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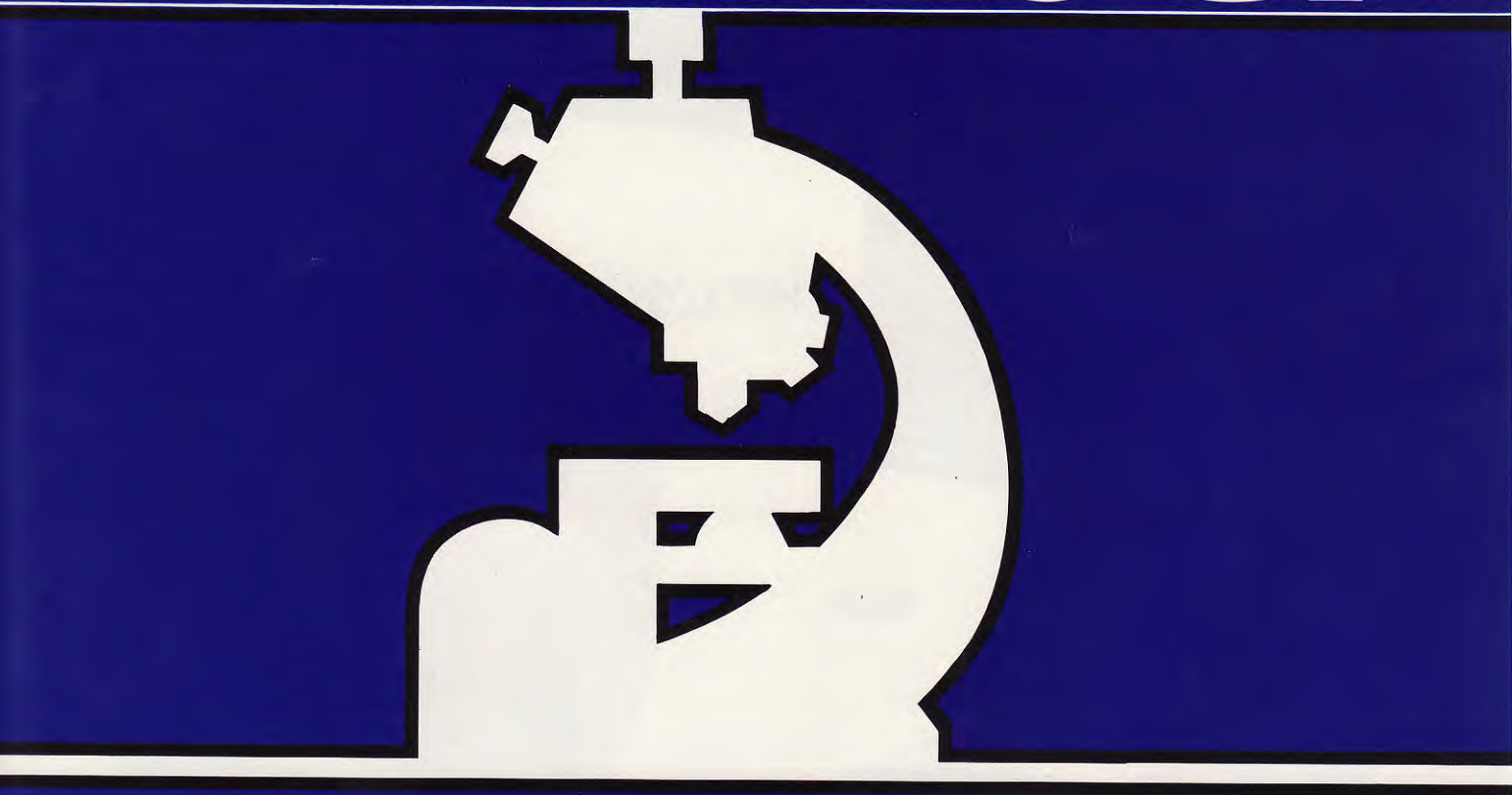

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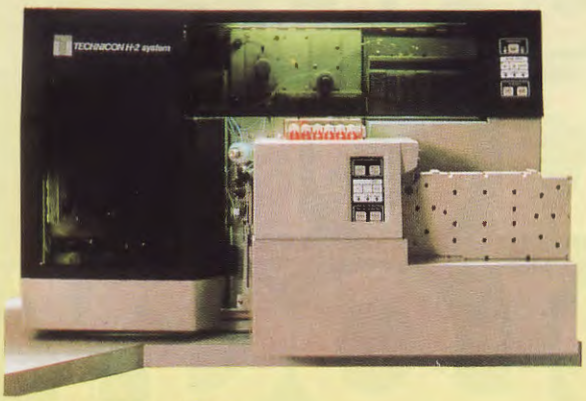

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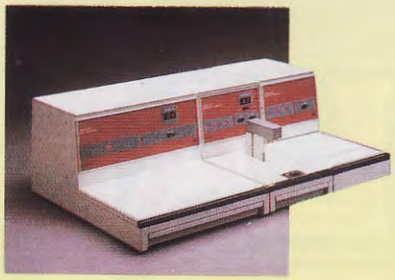

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Original Articles

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DIRECTIONS FOR CONTRIBUTORS

From Vol. 36 No. 1 all papers published will be in the form known as "Vancouver Style" or Uniform Requirements for Manuscripts submitted to Biomedical Journals. Full details may be found in the New Zealand Journal of Medical Laboratory Technology, Vol. 42 No. 2, page 54 to 60 or from the Editor.

Intending contributors should submit their material to the Editor, M. Gillies, Microbiology Laboratory, Princess Mary Hospital, Auckland, New Zealand, or the Editor, P.O. Box 9095, Newmarket, Auckland, New Zealand. Acceptance is at the discretion of the Editor, and no undertaking is given that any article will be published in a particular issue. The copy deadline for each issue is the first of the month prior to the month of publication.

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The months of publication for 1990 are March, May, August and November.

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N.Z.J. Med. Lab. Technol. 1990; **44** (4): 100-102.

Singlicate Versus Duplicate Coagulation Testing on the Roche Cobas Fibro.

John A Pountney, ANZIMLT, Graded Officer
Judy R Browne, Staff Technologist
Department of Haematology, North Shore Hospital.

Abstract

Patient prothrombin times (PT), activated partial thromboplastin times (APTT) and fibrinogen assay results were analysed in a four month retrospective study to establish whether it is necessary to perform duplicate assays on the Roche Cobas Fibro coagulation analyser.

The total number of tests performed in duplicate included 1273 PT's, 1272 APTT's and 477 fibrinogen assays. Of the fibrinogen assays, 14% had "high deviations" i.e. a deviation in either one of the duplicates greater than 10% from the mean.

For the PT's and APTT's, the high deviations were 1.5% and 1.0% respectively. If these same PT's and APTT's had been performed in singlicate, but with well defined protocols for repeat testing (APPENDIX A), only 0.2% of the total PT's and 0.3% of the APTT's would have had erroneous results reported that might have affected patient management.

In our opinion, duplicate testing for PT's and APTT's on the Roche Cobas Fibro is unwarranted and we estimate a savings in reagent and consumable costs of up to 40% with the added advantage of a reduction in technologist time required to perform the tests.

Introduction

There have been several articles published over the past six years regarding singlicate versus duplicate PT and APTT assays. The majority have questioned the need for duplicate testing on todays sophisticated automated coagulation instruments, such as the MLA Electra 700.

We decided to test the need for duplicate testing on a less sophisticated semi-automated coagulation analyser, the Roche Cobas Fibro. We were also interested in the potential savings that might be obtained by using less reagent and cuvettes and if there would be any significant savings in technologist time.

In todays climate of budgetary restraint laboratory services are expected to contribute to cost containment measures, even if those savings are modest when compared to overall expenditure.

With the Cobas Fibro, the operator's active participation is limited to the pipetting of plasma samples into cuvettes, pipetting of reagents, and timing the incubation prior to testing.

Temperature control, timing, end point detection and calculation of the final result are performed by the instrument.

Materials and Methods

All routinely requested PT's, APTT's and fibrinogen assays over a four month period were included in the study. Duplicate determinations were performed on every sample.

Plasma specimens were collected in Vacutainer® tubes containing 0.105 M buffered trisodium citrate. The specimens were centrifuged at room temperature for 10 minutes at 1,500g the plasma separated into labelled plastic tubes and stored at 4°C. Testing was generally performed within two hours of specimen collection. All tests were done on the Roche Cobas Fibro, a semi-automated programmable coagulation analyser with modulated infra red photo-optic clot detection.

Reagents used were NZST (rabbit) thromboplastin for PT's, Dade Actin-FS reagent for APTT's, Gibco 100unit/ml thrombin for fibrinogen assays.

Controls used were Dade Citrol Level 1 and 11, but no control results were included in the study.

Plasma and reagent were added to the reaction cuvettes manually with a 100μl Oxford P-7000 pipette.

For all tests, the mean and percent deviation of duplicates from the mean were derived, as well as the number of tests showing the "high deviation" warning on the Cobas Fibro printout i.e. a deviation in either one of the duplicates greater than 10% from the mean.

A cross section of PT's and APTT's that did not have "high deviations" were further divided arbitrarily into 3 groups according to clotting times and percent deviation from the mean.

Finally, the overall percent deviation from the mean was calculated for the individual machine operators.

Results

The total number of tests performed over a four month period and their respective percentages of 'high deviations' is shown in Table 1.

Table 1.

Total number of tests performed over a 4 month period with their respective percentages of "high deviations".

PT	=	1273	1.5%
APTT	=	1272	1.0%
Fibrinogen Assay	=	477	14.0%

The disproportionately large number of 'high deviations' for fibrinogen assays precluded further analysis of the results. Partial explanation for this could be the reduced tolerance of a 10% variation in fibrinogen assays of greater than 2.0g/1 i.e. giving clotting times of less than 14 seconds, which account for the vast majority tested.

Table 2. shows a cross-section (461/1273) of PT results divided arbitrarily into 3 groups depending on the clotting times and percent deviation from the mean. The average percent deviation from the mean is also shown.

Table 2.

Cross section (461) of PT results divided into 3 groups depending on clotting times, and % deviation from the mean.

TIME(S)	TOTAL TESTS	No. of tests with % Deviation from Mean			AVERAGE % DEVIATION FROM MEAN
		0-3%	4-7%	8-10%	
< 20	151	149	1	1	1.13%
20-50	215	207	7	1	1.33%
> 50	95	98	8	-	1.39%

These results were derived from work done by seven full time (day) employees, including graded technologists, staff technologists and laboratory assistants. There were no significant differences between operators when their individual percent deviations from the mean were averaged. Similar data was obtained for 3 part-time night duty staff technologists.

The range of mean deviations for all staff for PT's was 0.86-1.68%.

There were 19/1273 PT's (1.5%) that had deviations of greater than 10% from the mean. If these PT's had been

tested in singlicate, then 13/19 (68%) would have been repeated using the following proposed protocol for singlicate testing:-

Repeat the test for 1. Results < 14.0 seconds
2. First time abnormal result i.e. prothrombin ratio (PR) 1.4 or greater.
3. Any patient with a PR >4.0
4. Delta check of 25% i.e. a change of more than 25% from the previous result.

Table 3.

6/1273 duplicate PT results (0.47%) with deviations from the mean of greater than 10%.

	PT1	PR	PT2	PR	MEAN	% Deviation from mean
1	18.4	1.1	23.2	1.4	20.8	11.5
2	19.2	1.1	24.0	1.4	21.6	11.1
3a	34.3	2.1	43.3	2.6	38.8	11.6
3b	34.9	2.1	43.3	2.6	39.0	10.8
4	14.8	0.9	19.4	1.2	17.1	13.5
5	20.2	1.2	26.2	1.6	23.2	12.9
6a	20.5	1.2	29.5	1.8	25.0	18.0
6b	15.9	1.0	27.8	1.7	21.8	27.5

NOTE: 3b and 6b are repeats of 3 and 6 respectively.

Table 4.

A cross-section (387) of APTT results divided into 3 groups depending on clotting times and % deviation from the mean.

TIME(S)	TOTAL TESTS	No. of tests with % Deviation from Mean			AVERAGE % DEVIATION FROM MEAN
		0-3%	4-7%	8-10%	
< 50	170	165	5	-	1.06%
50-100	173	155	18	-	1.40%
> 100	44	38	5	1	1.86%

Table 5.

12/272 duplicate APTT's (0.99%) with deviations from the mean of greater than 10%.

	>10% DEVIATION FROM MEAN				REPEAT TESTING			
Patient	T1	T2	Mean	Deviation (%)	T1	T2	Mean	Deviation (%)
1	29.0	35.8	32.4	10.5	-	-	-	-
2	68.1	84.7	76.4	10.9	92.9	100.9	96.9	4.1
3	32.6	41.1	36.9	11 4	38.5	38.2	38.3	0.5
4	82.7	103.8	93.2	11.4	90.7	100.7	95.7	5.2
5	32.8	25.9	29.4	11.6	41.2	42.6	41.9	1.6
6	21.2	28.6	24.9	14.9	37.4	37.8	37.6	0.5
7	61.0	86.0	73.5	17.0	62.5	63.5	63.0	0.8
8	77.5	109.0	92.7	17.6	128.8	132.7	130.7	1.5
9	47.5	68.8	58.1	18.4	61.5	65.8	63.7	3.3
10	29.3	43.6	36.4	19.8	46.6	48.9	47.8	2.3
11	50.2	82.8	66.5	24.5	49.5	51.3	50.4	1.2
12	19.3	45.7	32.5	40.6	42.6	49.8	46.2	7.8

The remaining six samples produced results that are shown in Table 3.

Of these, possibly only #5 and #6 might have affected patient management by reporting an erroneous result i.e. 2/1273 or 0.2% of PT's in a four month period.

Table 4 shows a cross section (387/1272) of APTT results divided once again into 3 groups depending on the clotting times and percent deviation from the mean.

There were no significant differences between any of the staff with the range of deviations being 1.03-1.79%. There were 12/1272 APTT's (0.94%) that had deviations from the mean of greater than 10%.

These results, along with the repeats, are shown in Table 5. In all cases, the repeat test had duplicates that deviated <10% from the mean.

If repeat testing had not been done, one of the duplicates is the right answer in patients 7, 11 and 12 so the chance of reporting an erroneous result in these patients is reduced by 50%. If singlicate testing had been in use, patients 6 and 12 would have had their PT1 times repeated using the following protocol for singlicate testing of APTT's (Dade Actin — FS):-

Repeat the test for:-
1. Results < 28 seconds
2. Unexpected first time abnormal result i.e. 46 seconds or greater.
3. Any result > 180 seconds.
4. Delta check of 50% for patients on heparin (excluding pre-heparin screen result).

Four of the twelve APTT's (0.3% of the total APTT's) i.e. patients 8, 9, 10 and 11 might have affected patient management if the erroneous result had been reported.

Discussion

Errors in coagulation testing arise from 3 main sources:-
1. Preanalytic — problems with specimen collection, handling, storage etc.
2. Analytic — problems with the instrument/reagent system.
3. Human error.

Errors due to preanalytical problems would not be revealed by duplicate testing. Operator errors most commonly include clerical errors such as specimen misidentification or pipetting errors. The former would not be corrected by duplicate analysis. Analytical errors i.e. faulty reagent preparation, incorrect temperature, incorrect incubation times etc. are best addressed by quality control systems already in place [1].

The use of manual pipetting steps, in itself, does not necessitate that a particular method be performed in duplicate. A popular argument for continued use of duplicate testing for PT and APTT is that "occasional" errors will be detected. Although this is true, it is also true of a wide variety of assays that are not routinely duplicated, even though incorrect results pose great risks to the patient [2].

After our retrospective study was completed, a four week trial of singlicate testing for PT's and APTT's was instituted, with day staff only.

The protocol for repeating APTT's was modified to accommodate a change to General Diagnostics Auto APTT reagent i.e. repeat APTT's were performed (in singlicate) if:-

1. The APTT was < 24 seconds.
2. An unexpected first time abnormal result greater than 41 seconds.
3. Any APTT > 180 seconds.
4. APTT's exceeding the 50% delta check for heparin patients.

Over this four week period, 6.7% of the PR's and 6.3% of the APTT's were repeated. The majority of repeats for both tests were for failed delta checks.

All repeats duplicated the original results.

For both PR's and APTT's, the number of repeat tests was less than we had originally expected, and so the monetary savings in consumables and reagents may be greater than our original estimate of 25-30%, possibly up to 40%.

It is much easier to cope with heavy workload days and the rostered coagulation person has more time to help out in other areas. The criteria used for repeat testing also builds in more stringent checks than were existing previously.

When repeat testing is required due to failed delta checks, every effort is made to find out from the ward why the result has changed so much (eg) — has the heparin or warfarin dose been changed, or stopped, has the patient been given Vitamin K, was the specimen collect difficult etc.

Conclusion

The accuracy of automated/semiautomated PT's and APTT's is increased little by running each specimen twice. The continued use of duplicate analyses only serves to identify those chance, inexplicable and generally unreproducible occurances when duplicates do not match. These may involve a large discrepancy but overall account for less than 1% of total tests [1].

However, there are still situations where duplicate testing is warranted (e.g.) grossly abnormal results, unexpectedly high or low results, results exceeding critical values and results inconsistent with other test results or with medication administration [2].

In addition, the various functions of the instrument must be monitored by a continuously applied quality control program. Coagulation tests are functional assays that survey a complex series of chemical reactions where the formation of a fibrin clot is the measurable end point. For this reason PT and APTT tests may never equal the precision of chemical tests [3]. However, we felt that duplicate testing is not necessary (for the majority of specimens) especially with well defined protocols in place for repeat testing.

We have therefore instituted singlicate testing for PR's and APTT's (including controls) for all shifts. The reaction from staff has been very positive. We will continue to monitor the numbers and reasons for repeat testing until all staff have rotated through the department, and also to see whether the repeat testing protocols are still appropriate.

References

1. Morris MW, Brooker DW, Miller JL, Winkelman JW. Single Versus duplicate Prothrombin Time Assays. *Laboratory Medicine* 1987; **18**(8): 524-6.
2. James PL. Duplicate Testing for PT/APTT: Time For A Change? *Diagnostics and Clinical Testing.* 1989; **27**: 21-3.
3. Keshgegian AA, Mann JM, Cooper JH. Is Duplicate Testing For Prothrombin Time And Activated Partial Thromboplastin Time Necessary? *Arch Pathol Lab Med* 1986; **110:** 520-2.

Appendix A

Complete Protocol for PT and APTT Repeat Testing

1. PT less than 14 seconds.
2. Prothrombin ratio (PR) 1.4 or greater — first time abnormal result (patient not on warfarin).
3. PR greater than 4.0.
4. PR exceeding the 25% delta check.
5. APTT less than 24 seconds.
6. Unexpected abnormal APTT greater than 41 seconds.
7. APTT greater than 180 seconds.
8. APTT exceeding 50% delta check for patients on heparin.
9. Machine error.
10. Operator error.
11. Any control outside its 2SD range.

NOTE: An explanation is sought for any test that is repeated due to a failed delta check.

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A well experienced, Filipino Registered Medical Technologist seeks a position in New Zealand, to become eligible for registration in Microbiology. She has fifteen (15) years of teaching experience in Parasitology, Urinalysis and other body fluids and Clinical Chemistry. Since 21 December, 1986, she has been working as Senior Laboratory Technician under the Ministry of Health, Sultanate of Oman. She can work in Haematology, Blood Bank and Clinical Chemistry, but would prefer Microbiology.

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Please contact: Evelyn E. Brana
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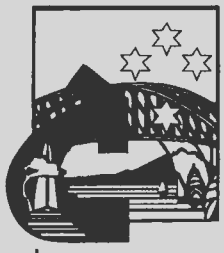

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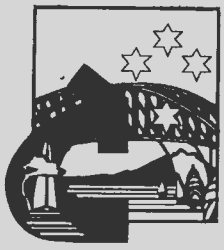

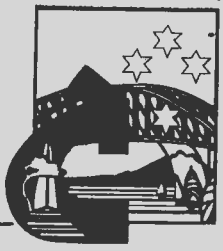

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The appropriate membership subscription must accompany this application for this to be a valid application.

Minutes of the Special Meeting of the New Zealand Institute of Medical Laboratory Technology (Inc) held at Invercargill on 29 August 1990 Commencing at 4.15pm

Chairman

Mr W Wilson

Minutes

It was resolved that the Minutes of the Special General Meeting held on 30 August 1989 be taken as read and approved.

I Bardsley/K McLoughlin

Business Arising

The President reported on matters as had been actioned by Council.

Remits

1. It was moved D Dixon-McIver, seconded by P McLeod that subject to any amendment or change requested by Registrar of Incorporated Societies "that the rules of the New Zealand Institute of Medical Laboratory Technology be substituted with the rules of the New Zealand Institute of Medical Laboratory Science".

   After discussion, the motion was put to the meeting and declared carried.

