Volume 49 Number 1 March 1995 ISSN 1171-0195

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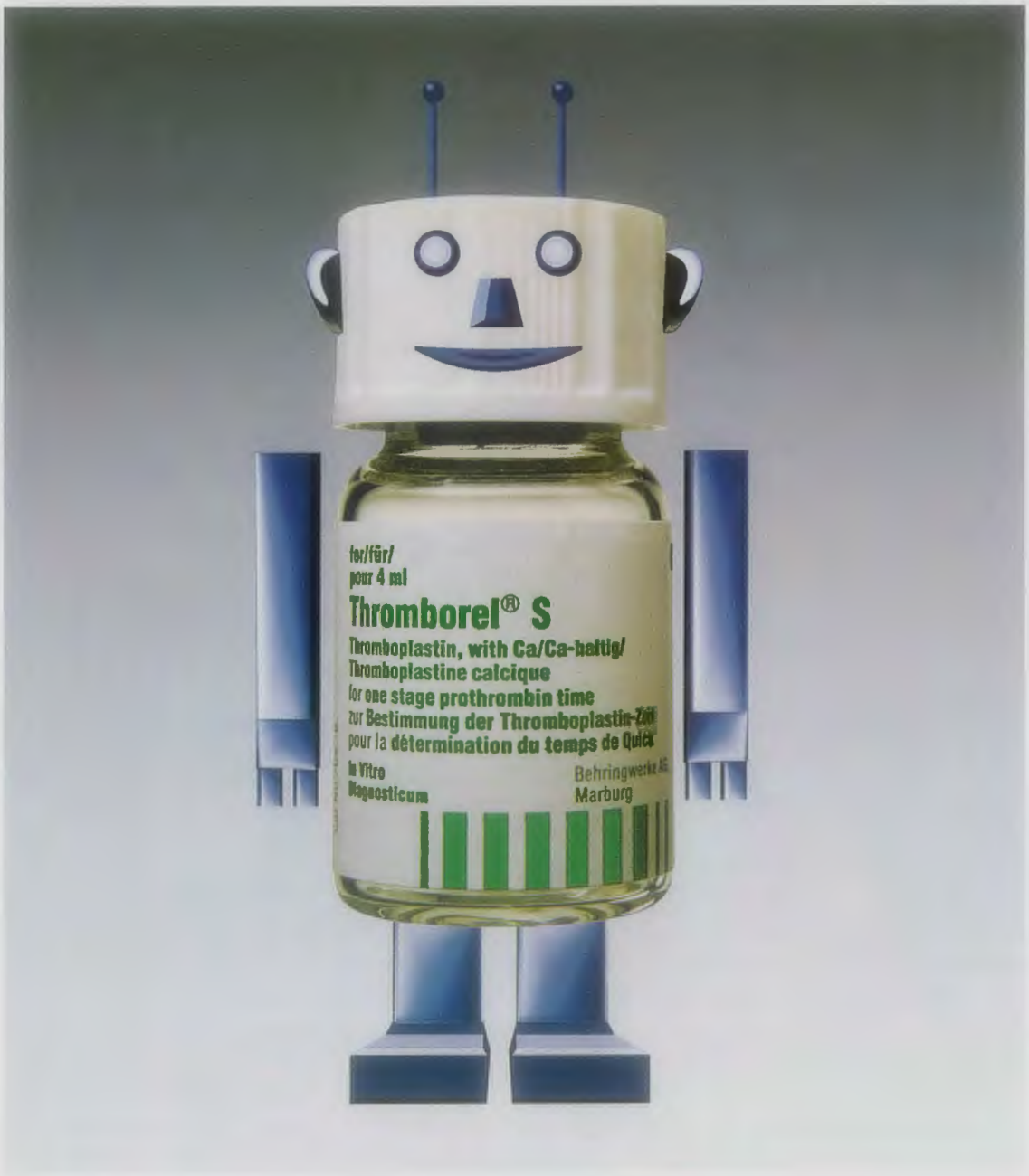


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New Zealand Journal of
# Medical Laboratory Science
Volume 49 Number 1
March 1995
ISSN 1171-0195

# NEW ZEALAND JOURNAL OF MEDICAL LABORATORY SCIENCE




The New Zealand Journal of Medical Laboratory Science is published quarterly (March, May, August & November) on behalf of the New Zealand Institute of Medical Laboratory Science (Inc) by Institute Press Ltd, Auckland.

The Journal is indexed in the Cumulative Index to Nursing and Allied Health Literature (CINAHL).

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# Editorial

## The Maintenance of Laboratory Professional Standards Programme (MOLS)

*Dennis Reilly*
*Diagnostic Laboratory*
*Auckland*

The Medical Laboratory Technologists' Board (MLTB) is currently putting together a pilot programme known briefly as MOLS. The MLTB recognises that rapid advances in laboratory medicine have underlined for technologists the importance of continuing education and a commitment to a lifetime of learning. Osler, addressing Canadian and American medical students in 1905 stated *"the hardest conviction to get into the mind of a beginner is that the education upon which he is engaged is not a college course, not a medical course but a life course ending only with death, with which the work of a few years under teachers is but a preparation".*

The NZIMLS's Special Interest Groups have over the past years provided a continuing education programme whereas the MOLS scheme is seeking to formalise this learning and, equally importantly, to demonstrate it. There is now a rapidly increasing public interest in the standards of laboratory practice. Recent events have alarmed the public in an area where they believe they had almost total security. The MOLS programme, in its embryonic state, requires input from technologists around the country as more information comes from the MLTB. Individual members of the profession will be able to monitor the programme and contribute to this significant change in what is a sensitive area.

In New Zealand, the practice of medical science demands registration with the Minister of Health's MLTB. It was established to administer this function and does so through the issuing of annual practice certificates and, in so doing, has considerate power in controlling who can practice medical laboratory science by accrediting training institutions in accordance with the competency document. Given its power, the MLTB has a moral obligation to ensure that the community is provided with a high standard of care in each discipline. This self-regulation lies at the very heart of the professional ideal. It is, of course, in the interest of all technologists to maintain standards. All will benefit to some degree when a professional group is seen as having high standards and on the other hand, all suffer to some degree when some are shown publicly to have low standards.

Therefore, it is not only in the interests of the community that the MLTB concerns itself with standards, it is also in the interests of the technologists themselves. The MOLS programme will allow the MLTB to ensure that the register of practising technologists is a list of people who have a commitment to the principle of mandatory continuing laboratory education as part of their role in the laboratory medicine team. It is, therefore, a dynamic concept associated with improving as well as maintaining standards. MOLS will require technologists to accumulate 2,500 credits over a 4-year period and is concerned with the maintaining of the highest standards of professional service consistent with the current body of knowledge associated with each laboratory discipline.

# In This Issue

**Hepatitis B.** In this leading article S Milne and N Hopkirk from the Whakatane based Hepatitis Foundation review the data on the incidence and prevalence rates of Hepatitis B in the Oceania countries compared to New Zealand. They discuss the problems in controlling Hepatitis B in Oceania and point out that New Zealand and Australia have the skills and resources in assisting Oceania countries to control Hepatitis B.

