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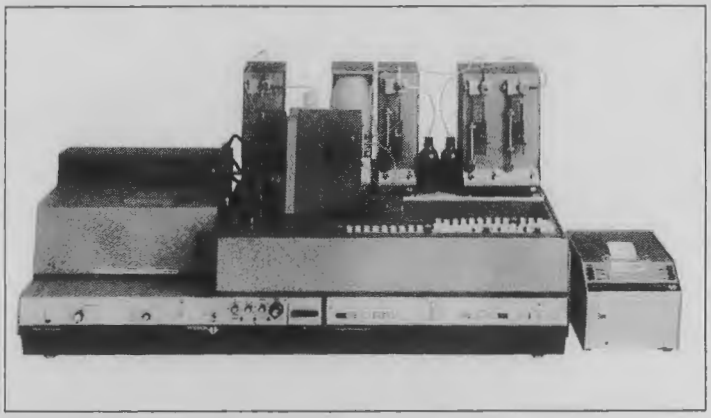

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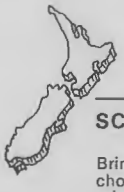

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T. H. Pullar Memorial Address

Dr J. M. Staveley, MC, OBE, FRCPE (Ed), FRCPA

May I first say that I feel very privileged to be invited to present the Pullar Memorial Address for 1976 at this Conference of the New Zealand Institute of Medical Laboratory Technology, and it is a great pleasure to be with you all here in Whangarei. Many of the members of the Institute would be too young to have any clear idea of who Thomas Henry Pullar was, so an outline of his career may be appropriate.

Dr Pullar was known universally by the nickname 'Thos' and was greatly respected throughout the country both as a man of high principles and a sound clinical pathologist. He was born in Auckland in 1907, but was educated primarily in Scotland and England. He was appointed Pathologist to the Palmerston North Hospital in 1937 and he remained in that post until deteriorating health made it necessary for him to lighten the work load. In 1963 he moved to the milder climate of Tauranga and engaged in a part-time private laboratory practice. Unhappily, this lasted only three years. He died in 1966. The period during which his great contribution to the advancement of clinical pathology and medical education was made was during the Palmerston North segment of his career. Any aspect of medical laboratory work was of importance to him, but it must be remembered that his training had been basically clinical and he was equally at home in the wards. Apart from medicine, Thos Pullar had a wide interest in current affairs, sport, and the arts: and when time allowed he indulged in his golf and fishing. He was thus an all-rounder. From my own knowledge of him I can say that he was intensely concerned and involved in the training and welfare of medical laboratory technologists. Having known Thos for a period of 27 years, I feel confident that he would have supported the proposition which I wish to put before you this morning. You could count on him to put his weight behind any programme designed to raise standards of laboratory practice.

Our proposition relates to the enhancing status of laboratory technology in the practice of medicine but before any major restructuring of laboratory staff can be considered, unity of purpose within the Institute is essential. Parochial ambitions always result in conflict of interests and division of effort, but even worse, a ready excuse for procrastination at the higher administrative levels. Satisfactory advancement of the Institute's interests will be best achieved by unity of purpose within the Institute. With this plea for a united front, I want to recommend to you the proposals put forward by Mr Roy Douglas some years ago.

The plan he advances would remove the major deficiency in the present attitude to what constitutes an appropriate qualification for the technologist. This qualification, the Part III examination, is a cul-de-sac; the end of five years study and practical work, and there is nowhere to go beyond it — unless the technologist starts again to get a degree qualification. This is where the present arrangments land the candidate; and this in the face of accelerating advances in scientific method which have diversified the demands on the technologist. Longer periods are required for his training and a greater range of subjects must be brought into the curriculum. The widening fields and the higher standards being demanded in the education of the technologist superimpose a heavy study load on to the normal day's work and this is not readily met by the day release and block course approach. You are only too familiar with the pressures and extended hours of study after a solid day's work in the laboratory. It is in relation to these aspects of the technologist's career that we find a possible answer in Mr Douglas' paper. The core of his proposal is that the basic training for a medical laboratory technologist should be a suitable Bachelor of Science degree, the university education being complemented by practical hospital laboratory experience during the extensive university vacations. The suggestion is that all technical staff joining the laboratory will spend the first year as laboratory assistants. The examination at the end of this year, together with the performance during the year, will select those who will be offered the opportunity to embark on the B.Sc. course. The options for the laboratory assistant remain as they are now.

From the Qualified Technical Assistant examination there is access to the Qualified Technical Officer and New Zealand Certificate of Science qualifications. The opportunity to earn a cadetship for the B.Sc. qualification is not restricted to the first year only, so the proposal offers considerable flexibility for the candidate. Such a programme would see a reduction in the numbers of qualified technologists in our laboratories since they will all ultimately be degree qualified. But there would be an increase in the numbers of laboratory assistants. The arrangements would thus open to the young person joining the staff the road to realising the limit of his capabilities. Beyond the basic B.Sc. there would be access to the Masters degree, and beyond to the Doctorate. Such a curriculum would lift the status of laboratory technology and some merging with the administrative and political life of clinical pathologists would be inevitable. But this could only strengthen the whole area of laboratory medicine.

There is nothing in these proposals which we can see to be inimical to the practice of private laboratories, and it would obviously be essential that hospital and private laboratories co-operate to the full in establishing such a programme.

In summary, it is suggested that the technologist as we have known him will be phased out and his place taken by a degree qualified technologist who began his career as a laboratory assistant. There is no new ground to be broken as the administrative machinery is already there—except for the division of the year between the university terms and the hospital employment in the vacations. This should not present too great a problem as the cost aspect would be largely offset by the changed balance of the laboratory assistants to the technologists.

We would all recognise that any modification of the education policy for laboratory staff which may be adopted at this time is certain to require further modification in a few years. And the role of the technologist must continue to change as automated methods expand.

The suggestions made this morning are intended to stimulate a fresh look at the technologist's role and status, recognising that there are other ways of viewing the staffing of medical laboratories; close co-operation between the Institute and the New Zealand Society of Pathologists is the keystone and the objective prompting any change must ultimately be the provision of the highest possible standard of service to the patient.

I would like to finish this with this thought. Members of this Institute are in a strong position to respond to the statement made by the Prime Minister and reported in the news last Tuesday. He said that the cost of maintaining the Health Services were outstripping the national economic growth rate. Regardless of which political party is the government this fact must dictate what is possible and what is not in the expansion of the laboratory services.

If Rosemary Biggs and her team at the Churchill Hospital in Oxford can produce the quality of work they did in blood coagulation during the 1950s in a Nissen hut, with barely adequate equipment, it is clear that the priorities are brains first, equipment second and housing a very poor last! These priorities are basic in my call to the Institute to examine critically the definition of a qualified medical laboratory technologist and his status in medical science.

Correspondence

Sir,—Past forums on the subject of education have only too often served as an opportunity for vociferous table bashing resulting in the release of tensions for individual speakers, and little else. The education forum for this year's conference was a very different affair. One could not help but be impressed by the maturity and uniformity with which nearly all speakers from the floor expressed a very definite demand for proper access to University qualification at a reasonable level and by right. It was made clear that many British and Australian Universities accept the Fellowship of their respective technical institutions as prequalification for an M.Sc. degree. Surely, Sir, members must demand that the Council take

full note of this forum and proceed immediately and energetically to find a formula which will allow medical laboratory technologists of this country to obtain University qualification if they have the ability and the desire.

R. DOUGLAS.
N.Z. Blood Transfusion Services.
August, 1976.

I feel it is incumbent on me to reiterate the policy of the Council on Education. Several educational schemes including that submitted by Mr Douglas were considered over a long period. Practical considerations weighed heavily, particularly the need to keep the laboratory service running which means the structure which has evolved, intact. The four year diploma course was the final compromise accepted and with the sanction of the Medical Technologists Board, work on the curricula is proceeding. The initial discussions on this type of course typified in the Pullar Address of 1974, November Journal, envisaged the possibility of transfer to a University course at a suitable stage. The Council endorses the principle of an open-ended educational structure for all classes of laboratory workers. Prerequisites are however frequently outside Council's jurisdiction. As most members are aware there is a degree route available to medical laboratory technologists. A B.Sc. (Hons) degree in paramedical science may be obtained at Massey University and indeed the setting up of this qualification was due in no small measure to the good offices and persistence of Mr H. E. Hutchings, a previous president of the Institute and a current member of the Medical Technologists Board. Some concessions may be granted on the basis of the NZCS and COP qualifications. It is possible to assert that medical laboratory technologists may obtain university qualification if they have the ability and desire.—**Editor.**

Lecithin to Sphingomyelin Ratio— A Comparison of Two Methods of Assessment

M. Legge

Perinatal Biochemisery Unit, Pathology Services, Christchurch Women's Hospital, Christchurch
Received for publication, March 1976

Summary

Two methods of assessing Lecithin to Sphingomyelin (L/S) ratios were examined. It was found that the Lecithin Sphingomyelin Area Ratio (LSAR) was superior to densitometry, although no statistical significance was shown between the results obtained with the two methods.

Introduction

Avery and Mead[1] in 1959 confirmed previous work [2, 6] that a surface active material was deficient in the lungs of infants dying from hyaline membrane disease. Gluck et al[4] demonstrated that the active components in the surface active material were the neutral phopholipids, mainly lecithin, which increased with gestation. Later work by Gluck et al[5] produced a relatively simple assay to determine the optimum time for obstetric intervention without respiratory distress developing in the newborn.

A number of variations of the L/S ratio methods have subsequently been presented in the literature, however, very little has been presented on the correlation between LSAR and densitometry as methods of assessing L/S ratios. A comparison has been carried out of the two methods of assessing the L/S ratio.

Materials and Methods

Amniotic fluid was obtained transabdominally from 26 patients for assessment of fetal lung maturity. None of the 26 patients had diabetes, Rhesus incompatibility or severe toxemia. The specimens were free from blood and meconium and were centrifuged within 15 minutes of amniocentesis to remove cellular debris. The L/S ratios were carried out according to the method of Gluck and Kulovich modified by Dohrman.[3] Densitometry was performed on a Helena Quick Quart Scan. The LSAR was measured (length and width of each spot) using a pair of dividers and a vernier

scale. The plates were read using transmitted light.

All patients with mature L/S ratios were delivered within 48 hours of testing.

The Snedecors Ratio test ('F' test) was used to compare LSAR with densitometry and the Bravais-Pearson correlation co-efficient was also determined.

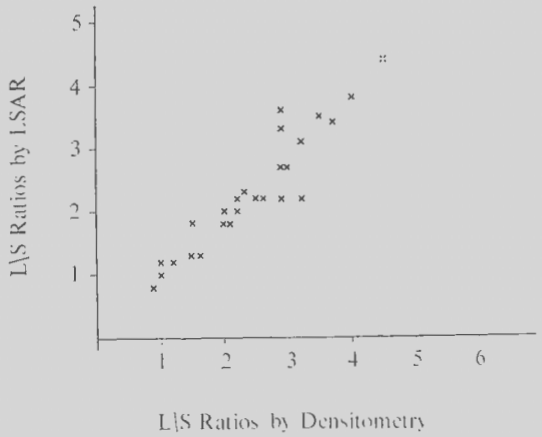

Figure 1: Scattergraph comparing L/S ratios using LSAR and densitometry.

Table 1

Densitometry (x)	LSAR (y)
1.0	1.0
3.2	2.2
3.5	3.5
1.5	1.3
2.0	1.8
2.0	1.8
1.5	1.8
2.9	3.3
2.9	3.6
1.2	1.2
2.9	2.2
2.3	2.3
2.5	2.2
2.6	2.2
2.2	2.2
2.0	2.0
2.2	2.0
2.9	2.7
0.8	0.9
1.6	1.3
1.0	1.2
2.8	2.6
3.2	3.1
2.2	2.5
2.0	1.9
2.3	2.2

Table 1: Comparison of L/S ratios using LSAR and densitometry.

