

CHAPTER 10

CANCER REPORT

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This report surveys non-skin cancers reported in all patients in Australia and New Zealand until March 2002.

All analyses exclude patients who had cancer diagnosed within 3 months of either commencing dialysis or receiving a renal transplant.

In keeping with previous reports figures 10.2, 10.4 and 10.5 also exclude those receiving 2nd grafts.

Cumulative risk of cancer for recipients of first cadaveric grafts and for patients treated only with dialysis are shown graphically in figures 10.1 and 10.2.

For recipients of a cadaveric graft the risk of developing a skin cancer is greater than 30% at 10 years, and almost 20% of developing a non-skin cancer by 15 years. Over 10% of patients on dialysis for 5 years will develop some form of cancer, and almost 20% of those surviving 10 years will develop a non-skin cancer.

For figures 10.3 to 10.5 relative risk (risk ratio) is calculated as ‘observed/expected’ number of cases. “Expected number of cases” are calculated overall and for each cancer type by comparing the observed number of cases seen in an age matched South Australian population using the mean population for the years 1980, 1994 and 1995. Where the number of cancers observed or expected was too small to provide a useful estimate of risk, then risk has not been calculated.

Figure 10.1

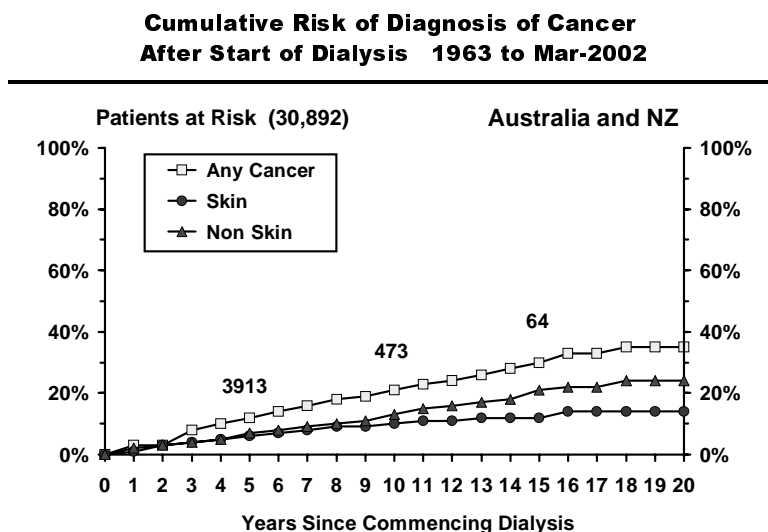


Figure 10.2

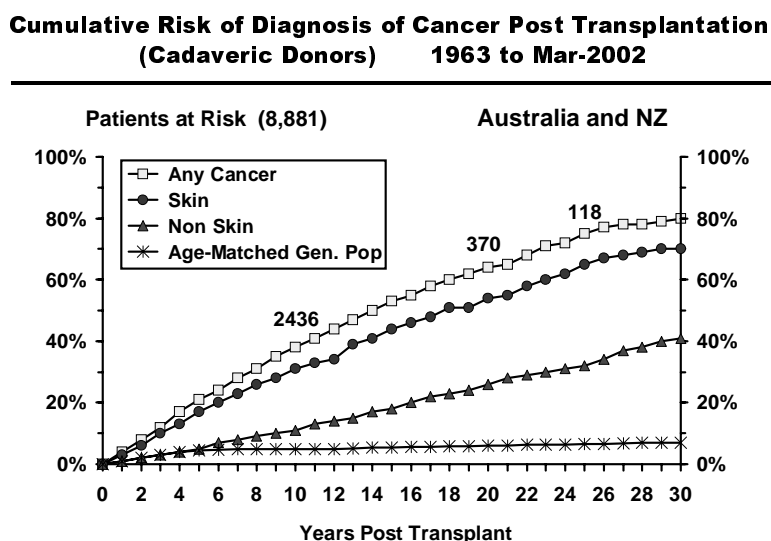


Figure 10.3

Risk of Diagnosis of Cancer *
Following Commencement of Dialysis (n=30,892)
1963 to 31 March 2002