**A potentially new human polymorphism.** S Henry and R Oriol from New Zealand, Sweden and France report that paneth cells from human small intestine react positively with sialic acid reactive lectins thus indicating a potentially new human polymorphism unrelated to ABO or Lewis phenotypes. Their observations could be of use in elucidating the function of these cells.

**Random access lipid analysis.** R Sargon from Auckland investigated how well cholesterol, HDL cholesterol and triglyceride assays by random access analysis compared with their laboratory's current automated batch methods. Results from this study demonstrated no sacrifice in current performance while results were deliverable in a more timely and cost effective manner.

**Neonatal haemolytic anaemia.** W Melrose from the James Cook University in Australia describes the case history of an infant presenting with severe haemolytic anaemia. A presumptive diagnosis of an unstable Haemoglobin F variant was made on the basis of positive tests for unstable haemoglobin. Unfortunately the infant was exchange transfused before confirmatory tests could be made. This study emphasises the need for liaison between laboratory and medical staff. Furthermore unstable Haemoglobin F variants should be considered in the investigation of neonatal haemolysis.

**AIDS/HIV knowledge in Fiji.** R Siebers and M Lynch from Wellington, and K Singh from Suva, Fiji report on the relationship between AIDS/HIV knowledge of Fiji medical laboratory technologists, and their attitudes, concerns and practices in the laboratory regarding biological specimen handling. Results from this study demonstrated various deficiencies in AIDS/HIV knowledge (similar to previous studies in New Zealand) and that this was associated with their fears and attitudes. The authors recommend continuous educational programmes.

**Private laboratory funding.** G Goodman from New Plymouth looks at various options for private laboratory services funding in an attempt to curb cost escalation. In particular the Midland RHA's proposal for funding and provision of laboratory services is critically reviewed. This proposal is a move towards capitation and prospective payment instead of the present fee-for-service system.

# Leading Article

# Hepatitis B Control in Oceania

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NZ J Med Lab Science 1995, 49(1) 4-7

## Introduction

The Hepatitis B virus (HBV) carrier is the principal source, and victim of the virus, in those countries in which HBV is endemic. The indigenous peoples in all countries in Oceania have high incidence and prevalence rates for HBV infections, and this includes New Zealand.

It is now well known that HBV carrier rates in New Zealand polynesians are, overall, ten or twelve times higher than in Europeans, and that in the Eastern Bay of Plenty, rates in European children[1,2] are the highest reported in Europeans globally. It is less well known that in some of the Pacific Islands to the north of New Zealand, infection with HBV is almost universal[3,4] with over 30% of young children in Vanuatu and Solomons being HBsAg positive.

The association between the HBV carrier state and chronic liver disease (CLD) is now well established, though data from Oceania are still soft, and largely anecdotal. Follow up of almost 1500 Hepatitis B carriers by the Hepatitis Foundation confirms the extent of chronic liver disease in carriers, and using various methods, we have calculated that one in six male carriers will die of hepatocellular carcinoma. Additional carriers will die prematurely of other chronic conditions of the liver. Over 100 children can be vaccinated for the cost of treating or otherwise managing a carrier with serious liver disease.

We live in a region where HBV is endemic, where the logistics of control are challenging, and where vaccination coverage is often poor. Another major problem, confirmed in continuing work by Foundation staff, is that doses of Hepatitis B vaccine which elicit an immune response in 95-98% of newborn in most first world countries, have a very high failure rate in the countries worst affected. Larger doses can correct this, but are unaffordable for most Pacific Island states.

New Zealand and Australia are well positioned, and have the skill and resources, to assist our neighbours to control HBV. We believe that we have a duty to do so, and hope that the following story explains why, and encourages others to assist.

## Key Words

Hepatitis B virus, Hepatocellular carcinoma, Hepatitis B vaccination, Seroconversion.

## The Nature of the Problem

In many Western countries, the principal burden caused by HBV is the acute illness in adults, usually associated with intravenous drug use, or imprudent sexual activity. Acute *infection* per se is not the problem, for acute means "of short duration", and two thirds of acute infections are symptomless anyway. In low prevalence countries there are few carriers to act as a source of infection for others, and the burden for health authorities is minimal.

Eighty percent of Hepatitis B carriers in the world live in the western Pacific region, extending from China, down through S.E. Asia to the South Pacific. In those countries, the carriers who are most likely to be HBeAg positive and highly infectious, are very young children, and they form a pool of infectivity which will persist as long as new carriers continue to arise. These same young carriers appear to be the ones at greatest risk of developing chronic liver disease in later life, the risk of which is variously estimated to be 10-100 times the risk of a non-carrier[5]. We thus have the problem that in hyperendemic regions, the eventual principal victim of HBV started out as the young infectious carrier who was the greatest social risk to others as a child. Globally HBV is second only to cigarette smoke as a cause of cancer in humans and creates a burden for health authorities in poorer countries. For unexplained reasons female long-term carriers have risk of subsequent CLD only a fraction of the risk for males.

## The Natural History of HBV Infection

Response to HBV infection in a susceptible person is dependent on a number of factors, including age at infection. In "acute" hepatitis, with or without symptoms, clearance of HBV occurs, by definition and is followed by the appearance of HBV antibodies and lifelong protection. Development of the carrier state is associated with infection early or very late in life. In the case of unvaccinated newborn infected at birth, over 90% will become HBsAg positive. The great majority of positives will remain carriers for life. From our carrier follow-up data it appears that less than 0.5% of New Zealand carriers lose HBsAg per year. New carriers are generally infectious for a number of years. In New Zealand 20-25% of early onset carriers are probably still infectious by their early twenties. Risk of developing the carrier state drops to perhaps 2% or less following infection in adulthood. The well known accidental infection of 50,000 US troops in 1942 may be the best support for this figure[6]. The much quoted figure of 5-10% is almost certainly incorrect.

Risks of CLD correlates with duration of infection, and the prognosis for a carrier is difficult to determine unless a good family history is available, and/or follow up tests done regularly according to the protocol recommended by the NZ Ministry of Health[7], (since slightly amended). ALT elevation is the most sensitive indicator of liver inflammation due to viral hepatitis and analysis of results from 1365 carriers, most of whom were schoolchildren, confirm that there is cause for concern (see Table 1).