2. It was moved A Paterson, seconded J Le Grice "that Policy Decision No. 3 be reaffirmed".

   Policy Decision No. 3 (1972): Council will make and administer awards to the members of the Institute, the details of each award will be recorded and may be amended from time to time by resolution of Council. The summary of these details shall be published annually in the newsletter.

   The motion was put to the meeting and declared carried.

3. It was moved D Dixon-McIver, seconded by G Rimmer "that Policy Decision No. 5 be reaffirmed".

   Policy Decision No. 5 (1978): That medical supply companies should not be approached to aid in the finance of Branch meetings; companies may be invited to regional seminars and although donations may be accepted, money is not to be solicited.

   The motion was put to the meeting and declared carried.

General Business

It was moved D Dixon-McIver, seconded B Edwards "that the administrative details of all examinations run by the New Zealand Institute of Medical Laboratory Science be set by Council".

After discussion the motion was put to the meeting and declared carried.

It was moved D Daniels, seconded R Nightingale "that Council investigate the establishment of National Quality Control programmes to be available within New Zealand.

After discussion the motion was put to the meeting and declared carried.

It was moved G Rimmer, seconded S Holland "that Council promote more regional activities by providing funds and encouragement for establishment and continuance of local branches".

After discussion it was moved B Edwards, seconded D Dixon-McIver that the motion be amended to read "Council consider financial requests from branches intended to promote regional activities".

After discussion the amendment was put to the meeting and declared carried on a show of hands.

The amendment then became the motion and was put to the meeting and was declared lost on a show of hands.

It was moved A Knight, seconded A Paterson "that Council investigate the possibility of the Annual Scientific Meeting becoming a Tri-Annual Scientific Meeting".

After discussion the motion was put to the meeting and lost on the show of hands.

Prior to the meeting being closed, Mr P McLeod thanked Mr W Wilson for the work that he had done in the interest of the profession during his twelve years as a member of Council. This was greeted with acclamation.

There being no further business the meeting closed at 5.00pm.

CHAIRMAN

New Zealand Institute of Medical Laboratory Technology

Presidential Address

Walter Wilson

Ladies and gentlemen, it is with pleasure and some regret that on this the last occasion I report to you on the activities of your Institute.

The last three years have seen more change to the Institute and our profession than I have experienced over the previous ten years of my involvement on the Council. Most of these changes have been as a direct result of restructuring of the industrial and Health Service environment following legislative changes.

Unfortunately the full impact of these changes has not yet been experienced and indeed Governmental changes are still proceeding, such as the pending changes to the resourcing of the Medical Auxiliaries Registration Boards.

For the Institute we have divested our industrial responsibilities to a formal Union, established the Medical Laboratory Science Trust which is an investment in the future, and today we are to consider a change of name. While each of these changes are in themselves of some importance, they are only part of the platform from which this profession will with confidence confront the challenge of the 90's and the 21st century.

We are well within sight of a Degree in Medical Laboratory Science which I am convinced will become the minimum academic requirement for registration, however we must now look beyond this step and if we are to become a proud and established profession we must confront the task of a continuing professional development programme by which we each can establish our currency and competency to practise and so ensure the confidence of the public in the service we supply. Along with the need for on-going professional upgrading we must move quickly to establish standards of professional conduct and service delivery. As a requirement for Area Health Boards to contract with the Crown on service output of which the two principal components are quantity and quality, it is to the professions who on behalf of the public, fall the responsibility for setting the standards both for the conduct of their members, but importantly also on the quality of the services provided by, in our case, Medical Laboratories be they public or private. In both environments a major resource limitation is the amount of money available to fund the Laboratory Services and considerable pressure will be placed upon us to provide more output for less. This will result in pressure to choose the laboratory providing the "cheapest" test available. It is our responsibility in the public interest to ensure that the quality is not compromised.

It is these two areas which will demand considerable time of this Institute over the next few years as to achieve consensus will be difficult as many current practises and beliefs will need to be challenged. This is evidenced already in your concerns over the impact of "direct supervision" as this is seen by many to be a threat to established practises. I urge you to put aside your own situation and take the perspective of the patient and decide for that which offers the greatest protection to the public.

I hear statements that the category of Laboratory Assistants is to be phased out, again I personally do not accept this and am convinced that there will be for the foreseeable future a need for Laboratory Assistants in the New Zealand Medical Laboratory Service. However, they are not and should never be used as pseudo-technologists irrespective of the competency of individuals. We only have to look overseas where many of the challenges and problems that we face are the same and on the question of Laboratory Assistants it is with interest to note that in the United Kingdom they are moving to introduce the category of Medical Laboratory Assistants. They obviously have determined a need.

During the past year we have established discipline based Special Interest Committees which I am sure will form the basis for providing the direction for educational policy standard and Code of Practice for the profession. It will be from these Committees that the Executive will seek guidance and counsel.

On this occasion I must formally welcome Maree Gillies as recently appointed Journal Editor, which again is an Executive position of considerable importance and requiring substantial time-involvement. We wish Maree well in this position.

In conclusion I thank you for the opportunity to serve, I sincerely hope I have met your expectations and have represented your interests as you would have had me do. I wish you well and can assure you with Paul McLeod we will progress still further as our place in the Health Care delivery system is more fully understood by both our professional colleagues and the public.

It is, however, of considerable disappointment that a major concern of the Institute has not been resolved and that is the question of the inequities in the funding of the Public Hospital and Private Medical Laboratories. It is very apparent to me, your Council, and other senior members of our profession, that the problems while well understood and acknowledged by department officials is not reflected by their political masters in that there is an apparent unwillingness on the part of the politicians to either comprehend or attempt to satisfactorily resolve the problem. I am not convinced that a change in government will change the situation as I am equally convinced that there are pressures directing the decisions of the politicians reflecting other than common sense and public interest.

Another matter of concern is what I consider to be an attempt at brain-washing by current political direction. This is the programme to convince us that the delivery of the Health Service is just another commercial enterprise and that the people we serve are not patients, but clients or customers. Health is different, for those needing our service cost should not be the basis for the quality or quantity of service delivered. In a commercial situation clients or customers generally have a choice, but in the Health Service in most situations the patients have none.

However, we each have a responsibility to ensure that we deliver our service as effectively and efficiently as possible but as previously stated with no compromise on quality. This may mean that individually we will have to take some very difficult decisions such as accepting that an adequate high quality service could be delivered more cost-effectively by another or a rationalized Laboratory Service. If we are to be regarded as a responsible profession I suggest that we must confront these decisions face-on and where clearly in the public interest we must accept and embrace the consequences.

On a more positive note, it is especially gratifying that in spite of the establishing of the Union at considerable additional personal expense to us all, the membership of the Institute has remained relatively stable. This, to your Council, is a sign of good faith and confidence and support for the Institute and your Executive. On the basis of this support we have employed an Executive Assistant to carry out many of the operational activities of the Secretary. It is planned that this will form the basis for a permanent and established Executive which will give an improved service to you all. While I admit that there are justified complaints about unnecessary delays in attending to Institute matters it must be remembered that all of your Executive undertake their duties and responsibilities voluntarily and many hold senior full-time positions around which they must fit their Institute activities.

In defence of all of the members of your Council I personally can without reservation state that they have delivered "their all" and serve out of a genuine desire to improve the lot of the profession as a whole.

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Biochemistry Stat Analysis : The Green Lane Experience with the Nova Stat Profile 5.

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Abstract

A brief comparative study was performed between the Nova Stat Profile 5 (NSP5) and our previous methods for the NSP5 tests (ABL3, blood gas analyser; Corning 902, Sodium and Potassium; EPX, Choride; Haematocrit centrifuge, Haematocrit). Blood gas specimens from Theatre and Intensive Care were processed by our previous methods and then twice by the NSP5.

Imprecision expressed as Standard Deviation, calculated from differences between pairs, was acceptable (excluding Haematocrit no Coefficient of Variation exceeded 2%).

Inaccuracy, assessed using Linear Regression according to Deming, gave a bias of -1% for the NSP5 against the ABL3 for pO_2. Choice of quality control material is limited because dyes and preservatives reduce the life of the membranes. Turnaround time has been significantly reduced due to shorter analysis time and interfacing with laboratory computer system. This factor plus the ability to provide Glucose and Ionised Calcium has greatly improved our service.

Key Words

Blood Gas Analyser, Ion Selective Electrodes, Ionised Calcium.

Introduction

The Analyser

On the 5th September, 1989, the Biochemistry Department at Green Lane Hospital installed a Nova Stat Profile 5 analyser (NOVA Biomedical, Massachusetts, U.S.A.), supplied by Bayer Diagnostics. The Nova Stat Profile 5 analyser (NSP5) combines blood gas and related stat tests of serum, plasma, whole blood and expired gas for in vitro diagnostic use.

These features are summarised in Table 1. The NSP5 requires a sample volume of 250μl. While it has the ability to accept capillary samples, we do not utilise this feature because of the large sample volume needed. Results are produced routinely within 45 seconds, or within 180 seconds if a 1 point calibration is required.

Table 1.

Features of the NSP5

Measured Parameter	Calculated Parameters	Acceptable Samples
pH	Oxygen Saturation	Whole Blood (^)
pCO_2	Base Excess of Blood	Plasma
pO_2	Base Excess of ECF	Serum
Sodium	Bicarbonate	Expired Gas
Potassium	Standard bicarbonate	
Chloride	Total Carbon Dioxide	
Ionised Calcium	Oxygen Content	
Glucose	Normalised Calcium	
Haematocrit	Haemoglobin	
	Anion Gap	
	Osmolality (I)	

(^) Sodium and lithium heparin are the recommended anticoagulants for pH, pCO_2 and pO_2. EDTA, citrate, oxalate or sodium fluoride are not recommended for use during electrolyte analysis. Oxalate and sodium fluoride can be used for glucose analyses. Ammonium heparinised capillary tubes have been used with acceptable results.

(I) Requires BUN value to be entered.

The Laboratory

The NSP5 is located in the 'Bypass Bay', in the Biochemistry Department of Green Lane Hospital. This area processes all the Blood Gas samples on the Green Lane site. This area is also equipped with: an ABL3 Blood Gas Analyser (Radiometer, Copenhagen, Denmark), a Corning 902/Na/K ISE analyser (Corning Medical and Scientific, Essex, England),a Haematocrit centrifuge, a small bench centrifuge and a Schimadzu Double Beam Spectrophotometer. Its primary function is to provide a stat service to the Cardio-Thoracic Surgical Unit both during Bypass surgery and while monitoring post-operative recovery in the Intensive Care Room.

Workload

This area has a throughput of approximately 100 samples per day. Sixty to eighty percent of this workload goes through the NSP5. All Theatre samples are processed on the NSP5 for any combination of Blood Gases, Potassium, Haematocrit, Ionised Calcium and Glucose, as requested. The samples from the Intensive Care Room are divided between the ABL3 and the NSP5. Some of these samples require Ionised Calcium and Glucose and therefore must be analysed on the NSP5. These samples are all whole blood. The Chloride electrode is not utilised.

Results

Imprecision and Inaccuracy

A brief comparative study was performed on installation to determine if there were any clinically significant differences between the NSP5 and the other analysers sharing the workload.

It was performed over 2 consecutive days and involved a total of approximately 50 samples. These samples were routine samples from Theatre and ICR. The sample was analysed first on the ABL3 Blood Gas Analyser and then twice on the NSP5. A separate cup was split off for a Sodium and Potassium on the Corning 902 and a spun Haematocrit was performed if requested from Theatre.

Imprecision data from this study is presented in Table 2, and data on inaccuracy in Table 3. Linear regression according to Deming [2] was used to calculate the values shown for the correlation coefficient (r) and regression coefficient (slope).

Note:

1. Ionised Calcium is not included as our laboratory has no other method with which to compare it.
2. Glucose is not included as all of the patients in the study were on paracetamol of varying levels. (It is known that paracetamol produces a positive interference of 1.12 mmol of glucose per mmol of paracetamol) .
3. Chlorides were tested over 4 days, 2 months after the other comparisons as we had no current method for Chloride. They were performed on whole blood on the NSP5 and spun down to process on the EPX as plasma.

The pO_2 showed a bias of -1% and is currently the only parameter which requires an offset value.

Quality Assurance

A. Internal

Due to the greater expense of the Nova Controls and a desire to use more than one type of Quality Control Material we considered several controls, as listed in Table 4.

Our aim was to find a control suitable for both the NSP and the ABL3. Therefore the Blood Gas controls with electrolytes were also processed through the ABL3.

1. Nova Multipak Control with Glucose
   - (i) The ranges provided do not accommodate other analysers
   - (ii) The results obtained from the ABL3 were significantly different to the NSP5 range of results.

Table 2
Within batch imprecision

Analyte	Unit	Standard Deviation	Number of Pairs
pH		0.003	50
pCO_2	kPa	0.070	50
pO_2	kPa	0.030	44
Sodium	mmol/l	0.680	50
Potassium	mmol/l	0.045	50
Glucose	mmol/l	0.220	50
Chloride	mmol/l	0.940	50
Ionised Calcium	mmol/l	0.011	50
Haematocrit		0.020	49

The standard deviation was calculated from differences between pairs, [1].

Table 3.
Inaccuracy

Analyte	Comparison Analyser	r	slope	intercept	std error of regression	no.
pH	ABL3	0.990	0.964	0.258	0.010	50
pCO_2	ABL3	0.961	1.080	-0.308	0.250	50
pO_2	ABL3	0.998	1.005	0.004	0.551	44
Na	Corning 902	0.932	1.018	-2.021	1.771	50
K	Corning 902	0.983	0.917	0.334	0.128	50
Hct	Centrifuge	0.974	1.049	-0.021	0.013	49
Cl	Abbott EPX	0.898	0.820	18.213	1.811	37

The results from the comparison analyser were plotted on the abscissa.

Table 4.
Controls Considered for Use on the NSP5

	Analyte								
Control	pH	pCO_2	pO_2	Na	K	Glu	Cl	iCa	Hct
Nova Multi	*	*	*	*	*	*	*	*	
Nova Hct									*
Dade	*	*	*	*	*		*	*	
Biorad	*	*	*	*	*		*		
Gibco Ref.				*	*	*	*	*	
Monitrol 1				*	*	*	*	*	
Monitrol 2				*	*	*	*	*	
Gibco Low				*	*	*	*	*	
Gibo High				*	*	*	*	*	

Abbreviations:
* indicates the analytes present in the control.

Nova Multi — Nova Stat Profile Control Multipack with Glucose (Nova Biomedical, Massachusetts, U.S.A.)
Nova Hct — Nova Haematocrit Control Multipack (Nova Biomedical, Massachusetts, U.S.A.)
Dade — Aqueous Blood Gas/Electrolyte Control (Dade, Florida, U.S.A.)
Biorad — Blood Gas Plus E Control (Biorad, California, U.S.A.)
Gibco Ref. — Gibcontrol Unassayed Reference Control Serum (Life Technologies, Auckland, New Zealand)
Monitrol 1 — Moni-Trol, ES Level I.X (Dade, Florida, U.S.A)
Monitrol 2 — Moni-Trol. ES Level II.X (Dade, Florida, U.S.A)
Gibco Low — Gibcotrol Unassayed Low Control Serum (Life Technologies, Auckland, New Zealand)
Gibco High — Gibcotrol Unassayed High Control Serum (Life Technologies, Auckland, New Zealand)

2. Dade Blood Gas and Electrolyte Control
   (i) Contain coloured dyes and additives which reduce the life of the membranes.
   (ii) Imprecision on the NSP5 for pH was unacceptable but all other results on both analysers were acceptable.
3. Biorad Blood Gas with Electrolyte Control
   (i) Specifically contains no dyes or preservatives for use on the Stat Profile range of analysers.
   (ii) It performed welll on both analysers.
   (iii) When initially tested it did not contain Ionised Calcium, however it has since been added and we are currently re-evaluating its performance.
4. Gibcontrol and Monitrol Controls
   (i) These are all serum controls.
   (ii) All contrain preservatives which will reduce membrane life.
   (iii) All contain varying amounts of salicylate and paracetamol which positively interfere with Chloride and Glucose respectively.

We have also tested in-house, aqueous Glucose controls. The results for these specimens run on the NSP5 compare well with those run on the Abbott EPX Hexokinase method for Glucose. (Note: Aqueous controls must contain 0.9% saline for the sample to be detected by the NSP5).

B. External

We participate in the Australian Blood Gas Survey. The sample matrix is a red fluorocarbon which seems to leave an oily residue in the flowpath and stains the Chloride membrane bright red, rendering it useless. Therefore we now remove all electrolyte electrodes and replace them with blanks before analysis of these samples. The results from cycle 4 were excellent. However, the first 3 samples of cycle 5 indicate a significantly low bias on the pO_2channel at tensions below 15kPa. This is currently being investigated.

We have just started to run the Wellcome Survey for Chloride and Glucose as it contains no salicylate or paracetamol. These results are unavailable at present.

From these assessments we have concluded that only controls without dyes and preservatives are suitable for the NSP5. To reduce the number of controls being run we are looking for Blood Gas Controls which also contain Sodium, Potassium, Chloride, Ionised Calcium and Glucose.

Our current Quality Control Programme for the NSP5 is as follows:

Internal

1 Nova Multipack with Glucose control is opened daily. This is recapped, refrigerated and resampled 4 hourly for Glucose only.

1 Nova Haematocrit control is sampled daily. This is also recapped and refrigerated, and lasts approximately 5 days.

1 patient comparison between the NSP5, the ABL3 and the Corning 902 is run daily.

External

RCPA Quality Assurance Programme — Blood Gases

Wellcome Diagnostics Clinical Chemistry Quality Assessment Programme.

Maintenance

To date we have found the prescribed maintenance programme to be suitably timed for the most part. However, we do find it necessary to change the gas membranes 2-weekly instead of monthly.

Daily maintenance is normally completed within 15 minutes, or 30 minutes if pre-heater cleaning is required. These times reflect 3 minutes for a gas prime if the humidifiers are topped up, 5 minutes for pre-heater cleaning, 5 minutes for flow-cell conditioning after pre-heater cleaning and 2 x 6 minutes for 2 full calibrations at the end. During these set standing times it is possible to perform other tasks. Teaching and performing the maintenance are simple operations.

Weekly maintenance adds about 5 minutes to daily maintenance if time is organised efficiently. It involves changing the humidifier water, cleaning the air filter and massaging the reagent tubing in the pinch valves.

Monthly maintenance takes about 10 minutes. It involves changing the Waste/Reference pump tubing segments.

Membrane changes are very simple to perform. However,

to achieve maximum performance, most require either 10 to 15 minutes to equilibrate to 37 degrees Centigrade or 5 minutes of conditioning with blood.

The time required for the temperature to return to 37 degrees Centigrade after the front panel has been open is exceptionally brief, often just a matter of seconds and never more than a couple of minutes. This is an advantage over the ABL3 which has a minimum of 30 minutes to equilibrate after similar treatment.

Interfacing with the Laboratory Computer System

The NSP5 is interfaced with the laboratory's ADDS MENTOR computer system. During analysis the patient demographic screen appears and through this it is possible to enter the sample's lab no., the patient's hospital number, the time the specimen was taken and the fraction of inspired oxygen that the patient is being administered. All this information is transferred onto our patient report. (Note — the temperature may also be entered and corrected values printed. However, it is the policy at Green Lane Hospital to report all Blood Gases at 37 degrees Centigrade).

The NSP5 has no alpha characters on its keyboard. Both our laboratory numbers and patient numbers have alpha characters. However, we have overcome this in the following manner. Although our laboratory number is 2 alpha 4 numeric we only have to enter the numeric portion. This is because the alphas remain the same for 10,000 samples and it is very easy to programme the computer to add these alpha characters. A menu item has been added to enable us to change the alpha prefix when necessary.

Our patient numbers are 3 alpha 4 numeric so we have created 2 digit number codes for the alphas, e.g., A = 01, B = 02, etc. If the patient number is not recognised by the computer (either through incorrect entry or because that patient number has never been registered before) the results are sent to a dumping file from which it is possible to retrieve these results and transfer them into the correct patient file. To detect these errors a checklist is regularly printed.

We have created patient numbers for our quality control material and these are also sent down to the appropriate quality control file in the computer. There is a sample option in the patient demographic screen to indicate if a specimen is arterial, venous, capillary, expired gas or Q.C. If the Q.C. option is entered it will remove any offset values which have been entered.

The NSP5 has an inspired oxygen default value of 20.9%. Our interface is programmed to transmit this as NA (data not available) when no value is given on the request form. It is also programmed to transmit an entered value of 22% as AIR. Using these code numbers we are able to get around the problem of having no alpha keys.

The Intensive Care Room has its own computer terminal from which they can call up results. This reduces the number of phone calls both to and from the laboratory. Shortly there will be computer terminals installed in the Bypass Theatres. This all contributes to a much faster turnaround time as there is no waiting for a report to be printed. Staff time is not wasted on the end of a telephone either. At the moment the only significant delay is from the human transport system required to get the specimens to the laboratory. This will also be reduced in a few months when a pneumatic tube system is in operation. Ultimately the medical staff could have the results on screen within 3 minutes of taking the specimen.