Results

No significant difference was found between the LSAR and densitometry results ($F = 1.027$, $p<0.05$). The Bravais-Pearson correlation coefficient was $r = 0.896$. A scattergraph comparing the LSAR and densitometry results is shown in Figure 1.

None of the infants who were delivered with mature L/S ratios according to LSAR and densitometry developed respiratory distress syndrome.

Discussion

The use of LSAR offers a technique which is cheap and simple to use. It requires no densitometer and provides results which are comparable to those provided by densitometry. In some ways it is felt that the LSAR is superior to densitometry. Occasionally poor separation is found and the densitometer has difficulty in differentiating the individual spots. However, by assessing the spots visually, marking their boundaries and using LSAR; results consistent with the condition of the neonate are obtained.

A common contaminant of sphingomyelin in L/S ratio studies is lysophosphatidylcholine[7] which runs closely behind sphingomyelin and can produce false immature L/S ratios, particularly when using densitometry. By using LSAR the identification of lysophosphatidylcholine is made visually before assessment of the L/S ratio, thereby excluding the possibility of lysophosphatidylcholine contamination.

When monitoring high risk pregnancies, such as Rhesus incompatibility, diabetes and latent diabetes, the LSAR offers distinct advantages over visual assessment. It is possible to accurately follow the increasing lecithin concentration in the liquor and provide the

obstetrician with definitive results each time. This enables the optimal time for delivery to be decided with little or no neonatal compromise.

The LSAR technique is now in routine use in this laboratory and since its inception no discrepancies between the result and neonatal condition have been found.

Acknowledgment

I am grateful to Dr R. W. Carrell for reading this paper.

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Kinetic Creatine Kinase Kits

D. Dohrman

Department of Clinical Biochemistry, Christchurch Hospital

Received for publication, July 1976

Summary

Six Spectrophotometric Creatine Kinase (CK) Kits were compared using the Vitatron A.K.E.S.

Analyses were performed according to the Kits instructions with regard to analysis temperature, sample volume, and substrate. A comparison of the Kits was also made under preselected conditions of temperature (37°), sample volume (20μl), and substrate volume (500μl).

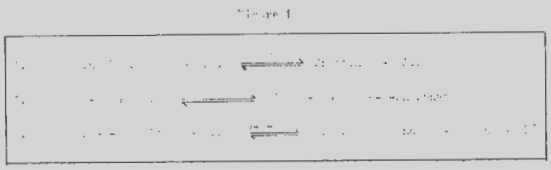
The Kits were evaluated with different manufacturers' control sera for within batch precision and accuracy. Linearity was verified using a plasma specimen with an elevated CK activity.

Introduction

Creatine kinase (creatine phosphotransferase 2. 7. 3. 2) catalyses the reversible transfer of the terminal phosphate group of ATP with the formation of ADP and creatine phosphate.

The kinetic methods in clinical use for CK determination are based on the procedure developed by Oliver[1] and modified by Rosalki[2] which uses the reverse reaction of CK coupled to an indicator reaction as in fig 1.

Figure 1



The reduction of NADP per unit of time is a measure of the CK activity and may be measured spectrophotometrically at 340 nm.

The reaction shows a sigmoid curve with a 4-5 m lag phase[3].

Materials and Methods

The samples were processed by a Vitatron A.K.E.S. The instrument takes a sample of plasma, dilutes it with substrate, preincubates for approximately 5 m at the selected temperature, calculates the activity and prints out the results in IU/l at the rate of approximately 100 tests per hour.

A sample chain of 45 tests were made up in the following sequence:

Cup No. 1:	Distilled H_2O
Cup No. 2-5, 10, 15, 20, 25, 30, 35, 40, 44, 45:	Beef Pool Precision Control
Cup No. 6-27:	Controls
Cup No. 28, 29, 41-43:	Patient specimens
Cup No. 31-39:	Dilutions

Table I

NAME	VOLUMES IN PACKAGE	CONTROLS
S.K.I. Bulk Reagent (Eskalab)	5 x 20 ml	Eskalab Control
Boehringer (15790)	20 x 2.5 ml	Precinorm-E
Merck-I-Test (3381)	12 x 3.0 ml	
Dade UV 10 (B5329-10)	10 x 10 ml	Dade Monitrol
Calbiochem Stat Pak (869214)	10 x 15.5 ml	Caltrol
J.T.B. (3108 and 3107)	10 x 22 ml	
		Hyland Multienzym
		Hyland Metrix

The chain was put through the instrument twice.

Table II

MANUFACTURERS	25°C	4°C
S.K.I.	12 hours	48 hours
BOEHRINGER	5 hours	24 hours
MERCK	5 hours	24 hours
DADE	2 hours	4 hours
CALBIOCHEM	2 hours	48 hours
J. T. BAKER	– hours	30 hours

The manufacturers' quoted stabilities for the reconstituted reagents are shown in Table II.

All the kits gave considerably lower results using reagents made up from the previous day. Therefore any reagent left over cannot be used for assays on the following day.

The reagent composition and the sample to substrate ratios of the six kits were compared in Table III to see if any specific difference in the composition influenced the analyses in any way. Also included in Table III are the constituents as used in the method of Rosalki[2].

Table III

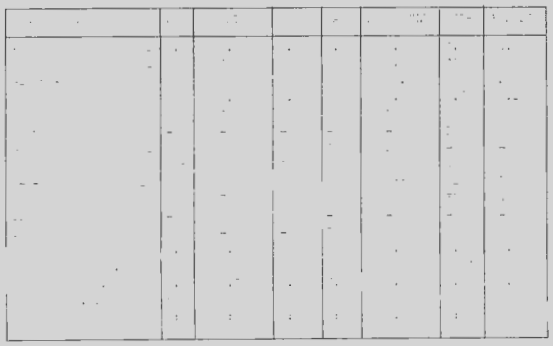


Table IV VALUES OF POOL IN IU/l

Cup No.	SKI		Boehringer		Merck		Dade		Calbiochem		C.T. Baker	
	A	B	A	B	A	B	A	B	A	B	A	B
2	[illegible]		21	75	27	132	132	47	47	37	33	
3	[illegible]		[illegible]		25	130	130	52	57	30	29	
4	[illegible]		25	74	27	13[illegible]	.28	53	35	37	34	
5	[illegible]		27	82	19	131	130	53	53	39	39	
10	[illegible]		19	67	24	11[illegible]	121	61	45	38	30	
15	[illegible]		[illegible]	63	19	107	121	55	45	42	37	
20	[illegible]		27	70	30	117	118	56	72	40	54	
25	[illegible]		25	71	25	114	121	53	74	39	53	
30	110	92	26	67	23	115	119	49	105	41	90	
40	[illegible]		27	65	23	101	125	56	91	43	80	
45	[illegible]		23	70	26	105	130	51	93	39	79	
	105	87	24	67	26	120	125	52	81	39	61	
SD	[illegible]	6.5	2.7	3.6	3.1	7.0	6.2	3.7	[illegible]	1.6	3.7	
CV	7.6	7.6	17.9	5.7	11.8	6.1	4.9	6.9	10.9	4.0	4.0	

There was insufficient Merck kit to be run at 37°.

Table V

	S.K.I.	Boehringer	Dade	Calbiochem	J.T.B.
pool	93	68	126	91	91
patient specs	282	250	344	290	304

Table VI DUPLICATES WITHIN RUN - CPK STUDY

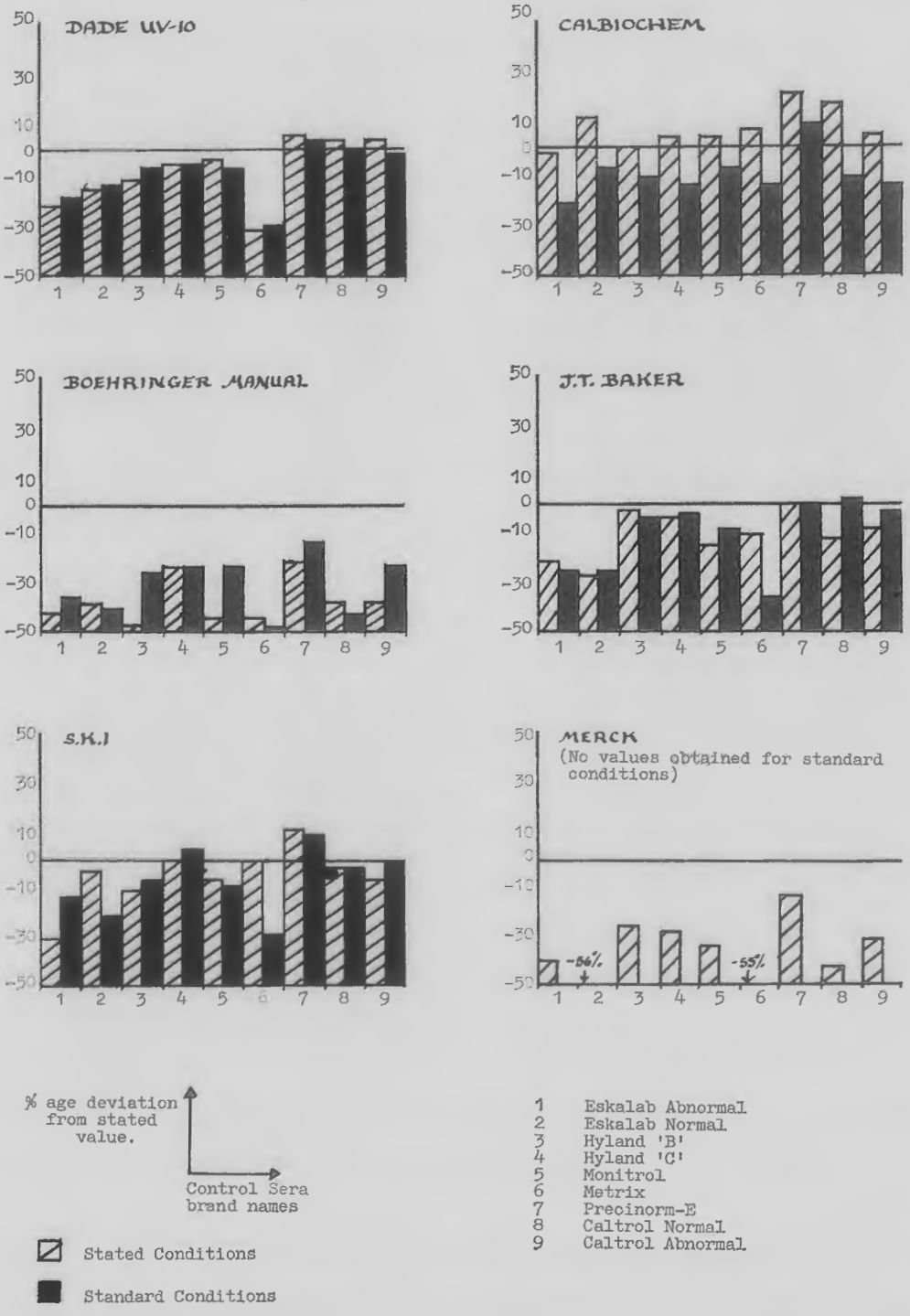
CUP	SKI		BOEHRINGER		MERCK		DADE		CALBIOCHEM		JTB	
	A	B	a	b	A	B	a	b	A	b	A	b
6 Askalab N	52	53	16	37	–		53	61	29	60	21	46
27	77	45	15	41	12		58	51	27	62	21	51
7 Hyland N	242	328	60	212	107		246	300	149	283	134	300
26	300	270	88	232	102		309	304	154	271	140	310
8 Caltrol N	–	63	10	35	16		70	62	34	68	21	63
24	62	–	16	44	–		62	65	34	74	25	66
9 Precinorm A	266	264	83	208	90		247	253	124	250	103	238
23	256	244	82	207	86		247	246	12[illegible]	251	106	255
11 Metrix	–	55	16	35	15		47	47	27	65	21	48
22	–	53	15	37	14		55	55	26	60	23	45
12 Monitrol	330	386	66	281	108		346	346	170	358	137	330
21	367	299	95	280	112		366	347	18	326	141	350
13 Askalab A	424	475	141	354	142		422	447	224	428	189	368
19	324	438	142	351	144		448	448	228	421	187	400
14 Hyland A	628	684	172	442	196		556	576	282	501	249	550
18	554	557	174	456	191		566	555	294	510	259	562
16 Caltrol A	558	512	140	392	156		551	512	253	474	210	504
17	382	479	144	404	153		528	504	254	473	196	507
S.D. OF PAIRS	60.5	43.3	1.3	7.0	2.6		17.6	6.4	5.0	8.7	4.6	5.8

Results

Table IV shows the values in IU/1 for the beef pool which was used as the precision control. This was in cups 2-5, 10, 15, 20, 25, 30, 40, 45. Column A shows the results obtained using the conditions specified by the manufacturers and column B using pre-selected conditions.

