Cancer Council Queensland

Childhood cancer incidence in Australia 1983 – 2006

AUSTRALIAN PAEDIATRIC CANCER REGISTRY

VCRCC Viertel Centre for Research in Cancer Control

Accredited by the NHMRC as an independent research institute.
The generosity of the Queensland community and the *Sylvia and Charles Viertel Charitable Foundation* makes our research possible.

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Foreword

The Australian Paediatric Cancer Registry is one of the few national registers of childhood cancer in the world. Funded and managed by the Cancer Council Queensland, and with appropriate ethical and legislative approvals, the Registry records clinical and treatment information on the more than 600 children a year diagnosed with cancer in Australia. Our hope is that with better information will come better understanding of childhood cancer, opportunities to standardise and improve care and, ultimately, better outcomes for children with cancer.

This report provides detailed information on the long-term trends in the incidence of childhood cancer in Australia since 1983. Information on cancer incidence is presented for each of the major childhood cancer diagnostic groups, by age group, and separately for girls and boys. Future reports will detail treatment and outcomes for children with cancer in Australia.

Accurate and timely data collection is a key priority for the Registry. This has been made possible only through the support and assistance of all State and Territory Cancer Registries and all treating paediatric oncology hospitals throughout Australia. I would like to express my personal thanks to staff of the State and Territory Cancer Registries and paediatric oncology hospitals who have given their time and energy to support this national data collection.

We trust that this report will be a useful resource for clinicians, families, health managers, and all those who wish for, and work towards, improved outcomes for children with cancer.

Professor Jeff Dunn
Chief Executive Officer
Cancer Council Queensland

1 Introduction

1.1 The burden of childhood cancer

Compared to cancers among adults, cancers among children aged 0-14 are rare. Between 2001-2005, over 20% of the Australian population was comprised of children under the age of 15,[1] but they accounted for only 0.6% of all cancers diagnosed.[2] Consequently, the incidence rate of cancer was more than 40 times higher among people aged 15 years and over compared to the incidence rate among children.

Despite the lower occurrence of childhood cancers, the consequences are far-reaching. Cancer was responsible for 19% of all deaths recorded among Australian children aged 1-14 during 2004, and was the second most common cause of death in this age group behind the grouping of external causes (which includes traffic accidents and drowning).[3]

Beyond the loss of young lives, the burden of childhood cancer extends to the long term adverse health effects experienced by a large proportion of childhood cancer survivors, either because of the cancer itself or as a result of treatment.[4-8] A diagnosis of cancer for a child is a source of great distress for the family[9,10] and can have a significant psychosocial impact on the patient, their parents and siblings over an extended period.[11-13] Families must also face the financial strain of treatment costs, the problems of balancing work while caring for a sick child, and the disruption of normal family and social routines.[10,14,15]

1.2 The Australian Paediatric Cancer Registry

The APCR is one of only a few national registries of childhood cancer in the world. Information is collected on incidence, stage at diagnosis, treatment and survival for all children in Australia aged 0-14 years old who are diagnosed with cancer. While details on cancer incidence and survival by age group are available from each individual State and Territory Cancer Registry, these registries do not collect data on the stage of disease or the treatment given to children with cancer. This information is essential in order to set and measure standards of care for children with cancer and to track improvements in treatment outcomes over time.

Notification of invasive cancer is a statutory requirement in Australia and information on cancer diagnoses is gathered by the Cancer Registries in all States and Territories. With appropriate ethical and legislative approvals, the APCR collects demographic and clinical information about all cases of cancer diagnosed in children aged 0-14 years from the State and Territory Cancer Registries, or, in some States, directly from the treating hospitals. As part of a comprehensive quality assurance process, the APCR data manager makes regular site visits to the major children's hospitals throughout Australia to cross-check registry records against hospital records and to resolve any inconsistencies or differences in the information collected.

Cancer Council Queensland (CCQ), formerly known as the Queensland Cancer Fund, has provided financial support for the APCR since its inception in 1977. The APCR was transferred to Brisbane from Sydney in 1983, and in 2004 CCQ took over its management. All State and Territory Cancer Registries and major treating hospitals have provided ethical approval for the data collection. The APCR is housed within the office of the Queensland Cancer Registry (QCR) to ensure the privacy and confidentiality of all information stored on the APCR database.

Currently there are 24 years of detailed and verified data available from the APCR (1983 to 2006), involving approximately 14,000 cases.

1.3 Purpose and structure of this report

A previous report from the APCR was published in 2000, which contained incidence data from the period 1986 to 1995.[16] This report provides an update on the incidence of childhood cancer in Australia, based on the most recent information collected and maintained by the APCR, with data currently available to the end of 2006.

Data on average annual incidence by sex, age group and State/Territory is presented in tabular format for all cancers combined and for each of the main diagnostic groups (see Sections 3 and 4). Cancer incidence is expressed both in terms of counts (the number of new cases diagnosed) and rates (which divide the incidence count by the size of the population). Incidence rates have been age-standardised to the 2001 Australian Standard population, and are expressed per million population per year. A measure known as the 95% confidence interval (CI) is also included in these tables, which expresses the degree of accuracy associated with the estimated incidence rate. Ten years of data (1997-2006) were used in order to reduce the effects of random fluctuations.

Trends in incidence rates for the 24 year period between 1983-2006 were calculated by sex and by age group to examine if there were any significant changes in cancer incidence over time (in terms of either the magnitude or direction of the trend). Observed incidence rates are shown in a graphical format for each diagnostic group along with the underlying trends. Annual percentage changes, which measure the average increase or decrease in the incidence rate trend from year to year, are also presented.

Information on the codes for the childhood cancer diagnostic groups and subgroups, as well as a description of the statistical methods and terminology used throughout this report, can be found in the Appendix. The Appendix also includes detailed tables containing annual counts and rates for each diagnostic group by sex and by age group.

2 Classification of childhood cancers

There are several important differences between childhood and adult cancers, such as how the cancer originates and various clinical characteristics.[17] Unlike cancer in adults, many childhood cancers develop as a result of abnormal cell maturation. The tissue of origin, rather than the location in the body where the cancer starts, is the best predictor of tumour behaviour, prognosis and the required treatment. Therefore, childhood cancers are classified using a different coding system to adult cancers, with categories based on the type of cancer tissue (morphology) instead of where the cancer occurs in the body.[18,19]

The third edition of the International Classification of Childhood Cancers (ICCC-3), the current standard for reporting the incidence of childhood cancer, is comprised of 12 major diagnostic groups[18] (Table 2.1). Full details of the codes for each diagnostic group and subgroup of childhood cancer are included in the Appendix (Table A.1).

Table 2.1 International Classification of Childhood Cancers, 3rd edition (ICCC-3) Diagnostic Groups

Diagnostic Group	Full title	Abbreviated title used in this report
I.	Leukaemias, myeloproliferative diseases and myelodysplastic diseases	Leukaemias
II.	Lymphomas and reticuloendothelial neoplasms	Lymphomas
III.	Central nervous system and miscellaneous intracranial and intraspinal neoplasms	Tumours of the central nervous system
IV.	Neuroblastoma and other peripheral nervous cell tumours	Neuroblastoma
V.	Retinoblastoma	Retinoblastoma
VI.	Renal tumours	Renal tumours
VII.	Hepatic tumours	Hepatic tumours
VIII.	Malignant bone tumours	Malignant bone tumours
IX.	Soft tissue and other extraosseous sarcomas	Soft tissue sarcomas
X.	Germ cell tumours, trophoblastic tumours and neoplasms of gonads	Germ cell tumours
XI.	Other malignant epithelial neoplasms and melanomas	Other malignant epithelial neoplasms
XII.	Other and unspecified malignant neoplasms	Other malignant tumours

Source: Steliarova-Foucher et al, 2005.[18]

Most of the cases of childhood cancer included in this report are malignant (or invasive) cancers. Although tumours of benign or uncertain behaviour are generally not included in cancer registry data for adults, the ICCC-3 includes non-malignant intracranial and intraspinal tumours within diagnostic groups III and X due to similarities with malignant tumours in their clinical symptoms and prognosis.[18] ***Therefore, throughout this report, childhood cancers refer to all malignant tumours as well as intracranial and intraspinal tumours of benign or uncertain behaviour within the diagnostic groups "Tumours of the central nervous system" and "Germ cell tumours".*** Other non-invasive tumours (e.g. in situ melanomas) are not part of the international standard, and have been excluded from all tables and graphs in the report.

Also note that only 29 cases were assigned to diagnostic group XII ("Other malignant tumours") between 1983-2006. Due to the small number of cases, no further analysis was undertaken nor detailed results presented for this group.

Leukaemias

Leukaemias are cancers that arise from uncontrolled overproduction of white blood cells within the bone marrow. White blood cells are an important component of the immune system, and are involved in the response to bacterial, viral and parasitic infection. There are two main types of white blood cells: myeloid cells, which are essential for effective killing of bacteria; and lymphoid cells, which are involved in more sophisticated reaction to infection and control of the body's immune response. Leukaemia is classified as either myeloid leukaemia or lymphoid leukaemia (which includes acute lymphoblastic leukaemia, the most common form of childhood leukaemia), according to the predominant type of abnormal white blood cells present.[17] The treatment required and prognosis depends on the type of leukaemia.

Most childhood leukaemias are acute, meaning that the cancerous cells are both immature and produced rapidly. This results in normal cells being 'crowded out' of the bone marrow. The symptoms of leukaemia are mainly those of inadequate normal bone marrow function, such as tiredness, pallor and easy bruising. Some children also experience bone pain as a result of increased bone marrow activity.[8,17]

The causes of most cases of childhood leukaemia are currently unclear. Whilst a number of potential risks have been identified, including genetic susceptibility, exposure to ionising radiation or certain chemicals (such as benzene and pesticides), higher birth weight and having older parents,[8,20-22] these factors could potentially explain only a small proportion of all childhood leukaemias.[21]

Lymphomas

Lymphomas are also cancers of the lymphoid subgroup of white blood cells, and therefore they have some similarities to lymphoid leukaemias. However, in lymphomas the abnormal white blood cells are principally found in lymph glands, with minor, if any, bone marrow involvement. Lymph glands are a network of clusters of immune cells which intercept and coordinate the response to infections. These glands, which include the tonsils and adenoids, are found in the neck, armpits, groin and within the chest and abdomen.

There are two main types of lymphoma – Hodgkin lymphoma and non-Hodgkin lymphoma (including the subgroup of Burkitt lymphoma).[18] The type of lymphoma determines treatment and prognosis. Hodgkin lymphomas tend to be relatively slowly growing, and cases present with painless lumps at sites in which lymph glands are located. Some children with Hodgkin lymphoma also develop fevers and night sweats or experience unexplained weight loss. In contrast, non-Hodgkin lymphomas tend to progress much more rapidly. Children with non-Hodgkin lymphoma usually present as very unwell, with swelling in the abdomen or chest causing obstruction to major organs, such as the bowel or trachea (windpipe).[8,17]

Little is known about the causes of lymphoma. The risk is increased in children with inherited or acquired immune deficiencies, including those receiving immune suppression after organ transplants.[8,17,19] Infection with Epstein-Barr virus (which causes glandular fever) has been linked to the development of lymphoma in some cases. A family history of cancer has also been associated with an elevated risk of childhood lymphoma.[23]

Tumours of the central nervous system

The central nervous system (CNS) consists of the brain and the spinal cord, which starts at the base of the brain and extends about half way down the spine. Tumours of the CNS vary widely in terms of pathologic appearance, behaviour and prognosis. They can occur anywhere in the CNS but are most common in the brain, especially among children.[24]

Presenting features are determined mainly by the location of the tumour. Because of the complex organisation of the CNS, tumour location is also extremely important in determining the role of surgery in treatment. Many brain tumours lead to an increase in pressure within the brain. In turn, this may cause headaches, sleepiness, vomiting and loss of coordination. Local effects of a tumour may include abnormal eye movements, seizures, difficulties with swallowing or weakness in the limbs.[8,17,25]

Around 5% of CNS cases among children are believed to result from genetic predisposition. Other than that, the causes of childhood tumours of the CNS remain largely unidentified, with ionising radiation being the only established environmental risk factor at the present time.[8,24]

Malignant and non-malignant (i.e. benign and uncertain) intracranial and intraspinal tumours generally have similar symptoms and outcomes. Therefore, they have been combined within the CNS diagnostic group for this report, as per the ICCC-3 coding classification.[18]

Neuroblastoma

Neuroblastoma is a cancer of specialised nerve cells (neural crest cells) which form the sympathetic nervous system. This system controls automatic body functions, such as blood pressure regulation, and runs along the length of the spine from the neck to the pelvis. Neuroblastoma can develop anywhere along the sympathetic nervous system, but most commonly starts in one of the adrenal glands in the abdomen.[17,26] It often spreads to other parts of the body, such as the bone marrow, bones, liver or skin. Individual genetic features of the tumour are a powerful predictor of outcome and are used to determine therapy.

The symptoms of neuroblastoma depend on the site and size of the tumour. There may be a palpable mass in the abdomen, respiratory problems, or bladder or bowel dysfunction. Older children with widespread disease often experience skeletal pain, fever, anaemia or general failure to thrive.[8,17,26]

The exact causes of neuroblastoma are unknown.[8,26] Associations have been reported with some congenital anomalies,[27] maternal drug use[28] and parental exposure to certain chemicals.[29]

Retinoblastoma

Retinoblastoma is a cancer that forms in the retina, the light-sensitive tissue at the back. It almost always develops during the first five years of childhood.[30] Tumours may occur in one eye (known as unilateral retinoblastoma) or both eyes (bilateral retinoblastoma).[17,19]

Symptoms generally include squinting or eye swelling and redness, but in many children the first sign noted is a visible whiteness of the pupil, particularly obvious in photographs.[8,17,30,31]

All retinoblastoma is due to a genetic error in the retinal tissue.[31] The error may occur only in the retina (sporadic retinoblastoma) or may be present in all cells in the body (hereditary retinoblastoma). If the genetic error is just in the retina of one eye, only that eye will be affected. However, if it is hereditary, retinoblastoma may develop in either one or both eyes. Children with hereditary retinoblastoma are also at risk of developing other cancers elsewhere in the body, and may pass the genetic error on to their children. Genetic testing can be carried out to determine whether a child has sporadic or hereditary retinoblastoma.

Renal tumours

Renal (kidney) tumours that occur in children often originate from abnormalities during development of the kidneys prior to birth. They are usually diagnosed before the age of five. Nephroblastoma (or Wilms' tumour) is by far the most common type.[32] Children with renal tumours usually have cancer in one kidney, but occasionally tumours develop in both kidneys.[17,33]

The most common symptom is a lump in the abdomen in an otherwise well child. Some children also have abdominal pain, blood in the urine, hypertension (high blood pressure) or fever.[8,17,32,33]

A small proportion of cases are linked to congenital anomalies and syndromes which affect growth of the fetus or normal development of the genital and urinary system.[8,17,32,33] However, the causes of the majority of childhood renal tumours remain unclear.

Hepatic tumours

Hepatic tumours are cancers of the liver. The two main types in children are hepatoblastoma and hepatic carcinoma. Hepatoblastoma usually occurs in younger children (under four years of age), while hepatic carcinoma primarily affects children over the age of ten.[8,34,35] Children with hepatic tumours typically have a painless mass in their abdomen, although they may sometimes experience abdominal pain, constipation, weight loss or nausea,[34] particularly if the tumour is more advanced.[8]

Hepatoblastoma may be seen in association with several genetic syndromes and has also been observed to occur more frequently among infants delivered prematurely.[8,35] In addition, there is some evidence of links to parental smoking or occupational exposures to substances such as paint and petroleum.[8,34] The risk of hepatic carcinoma appears to be increased among children who have had other liver diseases (such as cirrhosis, metabolic diseases or chronic hepatitis),[8] although the tumour may take years to develop.[34]

Malignant bone tumours

Malignant bone tumours are usually diagnosed in children around the age of the pubertal growth spurt. The two main types are osteosarcomas and Ewing sarcomas.[8,19] Childhood bone tumours most frequently develop at the ends of the long bones in the arms and legs (particularly around the knee) where new bone tissue forms as a child grows. Ewing sarcomas are more likely than osteosarcomas to occur in the pelvis, ribs or spine.[8,17,36]

The most common symptom of malignant bone tumours is localised pain at the tumour site that may persist at night. This can be accompanied by tenderness, swelling and fever.[8,17]

Little is known about the causes of most malignant bone tumours in children,[8] although a combination of environmental and genetic factors are likely.[36] Children with hereditary retinoblastoma or Li Fraumeni syndrome are at significantly increased risk of osteosarcoma, while Ewing sarcomas are relatively more common in children of Caucasian descent. Other possible risk factors that have been linked to both types of malignant bone tumours include family history of cancer, younger age at puberty and having parents who were farmers.[36] However, the mechanisms that might cause these factors to increase the risk of malignant bone cancers are unclear.

Soft tissue sarcomas

Soft tissue sarcomas are a diverse group of cancers that develop in the soft tissues (such as muscles, fat, blood vessels, lymphatic vessels, nerves, ligaments and tendons) which connect, support or surround bones and organs. The most common type of soft tissue sarcoma in children is rhabdomyosarcoma. These tumours usually occur in children under ten years of age and begin in muscles around the bones, especially in the head, neck and genitourinary tract.[17,37,38] In contrast, non-rhabdomyosarcoma soft tissue sarcomas tend to occur in the extremities of the body (i.e. arms and legs) and are more common among infants and older children.[37-39]

Children with soft tissue sarcoma may present with a lump at the involved site. Other symptoms tend to be site-specific, such as headaches, sinusitis, persistent ear or nasal discharge or protrusion of the eyeball in head and neck tumours, or abnormal urine flow in genitourinary tumours.[17,37-39]

Increased risk has been connected with certain genetic syndromes, including neurofibromatosis, but in most cases the factors that lead to the development of soft tissue sarcoma are unknown.[8,37-39]

Germ cell tumours

Germ cell tumours are comprised of a varied group of cancers that originate from cells that normally develop into gonads (testicles in boys and ovaries in girls). Hence, germ cell tumours usually affect the gonads. However, it is possible for germ cell tumours to occur in other parts of the body, particularly the pelvis, brain or chest.[8,17,40,41]

Signs and symptoms of germ cell tumours vary by site, and may include swelling in the buttocks, testicular enlargement in boys, an abdominal mass, bladder or bowel obstruction or respiratory problems.[8,17,40,41]

The causes of the majority of germ cell tumours remain unclear, although a combination of genetic aberrations and environmental exposures (such as maternal exposure to certain chemicals and solvents) may play a role.[40]

In accordance with the standard international classification for childhood cancers (ICCC-3),[18] non-malignant intracranial and intraspinal germ cell tumours have been included in the data presented for this diagnostic group.

Other malignant epithelial neoplasms and melanomas

Epithelial cells form the outer layer of the skin and line the internal cavities of the body. Most glands are also composed of epithelial cells. Tumours that originate in epithelial cells are called carcinomas. Although many of the types of cancers found in adults are classified as carcinomas, they are relatively rare among children, especially within the younger age groups.[17]

The most common site for malignant epithelial neoplasms diagnosed among children is the thyroid gland.[19] Thyroid carcinoma is seldom accompanied by symptoms, with most cases presenting to a doctor with a painless mass in the neck.[8] Exposure to radiation has been found to have a strong association with the development of thyroid carcinomas.[8,19,42]

Melanoma is a type of skin cancer that originates in melanocytes, the cells which produce the pigment melanin that gives colour to a person's skin, hair, and eyes. Diagnosis usually follows the discovery of a suspicious lesion on the skin, particularly when there has been a sudden change in size or colour, itching or bleeding.[8,43,44] The much higher incidence of melanoma in all age groups, including childhood, reported in Australia compared to the rest of the world is likely to be due to the high exposure to ultra-violet (UV) radiation from the sun experienced in parts of the country, in combination with a large proportion of the population having fair pigmentation and skin that is susceptible to sun damage.[19]

Although not one of the ICCC-3 diagnostic groupings, melanomas are also presented as a separate section in this report (see Section 4.11.1) because of the particular interest in this cancer in Australia.

3 Summary of childhood cancer incidence

Average annual incidence, 1997-2006

In the 10 years between 1997-2006, an average of 618 children under the age of 15 were diagnosed with cancer each year in Australia (a rate of 156 per million), including 57 intracranial or intraspinal tumours of benign or uncertain behaviour (14 per million per year).

As shown in Table 3a, the incidence of childhood cancer was significantly higher among boys (337 cases per year or 165 per million) compared to girls (282 cases per year or 146 per million).

Almost half (285 cases per year or 46%) of the cancers diagnosed were among children aged 0-4 years, an incidence rate of 223 per million per year. The annual incidence rate dipped to 117 per million among children aged 5-9 years, and then rose again to 131 per million in the 10-14 age bracket.

There were only minor differences in incidence rates of childhood cancer throughout most of Australia, (p=0.32 for the overall variation). Although not statistically significant, the estimated rates were somewhat lower in the Northern Territory (118 per million per year) and higher in the Australian Capital Territory (173 per million per year). This perhaps reflects the smaller population sizes in these areas (which leads to greater variability in the calculation of rates) and is also consistent with the generally lower incidence of cancer that has been reported among Indigenous people in Australia.[45]

Table 3a: Average annual incidence of all childhood cancers by sex, age group and State/Territory, Australia, 1997-2006

	Average cases per year	(%)	Rate per million population per year[1] (95% CI)[2]
Total	618.4	100.0	155.8 (152.0-159.7)
Sex (p<0.001)			
Males	336.7	54.4	165.4 (159.9-171.1)
Females	281.7	45.6	145.7 (140.3-151.2)
Age group (p<0.001)			
0-4 years	284.6	46.0	222.9 (214.8-231.3)
5-9 years	156.4	25.3	117.2 (111.4-123.1)
10-14 years	177.4	28.7	130.8 (124.8-137.0)
State/Territory (p=0.325)			
New South Wales	209.1	33.8	157.2 (150.5-164.1)
Victoria	151.3	24.5	158.0 (150.1-166.2)
Queensland	119.7	19.4	154.0 (145.4-163.0)
South Australia	42.8	6.9	147.7 (134.0-162.4)
Western Australia	62.5	10.1	156.7 (144.7-169.5)
Tasmania	15.7	2.5	159.5 (135.5-186.5)
Northern Territory	6.1	1.0	118.4 (90.5-152.1)
Australian Capital Territory	11.2	1.8	172.8 (142.3-208.0)

Notes: 1. Rates age-standardised to the 2001 Australian Standard Population.
2. 95% CI = 95% confidence interval.

Incidence rate trends, 1983-2006

Incidence rates of all cancers among boys increased significantly until the mid 1990s (a trend of +1.7% per year between 1983-1994), but have subsequently remained stable. Among girls, incidence rates increased significantly by 0.9% per year over the entire period between 1983-2006 (Figure 3a and Table 3b).

Trends in incidence rates for all cancers by age group were mixed (Figure 3b and Table 3b). Among children aged 0-4 years, incidence rates increased significantly by an average of 0.7% per year between 1983-2006. While there was evidence of a possible increase among children aged 5-9 years, the underlying trend was not statistically significant. Within the older age group (10-14 years), incidence rates increased significantly between 1983-1996 (+2.7% per year), but since then there has been evidence of a possible decrease (although the trend between 1996-2006 was not statistically significant).

