile cancer

Introduction:

Cancers of the penis are rare. When they do occur, they mostly affect the glans or foreskin in males over 50 years of age. The great majority are classified by cell type as squamous cell carcinomas. These cancers can present as growths, sores, unusual discharge or bleeding, or a swelling of lymph nodes in the groin.

Risk factors:

- **Being uncircumcised**, although the risk in uncircumcised men probably can be minimised by good hygiene practices.
- **A history of infection with the Human Papilloma Virus (HPV).**
- **Behaviour that increases the risk of HPV infection** (eg, unprotected sex with multiple partners).
- **Phimosis**, where the orifice of the foreskin is too narrow for retraction.
- Possibly cigarette smoking.
- Possibly immunosuppression.

Occurrence:

In South Australia:

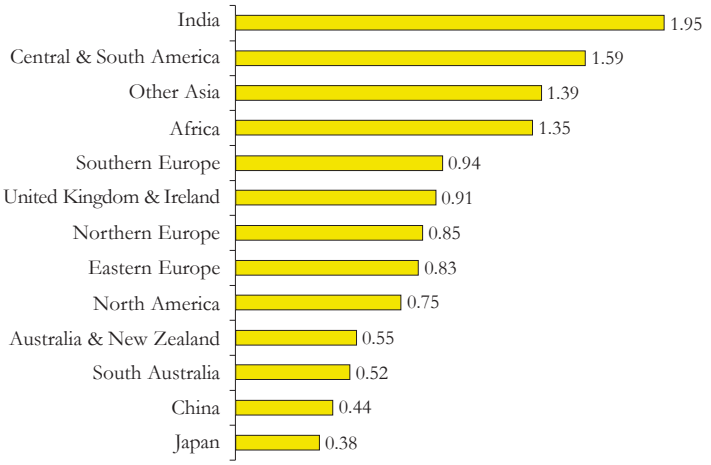
From 1997 to 2001:

- **An annual average of eight men were diagnosed with cancer of the penis.**
- **An annual average of less than one male died from this cancer.**

In the world:

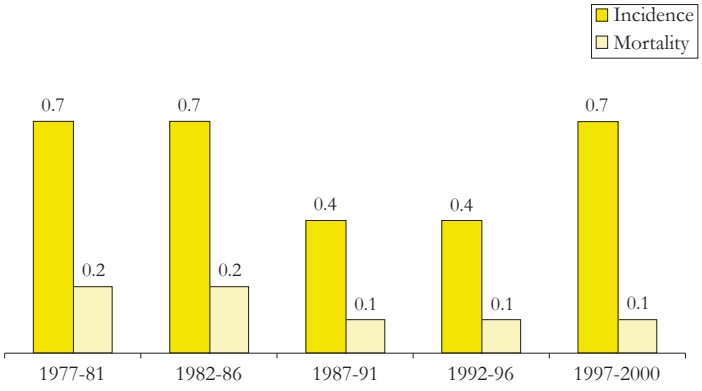
Cancer of the penis is generally more common in countries with low standards of living. *Figure 17* shows an approximate five-fold variation in incidence worldwide. High rates apply to India, Central & South America, Asia (apart from Japan and China) and Africa. By comparison, Japan, China, **South Australia, and Australia & New Zealand collectively have low rates.**

Figure 17: Annual world-wide incidence of cancer of the penis per 100,000 males; circa 1990*



*Age standardized (World Population).

Figure 18: Annual incidence and mortality rates for cancer of the penis per 100,000 males; South Australia, 1977-2001*



*Age standardized (World Population).

Time trends:

The incidence of this cancer was inconsistent in South Australia during 1977-2001, probably due to the statistical instability inherent in small numbers (*Figure 18*). A clear upward or downward trend was not evident. While a reducing mortality rate was suggested, this could have occurred by chance, given the small numbers of deaths involved.

Case outcomes:

The proportion of South Australian patients dying from cancer of the penis in the first five years from

diagnosis approximated 25% for the 1991-98 diagnostic period (i.e., 75% survived five years or more). This did not differ substantially from earlier periods (*Figure 19*).

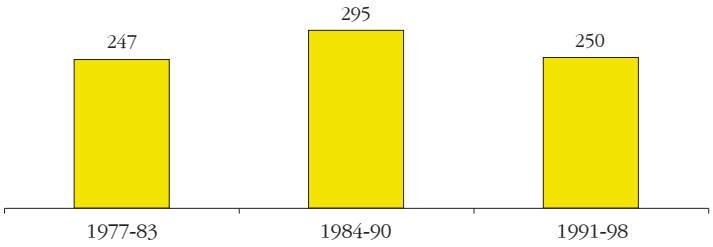
The 75% five-year survival from this cancer in 1991-98 was the same as for the USA in 1992-99, and similar to the 72% for European cases in 1985-89. These cancers are highly curable if found early. Very small cancers can be treated with chemotherapy cream, whereas surgery is normally required for more advanced lesions.