Most of the kits showed a smaller C.V. when run at 37°C and using standard sample to substrate ratio of 1:25. It was of interest to note that the SKI kit, which normally runs at 37° with a sample to substrate ratio of 1:60 (twice that of any other kit), showed a tendency to give low results, with a mean loss of 30 IU, when run with a sample to substrate ratio of 1:25.

Figure 2


DADE UV-10
CALBIOCHEM
BOEHRINGER MANUAL
J.T. BAKER
S.K.I
MERCK
(No values obtained for standard conditions)
-86%
-55%
50
30
10
0
-10
-30
-50
1 2 3 4 5 6 7 8 9
% age deviation from stated value.
Control Sera brand names
Stated Conditions
Standard Conditions
1 Eskalab Abnormal
2 Eskalab Normal
3 Hyland 'B'
4 Hyland 'C'
5 Monitrol
6 Metrix
7 Precinorm-E
8 Caltrol Normal
9 Caltrol Abnormal

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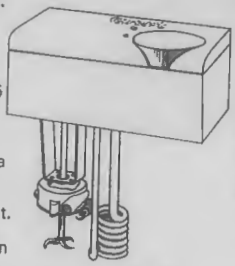

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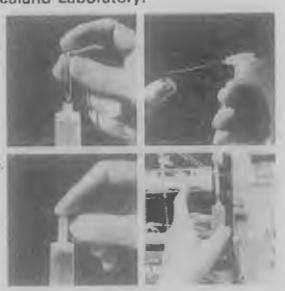

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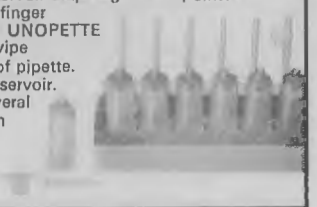

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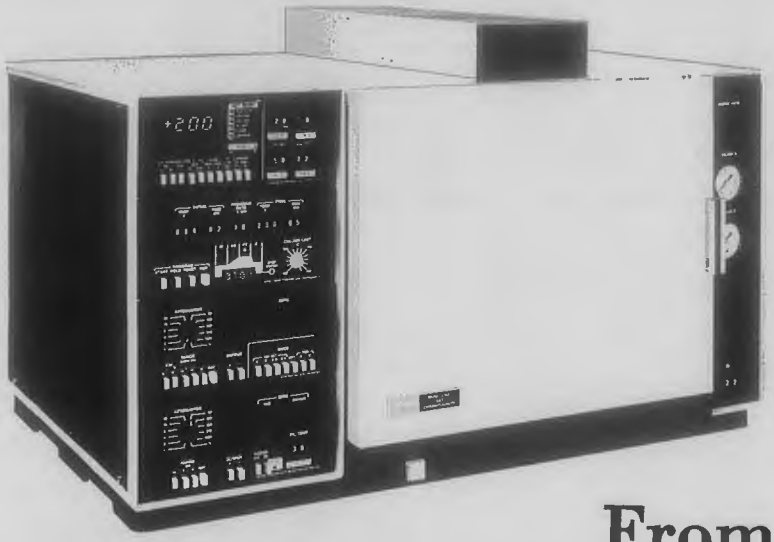

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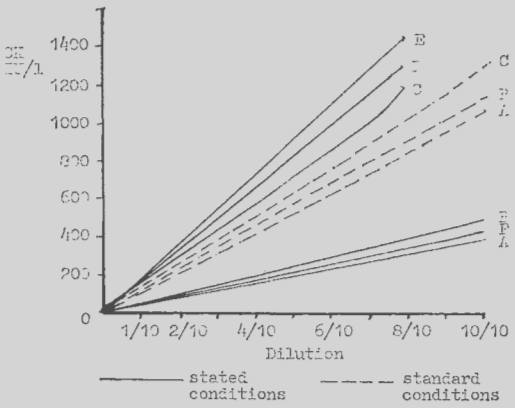
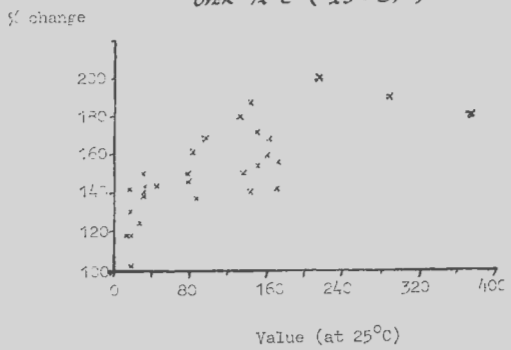
Figure 3
SERIAL DILUTIONS OF CPK



A Boehringer D Calbiochem
B J.T. Baker E Dade
C S.K.I. F Merck

Figure 4
BOEHRINGER CPK LEVELS VS % CHANGE OVER 12°C (25°-37°)



The table also demonstrates that although analyses were performed with the different kits at 37°C and a sample to substrate ratio of 1:25, the results varied greatly.

In Table V are the means of values in IU/1 obtained with the various kits at 37°C.

The values obtained with Dade kits were much higher than most kits, and Boehringer values were much lower.

Nine commercial controls were duplicated throughout the run. Table VI shows the SDs of the pairs. The reason for the high SD (60.5) given by the SKI kit in column A is the use of a 1:60 sample to substrate ratio (as stated by SKI) which uses only 5μl of sample, although even in column B (under pre-selected conditions) a high SD resulted. The Boehringer kit showed a very close SD of duplicates of only 1.3.

The block diagrams in Figure 2 show % deviation from stated value along the vertical axes and the control sera along the horizontal axes.

Precinorm E is the control which gave the closest results to the stated value with all kits.

In most cases there was no loss of accuracy when changing from the conditions stated by the manufacturer to pre-selected conditions except with the Calbiochem kit which gave an average 15-20% loss. Under the manufacturers stated conditions Calbiochem kits gave the most accurate answers according to the stated values on the controls. Boehringer kits gave low results on all the control sera. There was insufficient reagent in the Merck kit to repeat the assays under preselected conditions.

Dilution Effect

A specimen with a high level of CK activity (approx 1500 IU/1) was analysed with each kit at the following dilutions: 1:20, 1:10, 1:5, 2:5, 3:5, 4:5 and undiluted. The dilutions were made with distilled water. The results were linear over the range tested with all the kits, as is shown in Figure 3.

Temperature Conversions

The manufacturers' instructions with regard to running the kits at different temperatures, were:

SKI	—	7% per °C
JTB	—	only 25°C stated
Calbiochem	—	8% per °C
Merck	—	only 25°C stated
Dade	—	25°C or 37°C, but no conversion factor given. (Referred to Rosalki's paper.)

All the kits were assayed under preselected conditions at both 25°C and 37°C and we found the temperature conversions to be widely inaccurate. The percentage change differed

from specimen to specimen and also differed according to the level of CK.

Figure 4 shows the graph of the percent change over 12°C (25°C-37°C) for the J. T. Baker kitset. The change varied from 135% to 190% at a level of 160 IU/l.

Conclusion

In the within batch precision study the Boehringer kit was clearly the best, with a standard deviation of duplicates of 1.3. The large standard deviation of duplicates obtained with the SKI kit did improve, with the use of more sample, from 60.5 to 43.3 We originally thought that using only 5 μl of sample might have caused such a high SD of duplicates. Long term precision has not been investigated.

The Calbiochem kit showed a marked loss of accuracy when the manufacturer's specified conditions were not adhered to. It was the only kit which behaved in this manner.

It was shown clearly that in changing from one manufacturer's kit to another there was a possibility of obtaining widely differing results. For example, when changing from Dade to Boehringer kits the CK values would drop by a half.

The other important aspect demonstrated was that poor results can be expected when the kits are run at one temperature, and the results corrected to another.

Acknowledgments

The following kits were supplied free by the listed manufacturers:

SKI—Smith Biolab
JTB—Meddic DDS
Merck—Townsend and Mercer
Calbiochem—Calbiochem
Boehringer—Harrison and Crossfields
Dade—McGaw Ethicals

Thanks to Mrs A. Rofe, Q.T.A., for help in running the analyses.

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Amniotic Fluid Embolism Induced Disseminated Intravascular Coagulation

Lynette Giles
Laboratory, Public Hospital, Nelson
Student Essay Award, 1976

Introduction

Diffuse intravascular coagulation (D.I.C.) is a haemorrhagic disorder resulting in consumption of clotting factors and platelets causing a severe bleeding tendency. This diffuse intravascular coagulation may be as a result of either entry into the bloodstream of tissue factors, or extensive damage to the endothelial system. This results in a depletion of clotting factors, I, II, V, VIII and platelets, leaving an incoagulable fluid and therefore severe bleeding results. This massive over coagulation may also activate the fibrinolytic system causing an increase in fibrin, fibrin monomers and split products, which have an anticoagulant activity and so enhance the haemorrhage.[3]

This condition can be acute as in obstetrical accidents, for example, abruptio placentae, amniotic fluid embolism and abortion. Also acute in surgery (heart and lung) haemolytic transfusion reaction, septicaemia, pulmonary embolism, snake bite and hypersensitivity reactions. A subacute or chronic form of this condition may be seen in carcinoma, leukaemia, and foetal death in utero.[2]

In amniotic fluid embolism, profound shock occurs during labour with cough, cyanosis and violent uterine contractions.[1] If the initial shock and respiratory distress are overcome, haemorrhagic complications are common. These may take the form of local uterine bleed-

ing and/or generalised bleeding; that is, haematuria, gastrointestinal bleeds, haematoma, ecchymosis and bleeding from drip and venepuncture sites.

Patients History and Clinical Notes

Mrs W., aged 41, gravida 15 para 11 was admitted to hospital 37 weeks pregnant, for foetal distress and delayed labour. Labour was postponed until full term, induction beginning in the morning of July 18, with a Syntocinon drip. Three or four hours after commencing the drip Mrs W. was having good contractions until it was noticed that the membranes had ruptured, the Syntocinon drip was removed immediately. Within half an hour of removing the drip the uterus was in continuous spasm with strong to severe contractions. Mrs W. was now very distressed, therefore a Caesarian section was performed. After delivery of a healthy infant haemostasis was unable to be achieved, a hysterectomy having then to be performed. Massive oozing of blood continued despite suturing and packing. Emergency whole blood was sent for and crossmatching of more units was ordered, however it was noticed by the Bloodbank staff that the blood failed to clot. The transfusion commenced and it was noticed that Mrs W's drip site was also bleeding. Blood was then sent to the laboratory for coagulation studies at 4 p.m.

Laboratory Tests and Results

The initial screen in this laboratory for investigation of a D.I.C. includes a prothrombin time, Activated Partial Thromboplastin Time (A.P.T.T.), Thrombin Clotting Time (T.C.T.), platelet count and film estimate, fibrinogen assay and a Factor VIII assay.

