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## APPENDICES

Incidence of Anemia in Thailand

In 1991, Health Systems Research Institute studied the incidence of anemia in Thailand and found that there were 2,934 cases or 21.7 % of the sample population who got anemia. Female was 25.0 % and male was 17.3 % Most of the cases were in the Southern region (33.2 %) and the least was in the Central region (14.9 %)

Table 1 The Percentage of Cases Divided by Sex

Region	Male	Female	Total
All over the country	17.3	25.0	21.7
North - East	13.2	19.2	16.5
Central (except Bkk)	10.8	17.6	14.9
North	22.4	30.3	26.8
South	26.3	38.2	33.2

According to these criteria : age , sex , and region of the country , the larger number of cases were females in all ages except in 70 up aged-group and they increased in both sexes as the age went by especially in 70 up aged-group , there were half of the sample population who got anemia.

When we consider in each aged-group and compare to the region of the country , the number of female cases in the Southern region were largest in almost every aged-group except in 15 - 19 group and 25 - 29 group which were the largest number of cases in the Northern region and there was the largest number of male cases in 65 up aged-group , 53.8 % in 65 - 69 aged-group and 66.1 % in 70 up aged-group.

Table 2 The Percentage of Cases Divided by Age and Region

Age (years)	North-East		Central		North		South	
	male	Female	Male	Female	male	Female	male	female
15-19	10.0	11.6	6.6	11.6	17.7	27.7	16.3	23.8
20-24	8.4	13.5	3.2	9.6	12.4	26.8	16.2	32.4
25-29	7.8	13.9	5.8	18.1	16.7	30.7	18.9	27.6
30-34	5.2	17.1	12.3	14.9	21.0	26.4	15.6	32.9
35-39	7.6	12.9	6.6	15.6	16.0	26.9	20.4	36.2
40-44	12.0	19.5	7.3	18.8	17.8	29.1	25.0	35.9
45-49	16.9	19.6	8.1	15.7	24.7	31.0	36.8	48.6
50-54	17.3	18.6	11.6	17.7	24.7	24.5	25.5	46.5
55-59	14.6	25.3	16.8	21.0	24.0	33.0	31.2	49.1
60-64	24.0	28.6	20.0	28.6	27.3	45.4	37.3	55.2
65-69	24.7	38.8	20.5	35.0	46.1	43.3	53.8	49.1
70 up	51.1	57.4	29.7	27.4	56.4	38.6	66.1	54.5

Further more , there were a lot of anemia cases in unemployed population and housewives. Most of them were elderly and females. If these two groups were excluded , the largest number of cases would be the agricultural group.

Table 3 The Percentage of Cases Divided by Occupation and Region

Occupation	Country level	North-East	Central	North	South
Technical	15.1	11.1	6.2	26.0	23.4
Services	20.1	12.5	13.2	26.2	30.3
Agriculture	22.2	16.9	18.0	25.0	38.7
Labour	17.4	6.7	12.6	23.2	27.9
Housewife	23.1	17.9	16.9	27.5	32.6
Student	14.2	9.4	8.9	26.3	17.2
Unemployed	34.0	32.1	21.3	37.6	44.3

### Bone Marrow Transplantation Procedure

Transplantation of bone marrow or peripheral blood stem cells (PBSTC) involves potentially serious risks, and patients require the care of skilled medical staff and state-of-the-art support services. For this reason, BMT and PBSTC should be performed at established transplant centers whenever possible. The steps involved in transplantation vary from one medical center to another and with the type of transplantation done.