Most of our HBV carriers were identified in large-scale prevaccination screening programmes in schools, or in visits to the households of contacts. We have over 4,000 carriers on our records, and we estimate that more than 80% of New Zealand carriers are currently unidentified. We consider that risks to unidentified carriers are greater than risks to those whose status is unknown, for without knowledge of the condition, a carrier is not in a position to take precautions in dealing with toxic agents, eg alcohol, agricultural sprays, which could be an unnecessary additional insult to the liver. Carriers have a right to know their status for personal reasons, and

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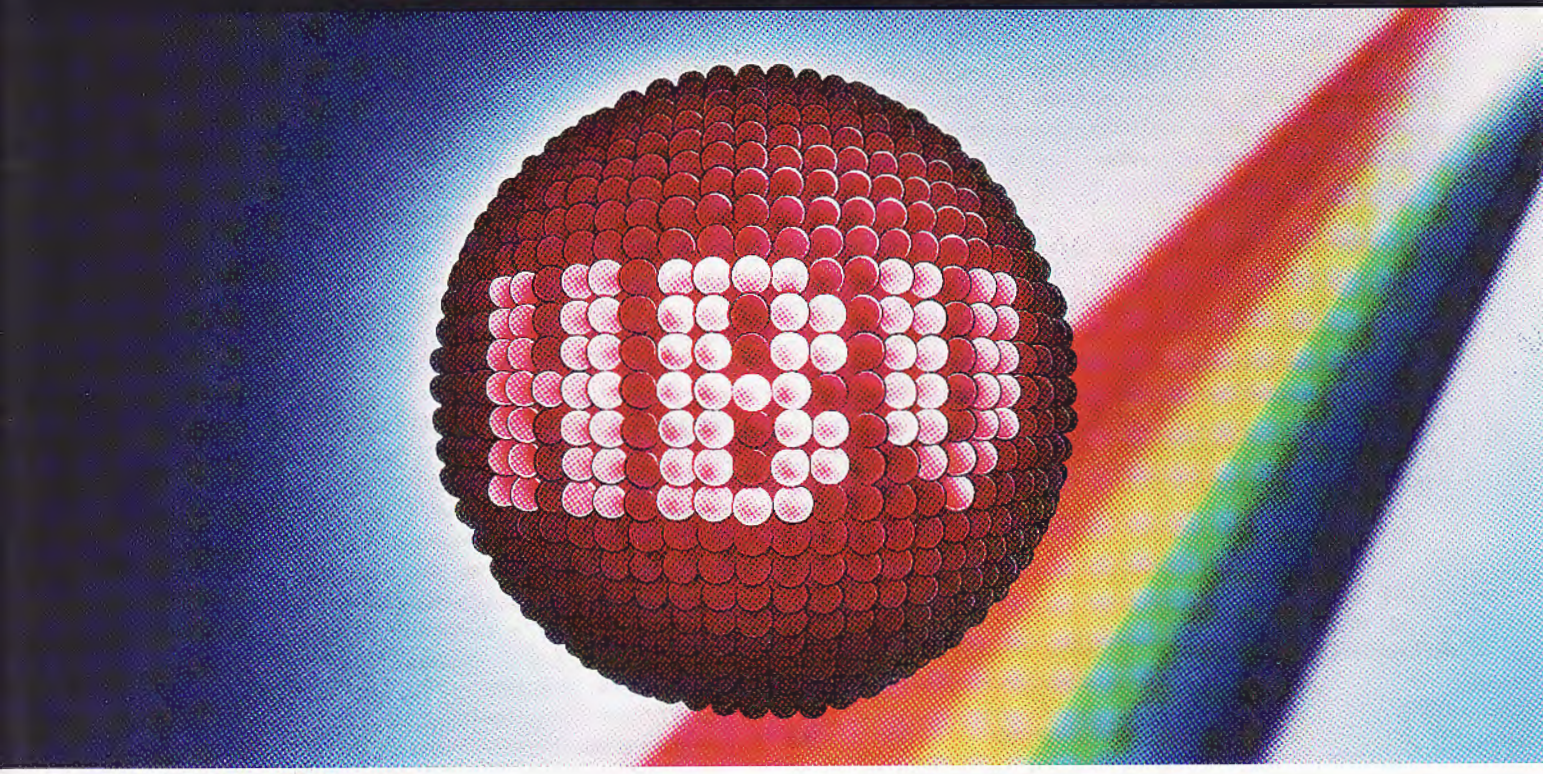

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in the interests of others. How can a carrier be socially responsible, and also advise contacts to seek free immunisation, without knowledge of his or her status?

In 1993, the Hepatitis Foundation set up a carrier follow-up programme on the lines of that provided for Alaska native carriers by the US Public Heatlh Service. We are now preparing for a major extension of our NZ screening programme. This involves regular (annual at least) testing for HBV seromarkers, LFTs, AFP etc with further work up where needed.

We will not elaborate further on our carrier identification and management programme, except to say that it is long overdue, and will make best use of skilled nurses, technologists and specialist physicians in a manner which, with good data gathering and analysis, should ensure assessment of risk for individual carriers with greater precision. It is calculated that over 70% of those currently occult carriers who are unfortunate enough to present with symptoms when it is too late, would have benefited from a screening programme to detect early liver disease.

## Table 1.

HBsAg carrier follow up 1993/94
Elevated ALT levels on initial test by HBeAg, SEX, AGE. N(%)

| | | | | ALT ≥60 | ≥80 | ≥100 | ≥250 |
|---|---|---|---|---|---|---|---|
| HBeAg POS | Male | ≥18 y | N=77 | 37 (48) | 25 (32) | 18 (23) | 3 (4) |
| | | <18 y | N=257 | 50 (19) | 26 (10) | 14 (5) | 3 (1) |
| | Female | ≥18 y | N=78 | 9 (12) | 3 (4) | 1 (1) | 0 |
| | | <18 y | N=139 | 18 (13) | 10 (7) | 7 (5) | 0 |
| HBeAg NEG | Male | ≥18 y | N=267 | 57 (21) | 32 (12) | 22 (8) | 3 (1) |
| | | <18 y | N=172 | 20 (12) | 9 (5) | 2 (1) | 0 |
| | Female | ≥18 y | N=248 | 17 (7) | 7 (3) | 5 (2) | 2 (1) |
| | | <18 y | N=127 | 6 (17) | 2 (2) | 1 (1) | 0 |

## Control of Hepatitis B

### Use of vaccine in New Zealand

Since 1984, a priority of the Hepatitis Foundation has been protection of children by vaccination, and most of our work in that area has been done in NZ. Prevaccination screening in schoolchildren in high risk ethnic groups (Maori, Pacific Islander, Chinese, plus others) has confirmed the extent of the problem, and a major vaccination catch up programme in 1310 primary schools, just completed, saw us vaccinate over 32,000 children – in many cases high risk children who had not been offered vaccine earlier. By this progrmame, coverage of Hepatitis B vaccine in 5-10 year olds was raised to over 90% in all groups compared with, eg. 64% in Maori children before the programme commenced.

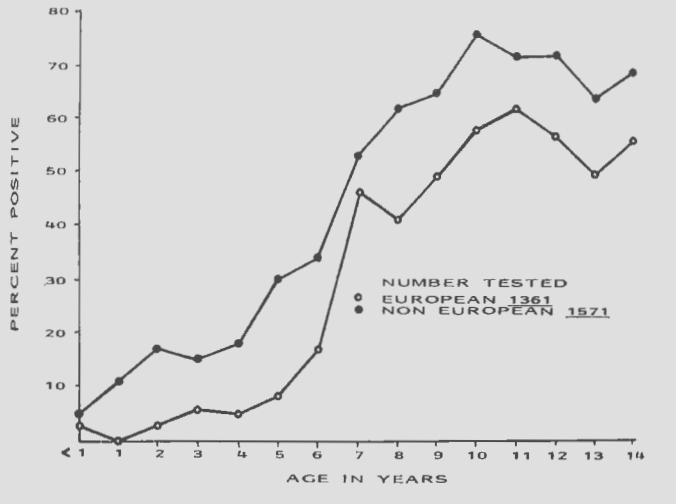
We have reported that[8] in Kawerau, where rates of infection were at Third World levels (fig 1), protection against HBV in successfully vaccinated subjects was almost 100% after nine years. If seroconversion to anti-HBs positivity follows primary vaccination, as it did in 98% of children in the 1988 national programme for preschoolers[9], then antibody is detectable, or immune memory demonstrable, in 99% of successfully immunised children. For population control of Hepatitis B, additional or booster doses are not needed. Instead, energy needs to be directed at catching up with children who have been overlooked.