Site of Cancer	Observed Cancer	Expected Cancer	Risk Ratio	95% Confidence Interval
ALIMENTARY TRACT	226	97.00	2.33	2.04, 2.66
Buccal Cavity	19	23.07	0.82	0.52, 1.30
Pharynx	5	4.70	1.06	0.44, 2.58
Oesophagus	16	8.79	1.82	1.11, 3.00
Stomach	26	21.41	1.21	0.82, 1.79
Small Intestine	5	1.28	3.91	1.57, 9.71
Colon	78	63.02	1.24	0.99, 1.55
Rectum & Anus	28	41.27	0.68	0.47, 0.98
Liver	16	4.72	3.39	2.04, 5.63
Gall Bladder & Extra Hepatic Bile Ducts	4	5.83	0.69	0.26, 1.84
Pancreas	13	15.23	0.85	0.49, 1.48
RESPIRATORY	163	95.82	1.70	1.46, 1.99
Larynx	7	5.92	1.18	0.56, 2.50
Trachea, Bronchus & Lung	153	86.65	1.77	1.50, 2.07
Pleura	3	3.25	0.92	0.29, 2.89
BONE	2	0.82	2.44	0.59, 10.09
CONNECTIVE TISSUE	0	4.95		
BREAST	89	72.57	1.23	0.99, 1.51
Breast - female	88	71.82	1.23	0.99, 1.51
Breast - male	1	0.75	1.33	0.18, 9.72
GENITO-URINARY	319	228.66	1.40	1.25, 1.56
Cervix - In situ	9	2.7	3.33	1.70, 6.55
Cervix - Invasive	9	5.84	1.54	0.79, 2.99
Uterus	11	13.48	0.82	0.45, 1.48
Ovary	8	7.79	1.03	0.51, 2.07
Vulva & Vagina	3	2.04	1.47	0.47, 4.64
Prostate	55	150.07	0.37	0.28, 0.48
Testis	1	1.9	0.53	0.07, 3.78
Penis	1	0.68	1.47	0.20, 10.75
Bladder	103	24.98	4.12	3.37, 5.04
Kidney	91	19.01	4.79	3.86, 5.93
Ureter	15	0.16	93.75	39.58, 222.08
CENTRAL NERVOUS SYSTEM [excluding lymphoma]	19	10.76	1.77	1.12, 2.79
ENDOCRINE GLANDS	28	4.01	6.98	4.70, 10.37
Thyroid	24	3.97	6.05	3.96, 9.24
Parathyroid	3	0.00		
Other Endocrine	1	0.03	33.33	2.63, 421.94
LYMPHOMA	28	25.33	1.11	0.76, 1.61
Lymphoproliferative CNS	0	0.00		
Non-Hodgkins Disease	22	23.61	0.93	0.61, 1.42
Hodgkins Disease	4	1.71	2.34	0.86, 6.38
MULTIPLE MYELOMA	28	8.81	3.18	2.17, 4.66
LEUKAEMIA	14	19.82	0.71	0.42, 1.20
KAPOSI SARCOMA	4	0.27	14.81	4.84, 45.30
MALIGNANT MELANOMA	62	46.42	1.34	1.04, 1.72
MISCELLANEOUS	15	4.28	3.50	2.08, 5.92
TOTAL	1034 **	737.81	1.40	1.32, 1.49

* Non-Melanotic skin cancers are not included

** The 1034 cancers occurred in 972 (3.1%) patients

Figures 10.3 to 10.5 show a breakdown of cancer by site for recipients of cadaveric and living related transplants and for patients treated with dialysis. Of the 30,892 patients on dialysis at risk, 1034 cancers have been diagnosed in 972 patients. 1200 cancers occurred in 1072 of the 8881 recipients of primary cadaveric transplants, 125 cancers in 114 of the 1808 living related donor transplant recipients, and 5 cancers in 5 of 273 recipients of a living unrelated donor kidney.