Mrs W's results were as follows. Normal values for this laboratory also shown.

	Mrs W.	*Normal*
Platelet Count	152 x 10^9/l	150-400 x 10^9/l
Prothrobin Time	22.5 s	11-15 s
A.P.T.T.	50.0 s	<40 s
T.C.T.	17.0 s	<10 s
Fibrinogen assay	1.0 g/l	1.5-4.0 g/l
Factor VIII assay	45%	50-200%

From these results and the patient's clinical state it was diagnosed that Mrs W. was a mild case of D.I.C. caused by the introduction into the maternal bloodstream of amniotic fluid during the severe tonic uterine contractions.

Treatment

The principles of treatment are:

1. Elimination of the precipitating factor.
2. Replacement of coagulation factors and platelets.
3. Inhibition of clotting process with heparin.

With Mrs W. having had a hysterectomy performed, the causative agent was removed and with correct supportive treatment the released amniotic fluid was self limiting. This supportive treatment involved replacement of body fluids and electrolytes and frequent determination of haematological and biochemical parameters.[4]

Stored blood is deficient in coagulation factors and platelets, therefore fresh blood was necessary to replace the factors. If thrombocytopenia was severe, platelet rich plasma should have been given. Fibrinogen replacement is important if bleeding is severe and there is a delay in obtaining fresh blood.

Inhibition of the clotting process with heparin, the usual treatment in continued bleeding despite adequate replacement therapy, was not necessary with Mrs W. Neither was treatment of fibrinolysis with epsilon amino caproic acid (E.A.C.A.) considered necessary.

At 7 p.m. Mrs W's coagulation studies were repeated along with the estimation of fibrin degradation products, a test for the amount of fibrinolysis occuring:

The results were:
Platelets: 115 x 10^9/l
Prothrombin: 17.0 s
T.C.T.: 8.0 s
Fibrinogen: 1.85 g/l
Fibrin degradation products: >40μg/ml
(Normal: 2.1-7.7 μg/ml)

From the above tests it can be seen that the fibrinogen level was now within normal limits, however, the platelets were reduced, but as fresh blood was now available platelets and deficient factors would be restored to normal levels. The following day the same coagulation tests were performed and all had returned to normal except platelets. These had reached their normal numbers by the third day after the D.I.C. The administration of platelet rich plasma or platelet concentrate would have hastened their return to normal.

Conclusion

The acute form of D.I.C. is characterised by explosiveness, and severity of symptoms and is usually life threatening, therefore it is essential to make a rapid diagnosis and investigation so that treatment can begin as soon as possible. If the laboratory diagnosis had been in doubt, a Euglobulin clot lysis time and fibrin plate techniques and plasminogen levels could have been done to rule out primary pathological fibrinolysis.

Following successful treatment of the bleeding abnormality the patient made a good recovery and was discharged from hospital fourteen days later.

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3. Kennedy, J., *Laboratory Investigation of Hemostasis,* 1973, Dade Monograph, Miami, 15.
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Quality Control in Blood Gas Measurement

I. D. Breed, ANZIMLT, and C. W. Small, MSc, PhD, MNZIC, RMedT,
Chemical Pathology Department, Green Lane Hospital.

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Summary

The Quality Control of Blood Gas determinations using the "Blood G.A.S. Control" manufactured by General Diagnostics Division of Warner Lambert Ltd., will be discussed. Data was obtained using a Radiometer ABL 1 and a Corning E.E.L. 165. This data is reported in relation to results obtained with other standard procedures over a period of four to five months.

Introduction

Quality control of blood gas analysis has not progressed as rapidly as quality control in other sections of the Chemical Pathology Department. The maintenance of adequate standards of work has depended to a significant degree on the technical skill and expertise of the competent worker who can recognise malfunctioning electrodes on manual instruments by slower response times and drifting results. Modern automatic instrumentation has removed the variation due to operator technique, Breed (1976)[1] making Blood Gas estimations a relatively easy job requiring less skill and the control exercised by the experienced analyst has to some extent been lost.

The classical method for checking the accuracy of blood gas electrodes is tonometry, but this is subject to certain limitations, Severinghaus *et al* (1971)[4] and is very dependent on operator skill for reproducible results. The use of air saturated water has been used as an alternative for the control of pO_2, but this does not provide adequate pH or pCO_2 control. Other tonometric techniques have also been described using a bicarbonate-chloride solution, Noonan *et al* (1974)[2] or a phosphate-bicarbonate-chloride glycerol mixture, Veefkind *et al* (1974)[5] for the control of pH, pCO_2, and pO_2. These techniques are not suitable for a laboratory lacking adequate expertise or with a limited number of requests for Blood Gas analysis.

It had been hoped that the Acid-Base Control manufactured by the Warner Lambert Company would provide an adequate commercially available control. This material had to be stored at 4°C and reconstituted before use. The reconstituted material is stable for a week if stored anaerobically at 4°C, Sautner *et al* (1973)[3]. This provided a control for pH and pCO_2 only. Variations from the target values for pH and pCO_2 could sometimes be attributed to inaccurate reconstitution of the materials which has to be considered as another source of error. The new Blood G.A.S. (Gas Analyser System) Control also manufactured by the Warner Lambert Company has the potential of providing instant ready to use controls for pH, pCO_2, and pO_2. It is the purpose of this paper to evaluate the potential of this material for the routine Quality Control of blood gas determinations.

Materials and Methods

(1) INSTRUMENTATION

Two types of instrument were used to assess this material.

(a) A Radiometer ABL 1 — fully automated blood gas equipment which initiates its own calibration and adjustment of values on self-generated calibrating solutions with known gas tension.

(b) A Corning E.E.L. Model 165 — a manual instrument. The gas electrodes were calibrated on analysed gas mixtures of 4 percent CO_2 in air and 8 percent CO_2 in Nitrogen using normal calibration procedure. The pH electrode was calibrated on buffers of pH 7.382 and pH 6.838 supplied by the manufacturer.

(2) CONTROL MATERIAL

The Blood G.A.S. control (Cat. No. CO194 — Lot No. 4K011) was obtained from Warner Lambert N.Z. Limited. This material is supplied in sets of three vials each vial having a different level of pO_2, pCO_2 and pH. The three controls are packed in a ready-to-use liquid form each in a single analysis (2 ml) vial with a vial of each level in a disposable tray. There are ten trays to each box. This material is stored at room temperature (25-35°C). Each control represents a different physiological condition.

LEVEL I: *Acidosis.* This control has decreased pH and pCO_2 values similar to that of a patient with metabolic acidosis and an elevated pO_2 consistent with oxygen therapy.

LEVEL II: *Normal.* The values of this control are typical of a normal person.

LEVEL III: *Alkalosis.* The increased pH and pCO_2 values on this control are consistent with a metabolic alkalosis and a decreased pO_2 representative of hyperventilation. The assigned values of each of these levels are based on multiple determinations performed in the Quality Control laboratory of General Diagnostics using instrumentation representative of that currently in use in Medical Laboratories.

(3) ANALYSIS

The Blood G.A.S. Control was routinely analysed on a daily basis. A vial was shaken for ten seconds to equilibrate the entrapped gases, opened and the contents transferred to the instrument.

(a) Automated Instrument — Immediately after opening a 1 ml tuberculin syringe was filled from the vial and the material transferred to the instrument. Random times were selected for the analysis of the material as this instrument is nominally "ready" for analysis at any time.

(b) Manual Instrument — The control material was aspirated directly from the vial to the electrode chamber using the standard micro sampling attachment. Analysis was carried out each morning after the initial calibration.

Results and Discussion

The data obtained from both instruments is shown in Tables 1-3 in relation to the manufacturers' assigned values.

Tables showing means and standard deviations of results obtained on various instruments.

Table I - values for pH, Table II - values for pCO_2, Table III. - values for pO_2.

pH

TABLE I	LEVEL I	LEVEL II	LEVEL III
Assigned value Range	7.10 ±.02	7.40 ± .02	7.59 ±.02
Automatic instrument Std. Dev.	7.10 ±.01	7.39 ±.01	7.58 ±.01
Manual Instrument Std.Dev.	7.07 ±.02	7.36 ±.02	7.56 ±.02

pCO_2 - mm Hg

TABLE II	LEVEL I	LEVEL II	LEVEL III
Assigned value Range	37 ± 2	41 ± 3	56 ± 5
Automatic instrument Std. Dev.	37 ± 1	39 ± 2	53 ± 3
Manual instrument Std.Dev.	36 ± 1	40 ± 2	54 ± 2

pO_2 - mm Hg

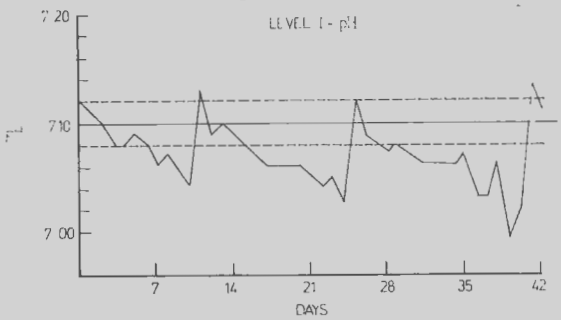
TABLE III	LEVEL I	LEVEL II	LEVEL III
Assigned value Range	145 ± 10	98 ± 5	57 ± 5
Automatic instrument Std. Dev.	145 ± 5	103 ± 4	62 ± 4
Manual Instrument Std. Dev.	144 ± 8	106 ± 7	69 ± 7

The means and standards deviations were calculated using 80 sets of results for the automated procedure and 40 for the manual.

(1) pH

The results obtained on the Automated Instrument compare favourably with the manufacturers' assigned values, while those obtained on the manual instrument

yield a significantly lower mean. Closer examination of the manual results revealed a downward trend in results with a sudden jump after 10-14 days, most obvious in the pH of Level I.



Variation of pH obtained on Level I Blood G.A.S. Control over a period of 42 days using the Corning E.E.L. system.

Investigations showed that this jump coincided with a change of 6.838 buffer and/or the Potassium Chloride solution in the reference electrode.

(2) pCO_2

These results compare favourably with those assigned by the manufacturers.

(3) pO_2

Level I exhibits good correlation with the values assigned by the manufacturer, but Levels II and III show some difference. The higher values on these samples were still obtained after replacing either the electrode or its membrane. Random analysis of these controls by another instrument (Radiometer BMS 3) also gives elevated results for Levels II and III.

In addition, the calibration of the ABL 1 was checked out using tonometry with blood equilibrated with a gas containing 4 percent CO_2 in air. The results obtained showed no fault in the electrode. Equilibration of control material with room air cannot be considered as a cause of this elevation as time delays were minimal.

Values agreeing with the manufacturers assigned values have been obtained on a different batch of control material. It was therefore concluded that the true pO_2 content of this batch of control material differed significantly from that assigned by the manufacturer. Despite this discrepancy from the assigned value, malfunctions of the electrode were evident by incorrect results obtained on all three levels.

STABILITY OF REAGENT

Throughout the 4 months this material has been used it has been stored at room temperature (20°C) and no change in the material has been observed.

Once opened the manufacturers state the controls should be analysed within 30 seconds. No significant change in results has been observed leaving the material open for two minutes before analysis, but after this time the parameters on Levels II and III tend to equilibrate with room air.

Conclusion

This control has proven itself to be worthwhile. It has indicated a problem with pH on the manual instrument and was of assistance in rectifying this problem. A fault in the pO_2 electrode was found in the automatic instrument even though the instrument was within the acceptable calibration limits of the manufacturer. This was detected when all controls showed significantly higher values than the mean pO_2 level. The readings returned to the expected values following an electrode membrane change.

This material has also been of value when commissioning new equipment. It can be used to check out response times and linearity of electrodes.