Other trends:

Most international studies show a higher incidence of cancer of the penis among lower than upper socio-economic groups. A lower socio-economic gradient also was evident in South Australia in 1977-2000, although comparisons were hindered by small case numbers. **Compared with upper socio-economic areas of Adelaide, the incidence was 26% higher in the middle socio-economic suburbs and 33% higher in low socio-economic suburbs.**

While male residents born in Southern Europe had an elevated incidence, the numbers of cases available for study were too small for this to be a definitive finding. Similarly, there were too few cases to evaluate differences by race.

Figure 19: Numbers per 1,000 cases dying from cancer of the penis within five years of diagnosis; South Australia, 1977-98*



*Date of censoring: 31 December 1998.

Reducing the impact of cancer of the penis:

- **Use of condoms is advocated** to reduce the risk of HPV infection.
- **Prompt medical attention should be sought if symptoms present**, such as growths, persistent sores, abnormal discharge, or a swelling of lymph nodes in the groin.

While circumcision may reduce the risk, this practice is controversial due to broader health implications. Meanwhile, the development of a HPV vaccine is an important goal for the prevention of these and other genital cancers.

Penile cancer

Cancer of the penis is a rare disease. Risk factors include being uncircumcised, although this risk can probably be minimised through good hygiene practices. Infection by the Human Papilloma Virus (HPV) is another risk factor, as is phimosis where the orifice of the foreskin is too narrow for retraction. About eight men are diagnosed annually with cancer of the penis in South Australia, with an average of less than one dying of this disease per annum.

This cancer is generally more common in countries with relatively low standards of living. South Australia and Australia & New Zealand collectively have relatively low rates. A tendency is evident in South Australia and elsewhere for cancer of the penis to be more common in lower than upper socio-economic areas.

Use of condoms is recommended to reduce the risk of HPV infection. While circumcision also may reduce the risk of this cancer, this practice is controversial due to broader health implications. Meanwhile, the development of a HPV vaccine is an important goal for the prevention of this and other genital cancers.

Bladder cancer

Introduction:

The main role of the bladder is to store urine excreted by the kidneys for emptying during urination. Bladder cancers are generally classified by cell type as transitional cell carcinomas, although around six per cent may be squamous cell lesions or other cell types. Symptoms of bladder cancers include frequent urination or an increased urge to urinate without significant volumes being passed. While pain is rare, it may occur during urination. Blood in the urine is the most common sign, although it can frequently result from bladder infections.

Risk factors:

- **Cigarette smoking**. About 40% of bladder cancers in Australia are attributed to smoking.
- **Exposure to phenacetin for pain relief**, although these drugs were discontinued long enough ago to be an unlikely cause of future cancers in Australia.
- **A history of non-specific bladder infections, inflammation or urinary tract stones.**
- **Large exposures at an earlier age to ionising radiation.**
- **Occupational exposures to aromatic amines** (eg, as used in dyestuff manufacturing) **and polycyclic aromatic hydrocarbons** (products of incomplete burning of coal, oil, wood or other organic matter).
- In rare circumstances, **inherited susceptibility**.
- Possibly diets deficient in fruit and vegetables.

Chlorination by-products also may cause a slight increase in risk, as may environmental exposures to arsenic emitted by smelters or other industrial sources. Heavy consumption of coffee has been implicated in some studies as a possible cause. A number of overseas studies point to occupational risks for painters, printers, machinists, mechanics, metal workers, textile workers, leather workers, shoemakers, hairdressers, rubber workers, and employees in the dry cleaning or transport industry, although the actual exposures causing these cancers are often not clear. In some Middle Eastern and East African countries, *Schistosoma* infection (with *S. haematobium*) is an important cause of squamous cell carcinoma of the bladder. This is a comparatively rare form of bladder cancer in western populations, but it can be commonplace where these infections occur. *Schistosoma* infection is usually transmitted through freshwater where larval forms, released by snails, penetrate the human skin.

Occurrence:

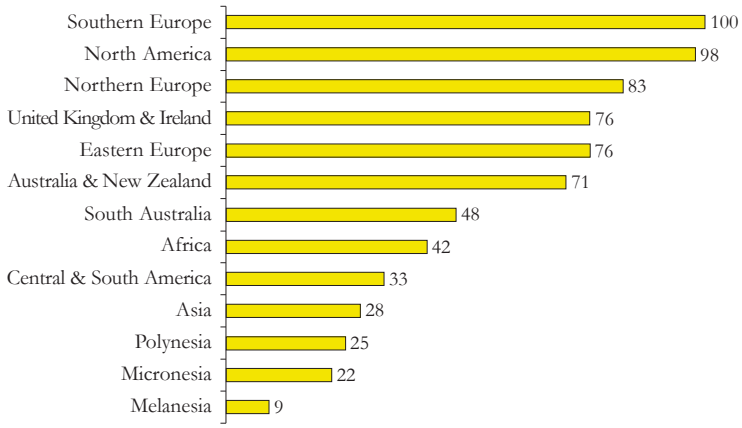
In South Australia:

Each year from 1997 to 2001:

- **About 185 residents were diagnosed with bladder cancers.**
- **About 84 died from these cancers.**

Males were affected more often than females, with a male-to-female ratio of about *2.7 to 1*. This would be partly a result of more common histories of cigarette smoking in males than females. Although deaths mostly occur in older age groups, about five occur annually in South Australians in their fifties or younger.

Figure 20: Bladder cancer incidence estimates for the year 2000, with Southern Europe used as the reference category* (reference set at "100")



*Age-sex standardized (World Population).

In the world:

International comparisons are complicated by variations in definition of bladder cancer. Nonetheless, it would appear that **South Australians have a middle-ranking incidence**. Most western populations have higher incidence estimates, but lower estimates apply to Asia, Central & South America, Africa and other regions of the world (*Figure 20*). Differences in smoking prevalence over the past 20-30 years would have been an important contributor to these international variations in incidence.

Time trends:

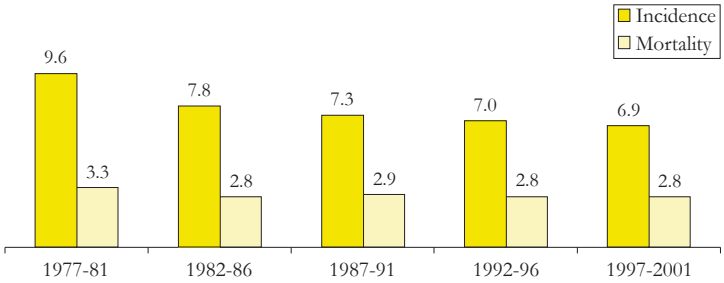
A decrease in incidence and mortality is suggested in South Australia, although if the 1977-81 incidence is disregarded due to definitional differences, the decreases become less apparent (*Figure 21*). A decrease is consistent, at least in males, with reductions in cigarette smoking.

Case outcomes:

The prospects of surviving bladder cancer vary markedly by stage of progression of the disease at diagnosis. For example, for cases diagnosed at an early stage (TNM stage I) at South Australian teaching hospitals, about three quarters survive their cancers five years or more from diagnosis (*Figure 22*). Where there is evidence at diagnosis of spread to other parts of the body (TNM stage IV), fewer than 20% survive five years from diagnosis.

About 60% of South Australians with invasive bladder cancer (all stages combined) survive their disease five or more years from diagnosis. **If non-invasive lesions (pre-invasive cancers) are included, as in USA figures, the five-year survival for the 1991-98 diagnostic period becomes 79%. This is very similar to the corresponding 82% reported for the USA in 1992-99**. Comparisons with other populations are complicated by variations in inclusion of these non-invasive lesions. Surgery is the principal mode of treatment. For example, in South Australian teaching hospitals in 1990-97, 93% of patients had surgery as part of their primary course of treatment, 17% had radiotherapy, and 16% had chemotherapy.

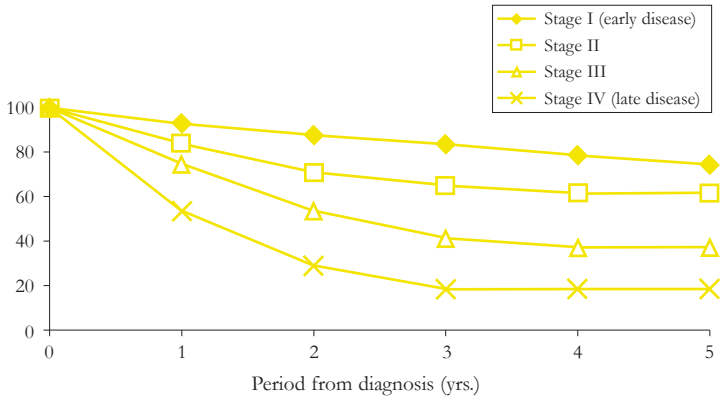
Figure 21: Annual incidence and mortality rates for bladder cancer per 100,000 South Australians; 1977-2001*



*Age-sex standardized (World Population).

NB: 1977-81 incidence rate elevated due to inclusion of pre-invasive cancers.