Figure 3a: Observed incidence rates[1] and underlying trends[2] of all childhood cancers by sex, Australia, 1983-2006

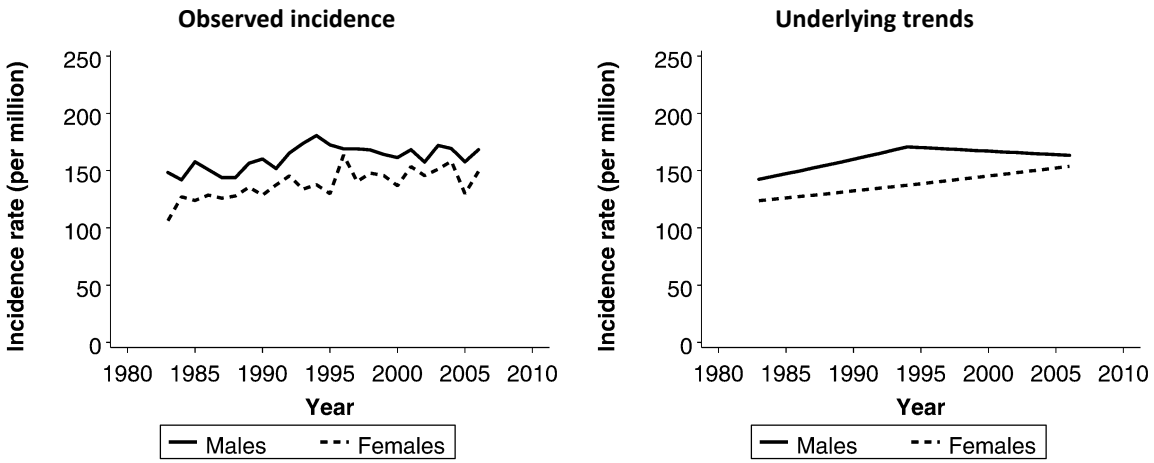

Figure 3b: Observed incidence rates[1] and underlying trends[2] of all childhood cancers by age group, Australia, 1983-2006

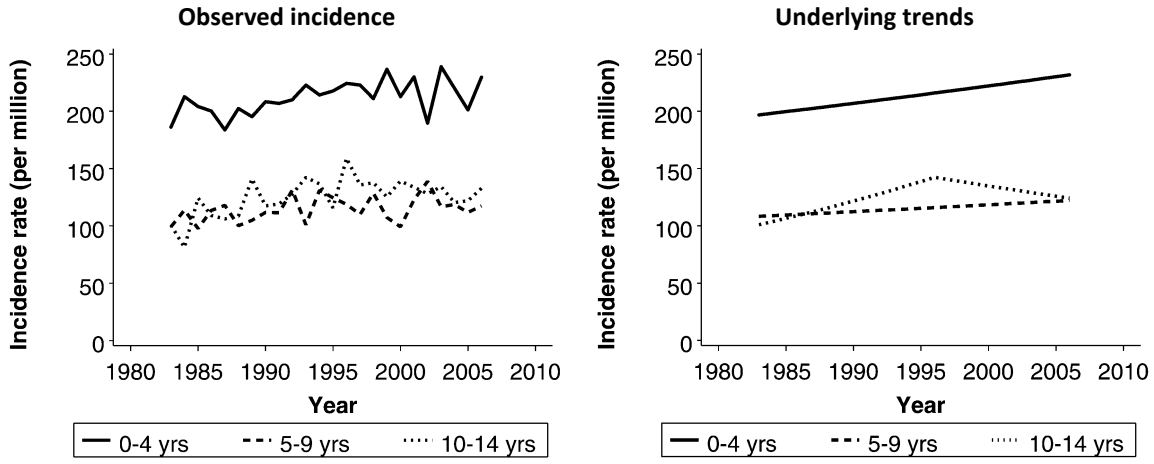

Table 3b: Trends[2] for incidence rates[1] of all childhood cancers by sex and age group, Australia, 1983-2006

Sex/Age group	Trend 1[3-5]	Trend 2[3-5]
Boys	1983-1994 +1.7% (+0.9%,+2.5%)	1994-2006 -0.4% (-1.0%,+0.3%)
Girls	1983-2006 +0.9% (+0.5%,+1.4%)	
0-4 years	1983-2006 +0.7% (+0.3%,+1.1%)	
5-9 years	1983-2006 +0.5% (-0.1%,+1.1%)	
10-14 years	1983-1996 +2.7% (+1.1%,+4.2%)	1996-2006 -1.4% (-3.3%,+0.7%)

Notes:
1. Rates age-standardised to the 2001 Australian Standard Population.
2. Trends modelled using joinpoint regression (www.srab.cancer.gov/joinpoint).
3. Trend data indicates the period of the trend and the estimated annual percentage change.
4. Figures in brackets correspond to the associated 95% confidence interval.
5. Shaded cells indicate statistically significant trends.

Incidence by diagnostic group and subgroup

Between 1997-2006, leukaemias accounted for around one third of all childhood cancers (34%, 207 cases per year – see Table 3c and Figure 3c). The next most frequent diagnostic groups were tumours of the central nervous system (23%, 141 cases per year) followed by lymphomas (10%, 62 cases per year).

Table 3c: Average annual incidence of childhood cancer by diagnostic group and subgroup, Australia, 1997-2006

Diagnostic group/*subgroup*[1]	Average cases per year	(%)	Rate per million population per year[2] (95% CI)[3]
All childhood cancers[3]	**618.4**	**100.0**	**155.8 (152.0-159.7)**
I. Leukaemias, myeloproliferative & myelodysplastic diseases	**207.2**	**33.5**	**52.2 (50.0-54.5)**
a. Lymphoid leukaemias	*159.0*	*25.7*	*40.1 (38.2-42.1)*
b. Acute myeloid leukaemias	*34.3*	*5.5*	*8.6 (7.8-9.6)*
c. Chronic myeloproliferative diseases	*6.9*	*1.1*	*1.7 (1.4-2.2)*
d. Other myeloproliferative diseases	*4.8*	*0.8*	*1.2 (0.9-1.6)*
e. Other & unspecified leukaemias	*2.2*	*0.4*	*0.6 (0.3-0.8)*
II. Lymphomas & reticuloendothelial neoplasms	**62.0**	**10.0**	**15.6 (14.4-16.9)**
a. Hodgkin lymphomas	*26.0*	*4.2*	*6.5 (5.8-7.4)*
b. Non-Hodgkin lymphomas (excl. Burkitt lymphomas)	*21.8*	*3.5*	*5.5 (4.8-6.3)*
c. Burkitt lymphomas	*12.4*	*2.0*	*3.1 (2.6-3.7)*
d. Miscellaneous lymphoreticular neoplasms	*1.1*	*0.2*	*0.3 (0.1-0.5)*
e. Unspecified lymphomas	*0.7*	*0.1*	**[5]
III. Central nervous system & intracranial/intraspinal neoplasms[4]	**140.5**	**22.7**	**35.4 (33.6-37.3)**
a. Ependymomas and choroid plexus tumours[4]	*13.1*	*2.1*	*3.3 (2.8-3.9)*
b. Astrocytomas[4]	*63.9*	*10.3*	*16.1 (14.9-17.4)*
c. Intracranial & intraspinal embryonal tumours[4]	*28.0*	*4.5*	*7.1 (6.3-7.9)*
d. Other gliomas[4]	*16.5*	*2.7*	*4.2 (3.6-4.8)*
e. Other specified intracranial & intraspinal neoplasms[4]	*15.5*	*2.5*	*3.9 (3.3-4.6)*
f. Unspecified intracranial & intraspinal neoplasms[4]	*3.5*	*0.6*	*0.9 (0.6-1.2)*
IV. Neuroblastoma & other peripheral nervous cell tumours	**36.6**	**5.9**	**9.2 (8.3-10.2)**
a. Neuroblastoma & ganglioneuroblastoma	*36.0*	*5.8*	*9.1 (8.2-10.1)*
b. Other peripheral nervous cell tumours	*0.6*	*0.1*	**[5]
V. Retinoblastoma	**14.8**	**2.4**	**3.7 (3.2-4.4)**
VI. Renal tumours	**32.5**	**5.3**	**8.2 (7.3-9.1)**
a. Nephroblastoma & other nonepithelial renal tumours	*31.2*	*5.0*	*7.9 (7.0-8.8)*
b. Renal carcinomas	*1.1*	*0.2*	*0.3 (0.1-0.5)*
c. Unspecified malignant renal tumours	*0.2*	*0.0*	**[5]
VII. Hepatic tumours	**9.8**	**1.6**	**2.5 (2.0-3.0)**
a. Hepatoblastoma	*8.0*	*1.3*	*2.0 (1.6-2.5)*
b. Hepatic carcinomas	*1.6*	*0.3*	*0.4 (0.2-0.7)*
c. Unspecified malignant hepatic tumours	*0.2*	*0.0*	**[5]
VIII. Malignant bone tumours	**26.3**	**4.3**	**6.6 (5.8-7.5)**
a. Osteosarcomas	*12.1*	*2.0*	*3.0 (2.5-3.6)*
b. Chondrosarcomas	*0.4*	*0.1*	**[5]
c. Ewing tumours & related bone sarcomas	*12.5*	*2.0*	*3.1 (2.6-3.7)*
d. Other specified malignant bone tumours	*0.7*	*0.1*	**[5]
e. Unspecified malignant bone tumours	*0.6*	*0.1*	**[5]

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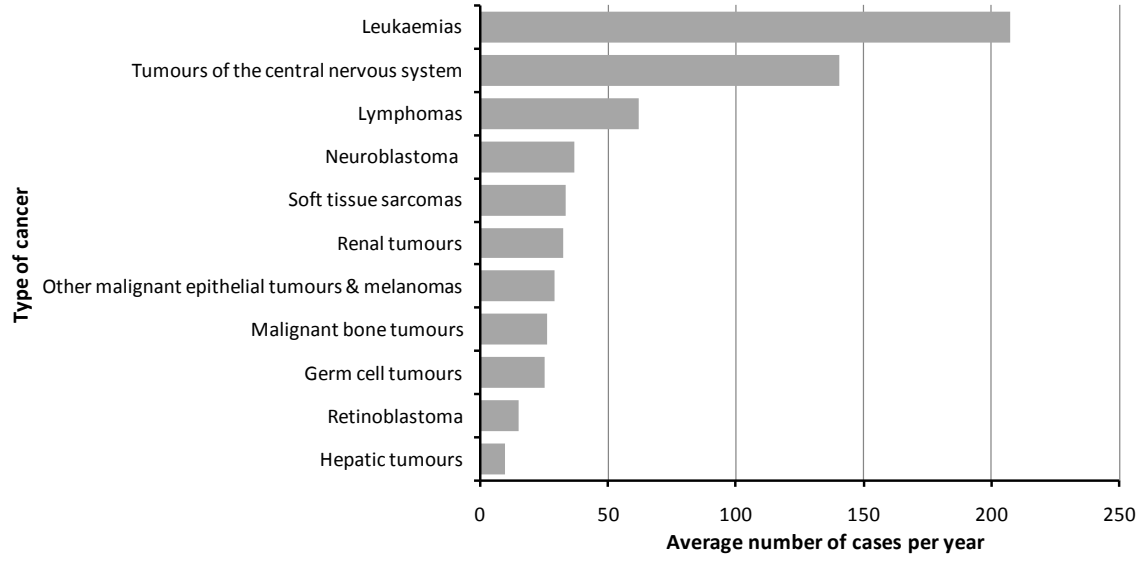
Notes: 1. Diagnostic groups defined using the International Classification of Childhood Cancers (ICCC-3)[18] – see Appendix.
2. Rates are age-standardised to the 2001 Australian Standard Population.
3. 95% CI = 95% confidence interval.
4. Diagnostic group/subgroup includes intracranial and intraspinal tumours of benign or uncertain behaviour.
5. ** = Estimated incidence rate was suppressed due to an insufficient number of cases.

Table 3c (*cont.*): Average annual incidence of childhood cancer by diagnostic group and subgroup, Australia, 1997-2006

Diagnostic group/*subgroup*[1]	Average cases per year	(%)	Rate per million population per year[2] (95% CI)[3]
IX. Soft tissue & other extraosseous sarcomas	**33.2**	**5.4**	**8.4 (7.5-9.3)**
a. Rhabdomyosarcomas	*16.5*	*2.7*	*4.2 (3.6-4.8)*
b. Fibrosarcomas & other fibrous neoplasms	*3.1*	*0.5*	*0.8 (0.5-1.1)*
c. Kaposi sarcomas	*0.0*	*0.0*	**[5]
d. Other specified soft tissue sarcomas	*11.8*	*1.9*	*3.0 (2.5-3.6)*
e. Unspecified soft tissue sarcomas	*1.8*	*0.3*	*0.5 (0.3-0.7)*
X. Germ cell tumours, trophoblastic tumours & neoplasms of gonads[4]	**25.1**	**4.1**	**6.3 (5.6-7.1)**
a. Intracranial & intraspinal germ cell tumours[4]	*7.1*	*1.1*	*1.8 (1.4-2.3)*
b. Malignant extracranial & extragonadal germ cell tumours	*7.7*	*1.2*	*1.9 (1.5-2.4)*
c. Malignant gonadal germ cell tumours	*9.7*	*1.6*	*2.4 (2.0-3.0)*
d. Gonadal carcinomas	*0.5*	*0.1*	**[5]
e. Other & unspecified malignant gonadal tumours	*0.1*	*0.0*	**[5]
XI. Other malignant epithelial neoplasms & melanomas	**29.0**	**4.7**	**7.3 (6.5-8.2)**
a. Adrenocortical carcinomas	*1.3*	*0.2*	*0.3 (0.2-0.6)*
b. Thyroid carcinomas	*5.3*	*0.9*	*1.3 (1.0-1.7)*
c. Nasopharyngeal carcinomas	*1.0*	*0.2*	*0.3 (0.1-0.5)*
d. Melanomas	*14.3*	*2.3*	*3.6 (3.0-4.2)*
e. Skin carcinomas	*1.0*	*0.2*	*0.3 (0.1-0.5)*
f. Other & unspecified carcinomas	*6.1*	*1.0*	*1.5 (1.2-2.0)*
XII. Other & unspecified malignant neoplasms	**1.4**	**0.2**	**0.4 (0.2-0.6)**
a. Other specified malignant tumours	*1.0*	*0.2*	*0.3 (0.1-0.5)*
b. Other unspecified malignant tumours	*0.4*	*0.1*	**[5]

Notes: 1. Diagnostic groups defined using the International Classification of Childhood Cancers (ICCC-3)[18] – see Appendix.
2. Rates are age-standardised to the 2001 Australian Standard Population.
3. 95% CI = 95% confidence interval.
4. Diagnostic group/subgroup includes intracranial and intraspinal tumours of benign or uncertain behaviour.
5. ** = Estimated incidence rate was suppressed due to an insufficient number of cases.

Figure 3c: Average annual incidence counts of childhood cancer by diagnostic group[1,2], Australia, 1997-2006



Notes: 1. Diagnostic groups defined using the International Classification of Childhood Cancers (ICCC-3)[18] – see Appendix.
2. "Tumours of the central nervous system" and "Germ cell tumours" include intracranial and intraspinal tumours of benign or uncertain behaviour.

Most common cancers by sex

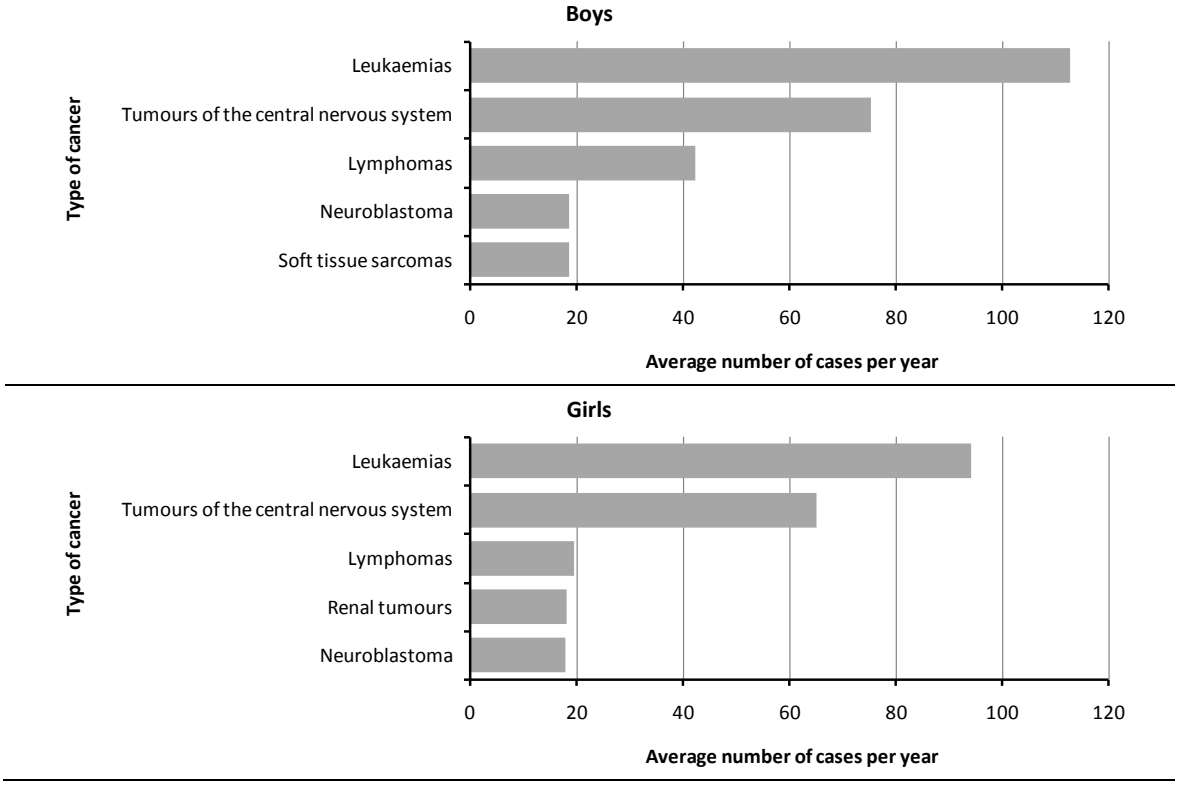
The three most common diagnostic groupings of childhood cancer were the same for both boys and girls: leukaemias (34% of all cancer diagnoses for both sexes), tumours of the central nervous system (22% for boys, 23% for girls) and lymphomas (13% for boys, 7% for girls – see Table 3d and Figure 3d).

Table 3d: Most common childhood cancers by diagnostic group and sex, Australia, 1997-2006

Diagnostic group[1]	Average cases per year	(%)	Rate per million population per year[2] (95% CI)[3]
Boys			
All cancers	**336.7**	**100.0**	**165.4 (159.9-171.1)**
Leukaemias	112.9	33.5	55.5 (52.3-58.8)
Tumours of the central nervous system[4]	75.4	22.4	37.1 (34.5-39.8)
Lymphomas	42.4	12.6	20.8 (18.9-22.9)
Neuroblastoma	18.7	5.6	9.2 (7.9-10.6)
Soft tissue sarcomas	18.7	5.6	9.2 (7.9-10.6)
Girls			
All cancers	**281.7**	**100.0**	**145.7 (140.3-151.2)**
Leukaemias	94.3	33.5	48.8 (45.7-52.0)
Tumours of the central nervous system[4]	65.1	23.1	33.7 (31.2-36.4)
Lymphomas	19.6	7.0	10.1 (8.7-11.6)
Renal tumours	18.1	6.4	9.4 (8.1-10.9)
Neuroblastoma	17.9	6.4	9.3 (8.0-10.7)

Notes: 1. Diagnostic groups defined using the International Classification of Childhood Cancers (ICCC-3)[18] – see Appendix.
2. Rates are age-standardised to the 2001 Australian Standard Population.
3. 95% CI = 95% confidence interval.
4. Diagnostic group/subgroup includes intracranial and intraspinal tumours of benign or uncertain behaviour.

Figure 3d: Most common childhood cancers by diagnostic group[1,2] and sex, Australia, 1997-2006



Notes: 1. Diagnostic groups defined using the International Classification of Childhood Cancers (ICCC-3)[18] – see Appendix.
2. "Tumours of the central nervous system" include intracranial and intraspinal tumours of benign or uncertain behaviour.

Most common cancers by age group

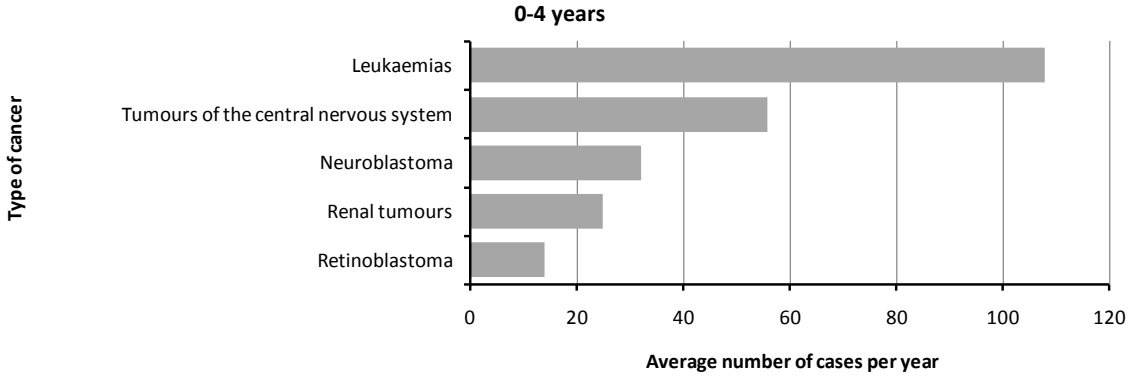
Leukaemias and tumours of the central nervous system were the two most common types of cancer within each age group (Table 3e and Figure 3e). The proportion of leukaemias decreased as age increased (38% of all cancers diagnosed among children aged 0-4, compared to 35% in the 5-9 age group and 25% in the 10-14 age group), while tumours of the central nervous system comprised 20%, 30% and 21% of the total cancer incidence counts for children aged 0-4 years, 5-9 years and 10-14 years respectively.

Table 3e: Most common childhood cancers by diagnostic group and age, Australia, 1997-2006

Diagnostic group[1]	Average cases per year	(%)	Rate per million population per year[2] (95% CI)[3]
0-4 years			
All cancers	**284.6**	**100.0**	**222.9 (214.8-231.3)**
Leukaemias	108.0	37.9	84.6 (79.6-89.8)
Tumours of the central nervous system[4]	55.8	19.6	43.7 (40.2-47.5)
Neuroblastoma	32.0	11.2	25.1 (22.4-28.0)
Renal tumours	24.8	8.7	19.4 (17.1-22.0)
Retinoblastoma	14.0	4.9	11.0 (9.2-12.9)
5-9 years			
All cancers	**156.4**	**100.0**	**117.2 (111.4-123.1)**
Leukaemias	55.2	35.3	41.4 (38.0-45.0)
Tumours of the central nervous system[4]	47.6	30.4	35.7 (32.5-39.0)
Lymphomas	19.1	12.2	14.3 (12.4-16.5)
Soft tissue sarcomas	8.7	5.6	6.5 (5.2-8.0)
Malignant bone tumours	6.6	4.2	4.9 (3.8-6.3)
10-14 years			
All cancers	**177.4**	**100.0**	**130.8 (124.8-137.0)**
Leukaemias	44.0	24.8	32.5 (29.5-35.6)
Tumours of the central nervous system[4]	37.1	20.9	27.4 (24.6-30.3)
Lymphomas	32.7	18.4	24.1 (21.6-26.9)
Other malignant epithelial neoplasms & melanomas	21.9	12.3	16.2 (14.1-18.4)
Malignant bone tumours	17.2	9.7	12.7 (10.9-14.7)

Notes: 1. Diagnostic groups defined using the International Classification of Childhood Cancers (ICCC-3)[18] – see Appendix.
2. Rates are age-standardised to the 2001 Australian Standard Population.
3. 95% CI = 95% confidence interval.
4. Diagnostic group/subgroup includes intracranial and intraspinal tumours of benign or uncertain behaviour.