#### **1. Patient Selection and Consent**

When considering transplantation, physicians carefully evaluate a patient's medical history to be sure this procedure is the most appropriate treatment option. The potential complications of BMT and PBSTC are given significant consideration because they can be severe and, in some cases, fatal. Patients and physician must work closely together to weigh the potential benefits against the risks. After reviewing the transplantation process, the patient is asked to sign hospital consent forms authorizing the procedure which means that the patient has been giving enough information to make an informed decision about treatment and to understand what the treatment involves. (The Children's Hospital of Philadelphia, 1994)

#### **2. Pretreatment Procedure**

Before the actual transplantation, the patient undergoes several days of laboratory and diagnostic tests. Physicians check the patient's general medical condition, looking for signs of infection or damage to organs from previous treatment. A dental exam generally is recommended to make sure the mouth is as healthy as possible before treatment begins, because treatment will likely cause it to become sensitive and easily infected. An intravenous catheter usually is surgically placed in one of the large veins in the chest. The catheter is used for drawing blood samples; for giving the patient blood or blood products, antibiotics, other drugs, and

nutritional support ; and for transplanting the new marrow. (The Children's Hospital of Philadelphia , 1994)

### 3. Procedure for **Allogenic** or **Syngeneic** Donors

The donors enter the hospital the day before or the day of the donation. Donors normally stay in the hospital for 1 or 2 nights because most receive general anesthesia , which puts them to sleep. Bone marrow is removed from the pelvic (hip) bones and , in rare cases , from the sternum (breastbone) as well. Usually , 500 to 1,000 milliliters ( 1 to 2 pints) of the donor's marrow is taken which contain 3 to 5 percent of all the donor's developing blood cells. Harvested bone marrow is then processed to remove blood and bone fragments. Marrow that is to be stored may be combined with dimethyl sulfoxide (a preservative , often referred to as DMSO) and placed in a liquid nitrogen freezer to keep stem cells alive until the day of transplantation. Using this technique , known as Cryopreservation , bone marrow can be preserved for 3 years or more. Within a few weeks , the donor's body will have replaced the donated marrow. (The Children's Hospital of Philadelphia , 1994)

### 4. Harvesting Marrow or Peripheral Blood Stem Cells for **Autologous** Transplantation

The procedures for harvesting marrow in autologous transplantation differ , depending on factors such as the patient's physical condition and the time between harvesting and transplantation. Removal of a larger amount of marrow requires a greater number of needle punctures and a longer period of time to collect the bone marrow. Any problems with bleeding are treated with transfusions of blood products from a blood bank. The marrow is stored until the time of transplantation. Peripheral stem cells are harvested in a process called Apheresis or Leukapheresis. In this procedure , blood is removed through an intravenous catheter or through a large vein in the arm and is run through a machine that removes stem cells. The rest of the blood is returned to the patient. There is no need for hospitalization or anesthesia. Stem cells collected by apheresis are cryopreserved in the same way as in bone



marrow. Because the concentration of stem cells circulating in blood is at least 10 times lower than that found in the bone marrow, researchers are exploring ways to "mobilize" the stem cells - that is, to increase the number that can be harvested. By collecting them during the recovery period after chemotherapy, when the number of circulating stem cells may be as much as 25 times higher than usual and treating the patient with hematopoietic growth factors. (The Children's Hospital of Philadelphia, 1994)

### **5. Conditioning Regimens**

Conditioning is a treatment with high dose chemotherapy with or without radiation. Its primary purpose is to destroy cancer cells throughout the body more effectively than may be possible through conventional treatment. In addition, cells in the marrow are destroyed, creating space for the new marrow. It serves the third purpose in patients undergoing allogenic transplantation because it destroys the cells of the immune system, it reduces the risk that the recipient will reject the graft. The anticancer drugs used in high dose chemotherapy may be given over the course of 2 to 6 days. (The Children's Hospital of Philadelphia, 1994)

### **6. Marrow or Stem Cells Infusion**

After the high dose treatment is completed, the patient receives the donated or autologous marrow through the intravenous catheter. Peripheral blood stem cells for autologous transplantation are infused in the same way. The infusion of marrow or peripheral blood stem cells is called the rescue process. The stem cells travel through the bloodstream to the bone marrow, where they begin to produce new WBC's, RBC's, and platelets. Engraftment or blood cell production from transplanted stem cells usually occurs within about 2 to 4 weeks following transplantation. Complete recovery of immune function takes much longer, however, up to several months for autologous transplant recipients and 1 to 2 years for allogenic transplant recipients. (The Children's Hospital of Philadelphia, 1994)