We have shown that in New Zealand, vaccination as a means of control of HBV is highly effective. The vaccine is now relatively inexpensive (for a Western country), coverage is now reasonable, seroconversion is superb in our populations, and protection lasts for more than a decade, certainly during the early years when the risk of becoming a carrier is high. For newborn of HBeAg positive mothers, the use of Hepatitis B immunoglobulin combined with vaccine has had the potential to greatly reduce risk to newborn. Follow up of infants should be routine, as risks for babies of HBeAg positive mothers is greater than for any other groups, but such evaluation has never been mandated, and is almost certainly not done for many babies.

We now turn to the dilemma which has been a continuing problem for Hepatitis Foundation staff – poor coverage and poor response to vaccine, in babies at greatest risk in the world.

## Hepatitis B in Pacific Islands

Data on seroprevalence of HBV in Pacific Islands are not always good, or comparable. Such data as we have confirm that HBV is common in indigenous peoples all over the Pacific, in fact in Oceania generally. The Pacific Islands are divided into the predominant racial groups, Micronesian, Melanesian, and Polynesian. HBsAg carrier rates in selected countries, including several Pacific Islands are shown in Table 2 which emphasises the problem in our region. Rates for most other Pacific Island countries are extremely high. Recent work with which this Foundation has been associated shows that in two Melanesian states, over 90% of the indigenous population have been infected with HBV, and about a third of those are carriers, consistent with infection early in life. It is assumed that there is a simular problem in Papua New Guinea. Results in Vanuatu[3] and Solomons[4] are almost identical. In the case of Solomons the data were obtained from a survey in which 1128 subjects in 29 villages in Guadalcanal province were tested. In some villages every second child was HBsAg positive. Anecdotal information suggests that hepatocellular carcinoma is common in Solomons. Information on HCC in Vanuatu appears to be better recorded, and it is clearly understood there that HBV needs to be controlled. This goal is now shared by health officials in all South Pacific countries we deal with. But there are problems.




## Figure 1.

HBsAg and Anti-HBs prevalence combined, Kawerau 1994

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**Table 2.**
HBsAg positivity in selected groups/populations, (see text)

| Country/Subjects | | Number Tested | HBsAg Positive % |
|---|---|---|---|
| New Zealand Children, (National) | Europeans | 23760 | 0.4 |
| | Maori | 17675 | 3.9 |
| | Pacific Islander | 14088 | 3.1 |
| New Zealand Children, (Kawerau) | Europeans | 1361 | 3.7 |
| | Maori | 1571 | 12 |
| Australia | Aborigines | 236 | 17 |
| | Caucasians | 125 | 0 |
| Vanuatu children, indigenous | | 482 | 27 |
| Solomon Island children, indigenous | | 588 | 31.1 |
| Tonga, general population | | 414 | 20 |
| Niue children, indigenous | | 1055 | 11 |
| Japan, children (<15 years) | | 2550 | 0.7 |
| Southern Africa, rural children | | ? | 15 |
| Soweto, urban children | | 2364 | 1 |
| Zambia, villages, all ages | | 620 | 6 |
| Sweden, adults | | ? | 0.25 |

## Problems in controlling HBV in Oceania

Populations are sparsely distributed. There are many islands. For some communities, transport is either non-existent or difficult. Nurses travel on vaccination duty at set intervals. Communication is often difficult. A mother may have to walk for hours to a clinic, carrying a baby. It is difficult to verify reports of coverage, where good. We must assume that in the case of Hepatitis B vaccination, perhaps 50% of the babies who are at greatest risk in the world are getting no vaccine, or doses which are inadequate, in at lease some countries. In most countries, antenatal screening is not feasible. Babies of HbEAg positive mothers therefore get the same care as all others.

## Immunogenicity of vaccine

Since 1989, our laboratory has initiated or been associated with, evaluation of Hepatitis B vaccines in newborn in Melanesia. In five evaluations, involving three different vaccines, seroconversion following vaccination in field conditions has been disappointing, even using Merck Sharp & Dohme recombinant vaccine (MSD rDNA).

In our latest evaluation, 26 of 77 (34%) "low risk" babies (mothers HBeAg negative) failed to respond to a course of Cheil (Korea) plasma derived vaccine (Cheil PDV) which was given in controlled conditions. All 26 failures had anti-HBs values <2.1 IU/L. Not only was there poor immunogenicity, efficacy was almost zero, there being no significant difference in infection rates between vaccinated babies and unvaccinated historical controls. When one remembers the risk these babies face later in the childhood, this failure rate is very serious. This vaccine is recommended by the International Task Force on Hepatitis B Immunisation, and is widely used in our region.

We have just received an anecdotal report from Philippines, a country where HCC tops the list on cancers, of poor imrnunogenicity of a plasma derived vaccine, and we have alerted UNICEF, WHO and other agencies to the problem. The explanations for this poor response are not known. We have considered basic causes, such as poor vaccine storage or bad vaccination technique and found no real problem. Environmental, genetic, and nutritional (especially vitamin deficiency) factors are to be studied, probably in collaboration with workers at the Fox-Chase Cancer Centre, Philadelphia. We do know that response is dose related; higher doses elicit better seroconversion and higher geometric mean titres of anti-HBs. But higher doses are unaffordable for countries which rely heavily on foreign aid for healthcare delivery. In mid 1994 UNICEF announced that it would fund the procurement of Hepatitis B vaccines for newborn in countries where the HBsAg carrier rate exceeded 5%, as it is in most of Oceania, however, this policy decision has not yet been translated into action. Every year there are 200,000 births in the Pacific Islands (including PNG) to our north. New carriers are being produced at a rate of perhaps 50-100 per day. Many will die of liver disease which would be preventable if higher priority was given to this problem, and resources modestly improved. In order to facilitate this, Hepatitis Foundation staff met representatives of international health agencies, and government aid workers, in Whakatane on 7 and 8 February this year. Progress is now expected.

It is certainly possible for us to dramatically reduce the number of new infants entering the carrier pool, and if we do this we will be making the first step in minimising the burden that HBV places on health systems in all the countries in our region.

The governments of Australia and New Zealand seem to recognise the problem with this, our most troublesome virus, and they are taking steps to assist.

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# A Potentially New Human Polymorphism. Individual Differences in Reactivity of Paneth Cells with the Sialic Acid Reactive Lectins of *Maackia amurensis* and *Sambucus nigra.*

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NZ J Med Lab Science 1995; 49(1): 9-10

## Abstract
Paraffin-embedded histological sections of human small intestine were fluorescently stained with sialic acid reactive lectins of *Maackia amurensis* and *Sambucus nigra.* Positive reactivity was found in paneth cell cytoplasmic granules in the deep glands of 8 of 13 samples. This is potentially a new polymorphism which is unrelated to ABO and Lewis phenotypes. Although an explanation is not forthcoming this observation may be of value in determining the function of paneth cells.