Figure 3e: Most common childhood cancers by diagnostic group[1,2] and age, Australia, 1997-2006



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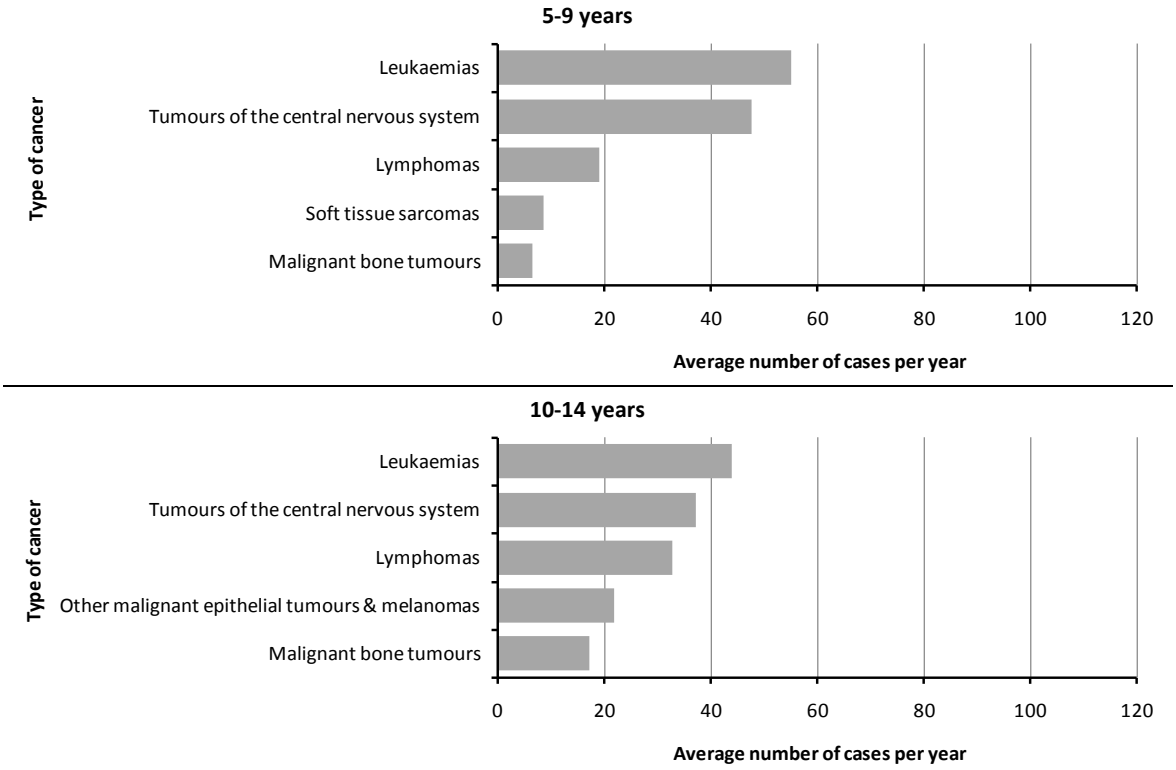
Notes: 1. Diagnostic groups defined using the International Classification of Childhood Cancers (ICCC-3)[18] – see Appendix.
2. "Tumours of the central nervous system" include intracranial and intraspinal tumours of benign or uncertain behaviour.

Figure 3e (*cont*.): Most common childhood cancers by diagnostic group[1,2] and age, Australia, 1997-2006



Notes: 1. Diagnostic groups defined using the International Classification of Childhood Cancers (ICCC-3)[18] – see Appendix.
2. "Tumours of the central nervous system" include intracranial and intraspinal tumours of benign or uncertain behaviour.

4 Incidence by childhood cancer diagnostic group

4.1 Leukaemias, myeloproliferative diseases and myelodysplastic diseases

Average annual incidence, 1997-2006

An average of 207 cases of childhood leukaemia (52 per million) were diagnosed in Australia each year between 1997-2006. More than three-quarters (77%, 159 cases per year) were lymphoid leukaemias and a further 17% (34 cases per year) were acute myeloid leukaemias (Table 3c).

The incidence rate of leukaemia was significantly higher among boys (56 per million per year) compared to girls (49 per million per year – see Table 4.1a).

Leukaemia became less common as age increased. Over half (52%) of all childhood leukaemias occurred within the 0-4 age group, an incidence rate of 85 per million per year. This incidence rate was more than double that for children aged 5-9 years (41 per million per year), which in turn was significantly higher than the rate among children aged 10-14 years (32 per million per year).

While there was some variation in incidence rates for leukaemia between the States/Territories, these differences were not statistically significant.

Table 4.1a: Average annual incidence of childhood leukaemias by sex, age group and State/Territory, Australia, 1997-2006

	Average cases per year	(%)	Rate per million population per year[1] (95% CI)[2]
Total	207.2	100.0	52.2 (50.0-54.5)
Sex (p=0.004)			
Males	112.9	54.5	55.5 (52.3-58.8)
Females	94.3	45.5	48.8 (45.7-52.0)
Age group (p<0.001)			
0-4 years	108.0	52.1	84.6 (79.6-89.8)
5-9 years	55.2	26.6	41.4 (38.0-44.9)
10-14 years	44.0	21.2	32.4 (29.5-35.6)
State/Territory (p=0.645)			
New South Wales	70.7	34.1	53.1 (49.3-57.2)
Victoria	51.8	25.0	54.1 (49.5-59.0)
Queensland	38.9	18.8	50.2 (45.3-55.4)
South Australia	14.9	7.2	51.6 (43.6-60.6)
Western Australia	18.7	9.0	47.1 (40.6-54.4)
Tasmania	5.6	2.7	56.8 (42.9-73.8)
Northern Territory	2.6	1.3	50.4 (32.9-73.8)
Australian Capital Territory	4.0	1.9	61.8 (44.1-84.1)

Notes: 1. Rates age-standardised to the 2001 Australian Standard Population.
2. 95% CI = 95% confidence interval.

Incidence rate trends, 1983-2006

Incidence rates of leukaemia among boys increased significantly by 0.6% per year between 1983-2006, while girls experienced a significant increase of 1.3% per year in the underlying trend over the same period (Figure 4.1a and Table 4.1b).

Trends for leukaemia also increased significantly across all three age groups between 1983-2006 – by an average of 0.7% per year within the 0-4 age group, 1.1% per year within the 5-9 age group and 1.5% per year among children aged 10-14 (Figure 4.1b and Table 4.1b).

Figure 4.1a: Observed incidence rates[1] and underlying trends[2] of childhood leukaemias by sex, Australia, 1983-2006

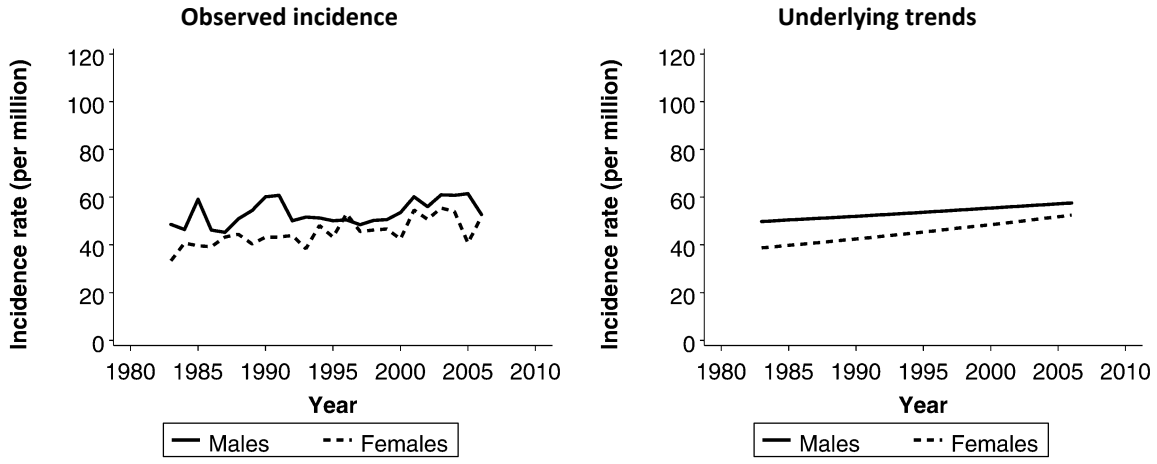


Figure 4.1b: Observed incidence rates[1] and underlying trends[2] of childhood leukaemias by age group, Australia, 1983-2006

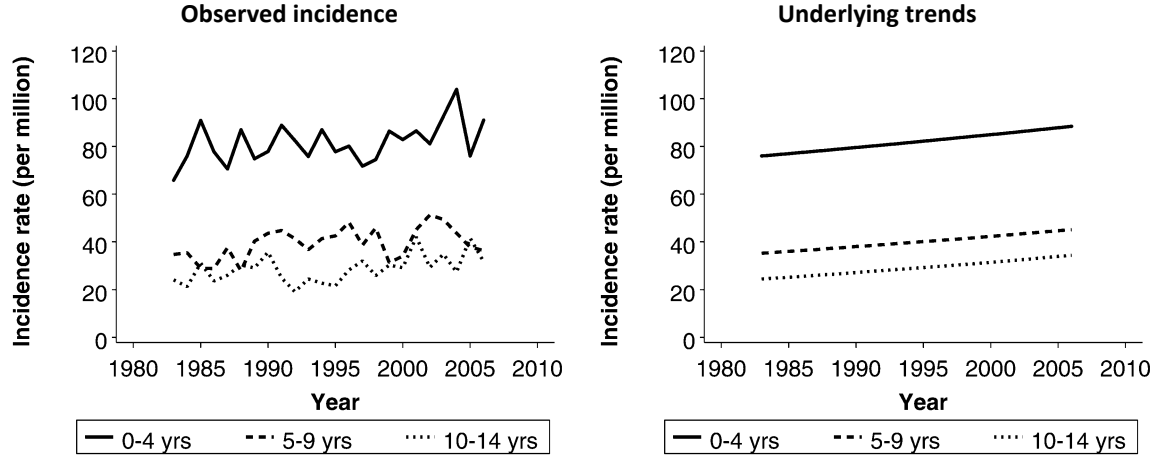


Table 4.1b: Trends[2] for incidence rates[1] of childhood leukaemias by sex and age group, Australia, 1983-2006

Sex/Age group	Trend 1[3-5]
Boys	1983-2006 +0.6% (+0.1%,+1.2%)
Girls	1983-2006 +1.3% (+0.8%,+1.9%)
0-4 years	1983-2006 +0.7% (+0.1%,+1.2%)
5-9 years	1983-2006 +1.1% (+0.1%,+2.0%)
10-14 years	1983-2006 +1.5% (+0.4%,+2.6%)

Notes:
1. Rates age-standardised to the 2001 Australian Standard Population.
2. Trends modelled using joinpoint regression (www.srab.cancer.gov/joinpoint).
3. Trend data indicates the period of the trend and the estimated annual percentage change.
4. Figures in brackets correspond to the associated 95% confidence interval.
5. Shaded cells indicate statistically significant trends.

4.2 Lymphomas and reticuloendothelial neoplasms

Average annual incidence, 1997-2006

In the 10 years between 1997-2006, 62 children in Australia were diagnosed with lymphoma each year on average, corresponding to an annual rate of 16 per million. Hodgkin lymphoma was the most common subgroup (42%, 26 cases per year), followed by non-Hodgkin lymphoma excluding Burkitt lymphoma (35%, 22 cases per year), and Burkitt lymphoma (20%, 12 cases per year - see Table 3c).

The incidence rate of lymphoma was more than double for boys (21 per million per year) compared to girls (10 per million per year – see Table 4.2a).

Unlike most other childhood cancer diagnostic groups, the incidence rate of lymphoma increased with age, from 8 per million per year in the 0-4 age group to 14 per million per year among children aged 5-9 years and 24 per million per year among children aged 10-14 years.

Incidence rates of childhood lymphoma were quite similar in most States and Territories, with no statistically significant differences observed.

Table 4.2a: Average annual incidence of childhood lymphomas by sex, age group and State/Territory, Australia, 1997-2006

	Average cases per year	(%)	Rate per million population per year[1] (95% CI)[2]
Total	62.0	100.0	15.6 (14.4-16.9)
Sex (p<0.001)			
Males	42.4	68.4	20.8 (18.9-22.9)
Females	19.6	31.6	10.1 (8.7-11.6)
Age group (p<0.001)			
0-4 years	10.2	16.5	8.0 (6.5-9.7)
5-9 years	19.1	30.8	14.3 (12.4-16.5)
10-14 years	32.7	52.7	24.1 (21.6-26.9)
State/Territory (p=0.805)			
New South Wales	19.8	31.9	14.9 (12.9-17.2)
Victoria	16.1	26.0	16.8 (14.3-19.6)
Queensland	12.1	19.5	15.5 (12.9-18.6)
South Australia	4.5	7.3	15.4 (11.2-20.6)
Western Australia	6.6	10.6	16.4 (12.7-20.8)
Tasmania	1.2	1.9	12.1 (6.3-21.1)
Northern Territory	0.5	0.8	**[3]
Australian Capital Territory	1.2	1.9	18.5 (9.6-32.3)

Notes: 1. Rates age-standardised to the 2001 Australian Standard Population.
2. 95% CI = 95% confidence interval.
3. ** = Estimated incidence rate was suppressed due to an insufficient number of cases.

Incidence rate trends, 1983-2006

There was evidence of a possible increase in incidence rates of lymphoma for both boys and girls between 1983-2006, although the corresponding trends were not statistically significant for either sex (Figure 4.2a and Table 4.2b).

Incidence rates of lymphoma have generally been diverging by age group (Figure 4.2b and Table 4.2b). Between 1983-2006, rates of lymphoma decreased significantly by an average of 1.5% per year among children aged 0-4 years. In contrast, the trend in incidence rates remained stable within the 5-9 age group over this period, while among children aged 10-14 years there was a significant increase of 3.4% per year between 1983-1998, followed by evidence of a possible decrease (non-significant) to the end of 2006.

Figure 4.2a: Observed incidence rates[1] and underlying trends[2] of childhood lymphomas by sex, Australia, 1983-2006

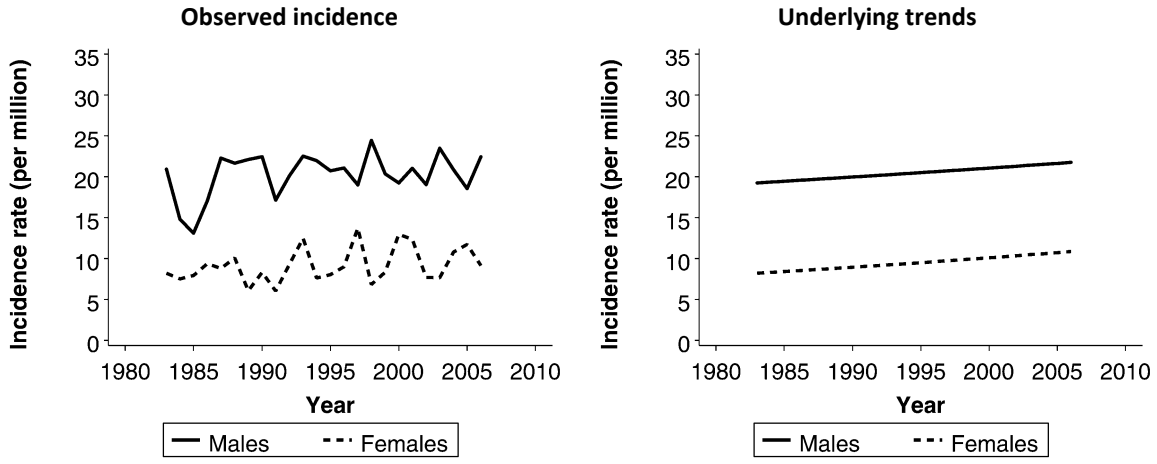


Figure 4.2b: Observed incidence rates[1] and underlying trends[2] of childhood lymphomas by age group, Australia, 1983-2006

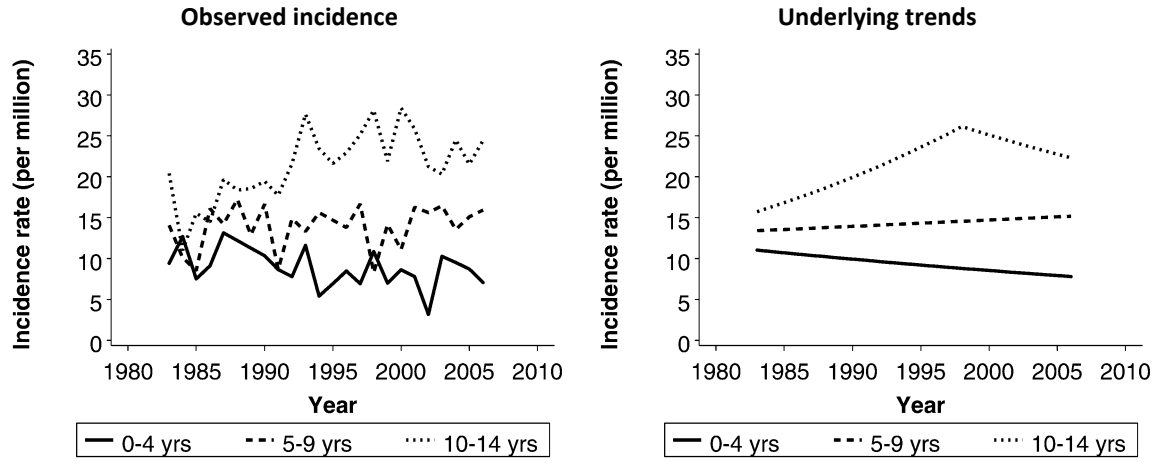


Table 4.2b: Trends[2] for incidence rates[1] of childhood lymphomas by sex and age group, Australia, 1983-2006

Sex/Age group	Trend 1[3-5]	Trend 2[3-5]
Boys	1983-2006 +0.5% (-0.3%,+1.3%)	
Girls	1983-2006 +1.2% (-0.1%,+2.6%)	
0-4 years	1983-2006 -1.5% (-2.9%,-0.1%)	
5-9 years	1983-2006 +0.5% (-0.6%,+1.7%)	
10-14 years	1983-1998 +3.4% (+1.6%,+5.4%)	1998-2006 -2.0% (-6.0%,+2.2%)

Notes:
1. Rates age-standardised to the 2001 Australian Standard Population.
2. Trends modelled using joinpoint regression (www.srab.cancer.gov/joinpoint).
3. Trend data indicates the period of the trend and the estimated annual percentage change.
4. Figures in brackets correspond to the associated 95% confidence interval.
5. Shaded cells indicate statistically significant trends.

4.3 Central nervous system and miscellaneous intracranial and intraspinal neoplasms

Average annual incidence, 1997-2006

There were an average of 141 children per year in Australia (35 per million) diagnosed with tumours of the central nervous system between 1997-2006. Astrocytomas were the most common subgroup (see Table 3c), accounting for 45% of these tumours (64 cases per year). Other main subgroups included intracranial/ intraspinal embryonal tumours (28 cases per year, 20%), other gliomas (17 cases per year, 12%) and ependymomas and choroid plexus tumours (13 cases per year, 9%).

The incidence rate of tumours of the central nervous system was slightly higher among boys than girls (37 per million per year compared to 34 per million per year), but the difference was not statistically significant (Table 4.3a).

Tumours of the central nervous system became less common as age increased, declining from an incident rate of 44 per million per year among children aged 0-4 years to 36 per million per year within the 5-9 age group and 27 per million per year within the 10-14 age group.

Despite some variation in incidence rates between the States/Territories (particularly the lower rate reported in the Northern Territory), the differences throughout Australia were not statistically significant.

Table 4.3a: Average annual incidence of childhood tumours of the central nervous system[1] by sex, age group and State/Territory, Australia, 1997-2006

	Average cases per year	(%)	Rate per million population per year[2] (95% CI)[3]
Total	140.5	100.0	35.4 (33.6-37.3)
Sex (p=0.074)			
Males	75.4	53.7	37.1 (34.5-39.8)
Females	65.1	46.3	33.7 (31.2-36.4)
Age group (p<0.001)			
0-4 years	55.8	39.7	43.7 (40.2-47.5)
5-9 years	47.6	33.9	35.7 (32.5-39.0)
10-14 years	37.1	26.4	27.4 (24.6-30.3)
State/Territory (p=0.165)			
New South Wales	45.3	32.2	34.1 (31.0-37.4)
Victoria	37.4	26.6	39.1 (35.2-43.3)
Queensland	27.1	19.2	34.9 (30.9-39.3)
South Australia	8.9	6.3	30.6 (24.6-37.7)
Western Australia	13.8	9.8	34.6 (29.0-40.8)
Tasmania	4.3	3.1	43.7 (31.6-58.9)
Northern Territory	1.2	0.9	23.6 (12.2-41.3)
Australian Capital Territory	2.5	1.8	38.6 (25.0-57.0)

Notes: 1. Includes intracranial/intraspinal tumours of benign or uncertain behaviour.
2. Rates age-standardised to the 2001 Australian Standard Population.
3. 95% CI = 95% confidence interval.

Incidence rate trends, 1983-2006

There was evidence of a possible increase in incidence rates of tumours of the central nervous system for boys between 1983-2006, but the underlying trend was not statistically significant (Figure 4.3a and Table 4.3b). Incidence rates remained stable for girls over this period.

Trends in the incidence rate of tumours of the central nervous system peaked in 1997 among children aged 0-4 years and in 1994 among children aged 10-14 years (Figure 4.3b and Table 4.3b). There was evidence of a possible decrease (non-significant) in incidence rates within both of these age groups since then. Among children aged 5-9 years there was evidence of a possible increase in the incidence rate trend between 1983-2006, but again this was not statistically significant.

Figure 4.3a: Observed incidence rates[1] and underlying trends[2] of childhood tumours of the central nervous system[3] by sex, Australia, 1983-2006

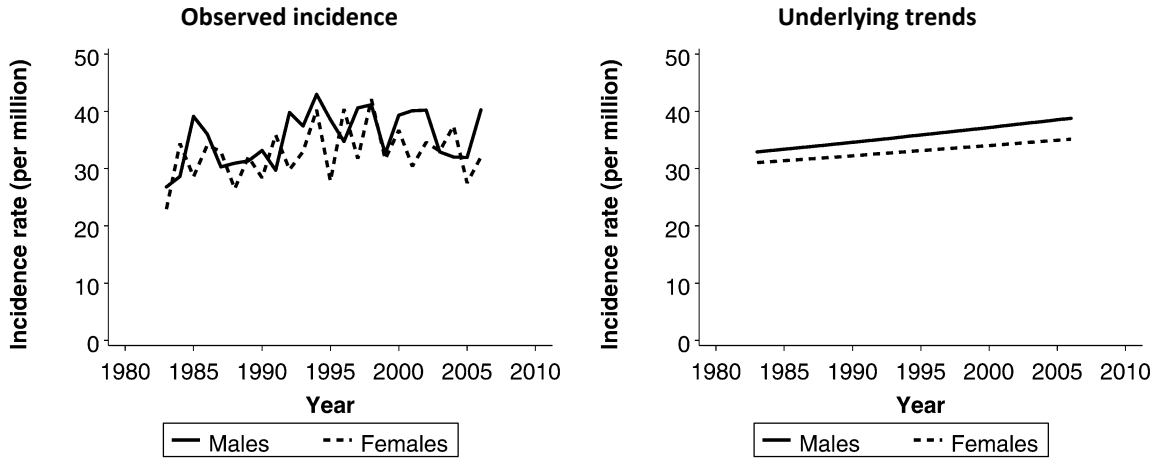


Figure 4.3b: Observed incidence rates[1] and underlying trends[2] of childhood tumours of the central nervous system[3] by age group, Australia, 1983-2006

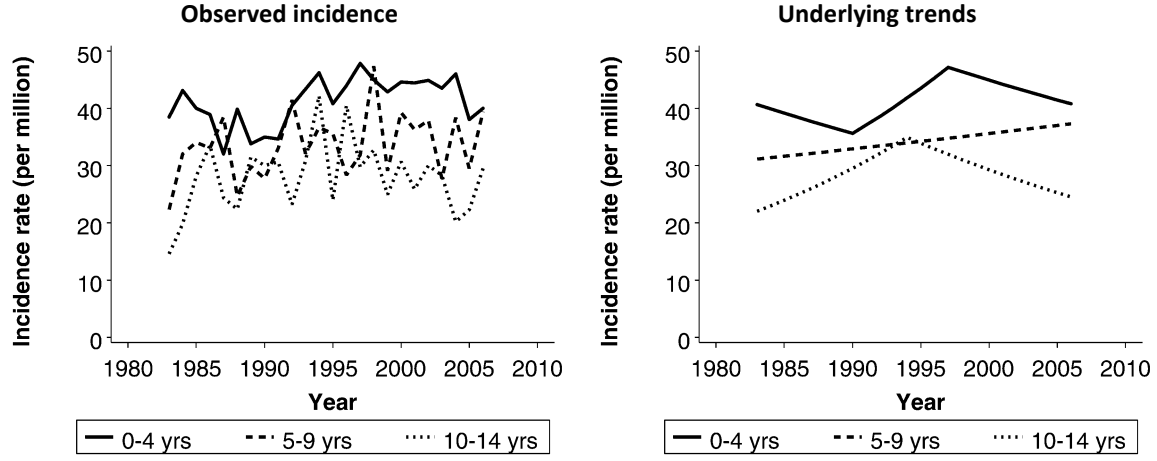


Table 4.3b: Trends[2] for incidence rates[1] of childhood tumours of the central nervous system[3] by sex and age group, Australia, 1983-2006

Sex/Age group	Trend 1[4-6]	Trend 2[4-6]	Trend 3[4-6]
Boys	1983-2006 +0.7% (-0.1%,+1.5%)		
Girls	1983-2006 +0.5% (-0.3%,+1.4%)		
0-4 years	1983-1990 -1.9% (-4.9%,+1.3%)	1990-1997 +4.1% (+0.3%,+8.0%)	1997-2006 -1.6% (-3.5%,+0.3%)
5-9 years	1983-2006 +0.8% (-0.2%,+1.8%)		
10-14 years	1983-1994 +4.3% (+0.1%,+8.7%)	1994-2006 -2.9% (-6.0%,+0.3%)	

Notes:
1. Rates age-standardised to the 2001 Australian Standard Population.
2. Trends modelled using joinpoint regression (www.srab.cancer.gov/joinpoint).
3. Includes intracranial/intraspinal tumours of benign or uncertain behaviour.
4. Trend data indicates the period of the trend and the estimated annual percentage change.
5. Figures in brackets correspond to the associated 95% confidence interval.
6. Shaded cells indicate statistically significant trends.

