CANCER REPORT

Professor A. G. R. Sheil
Royal Prince Alfred Hospital, Sydney, N.S.W.

This report deals with patients in Australia and New Zealand reported to ANZDATA to 31 March 1997. There were 21093 dialysis patients, and 9796 transplant recipients who survived more then three months post-operation. Of the latter, there were 1178 recipients of living related donor kidneys, 60 living unrelated and 8558 cadaveric donors.

Non Hodgkin's Lymphoma

Since the mid 1980's, following the advent of Cyclosporine-A (CyA) and successful heart and liver transplantation, it has been reported that non Hodgkin's lymphoma (NHL) is occurring with heightened incidence compared to that which followed renal transplantation under Azathioprine (AZA) – based immunosuppression (Penn and Brunson, 1988; Penn, 1996). This conclusion was reached by comparing the 30-37% NHL proportions of all non skin cancers diagnosed post transplant in CyA treated recipients with the 12-20% which currently pertain to transplant recipients treated with other (largely AZA-based) immunosuppression. However, in a recent ANZDATA report to the XVI International Congress of the Transplantation Society in Barcelona in August 1996 (Sheil et al 1997), we pointed out that the conclusion might be premature, as the duration of follow-up of patients in the CyA era is short compared to that of the AZA era and, as reported from ANZDATA previously (Sheil et al 1992, Sheil et al 1993) with passage of time the types of cancer in renal transplantation rate change from predominance of NHL to an increased incidence of those cancers common in older patients in the general population, so causing progressive decrease in the proportions of NHL.

The ANZDATA incidences of all cancers and of NHL following renal transplantation are shown in Table 111. As the mean survival time post-transplant progressively lengthens from 2.2 to 7.9 years, so too NSCA incidence progressively increases from 2% to 9% of patients. However, NHL incidence remains steady at 0.8% to 1.2% of patients. Consequently, there is a progressive decrease in NHL proportions of all cancer from 44% (1977) to 13% (1997).

Thus, the incidence of lymphoma is at the same level today as was reported in Australia before the introduction of CyA (Sheil 1977) and continues at this level ever since despite the almost uniform addition of CyA to the immunosuppression used. The progressive reduction of NHL proportions of post-transplant cancer from 44% (in 1977) to the current 13% is not unique to Australia/New Zealand as a similar reduction can be traced in the reports from the Cincinnatti Transplant Tumour Registry for 1975 (Penn 1975), 1981 (Penn 1981) and 1995 (Penn 1996) where the recorded NHL proportions of all cancers were 45%, 29% and 17% respectively.

Our conclusion is in accord with that of Opelz and Henderson (1993) analysing European and American transplant recipients, who found no increase of NHL in transplant recipients treated with CyA alone, though, unlike in our experience, these authors did find an increase of NHL in patients receiving CyA in addition to AZA. As detailed later in this report, in our analysis of patients treated since 1980 with immunosuppression which included or excluded CyA there was no significant difference in NHL or other cancer development, it appearing that, so far in Australia/New Zealand, the pattern of cancer development in CyA treated renal transplant recipients remains substantially the same as that which followed renal transplantion in the AZA era.

Cancer Following Cadaveric Donor Renal Transplantation 1977 - 31-Mar-1997

Year	Cancer Incidence	Lymphoma		Mean Followup
		No. (%Ca)	% Pts	
1977	34/1884 (2%)	15/34 (44%)	0.8%	2.2
1981	113/3274 (3%)	32/113 (28%)	1%	4.2
1984	163/3755 (4%)	33/163 (20%)	0.9%	4.8
1990	372/5879 (6%)	50/372 (13%)	0.9%	6.4
1995	668/7909 (8%)	85/668 (13%)	1%	7.6
1997	785/8618 (9%)	102/785 (13%)	1.2%	7.9

Breast Cancer

The Australia/New Zealand results may differ also from those of Stewart et al (1995) reporting from the Opelz Collaborative Transplant Study. These authors reported a significantly decreased incidence of breast cancer in European and North American renal transplant recipients followed 1-11 years post-transplantation (no mean survival given) and argued persuasively several reasons why this should be so. However, in the Australia/New Zealand experience, this cancer was already occurring with the same frequency as in the age matched general population in 1984 (mean follow-up 4.8 years, the approximate mean follow-up of the Opelz Study patients) (Sheil et al 1985) and the incidence remains that of the age matched general population since, including in this report. However, since breast cancer is late-occurring (current mean diagnosis time post-transplant is nine years exceeding the current mean survival of female patients [7.8 years]) it is too early to make any conclusions about the relative long term incidence of this cancer in immunosuppressed renal transplant recipients.