## Key words
Lectins, sialic acid, polymorphism, paneth cells.

## Introduction
Plant lectins are widely used for the isolation and characterisation of glycoconjugates because of their characteristic carbohydrate binding properties. Although many plant lectins have been isolated and their carbohydrate binding specificities characterised, very few plant lectins are reported to bind specifically to sialic acid (neuraminic acid) or oligosaccharide units which include this sugar residue. The lectins of Elderberry bark *Sambucus nigra* (SNA) and the leguminous seed of *Maackia amurensis* (MAA) are both known to have a strong affinity for some glycoconjugates with sialic acid residues[1-6] During the course of immunological studies into the expression of Lewis antigens in human small intestine[7] we counter stained samples with the lectins of SNA and MAA and found variable reactivity between individual tissues.

## Materials and Methods
### Samples
Human small intestine was obtained from cadavers within 36 hours post mortem and a sample of jejunum (and large intestine) was taken and fixed in 2% formol saline. The ABO and Lewis blood group of the cadavers was determined from washed red blood cells using commercial antisera (Ortho Diagnostic Systems Inc, Raritan, NJ). The collection of samples was approved by the Auckland Area Health Board Ethics Committee.

The samples were predominantly of Polynesian origin as part of a separate investigation into usual Lewis phenotypes, the results of which, and a full description of the samples, have been published elsewhere[7].

### Lectins and Immunofluorescence
Sialic acid reactive lectins of *Sambucus nigra* (SNA) and *Maackia amurensis* (MAA), TRITC labelled, were obtained from EY Laboratories, Inc (San Mateo, CA). The paraformaldehyde fixed tissues were paraffin embedded and processed for indirect immunofluorescence after deparaffination. Immunofluorescence was as previously described[7,8].

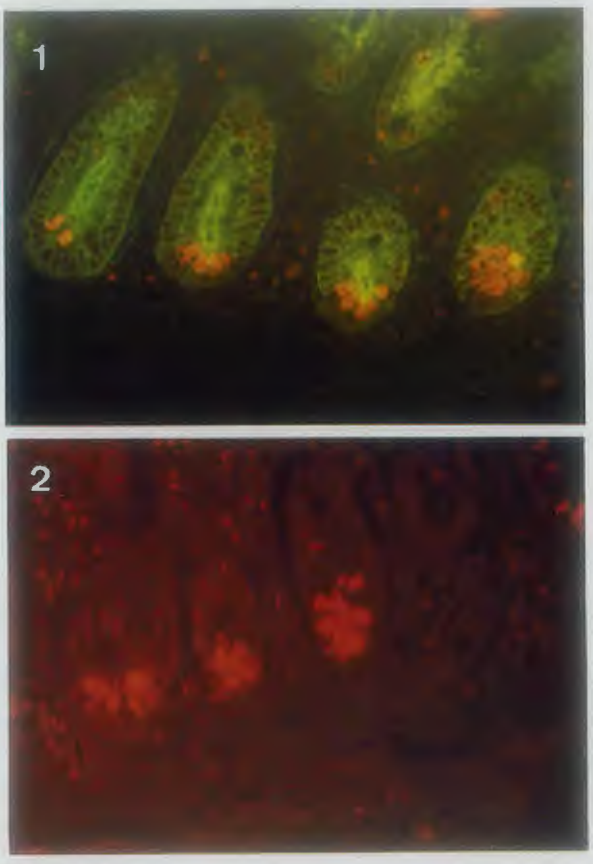


**Figure 1**
**Plate 1.** Lieberkühn crypts of the O Le(a-b-) nonsecretor individual (sample 529) double stained with FITC anti-$Le^c$ (green) and TRITC labelled *Maackia amurensis* lectin (red). Strong staining of all the epithelial cells, with the anti_lewis reagent (green) corresponds to the red cell and secretor phenotype of the tissue donor[7]. Only the Paneth cells show strong granular fluorescence in the cytoplasm with the anti-NeuAc lectin (red).
**Plate 2.** Strong TRITC staining of cytoplasmic granules in Paneth cells as seen with the anti-NeuAc lectin SNA (red).

## Results and Discussion
The two lectins were found to react with paneth cell cytoplasmic granules in 8 of the 13 samples tested (Table 1). Both lectins reacted in an identical manner and examples of this reactivity are seen in Figure 1, plates 1 and 2. This unexpected polymorphism appeared to be unrelated to the individuals ABO and Lewis blood group, secretor status, age, sex or sample age prior to fixation.

Large intestinal samples from the same individuals were also tested with these lectins. Because post mortem degradation was a problem complete interpretations were not possible, however, it was noted that the deep glands of all large intestinal samples stained positive with MAA but negative with SNA (results not shown)., There also appeared to be some surface staining, although interpretation was difficult due to post mortem degradation.

Although the lectin SNA is probably detecting NeuAcα(2,6) Gal and MAA detecting NeuAcα(2,3) Gal, we cannot be certain because the two lectins used were in their crude form as supplied by the manufacturer and their specificities are complex[1-6]. Furthermore the structural diversity of oligosaccharide chains present in various tissues and cells may hinder the ability of these lectins to recognise specific chain sequences[4]. However, it is reasonably certain that these lectins are detecting sialylated glycoconjugates although the exact nature of the sialylated glycoconjugate(s) they are reacting with is uncertain.

## Table 1

Human small intestine staining with sialic acid reactive lectins *Sambucus nigra* (SNA) and *Maackia amurensis* (MAA). Scores refer to reactivity of deep glands as seen in Figure 1 plates 1 and 2. Immunohistological results are graded from negative (-) to very strong (+++).

| Sample | Phenotype | SNA | MAA |
|---|---|---|---|
| 529 | O Le(a-b-) | ++ | ++ |
| 536 | O Le(a+b-) | - | - |
| 076 | O Le(a+b-) | - | - |
| 214 | O Le(a-b+) | +++ | ++ |
| 208 | O Le(a-b+) | - | - |
| 285 | O Le(a-b+) | ++ | ++ |
| 409 | O Le(a-b+) | ++ | ++ |
| 070 | O Le(a-b+) | - | - |
| 578 | O Le(a-b+) | ++ | ++ |
| 363 | $A_1$Le(a-b-) | ++ | ++ |
| 118 | $A_1$Le(a-b+) | - | - |
| 153 | $A_1$Le(a-b+) | +++ | +++ |
| 408 | $A_1$Le(a-b+) | +++ | +++ |

## Conclusion

A potentially new sialic acid reactive polymorphism is reported in the cytoplasmic granules of paneth cells. This observation may be of interest for elucidating the function of these cells in the small intestine.


## Acknowledgements

Leonie Robinson, John Russell, Michelle Roeleder and Anne Clothier are gratefully acknowledged for their invaluable help in obtaining cadaver samples. This work was partially supported by a grant from the Health Research Council of NZ.


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# Erratum

An error appeared in the paper entitled "Tunga penetrans – an unwelcome visitor" by Lynette C Jones and Robert LC Pilgrim. NZJ Med Lab Science 1994; 48(4): 171-2.

In the methods section, first paragraph after point 7 should read "The encysted female adult can be recognised and differentiated from other fleas by its angulated frons, long stiff barbed lacineae, foreshortened thorax and enormously distended abdomen (Fig. 1).