4.4 Neuroblastoma and other peripheral nervous cell tumours

Average annual incidence, 1997-2006

Between 1997-2006, an annual average of 37 cases (9 per million per year) of childhood neuroblastoma were registered throughout Australia. Nearly all (98%) of these tumours were either neuroblastoma or ganglioneuroblastoma (36 cases per year – see Table 3c).

Incidence rates of neuroblastoma were evenly distributed between boys and girls (both 9 per million per year – Table 4.4a).

There were, however, large differences in incidence by age, with most cases (87% or a rate of 25 per million per year) occurring among children aged 0-4 years. This contrasts with incidence rates of 3 per million per year and 1 per million per year in the 5-9 and 10-14 age groups respectively.

Incidence rates of neuroblastoma were quite consistent across the Australian States for which there were a sufficient number of cases to calculate reliable estimates.

Table 4.4a: Average annual incidence of childhood neuroblastoma by sex, age group and State/Territory, Australia, 1997-2006

	Average cases per year	(%)	Rate per million population per year[1] (95% CI)[2]
Total	36.6	100.0	9.2 (8.3-10.2)
Sex (p=0.936)			
Males	18.7	51.1	9.2 (7.9-10.6)
Females	17.9	48.9	9.3 (8.0-10.7)
Age group (p<0.001)			
0-4 years	32.0	87.4	25.1 (22.4-28.0)
5-9 years	3.5	9.6	2.6 (1.8-3.6)
10-14 years	1.1	3.0	0.8 (0.4-1.5)
State/Territory (p=0.366)			
New South Wales	13.4	36.6	10.0 (8.4-11.9)
Victoria	7.9	21.6	8.2 (6.5-10.3)
Queensland	6.8	18.6	8.8 (6.8-11.1)
South Australia	2.7	7.4	9.4 (6.2-13.7)
Western Australia	4.1	11.2	10.4 (7.5-14.1)
Tasmania	0.9	2.5	9.2 (4.2-17.5)
Northern Territory	0.1	0.3	**[3]
Australian Capital Territory	0.7	1.9	**[3]

Notes: 1. Rates age-standardised to the 2001 Australian Standard Population.
2. 95% CI = 95% confidence interval.
3. ** = Estimated incidence rate was suppressed due to an insufficient number of cases.

Incidence rate trends, 1983-2006

Among boys, the incidence rate trend for neuroblastoma has decreased significantly by an average of 4.1% per year since 1994 (Figure 4.4a and Table 4.4b). While there was evidence of a possible increase in incidence rates for girls, the underlying trend was not statistically significant.

Incidence rate trends for neuroblastoma remained stable between 1983-2006 within both the 0-4 and 5-14 age groups (Figure 4.4b and Table 4.4b).

Figure 4.4a: Observed incidence rates[1] and underlying trends[2] of childhood neuroblastoma by sex, Australia, 1983-2006

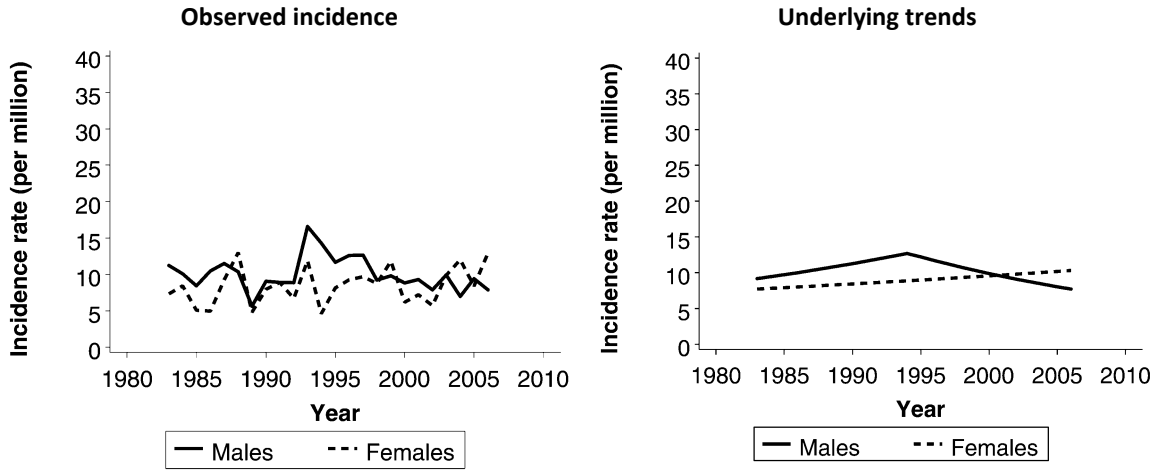


Figure 4.4b: Observed incidence rates[1] and underlying trends[2] of childhood neuroblastoma by age group[3], Australia, 1983-2006

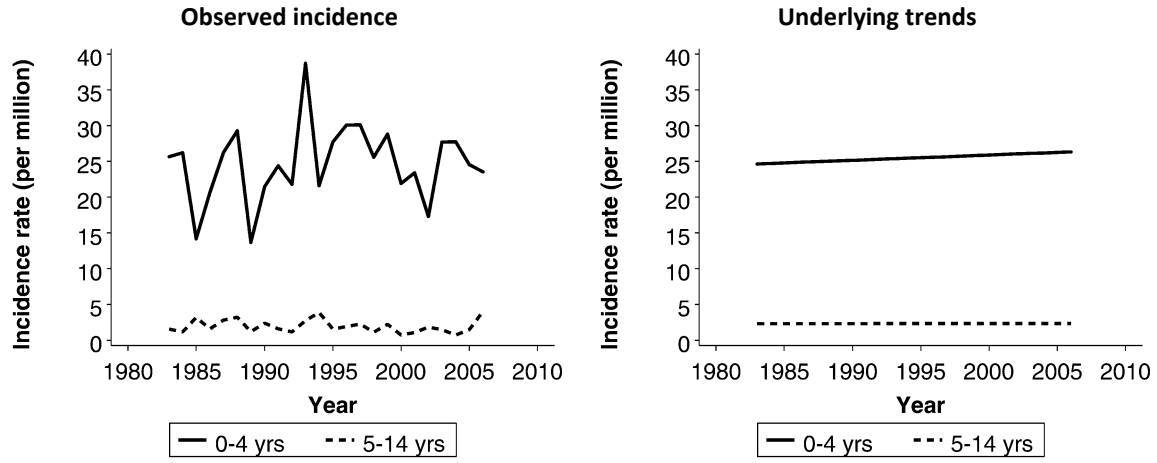


Table 4.4b: Trends[2] for incidence rates[1] of childhood neuroblastoma by sex and age group[3], Australia, 1983-2006

Sex/Age group	Trend 1[4-6]	Trend 2[4-6]
Boys	1983-1994 +3.0% (-0.8%,+7.0%)	1994-2006 -4.1% (-7.4%,-0.6%)
Girls	1983-2006 +1.3% (-0.5%,+3.0%)	
0-4 years	1983-2006 +0.3% (-1.1%,+1.7%)	
5-14 years[3]	1983-2006 +0.1% (-2.6%,+2.8%)	

Notes:
1. Rates age-standardised to the 2001 Australian Standard Population.
2. Trends modelled using joinpoint regression (www.srab.cancer.gov/joinpoint).
3. Data was combined for the 5-9 and 10-14 age groups due to the small number of cases.
4. Trend data indicates the period of the trend and the estimated annual percentage change.
5. Figures in brackets correspond to the associated 95% confidence interval.
6. Shaded cells indicate statistically significant trends.

4.5 Retinoblastoma

Average annual incidence, 1997-2006

Retinoblastoma are less common than most other types of childhood cancer (see Figure 3c). In the 10-year period between 1997-2006 there were an average of 15 cases of retinoblastoma diagnosed per year among children in Australia, an annual incidence rate of 4 per million.

Incidence rates were slightly, but significantly, higher among boys compared to girls (4 per million per year and 3 per million per year respectively – Table 4.5a).

The majority (95%) of retinoblastoma cases occurred in the 0-4 age group, corresponding to an incidence rate of 11 per million per year. No cases were reported among children aged 10-14 years.

Only minor (non-significant) differences were found in the incidence rates of retinoblastoma between the States and Territories.

Table 4.5a: Average annual incidence of childhood retinoblastoma by sex, age group and State/Territory, Australia, 1997-2006

	Average cases per year	(%)	Rate per million population per year[1] (95% CI)[2]
Total	14.8	100.0	3.7 (3.2-4.4)
Sex (p=0.031)			
Males	8.9	60.1	4.4 (3.5-5.4)
Females	5.9	39.9	3.1 (2.3-3.9)
Age group (p<0.001)			
0-4 years	14.0	94.6	11.0 (9.2-12.9)
5-9 years	0.8	5.4	0.6 (0.3-1.2)
10-14 years	0.0	0.0	**[3]
State/Territory (p=0.740)			
New South Wales	4.9	33.1	3.7 (2.7-4.8)
Victoria	3.7	25.0	3.9 (2.7-5.3)
Queensland	2.8	18.9	3.6 (2.4-5.2)
South Australia	0.9	6.1	3.2 (1.4-6.0)
Western Australia	1.9	12.8	4.8 (2.9-7.6)
Tasmania	0.1	0.7	**[3]
Northern Territory	0.2	1.4	**[3]
Australian Capital Territory	0.3	2.0	**[3]

Notes: 1. Rates age-standardised to the 2001 Australian Standard Population.
2. 95% CI = 95% confidence interval.
3. ** = Estimated incidence rate was suppressed due to an insufficient number of cases.

Incidence rate trends, 1983-2006

The underlying trends in incidence rates of retinoblastoma between 1983-2006 were stable among both boys and girls (Figure 4.5a and Table 4.5b).

Despite relatively large fluctuations from year to year in the incidence rate of retinoblastoma within the 0-4 age group, the trend also remained stable (Figure 4.5b and Table 4.5b). Trends could not be calculated for children aged 5-14 years due to insufficient data.

Figure 4.5a: Observed incidence rates[1] and underlying trends[2] of childhood retinoblastoma by sex, Australia, 1983-2006

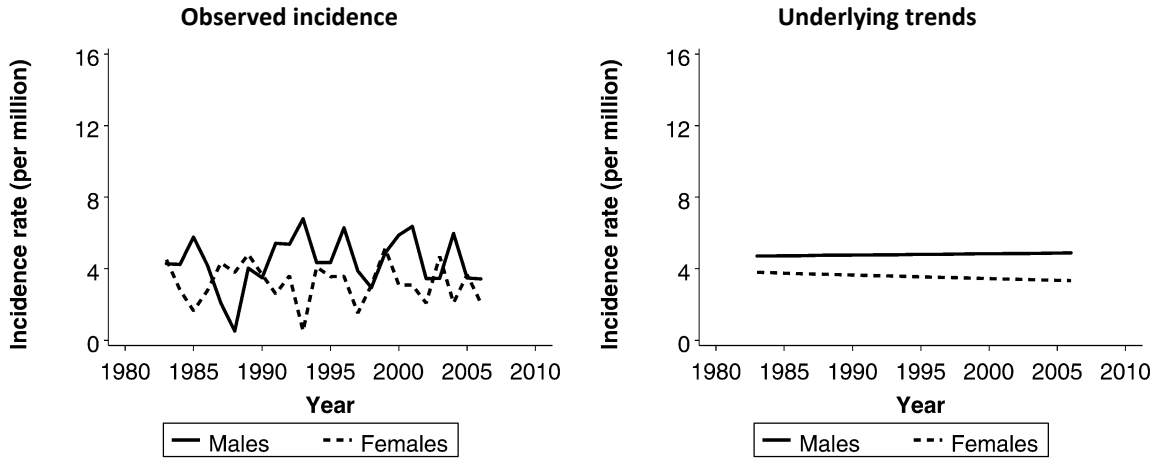


Figure 4.5b: Observed incidence rates[1] and underlying trends[2] of childhood retinoblastoma by age group[3,4], Australia, 1983-2006

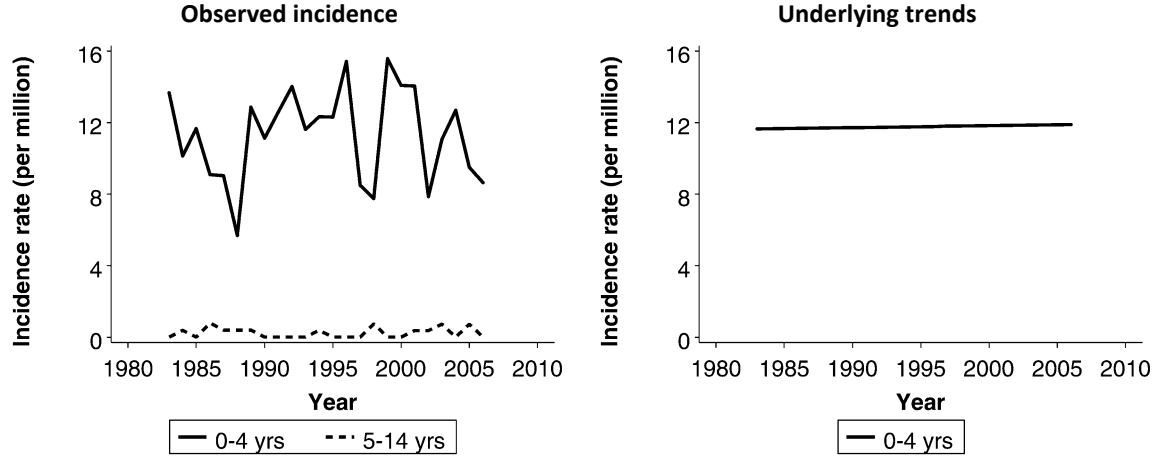


Table 4.5b: Trends[2] for incidence rates[1] of childhood retinoblastoma by sex and age group[4], Australia, 1983-2006

Sex/Age group	Trend 1[5,6]
Boys	1983-2006 +0.1% (-1.7%,+2.0%)
Girls	1983-2006 -0.6% (-2.4%,+1.4%)
0-4 years	1983-2006 +0.1% (-1.4%,+1.6%)
5-14 years[4]	n.a.[7]

Notes:
1. Rates age-standardised to the 2001 Australian Standard Population.
2. Trends modelled using joinpoint regression (www.srab.cancer.gov/joinpoint).
3. Observed incidence data was combined for the 5-9 and 10-14 age groups due to the small number of cases.
4. Trends could not be calculated for children aged 5-14 years due to insufficient data.
5. Trend data indicates the period of the trend and the estimated annual percentage change.
6. Figures in brackets correspond to the associated 95% confidence interval.
7. n.a. = not applicable.

4.6 Renal tumours

Average annual incidence, 1997-2006

An average of 33 renal tumours (or a rate of 8 per million) were diagnosed among children in Australia each year between 1997-2006. Nephroblastoma (commonly known as Wilms' tumours) and other nonepithelial renal tumours were by far the most common subgroup, accounting for 96% of all childhood renal tumours with 31 cases per year (see Table 3c).

As shown in Table 4.6a, renal tumours were more common among girls compared to boys (incidence rates of 9 per million per year and 7 per million per year respectively).

Around three-quarters (76%) of childhood renal tumours were diagnosed before 5 years of age. Incidence rates decreased from 19 per million per year among children in the 0-4 age group to 4 per million per year among those aged 5-9 years and 1 per million per year in the 10-14 age group.

There were no statistically significant differences in incidence rates of childhood renal tumours by State or Territory throughout Australia, although the rate reported in the Australian Capital Territory was around twice as high as the rates in each of the mainland States.

Table 4.6a: Average annual incidence of childhood renal tumours by sex, age group and State/Territory, Australia, 1997-2006

	Average cases per year	(%)	Rate per million population per year[1] (95% CI)[2]
Total	32.5	100.0	8.2 (7.3-9.1)
Sex (p=0.012)			
Males	14.4	44.3	7.1 (6.0-8.3)
Females	18.1	55.7	9.4 (8.1-10.9)
Age group (p<0.001)			
0-4 years	24.8	76.3	19.4 (17.1-22.0)
5-9 years	5.9	18.2	4.4 (3.4-5.7)
10-14 years	1.8	5.5	1.3 (0.8-2.1)
State/Territory (p=0.341)			
New South Wales	10.5	32.3	7.9 (6.4-9.5)
Victoria	8.5	26.2	8.9 (7.1-11.0)
Queensland	5.2	16.0	6.7 (5.0-8.8)
South Australia	2.2	6.8	7.7 (4.8-11.6)
Western Australia	3.4	10.5	8.6 (6.0-12.0)
Tasmania	1.1	3.4	11.2 (5.6-20.1)
Northern Territory	0.6	1.8	**[3]
Australian Capital Territory	1.0	3.1	15.5 (7.4-28.4)

Notes: 1. Rates age-standardised to the 2001 Australian Standard Population.
2. 95% CI = 95% confidence interval.
3. ** = Estimated incidence rate was suppressed due to an insufficient number of cases.

Incidence rate trends, 1983-2006

The incidence rate trends for renal tumours remained stable among both boys and girls between 1983-2006 (Figure 4.6a and Table 4.6b).

Similarly, the trends in renal tumour incidence rates were also stable for children in both the 0-4 and 5-14 age groups (Figure 4.6b and Table 4.6b).

Figure 4.6a: Observed incidence rates[1] and underlying trends[2] of childhood renal tumours by sex, Australia, 1983-2006

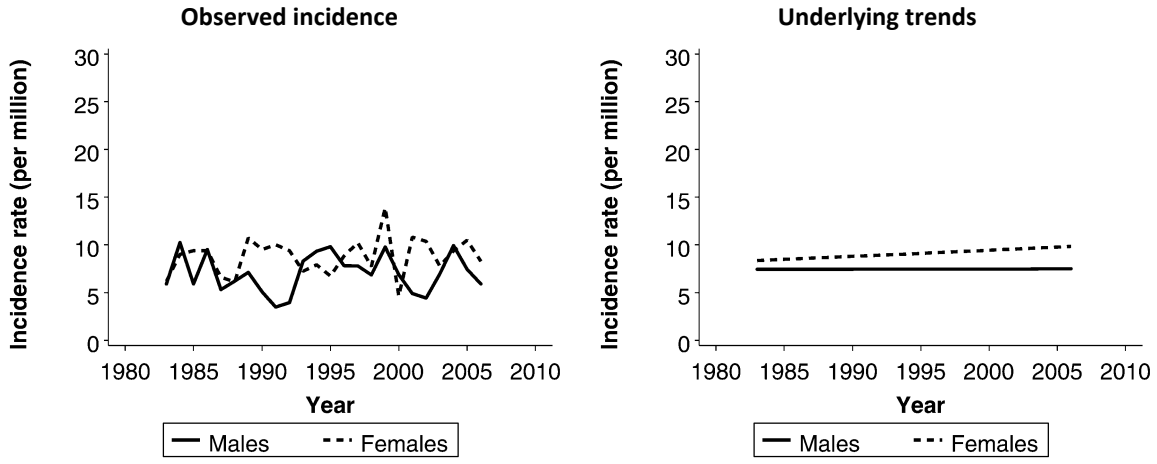


Figure 4.6b: Observed incidence rates[1] and underlying trends[2] of childhood renal tumours by age group[3], Australia, 1983-2006

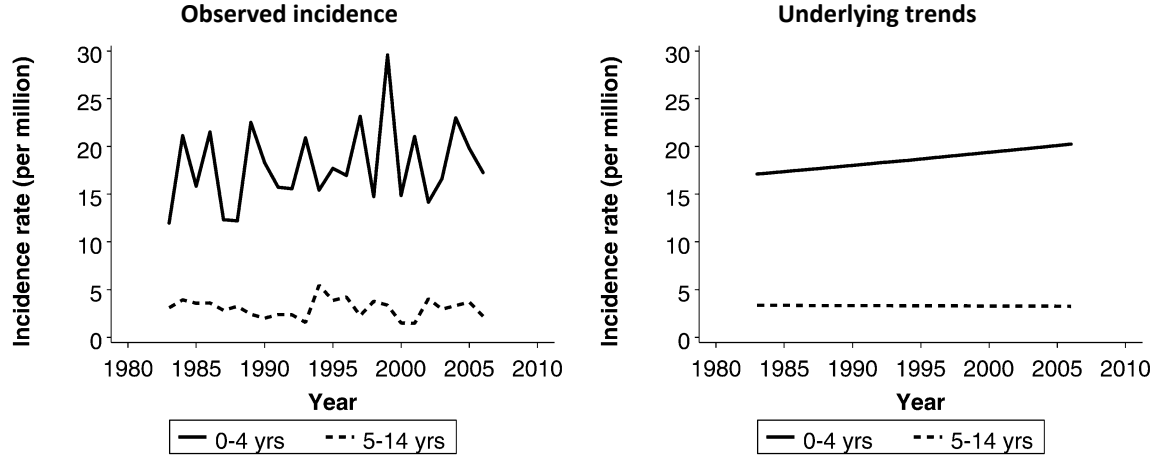


Table 4.6b: Trends[2] for incidence rates[1] of childhood renal tumours by sex and age group[3], Australia, 1983-2006

Sex/Age group	Trend 1[4,5]
Boys	1983-2006 +0.0% (-1.7%,+1.8%)
Girls	1983-2006 +0.7% (-0.7%,+2.1%)
0-4 years	1983-2006 +0.7% (-0.7%,+2.2%)
5-14 years[3]	1983-2006 -0.2% (-2.0%,+1.7%)

Notes:
1. Rates age-standardised to the 2001 Australian Standard Population.
2. Trends modelled using joinpoint regression (www.srab.cancer.gov/joinpoint).
3. Data was combined for the 5-9 and 10-14 age groups due to the small number of cases.
4. Trend data indicates the period of the trend and the estimated annual percentage change.
5. Figures in brackets correspond to the associated 95% confidence interval.