Problems

A. Glucose and Chloride Membrane Life
   1. Initially 3 to 4 days.
   2. Other users report a life of 10 to 14 days.
   3. Since we have stopped using quality control material containing dyes and preservatives the life of these membranes has extended to approximately 7 days.

B. Nova Haematocrit Control
   1. This would frequently not produce a result and instead print 'Bypass Valve Bad'.
   2. This would generally indicate some form of block but routine blood gases processed immediately after would not reproduce this error.
   3. It has been rectified with the latest software version.

C. Sample Probe
   1. Presentation of the probe was frequently accompanied by a spitting action of residual fluid in the lines.
   2. This has been significantly reduced by the latest software version.

D. 'Cal Flow time Slow'
   1. This error message indicates some form of block.
   2. It appeared frequently in the first three months of use.
   3. It proved to be the result of incorrectly following the maintenance procedure for changing the Waste/Reference Pump Tubing.
   4. The small piece of tubing lying in the Bypass Valve was inadvertently left in when the pump tubes were replaced and was badly blocked.

E. Default Haemoglobin
   1. Haematocrit is measured by electrical impedance of red blood cells after correcting for the electrical effect of Sodium.
   2. Haemoglobin is calculated from Haematocrit.
   3. Therefore if Sodium is suppressed, no Haematocrit is displayed and no Haemoglobin can be calculated.
   4. When Haemaglobin cannot be calculated a default value of 143 g/l is printed.
   5. This value will have a small 'd' beside it for default as opposed to a small 'c' for a calculated result.
   6. The default value was inadvertently reported by a staff member, unaware of the significance of the 'd', when they suppressed an unwanted Sodium result.

F. Ionised Calcium
   1. As this is the first time we have offered this test a significant investigation was performed as to the suitability of the anticoagulants used in our Blood Gas Syringes.
   2. Our adult Blood Gases are collected into pre-heparinised 5ml Terumo Syringes.
   3. As long as these contain a minimum of 3ml of whole blood, the Ionised Calcium is not significantly affected.
   4. Neonatal Blood Gases are collected into manually heparinised 1ml Terumo Syringes and these were found to significantly reduce the Ionised Calcium result.
   5. Various concentrations and brands of Heparin were tested and the only suitable brand was that produced by Radiometer, 'Titrated Heparin for Ionised Calcium'.
   6. We are currently investigating a 1ml Blood Gas Syringe pre-heparinised with 15 Units of lyophilised lithium heparin.

Technical Support

The support from Bayer Diagnostics (the agent for NOVA biomedical) has been excellent. The sales staff are regularly in touch and have answered my numerous questions promptly. Their stock management system is well organised and the service department has only been called out once.

There was a comprehensive 3 day course which was most worthwhile as we had previously had very little hands on use of our own NSP5. On day 1 we were asked what questions we had and were promised answers by the end of the course. Then the menus and their functions were explained. The afternoon was spent totally dismantling the analyser and stripping it down to the motors. Day 2 was spent fixing faults put on the analysers. Day 3 started with a test of what had

been learnt in the previous 2 days. Afterwards there was an opportunity to go over maintenance procedures and a data management package which is also available. Four teaching manuals were used in conjunction with the course and the participants were expected to work through these as well. I have found these to be most useful in training staff back in the laboratory. Overall I found the course thorough, practical and the format flexible. The flexibility means that sales representatives through to nurses and laboratory staff can be taught on this course. However, it would be most beneficial to attend with others of a similar background.

Conclusion

It would be wise to note that this analyser has 3 times as many channels as an ordinary Blood Gas Analyser and it would not be unreasonable to expect more down-time than on an ordinary Blood Gas Analyser, for both maintenance and trouble-shooting.

Our NSP5 has had a lot of down-time due to problems with faulty Potassium and Ionised Calcium electrodes and a high failure rate with Glucose Membranes. The company is open about these particular batch problems and is happy to replace those batch numbers which are known to be affected. The design is such that it is very easy to maintain, remove, and replace electrodes and their membranes.

The screen has many prompts and is very user-friendly. The manual is well set out, easy to follow and has a comprehensive trouble-shooting section. All of these features have meant that the staff has had no difficulty in learning how to operate it and are generally happy with its operation.

The service to Theatre and ICR has been greatly improved both in turnaround time and with the provision of Ionised Calcium and Glucose on the Blood Gas specimens.

Acknowledgements

The author wishes to thank Roger Johnson for critically reading the manuscript.

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Laboratory Technology at Norfolk Island

Malcolm Rees

Geographically, Norfolk Island lies at the intersection of two imaginary lines. One, north from Christchurch, one east from Brisbane.

The Island is 8km by 5km. The climate would be considered sub-tropical with temperatures rarely going above 30°C or below 10°C. Often the humidity reaches 99%.

The population is approximately 2,500 people, consisting of residents and both Australian and New Zealand expatriate workers, like myself.

Although it is an Australian territory, Norfolk Island has its own Administrative system, including a Legislative Assembly, local Government and Government Departments.

Health System

A recently introduced health system on Norfolk Island requires all adults to pay $120.00 each per annum for health care. This provides the health care with an excess of $2,000 per annum. In other words, you pay the first $2,000 — after that care is free.

The hospital has two Doctors, approximately 18-20 nurses, a small Dentistry department, X-ray, Pharmacy and Laboratory.

The hospital is self funding, by charging for all treatment procedures and consultations. People attending the Laboratory receive an invoice for the laboratory tests to be done, at the time of blood collection. The charges are set according to the Australian schedule of charges.

The Laboratory Technologist position is a sole charge position. Most facets of laboratory work are performed here, including biochemistry, haematology, immunology, microbiology and blood bank.

The laboratory processes some 150-200 samples per month. The type of work and specimens is similar to New Zealand. The usual swabs, urines, biochemistry tests, full blood counts, coagulation tests are done here. Of course you have to be able to do them all.

I am the only scientific reference on the Island, thus am often called upon to perform other than Medical Laboratory tests e.g., cultivation of a Tyromyces Fungus, for the Forestry Department. This is used to prevent the transfer of a disease called "Phellinus Noxious" on newly cut tree stumps.

The Wildlife Department are involved in a breeding programme with the indigenous "green parrot". From time to time I check the parrot faeces for pathogens (fortunately someone else catches the parrots).

I am also the local vet laboratory and receive specimens from all sorts of animals.

This is an interesting place to work. I have found a high degree of versatility and ingenuity necessary and if you can cope with this, work here can be a lot of fun.

Malcolm Rees is a New Zealand Medical Laboratory Technologist currently working in the hospital on Norfolk Island.

Malcolm trained at Middlemore Hospital and worked post qualification at Te Kuiti, Middlemore and Rotorua Hospitals before taking up his present position. His wife Lorraine is a trained nurse but currently spends most of her time looking after their two young children.

Dumping Rubbish — The Pacific Way

Proposals to dump hazardous and supposedly safe municipal waste are constantly being made to Island Governments. But most do not have the technical capacity to evaluate the effects of such schemes; The Marshall Islands Government was attracted by the idea of building the height of an island using garbage to offset the rising sea level expected because of the Greenhouse effect, but did not take into account the damage caused by the garbage leeching into water supplies and marine ecosystems.

South Pacific nations are under increasing pressure from the Northern hemisphere countries to become a dumping ground for hazardous waste — and this pressure will grow even faster as the major industrial nations run out of alternatives for waste disposal. Mr Peter Dunn, New Zealand's Associate Environment Minister, recently told the Environment — 90 Conference held in Sydney, that the main attraction for Pacific nations was that becoming a garbage dump was a means to earn much needed money, just as the Marshall Islands had been tempted to accept huge quantitites of commercial and household refuse from the United States mainland.

Dumping Sewage — A Matter of Ingenuity

Western Samoa does not have any large scale sewage treatment plant. Sewage disposal carried out by private contractors are therefore based mainly on ingenuity. Some dig trenches in isolated areas and allow the waste to decompose naturally. Others spread the waste over a large surface area, allowing the sun, rain and soil absorption to break it up.

Some villages on the south coast of Western Samoa's main island of Upolu had their water supply disconnected for several weeks when raw sewage entered the system. Water was brought in by trucks. A private septic tank cleaning company had dumped the sewage near a water supply intake at Togigiga, 14 miles south, across a mountain range from the capital Apia. The workers were warned of the water supply intake but dumped anyway. Solid waste on the bank of the river had to be cleared physically to prevent more contamination during rain.

Further Cause for Pacific Anxiety

Johnston Atoll, about 1300kms south-west of Honolulu, is a bleak, treeless, uninhabited former bird sanctuary. Originally there were just two tiny islands on the atoll — Johnston and Sand — but they have been expanded into artificial islands created for military installations. Johnston Island has been increased 12 fold to 260 hectares.

The United States Army's $3.1 billion plan to destroy its aging chemical weapons arsenal, has stirred fears of potentially disastrous consequences. Testing for the full scale burn-off of nerve and mustard gus stockpiles removed from Okinawa, and moved to the Atoll in 1971, is due to start soon. The chemical weapon destruction plant called The Johnston Atoll Chemical Agent Disposal System (JACADS) has been built over several years.

The army plans to ship out chemical weapons from West Germany and destroy them in the four JACADS incincerators on Johnston Island. Among the United States stockpile in Germany is an estimated 400 tonnes of lethal nerve gas — GB (SARIN) and VX — contained in about 100,000 8" and 150mm shells. Nerve gas causes convulsions and death — sometimes within 10 minutes of exposure. Mustard blistering agents H, HD, and HT are also among the weapons.

The Pacific paradise at our back door is in peril. The region is a mosaic of serious actual or potential environmental problems — hazardous waste dumping, drift net fishing, ocean dumping, Greenhouse effect, ozone depletion, nuclear tests, deforestation, nerve gas burn-offs, coral reef damage, mining devastation and pollution.

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A Reference Range for the Haematological Changes of Pregnancy

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Abstract

Full blood counts processed on automated Coulter cell counting analysers from 2,319 women with normal pregnancies, were used to re-establish a reference range. The main differences from previously published data were a fall in haemoglobin and mean cell volume after 32 weeks gestation, and an eosinophilia detected in 33% of Samoan women. Analysis of variance also showed significant differences between the races in the white blood count ($p = 0.0006$) and platelet counts ($p < 0.0005$), with a higher level of platelet counts identified in Maori women (in comparison with the Europeans and other Polynesian groups studied).

Introduction

In view of the advent of automated cell counting technology, the reference ranges for haematological parameters in pregnancy have been re-established for our laboratories. Over the period mid-1985 until late 1986, full blood counts were obtained from healthy pregnant women attending Ante-natal Clinics at both Middlemore Hospital (MMH) and National Womens Hospital (NWH) in Auckland.

The full blood count samples collected in EDTA at routine Ante-natal clinic visits, were analysed with reference to weeks of gestation and ethnic origin. Samples were only included from women whose singleton pregnancies were clinically assessed as normal, who had certain dates (confirmed by clinical examination) and ethnic origin, and whose laboratory investigations failed to identify co-existent haematological disorders.

Methods

Samples were processed on the Coulter S+6 at MMH and the Coulter S+3 at NWH. Both machines were controlled daily with the Coulter 4C standard and the Auckland standard (produced at Auckland Hospital for use in the Auckland Hospital Board Laboratories). Also, a local quality control sample was used at MMH to check for any drifts in the results during the day. References ranges for the haematology (Coulter) parameters were calculated using the formula mean ± 2 standard deviations (±2S.D.).

Differential white counts were performed manually counting 100 cells. Reference ranges for the white cell differential were determined as from the 3rd to the 97th percentile because of skewardness in some of the data. Mean platelet volume (MPV) and platelet cell distribution width (PDW) were collated from the NWH data only. Erythrocyte sedimentation rates (ESR) were not performed as the wide range of values in pregnancy do not generally have clinical significance [1].

Samples were excluded from the data where a co-existent haematological disorder was identified such as thalassaemia, iron deficiency, and immune thrombocytopenia purpura. Data from further patients was excluded from the analysis because of abnormal pregnancies, such as those with pre-eclampsia and diabetes. In this patient group, iron supplementation was generally only given when there was a significant fall in haemoglobin or mean cell volume (MCV).

The results were grouped in five gestational periods: 1. earlier than 20 weeks; 2. 20-27 weeks; 3. 28-31 weeks; 4. 32-35 weeks and 5. 36 or more weeks. Ethnic origin was obtained by direct questioning and/or from patient registration data. Inter-racial comparisons were made by pooling the results obtained during the third trimester from 28 weeks until term i.e., gestational periods 3-5. Five

Table 1

Reference Ranges in Pregnancy Coulter Parameters (mean ± 2 S.D.)

	Less than 20 weeks n = 468 (273)*	20-27 weeks n = 386 (251)	28-31 weeks n = 572 (245)	32-35 weeks n = 651 (261)	36 weeks or greater n = 242 (121)
WBC x 10^9/l	5.6-13.7	6.1-15.3	6.1-15.3	5.5-14.4	5.1-14.5
RBC x 10^{12}/l	3.4-4.9	3.3-4.6	3.2-4.5	3.2-4.8	3.4-4.8
Hb g/l	105-140	100-140	100-140	96-138	96-139
PCV	31-42	29-40	28-39	28-41	28-41
MCV fl	77-96	77-97	77-97	74-97	74-96
RDW %	11.3-15.6	11.1-14.6	11.2-14.8	11.5-15.6	11.3-16.8
MCH pg	26-33	26-34	26-34	25-33	25-33
MCHC g/l	326-360	329-357	324-356	323-355	325-353
Plts x 10^9/l	170-411	178-406	170-430	160-440	168-425
PDW % *	14.8-16.9	15.0-16.8	15.0-17.2	15.0-17.6	15.1-17.4
MPV fl*	6.6-9.8	6.5-9.7	6.4-9.8	6.3-10.1	6.6-9.8

*numbers in brackets refer to the number of samples analysed for PDW and MPV values.

Table 2
Differential White Cell Changes by Gestational Group (34rd-97th percentile)

	Less than 20 weeks n = 468	20-27 weeks n = 386	28-31 weeks n = 572	32-35 weeks n = 651	36 weeks or greater n = 242
Neutrophil bands x 10^9/1	0-0.9	0-1.1	0-1.1	0-0.9	0-0.9
Neutrophils segmented x 10^9/1	3.7-10.1	4.6-11.8	4.7-12.1	4.2-11.0	4.1-11.1
Lymphocytes x10^9/1	1.0-3.9	1.0-3.7	1.0-3.5	1.0-3.4	1.0-3.6
Monocytes x10^9/1	0-1.0	0-1.0	0-1.1	0-1.2	0-1.1
TOTAL GROUP					
Basophils x 10^9/1	0-0.1	0-0.1	0-0.1	0-0.1	0-0.1
Eosinophils x10^9/1*	0-0.8	0-0.8	0-0.9	0-0.8	0-0.7
Eosinophils x 10^9/1 excluding Samoan population	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5

* see Table 5 for different ranges in racial groups studied.

haematological parameters (haemoglobin, MCV, platelet count, total white cell count and eosinophil count) were assessed to make the comparisons between races.

Results

During the period of study, 2,319 full blood counts were available for analysis, 1,168 from women at MMH and 1,151 from NWH. The following number of samples were obtained from each gestational period: 1, n = 468; 2, 386; 3, 572; 4, 651; and 5, 242. The smaller number sampled at 36 or more weeks of gestation reflects the local practice where most of the women are seen by their primary care physicians during this period, with a minor contribution also from premature labour.

The Coulter Parameters (Table 1)

The red cell parameters changed very little throughout pregnancy although in the last 8 weeks a slight drop in haemoglobin and MCV was noted, possibly due to diminishing iron stores in our patients, as at that stage in pregnancy other workers have shown a rise in haemoglobin [2,3], and a rise or fall in MCV dependent on the administration or not of iron supplements. There was no change in the platelet counts. The total white count was the only parameter which showed a significant change, with a gradual climb until 28-31 weeks and then a decline. As well as an increase in the mean counts, there was a small population of women (approximately 2-4% at various stages of pregnancy) who had a more marked elevation in counts, reaching as high as 19x10^9/1 between 28-36 weeks (Figure 1). In comparison to our non-pregnant reference range which is 4-11 x 10^9/1, the total white count was increased even at the first antenatal visit before 20 weeks and remained elevated until term (Table 1).

The Differential Count (Table 2)

The main change in the differential white count throughout the pregnancy was an increase in the neutrophils until 28-31 weeks and then a decline until term, parallelling the change in total white count. A mild shift to the left was found in 67% of the samples processed at all stages of pregnancy, with a mean of 0.23x10^9/1 neutrophil bands and a maximum recorded value of 2.5x10^9/1 band forms. In addition to these changes, an eosinophilia was found among the Samoan population (see below). The other white cells did not change.

Racial Differences

The numbers of patients from the largest racial groups sampled after 28 weeks were as follows: Tongan, n = 90; Samoan 304; Cook Islander 146; Niuean 81; European 416, Maori 354. Analysis of variance showed significant differences between the races and the blood parameters MCV ($p = < .0005$) and Hb ($p = < 0.0005$) but in practical terms these changes are probably clinically insignificant. The values for haemoglobin and MCV are lower in the Cook Island and Maori women (Table 3), possibly due to the presence of alpha thalassaemia trait in a significant number from those populations [5]. Having studied larger numbers of patients since this previous publication from our institutions the laboratory at MMH (employing haemoglobin electrophoresis and gene studies on cord blood samples) has identified the percentage of each population with either — $\alpha/\alpha\alpha$ or $-\alpha/-\alpha$ genotypes to be as follows: Maori 15.6%, Cook Islanders 12.7%, Samoans 2.5%, Tongans 1.8% and Niue Islanders 0% — Europeans not formally studied, but incidence known to be close to 0%. [Personal communication from J. Rutherford].

Analysis of variance also showed minor but significant differences between the races in the white blood count ($p = 0.0006$) and platelet counts ($p = < 0.0005$) (Table 4). As in a recent study comparing platelet counts between Maori and non Maori men [6], we have also identified a higher level in our Maori women in comparison with the Europeans studied — whether these differences are genetic or an epidemiological marker for disease (such as cardiovascular) is not yet known. An unexpected result was found in the eosinophil counts (Table 5), with a significant increase identified in approximately 33% of the Samoan women, in comparison with the other Polynesians and the European group.

Conclusion

A reference range has been re-established for the haematological changes that occur in normal pregnancy in European and Polynesian populations. Although differences

Table 3
Comparison by Race of Haemoglobin and MCV After 28 Weeks Gestation

RACE	No. OF SAMPLES	HAEMOGLOBIN g/1		MCV fl	
		range*	mean	range*	mean
Tongan	90	103-137	120	76-94	85
Samoan	304	98-138	118	76-96	86
Cook Islander	146	94-138	116	74-96	85
Niuean	81	97-143	120	79-97	88
European	416	96-138	117	79-98	88
Maori	354	92-132	112	72-96	84

* mean ±2 SD.

Table 4

Comparison by Race of White Blood and Platelet Counts After 28 Weeks Gestation

RACE	No. OF SAMPLES	WHITE BLOOD COUNT x10⁹/1		PLATELETS x10⁹/1	
		range*	mean	range*	mean
Tongan	90	5.1-14.3	9.7	171-391	281
Samoan	304	5.7-14.5	10.1	162-428	295
Cook Islander	146	5.3-14.3	9.8	180-420	301
Niuean	81	6.6-15.0	10.8	158-472	315
European	416	5.5-16.0	10.5	157-425	291
Maori	354	5.7-14.7	10.2	183-457	320

* mean ± 2 SD.

Table 5.

Comparison by Race of Eosinophil Values After 28 Weeks Gestation

RACE	No. OF SAMPLES	RANGE x10⁹/1	MEAN x10⁹/1
Tongan	90	0-0.6	0.2
Samoan	304	0-1.2	0.4
Cook Islander	146	0-0.6	0.2
Niuean	81	0-0.5	0.2
European	416	0-0.5	0.1
Maori	354	0-0.5	0.1

* mean ± 2 SD.

have been documented between the various gestational and racial groups, in practical terms these are minimal. Our data suggest that one reference range could be used for all races at all gestational intervals (Table 6) except perhaps for the following situations, firstly the reduction in the haemoglobin and MCV after 32 weeks of gestation, and secondly the elevated eosinophil counts in the Samoan population.

This reduction in haemoglobin and MCV is in contrast to other published reference ranges where these parameters rise during the later weeks [2,3]. The reasons for our lower levels are not known, but may be nutritional, or related to the local policy on iron supplementation, or due to the greater parity of some of our patients. In addition, those women attending the antenatal clinics in the earlier stages of pregnancy tend to have a higher standard of living than those who only attend late in pregnancy. That iron deficiency may be contributing is supported by the steady platelet counts, which are in contrast to most publications which report a decrease in the later stages of normal pregnancy [7,8].