Although Blood G.A.S. control may be considered expensive, it provides consistent results when used by different technicians for pH, pCO_2 and pO_2, and is available for immediately use. It is a very worthwhile addition to any Laboratory, performing Blood Gas estimations, for the validation of instrument calibration and evaluation of overall performance.

Acknowledgments

We are most grateful for the co-operation received from Mr M. Killip and his staff, Laboratory, National Women's Hospital, and the staff of the Chemical Pathology Department, Green Lane Hospital.

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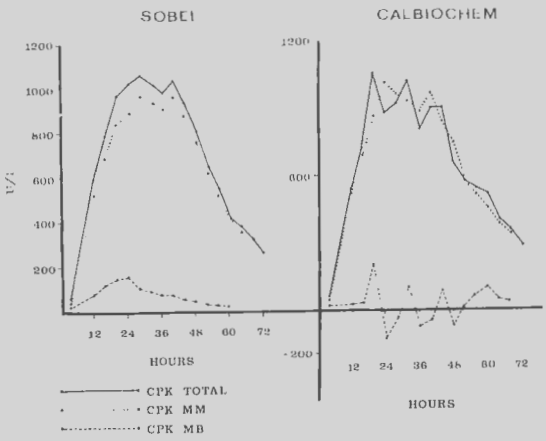
Technical Communication

Creatine Kinase Isoenzymes

Several methods, Rao *et al* (1975)[1], Henry *et al* (1975)[2], Somer *et al* (1972)[3], have been proposed for the determination of the isoenzymes of creatine kinase (E.C.2.7.3.2.). One of these, Rao *et al* (1975)[1], has been used as the basis of a reagent set marketed by Calbiochem. To evaluate the potential of this kit for the determination of the activity of the MB isoenzyme, a comparison was made with the method of Sobel, Henry *et al* (1975)[2].

Serial determinations of the activity of the total creatine kinase, the MM and the MB isoenzymes were made on blood specimens obtained at four-hourly intervals on two patients following confirmed myocardial infarctions. The serum was separated from the blood samples within twenty minutes of collection and stored at 4°C, for no longer than 48 hours, prior to analysis. Enzymes were assayed both by the Calbiochem CPK/MB procedure and the method of Sobel. The latter method employs ion exchange glass beads for the separation of the isoenzymes. The method of Sobel had previously been shown to correlate well with electrophoretic separation of the isoenzymes on cellulose acetate.



Results of total and isoenzyme determinations obtained by the methods of Sobel and Calbiochem on a patient following myocardial infarction.

The results of isoenzyme determinations on one patient are shown in the figure. Similar data was obtained with a second patient. It is apparent that the kitset procedure was not measuring the activity of the MB isoenzyme.

The Calbiochem kit is designed to measure total creatine kinase activity—the activity found in the presence of a sulphydryl activator, and also the MM fraction—the activity in the absence of activator. Creatine kinase is a sulphydryl enzyme, i.e. it is inactivated by reagents that block or oxidise the sulphydryl group. Oxidation to an inactive form will occur to a variable degree simply on standing, due to the effects of atmospheric oxygen. It seems likely that the lower activity found in some samples using a non-reactivating substrate mixture is due to this oxidation of active enzyme. It is not surprising, therefore, that the results obtained do not correlate with either the method of Sobel or the expected pattern following myocardial infarction.

It appears that with the present knowledge of the inhibition and activation of creatine kinase, the only reliable method of determining the MM and MB isoenzymes depends on their physical separation by ion-exchange or electrophoresis prior to analysis.

G. D. Lane, D. R. Howell, C. W. Small,
Clinical Biochemistry, Green Lane Hospital,
Auckland.

September 1976.

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Who's Who in the Institute

This is the fifth portrait in this rather desultory and intermittent series started eleven years ago. Our Officers always seem diffident about disclosing their origins, achievements and ambitions, and this is a pity because most of us have a lively interest in other people; as I have remarked before.

I am grateful to our current president for allowing himself to be pinned to the board and submitting to the usual penetrating analysis (actually wild surmise and unwarranted assumptions), which the usual scanty details provoke. Early on in our acquaintance I was surprised to find that his grave mien belied a great capacity for conviviality. The photograph does in fact show him accepting the small ration of completely unfermented fruit juice which he allows himself on festive occasions.

Thrifty and forthright, he so often says what we think. I well remember him accepting with alacrity a semi-jocular offer from the owner of a fishing vessel to reduce the fee because of inclement weather on a fruitless fishing trip. On reflection this was right and proper and all the rest of us would have done is grumble!

The ability to single out the essential issue and express himself clearly and unequivocally is one that we on Council appreciate. Sifting the grain from the chaff is of the utmost importance. Brian's family crest should include a magpie rampant, because he is a great collector! Stamps, stocks and shares, pictures and a vast subterranean cache of bottled gin to fortify his old age! The list of activities is no idle fantasy; he skis sufficiently well to win club races and coaxes a great variety of vegetables from Dunedin's rather reluctant soil. His tomatoes (40c lb, take it or leave it) are held in high regard.

Commercial fishing, with all its trials and tribulations, is scarcely a fit subject for jest. I recall with shame acting as for'ard deck hand on the maiden voyage of Brian's first boat, dropping the new Danforth anchor at Carey's Bay. Unfortunately the anchor rope was not, in nautical parlance, 'made fast to the boat' and the whole caboodle slid exorably into 40 fathoms of oily water! The skipper with admirable restraint passed no comment.

I believe we are fortunate to have a person who can exercise restraint in moments of stress, clearsighted enough to appreciate what we have gained as a professional body in self-determination and respect and determined enough to safeguard and consolidate what we have gained.

B. W. Main

Born in Oamaru November 21, 1930.

Educated at South Primary School and Waitaki Boys' High School. Always bottom of the class in maths and often put into the school garden to work during French lessons.

Commenced training at Oamaru Public Hospital laboratory in July 1948 under Mr K. B. Ronald. Moved to Christchurch Hospital Laboratory in 1951 and qualified in 1953.

Staff Technologist in Haematology and Microbiology until 1955. After a short relieving spell at Greymouth Public Hospital Laboratory was appointed Charge Technologist at Ashburton Public Hospital.

Appointed Charge Technologist at Princess Margaret Hospital in 1958. Moved to Dunedin to the charge position in the private laboratory in 1960. Moved to the Cytology Department of Otago University in July 1964 and became Charge Technologist in Haematology in January 1965. Still occupies this position.

Active in staff affairs on the Christchurch Hospital Laboratory Staff Committee which subsequently evolved into the Christchurch Branch. Committee member and Chairman of the Dunedin Branch for some years. Council Member since 1967 till the present with a break of one year. Convener of the Fellowship Sub-committee from its inception for some years. Sometime member of the Rules Sub-committee. President of the Institute since 1975. Member of the Medical Technologists Board.

Married, no children.

Member of the Dunedin Art Society and collector of porcelain and paintings. Keen Philatelist. Committee member of the Philatelists Society.

Outdoor activities: Ski-ing, whitebaiting, deerstalking (retired), horticulture and viticulture. Has a large vegetable garden and two glasshouses.

Commercial fisherman. Skipper of F.V. Papanui; O/L 22ft 6in. 130hp Volvo engine, line and cray boat. Obtained Restricted Limit Launchmaster Certificate 1969 and Master of Pleasure Craft First Grade, 1970.

Has some difficulty fitting in work but looks forward to solving this problem.

The Effect of an Informal Group on the Operation of an SMA 12/60

Michael Fitchett
Hamilton Medical Laboratory

Received for publication, July 1976

Introduction

In any organisation such as a medical laboratory, groups exist that are essential to an organisation's actual performance. Organisations in the past have been seen as sets of intervening factors influencing or controlling individual behaviour. However, research since the middle of the 1920s has shown how much it is the group that really controls such behaviour.[6] Because of the very nature of an individual as a member of an organisation the individual has needs beyond the minimum one of doing his job.[3] He will seek fulfilment of some of these needs through developing a variety of relationships with other members of the organisation. Individuals have a tendency toward informal group formation. Such informal group formation depends very much upon its environment and therefore we can say that these groups arise out of a combination of formal factors and human needs.

Object

It is the object of this study to analyse the informal group that is responsible for the running of an SMA 12/60 and to point out the advantages of promoting an informal group to carry out this task versus a system of organisation that tends to prevent informal group formation.

In order to understand group processes and dynamics, the Social System Model of G. C. Homans has been used and applied to this informal group study.[1]

Discussion

C. G. Homans, a sociologist, postulated that any social system, such as a small group, exists within a three-part environment—a physical environment, a cultural environment and a technical environment.

1. *Physical Environment*

This covers the physical layout of the department and the numbers and types of individuals found in the department.

The SMA 12/60 in this study is centrally located in the department so that individual members of the department must walk past it to get to four important work areas and the head of department's office.

The SMA 12/60 is operated by three people whose tasks cover the process from the post serum-separating stage to the stage where results are handed to the Data Processing Department for reporting to the doctors. They are also responsible for quality control and routine maintenance and stock control. A staff roster system is in operation, the object is to enable all department staff to be competent at the majority of tasks in the department. The running of the SMA 12/60 is one of those tasks. On average a change of tasks can be expected every six weeks. Before the group formation study the SMA 12/60 was run by three members, one permanent, and two under the roster system, so this task could expect a change of one member on an average every three weeks.

After the group formation study was started, two of the individuals became permanent members and the third could be expected to change every six weeks. This change in the rostering scheme meant that a highly cohesive informal group was now allowed to form. I see this as the difference between a non-group and informal group situation. Also, after the study was started the group of three individuals became supplemented into an expanded working group by two other past members of the group who retain group identity formally, by voluntarily helping out in times of increased work pressure and socially, by keeping up frequent interactions and participating in the social rituals and games of the group.

2. *Cultural Environment*

This covers the values and goals imposed by the formal organisation on the group. Such goals include in order of importance to the organisation:

(a) To complete as many serum analyses as possible before 3.30 p.m.

(b) To do as much of the day's work as possible.

(c) To maintain a high standard of precision —no fixed specification.

(d) To maintain a high degree of accuracy —no fixed specification.

(e) To maintain a high degree of mechanical efficiency—no fixed specification.

(f) To maintain adequate stock and spare parts control—no fixed specification.

(g) The organisation requires an adequate technical competence of each individual.

The cultural environment also includes the values of the individuals in the department which are consequently brought with them into the informal group.

EFFECT OF INFORMAL GROUPS (cont.)

3. *Technological Environment*

This area covers the state of knowledge and instrumentation. The environment demands a high degree of instrument competence, more so with this group than any other in the formal structure. This competence can be learned quickly, the machine can and is run by technical assistants. The roster system that operates in the department is adjusted to provide the technological competence required. Much of the technological environment I must leave as implied.

Psychology of the SMA 12/60 Group[1, 2, 4]

Because of the nature of the work on the SMA 12/60 very little opportunity exists to provide need satisfaction for the individual members of the group from the work itself. The work is very much production oriented, routine, unvaried in nature and task and tedious.

The individuals have few needs that can be fulfilled by the work itself, even the interesting abnormal results that appear from time to time are not sufficient to influence these factors.

If this is true, then why do the members who work the SMA 12/60 have a very cohesive group? Also, why do two other members of the department retain identity with the group even though they are not rostered to work on the SMA 12/60? The answer is to be found in the psychology of the informal group.

1. The group situation provides for its members an informal framework for affiliation needs, the need for friendship and support—probably the most important need in this

example. Homans hypothesised that the group in order to survive in the environment needs motives (sentiments), jobs (activities) and some communication (interactions), and that these three factors are mutually dependent. Persons who interact frequently tend to like one another (positive sentiments). Stated in another way, a decrease in interaction frequently between members of a group and outsiders, accompanied by an increase in the negative sentiments towards outsiders will increase the frequency of interaction and strengths of positive sentiments among members of the group and vice versa. Outsiders in this case represent the formal organisation and its members who exert pressure on the SMA 12/60 group.