Comparing the dialysis and transplant populations, the trend for increase in certain cancer types over and above the general population is similar. For certain cancers, whilst risk compared to the general population is increased for all patients, the magnitude of the increased risk is significantly different between dialysis and transplant populations. This is most notable for cancers that have been associated with viral infections, where the post transplant risk is greatly elevated (cervix in situ, vulvo-vaginal, lymphoma and leukaemia). Whilst a trend for an increase in colon cancer is seen in the dialysis population, risk is significantly higher for patients with allografts. Conversely, risk of prostate cancer is decreased for all patients, but significantly more so for the dialysis population.

An increase in tumours of the renal tract may be expected, and the increase in cancers of the oesophagus and respiratory tract may relate to the increased prevalence of previous or current tobacco smoking in the end stage renal failure population when compared to the general population. However of particular note is the increased risk in the dialysis population of endocrine and central nervous system tumours, malignant melanoma and Kaposi's sarcoma, which has no obvious explanation.



Figure 10.4

**Risk of Diagnosis of Cancer *
Following Cadaveric Renal Transplantation (n=8881)
1963 to 31 March 2002**

Site of Cancer	Observed Cancer	Expected Cancer	Risk Ratio	95% Confidence Interval
ALIMENTARY TRACT	226	97.00	2.33	2.05, 2.65
Buccal Cavity	37	15.71	2.36	1.70, 3.26
Pharynx	8	2.85	2.81	1.40, 5.64
Oesophagus	18	3.99	4.51	2.83, 7.20
Stomach	13	9.30	1.40	0.81, 2.41
Small Intestine	1	0.85	1.18	0.16, 8.41
Colon	81	31.19	2.60	2.09, 3.23
Rectum & Anus	34	21.55	1.58	1.13, 2.21
Liver	16	2.04	7.84	4.75, 12.94
Gall Bladder & Extra Hepatic Bile Ducts	5	2.70	1.85	0.77, 4.47
Pancreas	13	6.82	1.91	1.10, 3.29
RESPIRATORY	99	46.14	2.15	1.76, 2.61
Larynx	7	3.50	2.00	0.95, 4.21
Trachea, Bronchus & Lung	87	40.88	2.13	1.72, 2.63
Pleura	5	1.77	2.82	1.17, 6.83
BONE	4	0.75	5.33	1.97, 14.42
CONNECTIVE TISSUE	4	3.44	1.16	0.44, 3.11
BREAST	59	56.15	1.05	0.81, 1.36
Breast - female	58	55.72	1.04	0.80, 1.35
Breast - male	1	0.43	2.33	0.32, 16.73
GENITO-URINARY	350	99.79	3.51	3.16, 3.89
Cervix - In situ	72	4.19	17.18	13.50, 21.88
Cervix - Invasive	15	4.96	3.02	1.82, 5.04
Uterus	13	8.88	1.46	0.85, 2.53
Ovary	4	5.94	0.67	0.25, 1.80
Vulva & Vagina	44	1.24	35.48	25.66, 49.06
Prostate	34	49.30	0.69	0.49, 0.97
Testis	4	3.18	1.26	0.47, 3.36
Penis	7	0.39	17.95	8.24, 39.09
Bladder	71	10.87	6.53	5.16, 8.27
Kidney	72	10.79	6.67	5.28, 8.44
Ureter	14	0.06	233.33	104.33, 521.86
CENTRAL NERVOUS SYSTEM [excluding lymphoma]	11	8.51	1.29	0.71, 2.34
ENDOCRINE GLANDS	19	3.94	4.82	3.06, 7.60
Thyroid	16	3.92	4.08	2.49, 6.70
Parathyroid	1	0.00		
Other Endocrine	2	0.02	100.00	17.48, 572.13
LYMPHOMA	166	16.84	9.86	8.44, 11.51
Lymphoproliferative	17	0.00		
CNS	16	0.00		
Non-Hodgkins Disease	129	14.91	8.65	7.26, 10.31
Hodgkins Disease	4	1.94	2.06	0.77, 5.52
MULTIPLE MYELOMA	11	4.40	2.50	1.38, 4.53
LEUKAEMIA	29	10.34	2.80	1.94, 4.05
KAPOSI SARCOMA	19	0.25	76.00	44.29, 130.40
MALIGNANT MELANOMA	130	36.49	3.56	3.00, 4.23
MISCELLANEOUS	73	14.66	4.98	3.95, 6.28
TOTAL	1200 **	398.46	3.01	2.86, 3.18