Although alpha thalassaemia occurs in most of the racial groups studied, it is unlikely that this abnormality, present in just a minority (approx 6%), is a major influence. However, the combination of this haemoglobinopathy with absolute or relative iron deficiency due to the increased iron utilisation by the fetus may produce greater red cell changes. If there is a significant fall in these indices after 32 weeks gestation, we would recommend iron supplementation rather than investigations for the (probably) clinically insignificant alpha thalassaemia ($-\alpha/\alpha\alpha$ or $-\alpha/-\alpha$) in the Polynesians. However, investigations for haemoglobinopathies (including family studies) in other racial groups and in those Polynesians with Asian mixed blood where the genotype $\alpha\alpha/--$ occurs, may be important to exclude significant abnormalities in the fetus/child such as HbH disease.

The eosinophilia detected in a third of our Samoan population is of interest. In contrast to another study performed in Tokoroa which identified an eosinophilia in Cook Islanders [9], our investigations have not shown any abnormality in that population. The causes of the eosinophilia is not clear, nor do we have information on the birth place of the Samoan women studied. Thus the clinical significance, and whether further investigations are needed in such an individual, is not known and may warrant further study.

Finally, the general increase in white count throughout pregnancy is thought to be secondary to an increase in oestrogen levels [10]. However studies of other cytokines some of which are known to be produced by the placenta, such as granulocyte colony stimulating factor (G-CSF), would be of interest particularly in the subgroup of patients with the more marked elevation (Figure 1).

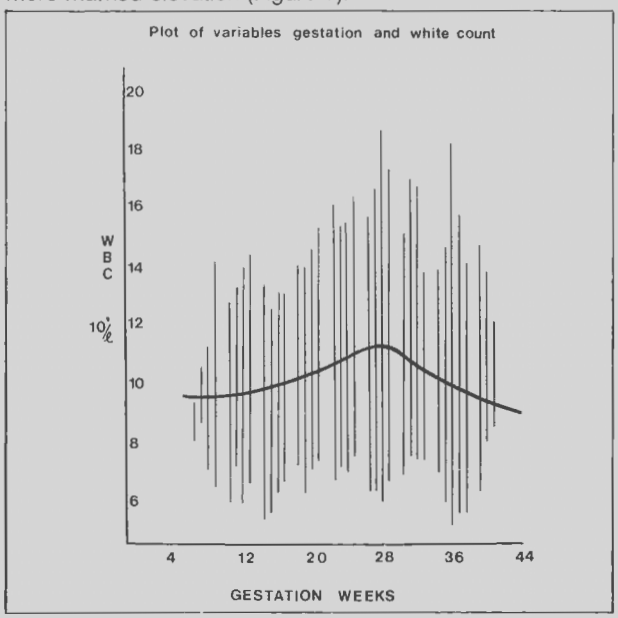

Table 6.

Suggested Reference Range for Coulter Parameters in Pregnancy

	UNITS	RANGE (mean ± 2SD)	MEAN
WBC	x10⁹/1	5.6-14.5	10.2
RBC	x10¹²/1	3.4-4.7	4.02
Hb	g/1	100-140	119
PCV		.30-.40	.35
MCV	fl	76-96	86
RDW	%	11.3-15.5	13.3
MCH	pg	26-33	3-
Plts	x10⁹/1	170-430	396
PDW	%	5.0-17.2	16.1
MPV	fl	6.5-9.8	8.2

White Blood Count Differential (x10⁹/1)

	RANGE (3rd-9th percentile)	MEAN
Neutrophil bands	0-1.0	0.23
Neutrophils seg.	4.0-11.0	7.23
Lymphocytes	1.0-4.0	2.04
Monocytes	0-1.0	0.47
Eosinophils	0-0.5	0.22
Basophils	0-0.1	0.10

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CURRENT COMMENT

Time Effort and Commitment

Anne Paterson, Dunedin Hospital.

Congratulations to all those involved with the 1990 N.Z.I.M.L.S. Conference.

The 45th Annual Scientific Meeting has come and gone in a whirl of well organized activity over a multiplicity of specialities, workshops, forums, guest speakers, trade displays, paper and poster presentations, the A.G.M. and social events in the evenings.

At the conclusion the incoming President of the now N.Z.I.M.L.S., Paul McLeod, gave a very fitting acknowledgement to all those involved in every capacity, who had given of their Time, Effort and Commitment. To the:

Trades People who generously support our conferences, transporting and exhibiting their displays at considerable cost. Perhaps not all members realize that it is their contributions that help keep registration costs lower and the quality of our annual scientific meeting up. Sponsorship of guest speakers and forums; venues and let's not forget all their giveaways in our registration pack, including the folder itself.

There were 27 trade firms with 70 delegates present this year.

The People Who Stay Behind at work to enable others to organize or attend the conference, various workshops, or sessions offered. All would agree our services must always be available — the work must be done regardless. But ongoing education and communication is crucial to the development and positive progress of our profession. All members should have the opportunity to share in and contribute to it.

The Venue Ascot Motor Hotel was an excellent venue. Walls appeared and disappeared; meals and refreshments appeared and disappeared; and for the staff of the Ascot, so did all the delegates.

The Delegates 160 professional delegates attended from around the country this year to provide the audience and feedback on papers offered. These people, perhaps attending for the first time to listen and learn from the knowledge and experience shared, through to the more experienced members present who recognize the importance of ongoing education.

The Delegates Who Gave Workshops and/or Scientific Papers

It is these people who must be particularly appreciated for their very important contributions to any conference. It is pleasing to note an increase in the scientific content offered by the members of the profession for the 1990 conference. From the specific forums, 29 papers presented orally and 7 poster presentations (all from Immunohaematology, Dunedin Hospital). To those delegates who did present papers, please seriously consider publishing it in N.Z.I.M.L.S. Journal, so that those unable to attend conference gain the opportunity to read it.

Remember! Publication of a scientific paper is a permanent record of the time and effort dedicated to producing it.

The Invercargill Conference Organizing Committee

At conference in 1989, 5 representatives promoted the 1990 conference with a very innovative slide show and by pretending to be penguins. The 10 members of the committee, with representatives from both the hospital and private laboratories, certainly gave of their Time, Effort and Commitment for the success of this year's conference.

Through all the unseen but critical organizing of guest speakers, forums, workshops, venues, equipment, sound and visual systems, advertising, accommodation, registrations, scientific programming, and social events, to the Conference itself, and afterwards winding up of all the various affairs involved. Probably only previous conference organizing committees can truly appreciate the work involved.

A pleasant break with tradition was the Mardi-Gras on Thursday night with most delegates coming in fancy dress. Equity is complete on the social scene but the pendulum may have overswung, as many gentlemen sat patiently until invited to dance.

All these parts contributed to the Annual Scientific Meeting of 1990.

Time, Effort and Commitment made the 1990 Annual Scientific Meeting the success that it was. Those who took part, looking to learn, or share their expertise, were the ones who gained individually and professionally and contributed to the profession as a whole.

NZIMLS CONTINUING EDUCATION
SPECIALIST INTEREST GROUP UPDATE

FROM THE HAEMATOLOGY SPECIAL INTEREST GROUP (HSIG)

Regional Representatives

At the recent Haematology Seminar in Auckland many of those attending asked what was the Haematology Special Interest group doing about continuing education particuarly in areas outside Auckland. It is obvious that a strong demand exists for relevant and well organised educational seminars and workshops. It is also recognised by the Special Interest Group, that being Auckland Based it is physically impossible for the members of this group to organise events outside the immediate Auckland Area.

To this end the HSIG is proposing that:

In 5 regional centres initially, a representative should be either elected, appointed or volunteered to liaise with the HSIG.

A. The regional representative would communicate regional needs to the HSIG.
B. The regional representative would be responsible for organising continuing education projects within their area, in association with HSIG.
C. There be a yearly meeting of the regional representatives in conjunction with the Annual Haematology Seminar in Auckland or at the Annual Scientific Meeting of the Institute to define projects and to arrange a programme for the following year.

The Continuing Education Sub-committee of the Institute has indicated that some funding will be available from the Institute to support this project.

Initially it is proposed that regional representatives should be sought for the areas:

1. Northland/Auckland City.
2. Waikato/Bay of Plenty.
3. Wellington/Hawkes Bay/Nelson/Marlborough.
4. Canterbury/Westland.
5. Otago/Southland.

Regional Seminars

Some thought has been given to the type of seminar that may be organised on a regional basis. A one day meeting is favoured initially, probably to be held on a Saturday to enable maximum participation by staff, with a format of invited presentations and case histories on a set subject, with time available for socializing during meal and tea breaks. The HSIG group would initially provide the expertise and resources to enable the seminar to be run by providing when needed detailed written information on: Organisation, Catering, Programme, Budget etc.

The seminars should be as far as possible self supporting financially but Cash floats for initial expenses etc. would be available from the Institute through the HSIG.

We are interested in your comments and suggestions on this project. Please let us know what you want, or if you are prepared to help. Please write to:

Haematology Special Interest Group, C/- Marilyn Eales, Dept Haematology, Middlemore Hospital, Private Bag, Otahuhu.

Who is Ross Buchanan?

We were rather mystified to discover in the last newsletter that we had a new Chairperson, Ross Buchanan, who was he? were we being taken over? Fortunately it turned out to be Typists error, so please note our chairperson is **Ross Anderson.**

Study Notes

Several requests have been received by HSIG for study materials for Certificate, Specialist and Technical assistant examinations. We regret that we are unable to provide these as we are heavily committed to syllabus revision and mastery manuals as well as the Haematology content of the National Diploma Course at the Auckland Institute of Technology. It is certainly a project that we may consider in the future but in the interim this is something that regional representatives could look at, by forming regional Journal clubs and circulating articles and papers of interest.

4th Annual Haematology Seminar 1991

Planning is well advanced for the 1991 two day Haematology Seminar being organised by the Haematology Charge Technologists Group, Auckland for HSIG. This seminar is being held to complement the South Pacific Congress and will be using invited speakers from overseas as well as local experts. It will be held on Monday 26th and Tuesday 27th August 1991 in the Ernest and Marion Davis Post Graduate Centre Auckland Hospital.

The theme for the seminar is Leukaemia and an exciting and forward looking programme is just about finalised. Sessions have been planned in.

1. Diagnosis and sub classification of acute Leukaemia.
2. The impact of molecular biology.
3. Mixed leukaemias.
4. The molecular basis of C.M.L.
5. Acute leukaemia, Clinical overview.
6. Bone marrow transplantation.

The seminar is being organised as a preliminary activity to the South Pacific Congress and the Haematology programme of the congress will be complementary, but will not cover the same ground, so by attending the Haematology seminar and then the Congress you can experience five quality days of Haematology. We look forward to seeing you there!

Haematology Syllabus and Log Book Review

A review of the Haematology Certificate Examination Syllabus and the Certificate log book content for 1991 is planned for the end of November of this year. Any comments, deletions, additions or amendments should be made by Monday 26th November and forwarded to:

Marilyn Eales, Dept Haematology,
Middlemore Hospital, Private Bag, Otahuhu.

FROM THE BIOCHEMISTRY SPECIAL INTEREST GROUP (BSIG)

Convenor: Alison Buchanan
Contact address: Clinical Chemistry Dept.
Auckland Hospital, Park Road, Auckland.

Thanks to all those who attended and thus helped to make the Seminar **"Paediatric aspects of Clinical Biochemistry"** such a success. 43 people attended, some from as far away as Christchurch, New Plymouth, Palmerston North, Kawakawa, Rotorua and Thames.

The speakers explored the development and well being of the fetus and neonate, the treatment of childhood diabetes and asthma, and post natal screening. The technical field was represented by an introduction to DNA technology,

fructosamine and HbA_1c assays, and anomalous serum amylase results from micro collecting. The consensus, when relaxing over wine and cheese at the end of the day, was that it was a "full" day but well worth attending.

The Post seminar questionnaire provided several suggestions for future topics, as did a letter from Palmerston North. The committee will be considering these at the October/November meeting.

IMMUNOLOGY SPECIAL INTEREST GROUP (ISIG)

Calling all Medical Laboratory Scientists Working in Immunology

The Immunology group in Auckland is spearheading the establishment of the ISIG to advise the NZIMLS Council on "things immunological" in the Continuing Education Programme. As Immunologists are small in numbers compared to some of the other disciplines we are seeking national rather than local representation which will provide a balanced approach, spread the work load and give workers in Immunology the chance to meet and have dialogue on a national level.

A letter is being sent to people involved in the immunodiagnosis of disease outlining the role and objectives of the group and asking for support. We would like to hear from anyone who does not receive a letter and who is interested in assisting with the programme.

Enquiries may be sent to:
Convenor: Gillian McLeay,
Address: C/o Immunology Department, Wallace Laboratory, Auckland Hospital, Park Road, Auckland 1.

MICROBIOLOGY SPECIAL INTEREST GROUP REPORT OCTOBER 1990.

Convenor: Shirley Gainsford
Contact address: Valley Diagnostic Laboratory, P.O. Box 30044, Lower Hutt.

At the N.Z.I.M.L.S. Conference in Invercargill a brief meeting was held with microbiology technologists that I managed to "round up". We are examining suggestions made to us at that meeting.

A seminar on "Nosocomially Acquired Infections" is to be held at Victoria University, Wellington, 15th and 16th of May 1991. This will be a session that we are helping to organise within the Microbiological Society meeting, so technologists are encouraged to stay on and attend the rest of this meeting. If you would like to present a paper at this session, on a topic relevant to Nosocomially Acquired Infections, please contact the convenor as above.

Membership of the Microbiology Journal Club is available to Institute members in the South Island and the lower half of the North Island, with new membership starting January 1991. Charge technologists will receive a letter giving details.

Other ideas we are pursuing for the N.Z.I.M.L.S. conference in Auckland 1991 and for our own conference in Wellington in 1992, so if you have any requests let us know.

MICROBIOLOGY SEMINAR

NOSOCOMIALLY ACQUIRED INFECTIONS

VICTORIA UNIVERSITY, WELLINGTON

15th, 16th MAY 1991

Organised by the
Microbiology Special Interest Group of the N.Z.I.M.L.S.
in conjunction with
The N.Z. Microbiological Society

Programme details and Registration forms will be sent to clinical laboratories in February 1991.

Enquiries to: S. Gainsford
Convenor MSIG,
Valley Diagnostic Laboratory
P.O. Box 30044
LOWER HUTT

T.H. Pullar Address

Jan Parker
Manager of Surgical Services, Dunedin Hospital.

Traditionally the Pullar Memorial address has been given by respected seniors, usually male, who are recognised as having given valued service to our profession. I am honoured, as a Technologist, to follow in their tradition. As a woman I trust I was chosen for my abilities — I do not readily wear the mantle of the token woman.

It seems probable that 1991 will mark the beginning of a new era, the era of the degree based Medical Technologist. With this finally achieved we can enter the new decade with confidence that on the educational front we can hold our own in both the local and the international arena. Medical Laboratory technology is a great job for women, the pay is equitable, the hours good and it is readily adaptable to the needs of maternity leave and childcare. It is also a good career for men who can readily achieve a comfortable and relatively senior position as a Charge Technologist or Graded Officer. What it is not, and has not been, is a good career for women. What you may say is the different between a job and a career? A job is a short term affair which can easily be discarded if a better opportunity occurs, a career is a way through life. The truth of the matter is that on the EEO front our track record is nothing short of appalling.

Let me quote you some statistics, bearing in mind that women account for more than two thirds of those recruited into Medical Technology. On the examination front these women traditionally hold their own or even exceed the achievements of their male colleagues. In 1990 of 8 top candidates at the certificate level, 2 were male, of 8 top candidates at the Specialist level none were male. So far so good, but the record of women Medical Technologists from that point on is a downward slide. A study carried out in the Auckland laboratories in late 1988 showed that while women formed 76% of the workforce only 12% of them held a grading compared with 47% of the men. At Dunedin Hospital for the same period, the figures were even worse. Excluding the blood donor and phlebotomy staff, women again formed 76% of the workforce, but only 9% were graded compared with 52% of the men. There were no females in charge or 2IC positions in any of the four main disciplines. Figures from Palmerston North for 1989 showed a $10,000 p.a. salary differential between male and female laboratory workers. At the helm guiding our profession the situation is no better, one woman on Council is usual, two a maximum — and the same thing applies to our Registration Board. Neither body has ever been headed by a woman. Career advancement for women in medical technology is difficult, sometimes very difficult and even impossible. The problems are not unique to our profession, women in New Zealand make up almost 50% of the paid workforce, but hold only 8% of management and administrative jobs.

The problem is two fold, in the first instance women in medical technology competing for gradings appear less likely to be appointed. If you look at those disciplines where, comparatively speaking, women are better represented, you will find that they are the 'minor disciplines' where the competition is likely to be less fierce. The second problem relates to the reticence of women to apply for senior posts. From childhood on they have been taught that nice girls don't compete, they are not taught to fight it out and to win.

It has been stated that women only apply for jobs when they are certain of being appointed and this has certainly been my experience. Men on the other hand are often prepared to take a punt and may, as a result, unexpectedly get a job for which they are less than ideal. With a few notable exceptions women are reluctant to sell themselves, particularly if the selection panel is all male. The problem is self perpetuating, it is difficult to create a balanced selectional panel when there are no senior women on staff.

Without measures such as these, we will lose our most competent women, those who find the system unacceptably frustrating will leave the profession and find other outlets. Others will remain but resent the circumstances in which they are caught. Employers need to re-examine their promotion activities and make a concerted effort to tap into the pool of intelligent and able women. Women in medical technology have the education, skills and abilities to forward their careers on equal terms with men.

May we all work to establish the 1990's as the decade of women in Medical Technology.

What are the issues facing women who do decide to compete for senior posts? One of the biggest problems is often the attitudes of colleages at work. The decision to forgo having a family (or even worse a husband) is socially unacceptable, to take maternity leave is to land others with your workload, and a rapid return to work after childbirth signals that one is totally lacking in maternal instincts and definitely unsuitable as a parent. Working arrangements are frequently very inflexible and do not allow for such exigencies as the school concert or a child's first week at school. EEO policies are a farce without quality childcare, but the accessibility and price of such care often means that it is not a viable option. On site childcare may be non-existent, and involvement in setting up creche facilities — while rewarding in itself — is a time consuming and exhausting extra to an overfull curriculum. Entrenched attitudes (not always male) are often expressed quite overtly 'women lack analytic and reasoned judgement' 'women leave to have children' 'women fail to present themselves well'. Such attitudes are nothing new, there is a long and noble history of denigrating women. As long ago as the 6th Century AD the christian bishops had to vote on the eternal question of whether women had souls. It was reported by the news media of the day that the vote was carried by one. Nearer to our own time, and location, Truby King was reported in the early years of this century as stating that young women should not be permitted to engage in the study of higher mathematics as it drew blood from the reproductive organs to the brain and lead to permanent sterility.

In 1936 the first legislation setting minimum rates for women set them at 47% of men's rates and the first equal pay legislation was based on the assumption that if you removed women's economic advantage, men would always be chosen for the job. Even now we turn on TV and are bombarded by images of women cooking (while the family sits around and waits expectently), women cleaning (the toilet, the stove and their husband's shirts) and women preening themsevles. The result was summed up by Hon. D McDonald, Department of the Secretary of State for Canada when he said 'How can a woman convince the corporate executive that she would make an excellent manager when he has spent most of his life absorbing images of women who need a man to show them how to balance a cheque book or explain what insurance is'.

Women have so much to offer, they have different ways of communicating to men, which can often be an advantage. Consider some of the skills that parenting teaches, self discipline, the ability to consider others needs ahead of ones own, the importance of consistency, the ability to deal with obstinate and defiant individuals on a day to day basis. We have barely begun to tap the talent and potential of women, positive action to retain women and improve their status within the profession is sound strategy. We need to enter the new decade committed to gender blindness, to fast promotion and to ensuring equal access to men and women. We need to increase women's presence on our controlling and policy making bodies. We must ensure that there is at least one woman on all interview panels and we must look at the needs of the whole workforce for flexible work times, parental leave, childcare provisions. Our exams must be tailored so they do not disadvantage particular employees or those with broken service. Above all, we need to change the expectations of women, and of men for women.

Much has been written about the use of mentors as a

support to self development within organisations. Having a mentor has been identified as a central element in helping women to build a successful and satisfying career. I have been fortunate to have had 2 valued and caring mentors in the course of my career, who have given me advice, encouragement and above all, their confidence. Most women who have made it will admit to the presence of an informal mentor (usually male) at some stage in their career, and such women can themselves provide a network to help others and provide successful role models.

Minutes of the 46th Annual General Meeting of the New Zealand Institute of Medical Laboratory Technology (Inc) Held in Invercargill on 29 August 1990 Commencing at 3.40pm.

Present

The President (Mr W Wilson) presided over the attendance of approximately 130 members.

Apologies

It was resolved that apologies be accepted from B Main, M Eales, D Philip, and CS Shepherd.

Proxies

A list of 14 proxy holders representing 55 proxies was read by the Secretary.