## 7.Supportive Care

The goal of supportive care is to prevent or manage the side effects of high dose chemotherapy and/or radiation therapy. One of the most serious effects is immunosuppression, in which the patient's body is unable to defend itself against infection. Supportive care for immunosuppression usually includes protective isolation: patients must stay in a hospital room, where it is easier to keep the environment free of infectious agents. Patients also may start receiving antibiotics, antiviral agents, and antifungal agents just before or soon after chemotherapy or radiation therapy in an effort to prevent infection. To reduce the severity of immunosuppression, many patients receive hematopoietic growth factors. (The Children's Hospital of Philadelphia, 1994)

## 8.Convalescence and Followup Care

Most patients stay in the hospital for 1 to 2 months after BMT. This is necessary to monitor whether engraftment has been successful and to treat any potential complications, such as infection and acute Graft-Versus-Host Disease (GVHD). Hospitalization time may be reduced when PBSTC is done alone or with BMT because engraftment time tends to be faster. The use of hematopoietic growth factors also can shorten the time. Generally, a patient is discharged from the hospital after the neutrophil count is greater than 500 in a standard measure of blood for at least 2 consecutive days. Patients may need frequent platelet and blood transfusions even after discharge; for reason, the catheter is left in place for as long as 3 to 6 months after transplantation. Some patients will need to return to the hospital's outpatient department daily for the first 2 weeks, while others can be seen less frequently. Follow up visits to the transplant clinic continue every 1 to 2 weeks for the first several months to ensure that blood counts are normal and that the cancer has not returned. Patients are then seen every month for about 6 months. Later, the

schedule of checkups is based on each patient's need, generally, checkups are done every 2 to 6 months. (The Children's Hospital of Philadelphia, 1994)

## APPENDIX III

Table 4 Costs and Length of Stay of the Studied Subjects

Patient No.	Costs (Bt)	Length of stay	Patient No.	Costs (Bt)	Length of stay
1.	526138	46	29	504498	39
2.	709476	72	30	666510	40
3.	790190	63	31	555173	48
4.	807288	81	32	501368	30
5.	708039	62	33	775953	31
6	982152	62	34	686716	52
7	684889	51	35	644284	44
8	570916	44	36	564024	37
9	901615	126	37	431193	30
10	529713	46	38	417059	27
11	584520	30	39	550834	30
12	904888	64	40	615044	48
13	700616	42	41	535597	33
14	647470	51	42	1128802	75
15	550886	32	43	1058153	81
16	532042	34	44	585508	46
17	639512	26	45	494530	32
18	762898	47	46	438326	42
19	598966	38	47	571366	25
20	640727	45	48	804451	59
21	712921	39	49	860288	42
22	485118	28	50	447962	27
23	545347	30	51	659511	41
24	537808	37	52	795616	62
25	594556	37	53	593827	43
26	730463	46	54	630844	44
27	730883	51	55	635496	59
28	468799	36	56	475671	32