* Non-Melanotic skin cancers are not included
** The 1200 cancers occurred in 1072 (12%) patients

Figure 10.5

**Risk of Diagnosis of Cancer *
Following Living Related Donor
Renal Transplantation (n=1808)
1963 to 31 March 2002**

Site of Cancer	Observed Cancer	Expected Cancer	Risk Ratio	95% Confidence Interval
ALIMENTARY TRACT	18	5.98	3.01	1.90, 4.77
Buccal Cavity	6	1.33	4.51	2.03, 10.05
Pharynx	1	0.18	5.56	0.78, 39.67
Oesophagus	2	0.21	9.52	2.37, 38.35
Stomach	2	0.51	3.92	0.98, 15.72
Small Intestine	0	0.05		
Colon	4	1.83	2.19	0.82, 5.83
Rectum & Anus	1	1.23	0.81	0.11, 5.77
Liver	1	0.11	9.09	1.27, 65.19
Gall Bladder & Extra Hepatic Bile Ducts	0	0.15		
Pancreas	1	0.38	2.63	0.37, 18.73
RESPIRATORY	5	2.40	2.08	0.87, 5.00
Larynx	0	0.19	0.00	
Trachea, Bronchus & Lung	5	2.11	2.37	0.99, 5.69
Pleura	0	0.10	0.00	
BONE	0	0.11	0.00	
CONNECTIVE TISSUE	2	0.36	5.56	1.38, 22.30
BREAST	8	4.36	1.83	0.92, 3.67
Breast - female	8	4.33	1.85	0.92, 3.69
Breast - male	0	0.03		
GENITO-URINARY	49	6.36	7.70	5.84, 10.17
Cervix - In situ	20	0.85	23.53	15.12, 36.61
Cervix - Invasive	3	0.55	5.45	1.75, 16.96
Uterus	3	0.57	5.26	1.69, 16.36
Ovary	1	0.42	2.38	0.33, 16.94
Vulva & Vagina	9	0.09	100.00	50.18, 199.28
Prostate	1	1.90	0.53	0.07, 3.74
Testis	1	0.66	1.52	0.21, 10.77
Penis	1	0.03	33.33	4.52, 245.79
Bladder	3	0.59	5.08	1.64, 15.81
Kidney	6	0.68	8.82	3.95, 19.70
Ureter	1	0.00		
CENTRAL NERVOUS SYSTEM [excluding lymphoma]	2	0.79	2.53	0.63, 10.14
ENDOCRINE GLANDS	2	0.5	4.0	1.00, 16.03
Thyroid	2	0.49	4.08	1.02, 16.36
Parathyroid	0	0.00		
Other Endocrine	0	0.01	0.00	
LYMPHOMA	19	1.54	12.34	7.86, 19.36
Lymphoproliferative	5	0.00		
CNS	0	0.00		
Non-Hodgkins Disease	13	1.20	10.83	6.28, 18.69
Hodgkins Disease	1	0.34	2.94	0.41, 20.94
MULTIPLE MYELOMA	1	0.26	3.85	0.54, 27.41
LEUKAEMIA	1	0.77	1.30	0.18, 9.23
KAPOSI SARCOMA	3	0.04	75.00	23.04, 244.10
MALIGNANT MELANOMA	12	3.90	3.08	1.75, 5.41
MISCELLAENOUS	3	0.87	3.45	1.11, 10.71
TOTAL	125 **	28.20	4.43	3.74, 5.25

* Non-Melanotic skin cancers are not included
 ** The 125 cancers occurred in 114 (6.3%) patients

SURVIVAL FOLLOWING DIAGNOSIS OF CANCER.