The underlined word frons appeared in the article as the word forms. The Editor regrets the mistake.

# Random Access Analysis of Cholesterol, HDL Cholesterol and Triglyceride.

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NZ J Med Lab Sci 1995 49 11-16

## Abstract

A study was carried out to investigate how well cholesterol, HDL cholesterol and triglyceride assays, run on a random access analyser in routine use, compare with our current automated batch methods. These batch methods have been standardised against, and are under the direct control of, this department's Lipid Reference Laboratory, which is in turn certified by the Centers for Disease Control, Atlanta, Georgia.

Apart from a slight negative bias, the random access methods exhibited similar performance characteristics to the batch analysis methods. This study suggests that suitably calibrated, cholesterol, HDL cholesterol (after pre-treatment) and triglyceride, run by random access analysis, would not sacrifice the current performance while delivering patient results in a more timely and cost effective manner. The continuing presence of the CDC certified Lipid Reference Laboratory would be an important feature in the long term performance of the random access methods.

## Key words

Cholesterol, HDL cholesterol, triglyceride, random access analysis.

## Introduction

Despite some opinion to the contrary, it is the majority view that elevated blood cholesterol levels are associated with an increased risk of coronary heart disease (CHD), in particular, atherosclerosis[1-3]. The Laboratory Standardization Panel of the National Cholesterol Education Program (NCEP) stated[4] that precise and accurate cholesterol measurements are required to identify and treat individuals with raised blood cholesterol levels. To achieve this, all laboratories need to minimise the cholesterol method-specific biases to a level less than +/-3% and to achieve a level of imprecision corresponding to a coefficient of variation of less than 3% (Westgard et al[5] went further, suggesting that in some situations, a coefficient of variation of 2% may be necessary). The NCEP concluded that the major reason for such biases is the lack of traceable calibration material with many commercial calibrators being assigned instrument specific values.

The end of cycle data from the Royal College of Pathologists of Australasia – Australasian Association of Clinical Biochemists (RCPA-AACB) General Chemistry proficiency survey (number 35, run between 17 January 1994 and 25 April 1994) indicates that bias and imprecision exist within a number of participating laboratories throughout Australasia. Of the 32 instrument groups enrolled for cholesterol, the median laboratory in 14 (43.8%) exhibited a bias of more than 3% for one or both target values (2.80 mmol/L and 7.00 mmol/L) while the median laboratory in 13 of the 32 (40.6%) instrument-groups, had imprecision of more than 3% coefficient of variation. Similar findings are also seen with the instrument groups enrolled for HDL cholesterol and for triglyceride. The survey also serves to show that the majority of instruments being used are random access analysers.

To date, the Lipid Reference Laboratory within our Department has resisted the introduction of random access instruments preferring instead to use automated batch analysis methods. The Lipid Reference Laboratory participates in the Centers for Disease Control (CDC) – National Heart, Lung and Blood Institute Lipid Standardization Program[6] and is the only laboratory in New Zealand certified by the CDC as a standardised centre for lipid analyses. The cost of maintaining this high standard is considerable in both financial and staffing terms, such that lipid measurement in this laboratory is only available during normal working hours, Monday to Friday. For the month of August 1994, the mean turnaround time for cholesterol, HDL cholesterol and triglyceride in this department were between 25 and 26 hours, in comparison, the Beckman CX7 chemistries were less than one hour. While it can be argued that cholesterol is not a "stat" test, there are certain advantages in returning a cholesterol result before the patient has been seen by the physician. Indeed, if a laboratory wishes to maintain its service, it can ill-afford not to explore methodologies, such as those available on multichannel random access analysers, that can provide fast turnaround times.

This department currently uses a Beckman Synchron CX7 random access analyser (Baxter Diagnostics, Auckland) to perform the majority of urgent and routine chemistries and currently performs 25 assays, operating 24 hours per day, 365 days per year. The presence of the Lipid Reference Laboratory within this department provided a unique opportunity: the comparison of cholesterol, HDL cholesterol and triglyceride assays performed by standardised batch analysis methods, whose imprecision and biases are known, against a multi-channel chemistry analyser in routine use with its associated faster turnaround time, 24 hour availability and more economical operation.

## Methods

### Instrument Parameters

A "User Defined" chemistry was created for both the cholesterol and triglyceride assays on the Beckman Synchron CX7 random access analyser. The reagents employed were the same as those in use with the Lipid Reference Laboratory standardised batch methods:: Boehringer Mannheim Cholesterol (CHOD-PAP MPR 3, catalogue number 236691) and Boehringer Mannheim Triglyceride (Peridochrom GPO-PAP, catalogue number 701904), both supplied by Boehringer Mannheim, New Zealand Ltd, Auckland. These reagents were prepared for use as per the manufacturer's instructions. The prepared reagents were transferred to compartment "B" of the appropriate "Beckman Synchron User-Defined Cartridge" (Baxter Diagnostics New Zealand Ltd, Auckland) and loaded onto the instrument. Due to a delay in obtaining the Boehringer Mannheim "user defined parameters" for cholesterol and triglyceride for the Beckman CX7, data sheets from various "third party" manufacturers for their (similar) reagents were consulted and in-house parameters were derived (Table 1). The Boehringer Mannheim parameters are now

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available and where they differ from those used, they have been noted in table 1.

### Sample Preparation

Samples for total cholesterol and triglyceride and analyses on the Beckman CX7 were centrifuged at 3500 rpm (1575G) for 10 minutes and the serum or heparinised plasma used for the analyses. Where sample volume permitted, the primary tube was analysed directly. HDL cholesterol was assayed in the supernatant of each sample following precipitating of the other lipoprotein fractions with magnesium and phosphotungstate ions[5]. These supernatants were then analysed by the Beckman CX7 cholesterol method.

### Calibration

The current Lipid Reference Laboratory standardised methods are performed on a Cobas Bio centrifugal analyser (Roche Products New Zealand Ltd, Auckland) and use calibration factors traceable on the CDC. Because of differences in optical systems between the two instruments (for example, cuvette pathlength), the Cobas Bio calibration factors were not relevant to the Beckman CX7 and thus a commercial calibrator, Beckman "CX Multicalibrator" (Baxter Diagnostics New Zealand Ltd, Auckland), was used to calibrate both the cholesterol and triglyceride methods using the stated set points. This calibrator, traceable to the CDC for cholesterol, but not necessarily triglyceride, was used daily.

### Assessment

The Beckman CX7 cholesterol and triglyceride evaluations were carried out using the Australasian Association of Clinical Biochemists (AACB) guideline for "Limited Assessment of a Candidate Method"[9].