Persons who feel sentiments of liking for one another will express those sentiments in activities over and above the activities of the external system and those activities in turn will reinforce the sentiments of liking. These sentiments, interactions and activities cut across the technical competence and formal training barriers that exist between individuals in the group. In the department these barriers are responsible for the existence of other informal groups in the organisation, for example, technical assistants being one informal group, C.O.P.'s another, and the management group consisting of male C.O.P.'s another.

Because the running of the SMA 12/60 fills the working day for the members of the group, there is not a great deal of opportunity for the members to interact with other groups as a unit nor become members of other groups. This fact will increase the number of interactions within the group and the sentiments which arise out of those interactions will further increase the activities which provide an increase in positive sentiments for each other. This factor contributes to the cohesiveness of the informal group. However the very location of the SMA 12/60 will provide and increase opportunity for interaction between members of the department on a random basis. This general contact exists more so with this group than any other, it fulfils affiliation needs on a wider range than for other groups in the department.

2. Working the SMA 12/60 provides a means of developing, enhancing and confirming a sense of identity and for maintaining self-esteem,

These needs are significantly strong in the individuals of the group because of the rigid hierarchical structure of the medical profession. Through group membership an individual can gain status, has some identity and thereby he enhances his self-esteem. The physical location of the SMA 12/60, which is in the centre of the department will contribute to status, and the workload itself, which is over sixty percent of the tests in the department will confirm that status and contribute to it.

In spite of workload units, this figure is one of status for the group and is a positive representation of the importance of the SMA 12/60 machine and personnel to the department.

When visitors are shown around the laboratory, a common reaction to the machine is one of impressiveness which reinforces the self-esteem of members of the group and possibly fulfils a need for esteem of others.

3. Groups will provide for their members a means of establishing and testing reality. In a highly cohesive group, consensus of opinion about the formal organisation environment can be made real and stable, as each individual can validate his own perceptions and feelings best by checking with other members of the group. Uncertainties about the formal organisation exert a pressure on the group such as management's opinions on quality of the machine. In fact, any untested thoughts that the individual members may think that management may have about the group's behaviour and performance can be explained and validated by consensus with other group members.

EFFECT OF INFORMAL GROUP (cont.)—

4. Groups provide a means of increasing security. The SMA 12/60 provides a degree of security against the roster system. Although the individual members can see the advantages of such a system, the members would all prefer to work in a cohesive group situation than under a system that tends to prevent informal group formation.[5] Even though one of the three people who run the machine is under the roster system, the fact that he usually maintains an identity with the group and has the technical competence required will mean that he is more likely to be considered for formal inclusion in the group.

The members of the department feel that a change of task fulfils a strong need to be competent at many tasks, they feel that this need is fulfilled in a short working period, just long enough for proficiency in the task to be re-established.

The large number of tests that the SMA 12/60 performs as compared to the whole department is a recognised fact with management which allows members to relax without fear of consequence i.e. the members feel a degree of security from departmental authority.

5. A sense of power. The high work load means that the group is a productive force that cannot be ignored in any formal discussions in or about the department. A sense of power is felt by the members of the group as a consequence which may fulfil some members' needs for power. Any change of a general nature to be made on a departmental, organisation basis, the question is usually asked "How does it effect the SMA 12/60?"

The needs of the two members who do not work on the SMA 12/60 but who make up the expanded group are the same as the needs of the individuals in the group. The reason why they retain their group identity is that the SMA 12/60 group fulfils their needs best.

Cohesiveness and Its Importance to Performance

Cohesiveness may be defined as stick-togetherness, it results from the attractiveness a group has for an individual. Highly cohesive groups have less variability in productivity, that is they tend to produce at a similar level. They exercise control over the productivity of members. The level of performances is specified by a norm. A norm is an idea in the minds of the members of the group about expected performances under given circumstances—a norm is not the behaviour.

Norms are supported by group pressures that ensure compliance of actual behaviour with desired behaviour. This means that the standards of performance and behaviour are specified by the members of the group and not by the formal organisation whose standards of performance and behaviour are specified in the cultural environment. For example taking each of these requirements.

1. The completion of work before 3.30 p.m. The formal organisation specifies, 'as much as possible'. There are two group norms in operation here. Firstly the starting time in the morning, which can effect the 3.30 p.m. deadline and the second norm is the finishing point in terms of the numbers of specimens that it was possible to complete before 3.30 p.m. but were carried past that deadline. This second norm is set each day well into the day's run and is influenced by the number of tests per time already completed as the most important factor and secondly the number of specimens remaining to be done (or the lack of sufficient numbers of specimens). One could also add to these two the seriousness of any procedural interruptions either to the SMA 12/60 or the data processing facility which will ultimately handle the results. This situation is an erratic unplanned occurrence, and the group handles it by setting different norms. For example, in certain situations these norms are influenced by the number of results that can be reported to the doctors and by the possible disruption of the next day's work by carrying work overnight and increasing the next day's work load. These norms will be different for the different degrees of disruption.

2. To do as much of the day's work as possible. Exactly the same norms exist for this formal requirement as for those to meet the 3.30 p.m. deadline.

3. To maintain a high degree of accuracy and standard of precision. Treating accuracy and precision together. The requirements here are both unspecified by the formal organisation. The group norm will specify the behaviour required to produce accuracy and precision to a standard which is also set by another group norm. This second norm is related partly to the previous history of accuracy and precision produced by the group and partly by the decision to reject results based on an accuracy and precision premise. This is entirely a group decision.

4. Mechanical Efficiency.—The norms that control the mechanical efficiency, general appearance and control of stocks, replacement parts and reagents are related to the status the SMA 12/60 assumes and a reflection of the technical competence required to run the SMA 12/60.

5. Procedural Efficiency. — Norms affecting the behaviour of groups in this area are difficult to define. The group norms allow numerous

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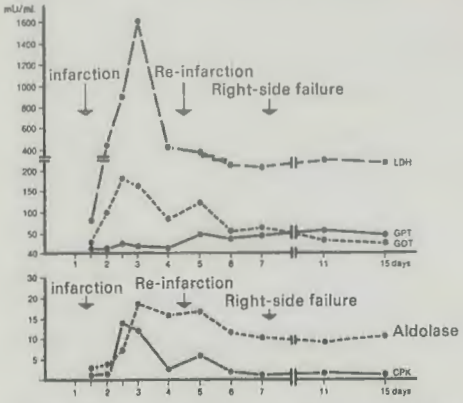

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short cuts in the formal procedures which were laid down by the formal organisation to try and cut down on the frequent stoppages occurring in the daily routine. These stoppages which include such things as blockages, running out of reagents and so on, were a feature of the non-group situation in spite of the rigid procedures laid down to actually prevent these occurrences. However, regardless of shortcuts, performance has improved under the group situation so that now stoppages of the machine for any reason are a rare accurrence. Daily records of these stoppages have recorded a significant decrease in the number of stoppages.

Conclusion

In summary, the advantages for the formal organisation that have been gained over promoting an informal group situation for the operation of an SMA 12/60 have been:

1. Fewer machine stoppages.
2. A cut back in the time taken to prepare the machine for its daily run.
3. A better kept machine both in terms of mechanics and appearance.
4. Better communications between individuals working the machine: this has important bearing on daily stoppages.

The advantages gained for the individual member are many but basically it is the fulfilment of individuals' needs, the important ones are:

1. Affiliation needs.
2. Status needs.
3. Power needs.
4. Security needs.
5. Needs for self-esteem and esteem of others.

The fulfilment of all of these needs contributes to a happier staff member in a pleasant social environment, as well as a marked increase in procedural efficiency and it makes a positive contribution to decreasing the staff turnover in an organisation.

It is in managements' interests to study informal groups and understand group processes and dynamics, particularly in the area of interaction between the formal organisation and the informal group. Management must realise the importance of informal group study not only in this example but right throughout the organisations they control, for the advantages to the individual have obvious advantageous benefits to the formal organisation.

The model of G. C. Homans' social system was not described in its entirety, it was used only as a vehicle for study. His book "The Human Group" sets out a method of study that can be applied to all such groups. The number of variables used in this study was kept as low as possible to suit the purpose of the paper. Many interesting variables were discovered and studied and yet not mentioned, for example the personalities of the individual members and their effects on group behaviour would be an important one.

Acknowledgments

I am grateful to the members of the group for their co-operation and patience in the interviews and their constructive criticisms of the study. Particular thanks to Jan Wasey of Waikato University for criticism and help on the sociological aspects.

My thanks to Hamilton Medical Laboratory for access to material used in this paper.

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Comments on Productivity Issues

J. Powell
Clinical Biochemistry, Green Lane Hospital, Auckland

Received for publication, April 1976

Recent events, both internal and external to the laboratory, have revitalised interest in productivity. Three factors that have stimulated this interest are:

1. Introduction of work load units.
2. Probable implementation of a 'Nationwide' computer system for major laboratories.
3. Since financies are limited, improvement in productivity will release funds for use in expansion and improvement of health services.

Productivity is defined[3] mathematically as the ratio of output to input. Expressed alternatively it is a measure of how well we use the resources of labour, machines, money and materials in the production of services and goods. Further, it is the task of management at all levels to co-ordinate these resources with the aim of greater productivity.

The fundamental unit from which productivity measurements are made is work. Management has employed the techniques of work study including method study and time study to examine work under existing conditions in order to effect improvements in a variety of ways and therefore enhance productivity. Productivity should not be confused with greater production which is producing more by utilising more resources.

Absolute measurement of productivity is a practical impossibility. However, assessment of relative changes in total or partial productivity can be made by comparison to a base year period. Commercial enterprises utilise such systems, [2, 6, 7, 8] as added value, total productivity measures, or derivations of them. N.Z. Forest Products Ltd for example make use of these parameters.

The laboratory, because of the lack of a suitable management data base, cannot use such systems. More importantly its special needs have led to the adoption of an evolving time based system, as described in the Canadian Schedule of Unit Values for Clinical Laboratory Procedures, 1976 Edition.

The following comments are relevant in addition to those of Kennedy[4] in his development of work load units towards measurement of productivity.

1. The accuracy of the unit value, although reasonably well established for automated procedures, may be grossly inaccurate for manual procedures, especially where:
   (a) Significant work simplification has taken place.
   (b) Where groups of people work together on specific tasks.

Due to the above, interlaboratory comparisons, if attempted, could be misleading in areas where labour is intensive.

2. Work that is performed but not requested, or work that need not have been requested, by the use of 'block' request forms for example which although simplifying work flow, adds to the work load. Perhaps there is a good case for some form of productivity incentive for improvements gained in an index such as:

$$\frac{\text{Work initially requested}}{\text{Work done (base period)}} \quad \text{or} \quad \frac{\text{Work clinically necessary}}{\text{Work done (base period)}}$$

Methods to improve productivity have included the use of techniques such as method study, value analysis, operational research, ergonomics and common sense. Moreover, there is increasing recognition being given by modern management theory and practice to the idea that not only management, but also the contribution of the workers, in our case laboratory staff, may hold the key to successful organisations. Especially important are group, motivation and self actualisation factors. As a consequence the concept of a productivity team has arisen. There are a number of reasons for having a productivity group. They help to promote the support and co-operation of all employees by using active participation, staff tend to work with rather than for management and, with the provision of a suitable environment, a flow of ideas, suggestions and recommendations for productivity improvement

is encouraged. Extension of employee interest in the job and the laboratory, along with an improvement in communication at all levels are additional benefits.