Figure 22: % surviving bladder cancer by TNM stage; South Australian teaching hospitals, 1990-97*

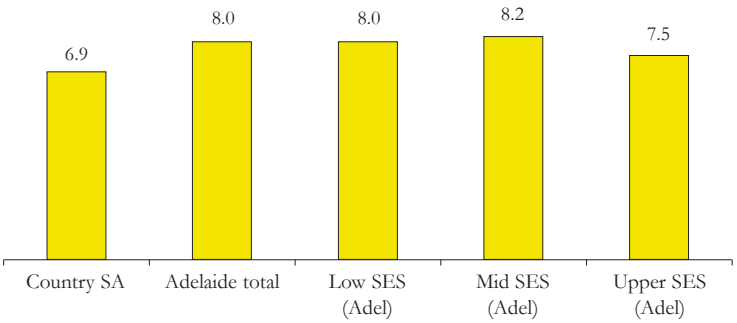


*Date of censoring: 31 December 1998.

Other trends:

The incidence of bladder cancer is normally higher in urban than rural areas of the world. This also applies in South Australia where Adelaide residents had an 18% higher incidence than country residents in 1977-2000 (*Figure 23*). **A**

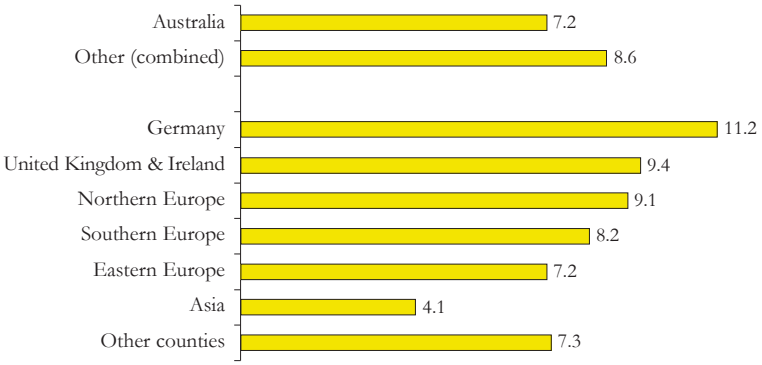
Figure 23: Annual incidence of bladder cancer per 100,000 South Australians by residential area; 1977-2000*



*Age-sex standardized (World Population).

tendency for residents of upper socio-economic (upper SES) areas to have relatively low incidence rates also is suggested. This is consistent with their lower levels of tobacco smoking and less common histories of employment in high-risk occupations.

Figure 24: Annual incidence of bladder cancer per 100,000 South Australians by country of birth; 1977-2000*



*Age-sex standardized (World Population).

South Australians born in Germany, other parts of Northern Europe, or the United Kingdom & Ireland had a relatively high incidence during 1977-2000, whereas the Asian born had a low incidence (*Figure 24*).

While there is the indication of a lower incidence rate in Aboriginal than other South Australians, the difference is small and potentially due to chance.

Reducing the impact of bladder cancer:

- **Tobacco smoking should be reduced.** WHO's International Agency for Research on Cancer estimated in 1990 that elimination of tobacco smoking in western populations would reduce incidence rates by between 30% and 70%.
- Good industrial hygiene should be maintained in order to minimise exposures to aromatic amines, polycyclic aromatic hydrocarbons, and other carcinogens.
- Diets rich in fruit and vegetables should be adopted.
- Medical attention should be sought promptly if symptoms arise, such as an increased urge to urinate without significant volumes being passed; increased frequency of urination; pain on urination; or blood in the urine.

In addition, eradication of schistosomal infections in Eastern Africa and the Middle East would be an important public health challenge for those parts of the world.

Bladder cancer

Risk factors for bladder cancer include cigarette smoking, non-specific bladder infections, inflammatory conditions, urinary tract stones, large exposures to ionising radiation, and occupational exposures to aromatic amines. By comparison, diets rich in fruit and vegetables are probably protective.

Each year from 1997 to 2001, about 185 South Australians were diagnosed with bladder cancer and about 84 died from this disease. Males were affected more than females, with a male-to-female ratio of *2.7 to 1*.

South Australia has a middle-ranking incidence of bladder cancer by international standards. While rates have tended to decline, partly due to decreases in smoking in males, reductions have also been affected artificially by changes in disease classification.

Adelaide residents have a higher incidence than country residents, consistent with urban-rural trends in other populations. There are also differences by place of birth, with South Australians born in Germany or the United Kingdom & Ireland having a relatively high incidence, and Asian-born residents having a low incidence.

Preventive action can be taken by reducing tobacco smoking, maintaining good industrial hygiene, and promoting diets rich in fruit and vegetables.

Kidney cancer

Introduction:

Kidney cancers comprise about two per cent of cancers recorded by cancer registries around the world. Each person has two kidneys, one located on either side of the body, which manufacture urine for the removal of body waste. The kidneys also regulate blood pressure and the composition of body fluids, and stimulate the production of red blood cells.