4.7 Hepatic tumours

Average annual incidence, 1997-2006

Hepatic tumours are relatively rare compared to other types of childhood cancer (Figure 3c), with an average of 10 cases per year (or 2 per million) diagnosed among 0-14 year olds in Australia between 1997-2006. Hepatoblastoma accounted for 81% of these diagnoses (8 cases per year - see Table 3c).

Boys (3 per million per year) were more likely to be diagnosed with a hepatic tumour than girls (2 per million per year- Table 4.7a).

Incidence of hepatic tumours was highest among children aged 0-4 years (a rate of 6 per million per year), compared with rates of around 1 per million per year in both the 5-9 and 10-14 age groups.

The incidence rates for the various States and Territories were based on a small number of cases each year, with no significant differences observed.

Table 4.7a: Average annual incidence of childhood hepatic tumours by sex, age group and State/Territory, Australia, 1997-2006

	Average cases per year	(%)	Rate per million population per year[1] (95% CI)[2]
Total	9.8	100.0	2.5 (2.0-3.0)
Sex (p=0.017)			
Males	6.2	63.3	3.1 (2.3-3.9)
Females	3.6	36.7	1.9 (1.3-2.6)
Age group (p<0.001)			
0-4 years	7.7	78.6	6.0 (4.8-7.5)
5-9 years	1.0	10.2	0.7 (0.4-1.4)
10-14 years	1.1	11.2	0.8 (0.4-1.5)
State/Territory (p=0.884)			
New South Wales	3.6	36.7	2.7 (1.9-3.7)
Victoria	2.0	20.4	2.1 (1.3-3.2)
Queensland	1.9	19.4	2.5 (1.5-3.8)
South Australia	0.5	5.1	**[3]
Western Australia	1.3	13.3	3.3 (1.7-5.6)
Tasmania	0.3	3.1	**[3]
Northern Territory	0.1	1.0	**[3]
Australian Capital Territory	0.1	1.0	**[3]

Notes: 1. Rates age-standardised to the 2001 Australian Standard Population.
2. 95% CI = 95% confidence interval.
3. ** = Estimated incidence rate was suppressed due to an insufficient number of cases.

Incidence rate trends, 1983-2006

While the incidence of hepatic tumours is still low, the trend in rates among boys increased significantly by 3.9% per year between 1983-2006 (Figure 4.7a and Table 4.7b). There was also evidence that incidence rates were possibly increasing among girls, although the underlying trend was not statistically significant.

A similar pattern emerged among children aged 0-4 years, with incidence rates of hepatic tumours increasing significantly by an average of 2.8% per year since the early 1980s (Figure 4.7b and Table 4.7b). Insufficient data prevented the calculation of trends for children aged 5-14.

Figure 4.7a: Observed incidence rates[1] and underlying trends[2] of childhood hepatic tumours by sex, Australia, 1983-2006

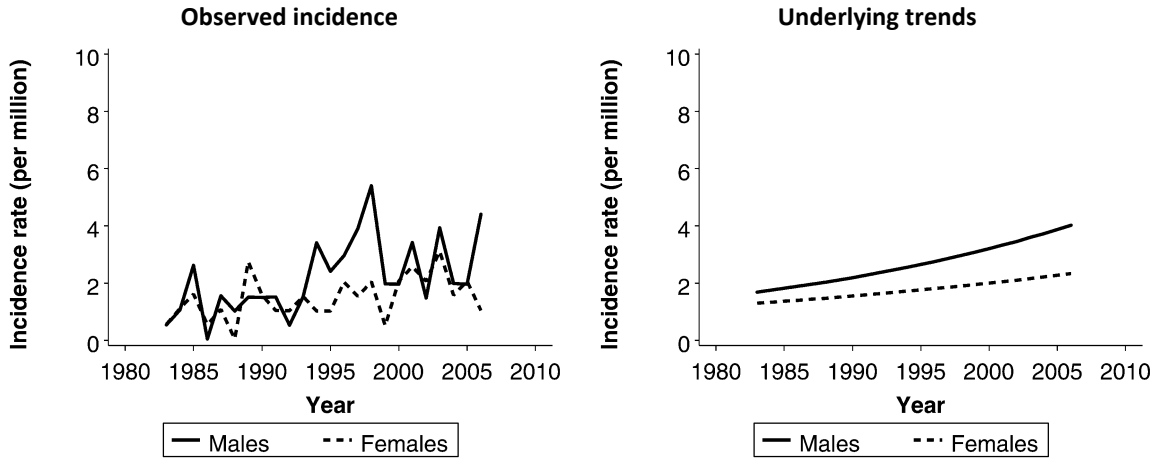


Figure 4.7b: Observed incidence rates[1] and underlying trends[2] of childhood hepatic tumours by age group[3,4], Australia, 1983-2006

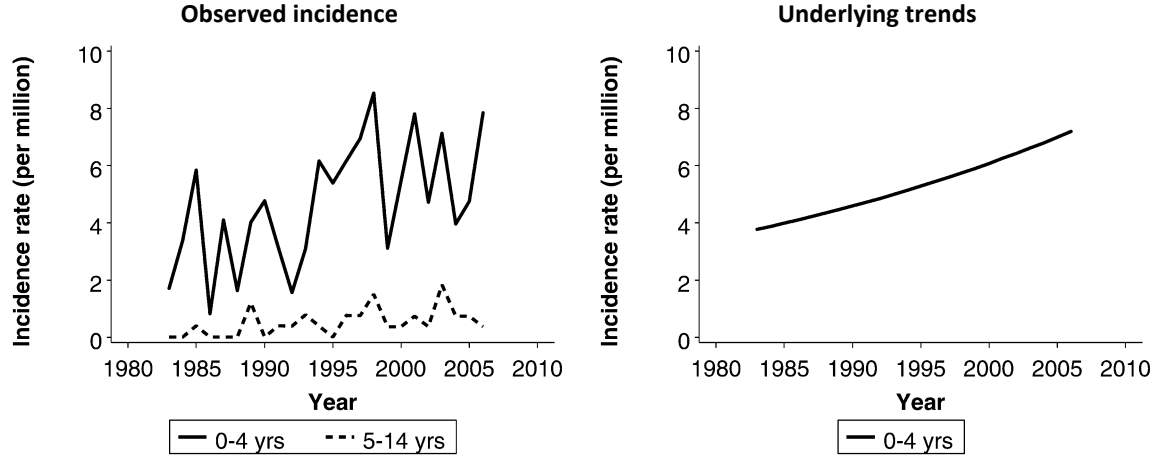


Table 4.7b: Trends[2] for incidence rates[1] of childhood hepatic tumours by sex and age group[4], Australia, 1983-2006

Sex/Age group	Trend 1[5-7]
Boys	1983-2006 +3.9% (+0.6%,+7.2%)
Girls	1983-2006 +2.6% (-0.1%,+5.3%)
0-4 years	1983-2006 +2.8% (+0.5%,+5.2%)
5-14 years[4]	n.a.[8]

Notes:
1. Rates age-standardised to the 2001 Australian Standard Population.
2. Trends modelled using joinpoint regression (www.srab.cancer.gov/joinpoint).
3. Observed incidence data was combined for the 5-9 and 10-14 age groups due to the small number of cases.
4. Trends could not be calculated for children aged 5-14 years due to insufficient data.
5. Trend data indicates the period of the trend and the estimated annual percentage change.
6. Figures in brackets correspond to the associated 95% confidence interval.
7. Shaded cells indicate statistically significant trends.
8. n.a. = not applicable.

4.8 Malignant bone tumours

Average annual incidence, 1997-2006

Between 1997-2006, 26 children were diagnosed with malignant bone tumours on average each year in Australia, a rate of 7 per million per year. This diagnostic group was fairly evenly divided between Ewing tumours and related bone sarcomas (13 cases per year, 48%) and osteosarcomas (12 cases per year, 46% - see Table 3c).

As shown in Table 4.8a, malignant bone tumours had similar incidence rates for boys and girls (6 per million per year and 7 per million per year respectively).

The incidence rate of malignant bone tumours among children increased with age, from 2 per million per year within the 0-4 age group, to 5 per million per year in the 5-9 age group and 13 per million per year for those aged 10-14 years.

There were no statistically significant differences in the incidence rates of malignant bone tumours among children from the various States and Territories throughout Australia.

Table 4.8a: Average annual incidence of childhood malignant bone tumours by sex, age group and State/Territory, Australia, 1997-2006

	Average cases per year	(%)	Rate per million population per year[1] (95% CI)[2]
Total	26.3	100.0	6.6 (5.8-7.5)
Sex (p=0.637)			
Males	13.1	49.8	6.4 (5.4-7.6)
Females	13.2	50.2	6.8 (5.7-8.1)
Age group (p<0.001)			
0-4 years	2.5	9.5	2.0 (1.3-2.9)
5-9 years	6.6	25.1	4.9 (3.8-6.3)
10-14 years	17.2	65.4	12.7 (10.9-14.7)
State/Territory (p=0.566)			
New South Wales	9.8	37.3	7.4 (6.0-9.0)
Victoria	5.3	20.2	5.5 (4.2-7.2)
Queensland	5.4	20.5	6.9 (5.2-9.0)
South Australia	2.4	9.1	8.2 (5.2-12.1)
Western Australia	2.4	9.1	6.0 (3.8-8.9)
Tasmania	0.5	1.9	**[3]
Northern Territory	0.2	0.8	**[3]
Australian Capital Territory	0.3	1.1	**[3]

Notes: 1. Rates age-standardised to the 2001 Australian Standard Population.
2. 95% CI = 95% confidence interval.
3. ** = Estimated incidence rate was suppressed due to an insufficient number of cases.

Incidence rate trends, 1983-2006

Trends in the incidence rate of malignant bone tumours remained stable among both boys and girls between 1983-2006 (Figure 4.8a and Table 4.8b).

There was evidence of a possible decrease in incidence rates of malignant bone tumours among children aged 0-9 years (Figure 4.8b and Table 4.8b). In contrast, there was evidence of a possible increase within the 10-14 age group. However, neither of these trends were statistically significant.

Figure 4.8a: Observed incidence rates[1] and underlying trends[2] of childhood malignant bone tumours by sex, Australia, 1983-2006

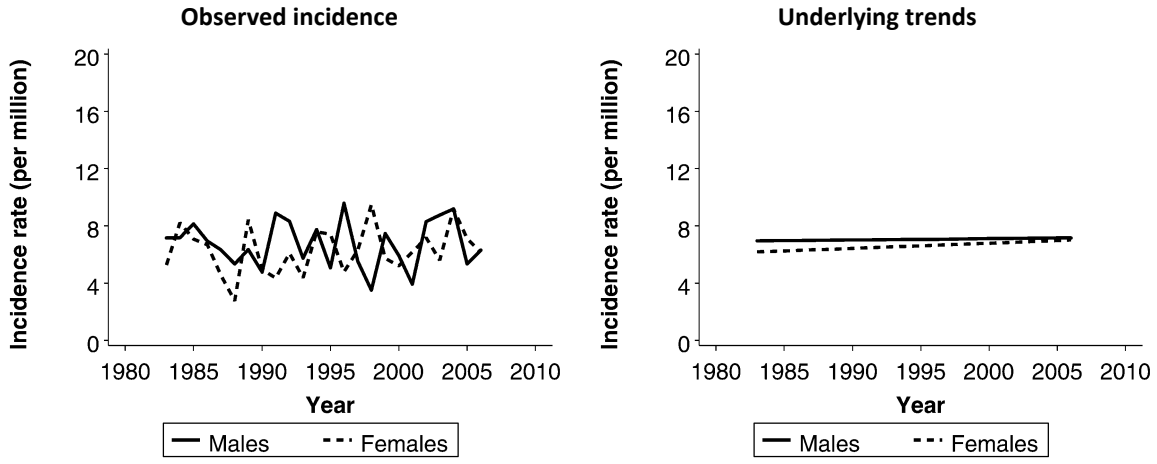


Figure 4.8b: Observed incidence rates[1] and underlying trends[2] of childhood malignant bone tumours by age group[3], Australia, 1983-2006

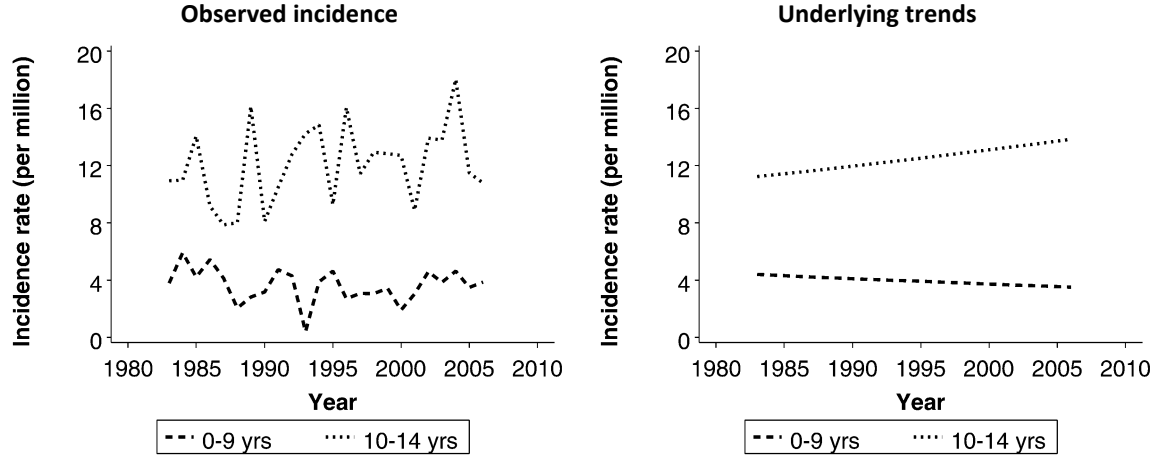


Table 4.8b: Trends[2] for incidence rates[1] of childhood malignant bone tumours by sex and age group[3], Australia, 1983-2006

Sex/Age group	Trend 1[4,5]
Boys	1983-2006 +0.1% (-1.3%,+1.6%)
Girls	1983-2006 +0.5% (-0.9%,+2.1%)
0-9 years[3]	1983-2006 -1.0% (-2.5%,+0.6%)
10-14 years	1983-2006 +0.9% (-0.4%,+2.3%)

Notes:
1. Rates age-standardised to the 2001 Australian Standard Population.
2. Trends modelled using joinpoint regression (www.srab.cancer.gov/joinpoint).
3. Data was combined for the 0-4 and 5-9 age groups due to the small number of cases.
4. Trend data indicates the period of the trend and the estimated annual percentage change.
5. Figures in brackets correspond to the associated 95% confidence interval.

4.9 Soft tissue and other extraosseous sarcomas

Average annual incidence, 1997-2006

There were an average of 33 cases per year of soft tissue sarcoma (a rate of 8 per million) diagnosed among children in Australia over the 10 years between 1997-2006. Rhabdomyosarcomas (17 cases per year, 4 per million) accounted for around half of these diagnoses (see Table 3c).

The incidence rate of soft tissue sarcomas was slightly higher among boys than girls, although the difference was not statistically significant (9 per million per year compared to 7 per million per year – Table 4.9a).

Soft tissue sarcomas occurred more frequently among children aged 0-4 years (10 per million per year) than within the 5-9 age group (7 per million per year), while there was an intermediate rate among children aged 10-14 years (9 per million per year).

The variation in incidence rates of childhood soft tissue sarcomas between the States and Territories was not statistically significant.

Table 4.9a: Average annual incidence of childhood soft tissue sarcomas by sex, age group and State/Territory, Australia, 1997-2006

	Average cases per year	(%)	Rate per million population per year[1] (95% CI)[2]
Total	33.2	100.0	8.4 (7.5-9.3)
Sex (p=0.066)			
Males	18.7	56.3	9.2 (7.9-10.6)
Females	14.5	43.7	7.5 (6.3-8.8)
Age group (p<0.001)			
0-4 years	12.8	38.6	10.0 (8.4-11.9)
5-9 years	8.7	26.2	6.5 (5.2-8.0)
10-14 years	11.7	35.2	8.6 (7.1-10.3)
State/Territory (p=0.574)			
New South Wales	10.8	32.5	8.1 (6.7-9.8)
Victoria	8.5	25.6	8.9 (7.1-11.0)
Queensland	6.2	18.7	8.0 (6.1-10.2)
South Australia	2.9	8.7	10.0 (6.7-14.4)
Western Australia	3.7	11.1	9.2 (6.5-12.7)
Tasmania	0.6	1.8	**[3]
Northern Territory	0.3	0.9	**[3]
Australian Capital Territory	0.2	0.6	**[3]

Notes: 1. Rates age-standardised to the 2001 Australian Standard Population.
2. 95% CI = 95% confidence interval.
3. ** = Estimated incidence rate was suppressed due to an insufficient number of cases.

Incidence rate trends, 1983-2006

The underlying trend in incidence rates of soft tissue sarcomas remained stable among boys between 1983-2006. In contrast, there was a significant increase of 7.7% per year between 1983-1992 among girls, followed by evidence of a possible decrease between 1992-1999 and a possible increase between 1999-2006, although neither of these latter trends were statistically significant (Figure 4.9a and Table 4.9b).

Trends by age group were also mixed (Figure 4.9b and Table 4.9b). Among children aged 0-4 years there were non-significant fluctuations in the incidence rates of soft tissue sarcomas, with evidence of possible increases between 1983-1992 and 1999-2006, separated by a possible decrease between 1992-1999. Within the 5-9 and 10-14 age groups, the underlying incidence rate trends were stable over the entire period.

Figure 4.9a: Observed incidence rates[1] and underlying trends[2] of childhood soft tissue sarcomas by sex, Australia, 1983-2006

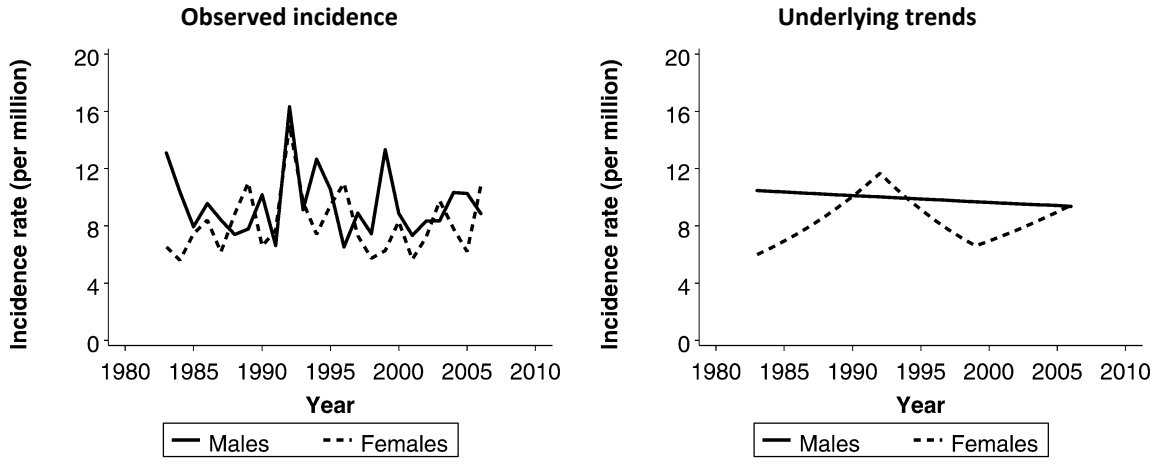


Figure 4.9b: Observed incidence rates[1] and underlying trends[2] of childhood soft tissue sarcomas by age group, Australia, 1983-2006

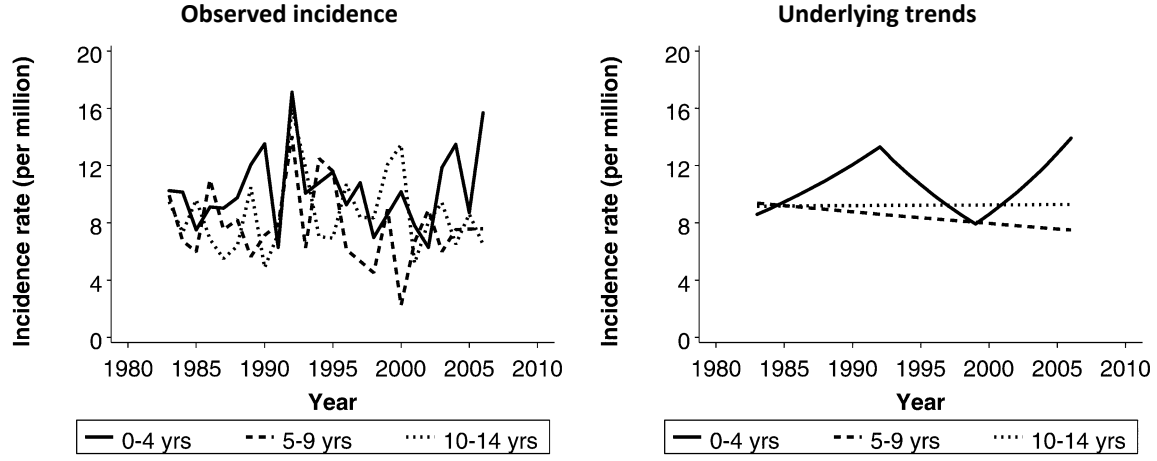


Table 4.9b: Trends[2] for incidence rates[1] of childhood soft tissue sarcomas by sex and age group, Australia, 1983-2006

Sex/Age group	Trend 1[3-5]	Trend 2[3-5]	Trend 3[3-5]
Boys	1983-2006 -0.5% (-2.0%,+1.0%)		
Girls	1983-1992 +7.7% (+0.9%,+15.0%)	1992-1999 -7.8% (-17.7%,+3.3%)	1999-2006 +5.3% (-3.2%,+14.5%)
0-4 years	1983-1992 +5.0% (-1.0%,+11.9%)	1992-1999 -7.1% (-17.5%,+4.6%)	1999-2006 +8.4% (-0.3%,+17.8%)
5-9 years	1983-2006 -1.0% (-2.9%,+1.0%)		
10-14 years	1983-2006 +0.1% (-1.9%,+2.1%)		

Notes:
1. Rates age-standardised to the 2001 Australian Standard Population.
2. Trends modelled using joinpoint regression (www.srab.cancer.gov/joinpoint).
3. Trend data indicates the period of the trend and the estimated annual percentage change.
4. Figures in brackets correspond to the associated 95% confidence interval.
5. Shaded cells indicate statistically significant trends.

4.10 Germ cell tumours, trophoblastic tumours and neoplasms of gonads

Average annual incidence, 1997-2006

Between 1997-2006, an average of 25 children per year were diagnosed with germ cell tumours in Australia, corresponding to an annual rate of 6 per million. The most common subgroups were gonadal germ cell tumours (39%, 10 cases per year), extracranial and extragonadal germ cell tumours (31%, 8 cases per year) and intracranial and intraspinal germ cell tumours (28%, 7 cases per year - Table 3c).

The incidence rate of germ cell tumours was similar for boys (6 per million per year) and girls (7 per million per year – Table 4.10a).

Over half (55%) of the diagnoses were among children in the 0-4 age group, with an incidence rate of 11 per million per year. The incidence rate was lowest among children aged 5-9 years (2 per million per year), and then rose again among children aged 10-14 years (6 per million per year).

Only minor differences were observed in the incidence rates of germ cell tumours throughout Australia, none of which were statistically significant. No cases were reported in the Northern Territory over the 10 year period.

Table 4.10a: Average annual incidence of childhood germ cell tumours[1] by sex, age group and State/Territory, Australia, 1997-2006

	Average cases per year	(%)	Rate per million population per year[2] (95% CI)[3]
Total	25.1	100.0	6.3 (5.6-7.2)
Sex (p=0.552)			
Males	12.4	49.4	6.1 (5.1-7.3)
Females	12.7	50.6	6.6 (5.5-7.8)
Age group (p<0.001)			
0-4 years	13.8	55.0	10.8 (9.1-12.8)
5-9 years	3.2	12.7	2.4 (1.6-3.4)
10-14 years	8.1	32.3	6.0 (4.7-7.4)
State/Territory (p=0.581)			
New South Wales	8.4	33.5	6.3 (5.0-7.8)
Victoria	5.5	21.9	5.7 (4.3-7.5)
Queensland	4.5	17.9	5.8 (4.2-7.8)
South Australia	2.1	8.4	7.3 (4.5-11.1)
Western Australia	3.5	13.9	8.8 (6.1-12.2)
Tasmania	0.7	2.8	**[4]
Northern Territory	0.0	0.0	**[4]
Australian Capital Territory	0.4	1.6	**[4]

Notes: 1. Includes intracranial/intraspinal tumours of benign or uncertain behaviour.
2. Rates age-standardised to the 2001 Australian Standard Population.
3. 95% CI = 95% confidence interval.
4. ** = Estimated incidence rate was suppressed due to an insufficient number of cases.