Minutes

It was resolved that the minutes of the 45th Annual General Meeting as held on 30 August 1989 be taken as read and confirmed.

J Le Grice/S Gainsford

Annual Report

It was resolved that the Annual Report be received.

B Edwards/K McLoughlin

A Paterson was the only speaker to the report.

It was resolved that the Annual Report be adopted.

B Edwards/A D Nixon

Financial Report

It was resolved that the Financial Report be received.

D Reilly/K McLoughlin

Speakers on the report included D Reilly, A D Nixon, B T Edwards and H Robertshawe.

It was resolved that the Financial Report be adopted.

D Reilly/E Norman

Election of Officers

The following members of Council were elected unopposed:

President	P McLeod
Secretary	B T Edwards
Treasurer	D Reilly
Auckland Regional Representative	G Rimmer
Wellington Regional Representative	S Gainsford
Christchurch Regional Representative	J Le Grice
Dunedin Regional Representative	A Paterson

Elections were necessary for the position of Vice-President and Central North Island Regional Representative.

Election results are as follows:

Vice-President	—	D Dixon-McIver	96
	—	D Reilly	92
	—	K McLoughlin	73
	—	D Pees	64

Mr D Dixon-McIver was declared elected.

Central NI Regional Representative			
	—	E Norman	33
	—	D Priest	11
	—	S Smith	10

Mr E Norman was declared elected.

Presentation of Awards

The award winners were announced and the awards presented by the President:

CERTIFICATE EXAMINATION AWARDS	
Clinical Biochemistry	Steven Watkins
Haematology	Claire Bowring
Immunohaematology	Michelle Kiernan
Immunology	Diane Siegenthaler
Virology	Paul Austin
Cytology	Carol Green
Nuclear Medicine	Katherine Caldwell
Cytogenetics	Judy Norrish
SPECIALIST CERTIFICATE EXAMINATION AWARDS	
Clinical Biochemistry	Anne Wharfe
Haematology	Anna Lloyd
Microbiology	Jennifer Ferguson
Immunohaematology	Elizabeth Mason
Virology	Judy Moodie
Medical Cytology	Eric Retter
Immunology	Stewart Smith
Cytogenetics	Miriam Garry
QUALIFIED TECHNICAL ASSISTANTS AWARDS	
Immunohaematology	Kathryn Holder
Clinical Biochemistry	Fleur Doidge
Haematology	Vimal Girdhari
	Alison Rhodes
General Certificate	Eric Voice
Medical Microbiology	Lai-Gi Gin
Histology	Peter Marriott
Medical Cytology	Cynthia Robertson
JOURNAL AWARDS	
Roche Diagnostics	
Clinical Chemistry Award	Robert Siebers
Pacific Diagnostics	
Haematology Award	Stephen Henry
NZIMLT Journal Award	Jan Parker
Best Trade Exhibit	SCIMED

Honoraria

It was resolved that no honoraria be paid.

D Reilly/P McLeod

Auditor

It was resolved that Deloitte, Ross, Tohmatsu be reappointed as the Institute's auditors.

D Reilly/A Paterson

Future Annual Scientific Meeting

The President confirmed that the 1991 Annual Scientific Meeting would take place in Auckland as would the third South Pacific Congress in Medical Laboratory Science.

The President asked if any centre was interested in hosting the 1992 meeting and the only offer was Wellington. This was met with acclamation.

There being no further business the meeting closed at 4.15pm.

NEW ZEALAND INSTITUTE OF

MEDICAL LABORATORY TECHNOLOGY

EXAMINATION LIFTOUT

Specialist Certificate Regulations
Specialist Certificate Examination Application Form
Q.T.A. Regulations
Q.T.A. Examination Application Form
N.Z.I.M.L.S. Membership Application Form

The New Zealand Institute of Medical Laboratory Science offers to medical laboratory assistants the qualification known as the Certificate of Qualified Technical Assistant (QTA) and to medical laboratory technologists the qualification known as the Specialist Certificate.

The Examinations Committee is based in Christchurch and all correspondence should be addressed to:—

The Executive Assistant
N.Z.I.M.L.S.
P.O. Box 3270
Christchurch
Phone/Fax (0502) 34-761

NEW ZEALAND INSTITUTE OF MEDICAL LABORATORY SCIENCE SPECIALIST CERTIFICATE EXAMINATION

EXAMINATION SUBJECTS

The examination is offered in:

Clinical Biochemistry
Haematology
Histology
Nuclear Medicine
Cytogenetics
Microbiology
Immunohaematology (Transfusion Science)
Medical Cytology
Immunology
Virology

PREREQUISITES

1. Candidates for the examination must have passed a Certificate Examination offered by the Medical Laboratory Technologists' Board or be granted an exemption by the Council of the NZIMLS.

2. **Candidates must be financial members of the NZIMLS at the time of sitting the examination and be a financial member or have submitted a valid membership application form at the time of applying to sit the examination.**

SYLLABUS

1. Copies of the syllabus are available from the Executive Assistant, NZIMLS, PO Box 3270, Christchurch. A charge of $15 (GST incl) is made for each syllabus.

EXAMINATIONS

1. The examinations will be held annually during November.

2. Candidates must complete the application form and forward this, complete with examination fees, to the Institute before the closing date. **No late applications will be accepted.**

3. Candidates must be financial members of the NZIMLS at the time of sitting the examination.

4. The examination consists of two written papers each of three hours duration.

5. To pass the examination candidates must obtain an overall mark of 50%.

6. The results of the examinations will be announced by the New Zealand Institute of Medical Laboratory Science. Successful candidates will be awarded the NZIMLS Specialist Certificate in the appropriate discipline.

7. The candidate's script will be returned upon receipt of a written request by the candidate. No copy will be retained and no correspondence relating to the marking of the script will be entered into.

NEW ZEALAND INSTITUTE OF MEDICAL LABORATORY SCIENCE

Application to sit Specialist Certificate Examination
13th and 14th November 1991

SECTION A — TO BE COMPLETED BY THE CANDIDATE

Name: Mr / Mrs / Miss ..... (Surname) ..... (First Names)

Laboratory .....

Laboratory Address .....

.....

Examination Subject .....

Medical Laboratory Technologist Board Certificate Examinations passed:

Subject ..... Year Sat .....

Subject ..... Year Sat .....

EXAMINATION FEE: $450 (GST Inclusive)

The full examination fee must be paid with the application.

SECTION B — TO BE COMPLETED BY THE PRINCIPAL OR CHARGE TECHNOLOGIST

"I certify that the above candidate will meet the requirements of the Specialist Certificate Examination"

Signed .....

Designation .....

Please state the name and address of the person responsible for receiving the papers and supervising the Examination in your laboratory or centre.

Name .....

Address .....

.....

.....

APPLICATIONS CLOSE FRIDAY 31 MAY, 1991

Please forward application forms accompanied by fees to: Executive Assistant, NZIMLS, PO Box 3270, Christchurch.

NO LATE APPLICATIONS WILL BE ACCEPTED

Special Note to Applicants
*If not already members of the NZIMLS applicants to sit this examination **must** submit a valid membership application along with this examination application.*

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3RD SOUTH PACIFIC CONGRESS ON MEDICAL LABORATORY SCIENCE

Aotea Centre,
Auckland, New Zealand

AUGUST 26 - 30 1991, AUCKLAND, NEW ZEALAND

- Concurrent Fora
  - — Microbiology
  - — Biochemistry
  - — Haematology
  - — Immunohaematology
  - — Virology
  - — Immunology
- Workshops
- General Forum
- Social Events

Speakers include Dr T. Gillis, (Microbiology), Dr G. Cooper (Biochemistry), Professor J. Stockigt (Endocrinology), Dr K. Bradstock (Haematology), Dr L. Petz (Immunohaematology), Professor R. Penny (Immunology), Professor D. Sutherland (Immunology), P. Bruhn (Education), Monica Cheeseborough, Dr A. Goldstone (Haematology).

If you attend only one Conference in 1991 this should be it.

Please place me on the mailing list

Name .....

Address .....

.....

Return to: **South Pacific Congress 1991.**
Guthreys Pacific Ltd.,
P.O. Box 22-255. Christchurch, New Zealand.

Telephone: (03) 668-711, Fax: (03) 790-175.
Telex: NZ 4243.

NEW ZEALAND INSTITUTE OF MEDICAL LABORATORY SCIENCE
CERTIFICATE OF QUALIFIED TECHNICAL ASSISTANT

EXAMINATION SUBJECTS

Clinical Biochemistry
Cytogenetics
General Certificate (see prerequisite 2)
Haematology
Histological Technique
Medical Cytology
Medical Microbiology
Mortuary Hygiene & Technique
Radioisotopes & Radioassay Technique
Immunohaematology (Transfusion Science)
Immunology (Microbiology)
Immunology (Tissue Typing)

PREREQUISITES

1. Candidates for the examination must be employed as medical laboratory assistants in an approved laboratory and have worked continuously in the subject since 30 June two years previously or accumulated not less than two years practical experience in the examination subject.
2. Small laboratories which require their medical laboratory assistants to work in more than one subject can apply to the NZIMLS for students to train for the General Certificate Examination.
3. A laboratory which requires a medical laboratory assistant to work in a narrow field may apply to the NZIMLS for the student to train for a Special Certificate Examination (Note syllabus requirements).
4. Candidates for the Immunohaematology Examination must have completed not less than 320 hours and candidates for the General Certificate Examination not less than 160 hours in practical cross-matching of blood for clinical use.
5. **Candidates must be financial members of the NZIMLS at the time of sitting the examination and be a financial member or have submitted a valid membership application form at the time of applying to sit the examination.**

SYLLABUS

1. The syllabuses for all subjects (except Special Certificates) are available from the NZIMLS.
2. Medical laboratory assistants intending to train for a Special Certificate Examination must have a detailed syllabus prepared by the charge technologist and forwarded to the NZIMLS for approval at least 6 months before the examination.

EXAMINATIONS

1. The examinations will be held annually during the month of May.
2. Candidates must complete an examination application form and forward this, together with the appropriate fee, to the Secretary before the closing date.

   (NOTE: LATE APPLICATIONS WILL NOT BE ACCEPTED)
3. The examination will consist of two written papers, each of two hours duration. Candidates for the Medical Cytology Examination will also be required to complete a practical examination.
4. The candidate must obtain an overall mark of 50% to pass the examination. Candidates for the General Certificate Examination must obtain a minimum of 40% in each of the four sections and 50% overall to pass the examination.
5. The results of the examinations will be announced by the New Zealand Institute of Medical Laboratory Science.
6. The candidate's script will be returned upon receipt of written application by the candidate. No copy will be retained and no correspondence relating to the marking of the script will be entered into.
7. Candidates must be financial members of the NZIMLS at the time of sitting the examination.

NEW ZEALAND INSTITUTE OF MEDICAL LABORATORY SCIENCE

Application to Sit the Examination of Qualified Technical Assistant 7th and 8th May, 1991

SECTION 1 — TO BE COMPLETED BY THE CANDIDATE

Name: Mr / Mrs / Miss ..... (Surname) (First Names)

Laboratory .....

Laboratory Address .....

.....

Subject (Haematology,Microbiology, etc) .....

EXAMINATION FEE: $60 (GST Inclusive)

The full examination fee must be paid with the application.

SECTION B — TO BE COMPLETED BY THE PATHOLOGIST OR CHARGE TECHNOLOGIST

Date candidate commenced work in examination subject .....

"I certify that the above candidate meets the requirements of the Q.T.A Regulations"

Signed .....

Designation .....

Please state the name and address of the person responsible for receiving the papers and supervising the Examination in your laboratory or centre.

Name .....

Address .....

.....

.....

Office use only

APPLICATIONS CLOSE FRIDAY 22 FEBRUARY, 1991

Please forward application forms accompanied by fees to:
The Executive Assistant, NZIMLS, PO Box 3270, Christchurch.

NO LATE APPLICATIONS WILL BE ACCEPTED

Special Note to Applicants
*If not already members of the NZIMLS applicants to sit this examination **must** submit a valid membership application along with this examination application.*

THE NEW ZEALAND INSTITUTE OF MEDICAL LABORATORY SCIENCE (INC.)

Application for Membership (For use with Examinations only).

(Please Print Clearly and Tick Appropriate Box)

I, _____

SURNAME _____

MR, MRS, MS, MISS _____

INITIAL(S) _____

FIRST NAME(S) _____

MAIDEN NAME _____

OF,

WORK ADDRESS _____

_____

PLEASE LEAVE BLANK	
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Received	
Acknowledged	
Council	
Notified	
Convenor	

Hereby apply for membership of the New Zealand Institute of Medical Laboratory Science in the category of:

☐ Member ☐ Associate

AND Certify That I Have:

☐ Not Previously Been a Member ☐ Previously Been a Member (State Category:_____)

☐ Resigned (Date: _____) ☐ Did Not Resign

I am employed as: _____

in the Speciality Department of: _____

Highest Professional Qualification: _____ Year Obtained: _____

Nominated By: _____

(Current Financial Member N.Z.I.M.L.S.)

Please forward payment with Application for Membership.

*Current Membership Subscriptions are:

MEMBER $88.40 (GST incl.) ASSOCIATE $33.80 (GST incl.)

*Under the rules of the NZIMLS membership categories are:
Members — any person who is registered by the Medical Laboratory Technologists Board.
Associate — any person engaged in Medical Laboratory Science who is not eligible for any other class of membership.

For applications accepted during the period 30th September 1990 — 31st March 1991 subscriptions are half the Annual Fee.
(ie) MEMBER $44.20 (GST incl.) ASSOCIATE $16.90 (GST incl).

For the financial year 1st April 1991 — 31st March 1992 subscriptions are:
MEMBER $88.40 (GST incl.) ASSOCIATE $33.80 (GST incl.)

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Minutes of the Special Meeting of the New Zealand Institute of Medical Laboratory Technology (Inc) held at Invercargill on 29 August 1990 Commencing at 4.15pm

Chairman

Mr W Wilson

Minutes

It was resolved that the Minutes of the Special General Meeting held on 30 August 1989 be taken as read and approved.

I Bardsley/K McLoughlin

Business Arising

The President reported on matters as had been actioned by Council.

Remits

1. It was moved D Dixon-McIver, seconded by P McLeod that subject to any amendment or change requested by Registrar of Incorporated Societies "that the rules of the New Zealand Institute of Medical Laboratory Technology be substituted with the rules of the New Zealand Institute of Medical Laboratory Science".

   After discussion, the motion was put to the meeting and declared carried.

2. It was moved A Paterson, seconded J Le Grice "that Policy Decision No. 3 be reaffirmed".

   Policy Decision No. 3 (1972): Council will make and administer awards to the members of the Institute, the details of each award will be recorded and may be amended from time to time by resolution of Council. The summary of these details shall be published annually in the newsletter.

   The motion was put to the meeting and declared carried.

3. It was moved D Dixon-McIver, seconded by G Rimmer "that Policy Decision No. 5 be reaffirmed".

   Policy Decision No. 5 (1978): That medical supply companies should not be approached to aid in the finance of Branch meetings; companies may be invited to regional seminars and although donations may be accepted, money is not to be solicited.

   The motion was put to the meeting and declared carried.

General Business

It was moved D Dixon-McIver, seconded B Edwards "that the administrative details of all examinations run by the New Zealand Institute of Medical Laboratory Science be set by Council"

After discussion the motion was put to the meeting and declared carried.

It was moved D Daniels, seconded R Nightingale "that Council investigate the establishment of National Quality Control programmes to be available within New Zealand.

After discussion the motion was put to the meeting and declared carried.

It was moved G Rimmer, seconded S Holland "that Council promote more regional activities by providing funds and encouragement for establishment and continuance of local branches".

After discussion it was moved B Edwards, seconded D Dixon-McIver that the motion be amended to read "Council consider financial requests from branches intended to promote regional activities".

After discussion the amendment was put to the meeting and declared carried on a show of hands.

The amendment then became the motion and was put to the meeting and was declared lost on a show of hands.

It was moved A Knight, seconded A Paterson "that Council investigate the possibility of the Annual Scientific Meeting becoming a Tri-Annual Scientific Meeting".

After discussion the motion was put to the meeting and lost on the show of hands.

Prior to the meeting being closed, Mr P McLeod thanked Mr W Wilson for the work that he had done in the interest of the profession during his twelve years as a member of Council. This was greeted with acclamation.

There being no further business the meeting closed at 5.00pm.

CHAIRMAN

New Zealand Institute of Medical Laboratory Technology

Presidential Address

Walter Wilson

Ladies and gentlemen, it is with pleasure and some regret that on this the last occasion I report to you on the activities of your Institute.

The last three years have seen more change to the Institute and our profession than I have experienced over the previous ten years of my involvement on the Council. Most of these changes have been as a direct result of restructuring of the industrial and Health Service environment following legislative changes.

Unfortunately the full impact of these changes has not yet been experienced and indeed Governmental changes are still proceeding, such as the pending changes to the resourcing of the Medical Auxiliaries Registration Boards.

For the Institute we have divested our industrial responsibilities to a formal Union, established the Medical Laboratory Science Trust which is an investment in the future, and today we are to consider a change of name. While each of these changes are in themselves of some importance, they are only part of the platform from which this profession will with confidence confront the challenge of the 90's and the 21st century.

We are well within sight of a Degree in Medical Laboratory Science which I am convinced will become the minimum academic requirement for registration, however we must now look beyond this step and if we are to become a proud and established profession we must confront the task of a continuing professional development programme by which we each can establish our currency and competency to practise and so ensure the confidence of the public in the service we supply. Along with the need for on-going professional upgrading we must move quickly to establish standards of professional conduct and service delivery. As a requirement for Area Health Boards to contract with the Crown on service output of which the two principal components are quantity and quality, it is to the professions who on behalf of the public, fall the responsibility for setting the standards both for the conduct of their members, but importantly also on the quality of the services provided by, in our case, Medical Laboratories be they public or private. In both environments a major resource limitation is the amount of money available to fund the Laboratory Services and considerable pressure will be placed upon us to provide more output for less. This will result in pressure to choose the laboratory providing the "cheapest" test available. It is our responsibility in the public interest to ensure that the quality is not compromised.

It is these two areas which will demand considerable time of this Institute over the next few years as to achieve consensus will be difficult as many current practises and beliefs will need to be challenged. This is evidenced already in your concerns over the impact of "direct supervision" as this is seen by many to be a threat to established practises. I urge you to put aside your own situation and take the perspective of the patient and decide for that which offers the greatest protection to the public.

I hear statements that the category of Laboratory Assistants is to be phased out, again I personally do not accept this and am convinced that there will be for the foreseeable future a need for Laboratory Assistants in the New Zealand Medical Laboratory Service. However, they are not and should never be used as pseudo-technologists irrespective of the competency of individuals. We only have to look overseas where many of the challenges and problems that we face are the same and on the question of Laboratory Assistants it is with interest to note that in the United Kingdom they are moving to introduce the category of Medical Laboratory Assistants. They obviously have determined a need.

During the past year we have established discipline based Special Interest Committees which I am sure will form the basis for providing the direction for educational policy standard and Code of Practice for the profession. It will be from these Committees that the Executive will seek guidance and counsel.

On this occasion I must formally welcome Maree Gillies as recently appointed Journal Editor, which again is an Executive position of considerable importance and requiring substantial time-involvement. We wish Maree well in this position.

In conclusion I thank you for the opportunity to serve, I sincerely hope I have met your expectations and have represented your interests as you would have had me do. I wish you well and can assure you with Paul McLeod we will progress still further as our place in the Health Care delivery system is more fully understood by both our professional colleagues and the public.

It is, however, of considerable disappointment that a major concern of the Institute has not been resolved and that is the question of the inequities in the funding of the Public Hospital and Private Medical Laboratories. It is very apparent to me, your Council, and other senior members of our profession, that the problems while well understood and acknowledged by department officials is not reflected by their political masters in that there is an apparent unwillingness on the part of the politicians to either comprehend or attempt to satisfactorily resolve the problem. I am not convinced that a change in government will change the situation as I am equally convinced that there are pressures directing the decisions of the politicians reflecting other than common sense and public interest.

Another matter of concern is what I consider to be an attempt at brain-washing by current political direction. This is the programme to convince us that the delivery of the Health Service is just another commercial enterprise and that the people we serve are not patients, but clients or customers. Health is different, for those needing our service cost should not be the basis for the quality or quantity of service delivered. In a commercial situation clients or customers generally have a choice, but in the Health Service in most situations the patients have none.

However, we each have a responsibility to ensure that we deliver our service as effectively and efficiently as possible but as previously stated with no compromise on quality. This may mean that individually we will have to take some very difficult decisions such as accepting that an adequate high quality service could be delivered more cost-effectively by another or a rationalized Laboratory Service. If we are to be regarded as a responsible profession I suggest that we must confront these decisions face-on and where clearly in the public interest we must accept and embrace the consequences.