The great majority of kidney cancers are classified by cell type as renal cell lesions, although transitional cell cancers also occur. Symptoms include blood in the urine, which would affect just over half of patients. Around 40% would get abdominal pain and some would experience an abdominal swelling or lump.

Risk factors:

- **Tobacco smoking.** About a quarter of kidney cancers in Australia are attributed to smoking.
- **Obesity**.
- **Exposures to phenacetin for pain relief**, although these drugs were discontinued long enough ago to be an unlikely cause of future cancers in Australia.
- **A history of dialysis.**
- **Exposures to large doses of ionising radiation.**
- **In rare instances, genetic diseases** such as von Hippel-Lindau syndrome, hereditary papillary renal carcinoma or tuberous sclerosis.
- Possibly persistent use of diuretics to reduce fluid levels.
- Possibly diets deficient in vegetables and fruit.

Some studies have implicated water contaminants as a cause, including chlorination by-products and arsenical compounds emitted by smelters or other industrial sources, and occupational exposures to asbestos, gasoline and other petroleum products, hydrocarbons, lead, cadmium, trichlorethylene, and other organic solvents. The risk of kidney cancer also may be hormone-related.

Occurrence:

In South Australia:

Each year from 1997 to 2001:

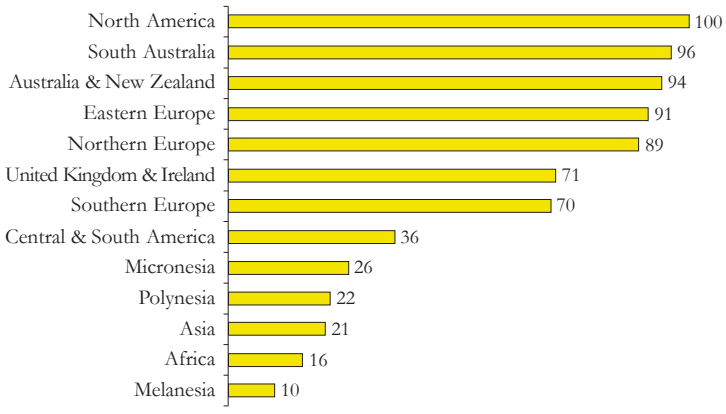
- **An average of 200 residents were diagnosed with kidney cancer.**
- **An average of 71 died from these cancers.**

Males were affected more frequently than females, with a male-to-female ratio of *1.9 to 1*. This is consistent with the more common histories of tobacco smoking in males than females. While deaths from kidney cancer usually occur among older residents, about 10 take place annually in South Australians in their fifties or younger.

In the world:

Incidence estimates for the year 2000 were highest for North America, followed by South Australia, Australia & New Zealand collectively, and Eastern Europe (*Figure 25*). By comparison, low estimates applied to Melanesia, Africa, Asia, Polynesia, Micronesia, and Central & South America. A ten-fold difference presented between the lowest and highest rates. It is likely that variations in smoking histories, obesity levels, and

Figure 25: Kidney cancer incidence estimates for the year 2000, with North America used as the reference category* (reference set at "100")

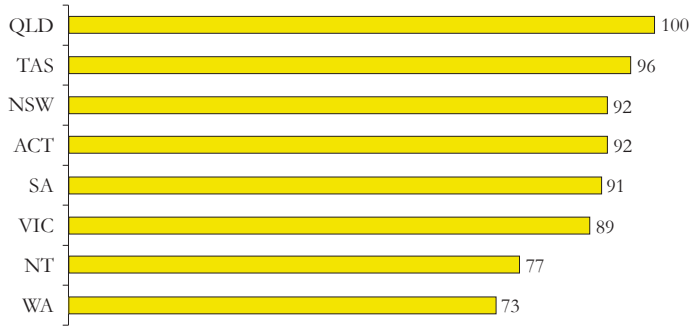


*Age-sex standardized (World Population).

possibly past exposures to phenacetin painkillers, would have contributed to these differences. Advanced diagnostic technologies have led to earlier detection. Their availability varies around the world and would have caused increased numbers of cases to be diagnosed in economically developed populations.

Incidence data for 1995-99 indicate that South Australia has a middle-ranking incidence by Australian standards, with Queensland presenting the highest incidence and Western Australia the lowest (*Figure 26*).

Figure 26: Annual incidence of kidney cancer; Australia, 1995-1999*
QLD rate set as the reference at "100"

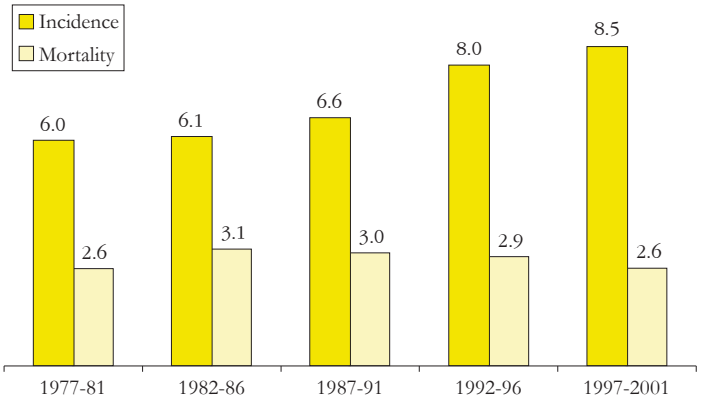


*Age-sex standardized (1991 Australian Population).