Cancer Risk

In Table 112 the risk of cancer following cadaveric donor renal transplantation in the Australia/New Zealand experience is shown. Here, the observed cancers in renal transplant recipients are compared with those expected in the age-matched general population (taken from the South Australian Cancer Registry) to establish a "risk ratio". The table shows that, overall, renal transplant recipients are 3.5 times more likely to develop cancer than the age matched general population, the 95% confidence levels confirming the significance of the observation. The cancers with the greatest increased risks are those in which viruses have been implicated, thus lymphoma (CNS) increased risk >1000 (EBV), Kaposi sarcoma 86 (CMV, herpes type VIII), vulva and vagina 43 (HPV), liver 5.6 (hepatitis B, C), oesophagus 5 (HPV), diffuse NHL 7.4 (EBV), leukaemia 3.6 (HTLV), cervix (invasive) 3.8 (HPV). If one excludes the common urinary malignancies (increased risk 15) because we are dealing with renal transplant recipients whose own renal tracts are sometimes associated with malignant or premalignant conditions, all other malignancies are still occurring at twice the expected rate, the 95% confidence levels indicating continued significance.

Amongst cancers with a moderately increased risk ratio are endocrine malignancies (4.3). There have been 11 patients with cancer of the thyroid gland, two with parathyroid malignancies and one other, when the total expected number is 2.2. While the parathyroid malignancies might be explained in part by abnormalities of parathyroid function associated with renal failure, the thyroid cancers are currently unexplained.

Risk of Cancer Following Cadaveric Donor Renal Transplantation
1965 - 31-Mar-97
(Number of Patients = 8618)

Site of Cancer	Observed Cancer	Expected Cancer	Risk Ratio	95% Confidence	
Alimentary Tract	**(154)**	**(69.39)**	**(2.22)**	**(1.88)**	**(2.60)**
Buccal Cavity	30	11.91	2.52	1.70	3.60
Pharynx	3	2.07	1.45	0.30	4.24
Oesophagus	14	2.78	5.04	2.49	8.00
Stomach	9	6.46	1.39	1.18	3.64
Small Intestine	1	0.64	1.56	0.04	8.71
Colon	50	22.11	2.26	1.68	2.98
Rectum and Anus	22	15.40	1.43	0.90	2.16
Liver	8	1.41	5.67	2.45	11.18
Gall Bladder and Extra Hepatic Bile Ducts	4	1.90	2.11	0.57	5.39
Pancreas	13	4.70	2.77	1.47	4.73
Respiratory	**(71)**	**(32.31)**	**(2.20)**	**(1.72)**	**(2.77)**
Larynx	7	2.53	2.77	1.11	5.70
Trachea, Bronchus and Lung	60	28.51	2.10	1.61	2.71
Pleura	4	1.27	3.15	0.86	8.06
Bone	**(2)**	**(0.62)**	**(3.23)**	**(0.39)**	**(11.65)**
Connective tissue	**(0)**	**(2.67)**	**(0.00)**	**(0.00)**	**(1.38)**
Breast	**(44)**	**(44.00)**	**(1.00)**	**(0.73)**	**(1.14)**
Breast - Female	42	43.69	0.96	0.69	1.30
Breast - Male	2	0.31	6.45	0.78	23.31
Genitourinary	**(269)**	**(70.16)**	**(3.83)**	**(3.39)**	**(4.32)**
Cervix - in situ	50	3.70	13.51	10.03	17.82
Cervix - invasive	15	3.97	3.78	2.11	6.23
Uterus	11	6.74	1.63	0.81	2.92
Ovary	2	4.66	0.43	0.05	1.55
Vulva and Vagina	40	0.92	43.48	30.14	57.95
Prostate	21	31.67	0.66	0.41	1.01
Testis	5	2.84	1.76	0.57	4.11
Penis	7	0.29	24.14	9.70	49.73
Bladder	54	7.51	7.19	5.40	9.39
Kidney	54	7.83	6.90	5.18	9.00
Ureter	10	0.04	250.00	119.88	459.75
Central Nervous System	**(6)**	**(6.61)**	**(0.91)**	**(0.31)**	**(1.98)**
Other than Lymphoma	6	6.61	0.91	0.31	1.98
Endocrine Glands	**(14)**	**(3.22)**	**(4.35)**	**(2.38)**	**(7.30)**
Thyroid	11	3.21	3.43	1.71	6.13
Parathyroid	2	0.01	200.00	24.20	722.50
Other Endocrine	1	0.01	100.00	2.50	557.20
Lymphoma	**(102)**	**(12.83)**	**(7.95)**	**(6.36)**	**(9.65)**
Central Nervous System	17	0.01	>1000	939.00	>10,000
Non-Hodgkin's Disease	83	11.21	7.40	5.90	9.18
Hodgkin's Disease	2	1.63	1.23	1.38	4.43
Multiple Myeloma	**(6)**	**(3.13)**	**(1.92)**	**(0.70)**	**(4.17)**
Leukaemia	**(27)**	**(7.51)**	**(3.60)**	**(2.37)**	**(5.23)**
Kaposi's Sarcoma	**(18)**	**(0.21)**	**(85.71)**	**(50.80)**	**(135.47)**
Miscellaneous	**(72)**	**(10.31)**	**(6.98)**	**(5/46)**	**(8.79)**
Total	**785**	**276.20**	**3.50**	**2.64**	**3.04**