Incidence rate trends, 1983-2006

Incidence rate trends for germ cell tumours increased significantly among both boys (2.5% per year) and girls (1.9% per year) between 1983-2006 (Figure 4.10a and Table 4.10b).

Within the 0-4 age group, there was an ongoing, significant increase of 3.8% per year in the incidence rate trend for germ cell tumours since 1983. In contrast, incidence rates remained stable among children aged 5-14 years over this time period (Figure 4.10b and Table 4.10b).

Figure 4.10a: Observed incidence rates[1] and underlying trends[2] of childhood germ cell tumours[3] by sex, Australia, 1983-2006

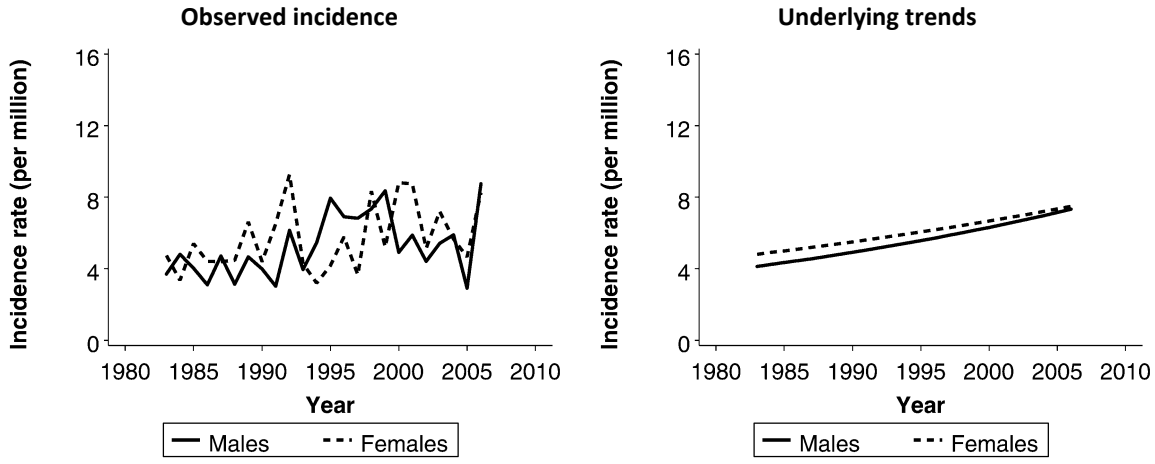


Figure 4.10b: Observed incidence rates[1] and underlying trends[2] of childhood germ cell tumours[3] by age group[4], Australia, 1983-2006

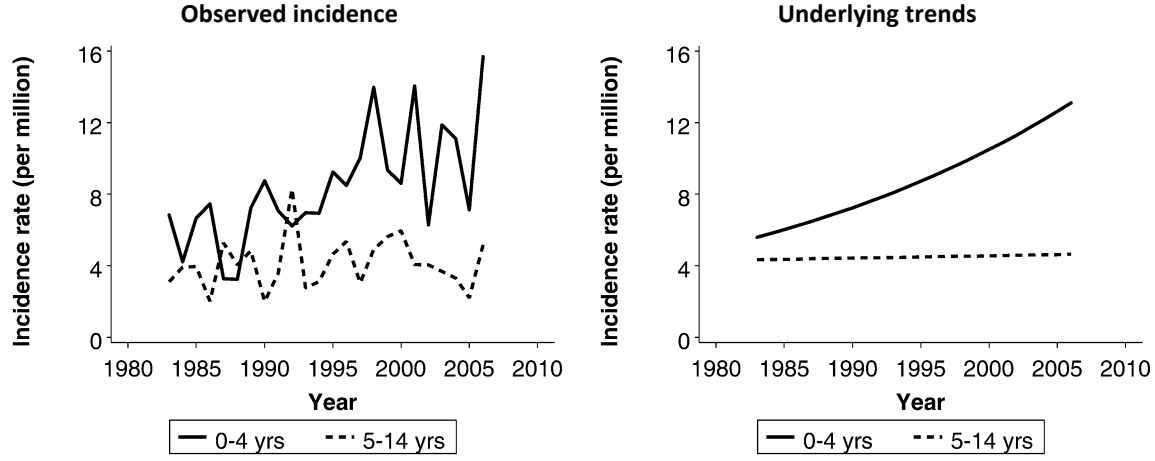


Table 4.10b: Trends[2] for incidence rates[1] of childhood germ cell tumours[3] by sex and age group[4], Australia, 1983-2006

Sex/Age group	Trend 1[5-7]
Boys	1983-2006 +2.5% (+0.7%,+4.4%)
Girls	1983-2006 +1.9% (+0.1%,+3.8%)
0-4 years	1983-2006 +3.8% (+2.0%,+5.5%)
5-14 years[4]	1983-2006 +0.3% (-1.9%,+2.5%)

Notes:
1. Rates age-standardised to the 2001 Australian Standard Population.
2. Trends modelled using joinpoint regression (www.srab.cancer.gov/joinpoint).
3. Includes intracranial/intraspinal tumours of benign or uncertain behaviour.
4. Data was combined for the 0-4 and 5-9 age groups due to the small number of cases.
5. Trend data indicates the period of the trend and the estimated annual percentage change.
6. Figures in brackets correspond to the associated 95% confidence interval.
7. Shaded cells indicate statistically significant trends.

4.11 Other malignant epithelial neoplasms and melanomas

Average annual incidence, 1997-2006

On average, 29 children (7 per million) were diagnosed with other malignant epithelial neoplasms in Australia each year between 1997-2006. Around half of these were melanomas (49%, 14 cases per year – see Section 4.11.1) and a further 18% (5 cases per year) were thyroid carcinomas (Table 3c).

Girls were significantly more likely to be diagnosed with other malignant epithelial neoplasms than boys (rates of 8 per million per year and 6 per million per year respectively - see Table 4.11a).

The incidence of other malignant epithelial neoplasms rose as children grew older, with rates increasing from 2 per million per year in the 0-4 age group up to 4 per million per year in the 5-9 age group and 16 per million per year among children aged 10-14 years.

There was significant variation in incidence rates of other malignant epithelial neoplasms between the States and Territories. In particular, Queensland (11 per million per year) reported higher rates compared to Victoria (4 per million per year) and South Australia (3 per million per year). This difference appears to be driven by variation in the incidence rates of melanoma between the States/Territories (see Section 4.11.1).

Table 4.11a: Average annual incidence of other childhood malignant epithelial neoplasms by sex, age group and State/Territory, Australia, 1997-2006

	Average cases per year	(%)	Rate per million population per year[1] (95% CI)[2]
Total	29.0	100.0	7.3 (6.5-8.2)
Sex (p=0.008)			
Males	12.6	43.4	6.2 (5.1-7.3)
Females	16.4	56.6	8.5 (7.2-9.9)
Age group (p<0.001)			
0-4 years	2.3	7.9	1.8 (1.1-2.7)
5-9 years	4.8	16.6	3.6 (2.7-4.8)
10-14 years	21.9	75.5	16.1 (14.1-18.4)
State/Territory (p<0.001)			
New South Wales	11.4	39.3	8.6 (7.1-10.3)
Victoria	4.2	14.5	4.4 (3.2-5.9)
Queensland	8.6	29.7	11.0 (8.8-13.5)
South Australia	0.8	2.8	2.7 (1.2-5.4)
Western Australia	3.0	10.3	7.4 (5.0-10.5)
Tasmania	0.3	1.0	**[3]
Northern Territory	0.2	0.7	**[3]
Australian Capital Territory	0.5	1.7	**[3]

Notes: 1. Rates age-standardised to the 2001 Australian Standard Population.
2. 95% CI = 95% confidence interval.
3. ** = Estimated incidence rate was suppressed due to an insufficient number of cases.

Incidence rate trends, 1983-2006

A significant decrease of 7.1% per year has been observed in incidence rates of other malignant epithelial neoplasms among boys since 1996, following evidence of a possible (though non-significant) increase between 1983-1996. The underlying trend was stable for girls between 1983-2006 (Figure 4.11a and Table 4.11b).

Incidence rates of other malignant epithelial neoplasms also remained stable among children aged 0-9 years (Figure 4.11b and Table 4.11b). However, a distinct pattern emerged for the 10-14 age group, with rates increasing significantly by 7.1% per year between 1983-1993, prior to a significant decrease of 4.6% per year between 1993-2006.

Figure 4.11a: Observed incidence rates[1] and underlying trends[2] of other childhood malignant epithelial neoplasms by sex, Australia, 1983-2006

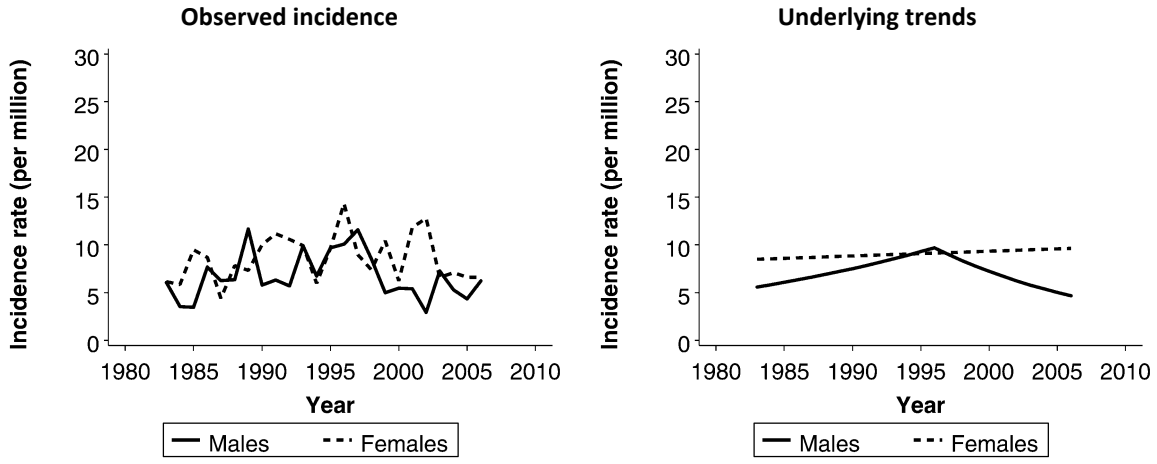


Figure 4.11b: Observed incidence rates[1] and underlying trends[2] of other childhood malignant epithelial neoplasms by age group[3], Australia, 1983-2006

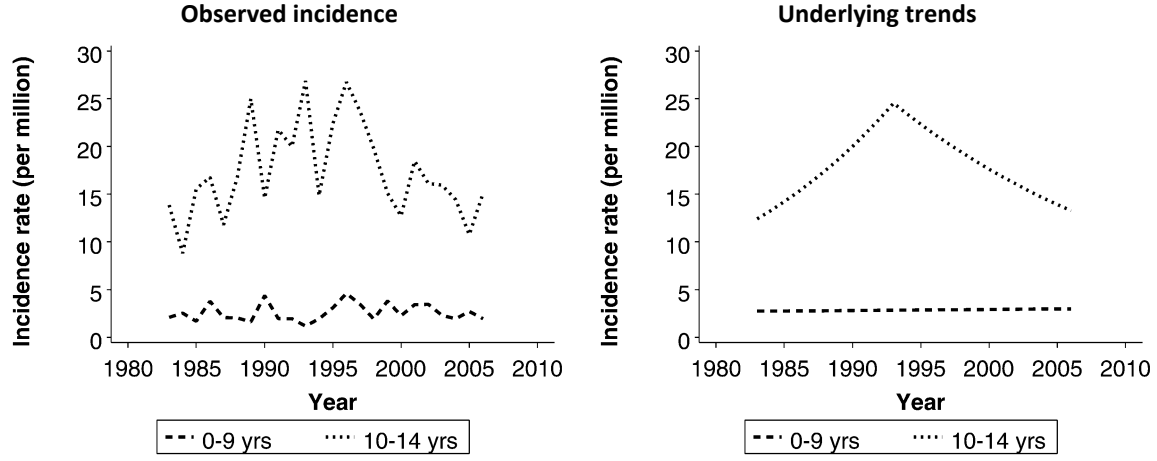


Table 4.11b: Trends[2] for incidence rates[1] of other childhood malignant epithelial neoplasms by sex and age group[3], Australia, 1983-2006

Sex/Age group	Trend 1[4-6]	Trend 2[4-6]
Boys	1983-1996 +4.3% (-0.6%,+9.5%)	1996-2006 -7.1% (-13.0%,-0.7%)
Girls	1983-2006 +0.6% (-1.3%,+2.5%)	
0-9 years[3]	1983-2006 +0.4% (-1.9%,+2.7%)	
10-14 years	1983-1993 +7.1% (+1.7%,+12.7%)	1993-2006 -4.6% (-7.7%,-1.4%)

Notes:
1. Rates age-standardised to the 2001 Australian Standard Population.
2. Trends modelled using joinpoint regression (www.srab.cancer.gov/joinpoint).
3. Data was combined for the 0-4 and 5-9 age groups due to the small number of cases.
4. Trend data indicates the period of the trend and the estimated annual percentage change.
5. Figures in brackets correspond to the associated 95% confidence interval.
6. Shaded cells indicate statistically significant trends.

4.11.1 Melanomas

Average annual incidence, 1997-2006

An average of 14 children (4 per million) were diagnosed with melanomas annually in Australia between 1997-2006.

The incidence rate of melanomas was slightly, but significantly, higher for girls (4 per million per year) compared to boys (3 per million per year - see Table 4.11.1a).

Melanomas were much more likely to be diagnosed among older children, with incidence rates increasing from less than 1 per million per year in the 0-4 age group and 2 per million per year in the 5-9 age group up to 8 per million per year among children aged 10-14 years.

Incidence rates of childhood melanoma were significantly higher in Queensland (7 per million per year) than New South Wales (4 per million per year), which in turn had significantly higher rates than Victoria (2 per million per year). This is consistent with previous findings that the greater amounts of UV radiation experienced in more northern areas of Australia all year round have an effect on melanoma incidence rates among children.[46]

Table 4.11.1a: Average annual incidence of childhood melanomas by sex, age group and State/Territory, Australia, 1997-2006

	Average cases per year	(%)	Rate per million population per year[1] (95% CI)[2]
Total	14.3	100.0	3.6 (3.0-4.2)
Sex (p=0.026)			
Males	6.0	42.0	2.9 (2.2-3.8)
Females	8.3	58.0	4.3 (3.4-5.3)
Age group (p<0.001)			
0-4 years	0.8	5.6	0.6 (0.3-1.2)
5-9 years	2.6	18.2	1.9 (1.3-2.9)
10-14 years	10.9	76.2	8.0 (6.6-9.7)
State/Territory (p<0.001)			
New South Wales	5.3	37.1	4.0 (3.0-5.2)
Victoria	1.8	12.6	1.9 (1.1-3.0)
Queensland	5.4	37.8	6.9 (5.2-9.0)
South Australia	0.2	1.4	**[3]
Western Australia	1.2	8.4	2.9 (1.5-5.1)
Tasmania	0.2	1.4	**[3]
Northern Territory	0.0	0.0	**[3]
Australian Capital Territory	0.2	1.4	**[3]

Notes: 1. Rates age-standardised to the 2001 Australian Standard Population.
2. 95% CI = 95% confidence interval.
3. ** = Estimated incidence rate was suppressed due to an insufficient number of cases.

Incidence rate trends, 1983-2006

Incidence rates of melanomas peaked in the mid 1990s for both boys and girls. This was followed by a significant decrease in the incidence rate among boys of 11.5% per year between 1996-2006, while there was evidence of a corresponding (though non-significant) decrease among girls over the same time period (Figure 4.11.1a and Table 4.11.1b).

Within the 10-14 age group, incidence rates of melanoma increased significantly by 8.4% per year between 1983-1993, and subsequently decreased significantly by an average of 8.5% per year to the end of 2006 (Figure 4.11.1b and Table 4.11.1b). Trends could not be calculated for children aged 0-9 years due to an insufficient number of cases.

Figure 4.11.1a: Observed incidence rates[1] and underlying trends[2] of childhood melanomas by sex, Australia, 1983-2006

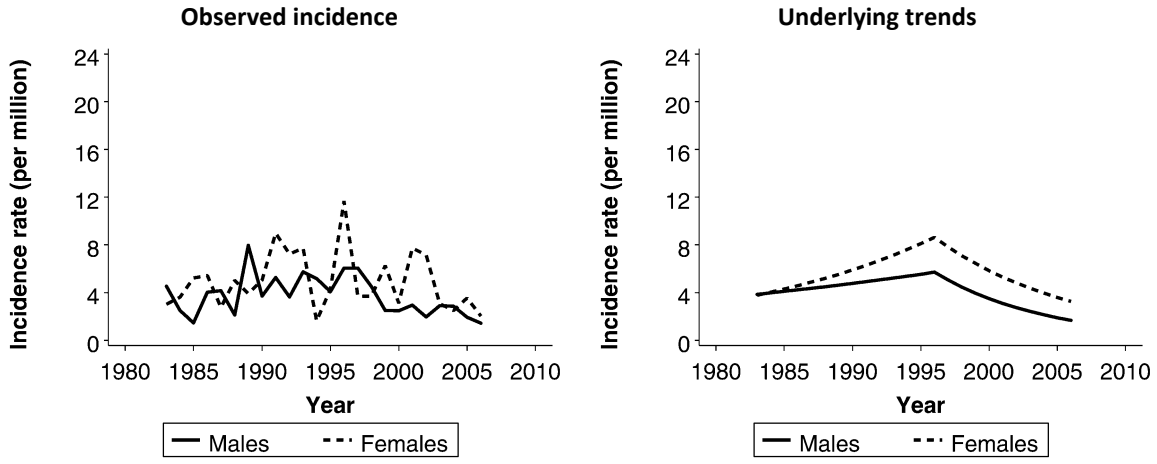


Figure 4.11.1b: Observed incidence rates[1] and underlying trends[2] of childhood melanomas by age group[3,4], Australia, 1983-2006

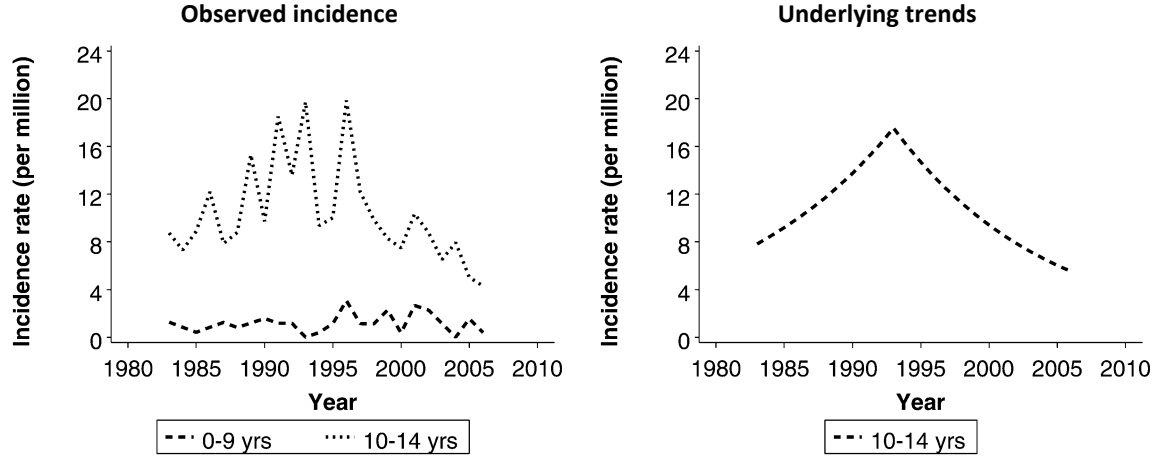


Table 4.11.1b: Trends[2] for incidence rates[1] of childhood melanomas by sex and age group[4], Australia, 1983-2006

Sex/Age group	Trend 1[5-7]	Trend 2[5-7]
Boys	1983-1996 +3.1% (-2.0%,+8.4%)	1996-2006 -11.5% (-18.9%,-3.5%)
Girls	1983-1996 +6.5% (-0.3%,+13.9%)	1996-2006 -9.3% (-19.2%,+1.8%)
0-9 years[4]	n.a.[8]	
10-14 years	1983-1993 +8.4% (+2.0%,+15.1%)	1993-2006 -8.5% (-12.9%,-3.9%)

Notes:
1. Rates age-standardised to the 2001 Australian Standard Population.
2. Trends modelled using joinpoint regression (www.srab.cancer.gov/joinpoint).
3. Observed incidence data was combined for the 0-4 and 5-9 age groups due to the small number of cases.
4. Trends could not be calculated for children aged 0-9 years due to insufficient data.
5. Trend data indicates the period of the trend and the estimated annual percentage change.
6. Figures in brackets correspond to the associated 95% confidence interval.
7. Shaded cells indicate statistically significant trends.
8. n.a. = not applicable.

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Appendix

A.1 Codes for childhood cancer diagnostic groups

The International Classification of Childhood Cancers, version three (ICCC-3) classifies tumours according to the International Classification of Diseases for Oncology, third edition (ICD-O-3)[47] into 12 main diagnostic groups and 47 subgroups (Table A.1).

Table A.1: International Classification of Childhood Cancer, Third Edition (ICCC-3)

	ICD-O-3 codes[47]	
***Diagnostic group*/subgroup**	**Histology**	**Site**
I. *Leukaemias, myeloproliferative diseases & myelodysplastic diseases*		
a. Lymphoid leukaemias	9820,9823,9826,9827,9831-9837,9940,9948	C000-C809
b. Acute myeloid leukaemias	9840,9861,9866,9867,9870-9874,9891,9895-9897,9910,9920,9931	C000-C809
c. Chronic myeloproliferative diseases	9863,9875,9876,9950,9960-9964	C000-C809
d. Other myeloproliferative diseases	9945,9946,9975,9980,9982-9987,9989	C000-C809
e. Other & unspecified leukaemias	9800,9801,9805,9860,9930	C000-C809
II. *Lymphomas & reticuloendothelial neoplasms*		
a. Hodgkin lymphomas	9650-9655,9659,9661-9665,9667	C000-C809
b. Non-Hodgkin lymphomas (excluding Burkitt lymphomas)	9591,9670,9671,9673,9675,9678-9680,9684,9689-9691,9695,9698-9702,9705,9708,9709,9714,9716-9719,9727-9729,9731-9734,9760-9762,9764-9769,9970	C000-C809
c. Burkitt lymphomas	9687	C000-C809
d. Miscellaneous lymphoreticular neoplasms	9740-9742,9750,9754-9758	C000-C809
e. Unspecified lymphomas	9590,9596	C000-C809
III. *Central nervous system & miscellaneous intracranial/intraspinal neoplasms*[1]		
a. Ependymomas and choroid plexus tumours[1]	9383,9390-9394	C000-C809
b. Astrocytomas[1]	9380	C723
	9384,9400-9411,9420,9421-9424,9440-9442	C000-C809
c. Intracranial & intraspinal embryonal tumours[1]	9470-9474,9480,9508	C000-C809
	9501-9504	C700-C729
d. Other gliomas[1]	9380	C700-C722,C724-C729,C751,C753
	9381,9382,9430,9444,9450,9451,9460	C000-C809
e. Other specified intracranial & intraspinal neoplasms[1]	8270-8281,8300,9350-9352,9360-9362,9412,9413,9492,9493,9505-9507,9530-9539,9582	C000-C809
f. Unspecified intracranial & intraspinal neoplasms[1]	8000-8005	C700-C729,C751-C753
IV. *Neuroblastoma & other peripheral nervous cell tumours*		
a. Neuroblastoma & ganglioneuroblastoma	9490,9500	C000-C809
b. Other peripheral nervous cell tumours	8680-8683,8690-8693,8700,9520-9523	C000-C809
	9501-9504	C000-C699,C739-C768,C809
V. *Retinoblastoma*	9510-9514	C000-C809
VI. *Renal tumours*		
a. Nephroblastoma & other nonepithelial renal tumours	8959,8960,8964-8967	C000-C809
	8963,9364	C649
b. Renal carcinomas	8010-8041,8050-8075,8082,8120-8122,8130-8141,8143,8155,8190-8201,8210,8211,8221-8231,8240,8241,8244-8246,8260-8263,8290,8310,8320,8323,8401,8430,8440,8480-8490,8504,8510,8550,8560-8576	C649
	8311,8312,8316-8319,8361	C000-C809
c. Unspecified malignant renal tumours	8000-8005	C649

(Continued next page...)