Time trends:

An approximate 40% increase in incidence was recorded in South Australia during 1977-2001 (*Figure 27*). Previous analyses have shown the increase to apply both to males and females, and to a wide cross-section of ages. Meanwhile, mortality rates remained relatively stable. Increases in incidence have been reported in many populations and attributed in part to increased detection from advances in ultrasonography and other diagnostic procedures. The risk of these cancers has been shown to correlate with obesity. Accordingly, it is possible that the increased prevalence of obesity in the Australian population is contributing to real increases in incidence.

Figure 27: Annual incidence and mortality rates for kidney cancer per 100,000 South Australians; 1977-2001*



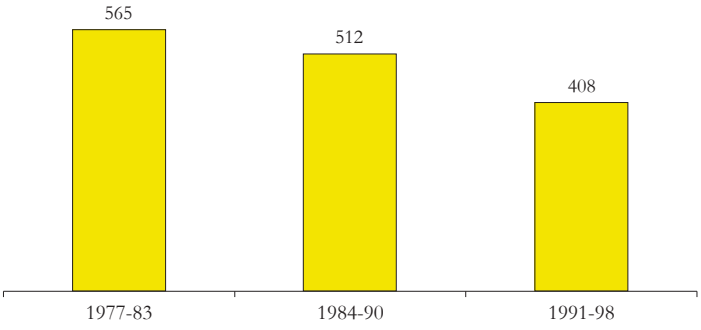
*Age-sex standardized (World Population).

Case outcomes:

The proportion of affected South Australians dying of kidney cancer within five years of diagnosis decreased from 57% in 1977-83 to 41% in 1991-98 (*Figure 28*). This was probably due to earlier diagnosis from advances in ultrasonography and computerised tomography. The South Australian five-year survival of 59% in 1991-98 was similar to the 60% for Australia collectively in 1992-97, and the 63% for the USA in 1992-99, but higher than the 50% reported for Europe in 1985-89.

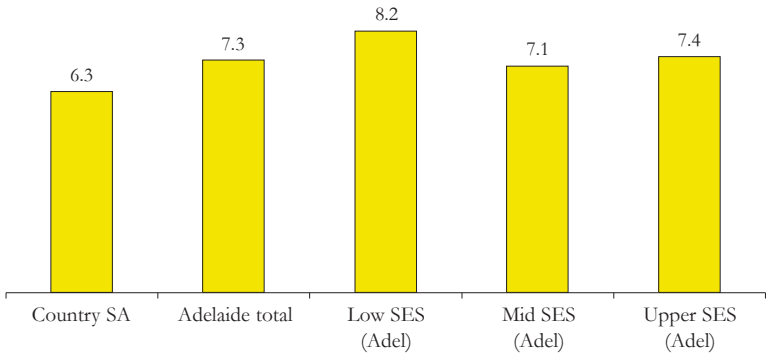
Kidney cancers normally require surgical excision, since they usually respond poorly to radiotherapy and chemotherapy. In South Australian teaching hospitals during 1990-97, about 82% of patients had surgery as a primary treatment, 7% had

Figure 28: Numbers per 1,000 cases dying from kidney cancer within five years of diagnosis; South Australia, 1977-98*



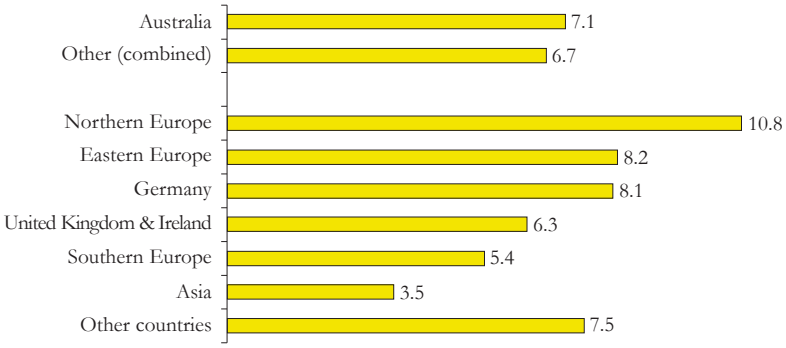
*Date of censoring: 31 December 1998.

Figure 29: Annual incidence of kidney cancer per 100,000 South Australians by residential area; 1977-2000*



*Age-sex standardized (World Population).