Times of Cancer Diagnosis

The times of presentation of the various cancers are shown in Table 113. Virtually all can occur within the early post-transplantation months and can be first diagnosed at any time throughout the subsequent years. However, there is a time differential for the mean times of diagnosis reflecting that some cancers are commoner in the early post-transplant course while others occur more commonly later. The former, early occurring cancers, include the lymphomas, Kaposi sarcoma and cancers of the endocrine glands. Later cancers include those of the viscera, breast and blood. In the latter group the mean times of presentation are currently 8-10 years. The implications of the mean presentation times of the cancers being either less or more than the current mean time of survival of our patients following transplantation is that those with a lesser mean time of presentation will present an ever decreasing proportion of all cancers, whereas those with greater mean presentation times will become ever more dominant. Also see Table 114 and 115.

Table 113 **Australia and New Zealand**

Times of Presentation
Number of Patients = 8618
Mean Survival Post Transplantation = 7.9 Years

Cancer	Time Post Transplant (Years)	
	Range	Mean
Lymphoma (CNS)	0.3 - 9	2.3
Kaposi's Sarcoma	0.3 - 18	5.8
Endocrine Glands	0.5 - 21	6.5
Lymphoma (diffuse)	0.2 - 23	6.9
Respiratory	0.2 - 23	8
Genitourinary	0.3 - 25	8.3
Breast	0.3 - 22	8.8
Leukaemia	1 - 19	8.8
Digestive	0.4 - 28	10.4
Miscellaneous	0.6 - 24	9.1

Table 114 **Australia and New Zealand**

Skin Pre-Cancer and Cancer in Patients
Prior to Dialysis, During Dialysis, Post Renal Transplantation
1965 - 31-Mar-97

		Prior to Dialysis	On Dialysis	Within 3 months post CD Tx	Beyond 3 months Post Tx	
					LRD	CD
Pre Cancer	Keratoacanthoma	27	115	5	18	489
	Bowen's Disease	20	85	3	26	583
Cancer	SCC	142 (32%)	326 (45%)	15 (34%)	79 (58%)	1644 (55%)
	BCC	206 (46%)	328 (45%)	28 (63%)	47 (34%)	1137 (38%)
	Melanoma	67 (15%)	35 (5%)	1 (1%)	8 (6%)	87 (3%)
	Other	32 (7%)	34 (5%)	0	3 (2%)	106 (4%)
Total Cancers		**447**	**723**	**44**	**137**	**2974**
Total Patients with Cancer		**374 (2%)**	**595 (3%)**	**38 (0.4%)**	**105 (9%)**	**2031 (24%)**
Patients at Risk		23560	21093	9317	1178	8618
Patient Years of Risk		1142246	45588	2204	8005	68580