As a prognostic aid to clinicians caring for end stage renal failure (ESRF) patients with a diagnosis of cancer, we have analysed survival for both dialysis and transplant patients diagnosed with cancer between 1963 and March 2002.

All analyses have been restricted to the following patient groups; patients diagnosed with cancer prior to the start of dialysis (pre-ESRF=1812), patients diagnosed with cancer whilst on dialysis who never received a transplant (dialysis=1087), and patients diagnosed with a cancer after transplantation (post transplantation=1325).

We have excluded all those diagnosed with cancer prior to ESRF who subsequently received a transplant (n=193), and those diagnosed with a cancer whilst receiving dialysis therapy who subsequently received a transplant (n=79).

We have also excluded all those patients who were diagnosed with cancer within 90 days of starting dialysis or receiving a transplant (pre-ESRF = 263, dialysis=274, post transplantation=27), reasoning that the timing of commencing treatment and the timing of cancer diagnosis have an uncertain relationship within this window period.

After allowing for these exclusions the final number of patients diagnosed with cancer in each group are pre-ESRF=1549, dialysis=813 and post transplantation=1298.

Survival has been calculated from the date of diagnosis of cancer in all cases. Survival curves have been produced from Kaplan-Meier survival probabilities using all cause mortality to define an event. Figure 10.6 summarises median survival and mean age for each cancer type by treatment group.

Figures 10.7 to 10.14 show survival curves for patients with the most frequently occurring cancer types. For 'first cancer' only the first cancer diagnosis is considered, although for subsequent

graphs all cases of each cancer are included, regardless of whether each patient had previously had another cancer diagnosed.

For all cancer types assessed patient survival is worse for patients on dialysis compared to patients who have received a renal allograft, and for all cancers the mean age of patients on dialysis is higher than that of the patients with an allograft.

Patients diagnosed with any cancer pre-ESRF are clearly a highly selected population. Their death rate is constant with time; for first cancer diagnosis mortality is approximately 4% per annum reaching 20% by 5 years, whereas for the other patient groups the greatest attrition rate is in the first 1-2 years.

For patients diagnosed with malignant melanoma, bladder cancer and for women with breast cancer there is clear separation of the survival curves for patients treated by dialysis and those treated by transplantation. This is not so for cancers of the colon or respiratory tract, where there is little difference in survival, suggesting that these cancers themselves are the driving force behind patient mortality.

Survival for patients with lymphoma should be interpreted with caution, as no attempt has been made to separate the patients declared to have post transplantation lympho-proliferative disorder (PTLD) from other lymphoma types, and patient numbers for the pre-ESRF and dialysis groups are relatively smaller. However, our analysis confirms other reports, that patients with any lymphoma post transplantation have a rapid early mortality, with only 50% surviving at 1 year.

These analyses have made no allowance for the confounding effects of age at diagnosis, nor for the duration of ESRF prior to cancer diagnosis. They are intended to provide clinicians with a useful estimate of survival for their patients with cancer.