On a more positive note, it is especially gratifying that in spite of the establishing of the Union at considerable additional personal expense to us all, the membership of the Institute has remained relatively stable. This, to your Council, is a sign of good faith and confidence and support for the Institute and your Executive. On the basis of this support we have employed an Executive Assistant to carry out many of the operational activities of the Secretary. It is planned that this will form the basis for a permanent and established Executive which will give an improved service to you all. While I admit that there are justified complaints about unnecessary delays in attending to Institute matters it must be remembered that all of your Executive undertake their duties and responsibilities voluntarily and many hold senior full-time positions around which they must fit their Institute activities.

In defence of all of the members of your Council I personally can without reservation state that they have delivered "their all" and serve out of a genuine desire to improve the lot of the profession as a whole.

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Biochemistry Stat Analysis : The Green Lane Experience with the Nova Stat Profile 5.

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Abstract

A brief comparative study was performed between the Nova Stat Profile 5 (NSP5) and our previous methods for the NSP5 tests (ABL3, blood gas analyser; Corning 902, Sodium and Potassium; EPX, Choride; Haematocrit centrifuge, Haematocrit). Blood gas specimens from Theatre and Intensive Care were processed by our previous methods and then twice by the NSP5.

Imprecision expressed as Standard Deviation, calculated from differences between pairs, was acceptable (excluding Haematocrit no Coefficient of Variation exceeded 2%).

Inaccuracy, assessed using Linear Regression according to Deming, gave a bias of -1% for the NSP5 against the ABL3 for pO_2. Choice of quality control material is limited because dyes and preservatives reduce the life of the membranes. Turnaround time has been significantly reduced due to shorter analysis time and interfacing with laboratory computer system. This factor plus the ability to provide Glucose and Ionised Calcium has greatly improved our service.

Key Words

Blood Gas Analyser, Ion Selective Electrodes, Ionised Calcium.

Introduction

The Analyser

On the 5th September, 1989, the Biochemistry Department at Green Lane Hospital installed a Nova Stat Profile 5 analyser (NOVA Biomedical, Massachusetts, U.S.A.), supplied by Bayer Diagnostics. The Nova Stat Profile 5 analyser (NSP5) combines blood gas and related stat tests of serum, plasma, whole blood and expired gas for in vitro diagnostic use.

These features are summarised in Table 1. The NSP5 requires a sample volume of 250μl. While it has the ability to accept capillary samples, we do not utilise this feature because of the large sample volume needed. Results are produced routinely within 45 seconds, or within 180 seconds if a 1 point calibration is required.

Table 1.

Features of the NSP5

Measured Parameter	Calculated Parameters	Acceptable Samples
pH	Oxygen Saturation	Whole Blood (^)
pCO_2	Base Excess of Blood	Plasma
pO_2	Base Excess of ECF	Serum
Sodium	Bicarbonate	Expired Gas
Potassium	Standard bicarbonate	
Chloride	Total Carbon Dioxide	
Ionised Calcium	Oxygen Content	
Glucose	Normalised Calcium	
Haematocrit	Haemoglobin	
	Anion Gap	
	Osmolality (I)	

(^) Sodium and lithium heparin are the recommended anticoagulants for pH, pCO_2 and pO_2. EDTA, citrate, oxalate or sodium fluoride are not recommended for use during electrolyte analysis. Oxalate and sodium fluoride can be used for glucose analyses. Ammonium heparinised capillary tubes have been used with acceptable results.

(I) Requires BUN value to be entered.

The Laboratory

The NSP5 is located in the 'Bypass Bay', in the Biochemistry Department of Green Lane Hospital. This area processes all the Blood Gas samples on the Green Lane site. This area is also equipped with: an ABL3 Blood Gas Analyser (Radiometer, Copenhagen, Denmark), a Corning 902/Na/K ISE analyser (Corning Medical and Scientific, Essex, England),a Haematocrit centrifuge, a small bench centrifuge and a Schimadzu Double Beam Spectrophotometer. Its primary function is to provide a stat service to the Cardio-Thoracic Surgical Unit both during Bypass surgery and while monitoring post-operative recovery in the Intensive Care Room.

Workload

This area has a throughput of approximately 100 samples per day. Sixty to eighty percent of this workload goes through the NSP5. All Theatre samples are processed on the NSP5 for any combination of Blood Gases, Potassium, Haematocrit, Ionised Calcium and Glucose, as requested. The samples from the Intensive Care Room are divided between the ABL3 and the NSP5. Some of these samples require Ionised Calcium and Glucose and therefore must be analysed on the NSP5. These samples are all whole blood. The Chloride electrode is not utilised.

Results

Imprecision and Inaccuracy

A brief comparative study was performed on installation to determine if there were any clinically significant differences between the NSP5 and the other analysers sharing the workload.

It was performed over 2 consecutive days and involved a total of approximately 50 samples. These samples were routine samples from Theatre and ICR. The sample was analysed first on the ABL3 Blood Gas Analyser and then twice on the NSP5. A separate cup was split off for a Sodium and Potassium on the Corning 902 and a spun Haematocrit was performed if requested from Theatre.

Imprecision data from this study is presented in Table 2, and data on inaccuracy in Table 3. Linear regression according to Deming [2] was used to calculate the values shown for the correlation coefficient (r) and regression coefficient (slope).

Note:

1. Ionised Calcium is not included as our laboratory has no other method with which to compare it.
2. Glucose is not included as all of the patients in the study were on paracetamol of varying levels. (It is known that paracetamol produces a positive interference of 1.12 mmol of glucose per mmol of paracetamol).
3. Chlorides were tested over 4 days, 2 months after the other comparisons as we had no current method for Chloride. They were performed on whole blood on the NSP5 and spun down to process on the EPX as plasma.

The pO_2 showed a bias of -1% and is currently the only parameter which requires an offset value.

Quality Assurance

A. Internal

Due to the greater expense of the Nova Controls and a desire to use more than one type of Quality Control Material we considered several controls, as listed in Table 4.

Our aim was to find a control suitable for both the NSP and the ABL3. Therefore the Blood Gas controls with electrolytes were also processed through the ABL3.

1. Nova Multipak Control with Glucose
   (i) The ranges provided do not accommodate other analysers
   (ii) The results obtained from the ABL3 were significantly different to the NSP5 range of results.

Table 2
Within batch imprecision

Analyte	Unit	Standard Deviation	Number of Pairs
pH		0.003	50
pCO_2	kPa	0.070	50
pO_2	kPa	0.030	44
Sodium	mmol/l	0.680	50
Potassium	mmol/l	0.045	50
Glucose	mmol/l	0.220	50
Chloride	mmol/l	0.940	50
Ionised Calcium	mmol/l	0.011	50
Haematocrit		0.020	49

The standard deviation was calculated from differences between pairs, [1].

Table 3.
Inaccuracy

Analyte	Comparison Analyser	r	slope	intercept	std error of regression	no.
pH	ABL3	0.990	0.964	0.258	0.010	50
pCO_2	ABL3	0.961	1.080	-0.308	0.250	50
pO_2	ABL3	0.998	1.005	0.004	0.551	44
Na	Corning 902	0.932	1.018	-2.021	1.771	50
K	Corning 902	0.983	0.917	0.334	0.128	50
Hct	Centrifuge	0.974	1.049	-0.021	0.013	49
Cl	Abbott EPX	0.898	0.820	18.213	1.811	37

The results from the comparison analyser were plotted on the abscissa.

Table 4.
Controls Considered for Use on the NSP5

	Analyte								
Control	pH	pCO_2	pO_2	Na	K	Glu	Cl	iCa	Hct
Nova Multi	*	*	*	*	*	*	*	*	
Nova Hct									*
Dade	*	*	*	*	*		*	*	
Biorad	*	*	*	*	*		*		
Gibco Ref.				*	*	*	*	*	
Monitrol 1				*	*	*	*	*	
Monitrol 2				*	*	*	*	*	
Gibco Low				*	*	*	*	*	
Gibo High				*	*	*	*	*	

Abbreviations:
* indicates the analytes present in the control.

Nova Multi — Nova Stat Profile Control Multipack with Glucose (Nova Biomedical, Massachusetts, U.S.A.)
Nova Hct — Nova Haematocrit Control Multipack (Nova Biomedical, Massachusetts, U.S.A.)
Dade — Aqueous Blood Gas/Electrolyte Control (Dade, Florida, U.S.A.)
Biorad — Blood Gas Plus E Control (Biorad, California, U.S.A.)
Gibco Ref. — Gibcontrol Unassayed Reference Control Serum (Life Technologies, Auckland, New Zealand)
Monitrol 1 — Moni-Trol, ES Level I.X (Dade, Florida, U.S.A)
Monitrol 2 — Moni-Trol. ES Level II.X (Dade, Florida, U.S.A)
Gibco Low — Gibcotrol Unassayed Low Control Serum (Life Technologies, Auckland, New Zealand)
Gibco High — Gibcotrol Unassayed High Control Serum (Life Technologies, Auckland, New Zealand)

2. Dade Blood Gas and Electrolyte Control
   (i) Contain coloured dyes and additives which reduce the life of the membranes.
   (ii) Imprecision on the NSP5 for pH was unacceptable but all other results on both analysers were acceptable.
3. Biorad Blood Gas with Electrolyte Control
   (i) Specifically contains no dyes or preservatives for use on the Stat Profile range of analysers.
   (ii) It performed welll on both analysers.
   (iii) When initially tested it did not contain Ionised Calcium, however it has since been added and we are currently re-evaluating its performance.
4. Gibcontrol and Monitrol Controls
   (i) These are all serum controls.
   (ii) All contrain preservatives which will reduce membrane life.
   (iii) All contain varying amounts of salicylate and paracetamol which positively interfere with Chloride and Glucose respectively.

We have also tested in-house, aqueous Glucose controls. The results for these specimens run on the NSP5 compare well with those run on the Abbott EPX Hexokinase method for Glucose. (Note: Aqueous controls must contain 0.9% saline for the sample to be detected by the NSP5).

B. External

We participate in the Australian Blood Gas Survey. The sample matrix is a red fluorocarbon which seems to leave an oily residue in the flowpath and stains the Chloride membrane bright red, rendering it useless. Therefore we now remove all electrolyte electrodes and replace them with blanks before analysis of these samples. The results from cycle 4 were excellent. However, the first 3 samples of cycle 5 indicate a significantly low bias on the pO_2channel at tensions below 15kPa. This is currently being investigated.

We have just started to run the Wellcome Survey for Chloride and Glucose as it contains no salicylate or paracetamol. These results are unavailable at present.

From these assessments we have concluded that only controls without dyes and preservatives are suitable for the NSP5. To reduce the number of controls being run we are looking for Blood Gas Controls which also contain Sodium, Potassium, Chloride, Ionised Calcium and Glucose.

Our current Quality Control Programme for the NSP5 is as follows:

Internal

1 Nova Multipack with Glucose control is opened daily. This is recapped, refrigerated and resampled 4 hourly for Glucose only.

1 Nova Haematocrit control is sampled daily. This is also recapped and refrigerated, and lasts approximately 5 days.

1 patient comparison between the NSP5, the ABL3 and the Corning 902 is run daily.

External

RCPA Quality Assurance Programme — Blood Gases

Wellcome Diagnostics Clinical Chemistry Quality Assessment Programme.

Maintenance

To date we have found the prescribed maintenance programme to be suitably timed for the most part. However, we do find it necessary to change the gas membranes 2-weekly instead of monthly.

Daily maintenance is normally completed within 15 minutes, or 30 minutes if pre-heater cleaning is required. These times reflect 3 minutes for a gas prime if the humidifiers are topped up, 5 minutes for pre-heater cleaning, 5 minutes for flow-cell conditioning after pre-heater cleaning and 2 x 6 minutes for 2 full calibrations at the end. During these set standing times it is possible to perform other tasks. Teaching and performing the maintenance are simple operations.

Weekly maintenance adds about 5 minutes to daily maintenance if time is organised efficiently. It involves changing the humidifier water, cleaning the air filter and massaging the reagent tubing in the pinch valves.

Monthly maintenance takes about 10 minutes. It involves changing the Waste/Reference pump tubing segments.

Membrane changes are very simple to perform. However,

to achieve maximum performance, most require either 10 to 15 minutes to equilibrate to 37 degrees Centigrade or 5 minutes of conditioning with blood.

The time required for the temperature to return to 37 degrees Centigrade after the front panel has been open is exceptionally brief, often just a matter of seconds and never more than a couple of minutes. This is an advantage over the ABL3 which has a minimum of 30 minutes to equilibrate after similar treatment.

Interfacing with the Laboratory Computer System

The NSP5 is interfaced with the laboratory's ADDS MENTOR computer system. During analysis the patient demographic screen appears and through this it is possible to enter the sample's lab no., the patient's hospital number, the time the specimen was taken and the fraction of inspired oxygen that the patient is being administered. All this information is transferred onto our patient report. (Note — the temperature may also be entered and corrected values printed. However, it is the policy at Green Lane Hospital to report all Blood Gases at 37 degrees Centigrade).

The NSP5 has no alpha characters on its keyboard. Both our laboratory numbers and patient numbers have alpha characters. However, we have overcome this in the following manner. Although our laboratory number is 2 alpha 4 numeric we only have to enter the numeric portion. This is because the alphas remain the same for 10,000 samples and it is very easy to programme the computer to add these alpha characters. A menu item has been added to enable us to change the alpha prefix when necessary.

Our patient numbers are 3 alpha 4 numeric so we have created 2 digit number codes for the alphas, e.g., A = 01, B = 02, etc. If the patient number is not recognised by the computer (either through incorrect entry or because that patient number has never been registered before) the results are sent to a dumping file from which it is possible to retrieve these results and transfer them into the correct patient file. To detect these errors a checklist is regularly printed.

We have created patient numbers for our quality control material and these are also sent down to the appropriate quality control file in the computer. There is a sample option in the patient demographic screen to indicate if a specimen is arterial, venous, capillary, expired gas or Q.C. If the Q.C. option is entered it will remove any offset values which have been entered.

The NSP5 has an inspired oxygen default value of 20.9%. Our interface is programmed to transmit this as NA (data not available) when no value is given on the request form. It is also programmed to transmit an entered value of 22% as AIR. Using these code numbers we are able to get around the problem of having no alpha keys.

The Intensive Care Room has its own computer terminal from which they can call up results. This reduces the number of phone calls both to and from the laboratory. Shortly there will be computer terminals installed in the Bypass Theatres. This all contributes to a much faster turnaround time as there is no waiting for a report to be printed. Staff time is not wasted on the end of a telephone either. At the moment the only significant delay is from the human transport system required to get the specimens to the laboratory. This will also be reduced in a few months when a pneumatic tube system is in operation. Ultimately the medical staff could have the results on screen within 3 minutes of taking the specimen.

Problems

A. Glucose and Chloride Membrane Life
   1. Initially 3 to 4 days.
   2. Other users report a life of 10 to 14 days.
   3. Since we have stopped using quality control material containing dyes and preservatives the life of these membranes has extended to approximately 7 days.

B. Nova Haematocrit Control
   1. This would frequently not produce a result and instead print 'Bypass Valve Bad'.
   2. This would generally indicate some form of block but routine blood gases processed immediately after would not reproduce this error.
   3. It has been rectified with the latest software version.

C. Sample Probe
   1. Presentation of the probe was frequently accompanied by a spitting action of residual fluid in the lines.
   2. This has been significantly reduced by the latest software version.

D. 'Cal Flow time Slow'
   1. This error message indicates some form of block.
   2. It appeared frequently in the first three months of use.
   3. It proved to be the result of incorrectly following the maintenance procedure for changing the Waste/Reference Pump Tubing.
   4. The small piece of tubing lying in the Bypass Valve was inadvertently left in when the pump tubes were replaced and was badly blocked.

E. Default Haemoglobin
   1. Haematocrit is measured by electrical impedance of red blood cells after correcting for the electrical effect of Sodium.
   2. Haemoglobin is calculated from Haematocrit.
   3. Therefore if Sodium is suppressed, no Haematocrit is displayed and no Haemoglobin can be calculated.
   4. When Haemaglobin cannot be calculated a default value of 143 g/l is printed.
   5. This value will have a small 'd' beside it for default as opposed to a small 'c' for a calculated result.
   6. The default value was inadvertently reported by a staff member, unaware of the significance of the 'd', when they suppressed an unwanted Sodium result.

F. Ionised Calcium
   1. As this is the first time we have offered this test a significant investigation was performed as to the suitability of the anticoagulants used in our Blood Gas Syringes.
   2. Our adult Blood Gases are collected into pre-heparinised 5ml Terumo Syringes.
   3. As long as these contain a minimum of 3ml of whole blood, the Ionised Calcium is not significantly affected.
   4. Neonatal Blood Gases are collected into manually heparinised 1ml Terumo Syringes and these were found to significantly reduce the Ionised Calcium result.
   5. Various concentrations and brands of Heparin were tested and the only suitable brand was that produced by Radiometer, 'Titrated Heparin for Ionised Calcium'.
   6. We are currently investigating a 1ml Blood Gas Syringe pre-heparinised with 15 Units of lyophilised lithium heparin.

Technical Support

The support from Bayer Diagnostics (the agent for NOVA biomedical) has been excellent. The sales staff are regularly in touch and have answered my numerous questions promptly. Their stock management system is well organised and the service department has only been called out once.

There was a comprehensive 3 day course which was most worthwhile as we had previously had very little hands on use of our own NSP5. On day 1 we were asked what questions we had and were promised answers by the end of the course. Then the menus and their functions were explained. The afternoon was spent totally dismantling the analyser and stripping it down to the motors. Day 2 was spent fixing faults put on the analysers. Day 3 starfed with a test of what had

been learnt in the previous 2 days. Afterwards there was an opportunity to go over maintenance procedures and a data management package which is also available. Four teaching manuals were used in conjunction with the course and the participants were expected to work through these as well. I have found these to be most useful in training staff back in the laboratory. Overall I found the course thorough, practical and the format flexible. The flexibility means that sales representatives through to nurses and laboratory staff can be taught on this course. However, it would be most beneficial to attend with others of a similar background.

Conclusion

It would be wise to note that this analyser has 3 times as many channels as an ordinary Blood Gas Analyser and it would not be unreasonable to expect more down-time than on an ordinary Blood Gas Analyser, for both maintenance and trouble-shooting.

Our NSP5 has had a lot of down-time due to problems with faulty Potassium and Ionised Calcium electrodes and a high failure rate with Glucose Membranes. The company is open about these particular batch problems and is happy to replace those batch numbers which are known to be affected. The design is such that it is very easy to maintain, remove, and replace electrodes and their membranes.

The screen has many prompts and is very user-friendly. The manual is well set out, easy to follow and has a comprehensive trouble-shooting section. All of these features have meant that the staff has had no difficulty in learning how to operate it and are generally happy with its operation.

The service to Theatre and ICR has been greatly improved both in turnaround time and with the provision of Ionised Calcium and Glucose on the Blood Gas specimens.

Acknowledgements

The author wishes to thank Roger Johnson for critically reading the manuscript.

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The Pacific Way

Laboratory Technology at Norfolk Island

Malcolm Rees

Geographically, Norfolk Island lies at the intersection of two imaginary lines. One, north from Christchurch, one east from Brisbane.

The Island is 8km by 5km. The climate would be considered sub-tropical with temperatures rarely going above 30°C or below 10°C. Often the humidity reaches 99%.

The population is approximately 2,500 people, consisting of residents and both Australian and New Zealand expatriate workers, like myself.

Although it is an Australian territory, Nortolk Island has its own Administrative system, including a Legislative Assembly, local Government and Government Departments.

Health System

A recently introduced health system on Norfolk Island requires all adults to pay $120.00 each per annum for health care. This provides the health care with an excess of $2,000 per annum. In other words, you pay the first $2,000 — after that care is free.

The hospital has two Doctors, approximately 18-20 nurses, a small Dentistry department, X-ray, Pharmacy and Laboratory.

The hospital is self funding, by charging for all treatment procedures and consultations. People attending the Laboratory receive an invoice for the laboratory tests to be done, at the time of blood collection. The charges are set according to the Australian schedule of charges.

The Laboratory Technologist position is a sole charge position. Most facets of laboratory work are performed here, including biochemistry, haematology, immunology, microbiology and blood bank.

The laboratory processes some 150-200 samples per month. The type of work and specimens is similar to New Zealand. The usual swabs, urines, biochemistry tests, full blood counts, coagulation tests are done here. Of course you have to be able to do them all.

I am the only scientific reference on the Island, thus am often called upon to perform other than Medical Laboratory tests e.g., cultivation of a Tyromyces Fungus, for the Forestry Department. This is used to prevent the transfer of a disease called "Phellinus Noxious" on newly cut tree stumps.

The Wildlife Department are involved in a breeding programme with the indigenous "green parrot". From time to time I check the parrot faeces for pathogens (fortunately someone else catches the parrots).

I am also the local vet laboratory and receive specimens from all sorts of animals.

This is an interesting place to work. I have found a high degree of versatility and ingenuity necessary and if you can cope with this, work here can be a lot of fun.