CD = Cadaver Donor LRD = Living Related Donor SCC = Squamous Cell Carcinoma BCC = Basal Cell Carcinoma

Table 115 Australia and New Zealand

Risk of Cancer Other than Skin - Related to Treatment Period 31-Mar-97

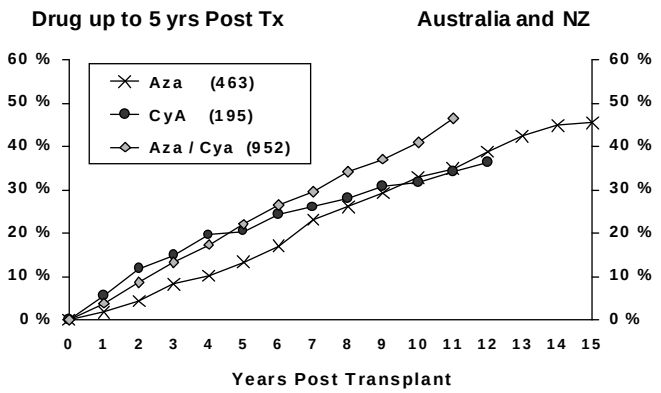
Gender	Patient Group	Prior to Dialysis	On Dialysis	Post Transplant	
				LRD	CD
Males	Patients at Risk	13167	11788	704	4994
	Observed Cancers	628	319	20	358
	Expected Cancers	1080	244	6.36	153
	Risk Ratio Obs/Exp Cancers	0.6	1.3	3.1	2.3
Females	Patients at Risk	10393	931	474	3624
	Observed Cancers	574	259	41	427
	Expected Cancers	846	135	6.56	123
	Risk Ratio Obs/Exp Cancers	0.7	1.9	6.3	3.5
Both Sexes	Patients at Risk	23560	21093	1178	8618
	Patient Years at Risk	114224	45588	8005	68380
	Observed Cancers	1202	578	61	785
	Expected Cancers	1925	379	13	276
	Risk Ratio Obs/Exp Cancers	0.6	1.5	4.7	2.8

Cancer in Patients Treated with Cyclosporin

CyA was introduced into clinical practice in Australia in 1980. It has been used in a variety of trials making the analysis of cancer development in the various groups complex. However, from all the trials there is one “pure” group of patients treated during the first five post-transplant years only with CyA as initial and maintenance therapy. There are well matched patients who received AZA and prednisolone and who never received CyA. There is also a large group of patients who have received CyA and AZA in a variety of protocols with and without prednisolone. The analyses, shown in Figure 146 and 147, reveal that skin cancer occurs significantly more frequently in patients treated with CyA, either alone or in combination, than in those not receiving CyA at least for the first several years. However, later, the lines for those receiving CyA alone and AZA alone come together, while those receiving both drugs remains significantly increased. There is no difference in the incidence of non skin cancer in those treated with or without CyA.See also Tables 116-118.