## Table 1.

"User Defined" Parameters for Cholesterol and Triglyceride on the Beckman CX7.

| Assay | Cholesterol | Triglyceride |
|---|---|---|
| Chemistry Name: | CHOLESTEROL | TRIGLYCERIDE |
| Test Name: | CHO | TRI |
| Reaction Type: | Endpoint 2 | Endpoint 2 |
| Reaction Direction: | Increasing | Increasing |
| Units: | mmol/L | mmol/L |
| Decimal Precision: | X.XX | X.XX |
| Math Model: | Linear | Linear |
| Cal. Time Limit: | 24 | 24 |
| No. of Calibrators: | 1 | 1 |
| Calibrator Value: | 5.44 | 2.10 |
| Primary Wavelength: | 520 nm | 520 nm |
| Secondary Wavelength: | 650 nm (700 nm) | 650 nm (700 nm) |
| Sample Volume: | 3 µL | 3 µL |
| Primary Inject Rgt: | B:300 µL | B:300 µL |
| Secondary Inject Rgt: | None | None |
| Reagent Blank: | | |
| Start Read: | 272 sec (240 sec) | 272 sec (240 sec) |
| End Read: | 304 sec (256 sec) | 304 sec (272 sec) |
| Low ABS Limit: | -0.100 (0.000) | -0.100 (0.000) |
| High ABS Limit: | 0.200 (0.100) | 0.500 (0.400) |
| Reaction: | | |
| Start Read: | 304 sec (320 sec) | 592 sec (320 sec) |
| End Read: | 336 sec | 624 sec (384 sec) |
| Low ABS Limit: | 0.000 | -1.500 (0.000) |
| High ABS Limit: | 1.000 (1.200) | 1.500 |
| Usable Range:: | | |
| Lower Limit: | 0.00 | 0.00 |
| Upper Limit: | 9.99 | 9.99 |
| Substrate Depletion: | | |
| Initial Rate: | 99.999 | 99.999 |
| Delta ABS: | 1.50 | 1.50 |

† The actual set points vary with calibrator lot number.
†† Once the linearity has been established, these values are edited to the appropriate values.

The values in brackets are the Boehringer Mannheim parameters that differ from the "in-house" parameters used.

## Results and Discussion

### Imprecision

Imprecision was evaluation in two parts. Pairwise intrabatch and interbatch imprecision for total cholesterol, HDL cholesterol and triglyceride, expressed as standard deviation of differences ($SD_d$) and coefficients of variation of differences ($CV_d$), is presented as table 2. The intrabatch data were calculated from duplicate vials of CDC human serum pools analysed in single runs, while the interbatch data were calculated from fresh human sera, each separated into two aliquots and run four days apart.

Interbatch imprecision was also evaluated by analysing three levels of a liquid stable human based control material (Beckman "Decision", Baxter Diagnostics, Auckland) for total cholesterol and triglyceride over 14 days. Expressed as standard deviation (SD) and coefficients of variation (CV), this data is presented as table 3.

The $CV_d$ and CV for the Beckman CX7 cholesterol and HDL cholesterol samples all better the NCEP recommended maximum allowable imprecision level of 3% coefficient of variation. In each case the total cholesterol coefficients of variation are all better than 1.5% with the HDL cholesterol CVs larger than those for total cholesterol. This finding is most likely due to the HDL cholesterol method requiring a manual precipitation step prior to analysis and the fact that the mean cholesterol concentrations of HDL cholesterol samples were much lower than for the total cholesterol samples. These levels of imprecision compare favourably with the Cobas Bio cholesterol method. Their stated imprecision for total cholesterol is a CV of between 0.8% and 1.7% (intrabatch) and between 1.1% and 2.0% (interbatch). Their stated imprecision for HDL cholesterol is a CV of between 1.7% and 3.3% (intrabatch) and between 2.0% and 2.1% (interbatch).

Apart from the interbatch imprecision data obtained from Beckman "Decision" level 1 (3.31%), the $CV_d$ and CV for the Beckman CX7 triglyceride method are all 1.8% or less. This compares with the Cobas Bio triglyceride method's intrabatch CV of 1.3% across all ranges of values and the interbatch CV which ranges between 0.9% and 1.4%.

These imprecision studies were conducted over a relatively short period of time (measurable in weeks) and by the predominant use of pairwise imprecision techniques. Pairwise imprecision does not

## Table 2.

Cholesterol and Triglyceride Pairwise Intrabatch and Imprecision on the Beckman CX7.

| Intrabatch Imprecision: | n (pairs) | Mean (mmol/L) | Low (mmol/L) | High (mmol/L) | $SD_d$ (mmol/L) | $CV_d$(%) |
|---|---|---|---|---|---|---|
| Cholesterol | 36 | 2.905 | 0.66 | 5.94 | 0.020 | 0.69 |
| HDL Cholesterol | 18 | 1.079 | 0.64 | 1.31 | 0.014 | 1.34 |
| Triglyceride | 18 | 1.586 | 0.63 | 2.86 | 0.013 | 0.85 |

| Interbatch Imprecision: | n (pairs) | Mean (mmol/L) | Low (mmol/L) | High (mmol/L) | $SD_d$ (mmol/L) | $CV_d$(%) |
|---|---|---|---|---|---|---|
| Cholesterol | 20 | 6.386 | 4.54 | 7.69 | 0.047 | 0.74 |
| HDL Cholesterol | 20 | 0.884 | 0.43 | 1.82 | 0.022 | 2.53 |
| Triglyceride | 20 | 1.940 | 0.95 | 3.64 | 0.021 | 1.08 |

$SD_d$: Standard deviation of differences. $CV_d$: Coefficient of variation of differences.

## Table 3.

Cholesterol and Triglyceride Interbatch Precision using Beckman Decision Controls on the Beckman CX7

| Cholesterol: | n | Mean (mmol/L) | Low (mmol/L) | High (mmol/L) | SD (mmol/L) | CV(%) |
|---|---|---|---|---|---|---|
| Level 1 | 14 | 3.294 | 3.18 | 3.33 | 0.044 | 1.33 |
| Level 2 | 14 | 4.007 | 3.94 | 4.10 | 0.042 | 1.05 |
| Level 3 | 14 | 5.141 | 5.05 | 5.27 | 0.049 | 0.95 |

| Triglyceride: | n | Mean (mmol/L) | Low (mmol/L) | High (mmol/L) | SD (mmol/L) | CV(%) |
|---|---|---|---|---|---|---|
| Level 1 | 14 | 1.001 | 0.94 | 1.04 | 0.033 | 3.31 |
| Level 2 | 14 | 1.232 | 1.21 | 1.27 | 0.015 | 1.24 |
| Level 3 | 14 | 1.542 | 1.51 | 1.61 | 0.028 | 1.80 |

take into account reagent, standard and sample deterioration[9] because this technique requires the replicate samples to be assayed in single runs, not too dissimilar to the batches used in the methods they are intended to replace. Therefore, the imprecision data gained here can only be viewed as an indication of how the instrument performed over this one time interval and is indicative of what can be expected in the long term.

### Linearity

The linearity of the cholesterol method was established using a human serum pool spiked with concentrated VLDL and LDL[5]. This method was conservatively considered to hold at least to the 50% dilution of the stock standard, measured as 12.81 mmol/L. This level is similar to that of the current method where all cholesterol samples with a concentration greater than 11.0 mmol/L (the concentration of their high control) are diluted and re-assayed.

The linearity of the triglyceride method was similarly established using a human serum pool. As with the cholesterol method, the Beckman CX7 triglyceride method was also considered to hold at least to the 50% dilution of the stock standard, measured as 4.81 mmol/L. This is somewhat lower than that of the current triglyceride method which is linear to 8.50 mmol/L.

