AUTOMATED BLOOD VOLUME MEASUREMENT IN A "NORMAL" HOSPITAL POPULATION — SHORT COMMUNIQUE

By P. H. Feng, P. S. Cheah, B. Singh and Y. K. Lee

SYNOPSIS

Blood volumes of 20 "normal" hospital patients are compared with Western standards. Statistical analysis show that their blood volumes are significantly lower than their Western counterparts.

The uses of blood volume estimation and its methodology have been described in the accompanying paper. In this communique we wish to present our data on the measurement of blood volumes in "normal" patients selected from the medical unit. None of these patients had renal, cardiac or other diseases that are known to cause disturbances in blood volume. All these patients were measured in the convalescent stage of their illness or just prior to discharge. The procedures were explained to the patients and permission was obtained voluntarily. None of the female patients were pregnant although the radiation hazard to these patients and their foetuses is negligible (Bland et al, 1969).

Their blood volumes were then compared with normal standards obtained from Western countries (Nadler et al, 1962).

RESULTS AND CONCLUSION

There were no untoward effects in any of the patients tested although human albumen is known to cause allergic manifestations. Details of the patients, their calculated and predicted blood volumes and statistical analyses, are presented in Tables I and II. It is seen that the blood volumes of this group of patients is significantly lower than the Western standards. There is good correlation between the predicted blood volumes and calculated blood volumes as shown in Figs. 1 and 2 (correlation coefficient r = 0·9725 in the male group and 0·9547 in the female group). The
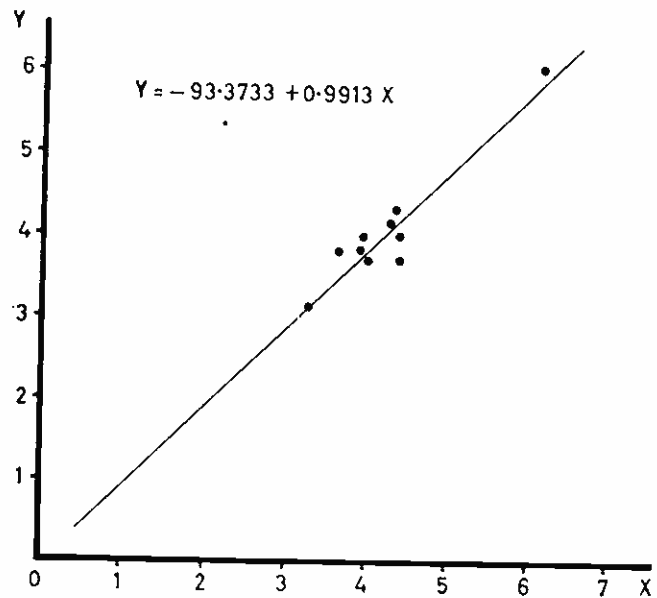
Medical Unit, Thomson Road General Hospital, Toa Payoh Rise, Singapore.