Malcolm Rees is a New Zealand Medical Laboratory Technologist currently working in the hospital on Norfolk Island.

Malcolm trained at Middlemore Hospital and worked post qualification at Te Kuiti, Middlemore and Rotorua Hospitals before taking up his present position. His wife Lorraine is a trained nurse but currently spends most of her time looking after their two young children.

Dumping Rubbish — The Pacific Way

Proposals to dump hazardous and supposedly safe municipal waste are constantly being made to Island Governments. But most do not have the technical capacity to evaluate the effects of such schemes; The Marshall Islands Government was attracted by the idea of building the height of an island using garbage to offset the rising sea level expected because of the Greenhouse effect, but did not take into account the damage caused by the garbage leeching into water supplies and marine ecosystems.

South Pacific nations are under increasing pressure from the Northern hemisphere countries to become a dumping ground for hazardous waste — and this pressure will grow even faster as the major industrial nations run out of alternatives for waste disposal. Mr Peter Dunn, New Zealand's Associate Environment Minister, recently told the Environment — 90 Conference held in Sydney, that the main attraction for Pacific nations was that becoming a garbage dump was a means to earn much needed money, just as the Marshall Islands had been tempted to accept huge quantitites of commercial and household refuse from the United States mainland.

Dumping Sewage — A Matter of Ingenuity

Western Samoa does not have any large scale sewage treatment plant. Sewage disposal carried out by private contractors are therefore based mainly on ingenuity. Some dig trenches in isolated areas and allow the waste to decompose naturally. Others spread the waste over a large surface area, allowing the sun, rain and soil absorption to break it up.

Some villages on the south coast of Western Samoa's main island of Upolu had their water supply disconnected for several weeks when raw sewage entered the system. Water was brought in by trucks. A private septic tank cleaning company had dumped the sewage near a water supply intake at Togigiga, 14 miles south, across a mountain range from the capital Apia. The workers were warned of the water supply intake but dumped anyway. Solid waste on the bank of the river had to be cleared physically to prevent more contamination during rain.

Further Cause for Pacific Anxiety

Johnston Atoll, about 1300kms south-west of Honolulu, is a bleak, treeless, uninhabited former bird sanctuary. Originally there were just two tiny islands on the atoll — Johnston and Sand — but they have been expanded into artificial islands created for military installations. Johnston Island has been increased 12 fold to 260 hectares.

The United States Army's $3.1 billion plan to destroy its aging chemical weapons arsenal, has stirred fears of potentially disastrous consequences. Testing for the full scale burn-off of nerve and mustard gus stockpiles removed from Okinawa, and moved to the Atoll in 1971, is due to start soon. The chemical weapon destruction plant called The Johnston Atoll Chemical Agent Disposal System (JACADS) has been built over several years.

The army plans to ship out chemical weapons from West Germany and destroy them in the four JACADS incincerators on Johnston Island. Among the United States stockpile in Germany is an estimated 400 tonnes of lethal nerve gas — GB (SARIN) and VX — contained in about 100,000 8" and 150mm shells. Nerve gas causes convulsions and death — sometimes within 10 minutes of exposure. Mustard blistering agents H, HD, and HT are also among the weapons.

The Pacific paradise at our back door is in peril. The region is a mosaic of serious actual or potential environmental problems — hazardous waste dumping, drift net fishing, ocean dumping, Greenhouse effect, ozone depletion, nuclear tests, deforestation, nerve gas burn-offs, coral reef damage, mining devastation and poilution.

NEW PRODUCTS AND SERVICES

NEW PORTABLE MAMMALIAN RESPIRATORY ANALYSER GIVES RAPID RESPONSE

Rapid measurement of mammalian respiratory rates can now be made using a new, portable CO_2 gas analyser from The Analytical Development Company (ADC) Limited. The unit, called the FM1, utilises infrared analysis technology and has been specifically developed for pharmaceutical, cosmetic, medical and veterinary research laboratories.

Measuring CO_2 in the 0-10% range, this truly portable unit offers a typical response time of 120 milliseconds and features an internal sample pump and rechargeable battery. With continuous operation of the heated analysis cell and sample pump, the unit will operate for periods in excess of fifteen hours between battery charges. A battery check facility is provided and a low battery warning indicator is included. Power can also be supplied by mains electricity.

An analogue flow rate display is mounted on the front panel, alongside the zero and span control and gas connections for 1.5 or 4mm bore tubing.

A multiway switch enables the user to hold the peak or trough signal on the display. There is also facility to compensate for the presence of nitrous oxide.

An optional battery charger is also available. The FM1 measures 160 x 215 x 300mm and weighs 550g.

For further information contact Wilton Instruments, PO Box 31-044, Lower Hutt, Phone (04) 697-099, Fax (04) 697-240

BRIGHT CRYOSTATS FOR HISTOLOGY AND RESEARCH

Wilton Istruments are pleased to announce their appointment as New Zealand distributors for Bright Instruments, U.K.

Bright Instruments are a specialist manufacturer of Cryostat Microtomes and have built a reputation for quality and innovative design.

Together with the traditional range of free standing and open top Cryostats, Bright Instruments offer two unique systems.

Starlet Cryostat

A small Benchtop Unit which is inexpensive, portable and can be battery operated. The Starlet includes all the facilities expected with larger systems including:

Auto-Defrost, Freeze Bar, Digital display of temperature, Automatic advance, Antiroll device, Open top design.

Series 7000 Safecut Cryostat

This unit features an automatic in-situ decontamination system, a revolutionary concept in Cryostat safety which also doubles as the defrost cycle. The microtome is located outside the refrigerated chamber with the specimen arm passing through a seal into the chamber.

For further information contact, Wilton Instruments, PO Box 31-044, Lower Hutt, Phone (04) 697-099, Fax (04) 697-240.

PROJECT YOUR IMAGE

A new projector tube for the latest Zeiss upright microscopes provides binocular drawing facilities, and because of its superbly corrected optics, offers a range of useful functions which go beyond the scope of a normal drawing apparatus.

With a zoom range from 4x to 14x, projected areas for drawing may be as large as A4. Likewise any macro objects placed in that area, such as whole specimen, will be imaged in the microscope for viewing and photography. In this macro mode gross details may be superimposed with microscopic details or reference material such as negatives, overlays and scales may be superimposed for comparative studies.

For more information on this new projector tube please contact: Carl Zeiss Pty Ltd, Auckland. Phone (09) 775-624. Fax (09) 366-1939. Wellington: Phone (04) 724-860. Fax (04) 499-1211.

ANTIFLEX TOOL FOR HISTOCHEMISTRY AND CYTOCHEMISTRY

Researchers in Immunochemistry, Hybridocytochemistry and Ligard Receptor Cytochemistry have an increasing requirement for highly sensitive microscopic detection methods to visualise non-automatic graphic hybridisation results.

For use with their current range of upright and inverted microscopes, Zeiss now has available from the line of ICS optics a special anti-flex objective for Reflection-Contrast Microscopy (RMC). RMC with the unique Antiflex Objective Plan-Neofluar 63x/12.5 oil Phase is a powerful and very sensitive optical tool for microscopy and documentation of the finest reflecting labellings such as collordal gold and PO/DA B.

For more information on this Antiflex Tool, please contact: Carl Zeiss Pty Ltd, Auckland: Phone (09) 775-624. Fax (09) 366-1939. Wellington: Phone (04) 724-860. Fax (04) 499-1211.

LASER INTERFACE FOR INVERTED MICROSCOPE

An integrated workstation for laser microbeam microscopy, based on the Axiovert range of inverted microscopes will make experimental laser techniques safer and easier to set up. The Laser Interface allows lasers of various wavelengths between 240nm and 1300nm to be used through the microscope for techniques such as: micro-fluorescence analysis, fluorescence microbleaching, chromosome distribution/nanosurgery, cell fusion, microbeam dissection, perforation and destruction of native cells and tissues. The workstation is based on the rugged Axiovert universal inverted microscope with its exceptionally stable, patented 3-point stage support. Four Axiovert models offers various photographic and TC combinations, some motorised objective selection.

A suitable laser may be coupled with the epi-fluorescence beam path of the microscope, which, when focused through Zeiss ICS infinity optics can provide laser spot diameters in the micrometer range and below. For instance, a 337nm laser, used with a 1.25 N.A objective, will give a spot size of appoximately 0.3um. This system ensures that the specimen targeted is hit exactly by the laser beam, a particularly important factor when invisible UV lasers are being used.

A comprehensive range of filter sets consisting of exciter filters, dichroic beam splitters and reflectors facilitate perfect matching to the wavelength of the relevant laser. Simultaneous laser coupling and epi-fluorescence microscopy is possible. The maximum permissible laser power that can be used is 100mW for continuous wave, 1.0mW for lasers with pulse lengths in the nano second range Maximum pulse frequency 100th second. For further information about the Laser Interface, please contact: Carl Zeiss Pty Ltd, Auckland. Phone (09) 775-624. Fax. (09) 366-1939. Wellington. Phone: (04) 724-860. Fax. (04) 499-1211.

IMMUNOLOGY PRODUCTS

Biolab Scientific is pleased to announce their appointment as agents for Immunoconcepts USA.

Immunoconcepts enjoy large market shares in both Australia and USA for Immunology products. These include Fluorescent ANA & DNA as well as Colorzyme ANA & DNA which do not require a fluorescent microscope.

The Autoantibody Test System includes SS-A, SS-B & SM/RNA. Indirect Fluorescent Antibody Test System for the detection of IgM & IgG antibodies to Epstein Barr Virus, completes the range.

Marketed by Biolab Scientific, Division of Salmond Smith Biolab.

MONOCLONAL ANTIBODIES DETECTING HUMAN ANTIGENS

Anti-TCR-Gamma/Delta-1 for:

* Identification and enumeration of T Cells bearing the Gamma/Delta T Cell Antigen Receptor.
* Studies of T Cell Lineages.
* Structured studies of the T Cell Antigen Receptor Complex
* Studies of MHC-Non-Restricted Cytotoxicity.

IG Chain Composition — It is Mouse IgG heavy chain and Kappa light chains.

Clone:- 11F2 derived from Hybridization of Mouse SP2/0 Myeloma cells with Spleen cells from BALB/C Mice immunised with a Sepharose/Anti-CD3/TCR-gamma/Delta complex.

100 tests available as:
Purified Antibody
or Biotin Conjugate
or Fluorescein Conjugate
or Phycoerythrin Conjugate

Marketed by Biolab Scientific, Division of Salmond Smith Biolab.

METAL CAPPED SPECIMEN CONTAINER

Fulfilling a market requirement for a metal capped specimen container, the Labserv division of Salmond Smith Biolab are pleased to announce the release of a 60ml polystyrene container, with a wadded leak-proof metal cap.

The container is available in four different presentations: unlabelled; labelled; unlabelled/sterile and labelled/sterile. The new container is supplied in cartons of 250 units. Buy N.Z. made!

Distributed by Biolab Scientific, Private Bag, Northcote, Auckland, Phone (09) 418-3039, Fax. (09) 418-0729.

Paediatric Aspects of Clinical Biochemistry.

Organised by the Biochemistry Special Interest Group of the New Zealand Institute of Medical Laboratory Science (Inc).

A one-day seminar was held on the 22nd September 1990 at the Ernest and Marion Davis Post Graduate Medical Centre Auckland Hospital. The papers presented at this seminar are abstracted below.

Substrates for Fetal Growth

Pandora C Evans, Department of Paediatrics, Auckland School of Medicine.

The mammalian fetus requires an adequate and continuous supply of substrates to sustain growth and energy production. A typical fetal "diet" contains approximately 50% glucose and 25% each lactate and amino acids.

Reduced supply of these substances, particularly glucose, leads to slowing of fetal growth. However the fetus and placenta adapt to reduced glucose supply by increasing metabolism of other substrates, particularly lactate and amino acids.

Currently, we are using as an experimental model, the intrauterine growth retardation of the ovine fetus due to maternal undernutrition. These studies aim to isolate those factors which permit the metabolic adaptation which allows fetal survival in the face of reduced substrate supply.

Carbohydrate Management of the Newborn

Jane E Harding, Department of Paediatrics, Auckland School of Medicine.

The newborn infant must make a rapid transition from a state of constant intravenous feeding to that of having to maintain circulating substrate concentrations from its own body stores. Glucose is the most important of these circulating substrates, essential for maintenance of normal brain metabolism. The mechanisms of the metabolic transition required are complex, and may be affected by many common neonatal problems such as birth asphyxia, sepsis, prematurity, and intrauterine growth retardation, with potentially serious consequences.

Although subnormal circulating glucose concentrations are known to cause brain damage, the definition of "normal" has been problematical. Recent evidence suggest the old definitions should be revised upward as high as 2.6mmol/L. This has major implications for routine clinical and laboratory surveillance of newborn infants.

Islet Cell Antibodies and Vitamin B6.

Robert B Elliott, Department of Paediatrics, Auckland School of Medicine.

Diabetes mellitus Type 1 occurs in 1/700 children under the age of 15 in Auckland, and the rate is increasing at 10%/year.

For years before the onset of the disease, islet cell antibodies are present in the blood.

Children with such antibodies are at risk of developing the disease. The risk can be further defined by assessing insulin response to I.V. glucose.

Nicotinamide is a precursor of N.A.D. which has been shown:

1. To prevent diabetes in an animal model of diabetes.
2. Prevent the killing of pancreatic B cells by cytokines.

When given to humans with islet cell antibodies, and impaired insulin release, it appears to prevent diabetes.

The means of preventing diabetes in defined 'at risk' individuals are at hand.

DNA Technology — 1). Tools of the Trade 2). Analysis of Gene Defects.

Neil S Van-de-Water, Department of Haematology, Auckland Hospital.

DNA Technology — Part 1 "Tools of the Trade"

A basic introduction to recombinant DNA technology outlining some of the more useful tools and techniques. Topics covered will include a brief historical perspective, restriction enzymes, nucleic acid hybridisation, Southern blotting, PCR etc.

DNA Technology — Part 2 "DNA Analysis of Gene Defects"

Advances in Molecular Biology over the last decade have revolutionised the study of genetic diseases. The application to medicine has enabled us to determine the underlying defect or mutation in many inherited disorders. This information provides us with a powerful tool for carrier detection and prenatal diagnosis of numerous genetic diseases such as cystic fibrosis, muscular dystrophy, sickle cell anaemia, and haemophilia. Haemophilia as an example of carrier detection and prenatal diagnosis will be discussed in detail.

Clinical Treatment of the Childhood Diabetic

Wayne S Cutfield, Department of Paediatrics, Auckland School of Medicine.

There are considerable limitations to outpatient management of diabetes mellitus in childhood. Specific dietary and insulin regimens are constructed and supervised by the paediatric diabetes team. The monitoring of diabetes control requires obsessive blood glucose and glycosolated protein estimations. Psychosocial problems play a major role in control of childhood diabetes.

Fructosamine and HbA1C.

Denis Jury, Clinical Chemistry Department, Waikato Hospital.

Protein glycation has offered both a means of assessing glycaemic control as well as a possible pathogenesis for diabetic complications.

The advantages and disadvantages of ion-exchange chromatography, immunoassay, boronate chromatography, furosine and HMF production and reducing activity as measures of protein glycation will be discussed.

Two decades of experience have established HbA, as a useful measure of long term glycaemic control, and although there have been many studies investigating the clinical use of fructosamine there is still much debate regarding this. Unfortunately most of the published studies regarding fructosamine have used the old methodology for measurements. The recently developed method offers considerable improvements for the quantitation of fructosamine.

Aberrant Amylases on Microcollect.

Geoff Rimmer, Clinical Chemistry, Princess Mary Hospital, Auckland.

A 12 year old cystic fibrosis patient with a history of abdominal pain was diagnosed as having pancreatitis. This diagnosis was assisted by raised serum amylase results. The problem was some amylase results were normal and changes in amylase levels did not follow changes in the patients symptoms. It was noted that there had never been a raised amylase on a venepuncture, 'macro', sample from this patient.

Our findings show that 27% of serum amylases on 'micro' collects were greater than 500 U/L compared with 4% on macro samples. Eight patients with raised 'micro' amylase results had normal levels when 'macro' samples were analysed. Changing reagent brands, collection systems, storage containers, analysers or washing fingers all made no difference. Salivary amylase was the predominant iso-enzyme in these 'micro' samples.

Theophylline — History and Modern Therapeutic Aspects.

Ron Couch, Clinical Chemistry Department, Auckland Hospital.

A methylated xanthine component was isolated from the leaves of tea in 1888 and the name "theophylline" was given to this compound. In 1922 a German physician, Hirsch, reported that two of his asthmatic patients responded well to "spasmopurin", a mixture containing mainly theophylline. An organic chemist, Traube initiated the chemical synthesis of theophylline in 1900 and this remains the basis of present day commercial synthesis.

An understanding of the pharmacodynamic and kinetic principles and the modern formulations available permit us to use theophylline both in prophylactic and urgent treatment of acute asthma. Theophylline if used concomitantly with high dose corticosteroids is a major adjunct determining the efficiency of asthma control in this therapy. In the emergency room, beta-$_2$ agonists (e.g. salbutamol) are effective and the role of theophylline in this situation is perhaps controversial. Theophylline mechanism of action is not clear — is it a phosphodiesterase inhibitor; an inhibitor of prostaglandins; does it effect adenosine receptor blockade? An adenosine non-blocking xanthine, endoprofylline, is reported to be more potent than theophylline.

The metabolism of theophylline is age dependent in children. In children less than 7 months of age, theophylline is metabolised to caffeine, and theophylline and caffeine are cleared renally. From 1 to 9 years of age, theophylline clearance becomes more rapid as the liver biotransformation alters to the adult pattern. Clearance is altered by other drugs such as cimetidine, the macrolide group of antibiotics, the cardiac drug mexilitine and the anticonvulsant phenobarbitone. Pharmacokinetics is also altered in the patient who smokes and in the "passive smoker".

Theophylline has a narrow therapeutic index and serum levels are not dose dependent. Therapeutic drug monitoring is essential to ensure adequate dosing regimes. The laboratory can provide this service as a stat and batch analysis. Analytical techniques are also designed to be used in the physicians centre. Predicting theophylline concentration is possible with "Bayesian" computer techniques.

Post Natal Screening.

Dianne Webster, National Testing Centre, Department of Community Health, Auckland School of Medicine.

The New Zealand National Testing Centre is funded from Vote: Health to provide newborn baby metabolic screening services for New Zealand newborns. The programme guidelines are the WHO Criteria for Good Screening Tests (Wilson and Jungner 1967).

In 1989, we screened 58,399 samples from the 58,091 infants born in New Zealand, The results are summarized below.

Condition	Metabolite	Assay	Cases	Rate
PKU	phenyl-alanine	bacterial inhibition	3	1:19 400
MSUD	leucine	"	0	1:166 500
Galactos-aemia	gal + gal-1-P	biochemical	0	1:67 600
Hypo-thyroidism	TSH	RIA	11	1:4 900
Cystic fibrosis	trypsinogen?	RIA	5 + 3?	1:4 100
Adrenal Hyperplasia	17-OHP	RIA	2	1:23 600
Biotinidase Deficiency	biotinidase enzyme	biochemical	0	1:46 500

The Fetus as a Patient.

Alistair Roberts, Department of Obstetrics and Gynaecology, Auckland School of Medicine.

This will cover recent developments in high-risk obstetric care with special reference to the fetus. This will involve ultrasound and discuss, with illustrations, the role of this in evaluating and diagnosing problems in the fetus. Chorion biopsy and amniocentesis and their roles in prenatal diagnosis will be discussed, as well as commenting on fetal blood and tissue sampling. Results will be discussed with intrauterine transfusion in Rh disease and touch on diabetes. Comments on future developments and ethical issues.

INSTITUTE BUSINESS

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Membership Convenor
Geoff Rimmer
P.O. Box 9095, Newmarket, Auckland.

Membership Fees and Enquiries

Membership fees for the year beginning April 1, 1990 are:

For Fellows — $88.40 GST inclusive

For Associates — $88.40 GST inclusive

For Members — $33.80 GST inclusive

For Non-practising Members — $33.00 GST inclusive

All membership fees, change of address or particulars, applications for membership or changes in status should be sent to the Membership Convenor at the address given above.

Members wishing to receive their publications by airmail should contact the Editor to make the necessary arrangment.