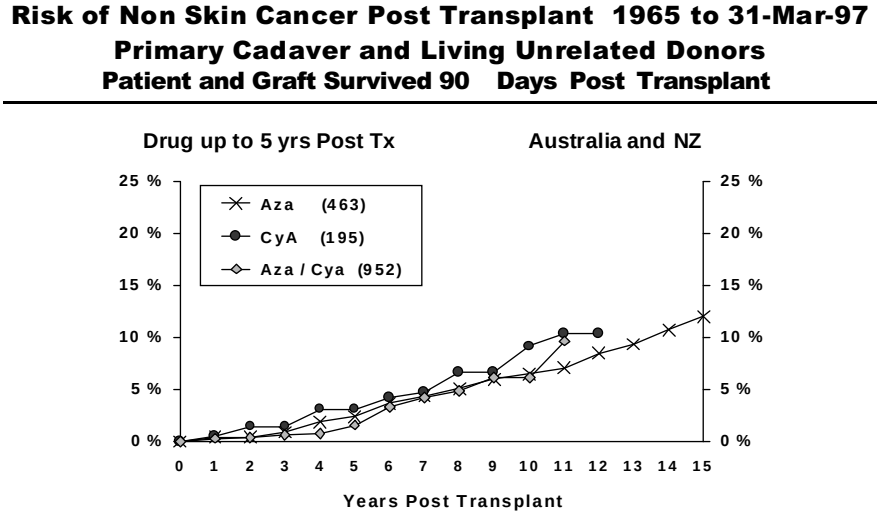
Figure 146

Risk of Skin Cancer Post Transplant 1965 to 31-Mar-97
Primary Cadaver and Living Unrelated Donors
Patient and Graft Survived 90 Days Post Transplant



The risk of developing skin cancer in cohorts of patients treated with Azathioprine, with Cyclosporin or with a combination of Azathioprine and Cyclosporin are shown. The patients received treatment with these drugs for at least the first five years following transplantation.

Figure 147

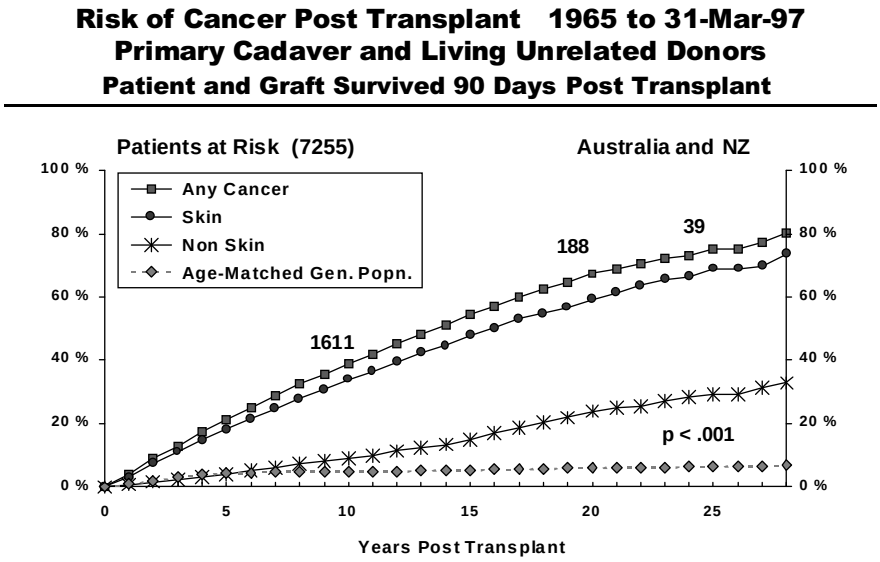


The risk of developing non-skin cancer in cohorts of patients treated with Azathioprine, with Cyclosporin or with a combination of Azathioprine and Cyclosporin are shown. The patients received treatment with these drugs for at least the first five years following transplantation.

Percentage Probability of Cancer Development

The percentage probability that patients will develop cancer following cadaveric donor renal transplantation is shown in Figure 148. The plots are for non skin cancer, skin cancer and any cancer. The numbers of patients surviving beyond 10, 20 and 25 years are 1611, 188 and 39 respectively. By 30 years post-transplant, the predicted incidences of non skin cancer, skin cancer and any cancer are 33%, 75% and 80% respectively.

Figure 148



The risk of cancer development following renal transplantation for cadaveric donor (and living unrelated donor) transplant recipients is shown, together with the incidents of non-skin cancer in the age-matched general population.

Sites of Cancer Other Than Skin
Diagnosed During Different Treatment Periods
1965 - 31-Mar-97