Figure 10.6

Survival Following Diagnosis of Cancer 1963 to 31 March 2002							
Site of Cancer	Treatment Modality at Diagnosis	Total Cases	Deceased	Median Survival	95% Confidence Interval	Mean Age	Standard Deviation
				(Years)			
ALL FIRST CANCERS		3654	2550				
	Pre ESRF	1549	1033	10.25	9.52, 10.98	57.21	13.35
	On Dialysis	812	662	0.86	0.72, 1.01	64.16	10.35
	Post Transplantation	1293	855	2.23	1.68, 2.78	52.03	12.74
BLADDER		330	239				
	Pre ESRF	164	103	10.26	7.87, 12.64	59.38	11.13
	On Dialysis	89	77	1.23	0.93, 1.54	64.91	8.52
	Post Transplantation	77	59	3.96	2.93, 5.00	54.40	9.74
KIDNEY		545	371				
	Pre ESRF	364	241	9.14	7.98, 10.29	58.28	11.96
	On Dialysis	90	69	1.15	0.45, 2.44	61.70	12.15
	Post Transplantation	91	61	1.64	0.48, 2.81	54.57	12.56
TRACHEA, BRONCHUS, LUNG		281	262				
	Pre ESRF	23	18	5.07	2.67, 7.47	62.85	7.34
	On Dialysis	155	147	0.26	0.18, 0.34	66.60	8.03
	Post Transplantation	103	97	0.4	0.25, 0.54	60.32	9.86
COLON		315	223				
	Pre ESRF	150	91	10.86	9.19, 12.53	62.07	10.46
	On Dialysis	72	60	0.51	0.00, 1.13	65.79	8.69
	Post Transplantation	93	72	0.76	0.19, 1.33	58.63	9.53
FEMALE BREAST		365	232				
	Pre ESRF	193	131	11.17	8.77, 13.57	56.48	11.94
	On Dialysis	92	61	2.46	1.96, 2.95	60.03	11.92
	Post Transplantation	80	40	5.74	4.21, 7.27	52.15	9.59
MELANOMA		338	217				
	Pre ESRF	99	72	12.1	9.07, 15.12	56.05	13.57
	On Dialysis	64	50	2.17	1.03, 3.31	66.88	9.56
	Post Transplantation	175	95	6.46	4.19, 8.74	52.69	12.29
ALL LYMPHOMA		294	198				
	Pre ESRF	52	34	11.68	8.9, 14.46	52.98	15.43
	On Dialysis	31	25	0.94	0.18, 1.71	61.24	9.04
	Post Transplantation	211	139	0.84	0.01, 1.66	48.50	14.57