P. H. FENG, M.B., B.S., M.R.C.P.G., A.M., Consultant Physician.

P. S. CHEAH, M.B., B.S., Medical Officer.

B. SINGH, M.B., B.S., Medical Officer.

Y. K. Lee, M.D., F.R.C.P.E., M.R.C.P., LL.B., A.M., Consultant Physician and Head.

Fig. 1. Correlation between predicted blood volume (X) and calculated blood volume (Y) in male patients (correlation coefficient r = 0.9725).
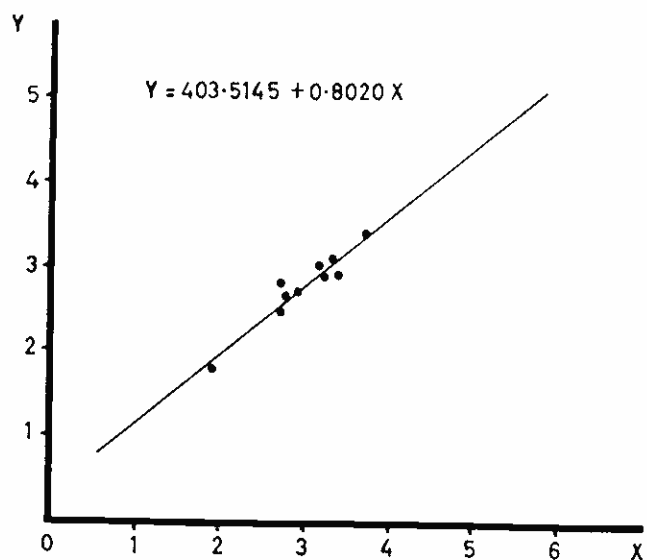
$$Y = -93·3733 + 0·9913 X$$

Fig. 2. Correlation between predicted blood volume (X) and calculated blood volume (Y) in female patients (correlation coefficient r = 0.9547).

$$Y = 403·5145 + 0·8020 X$$

TABLE I

DETAILS OF BLOOD VOLUME ANALYSIS IN MALE PATIENTS

Case No.	Age	Height (ins.)	Weight (lbs.)	Predicted Blood Volume X	Calculated Blood Volume Y	Difference (X - Y)	Diagnosis
1	44	65	145	4380	4000	380	Giddiness
2	23	66	110	3940	3980	—40	Peptic ulcer
3	22	60	101	3365	3150	215	Hysteria
4	24	64	99	3645	3800	—155	Quadriparesis
5	24	72	240	6180	6100	80	Malaria
6	34	65	137	4300	4360	—60	Giddiness
7	38	65	125	4085	3700	385	Hanging
8	23	66	133	4310	4170	140	Malaria
9	19	65	148	4450	4240	210	Periodic paralysis
10	23	67	102	3950	3800	150	Drug over-dosage

STATISTICAL

n	10	10	10
$\bar{x}$	4260·5	4130	130·5
S.D.	756·4076	771·0022	179·621 (Significant P <0·05)

ANALYSIS

The "t" Test

n = 18

"t" = 0·3821

Paired "t" = 2·297 (Significant P <0·05)

TABLE II

DETAILS OF BLOOD VOLUME ANALYSIS IN FEMALE PATIENTS

Case No.	Age	Height (ins.)	Weight (lbs.)	Predicted Blood Volume X	Calculated Blood Volume Y	Difference (X - Y)	Diagnosis
1	27	63	104	3220	2900	320	Cranial nerve palsy
2	26	60	94	2870	2700	170	Chlorax poisoning
3	31	63	111	3295	3170	125	Urethritis
4	44	60	87	2720	2800	—80	Haemoptysis
5	11	61	69	1890	1800	90	Herpes zoster
6	23	59	88	2735	2650	85	Malaria
7	23	60	86	2720	2560	160	Arthritis
8	25	65	94	3140	3000	140	Chlorax poisoning
9	59	64	136	3740	3400	340	Arthritis
10	33	60	129	3400	2900	500	Pharyngitis

STATISTICAL

n	10	10	10
$\bar{x}$	2973·0	2788·0	185·0
S.D.	508·9597	427·5979	162·344 (Highly significant P <0·01)

ANALYSIS

The "t" Test

n = 18

"t" = 0·8801

Paired "t" = 3·604 (Highly significant P <0·01)

regression lines for each group were also calculated and plotted.

ACKNOWLEDGEMENTS

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1. Bland, E. P., Docker, M. F., Crawford, J. S. and Farr, R. F.: "Radioactive Iodine Uptake by Thyroid of Breast-fed Infants after Maternal Blood Volume Measurements." Lancet, 2, 1039-1040, 1969.

2. Nadler, S. B., Hidalgo, J. U. and Block, T.: "Prediction of Blood Volume in Normal Human Adults." Surgery, 51, 224-232, 1962.