Site of Cancer	Prior to Dialysis	On Dialysis	Living Donor	Cadaver Donor
Alimentary Tract	**(159)**	**(117)**	**(6)**	**(154)**
Buccal Cavity	14	16	1	30
Pharynx	4	3	0	3
Oesophagus	2	9	1	14
Stomach	12	15	1	9
Small Intestine	2	0	0	1
Colon	84	44	1	50
Rectum and Anus	37	14	1	22
Liver	1	7	1	8
Gall Bladder and Extra Hepatic Bile Ducts	1	3	0	4
Pancreas	2	6	0	13
Respiratory	**(14)**	**(88)**	**(3)**	**(71)**
Larynx	2	6	0	7
Trachea, Bronchus and Lung	12	80	3	60
Pleura	0	2	0	4
Bone	**(3)**	**(1)**	**(0)**	**(2)**
Connective Tissue	**(0)**	**(0)**	**(2)**	**(0)**
Breast	**(99)**	**(48)**	**(3)**	**(44)**
Breast - Female	98	48	3	42
Breast - Male	1	0	0	2
Genitourinary	**(668)**	**(218)**	**(26)**	**(269)**
Cervix - in situ	25	15	9	50
Cervix - invasive	23	6	3	15
Uterus	29	8	2	11
Ovary	19	5	0	2
Vulva and Vagina	4	1	6	40
Prostate	89	33	0	21
Testis	27	1	1	5
Penis	2	0	1	7
Bladder	121	84	1	54
Kidney	302	54	3	54
Ureter	27	11	0	10
Central Nervous System	**(1)**	**(11)**	**(2)**	**(6)**
Other than lymphoma	1	11	2	6
Endocrine Glands	**(19)**	**(15)**	**(1)**	**(14)**
Thyroid	12	12	1	11
Parathyroid	4	2	0	2
Other endocrine	3	1	0	1
Lymphoma	**(42)**	**(17)**	**(8)**	**(102)**
Central Nervous System	1	1	0	17
Non-Hodgkin's Disease	32	12	7	83
Hodgkin's Disease	9	4	1	2
Multiple Myeloma	**(144)**	**(17)**	**(1)**	**(6)**
Leukaemia	**(26)**	**(5)**	**(2)**	**(27)**
Kaposi's Sarcoma	**(1)**	**(2)**	**(3)**	**(18)**
Miscellaneous	**(26)**	**(39)**	**(4)**	**(72)**
Total Cancers	**1202**	**578**	**61**	**785**
Total Patients with Cancer	**1079**	**533**	**56**	**705**
Patients at Risk	**23560**	**21093**	**1178**	**8618**

(Note: Diagnosis is recorded post 90 days of treatment)

Table 117 **Australia and New Zealand**

Clinical Features of all Cancers Other Than Skin Diagnosed Following Living Related Donor Renal Transplantation 1965 - 31-Mar-97 Number of Patients = 1178