NZIMLS Annual Staffing Survey April 1990

Medical Laboratory Technologists

Currently employed

	1984	1985	1986	1987	1988	1989	1990
Clinical Biochemistry	174	187	186	187	187	175	208
Microbiology	164	168	172	176	186	189	204
Haematology	160	160	163	168	176	174	180
Immunohaematology	86	90	92	97	102	96	105
Histology	22	24	24	24	28	26	29
Cytology	6.0	5.2	7.2	5.7	7.8	9.5	22
Nuclear Medicine	6.2	8.5	8.0	5.8	9.0	7.0	8.4
Immunology	23	22	28	22	21	30	31
Cytogenetics	5.5	7.5	6.5	7.5	8.0	6.4	5.8
Virology	1.0	2.0	6.0	4.5	6.5	10	12
Administration (full time)	37	34	39	34	33	33	30
On rotation	46	41	55	41	44	40	31
Other	4.5	7.3	2.4	3.0	11	7.8	13
Total	735.2	756.5	789.1	775.5	819.3	803.7	879.2

Current Vacancies

	1984	1985	1986	1987	1988	1989	1990
Clinical Biochemistry	9.0	8.5	15.3	11.5	14.0	15.0	10.6
Microbiology	1.5	4.0	12.5	10.0	9.6	13.0	5.8
Haematology	4.5	4.0	11.0	9.8	11.0	11.0	10.6
Immunohaematology	6.0	4.0	6.5	7.3	6.3	3.0	5.0
Histology	3.0	5.0	3.0	5.0	5.0	6.0	4.0
Cytology	-	-	-	2.0	2.0		1.0
Nuclear Medicine	-	-	1.0	1.0	1.0	-	1.0
Immunology	1.0	-	2.0	2.0	5.0	1.0	1.0
Cytogenetics	-	-	-	-	-	0.5	1.5
Virology	-	-	-	1.5	0.5	-	-
Administration (full time)	-	-	1.0	1.0	-	-	-
On rotation	1.0	3.8	6.5	3.1	3.6	0.5	4.9
Other	-	-	-	-	-	-	-
Total	26.0	29.3	58.2	54.2	58.0	50.0	45.4

Medical Laboratory Technology Trainees

Trainee Numbers

	1984	1985	1986	1987	1988	1989	1990
Total Trainees	381	334	341	349	371	347	241
NZCS Trainees (or NDMLT)	185	173	173	175	175	165	141
Graduate Trainees	22	15	39	55	63	64	30
Certificate Trainees	162	133	139	145	158	167	89
Specialist Cert. Trainees	34	29	29	29	38	42	-
Trainee Vacanies	6	21	11	7	8	15	32

NZCS or NDMLT Trainees

First Year	50	65	61	67	67	55	41
Second year	65	48	61	49	58	50	44
Third Year	70	60	51	59	50	60	56

Certificate Trainees

Clinical Biochemistry	45	39	42	46	44	40	22
Microbiology	41	35	33	41	49	53	36
Haematology	38	37	32	31	38	35	15
Immunohaematology	25	15	18	13	12	14	6
Histology	5	4	4	6	4	11	3
Cytology	2	-	2	3	2	5	1
Nuclear Medicine	-	-	-	1	-	1	1
Immunology	2	-	3	1	5	6	2
Cytogenetics	2	1	2	1	2	1	1
Virology	2	2	3	2	2	-	1

Specialist Certificate Trainees

Clinical Biochemistry	8	9	8	8	6	16	-
Microbiology	5	6	9	6	10	11	-
Haematology	9	5	4	5	7	2	-
Immunohaematology	3	4	5	2	6	6	-
Histology	2	2	1	3	4	4	-
Cytology	1	1	-	-	1	1	-
Nuclear Medicine	5	-	-	-	-	-	-
Immunology	-	1	-	1	-	1	-
Cytogenetics	1	-	2	2	3	1	-
Virology	-	1	-	2	1	1	-

Medical Laboratory Assistants

Currently employed

	1984	1985	1986	1987	1988	1989	1990
Clinical Biochemistry	188	193	183	169	174	177	154
Microbiology	165	186	168	152	188	176	185
Haematology	142	145	143	117	112	118	120
Immunohaematology	101	118	118	114	112	100	98
Histology	78	77	85	76	96	76	74
Cytology	40	32	36	40	35	56	59
Nuclear Medicine	16.0	12.5	16.8	11	13	9	4
Immunology	41	32	42	31	48	46	42
Cytogenetics	5.0	4.0	7.5	5.5	13	3.5	3.5
Virology	5.6	7.0	7.0	8.0	6.5	5.5	6.5
Blood Collection	87	96	91	91	75	77	71
On rotation	56	44	51	56	67	64	28
Other	24	31	44	49	49	66	50
Total	948.6	977.5	992.3	919.5	988.5	974.0	895

Current Vacancies

	1984	1985	1986	1987	1988	1989	1990
Clinical Biochemistry	5.5	5.5	7.0	11.0	5.3	2.0	8.0
Microbiology	3.9	4.8	8.4	5.4	1.9	4.0	5.4
Haematology	1.7	4.3	5.8	4.1	5.6	5.5	4.6
Immunohaematology	2.1	1.0	2.5	4.6	10.9	5.5	10.3
Histology	0.5	3.0	2.0	4.5	3.8	7.5	3.8
Cytology	-	1.0	1.0	1.0	-	2.0	0.7
Nuclear Medicine	-	1.0	-	-	1.0	1.0	1.0
Immunology	-	1.0	-	2.4	-	1.0	2.6
Cytogenetics	-	-	-	-	-	-	-
Virology	-	-	-	-	2.0	2.0	-
Blood Collection	-	1.0	4.0	3.0	-	4.6	4.0
On rotation	2.0	2.7	2.7	0.4	1.0	-	5.5
Other	-	1.0	-	0.5	5.5	1.5	2.3
Total	15.7	26.3	33.4	36.9	37.0	36.6	48.2

Scientific Officers

Currently Employed

	1989	1990
Clinical Biochemistry	37.7	33.7
Microbiology	5.9	4.9
Haematology	2.0	2.0
Immunohaematology	2.0	2.0
Histology	-	-
Cytology	0.6	-
Nuclear Medicine	2.0	2.0
Immunology	3.0	3.0
Cytogenetics	10.0	11.0
Virology	5.0	6.0
Blood Collection	-	-
On rotation	-	-
Other	8.0	8.0
Total	76.2	72.6

Membership Sub-Committee Report — August 1990

Since the May meeting there have been the following changes:

	27.8.90	29.5.90	14.3.90	15.11.89
Membership	1315	1702	1628	1669
less resignations	19	16	12	21
less G.N.A.	35	51	1	22
less deletions	-	328	-	-
less deceased	-	-	2	-
less duplications	- 9	-	-	-
	1252	1307	1613	1626
plus applications	9	8	89	2
plus reinstatements	11	-	-	-
	1272	1315	1702	1628
Composition				
Life Member (Fellow)	12	12	13	13
Life Member (Associate)	5	5	4	4
Fellow	22	23	26	26
Associate	721	688	???	741
Members	425	503	???	752
Non-practicing	56	53	61	61
Honorary	31	31	31	31
Total	1272	1315	1702	1628

Applications for Membership

A TALBOT; S IRELAND, ARBC; H. SPROSTON, Diagnostic Lab; T. CLEARY, Northland Path Lab; S. KAY, TELARC; K. MURRAY, National Womens; L. JONES, Valley Diagnostic Lab; S. POLASCHEK, Invercargill, M. WHITE, Diagnostic Lab.

Resignations

C. CRUICKSHANK; M. HALLOWES; W. ORBELL; L. WRIGHT; S CHAMBERS, Auckland; B. CHAMBERS, Middlemore; L. WONG; Middlemore; C. CROWTHER, National Womens; K. TAYLOR, Northland Path Lab; A. IDEMA, Princess Mary Ak; K. MONAGHAN, Christchurch; H. COOK, Pearson Lab; D. BAIN, Princess Margaret Chch; K. GAZLEY, Princess Margaret, Chch; L. STONE, Napier; F. MORATTI, New Plymouth Med Lab; S. KNYN, Palmerston North; E. McCHLERY, Wellington; L. BARCLAY, Invercargill Med Lab.

Gone No Address

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LETTERS TO THE EDITOR

Ed Note: I have received letters from Medical Technologists who are currently or were previously practising in the South East Asian region. I am sure their experiences will be of great interest to any who have worked in the area and for all members give an insight into the standard of Medical Technology and the role that NZ technologists can have in helping developing countries.

Dear Editor,

The hospital that I now find myself Hospital Director of, is in fact six hours journey inland from Karachi. If you get a good map of Pakistan you might just find Kunri close by another town called Umerkot on the edge of the Thar desert. The Thar is reported to be the biggest inhabited desert in the world. The hospital has 150 beds of which about 50 are for women and children, the balance for the Eye department which did 1500 catarract operations, plus the 10000 patients to the OPD. General OPD sees about 19000 patients a year. We also have a major TB programme going and with about 40% of the population in this part of the country active, we do not lack clients, although we realise that we only touch a small proportion. We have a small laboratory but we are trying to expand as the nearest other lab is about 80 kilometers away. The need for Widals and other basic serology, plus basic biochemistry is very obvious and in discussion with one or two local doctors would be welcomed. There are ample supplies of reagents in Karachi but many times one is left wondering if they have been stored correctly and therefore viable. But as a relaxation from my administrative tasks I take off to the lab and have a "play". We are looking to provide a basic training in lab techniques along the line of the technical assistants training as to have a marketable skill is so important for young people here.

Yours sincerely,

Stewart Entwistle
Kunri Christian Hospital
PAKISTAN.

Ed Note: Extracted from a letter to Pearson Laboratory Staff, Christchurch.

Dear Editor,

Return to Vietnam

During the time of the Vietnam war, between 1963 and 1975, the New Zealand Government provided not only troops but also civilian assistance in the form of medical personnel to the province of Binh Dinh. The New Zealand Surgical Team, as it was called, worked at the Province Hospital in Qui Nhon while the Combined Services Medical Team was stationed some 60 miles further north at the Bong Son hospital. I was privileged to be a member of the Qui Nhon team from October, 1968, to November, 1969, and I have recently been fortunate in returning to that city for a 4-week visit. I accompanied two other members of the team who were originally with me in 1969, Dr Margaret Neave, paediatrician and Mr Dennis Montgomery, engineer. Also with us was Mrs Lien Morris, a Vietnamese nurse now resident in New Zealand who had been working in the operating theatre at Qui Nhon during our time there. A number of New Zealand medical technologists have been members of the team at Qui Nhon during those years and I am happy to report on my visit for their interest as well as for other readers.

The first difference one notices on entering Vietnam now is the absence of military forces and equipment both of which were so evident during the war. We were able to go by road from Ho-chi-Minh (Saigon) to Qui Nhon, a two-day journey, and I was able to see what a beautiful country this really is. An overnight stop at the beach resort of Nha Trang was a welcome break on the trip, especially as the road is in very bad condition in places. Much of the journey follows the coastline which is the epitome of tropical beaches, golden sands, palm trees and clear blue sea.

Qui Nhon city has not altered much in the past 21 years except for the absence of a military presence as previously noted. There are no longer refugees camped along the beach front in wooden, corrugated iron or even cardboard homes and consequently the beach front presents a more tidy appearance. The main square of the city is now planted in gardens and trees which is an improvement.

There are now two hospitals in the city, the Province Hospital remembered by team members and the City Hospital, the latter being housed in what used to be a Catholic hospital staffed by an order of nuns from USA and known as the Holy Family Hospital. When Qui Nhon fell to the North

Vietnamese forces this hospital was occupied and used by those troops for some years and finally abandoned in a derelict state. It was opened as a second institution for the citizens of Qui Nhon about two years ago.

The Province Hospital has now greatly expanded and possesses twice as many wards and considerably more personnel than in 1969. The greatest change is that now patients are accommodated one to a bed and not the two or three to a bed which team members will remember was the norm in the past. Consequently the wards are far less crowded and more spacious.

The laboratory staff now consists of 35 members as opposed to the 5 remembered by the writer. A number of these are doctors trained in North Vietnam and each section has at least one if not more of these people. As is the case throughout the hospital there is an abysmal lack of equipment which precludes the performance of any tests other than the most basic. The biochemistry section has had an air-conditioned room for the past three months and contains a Corning flame photometer. However this cannot be used because the filters have become mouldy during the machines residence in the warm laboratory prior to this, and so far efforts to procure replacement filters have proved fruitless.

Microbiology is hampered by a chronic shortage of culture media or raw materials to manufacture this and there is no funding to purchase these items. Consequently most of the diagnoses are made on microscopic examinations of films or wet smears. In haematology the red and white cell counts are performed with dilution pipettes and haemoglobin is estimated by the Sahli method. There is a haematocrit centrifuge but often no heparinised capillary tubes can be obtained through lack of funds.

There is a blood bank operating and I am told no shortage of donors. This is because each donor is paid 15,000 dong ($NZ1 = 300 dong) per 100mls. of blood given. The maximum taken from a donor is 300 mls and payment for this represents more than a month's wages for most Vietnamese hence the ready availability of donors. The cross-matching of blood for transfusion seems to be carried out competently.

The City Hospital is in much the same condition except that it is smaller and appears to have even less available in the way of materials or equipment or money to buy these. While the Province Hospital staff appear only too willing to help, there is amongst the staff at the City Hospital an unfortunate attitude of distrust which means that the pooling of resources is virtually non-existent. This even extends to the ridiculous situation of the City Hospital endeavouring to start its own blood donor panel and rooms rather than take blood from the Province Hospital. This animosity caused us some difficulties in the City Hospital where we tried to establish the premise that we were there to find out how help could be given to both institutions and indeed to the general health services of the Binh Dinh province.

However, by the time we came to leave I think we had managed to get this message across to some degree and I hope that a dialogue will continue between the two hospitals.

On a more personal note, past members of the team may remember Nguyen-van-Tho who in my time was the head of the laboratory staff. He was subsequently drafted into the South Vietnamese Army attaining the rank of first lieutenant. When the Army finally capitulated in 1975 he was, like all other officers, sent to a re-education camp. However, the laboratory in the Province Hospital was so poorly staffed that he was released after only three months and returned to his old workplace where he has been ever since. It was a great pleasure to meet him again and make the acquaintance of his wife and two sons, aged 17 and 15 years. He well remembers the New Zealanders with whom he worked and has asked that I pass on his best wishes to any who may remember him. He is now in charge of the Biochemistry section of the laboratory for which he is paid the equivalent of seven NZ dollars a fortnight. This he supplements by running a private laboratory at his home as this is legally permissible in Vietnam. The two positions mean that his working day is usually about 16 hours long but he is able to maintain a reasonable standard of living for his family by this means.

I cannot speak too highly of the courtesy and warmth shown to us by all walks of life while in Vietnam, New Zealanders are still very much remembered in the Binh Dinh province particularly and an aid team would be certainly welcomed back. To go on a visit to Vietnam as a private citizen is now possible and if any past members of the Qui Nhon teams are interested or contemplating a return visit I would be happy to assist them with any queries they might have. Let me assure you that it is a wonderful experience!

Jim Mann
Palmerston North

Dear Sir,

I note in the minutes of the Special General Meeting of the Institute held in New Plymouth on 30th August 1989 (as published in the N.Z. Journal of Med Lab Tech November 1989) that Mr K. McLoughlin asked the Chairman for details of the financial situation of the Medical Laboratory Science Trust.

The minutes give no indication of the reply by Mr D.J. Philips, nor is there any statement elsewhere in the Journal answering this question.

Since the meeting various versions of the answer to the above question have emerged, and as I (and many other members of the Institute) did not attend the meeting I would be grateful if a detailed update on the performance of the trust could be published in the Journal to lay uninformed speculation to rest.

Yours faithfully
John Aitken
Christchurch

Ed Note: This letter has been referred to the Chairman of the Medical Laboratory Science Trust. A full financial report of the Trust will be published in the March 1991 edition of the Journal.

Dear Editor,

I would like to quote the following figures on the detection of *Giardia lamblia* at Valley Diagnostic Laboratory, Lower Hutt, in response to the article by Jackie Wright in the N.Z. Journal of Medical Laboratory Technology August 1990, Vol 44 No. 3, titled "*Giardia lambia* — An Assessment from the Eastern Bay of Plenty: September 1 1986 — September 30 1989."

Patients were from the community of Lower Hutt, Upper Hutt, Eastbourne (urban areas) and the coast from Paekakariki to Otaki (urban and rural).

In 1989 there were 95 cases of giardiasis from a total of 5334 faeces specimens (1.8%). Over the same period 6383 faeces were also tested for other faecal pathogens. The number of patients positive for Campylobacter sp. was 190 (3%), Salmonella sp. 58 (0.9%), Shigella sp. 2 (<0.1%), Yersinia enterocolitica 32 (0.5%), Rotavirus 51. (Not all specimens were tested for rotavirus).

55% of cases of giardiasis were female and age groups were:

< 10 years old — 26 (28%)	20-40 yrs old —43 (45%)
10-20 yrs — 5 (5%)	> 40 yrs old — 21 (22%)

I do not know how these figures relate to the sample submission according to age, or the age distribution of the population. *Giardia lamblia* cysts have been found in the Hutt and Waikanae rivers but not in the treated drinking water supplies. As for the geographic distribution of cases one area does appear to have a higher proportion of cases. However, until we have more epidemiological information the source/sources of *Giardia lamblia* are not known.

Shirley Gainsford
Valley Diagnostic Laboratory

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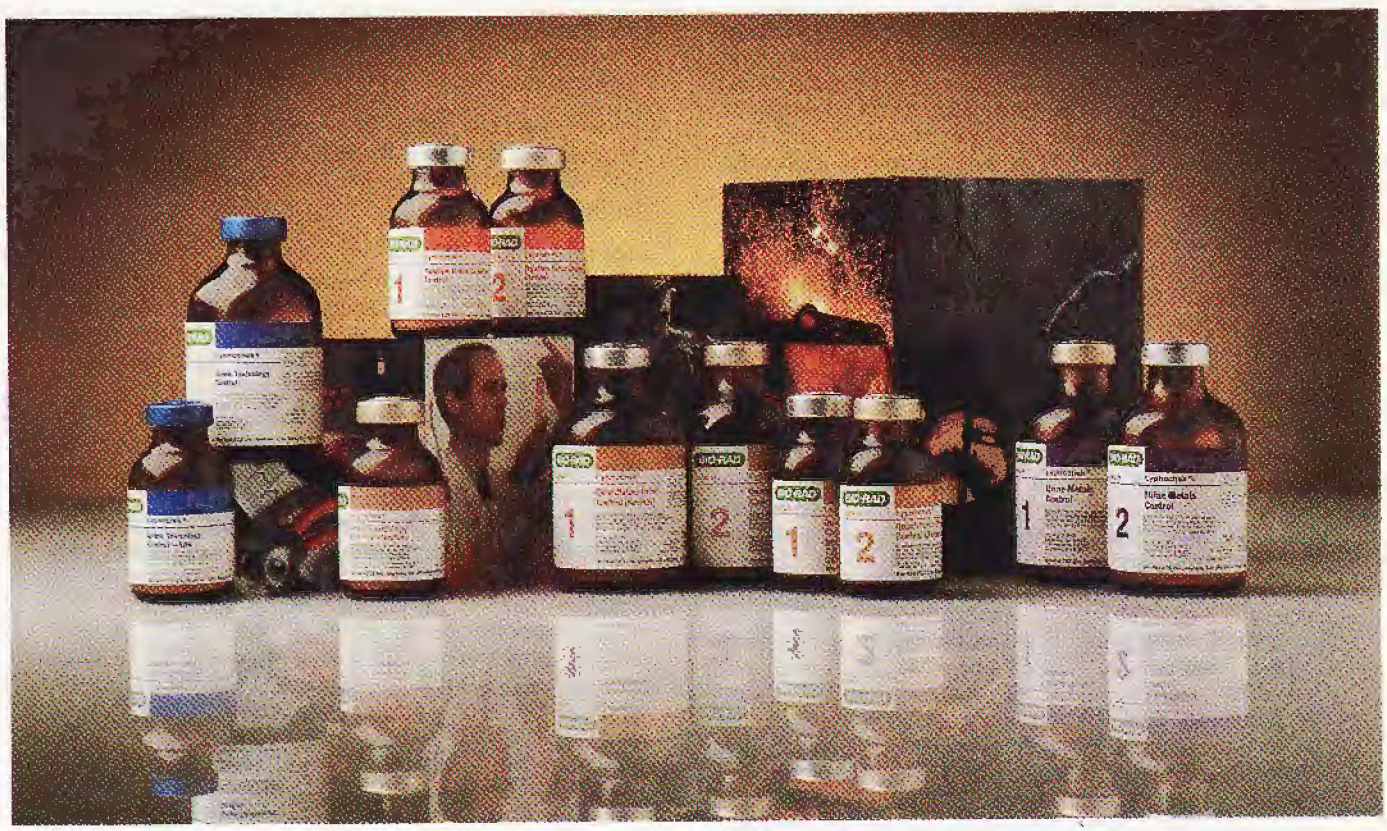

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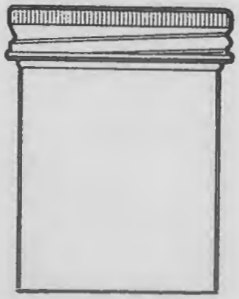

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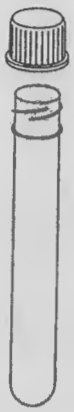

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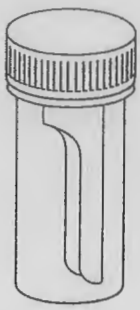

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