Figure 30: Annual incidence of kidney cancer per 100,000 South Australians by country of birth; 1977-2000*



*Age-sex standardized (World Population).

radiotherapy, 3% had chemotherapy, and 3% had hormone therapy. Recent research has been directed at immunotherapy in a bid to improve outcomes.

Other trends:

The incidence of kidney cancer was higher during 1977-2000 in Adelaide than country regions, and in lower than upper socio-economic (SES) areas of Adelaide (*Figure 29*). A higher incidence has been reported in urban than rural areas in many countries and attributed to differences in smoking. The higher incidence in the lower socio-economic areas of Adelaide also would correlate with smoking trends.

Incidence rates are higher among South Australians born in Northern and Eastern Europe than among the Australian born (*Figure 30*). Conversely, residents born in Asia and Southern Europe have comparatively low rates. Aboriginal South Australians appear to have a similar incidence to other residents.

Reducing the impact of kidney cancer:

- **Tobacco smoking should be reduced.** WHO's International Agency for Research on Cancer has estimated that elimination of tobacco smoking would reduce the incidence of kidney cancer in western populations by about a third.
- **Obesity levels should be reduced** through dietary means and increased exercise.
- **Medical attention should be sought promptly if symptoms arise**, such as blood in the urine, persistent abdominal pain, or an abdominal swelling or lump.

Kidney cancer

Kidney cancers account for about two per cent of cancers recorded in cancer registries worldwide. An average of 200 South Australians are diagnosed annually with these cancers, leading to about 71 deaths per annum. Males are affected more frequently than females, giving a male-to-female ratio of *1.9 to 1*.

Risk factors for kidney cancer include tobacco smoking, obesity, a history of dialysis, and exposures to large doses of radiation.

Incidence estimates are relatively high for North America, South Australia, and Australia & New Zealand collectively. While it is likely that differences in smoking histories, obesity levels, and possibly past exposures to phenacetin painkillers would have contributed to international variations in incidence, the availability of advanced diagnostic technologies in economically developed countries is likely to have increased the numbers of cancers diagnosed.

An approximate 40% increase in incidence occurred in South Australia in 1977-2001, whereas mortality rates remained relatively stable. The incidence increase would partly reflect increased detection through advances in diagnostic technology, but increased obesity levels also may have been instrumental.

Incidence rates have been higher in Adelaide, and particularly in low socio-economic areas of Adelaide, than in country regions. This accords with urban-rural and socio-economic trends in other populations. Incidence rates also vary by country of birth, with South Australian residents born in Northern and Eastern Europe being at higher risk, and those born in Asia and Southern Europe having a low risk.

Preventive opportunities exist through reductions in tobacco smoking and control of body weight.

Control measures for cancers of the prostate, testis and urological organs

Control measures for cancers of the prostate, testis and urological organs

Opportunities exist to prevent the risk of these cancers through:

- **Not smoking** - to prevent urological cancers.
- **Maintaining normal body weight** - to prevent kidney cancer.
- **Adopting a healthy diet rich in fruit and vegetables** - to prevent cancers of the kidney, bladder, and possibly prostate.
- **Adopting safer sex practices to reduce HPV infection** - to prevent cancers of the penis.
- **Maintaining good industrial hygiene** so as to minimise exposures to aromatic amines, polycyclic aromatic hydrocarbons, and other carcinogens, and as a consequence, the risk of bladder cancer.
- **Surgical correction of undescended testes**, ideally before two years of age, to make early diagnosis easier.

While screening for prostate cancer has the potential to increase cure rates, most Australian health authorities are not advocating population screening for these cancers at this time, due to uncertainties about benefits and side effects. Controversy exists that may be cleared with the release of results of field trials, presently underway in North America and Europe.

Meanwhile, prompt medical attention should be sought for symptoms that can arise from cancers of the prostate, testis and urological organs. They can include frequent urination, pain or burning when urinating and the presence of blood in the urine. Other symptoms may be persistent pain or a swelling or lump in the affected organ.

Further information on these cancers can be obtained by contacting the Cancer Help Line of The Cancer Council South Australia (telephone: 13 11 20).

Appendix A

Kidney
Ureter
Urinary Bladder
Prostate Gland
Urethra
Rectum
Penis
Testis

Appendix A

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Glossary of terms

Glossary of terms

Age-standardized:
A statistical adjustment to make the age distributions of different populations statistically equivalent. This enables comparisons of cancer rates between populations with different age distributions. The results show the differences in cancer rates that would have applied, had the age distributions of the populations been the same. Often the age distribution of the World Population is used for this purpose.

Aromatic amines:
These compounds were synthesised and used in the dye industry from the 1870s.

Cadmium:
A naturally occurring metallic element widely present in the environment.