Site of Cancer	No. of Ca's	Age of Patients (Years)		Sex		Time of Diagnosis after Transplant (months)		Occurr-ence of Metast-ases	Deaths		Patients Alive
		Range	Mean	M	F	Range	Mean		Of this Cancer	Of other Causes	
Alimentary Tract	**(6)**	**(35-54)**	**(43)**	**(1)**	**(5)**	**(16-235)**	**(113)**	**(3)**	**(4)**	**(0)**	**(2)**
Stomach	1	37-37	38	0	1	16-16	16	1	1	0	0
Colon	1	43-43	44	0	1	103-103	103	1	1	0	0
Rectum	1	35-35	35	0	1	127-127	127	0	0	0	1
Other	3	42-54	47	1	2	71-235	144	1	2	0	1
Respiratory Organs	**(3)**	**(45-53)**	**(50)**	**(1)**	**(2)**	**(12-234)**	**(134)**	**(2)**	**(1)**	**(0)**	**(2)**
Trachea and Lung	3	45-53	50	1	2	12-234	134	2	1	0	2
Bone	**(0)**	**(0-0)**	**(0)**	**(0)**	**(0)**	**(0-0)**	**(0)**	**(0)**	**(0)**	**(0)**	**(0)**
Connective Tissue	**(2)**	**(39-46)**	**(43)**	**(1)**	**(1)**	**(45-70)**	**(58)**	**(0)**	**(0)**	**(2)**	**(0)**
Breast	**(3)**	**(31-51)**	**(43)**	**(0)**	**(3)**	**(32-290)**	**(153)**	**(3)**	**(2)**	**(0)**	**(1)**
Genitourinary	**(26)**	**(16-56)**	**(34)**	**(6)**	**(20)**	**(3-216)**	**(86)**	**(2)**	**(3)**	**(2)**	**(21)**
Cervix - in situ	9	23-42	30	0	9	23-159	81	0	0	1	8
Cervix - other	3	27-48	38	0	3	48-126	94	1	1	0	2
Uterus	2	43-50	48	0	2	23-182	103	1	1	0	1
Vulva and Vagina	6	24-52	31	0	6	18-159	84	0	0	0	6
Bladder	1	41-41	42	1	0	102-102	102	0	0	0	1
Kidney and Ureter	3	16-56	33	3	0	3-78	39	0	1	1	1
Other	2	35-46	41	2	0	79-216	148	0	0	0	2
Central Nervous System other than Lymphoma	**(2)**	**(42-55)**	**(49)**	**(2)**	**(0)**	**(11-92)**	**(52)**	**(1)**	**(1)**	**(0)**	**(1)**
Endocrine Glands	**(1)**	**(30-30)**	**(31)**	**(0)**	**(1)**	**(67-67)**	**(67)**	**(1)**	**(0)**	**(0)**	**(1)**
Lymphoma	**(8)**	**(23-63)**	**(44)**	**(3)**	**(5)**	**(3-144)**	**(80)**	**(3)**	**(1)**	**(1)**	**(6)**
Non-Hodgkin's Disease	7	23-63	47	3	4	3-144	77	3	1	1	5
Hodgkin's Disease	1	24-24	24	0	1	104-104	104	0	0	0	1
Multiple Myeloma	**(1)**	**(58-58)**	**(58)**	**(1)**	**(0)**	**(59-59)**	**(59)**	**(0)**	**(0)**	**(1)**	**(0)**
Leukaemia	**(2)**	**(19-39)**	**(30)**	**(2)**	**(0)**	**(45-59)**	**(53)**	**(1)**	**(2)**	**(0)**	**(0)**
Kaposi's Sarcoma	**(3)**	**(11-43)**	**(31)**	**(2)**	**(1)**	**(9-146)**	**(70)**	**(0)**	**(0)**	**(0)**	**(3)**
Miscellaneous	**(1)**	**(52-52)**	**(52)**	**(0)**	**(1)**	**(160-160)**	**(160)**	**(1)**	**(1)**	**(0)**	**(0)**
Unknown	**(3)**	**(43-60)**	**(51)**	**(1)**	**(2)**	**(50-213)**	**(130)**	**(3)**	**(2)**	**(0)**	**(1)**
Total	**61**	**11-63**	**40**	**20**	**41**	**3-290**	**92**	**20**	**17**	**4**	**40**

Clinical Features of all Cancers Other Than Skin Diagnosed Following Cadaver Donor Renal Transpslantation 1965 - 31-Mar-97 Number of Patients = 8618