Source: Steliarova-Foucher et al., 2005.[18]

Note: 1. Diagnostic group/subgroup includes intracranial and intraspinal tumours of benign or uncertain behaviour.

Table A.1 (*cont.*): International Classification of Childhood Cancer, Third Edition (ICCC-3)

Diagnostic group/*subgroup*	ICD-O-3 codes[47] Histology	Site
VII. *Hepatic tumours*		
a. Hepatoblastoma	8970	C000-C809
b. Hepatic carcinomas	8010-8041,8050-8075,8082,8120-8122,8140, 8141,8143,8155,8190-8201,8210,8211,8230, 8231,8240,8241,8244-8246,8260-8264,8310, 8320,8323,8401,8430,8440,8480-8490,8504, 8510,8550,8560-8576	C220,C221
	8160-8180	C000-C809
c. Unspecified malignant hepatic tumours	8000-8005	C220,C221
VIII. *Malignant bone tumours*		
a. Osteosarcomas	9180-9187,9191-9195,9200	C400-C419,C760-C768, C809
b. Chondrosarcomas	9210,9220,9240	C400-C419,C760-C768, C809
	9221,9230,9241-9243	C000-C809
c. Ewing tumours & related bone sarcomas	9260	C400-C419,C760-C768, C809
	9363-9365	C400-C419
d. Other specified malignant bone tumours	8810,8811,8823,8830	C400-C419
	8812,9250,9261,9262,9270-9275,9280-9282, 9290,9300-9302,9310-9312,9320-9322,9330, 9340-9342,9370-9372	C000-C809
e. Unspecified malignant bone tumours	8000-8005,8800,8801,8803-8805	C400-C419
IX. *Soft tissue & other extraosseous sarcomas*		
a. Rhabdomyosarcomas	8900-8905,8910,8912,8920,8991	C000-C809
b. Fibrosarcomas & other fibrous neoplasms	8810,8811,8813-8815,8821,8823,8834-8835	C000-C399,C440-C768, C809
	8820,8822,8824-8827,9150,9160,9491,9540-9571,9580	C000-C809
c. Kaposi sarcomas	9140	C000-C809
d. Other specified soft tissue sarcomas	8587,8710-8713,8806,8831-8833,8836,8840-8842,8850-8858,8860-8862,8870,8880,8881, 8890-8898,8921,8982,8990,9040-9044,9120-9125,9130-9133,9135,9136,9141,9142,9161, 9170-9175,9231,9251,9252,9373,9581	C000-C809
	8830	C000-C399,C440-C768, C809
	8963	C000-C639,C659-C699, C739-C768,C809
	9180,9210,9220,9240	C490-C499
	9260	C000-C399,C470-C759
	9364	C000-C399,C470-C639, C659-C699,C739-C768, C809
	9365	C000-C399,C470-C639, C659-C768,C809
e. Unspecified soft tissue sarcomas	8800-8805	C000-C399,C440-C768, C809

(Continued next page...)

Source: Steliarova-Foucher et al., 2005.[18]

Note: 1. Diagnostic group/subgroup includes intracranial and intraspinal tumours of benign or uncertain behaviour.

Table A.1 (*cont.*): International Classification of Childhood Cancer, Third Edition (ICCC-3)

Diagnostic group/*subgroup*	ICD-O-3 codes[47] Histology	Site
X. *Germ cell tumours, trophoblastic tumours & neoplasms of gonads*[1]		
a. Intracranial & intraspinal germ cell tumours[1]	9060-9065,9070-9072,9080-9085,9100,9101	C700-C729,C751-C753
b. Malignant extracranial & extragonadal germ cell tumours	9060-9065,9070-9072,9080-9085,9100-9105	C000-C559,C570-C619, C630-C699,C739-C750, C754-C768,C809
c. Malignant gonadal germ cell tumours	9060-9065,9070-9073,9080-9085,9090,9091,9100,9101	C569,C620-C629
d. Gonadal carcinomas	8010-8041,8050-8075,8082,8120-8122,8130-8141,8143,8190-8201,8210,8211,8221-8241, 8244-8246,8260-8263,8290,8310,8313,8320, 8323,8380-8384,8430,8440,8480-8490,8504, 8510,8550,8560-8573,9000,9014,9015	C569,C620-C629
	8441-8444,8450,8451,8460-8473	C000-C809
e. Other & unspecified malignant gonadal tumours	8590-8671	C000-C809
	8000-8005	C569,C620-C629
XI. *Other malignant epithelial neoplasms & melanomas*		
a. Adrenocortical carcinomas	8370-8375	C000-C809
b. Thyroid carcinomas	8010-8041,8050-8075,8082,8120-8122,8130-8141,8190,8200,8201,8211,8230,8231,8244-8246,8260-8263,8290,8310,8320,8323,8430, 8440,8480,8481,8510,8560-8573	C739
	8330-8337,8340-8347,8350	C000-C809
c. Nasopharyngeal carcinomas	8010-8041,8050-8075,8082,8083,8120-8122, 8130-8141,8190,8200,8201,8211,8230,8231, 8244-8246,8260-8263,8290,8310,8320,8323, 8430,8440,8480,8481,8500-8576	C110-C119
d. Melanomas	8720-8780,8790	C000-C809
e. Skin carcinomas	8010-8041,8050-8075,8078,8082,8090-8110, 8140,8143,8147,8190,8200,8240,8246,8247, 8260,8310,8320,8323,8390-8420,8430,8480, 8542,8560,8570-8573,8940,8941	C440-C449
f. Other & unspecified carcinomas	8010-8084,8120-8157,8190-8264,8290,8310, 8313-8315,8320-8325,8360,8380-8384,8430-8440,8452-8454,8480-8586,8588-8589,8940, 8941,8983,9000,9010-9016,9020,9030	C000-C109,C129-C218, C239-C399,C480-C488, C500-C559,C570-C619, C630-C639,C659-C729, C750-C768,C809
XII. *Other & unspecified malignant neoplasms*		
a. Other specified malignant tumours	8930-8936,8950,8951,8971-8981,9050-9055, 9110	C000-C809
	9363	C000-C399,C470-C759
b. Other unspecified malignant tumours	8000-8005	C000-C218,C239-C399, C420-C559,C570-C619, C630-C639,C659-C699, C739-C750,C754-C809

Source: Steliarova-Foucher et al., 2005.[18]

Note: 1. Diagnostic group/subgroup includes intracranial and intraspinal tumours of benign or uncertain behaviour.

A.2 Methods

Incidence trends were modelled using JoinPoint software v3.3.1.[48] All remaining data analysis was performed using SAS® software v9.1.[49]

Age-standardised rates

Age-standardised rates are calculated in an attempt to adjust for variation in age structures in different populations (either different geographical areas or the same population across time). There are two methods of age-standardisation – direct and indirect.

Incidence rates presented throughout this report were directly age-standardised. The method involves applying age-specific rates from the population of interest (for example, incidence data from the APCR) to a standard population (the 2001 Australian Standard Population – see below). This gives an expected number of cases, which is then divided by the standard population to produce the standardised rate.

Denominators for the age-specific incidence rates were obtained from estimated resident population data by sex, age group and State/Territory published by the Australian Bureau of Statistics.[1] Five-year age groupings (0-4 years, 5-9 years and 10-14 years) were used for the calculation of all age-standardised rates in this report, and all rates have been expressed per million population per year, unless otherwise specified.

Incidence rates have not been published in Sections 3 and 4 of the report when the calculation was based on an insufficient number of cases to produce a reliable estimate. The cut-off for publication of incidence rates was an average of 0.8 cases per year or more.

Australian Standard Population (2001)

The standard population currently used for direct age-standardisation within Australia is the 2001 Australian Standard Population. It is based on estimated resident data collected by the Australian Bureau of Statistics from the 2001 national census.[50] The counts and weights from this standard population for children aged 0-14 years old are shown in Table A.2.

Table A.2: 2001 Australian Standard Population (0-14 years of age)

Age group	Population count	Population weight
0-4 years	1,282,357	0.3216
5-9 years	1,351,664	0.3390
10-14 years	1,353,177	0.3394

Source: Australian Bureau of Statistics.[50]

Confidence intervals

All statistical estimates are calculated with some degree of imprecision. The level of accuracy is typically reported in terms of a confidence interval, which specifies a range of values in which the true data point is expected to occur with a given level of certainty. For example, the incidence rate for tumours of the central nervous system in Queensland between 1997-2006 was estimated to be 34.9 cases per million population per year with a 95% confidence interval of 30.9-39.3. This means that there was a 95% probability that the true incidence rate was somewhere between 30.9 and 39.3 cases per million population per year.

Data quality

The quality of data contained in cancer registries is typically evaluated based on numerical indices for the proportion of records which have been morphologically verified (%MV) and the proportion which are based on death certificate only (%DCO).[51] Morphological verification includes diagnoses based on histological verification, exfoliative cytology and haematological examination of peripheral blood, histology of metastasis and autopsy with histology. High values of %MV and low values of %DCO generally indicate better quality data.

Indices of data quality for the APCR are shown in Table A.3. Morphological verification was greater than 95% for all diagnostic groups, apart from tumours of the central nervous system (86%), other and unspecified tumours (86%) and retinoblastoma (88%). Data quality was also high for the subset of intracranial and intraspinal tumours of benign or uncertain behaviour, with 92% of these cases being morphologically verified. The proportion of cases that were identified by death certificate only was consistently low across all diagnostic groups.

Table A.3: Indices of data quality for the Australian Paediatric Cancer Registry, 1983-2006

Diagnostic group[1]	Number of Cases	%MV[2]	%DCO[3]
I. Leukaemias, myeloproliferative & myelodysplastic diseases	4,591	99.3	0.1
II. Lymphomas & reticuloendothelial neoplasms	1,374	99.1	0.1
III. Central nervous system & intracranial/intraspinal neoplasms[4]	3,158	85.7	0.2
IV. Neuroblastoma & other peripheral nervous cell tumours	869	96.0	0.1
V. Retinoblastoma	357	87.7	0.3
VI. Renal tumours	735	98.8	0.1
VII. Hepatic tumours	174	96.0	1.7
VIII. Malignant bone tumours	602	98.7	0.0
IX. Soft tissue & other extraosseous sarcomas	820	98.5	0.0
X. Germ cell tumours, trophoblastic tumours & neoplasms of gonads[4]	511	95.1	0.4
XI. Other malignant epithelial neoplasms & melanomas	705	99.0	0.1
XII. Other & unspecified malignant neoplasms	29	86.2	0.0

Notes: 1. Diagnostic groups defined using the International Classification of Childhood Cancers (ICCC-3).[18]
2. %MV = percentage of cases that were morphologically verified.
3. %DCO = percentage of cases that were based on death certificate only.
4. Diagnostic group includes intracranial and intraspinal tumours of benign or uncertain behaviour.

Data contained in this report differs from national age-specific cancer incidence data published on-line in the Australian Cancer Incidence and Mortality (ACIM) books by the AIHW (see www.aihw.gov.au/cancer/data/acim_books/index.cfm). Most of these differences are due to the inclusion of intracranial and intraspinal tumours of benign or uncertain behaviour throughout this report, in accordance with the international standard (see Section 2). Only minor variations remain between APCR and AIHW data if non-malignant cases are removed, most likely arising from differences in methods of case ascertainment and verification that are used in the two collections (see Section 1.2 for further details).

Incidence

The incidence of a particular disease is the number of new cases diagnosed in a specified population during a given time period (usually one year). Incidence is also commonly expressed as a rate (e.g. per 1,000,000 population per year). Since the risk of most childhood cancers varies by age group, it is common practice to age-standardise incidence rates to allow for more valid comparisons over time or between populations (see "Age-standardised rates").

P-values

P-values provide a measure of how likely it is that a result has occurred by chance alone. In terms of comparing incidence rates, smaller p-values indicate rates that are more likely to be truly different from each other, rather than differences that are primarily a result of random variation. An arbitrary cut-off value ($p < 0.05$) has been chosen to determine the statistical significance of comparisons and trend values throughout this report.

The p-values shown in Table 3a and Tables 4.1a-4.11a were obtained by fitting a Poisson model to incidence counts, offset by the log of the corresponding population. Models were simultaneously adjusted for sex, age group and State/Territory. Differences in individual estimates (p-values not shown) were only deemed to be significant if the overall effect (sex, age group or State/Territory) was also statistically significant.

Trends

Trends were analysed using a statistical method called joinpoint regression, a technique developed by the Statistical Research and Applications Branch of the National Cancer Institute.[48] The joinpoint method evaluates changing trends (in terms of both direction and magnitude) over successive segments of time. A joinpoint is the point at which the linear segment changes significantly.

The analysis begins with the assumption of constant change over time (i.e. no joinpoint). Up to two joinpoints (corresponding to three trend lines) were tested in each model. Due to the large amounts of fluctuation in some of the childhood cancer incidence rates from year to year, the models were specified with a minimum of eight observations between any two joinpoints or between a joinpoint and either end of the data series. The trend line with the fewest joinpoints which provided the best fit to the observed data, based on Monte Carlo permutation tests,[52] was selected.

Increases or decreases in incidence trends determined by the joinpoint regression models are described in terms of an annual percentage change (APC). Negative APC values describe a decreasing trend and positive APC values describe an increasing trend. A trend is taken to be statistically significant if the 95% confidence interval does not include zero.

Trends for incidence counts are generally quite different to trends for incidence rates, reflecting changes in the size and age structure of the population. However, there were only minor changes to the population of children in Australia over the time period covered in this report (total growth of 6.2% between 1983-2006). As a consequence, trends for incidence counts were found to be very similar to the corresponding trends for incidence rates, and so trends have only been published for incidence rates to avoid possible confusion.

A.3 Detailed tables

The tables on the following pages contain detailed data which supplements the information in the main body of the report:

- Table A.4: Incidence counts and rates of childhood cancers by diagnostic group, sex and year of diagnosis, Australia, 1983-2006;
- Table A.5: Incidence counts and rates of childhood cancers by diagnostic group, age and year of diagnosis, Australia, 1983-2006;
- Table A.6: Incidence counts and rates of childhood melanoma by sex and age group by year of diagnosis, Australia, 1983-2006

Table A.4: Incidence counts and rates[1] of childhood cancers by diagnostic group, sex and year of diagnosis, Australia, 1983-2006

		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
All childhood cancers[2]																									
Boys	Count	283	269	302	287	273	275	301	311	298	326	345	360	346	341	342	340	333	328	344	321	350	344	321	344
	Rate	148.2	141.9	157.6	150.8	143.9	143.8	156.5	160.0	151.8	165.2	173.5	180.6	172.3	169.0	169.0	168.0	164.0	161.3	168.3	157.3	171.9	169.1	157.5	168.1
Girls	Count	193	229	226	232	227	232	247	237	255	272	252	261	248	313	270	284	281	264	298	282	293	305	251	289
	Rate	106.2	127.0	123.7	128.5	125.8	127.7	135.5	128.6	137.5	145.2	133.7	137.7	129.7	163.6	140.3	147.6	145.6	136.6	153.4	145.4	151.3	158.1	129.7	149.1
Children	Count	476	498	528	519	500	507	548	548	553	598	597	621	594	654	612	624	614	592	642	603	643	649	572	633
	Rate	127.7	134.6	141.1	139.9	135.1	136.0	146.2	144.7	144.8	155.5	154.1	159.7	151.5	166.3	155.0	158.1	155.0	149.3	161.0	151.5	161.9	163.7	144.0	158.9
Leukaemias, myeloproliferative diseases & myelodysplastic diseases																									
Boys	Count	92	88	113	88	86	98	105	117	120	100	103	103	101	102	98	102	103	109	123	114	124	123	125	108
	Rate	48.6	46.5	59.1	46.2	45.2	51.0	54.3	60.1	60.8	50.1	51.6	51.3	50.1	50.4	48.4	50.2	50.6	53.5	60.2	56.0	61.0	60.7	61.4	52.8
Girls	Count	60	73	72	71	78	81	74	80	81	83	73	92	83	102	88	89	90	82	106	98	107	104	79	100
	Rate	33.3	40.7	39.6	39.2	43.2	44.4	40.4	43.3	43.2	43.9	38.4	48.1	43.2	53.1	45.6	46.2	46.6	42.4	54.6	50.6	55.4	54.1	40.8	51.9
Children	Count	152	161	185	159	164	179	179	197	201	183	176	195	184	204	186	191	193	191	229	212	231	227	204	208
	Rate	41.1	43.7	49.6	42.8	44.3	47.8	47.6	51.9	52.2	47.1	45.2	49.7	46.8	51.7	47.1	48.3	48.7	48.1	57.4	53.4	58.3	57.5	51.4	52.3
Lymphomas & reticuloendothelial neoplasms																									
Boys	Count	41	28	25	32	42	41	42	43	33	39	44	43	41	42	38	49	41	39	43	39	48	43	38	46
	Rate	20.9	14.8	13.1	17.1	22.3	21.6	22.1	22.5	17.1	20.1	22.5	22.0	20.7	21.1	19.0	24.4	20.3	19.2	21.0	19.0	23.5	20.9	18.6	22.4
Girls	Count	15	14	15	17	16	18	11	15	11	17	23	14	15	17	26	13	16	25	24	15	15	21	23	18
	Rate	8.2	7.5	7.9	9.4	8.8	10.1	6.1	8.3	6.0	9.3	12.5	7.6	8.0	9.0	13.7	6.8	8.3	13.0	12.4	7.7	7.7	10.8	11.7	9.1
Children	Count	56	42	40	49	58	59	53	58	44	56	67	57	56	59	64	62	57	64	67	54	63	64	61	64
	Rate	14.7	11.2	10.6	13.3	15.7	16.0	14.3	15.6	11.7	14.9	17.6	15.0	14.5	15.2	16.4	15.8	14.5	16.2	16.8	13.5	15.8	16.0	15.2	16.0
Central nervous system & miscellaneous intracranial/intraspinal neoplasms[2]																									
Boys	Count	51	54	75	69	57	59	60	64	58	78	74	85	77	70	82	83	66	80	82	82	67	65	65	82
	Rate	26.8	28.6	39.1	36.0	30.3	31.0	31.3	33.1	29.7	39.8	37.4	42.9	38.5	34.7	40.6	41.2	32.5	39.3	40.1	40.2	32.9	32.0	31.9	40.2
Girls	Count	41	62	51	61	59	48	58	52	66	56	62	76	53	77	61	81	61	71	59	67	64	72	53	62
	Rate	22.9	34.4	28.6	34.1	33.0	26.5	32.0	28.4	35.9	29.8	33.0	40.2	27.8	40.4	31.7	42.1	31.6	36.7	30.4	34.6	33.0	37.4	27.5	32.0
Children	Count	92	116	126	130	116	107	118	116	124	134	136	161	130	147	143	164	127	151	141	149	131	137	118	144
	Rate	24.9	31.4	34.0	35.1	31.6	28.8	31.6	30.8	32.7	34.9	35.3	41.6	33.3	37.5	36.3	41.6	32.1	38.0	35.4	37.4	33.0	34.6	29.8	36.2

Notes: 1. Rates are expressed per million and age-standardised to the 2001 Australian Standard Population.

2. Diagnostic group includes intracranial and intraspinal tumours of benign or uncertain behaviour.

(Continued over...)

Table A.4 (*cont.*): Incidence counts and rates[1] of childhood cancers by diagnostic group, sex and year of diagnosis, Australia, 1983-2006

		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Neuroblastoma & other peripheral nervous cell tumours																									
Boys	Count	21	19	16	20	22	20	11	18	18	18	34	29	24	26	26	19	20	18	19	16	20	14	19	16
	Rate	11.2	10.1	8.4	10.5	11.5	10.3	5.6	9.0	8.9	8.9	16.6	14.3	11.7	12.6	12.7	9.2	9.8	8.8	9.3	7.9	9.9	7.0	9.4	7.9
Girls	Count	13	15	9	9	17	24	9	15	17	13	23	9	16	18	19	17	23	12	14	11	19	23	16	25
	Rate	7.3	8.4	5.1	5.0	9.2	13.0	4.8	8.0	8.9	6.7	11.9	4.6	8.2	9.2	9.7	8.8	11.8	6.2	7.2	5.7	9.9	12.0	8.4	13.0
Children	Count	34	34	25	29	39	44	20	33	35	31	57	38	40	44	45	36	43	30	33	27	39	37	35	41
	Rate	9.3	9.3	6.8	7.8	10.4	11.6	5.2	8.5	8.9	7.8	14.3	9.6	10.0	11.0	11.2	9.0	10.8	7.5	8.3	6.8	9.9	9.4	8.9	10.3
Retinoblastoma																									
Boys	Count	8	8	11	8	4	1	8	7	11	11	14	9	9	13	8	6	10	12	13	7	7	12	7	7
	Rate	4.3	4.2	5.8	4.2	2.1	0.5	4.0	3.5	5.4	5.4	6.8	4.3	4.3	6.3	3.9	2.9	4.9	5.9	6.4	3.5	3.5	6.0	3.5	3.4
Girls	Count	8	5	3	5	8	7	9	7	5	7	1	8	7	7	3	6	10	6	6	4	9	4	7	4
	Rate	4.5	2.8	1.6	2.8	4.3	3.8	4.8	3.7	2.6	3.6	0.5	4.1	3.6	3.6	1.5	3.1	5.1	3.1	3.1	2.1	4.7	2.1	3.7	2.1
Children	Count	16	13	14	13	12	8	17	14	16	18	15	17	16	20	11	12	20	18	19	11	16	16	14	11
	Rate	4.4	3.5	3.8	3.5	3.2	2.1	4.4	3.6	4.0	4.5	3.7	4.2	4.0	5.0	2.7	3.0	5.0	4.5	4.8	2.8	4.1	4.1	3.6	2.8
Renal tumours																									
Boys	Count	11	19	11	18	10	12	14	10	7	8	17	19	20	16	16	14	20	14	10	9	14	20	15	12
	Rate	5.9	10.3	5.9	9.5	5.3	6.2	7.1	5.1	3.5	4.0	8.3	9.3	9.8	7.8	7.8	6.9	9.8	6.9	4.9	4.4	6.9	9.9	7.5	5.9
Girls	Count	11	16	17	17	12	11	20	18	19	18	14	15	13	17	20	15	27	9	21	20	15	18	20	16
	Rate	6.2	9.0	9.4	9.4	6.6	6.1	10.7	9.5	10.0	9.4	7.2	7.9	6.7	8.8	10.2	7.8	13.9	4.6	10.8	10.4	7.8	9.4	10.5	8.3
Children	Count	22	35	28	35	22	23	34	28	26	26	31	34	33	33	36	29	47	23	31	29	29	38	35	28
	Rate	6.1	9.6	7.6	9.4	5.9	6.1	8.9	7.2	6.7	6.6	7.8	8.7	8.3	8.3	9.0	7.3	11.8	5.8	7.8	7.3	7.3	9.6	8.9	7.1
Hepatic tumours																									
Boys	Count	1	2	5	0	3	2	3	3	3	1	3	7	5	6	8	11	4	4	7	3	8	4	4	9
	Rate	0.5	1.1	2.6	0.0	1.5	1.0	1.5	1.5	1.5	0.5	1.5	3.4	2.4	2.9	3.9	5.4	2.0	2.0	3.4	1.5	3.9	2.0	2.0	4.4
Girls	Count	1	2	3	1	2	0	5	3	2	2	3	2	2	4	3	4	1	4	5	4	6	3	4	2
	Rate	0.6	1.1	1.6	0.5	1.1	0.0	2.7	1.6	1.0	1.0	1.5	1.0	1.0	2.0	1.5	2.1	0.5	2.1	2.6	2.1	3.1	1.6	2.1	1.0
Children	Count	2	4	8	1	5	2	8	6	5	3	6	9	7	10	11	15	5	8	12	7	14	7	8	11
	Rate	0.5	1.1	2.1	0.3	1.3	0.5	2.1	1.5	1.3	0.8	1.5	2.2	1.7	2.5	2.7	3.8	1.3	2.0	3.0	1.8	3.5	1.8	2.0	2.8

Notes: 1. Rates are expressed per million and age-standardised to the 2001 Australian Standard Population.
2. Diagnostic group includes intracranial and intraspinal tumours of benign or uncertain behaviour.