Cancer:
An uncontrolled growth of cells invading the surrounding areas of the body, which have the ability to spread to distant sites through the blood stream or lymphatics.

Chemotherapy:
Cancer treatment by chemical agents or drugs.

Cytomegalovirus:
A group of herpes viruses that infect large numbers of people. Most infections cause few (if any) symptoms, but there may be symptoms similar to those of glandular fever.

Dialysis:
A process of separating the content of solutions through differential rates of diffusion through semipermeable membranes.

Down's Syndrome:
A genetic disorder resulting from the inclusion of an extra chromosome.

Epstein-Barr virus:
A common type of herpes virus occurring world-wide and infecting most people at some time in their lives. Mostly it produces no symptoms, but it can cause glandular fever and has been implicated as a cause of nasopharyngeal cancer and some lymphomas.

Five-year cancer survival:
The % of patients surviving their cancer five years from diagnosis.

Glans:
The cap-shaped part of the penis located at the tip.

Herpes virus:
A group of viruses responsible for a broad range of diseases and disorders, including chickenpox, shingles, cold sores, etc.

Hippel-Lindau Syndrome:
A genetic condition characterised by tumours of the brain, spinal chord and retina; renal cysts and clear cell renal carcinomas; and other tumours.

Human papilloma virus (HPV):
A type of virus that can causes warts on body surfaces. HPV has been implicated as a cause of cervical, penile and some other cancers.

Hydrocarbons:
Organic compounds that contain carbon and hydrogen only.

Immune system:
A network of organs and cells that fight infections and other foreign invaders.

Immunosuppression:
A disorder where the immune response is reduced or absent.

Immunotherapy:
The targeting of tumour cells by immune mechanisms, such as the patient's own immune system or antibodies transferred to the patient for therapeutic purposes

Incidence rate (cancer):
The rate at which cancers arise in the population. It may be expressed as the number of new cases diagnosed annually per 100,000 people.

Inguinal hernia:
A condition where part of the intestine bulges through a weak area of surrounding abdominal muscles.

Ionising radiation:
X-rays and rays emitted by radioactive materials. They may occur naturally as: cosmic rays; radiation from air, food and water; and radiation from soil and rocks.

Klinefelter's Syndrome:
Males with this condition usually have two X chromosomes and one Y chromosome, rather than the usual one X and one Y chromosome. As a consequence, there is an inhibition of testicular growth during puberty.

Lesion:
An area of damage or injury to an organ. It may be described as a wound, ulcer, sore or cancer.

Lycopene:
A red carotenoid pigment in tomatoes and various berries and fruits.

Mortality rate (cancer):
The rate at which deaths from cancer occur in the population. It may be expressed as the number of deaths occurring annually per 100,000 people.

Neonatal jaundice:
A yellowish colouring of the skin occurring in the first four weeks from birth. It is caused by a substance called bilirubin, which is released into the bloodstream when red blood cells are broken down.

Occult::
Obscured or hidden from view.

Oestrogens:
Female sex hormones.

Pelvis:
Lower portion of the trunk between the hip bones.

Phyto-oestrogens:
Compounds occurring in plants that have both oestrogenic and anti-oestrogenic effects.

Polycyclic aromatic hydrocarbons:
A group of chemicals formed during the incomplete burning of coal, oil, gas, wood or other organic materials.

Prenatal:
Prior to birth.

PSA (Prostate Specific Antigen) testing:
A test often used to detect prostate cancer at an early stage. PSA is a protein that can be elevated in the blood of men with prostate cancer and some non-cancerous conditions, such as benign prostatic hyperplasia.

Pseudohermaphroditism:
A condition where a person genetically of one sex has sex characteristics of the other sex, often with ambiguous external genitalia.

Radiotherapy:
Treatment by radiation (eg, by X-rays or gamma rays).

Selenium:
An essential trace mineral for the human body.

Semen:
The white secretion of male reproductive organs containing sperm, which is ejaculated during sexual intercourse.

Shistosoma infections:
Infections with *s. mansoni, s. haematobium* or *s. japonicum* that cause illnesses in humans. Infection occurs when the skin comes into contact with contaminated fresh water that contains certain types of snails that carry schistosomes.

Socio-economic (SES):
Pertaining to social or economic status.

Therapy (cancer):
Cancer treatment. This may comprise surgery, chemotherapy, radiotherapy, hormone therapy, immunotherapy, or other treatments or treatment combinations.

Trichlorethylene:
A clear liquid with multiple industrial applications as a solvent that also is used as an inhalation painkiller for brief operations.

Tuberous sclerosis:
A rare genetic, neurological disorder characterized by seizures, mental retardation, and skin and eye lesions.

Ultrasonography:
A diagnostic procedure where sound waves (ultrasound) rebound off organs/tissues, producing echoes that show the profiles of these structures.