Site of Cancer	No. of Ca's	Age of Patients (Years)		Sex		Time of Diagnosis after Transplant (months)		Occurr-ence of Metast-ases	Deaths		Patients Alive
		Range	Mean	M	F	Range	Mean		Of this Cancer	Of other Causes	
Alimentary Tract	**(154)**	**(23-78)**	**(55)**	**(87)**	**(67)**	**(5-332)**	**(125)**	**(77)**	**(93)**	**(26)**	**(35)**
Stomach	9	48-66	58	6	3	11-134	59	5	8	0	1
Colon	50	39-72	58	23	27	11-323	126	25	26	15	9
Rectum	22	37-68	53	8	14	40-325	152	11	12	2	8
Other	73	23-78	54	50	23	5-332	124	36	47	9	17
Respiratory	**(71)**	**(31-75)**	**(60)**	**(46)**	**(25)**	**(3-277)**	**(96)**	**(42)**	**(56)**	**(5)**	**(10)**
Trachea and Lung	60	31-75	60	39	21	3-277	97	37	50	3	7
Other	11	47-66	59	7	4	6-214	91	5	6	2	3
Bone	**(2)**	**(51-53)**	**(52)**	**(0)**	**(2)**	**(70-86)**	**(78)**	**(0)**	**(2)**	**(0)**	**(0)**
Connective Tissue	**(0)**	**(0-0)**	**(0)**	**(0)**	**(0)**	**(0-0)**	**(0)**	**(0)**	**(0)**	**(0)**	**(0)**
Breast	**(44)**	**(31-68)**	**(53)**	**(2)**	**(42)**	**(3-261)**	**(106)**	**(22)**	**(18)**	**(4)**	**(22)**
Genitourinary	**(269)**	**(22-71)**	**(50)**	**(78)**	**(191)**	**(4-296)**	**(100)**	**(40)**	**(72)**	**(83)**	**(114)**
Cervix - in situ	50	23-65	39	0	50	4-236	85	1	1	13	36
Cervix - invasive	15	26-69	43	0	15	21-249	107	7	8	3	4
Uterus	11	37-65	51	0	11	15-296	134	3	4	2	5
Vulva and Vagina	40	25-60	45	0	40	21-284	150	4	5	14	21
Prostate	21	54-71	64	21	0	16-242	88	4	4	6	11
Bladder	54	30-70	54	21	33	4-236	96	8	20	22	12
Kidney and Ureter	64	22-70	55	24	40	4-239	80	8	27	21	16
Other	14	23-69	45	12	2	16-231	113	5	3	2	9
Central Nervous System other than Lymphoma	**(6)**	**(35-71)**	**(49)**	**(6)**	**(0)**	**(26-213)**	**(98)**	**(1)**	**(5)**	**(0)**	**(1)**
Endocrine Glands	**(14)**	**(23-60)**	**(44)**	**(7)**	**(7)**	**(6-248)**	**(78)**	**(7)**	**(3)**	**(5)**	**(6)**
Lymphoma	**(102)**	**(13-74)**	**(51)**	**(59)**	**(43)**	**(3-279)**	**(73)**	**(38)**	**(59)**	**(18)**	**(25)**
Central Nervous System	17	27-72	48	9	8	4-106	28	0	10	7	0
Non-Hodgkin's Disease	83	13-74	51	48	35	3-279	83	36	49	11	23
Hodgkin's Disease	2	59-67	64	2	0	48-67	58	2	0	0	2
Multiple Myeloma	**(6)**	**(44-69)**	**(57)**	**(3)**	**(3)**	**(10-315)**	**(121)**	**(0)**	**(5)**	**(0)**	**(1)**
Leukaemia	**(27)**	**(31-67)**	**(50)**	**(15)**	**(12)**	**(11-225)**	**(106)**	**(9)**	**(27)**	**(0)**	**(0)**
Kaposi's Sarcoma	**(18)**	**(28-62)**	**(50)**	**(8)**	**(10)**	**(4-216)**	**(70)**	**(8)**	**(8)**	**(3)**	**(7)**
Miscellaneous	**(28)**	**(31-66)**	**(53)**	**(19)**	**(9)**	**(7-284)**	**(109)**	**(17)**	**(17)**	**(5)**	**(6)**
Unknown	**(44)**	**(24-76)**	**(58)**	**(28)**	**(16)**	**(5-274)**	**(98)**	**(42)**	**(39)**	**(1)**	**(4)**
Total	**785**	**13-78**	**53**	**358**	**427**	**3-332**	**101**	**303**	**404**	**150**	**231**

References

Opelz G, Henderson R: Lancet 342:1514,1993.
Penn I: Transplant Proc. 7:323,1975.
Penn I: Transplant Proc. 13:736,1981.
Penn I: Transplant Proc. 28:876,1996.
Penn I, Brunson ME: Transplant Proc. 20:885,1988.
Sheil AGR. Transplant Proc. 9:1113,1977.
Sheil AGR: In: Fifth Report of the Australia and New Zealand Combined Dialysis and Transplant Registry: 62,1982.
Sheil AGR, Flavel S, Disney APS, Mathew TH: Transplant Proc. 17:195,1985.
Sheil AGR, Disney APS, Mathew TH, Amiss N, Excell L: Transplant Proc. 23:1111,1991.
Sheil AGR, Disney APS, Mathew TH, Amiss N, Excell L: Transplant Proc. 24:1946,1992.
Sheil AGR, Disney APS, Mathew TH, Amiss N, Excell L: Transplant Proc. 25:1383,1993.
Sheil AGR, Disney APS, Mathew TH, Livingston BER, Keogh AM: Transplan Proc. In Press, 1997.
Stewart T, Jane Tsai S-C, Grayson H, Henderson R, Opelz G: Lancet, 346:796,1995.