Annualization Factors

		DISCOUNT RATE																			
		1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	EXPECTED USEFUL LIFE IN YEARS	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2		1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528
3		2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106
4		3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589
5		4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991
6		5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.485	4.355	4.231	4.111	3.998	3.889	3.784	3.685	3.588	3.498	3.410	3.326
7		6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.208	5.033	4.868	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605
8		7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837
9		8.566	8.162	7.876	7.435	7.108	6.802	6.515	6.247	5.995	5.759	5.537	5.328	5.130	4.946	4.772	4.607	4.451	4.303	4.163	4.031
10		9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192
11		10.368	9.787	9.253	8.780	8.306	7.887	7.489	7.139	6.805	6.495	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.485	4.327
12		11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814	6.492	6.194	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439
13		12.134	11.348	10.636	9.985	9.394	8.853	8.358	7.904	7.487	7.103	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533
14		13.004	12.100	11.296	10.583	9.899	9.295	8.745	8.244	7.786	7.367	6.982	6.628	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611
15		13.865	12.849	11.936	11.118	10.380	9.712	9.108	8.589	8.061	7.606	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675
16		14.718	13.578	12.581	11.652	10.838	10.106	9.447	8.851	8.313	7.824	7.379	6.974	6.604	6.265	5.954	5.668	5.405	5.162	4.938	4.730
17		15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022	7.549	7.120	6.729	6.373	6.047	5.749	5.475	5.222	4.990	4.775
18		16.398	14.992	13.754	12.659	11.690	10.878	10.059	9.372	8.756	8.201	7.702	7.250	6.840	6.467	6.128	5.818	5.534	5.273	5.033	4.812
19		17.226	15.678	14.324	13.134	12.085	11.158	10.338	9.604	8.950	8.365	7.839	7.365	6.938	6.550	6.198	5.877	5.584	5.316	5.070	4.843
20		18.046	16.351	14.877	13.590	12.462	11.470	10.584	9.818	9.129	8.514	7.963	7.469	7.025	6.623	6.259	5.929	5.628	5.353	5.101	4.870
21		18.857	17.011	15.485	14.029	12.821	11.794	10.836	10.017	9.292	8.649	8.075	7.562	7.102	6.687	6.312	5.973	5.665	5.384	5.127	4.891
22		19.660	17.658	15.837	14.451	13.163	12.042	11.061	10.201	9.442	8.772	8.176	7.645	7.170	6.743	6.339	6.011	5.698	5.410	5.149	4.909
23		20.456	18.292	16.444	14.857	13.489	12.303	11.272	10.371	9.580	8.883	8.266	7.718	7.230	6.792	6.399	6.044	5.723	5.432	5.167	4.925
24		21.243	18.914	16.936	15.247	13.799	12.550	11.469	10.529	9.707	8.985	8.348	7.784	7.283	6.835	6.434	6.073	5.746	5.451	5.182	4.937
25		22.023	19.523	17.413	15.622	14.094	12.783	11.654	10.675	9.823	9.077	8.422	7.843	7.330	6.873	6.464	6.097	5.766	5.467	5.195	4.948
26		22.795	20.121	17.877	15.983	14.375	13.003	11.826	10.810	9.929	9.161	8.488	7.896	7.372	6.908	6.491	6.118	5.783	5.480	5.206	4.956
27		23.560	20.707	18.327	16.330	14.643	13.211	11.987	10.935	10.027	9.237	8.548	7.943	7.409	6.935	6.514	6.136	5.798	5.492	5.215	4.964
28		24.316	21.281	18.764	16.680	14.888	13.406	12.137	11.051	10.116	9.307	8.602	7.984	7.441	6.961	6.534	6.152	5.810	5.502	5.223	4.970
29		25.066	21.844	19.188	16.984	15.141	13.591	12.278	11.158	10.198	9.370	8.650	8.022	7.470	6.983	6.551	6.166	5.820	5.510	5.225	4.975
30		25.808	22.396	19.600	17.292	15.372	13.765	12.409	11.258	10.274	9.427	8.694	8.055	7.496	7.003	6.566	6.177	5.829	5.517	5.235	4.979

## BIOGRAPHY

Miss Kritsana Pornputtichai was born on February 14<sup>th</sup> in 1972 at Bangkok, Thailand. She finished a Bachelor of Pharmaceutical Science at Chulalongkorn University in 1995.

She has worked as a pharmacist at the Provincial Public Health Office, Chainat Province, in the central region of Thailand for 2 years. Her responsible work is about Thai Traditional Medicines and Consumer Protection. She is interested in Health Economics so she studied in this program in academic year 1997 and would like to work in this field. Her hobbies are sports , reading , and movies.