Pre ESR = black line Dialysis = mid grey line Post Transplant = light grey line

Figure 10.7

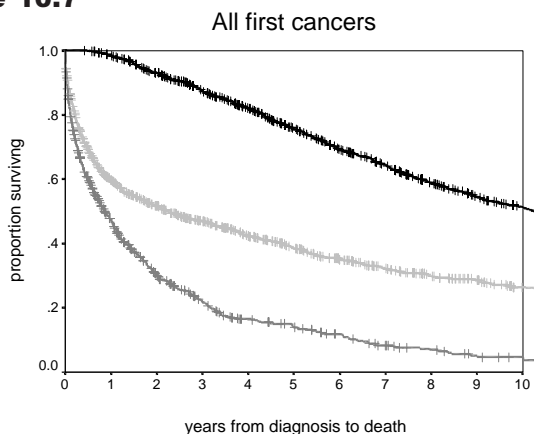


Figure 10.11

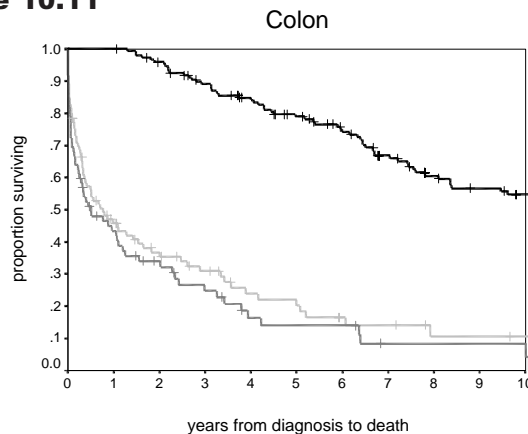


Figure 10.8

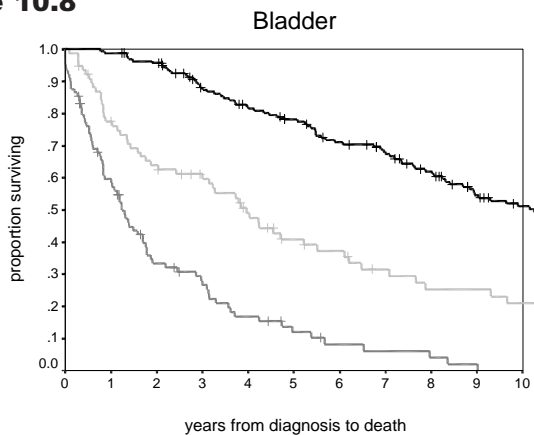


Figure 10.12

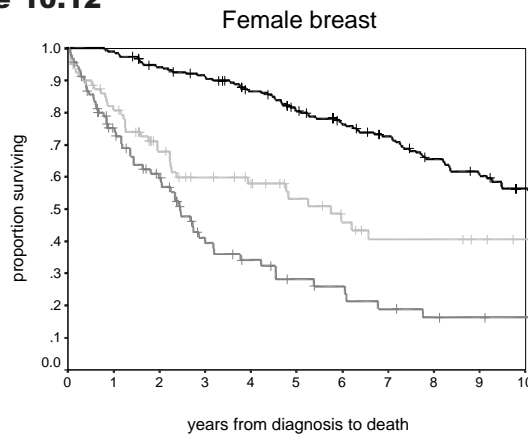


Figure 10.9

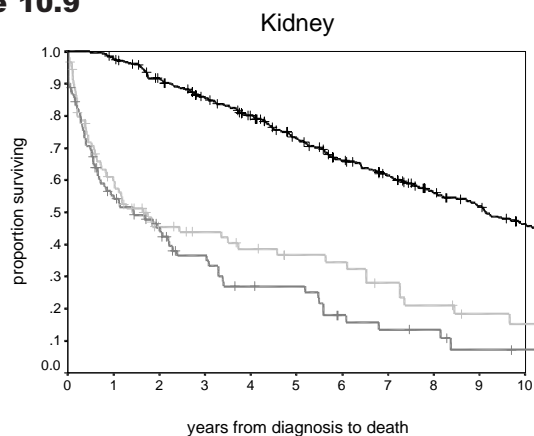


Figure 10.13

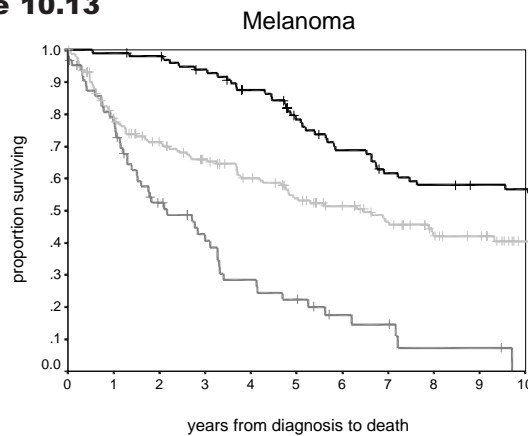


Figure 10.10

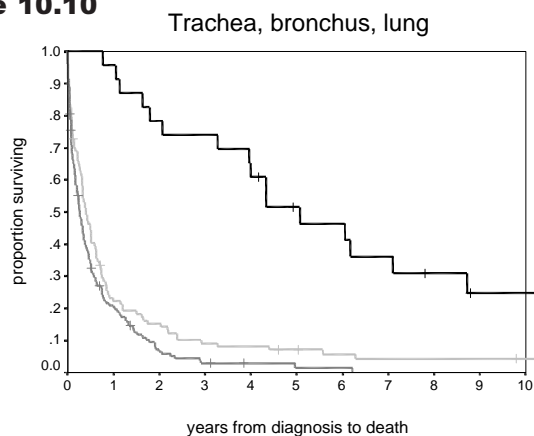


Figure 10.14