Gains in productivity should be translated into real savings, recorded as such, and recognition given to those who achieve it. We should ensure that real savings achieved are returned into useful areas of the health service rather than being assimilated into areas difficult to assess, such as so called development work where there is often no pressure, no review of progress nor assessment of achievement. However, the 'worker' need not necessarily despair because there are techniques available for the measurement of the activities of other areas of laboratory operations, namely—research, development and administration. One such technique[5] that can be applied to research and development in particular involves the following steps: (a) resource analysis, (b) project analysis, (c) outcome analysis.

Conclusion

Productivity measurements in the public hospital sector may become important as financial resources become more limited. They may be applied negatively as a means of extracting more work from individuals or teams, or positively to give credit for work done and to assess useful work. Many important productivity measurements are not currently being made. The Canadian Work Load Unit System, is in retrospect, a good start, but only a start to a potentially comprehensive system for measuring laboratory performance.

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Book Reviews

Introduction to Haematology. W. M. Dougherty, second edition, 1976. Published by C. V. Moseby Company, St. Louis. Supplied by N. M. Peryer Ltd., Christchurch 263 pages, illustrated. Price $N.Z.15.90.

This is the second edition of a very comprehensive text on haematology. The author has basically kept to his ideal, that the reader will understand the whys of haematology, not simply memorise them. The chapters are well laid out with clear subheadings and there are 303 illustrations including four colour plates. One major criticism is that more colour plates would have added much to the book, but no doubt cost had to be considered and at least the black and white plates are very clear with very full legends.

The first chapter deals with blood collection. It contains many very useful tips which are usually missing from books of this type, and the diagrams on the venous system are pertinent to any student.

The second chapter, which is often missing from a book of this type, deals with the cellular and subcellular aspects of cells. Again the diagrams are clear and concise and the discussions on plasma membrane, cytoplasm, golgi apparatus, lysosome, nucleus, etc, are very informative and give an excellent basis for any student to understand the working of the blood cells observed down a microscope.

Haematopoiesis is well dealt with and well up to date with the modern thinking. Haemoglobin is also well covered with a very concise coverage of the main abnormal haemoglobins and haemoglobinopathies. It was interesting to see a section on the major plasma proteins which included acid glycoprotein, albumin lipoprotein and the immunoglobulins to name but a few.

The chapter covering erythrocytes I felt would have benefited by having diagrams of the

Embden-Meyerhof Pathway, Pentose phosphate shunt and the 2, 3 DPG shunt, as well as the written description. Leucocytes were well covered, particularly the subsections on atypical lymphocytes, neutropenia, leucocytosis and inclusions. Coagulation was adequate, giving a good understanding without getting over-involved. The anaemias and leukaemias suffered somewhat by the author trying to be too concise, but books of 300 to 400 pages have been separately devoted to these subjects, therefor what is said in this book is all that is probably necessary.

The weakest aspects of this book are chapter 10, dealing with immunohaematology which is very sparce. Only eight pages are given to this subject which I feel is being rather too concise for a book of this nature, and chapter 11 which discusses the clinical haematology laboratory. Much more could have been said about automated counting apparatus, which today is an essential part of haematology. Also the tests chosen for discussion were rather perplexing to say the least.

Notwithstanding the drop in standard of the last two chapters, this book is a useful addition to any haematology library. It would be very useful to any third or fourth year students doing haematology as basic reading prior to progressing to more comprehensive texts. It should be pointed out that as the author assumes that certain basic knowledge has been acquired, I feel it is not suitable for first or second year students. Above all, the price is not expensive for a well expressed, informative introduction to the subject of Haematology.

M. G. Harper.

The Lab Aide. Leslie Lee B.S., M.T (ASCP). Published by C. V. Moseby Company, St. Louis, 1976. Supplied by N. M. Peryer., Christchurch. 140 pages, illustrated. Price $N.Z.6.85.

The author of this handbook is the Assistant Director of a Florida hospital laboratory and Clinical Assistant Professor of Allied Health Science at Florida Technological University. The book is an adjunct to a twelve week course for laboratory aides. It contains a great deal of simple advice, simply expressed and indeed seems to be written for applicants from the lower socio-economic groups or the 'poorer classes' as they used to be called. They are exhorted to have baths and brush their teeth, how to stand and how to walk and exactly what to wear. 'Loose hair around the face is discouraged.' (That knocks me out for a start!)

It contains general information on hospital and nursing organisation and detailed information on duties which might be undertaken in the laboratory and apparatus which might be used, some of which is illustrated. There are excursions into electrocardiography and nuclear medicine. There is much sensible advice on venepuncture, patient identification, laboratory safety, communication and records. There is quite an extensive medical glossary. There are hints on getting a job and what it might lead to. This includes stores clerk, departmental secretary, media technician or computer terminal operator.

While not without merit I do not see this publication helping a New Zealand laboratory assistant to obtain a Q.T.A. qualification.

R. D. Allan.

The Laboratory in Clinical Medicine: Interpretation and Application. Edited by James A. Halsted. Published by W. B. Saunders Company: 828 pages. Price $NZ35.75. Supplied by N. M. Peryer Ltd., Christchurch.

The Laboratory in Clinical Medicine is a text which is the successor to four editions of *Clinical Pathology: Application and Interpretation* first written in 1950 by Dr Benjamin B. Wells. In general it may be stated that the material within the text is well laid out with appropriate subheadings, diagrams and photomicrographs, with reproduction of, for example, x-rays where applicable. The written text is double column per page which may not appeal to all readers.

Initially there are two introductory chapters which first introduce the reader to the basic application of the laboratory to clinical medicine, and second to the subject of medical statistics, although the latter is treated in an all too brief a manner. Following this introduction the text is divided into eleven parts, each with multiple chapters, and covering the subjects of infectious diseases, diseases of the pulmonary, cardiovascular, renal, hepatic, gastrointestinal tract, haematologic, rheumatic, neurologic, endocrine and metabolic systems, and finally medical genetics.

Within each part emphasis is placed on the role of the laboratory as an aid to clinical

medicine with a succinct, brief explanation of the physiological basis and method of each laboratory test reviewed. Clinical conditions are in turn briefly commented upon and a successful attempt is made to integrate the clinical and laboratory findings.

Because of the information explosion, to many this text will have barely scraped the surface of each subject, but the wealth of information within the book certainly justifies its publication. The editor clearly points out that this book should not be seen as a textbook of medicine, nor a laboratory manual, but as a basic discussion of how the laboratory is interdigitated into clinical medicine. There can be no doubt that it has achieved this goal.

Unfortunately S.I. units are not employed in the text and this is an important feature particularly at this point in time. It is hoped that this will be remedied in future editions.

The contributors to this book are experts within their own fields and their writings have been put together to form a text, which although primarily aimed at the practising physician, should be of great value to all those involved in health care as a means of communication on how the laboratory in its broadest sense forms an integral role within clinical medicine.

Bert White

Fluorescent Protein Tracing, fourth edition, 1976. R. C. Nairn in conjunction with co-authors J. E. Fothergill, K. B. Fraser, M. G. McEntegart and H. A. Ward Published by Churchill Livingstone and available from N. M. Peryer Ltd., Cambridge Terrace, Christchurch. 648 pages, illustrated, size 14 × 22cm. Price $NZ48.90.

Since its inception 14 years ago this definitive publication has achieved pre-eminence in all aspects of the immunology and technology of fluorescent protein tracing. The current edition presents a completely revised publication without major new additions or change in layout. An appreciation of the breadth and depth of the subject is gained when it is seen that those portions allotted to References and Bibliography, together, comprise no less than 244 pages. Both are constructed to ensure convenient application to the text. Within Contents chapters are pleasingly arranged into sub-headings with further details followed by text page citation.

The initial chapters comprehensively discuss the conjugation of fluorochromes to proteins and the purification and properties of the conjugated products. More fundamental considerations such as the structure, properties and requirements of fluorochromes and the nature of fluorescence itself are also covered. The practical prerequisites for successful fluorescence microscopy are detailed and critically discussed in chapter four. Included here is a thorough description of illumination, filter systems, condensers and objectives, oculars and the microscopical preparation. These notes are liberally complemented with pertinent and informative illustrations, tables and colour plates. Important peripheral considerations such as the choice of microscope, the relative merits of transmitted and incident illumination, tissue auto-fluorescence and many other topics are itemised. Photomicrography is covered only briefly. Chapters six through nine exhaustively detail the application of immunological tracing to micro-organisms (bacteria, protozoa, helminths, fungi, viruses, rickettsias) and tissue antigens and antibodies. An account of the general methods of immunofluorescence commands a significant contribution in its own right. I doubt if the text as a whole would remain viable in the absence of these vital passages. A notable omission in the latter section is reference to a technical problem in immunofluorescence associated with prozoning. In my experience this phenomenon is not uncommonly observed in sera containing high titre antibodies to nuclear antigen and mitochondria. Such sera when screened in low dilutions typically confer a "dusty" fluorescent residue to the final preparation.

A number of the photomicrographs are disappointingly poor, e.g. those plates opposite page 98. Others, such as figures 9,9 to 9,15 which depict a variety of auto-antibody staining patterns could well be in colour. On at least one occasion (Figure 7,7) this omission denies the appreciation of the antigenic differences of a mixed film of *Trichomonas vaginalis* and *Trichomonas foetus*. In addition colour photomicrography would have been preferable to black and white in figures 7,1b, 7,2b and 7,3 to 7,6.

A useful appendix with a general comment and conclusions completes the text.

Notwithstanding the above criticisms which must be regarded as minor, this publication

maintains a reference manual of true worth and although many may find that the cost is prohibitive its ready availability in any laboratory routinely involved in immunofluorescence and fluorescence microscopy is essential. Mike Gratten.

The Epidemiology of Human Mycotic Diseases. Edited by Yousef Al-Doory. Charles C. Thomas, Springfield, Illinois, U.S.A. 1975. 346 pages. Price $US26.50.

That the publishers of "Opportunistic Fungal Infections", which was reviewed in the July issue of this journal, should follow it in the same years with this book is a measure of the growing interest in medical mycology and the consequent need for a wider dissemination of knowledge of mycotic infections. Like its predecessor, this volume is again concerned with the problem of fungi and the compromised host but all of the important mycoses are discussed in 19 chapters by world authorities, predominantly from the Americas.

The binding, paper and printing are again of the highest standard. Illustrations are in black and white and are understandably not numerous in a book which is offering discussions. There is a complete listing of details of the contributors. Each chapter has its own references and there is a separate index for authors and subjects.

Typographical errors must again be regretted. It seems inexcusably careless that so well-known an authority as Professor W. St Clair Symmers should be listed in the author index as both Symmer, W. S. C. and Symmers, W. St C. The nomenclature of the fungi also varies with *Trichophyton phaseoliforme* sometimes given as *T. phaseoliformis*. This dermatophyte is not of major importance but the variation causes concern when *Trichophyton erinacei* is consistently spelled as *T. erinaceae* without citing authority for the change. A curious monstrosity such as "dermatophyhosts" (page 292) requires a moment's pondering to correct it to the intended "dermatophytoses". However, if such errors are now a part of the price to be paid for scientific literature, a reviewer must note them while admitting that the value is minimally impaired.

After an erudite introduction by the editor, the chapters follow the classical pattern of each being devoted to a particular mycosis. There are a few exceptions and these are generally commendable. Thus the chapters on actinomycosis and nocardiosis are welcomed though the causative organisms are universally recognised as bacteria. The convenient designation of infections caused by them as being pseudomycotic justifies their inclusion here.

Chapter 9 on the epidemiology of candidosis is brief and concise but it is followed by a paper on the clinical aspects of *Candida* infections. This deals at considerable length (20 pages) with the subject but is little concerned with the stated primary topic of the book.

The final exception is a paper by Dr L. Ajello of the Center for Disease Control, Atlanta, with the title "The Medical Mycological Iceberg." This is a revised version of a 1971 publication and Dr Ajello's observations are now highly topical and valuable. They apply with equal force to New Zealand as well as to other countries with numerically greater mycotic infections. He stresses that the lack of notification and the paucity of reports of fungal infections produces the situation where geographical distribution, prevalence and incidence are misleading. In his opinion, "records generally reflect the location and activities of an investigator rather than true distribution patterns of the disease."