(Continued over...)

Table A.4 (*cont.*): Incidence counts and rates[1] of childhood cancers by diagnostic group, sex and year of diagnosis, Australia, 1983-2006

		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Malignant bone tumours																									
Boys	Count	14	14	16	13	12	10	12	9	17	16	11	15	10	19	11	7	15	12	8	17	18	19	11	13
	Rate	7.1	7.2	8.1	6.9	6.3	5.3	6.3	4.8	8.9	8.3	5.7	7.7	5.1	9.6	5.5	3.5	7.5	5.9	3.9	8.3	8.7	9.2	5.3	6.3
Girls	Count	10	15	13	12	8	5	15	9	8	11	8	14	14	9	12	18	11	10	12	14	11	18	14	12
	Rate	5.3	8.2	7.1	6.7	4.6	2.8	8.4	5.0	4.4	6.1	4.4	7.6	7.4	4.8	6.3	9.5	5.7	5.2	6.2	7.2	5.6	9.2	7.1	6.1
Children	Count	24	29	29	25	20	15	27	18	25	27	19	29	24	28	23	25	26	22	20	31	29	37	25	25
	Rate	6.2	7.7	7.6	6.8	5.5	4.1	7.4	4.9	6.7	7.2	5.1	7.7	6.2	7.2	5.9	6.4	6.6	5.6	5.0	7.7	7.2	9.2	6.2	6.2
Soft tissue & other extraosseous sarcomas																									
Boys	Count	25	20	15	18	16	14	15	20	13	32	18	25	21	13	18	15	27	18	15	17	17	21	21	18
	Rate	13.1	10.4	7.9	9.6	8.4	7.4	7.8	10.2	6.6	16.3	9.1	12.6	10.5	6.5	8.9	7.4	13.3	8.9	7.3	8.3	8.4	10.3	10.3	8.8
Girls	Count	12	10	14	15	11	16	20	12	14	28	18	14	18	21	14	11	12	16	11	14	19	15	12	21
	Rate	6.5	5.6	7.5	8.4	6.2	8.8	11.0	6.6	7.7	15.0	9.6	7.4	9.4	11.0	7.3	5.7	6.3	8.3	5.7	7.2	9.8	7.8	6.2	10.8
Children	Count	37	30	29	33	27	30	35	32	27	60	36	39	39	34	32	26	39	34	26	31	36	36	33	39
	Rate	9.9	8.0	7.7	9.0	7.3	8.1	9.3	8.4	7.1	15.7	9.4	10.1	10.0	8.7	8.1	6.6	9.9	8.6	6.5	7.8	9.0	9.1	8.3	9.8
Germ cell tumours, trophoblastic tumours & neoplasms of gonads[2]																									
Boys	Count	7	9	8	6	9	6	9	8	6	12	8	11	16	14	14	15	17	10	12	9	11	12	6	18
	Rate	3.7	4.8	4.0	3.1	4.7	3.1	4.7	4.0	3.0	6.1	4.0	5.4	7.9	6.9	6.8	7.3	8.4	4.9	5.9	4.4	5.4	5.9	2.9	8.7
Girls	Count	9	6	10	8	8	8	12	8	12	17	8	6	8	11	7	16	10	17	17	10	14	11	9	16
	Rate	4.7	3.4	5.4	4.4	4.4	4.5	6.6	4.4	6.5	9.3	4.3	3.2	4.2	5.8	3.7	8.3	5.2	8.8	8.7	5.1	7.2	5.7	4.7	8.2
Children	Count	16	15	18	14	17	14	21	16	18	29	16	17	24	25	21	31	27	27	29	19	25	23	15	34
	Rate	4.2	4.1	4.7	3.7	4.6	3.8	5.6	4.2	4.7	7.7	4.1	4.4	6.1	6.4	5.3	7.8	6.8	6.8	7.3	4.8	6.3	5.8	3.8	8.5
Other malignant epithelial neoplasms & melanomas																									
Boys	Count	12	7	7	15	12	12	22	11	12	11	19	13	19	20	23	17	10	11	11	6	15	11	9	13
	Rate	6.1	3.5	3.4	7.7	6.3	6.3	11.7	5.8	6.3	5.7	9.9	6.7	9.7	10.1	11.6	8.5	5.0	5.4	5.4	2.9	7.3	5.3	4.3	6.2
Girls	Count	12	11	18	16	8	14	13	18	20	19	18	11	18	27	17	14	20	12	23	25	13	14	13	13
	Rate	6.1	5.8	9.5	8.7	4.4	7.8	7.3	10.0	11.2	10.6	9.9	5.9	9.6	14.3	9.0	7.4	10.4	6.2	11.8	12.8	6.6	7.1	6.6	6.6
Children	Count	24	18	25	31	20	26	35	29	32	30	37	24	37	47	40	31	30	23	34	31	28	25	22	26
	Rate	6.1	4.7	6.4	8.2	5.4	7.1	9.5	7.8	8.7	8.1	9.9	6.3	9.7	12.2	10.3	8.0	7.6	5.8	8.5	7.7	6.9	6.2	5.4	6.4

Notes: 1. Rates are expressed per million and age-standardised to the 2001 Australian Standard Population.
2. Diagnostic group includes intracranial and intraspinal tumours of benign or uncertain behaviour.

Table A.5: Incidence counts and rates[1] of childhood cancers by diagnostic group, age and year of diagnosis, Australia, 1983-2006

		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
All childhood cancers[2]																									
0-4 yrs	Count	218	252	245	242	224	249	243	262	263	270	288	278	283	291	289	272	304	272	295	241	302	324	254	293
	Rate	186.3	212.9	204.2	200.3	183.8	202.5	195.4	208.2	206.8	210.2	222.8	214.2	217.8	224.4	222.9	210.9	236.7	212.7	230.0	189.6	238.8	256.9	201.1	229.8
5-9 yrs	Count	120	135	115	134	141	122	130	141	142	168	129	168	161	155	145	171	144	134	166	187	156	158	148	155
	Rate	99.2	113.8	97.9	113.6	117.9	100.1	104.8	111.7	111.6	131.3	100.8	131.1	124.5	118.7	110.0	128.5	107.3	99.3	122.8	138.9	116.6	118.8	111.8	117.5
10-14 yrs	Count	138	111	168	143	135	136	175	145	148	160	180	175	150	208	178	181	166	186	181	175	185	167	170	185
	Rate	100.6	81.3	124.4	109.0	106.1	108.7	141.1	117.5	119.2	127.8	142.2	136.7	115.7	159.0	135.7	137.6	125.3	139.1	133.8	128.0	134.1	120.4	121.9	133.0
Leukaemias, myeloproliferative diseases & myelodysplastic diseases																									
0-4 yrs	Count	77	90	109	94	86	107	93	98	113	106	98	113	101	104	93	96	111	106	111	103	117	131	96	116
	Rate	65.8	76.0	90.9	77.8	70.6	87.0	74.8	77.9	88.9	82.5	75.8	87.1	77.7	80.2	71.7	74.4	86.4	82.9	86.6	81.0	92.5	103.9	76.0	91.0
5-9 yrs	Count	42	42	34	34	45	34	50	55	57	53	47	53	55	63	51	61	42	46	61	69	66	58	50	48
	Rate	34.7	35.4	28.9	28.8	37.6	27.9	40.3	43.6	44.8	41.4	36.7	41.3	42.5	48.2	38.7	45.8	31.3	34.1	45.1	51.3	49.3	43.6	37.8	36.4
10-14 yrs	Count	33	29	42	31	33	38	36	44	31	24	31	29	28	37	42	34	40	39	57	40	48	38	58	44
	Rate	24.1	21.2	31.1	23.6	25.9	30.4	29.0	35.6	25.0	19.2	24.5	22.7	21.6	28.3	32.0	25.8	30.2	29.2	42.1	29.3	34.8	27.4	41.6	31.6
Lymphomas & reticuloendothelial neoplasms																									
0-4 yrs	Count	11	15	9	11	16	15	14	13	11	10	15	7	9	11	9	14	9	11	10	4	13	12	11	9
	Rate	9.4	12.7	7.5	9.1	13.1	12.2	11.3	10.3	8.6	7.8	11.6	5.4	6.9	8.5	6.9	10.9	7.0	8.6	7.8	3.1	10.3	9.5	8.7	7.1
5-9 yrs	Count	17	12	10	19	17	21	16	21	11	19	17	20	19	18	22	11	19	15	22	21	22	18	20	21
	Rate	14.1	10.1	8.5	16.1	14.2	17.2	12.9	16.6	8.6	14.8	13.3	15.6	14.7	13.8	16.7	8.3	14.2	11.1	16.3	15.6	16.4	13.5	15.1	15.9
10-14 yrs	Count	28	15	21	19	25	23	23	24	22	27	35	30	28	30	33	37	29	38	35	29	28	34	30	34
	Rate	20.4	11.0	15.5	14.5	19.6	18.4	18.5	19.4	17.7	21.6	27.7	23.4	21.6	22.9	25.2	28.1	21.9	28.4	25.9	21.2	20.3	24.5	21.5	24.4
Central nervous system & miscellaneous intracranial/intraspinal neoplasms[2]																									
0-4 yrs	Count	45	51	48	47	39	49	42	44	44	52	56	60	53	57	62	58	55	57	57	57	55	58	48	51
	Rate	38.5	43.1	40.0	38.9	32.0	39.9	33.8	35.0	34.6	40.5	43.3	46.2	40.8	43.9	47.8	45.0	42.8	44.6	44.4	44.8	43.5	46.0	38.0	40.0
5-9 yrs	Count	27	38	40	39	46	30	37	35	42	53	41	47	46	37	42	63	39	53	49	51	37	51	39	52
	Rate	22.3	32.0	34.0	33.1	38.5	24.6	29.8	27.7	33.0	41.4	32.0	36.7	35.6	28.3	31.9	47.3	29.1	39.3	36.3	37.9	27.7	38.3	29.5	39.4
10-14 yrs	Count	20	27	38	44	31	28	39	37	38	29	39	54	31	53	39	43	33	41	35	41	39	28	31	41
	Rate	14.6	19.8	28.1	33.5	24.4	22.4	31.4	30.0	30.6	23.2	30.8	42.2	23.9	40.5	29.7	32.7	24.9	30.7	25.9	30.0	28.3	20.2	22.2	29.5

Notes: 1. Rates are expressed per million and age-standardised to the 2001 Australian Standard Population.

2. Diagnostic group includes intracranial and intraspinal tumours of benign or uncertain behaviour.

(Continued over...)

Table A.5 (*cont.*): Incidence counts and rates[1] of childhood cancers by diagnostic group, age and year of diagnosis, Australia, 1983-2006

		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Neuroblastoma & other peripheral nervous cell tumours																									
0-4 yrs	Count	30	31	17	25	32	36	17	27	31	28	50	28	36	39	39	33	37	28	30	22	35	35	31	30
	Rate	25.6	26.2	14.2	20.7	26.3	29.3	13.7	21.5	24.4	21.8	38.7	21.6	27.7	30.1	30.1	25.6	28.8	21.9	23.4	17.3	27.7	27.8	24.5	23.5
5-9 yrs	Count	3	3	6	3	5	8	2	5	4	2	7	5	2	3	5	2	5	1	3	4	3	1	4	7
	Rate	2.5	2.5	5.1	2.5	4.2	6.6	1.6	4.0	3.1	1.6	5.5	3.9	1.5	2.3	3.8	1.5	3.7	0.7	2.2	3.0	2.2	0.8	3.0	5.3
10-14 yrs	Count	1	0	2	1	2	0	1	1	0	1	0	5	2	2	1	1	1	1	0	1	1	1	0	4
	Rate	0.7	0.0	1.5	0.8	1.6	0.0	0.8	0.8	0.0	0.8	0.0	3.9	1.5	1.5	0.8	0.8	0.8	0.7	0.0	0.7	0.7	0.7	0.0	2.9
Retinoblastoma																									
0-4 yrs	Count	16	12	14	11	11	7	16	14	16	18	15	16	16	20	11	10	20	18	18	10	14	16	12	11
	Rate	13.7	10.1	11.7	9.1	9.0	5.7	12.9	11.1	12.6	14.0	11.6	12.3	12.3	15.4	8.5	7.8	15.6	14.1	14.0	7.9	11.1	12.7	9.5	8.6
5-9 yrs	Count	0	1	0	2	0	1	1	0	0	0	0	1	0	0	0	2	0	0	1	1	2	0	2	0
	Rate	0.0	0.8	0.0	1.7	0.0	0.8	0.8	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	1.5	0.0	0.0	0.7	0.7	1.5	0.0	1.5	0.0
10-14 yrs	Count	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rate	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renal tumours																									
0-4 yrs	Count	14	25	19	26	15	15	28	23	20	20	27	20	23	22	30	19	38	19	27	18	21	29	25	22
	Rate	12.0	21.1	15.8	21.5	12.3	12.2	22.5	18.3	15.7	15.6	20.9	15.4	17.7	17.0	23.1	14.7	29.6	14.9	21.1	14.2	16.6	23.0	19.8	17.3
5-9 yrs	Count	7	10	7	7	7	7	5	4	5	4	3	12	9	10	6	8	8	2	3	9	5	5	10	3
	Rate	5.8	8.4	6.0	5.9	5.9	5.7	4.0	3.2	3.9	3.1	2.3	9.4	7.0	7.7	4.6	6.0	6.0	1.5	2.2	6.7	3.7	3.8	7.6	2.3
10-14 yrs	Count	1	0	2	2	0	1	1	1	1	2	1	2	1	1	0	2	1	2	1	2	3	4	0	3
	Rate	0.7	0.0	1.5	1.5	0.0	0.8	0.8	0.8	0.8	1.6	0.8	1.6	0.8	0.8	0.0	1.5	0.8	1.5	0.7	1.5	2.2	2.9	0.0	2.2
Hepatic tumours																									
0-4 yrs	Count	2	4	7	1	5	2	5	6	4	2	4	8	7	8	9	11	4	7	10	6	9	5	6	10
	Rate	1.7	3.4	5.8	0.8	4.1	1.6	4.0	4.8	3.1	1.6	3.1	6.2	5.4	6.2	6.9	8.5	3.1	5.5	7.8	4.7	7.1	4.0	4.8	7.8
5-9 yrs	Count	0	0	0	0	0	0	1	0	0	0	1	0	0	0	2	3	0	0	1	0	2	2	0	0
	Rate	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.8	0.0	0.0	0.0	1.5	2.3	0.0	0.0	0.7	0.0	1.5	1.5	0.0	0.0
10-14 yrs	Count	0	0	1	0	0	0	2	0	1	1	1	1	0	2	0	1	1	1	1	1	3	0	2	1
	Rate	0.0	0.0	0.7	0.0	0.0	0.0	1.6	0.0	0.8	0.8	0.8	0.8	0.0	1.5	0.0	0.8	0.8	0.7	0.7	0.7	2.2	0.0	1.4	0.7

Notes: 1. Rates are expressed per million and age-standardised to the 2001 Australian Standard Population.

2. Diagnostic group includes intracranial and intraspinal tumours of benign or uncertain behaviour.

(Continued over...)

Table A.5 (*cont.*): Incidence counts and rates[1] of childhood cancers by diagnostic group, age and year of diagnosis, Australia, 1983-2006

		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Malignant bone tumours																									
0-4 yrs	Count	2	4	2	2	2	1	2	3	5	2	1	1	6	2	5	1	4	1	1	2	4	2	2	3
	Rate	1.7	3.4	1.7	1.7	1.6	0.8	1.6	2.4	3.9	1.6	0.8	0.8	4.6	1.5	3.9	0.8	3.1	0.8	0.8	1.6	3.2	1.6	1.6	2.4
5-9 yrs	Count	7	10	8	11	8	4	5	5	7	9	0	9	6	5	3	7	5	4	7	10	6	10	7	7
	Rate	5.8	8.4	6.8	9.3	6.7	3.3	4.0	4.0	5.5	7.0	0.0	7.0	4.6	3.8	2.3	5.3	3.7	3.0	5.2	7.4	4.5	7.5	5.3	5.3
10-14 yrs	Count	15	15	19	12	10	10	20	10	13	16	18	19	12	21	15	17	17	17	12	19	19	25	16	15
	Rate	10.9	11.0	14.1	9.1	7.9	8.0	16.1	8.1	10.5	12.8	14.2	14.8	9.3	16.1	11.4	12.9	12.8	12.7	8.9	13.9	13.8	18.0	11.5	10.8
Soft tissue & other extraosseous sarcomas																									
0-4 yrs	Count	12	12	9	11	11	12	15	17	8	22	13	14	15	12	14	9	11	13	10	8	15	17	11	20
	Rate	10.3	10.1	7.5	9.1	9.0	9.8	12.1	13.5	6.3	17.1	10.1	10.8	11.5	9.3	10.8	7.0	8.6	10.2	7.8	6.3	11.9	13.5	8.7	15.7
5-9 yrs	Count	12	8	7	13	9	10	7	9	10	18	8	16	15	8	7	6	12	3	9	12	8	10	10	10
	Rate	9.9	6.7	6.0	11.0	7.5	8.2	5.6	7.1	7.9	14.1	6.3	12.5	11.6	6.1	5.3	4.5	8.9	2.2	6.7	8.9	6.0	7.5	7.6	7.6
10-14 yrs	Count	13	10	13	9	7	8	13	6	9	20	15	9	9	14	11	11	16	18	7	11	13	9	12	9
	Rate	9.5	7.3	9.6	6.9	5.5	6.4	10.5	4.9	7.2	16.0	11.9	7.0	6.9	10.7	8.4	8.4	12.1	13.5	5.2	8.0	9.4	6.5	8.6	6.5
Germ cell tumours, trophoblastic tumours & neoplasms of gonads[2]																									
0-4 yrs	Count	8	5	8	9	4	4	9	11	9	8	9	9	12	11	13	18	12	11	18	8	15	14	9	20
	Rate	6.8	4.2	6.7	7.4	3.3	3.3	7.2	8.7	7.1	6.2	7.0	6.9	9.2	8.5	10.0	14.0	9.3	8.6	14.0	6.3	11.9	11.1	7.1	15.7
5-9 yrs	Count	1	7	1	2	2	3	3	1	3	6	1	1	3	1	2	5	7	5	3	3	2	1	1	3
	Rate	0.8	5.9	0.9	1.7	1.7	2.5	2.4	0.8	2.4	4.7	0.8	0.8	2.3	0.8	1.5	3.8	5.2	3.7	2.2	2.2	1.5	0.8	0.8	2.3
10-14 yrs	Count	7	3	9	3	11	7	9	4	6	15	6	7	9	13	6	8	8	11	8	8	8	8	5	11
	Rate	5.1	2.2	6.7	2.3	8.6	5.6	7.3	3.2	4.8	12.0	4.7	5.5	6.9	9.9	4.6	6.1	6.0	8.2	5.9	5.9	5.8	5.8	3.6	7.9
Other malignant epithelial neoplasms & melanomas																									
0-4 yrs	Count	1	2	2	5	3	1	2	5	2	2	0	1	2	3	4	2	3	1	2	2	3	3	2	1
	Rate	0.9	1.7	1.7	4.1	2.5	0.8	1.6	4.0	1.6	1.6	0.0	0.8	1.5	2.3	3.1	1.6	2.3	0.8	1.6	1.6	2.4	2.4	1.6	0.8
5-9 yrs	Count	4	4	2	4	2	4	2	6	3	3	3	4	6	9	5	3	7	5	7	7	3	2	5	4
	Rate	3.3	3.4	1.7	3.4	1.7	3.3	1.6	4.8	2.4	2.3	2.3	3.1	4.6	6.9	3.8	2.3	5.2	3.7	5.2	5.2	2.2	1.5	3.8	3.0
10-14 yrs	Count	19	12	21	22	15	21	31	18	27	25	34	19	29	35	31	26	20	17	25	22	22	20	15	21
	Rate	13.9	8.8	15.5	16.8	11.8	16.8	25.0	14.6	21.7	20.0	26.9	14.8	22.4	26.8	23.6	19.8	15.1	12.7	18.5	16.1	15.9	14.4	10.8	15.1

Notes: 1. Rates are expressed per million and age-standardised to the 2001 Australian Standard Population.
2. Diagnostic group includes intracranial and intraspinal tumours of benign or uncertain behaviour.

Table A.6: Incidence counts and rates[1] of childhood melanomas by sex and age group by year of diagnosis, Australia, 1983-2006

		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Sex																									
Boys	Count	9	5	3	8	8	4	15	7	10	7	11	10	8	12	12	9	5	5	6	4	6	6	4	3
	Rate	4.5	2.5	1.5	4.0	4.2	2.1	8.0	3.7	5.3	3.6	5.7	5.2	4.1	6.1	6.0	4.5	2.5	2.5	2.9	1.9	2.9	2.9	1.9	1.4
Girls	Count	6	7	10	10	5	9	7	9	16	13	14	3	8	22	7	7	12	6	15	14	6	5	7	4
	Rate	3.0	3.6	5.2	5.4	2.8	5.0	3.9	5.1	9.0	7.2	7.7	1.6	4.3	11.7	3.7	3.7	6.3	3.1	7.7	7.2	3.1	2.5	3.6	2.0
Children	Count	15	12	13	18	13	13	22	16	26	20	25	13	16	34	19	16	17	11	21	18	12	11	11	7
	Rate	3.8	3.0	3.3	4.7	3.5	3.5	6.0	4.4	7.1	5.4	6.7	3.4	4.2	8.8	4.9	4.1	4.3	2.8	5.3	4.5	3.0	2.7	2.7	1.7
Age group																									
0-4 yrs	Count	1	1	0	0	2	0	1	1	1	1	0	0	1	2	1	1	1	0	1	2	1	0	1	0
	Rate	0.9	0.8	0.0	0.0	1.6	0.0	0.8	0.8	0.8	0.8	0.0	0.0	0.8	1.5	0.8	0.8	0.8	0.0	0.8	1.6	0.8	0.0	0.8	0.0
5-9 yrs	Count	2	1	1	2	1	2	2	3	2	2	0	1	2	6	2	2	5	1	6	4	2	0	3	1
	Rate	1.7	0.8	0.9	1.7	0.8	1.6	1.6	2.4	1.6	1.6	0.0	0.8	1.5	4.6	1.5	1.5	3.7	0.7	4.4	3.0	1.5	0.0	2.3	0.8
10-14 yrs	Count	12	10	12	16	10	11	19	12	23	17	25	12	13	26	16	13	11	10	14	12	9	11	7	6
	Rate	8.8	7.3	8.9	12.2	7.9	8.8	15.3	9.7	18.5	13.6	19.8	9.4	10.0	19.9	12.2	9.9	8.3	7.5	10.3	8.8	6.5	7.9	5.0	4.3

Notes: 1. Rates are expressed per million and age-standardised to the 2001 Australian Standard Population.

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