Each of the remaining 15 chapters on specific mycoses stresses this lack of reliable information. It is nowhere better summarised than at the end of the paper on actinomycosis with the statement that "actinomycosis occurs through (sic) the world and is neither a rare nor a common disease", since, "from the information presently available, it is not possible to establish a meaningful case rate."

The chapter on histoplasmosis by H. W. Larsh contains the warning that the histoplasmin skin test should be evaluated with caution because of cross-reactions between *Histoplasma capsulatum* and the related ubiquitous soil *Chrysosporium* species.

Of particular interest to New Zealand is the chapter on the epidemiology of cryptococcosis by M. A. Gordon stressing that it is a non-transmissible disease. "There has been no authenticated report of its transfer from person to person, from animal to person, or between animals, although viable cryptococci may be excreted in sputum, urine, exudates of lesions, and in cow's milk."

There is a profound sincerity in the dedica-

tion of the book " to the memory of those who have suffered and died needlessly from mycotic diseases; due mainly to a slow acceptance of the importance and magnitude of these diseases by the health profession, especially of those entrusted with the keeping of the mind of future practitioners." The responsibility for this trust is directed by the publishers in stating that " this book is intended to be used by the medical practitioner, the mycologist, the epidemiologist, the researcher, and the medical and graduate student, as well as those technicians in the diagnostic laboratories." This reviewer emphasises that no member of any of these professions in New Zealand should fail to have access to this book. It is a valuable reference, it should be widely read and carefully studied.

F. M. Rush-Munro.

An Introduction to Immunohaematology. Neville J. Bryant. 1976. Published by W. B. Saunders Co. and supplied by N. M. Peryer Ltd., Christchurch. 255 pages, illustrated. $NZ15.60.

This book is designed for the student of Medical Laboratory Technology in Canada and contains sufficient theory to complete the Canadian registration examinations. It is divided into six sections, dealing with basic genetics; immunology; blood group systems; haemolytic disease; methodology and techniques.

Each section starts with a list of objectives for the topic and typical examination questions are supplied at the end of each chapter.

Genetics and immunology are well covered and provide sufficient up-to-date information to serve trainees to N.Z.C.S. level examinations in New Zealand. It is pleasing to see that more weight is being given to description of the chemical structure of antigens and red cell membrane. The lucid diagrams and text on the structure of DNA and RNA and its mode of action in protein synthesis will help the student to more readily assimilate this information. The diagrams are clear and large and are ideal material for tutors to use as visual aids.

The chapter on autoimmune haemolytic anaemia gives an adequate introduction to the subject, including drug induced anaemias, but haemolytic disease of the newborn is less well covered, and includes some incorrect information on choice of blood for exchange transfusion.

Blood donation, component therapy and grouping reagents are briefly but clearly discussed and this material affords an easy revision source, but would need to be preceded by more detailed lectures.

Immunohaematological techniques cover most routine tests and include some recent innovations. A very worthwhile glossary is included to aid the student.

The most disappointing aspect of this book is the section on Blood Group Systems; even as an " Introduction " some groups are most inadequately covered, and a most unacceptable number of errors are included. The table on Lewis inheritance on page 75 is incorrect in fact, and disagrees with the explanation in the text; the explanation of Wiener nomenclature for Rhesus disagrees with Table 5-1 and the frequency of Co^b is given as less than 1 percent, whereas it should be approximately 10 percent. Such errors completely mislead the student and should have been eliminated. A further fault is that no references to other authors are given and thus the student is unable to read more authoritative works without a great deal of research.

Although introductory books, such as this are needed for the early years of training, there are other works which are more suited to this role. This book would be a useful addition to the shelves of tutor technologists who would realise its shortcomings but it is not likely to become a standard text for New Zealand examination. Derek S. Ford.

Book Received

Fundamental Skills in Serology by Leila J. Walker and Howard Tubb. An Allied Health Professions Project 1976. Published by Charles C. Thomas, Springfield, Illinois. Price $US 14.95. 473 pages.

THE EDITOR
WOULD WELCOME THE SUBMISSION
OF PAPERS READ AT THE 1976 NZIMLT
ANNUAL CONFERENCE.

Abstracts

Contributors: Janice Parker and L. M. Milligan

The Editor would be grateful for the services of two volunteers with access to the current literature, to provide a few abstracts of a practical nature in Haematology and Microbiology for the Journal.

CLINICAL BIOCHEMISTRY

A Comparison of Methods for the Immunoassay of Serum Apolipoprotein B in Man. Durrington, P. N., Whicher, J. T., Warren, Christine, Holton, C. H. and Hartog, M. (1976), *Clin. Chim. Acta* 71, 95.

Radioimmunoassay, automated immunoprecipitation and rocket immunoelectrophoresis techniques for assay of serum apolipoprotein B are compared and the results evaluated. The authors consider the assay potentially valuable in screening for coronary artery disease, with the method of choice depending on numbers of samples and the levels of apolipoprotein B measured. Only normal subjects, fasting and non-fasting, were included in the survey.
—J.P.

How to Pass Examinations: a Personal View on Good Technique in Clinical Biochemistry Examinations. Bold, A. M. (1976), *Ann. clin. Biochem.* 13, 399.

Advice is offered on answering multiple choice question and 'essay' questions and on how to tackle oral and practical examinations. A 'model answer' illustrating typical examination faults is included.
—J.P.

Assessment of Interference by Aspirin with Some Assays Commonly Done in the Clinical Laboratory. Routh, J. I. and Paul, W. D. (1976), *Clin. Chem.* 22, 837.

A series of 21 commonly done determinations were run on sera collected during and after aspirin therapy. The drug appeared to depress values for six constituents (protein calcium, cholesterol, uric acid, bilirubin and thyroxine) progressively in a three day regime. The same phenomenon was shown with a two week period followed by a return to zero +— values by the end of the second week. Chloride was the only constitutent which showed a significant increase.
—J.P.

Effect of Two New Serum Separating Devices on Resutls for Cholesterol and Triglyceride. Naito, H. K. and Gataulis, V. J. (1976), *Clin. Chem.* 22, 936.

The authors estimated cholesterol and triglyceride levels on ninety-five random patients using three methods of serum separation. The results using 'Sure-Sep' and 'SST' devices for separation are compared to those using conventional double centrifugation. Samples prepared with Sure-Sep showed significant lowering, those using SST correlated closely with the conventional method.
—J.P.

Flame Emission, Atomic Absorption, and Atomic Fluorescence Spectrometry. Heiftje, G. M., Copeland, T. R. and de Olivares, D. R. (1976), *Anal. Chem.* 48, 142R.

A biennial review covering books, articles, and chapters which appeared in the time period between January 1, 1974 and November 15, 1975. References have been organised into six major sections: A. Reviews, Book, and Bibliographers; B. Fundamental Studies; C. Automation and Advances in Instrumentation; D. Developments in Technique and Procedure; E. Analytical Comparisons and F. Applications.
—J.P.

IMMUNOHAEMATOLOGY

Detection of Hepatitis B Surface Antigen in Plasma samples by Reversed Passive Haemagglutination Tests. Cambridge, B. S. and Kennedy, B. J. (1975), *Vox Sang* 31, 32.

A comparison of two commercial reversed haemagglutination tests and counter immunoelectrophoretic test, used to detect Hepatitis-B surface antigen in reconstituted dried plasma. This comparison showed an increase in the number of positive results in the haemagglutination tests.
—L.M.M.

Bombay (Oh) Blood in a Sudanese Family. Abu Sin A. Y. H., Abdelrazig, H., Ayonb, M., and Sabo, B. H. (1975), *Vox Sang* 31, 48.

Two examples of Bombay (Oh) blood were found in Siblings of a Sudanese family belonging to a tribe of Arab and Negro Extraction.
—L.M.M.

New Laboratory Method to detect Hepatitis B (Australia) Antigen based on "Anomalous" Lactate Dehydrogenase Isoenzyme. Bam, A. J., Bapet, J. P., Dambe, S. R., Rajpal, R. M. and Dave, J. K. (1975), *Vox Sang* 31, 70.

A laboratory method for the indirect detection of Hepatitis B Antigen (HB,Ag) based on the presence of "anomalous" L.D.H. isoenzyme by disc electrophoresis has been developed. The method is specific and highly sensitive.
L.M.M.

Importance of the Auto-control Crossmatch in Human Renal Transplantation. Cross, D. E., Greiner, R., and Whittier, F. C. (1976), *Transplantation* 24, 4.

The killing of donor cells in the Standard Lymphocyte cross-match is considered strong evidence for preformed antibodies in the recipient's serum. Details of the experiment and the findings are discussed.
—L.M.M.

Storage of Human Platelets by Freezing. Kiri, B. K., Tancue, K., and Baldene, M. G. (1976), *Vox Sang* 30, 401.

Prolonged storage, probably indefinite of viable and functional human platelets is now possible by freezing. These platelets have a nearly normal survival time upon re-infusion and are capable of sustained haemostatic effectiveness in thrombocytopenic patients. Adaption of the freezing technique for large scale use has been achieved.
—L.M.M.

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These instructions are provided with the object of ensuring uniformity of presentation. Manuscripts should be typed double spaced, on one side only of good quality paper with one inch margins. Carbon copies are not acceptable. Give the author's name with initials if male, or one christian name if female, and the address of the laboratory where the work was carried out. Use capitals only where indicated and do not underline except where italics are required.

In general, papers other than reviews, should consist of a short summary capable of standing alone as an abstract; an Introduction (outlining the problem and the proposed solution); Material and Methods; Results and Discussion.

Illustrations

Illustrations are costly and should be used sparingly. Graphs, line drawings and photographs are all referred to as 'Figures' and should be numbered in the order of their appearance in the text using arabic numerals. Drawings (in indian ink on stout white paper) and photographs, should be about twice the size of the actual reproduction. The position of figures in relation to the text should be noted in the typescript. Legends typed on separate sheets are numbered to correspond with the illustrations. Tables should be typed separately and numbered in roman numerals.

Nomenclature and Units

Scientific names of micro-organisms should conform with Bergey's Manual of Determinative Bacteriology. The first time an organism is mentioned the full generic name should be given and underlined to indicate that it is to be printed in italics. Subsequently it may be abbreviated. Trivial or common names are printed in roman, e.g., staphylococci, and should not be underlined.

To conform with the Systemes Internationale D'Unites or SI units it is recommended that the following prefixes and abbreviations be employed.

Length: m, cm, mm, μm, nm.
Area: m^2, cm^2, mm^2, μm^2.
Volume: litre, ml, μl, nl, pl ('litre' in full avoids confusion with '1')
Mass: kg, g, mg, μg, ng, pg.
Mass concentrations: kg/litre, g/litre, mg/litre, μg/litre. For the present concentrations per 100 ml also accepted as are daily outputs in urine and faeces.
Molar concentrations: mol/litre, mmol/litre, μmol/litre, nmol/litre. (For the present mequiv/litre may also be used.)
Temperature: Express as °C.
Time: s, min, h, d, a. The latter two symbols which stand for day and year respectively are best expressed in full to avoid confusion.
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   m s = metre x second

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References should be listed alphabetically at the end of the article and numbered to correspond with the numbers used in superscript within the text. Citations in the text should give the author's name using *et al.* if more than one author, and the year, thus: Walker *et al.* (1972)[1]. All authors' names should be listed with initials; year of publication in brackets; journal title abbreviated and underlined to indicate italics; volume number in arabic numerals underlined with a wavy line to indicate bold type and the first page number. The reference for abbreviations is the World List of Scientific Periodicals. In general nouns have capitals, adjectives do not and conjunctions are omitted. Authors are referred to previous journals for examples.

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