### Method Comparison and Inaccuracy (Bias)

The data for the total cholesterol correlation equation, collected from samples run in small batches over three weeks, were approximately normally distributed over the range 2.69 mmol/L to 9.43 mmol/L and gave the equation: CX7 = 0.9855 (Cobas Bio) - 0.1005 (n = 47). The explained variance was 99..68% and standard deviation of residuals from the line (Sy.x) was 0.0819 mmol/L. Using the approach of Bland and Altman [11], the difference between the Cobas Bio and Beckman CX7 observations for each point plotted against the respective target (Cobas Bio) values, showed a random distribution of between -0.02 and -0.33 mmol/L. The mean difference was significantly less than zero (P <0.001). The data for the HDL cholesterol correlation equation, using supernatants prepared for the Cobas Bio HDL cholesterol assay and also collected over three weeks, were approximately normally distributed over the range 0.53 mmol/L to 2.04 mmol/L and gave the equation: CX7 = 0.9676 (Cobas Bio) - 0.0178 (n = 47, explained variance = 99.36% and Sy.x = 0.0300 mmol/L). As with total cholesterol, the plot of Bland and Altman[11] showed a random distribution of between 0.00 and -0.15 mmol/L. Again the mean difference was significantly less than zero (P<0.001).

Table 4 summarises the values obtained by the Beckman CX7 cholesterol method for the CDC cholesterol survey samples against the respective target values and allowable limits. The Beckman CX7 cholesterol method produced results that, while being within the respective CDC acceptable ranges, were, with one exception, all less than the target value. This combined with the slope from the correlation data, and the mean differences, suggests that there is a slight negative bias.

## Table 4.

Values Obtained for CDC Cholesterol Samples by the Beckman CX7.

| CDC Pool Number | Beckman CX7 Result* | CDC Target Value* |
|---|---|---|
| Low Total Cholesterol # LTC33 | 0.68 | 0.72 (0.65 - 0.79) |
| Low Total Cholesterol # LTC49 | 1.60 | 1.65 (1.48 - 1.82) |
| HDL Cholesterol # HDL 41 | 1.09 | 1.12 (1.00 - 1.24) |
| HDL Cholesterol # HDL 36 | 1.48 | 1.53 (1.38 - 1.68) |
| Total Cholesterol # TC/TG 60 | 3.85 | 3.77 (3.66 - 3.88) |
| Total Cholesterol TC/TG 71 | 7.04 | 7.07 (6.86 - 7.28) |

*Results (and ranges) in mmol/L

The correlation data from the HDL cholesterol samples produced a similar slope to that of the total cholesterol, and the two HDL cholesterol CDC survey samples were similarly acceptable (and again less than the target value). This suggests that the Beckman CX7 method, like the Cobas Bio method, is unaffected by the presence of magnesium and phosphotungstate ions used in the precipitation step and thus is suitable for HDL cholesterol estimations.

The data for the triglyceride correlation equation, again collected from samples run over a three week period, covered the range 0.49 mmol/L to 5.23 mmol/L. These data were approximately normally distributed over the range 0.49 mmol/L to 2.45 mmol/L, with four more points between 3.40 mmol/L and 5.29 mmol/L producing a tail to the distribution. To avoid the undue influence of these four points on the correlation, they were omitted. Thus the correlation equation for triglyceride was:
CX7 = 0.9464 (Cobas Bio) + 0.0886 (n = 43, explained variance = 99.33%, Sy.x. = 0.0435 mmol/L). The plot of differences against target values (including the four previously omitted points) were distributed about zero ranging between -0.14 and 0.11 mmol/L. Statistically, there was no difference between the mean differences and zero (P <0.1).

Table 5 summarises the triglyceride results for the CDC samples from the Beckman CX7 method. Direct comparison between these values and their assigned target values is not possible without first correcting the values obtained for the free glycerol present which, unlike normal sera, is present in significant concentrations in the CDC material (the CDC only publishes free glycerol-corrected triglyceride target values). Consequently, the values obtained were compared with the Lipid Reference Laboratory's uncorrected triglyceride values where three of the four results agreed to within 0.01 mmol/L.

The Lipid Reference Laboratory is known to be accurate and this is further demonstrated with these samples: all the Lipid Reference Laboratory corrected triglyceride results are within 0.02 mmol/L of the CDC target value. The CDC samples run on the Beckman CX7 show no obvious bias with results both less than and greater than the target values. While the slope from the correlation data suggests a slight negative bias, the mean differences from zero do not support this.

The NCEP place great emphasis on minimising cholesterol method biases. These Beckman methods have yet to be standardised against our CDC certified Lipid Reference Laboratory.

## Table 5.

Values Obtained for CDC Triglyceride Samples by the Beckman CX7

| CDC Pool Number | Beckman CX7 Result | Uncorrected Cobas Bio Result | Corrected Cobas Bio Result† | CDC Target Value |
|---|---|---|---|---|
| TC/TG60 | 1.05 | 1.04 | 0.86 | 0.86 |
| TC/TG71 | 2.62 | 2.62 | 2.30 | 2.29 |
| TG/TG63 | 0.6 | 0.73 | 0.56 | 0.56 |
| TC/TG66 | 1.24 | 1.24 | 1.03 | 1.05 |

†Corrected for Free Glycerol. Results in mmol/L

### Interference

Using a human serum pool divided into four aliquots and spiked with increasing concentrations of purified B Grade bilirubin (Calbiochem) dissolved in dimethyl sulphoxide (BDH), the Beckman CX7 cholesterol method was shown to be negatively affected by bilirubin. At bilirubin concentration of 124 µmol/L (subjectively "+"), the cholesterol value was suppressed by 5.4% while, at a bilirubin concentration of 340 µmol/L (subjectively "+++'), the value was suppressed by 13.9%. Using a human serum pool divided into four aliquots and spiked with increasing concentrations of freshly washed and haemolysed red blood cells, the method was found to be free of interference from the effect of haemolysis. Using a human serum pool divided into four aliquots and spiked with increasing concentrations of Intralipid (Baxter Health Care, Auckland), the method was found to also be free of intererence from the effect of turbidity. These findings are consistent with those of the Cobas Bio cholesterol method where a bilirubin concentration of as little as 68 µmol/L will suppress the result by 10% while haemolysis and turbidity have no effect.

Using the same bilirubin and haemolysis spiked human serum pools used for cholesterol, the Beckman CX7 triglyceride method was shown to be affected by both bilirubin and haemolysis. Bilirubin suppresses the triglyceride value by 8.0% at a subjective level of "+" through to 19.7% at a subjective level of "+++". Haemolysis has a positive effect on triglyceride values. At a plasma haemoglobin concentration of 560 mg/L (subjectively haemolysis of "+"), the triglyceride value increased by 3.1%. At plasma haemoglobin concentrations of 1555 mg/L (haemolysis "++") and 2600 mg/L (haemolysis "+++") the values increased by 7.8% and 10.9% respectively.

As the major source of turbidity in serum and Intralipid is triglyceride, the effect of turbidity on the Beckman CX7 triglyceride method was determined by analysing ten samples exhibiting turbidity ranging from "+" to "+++" on the Beckman CX7 and Cobas Bio and noting the differences. A paired t-test was performed on these differences and it showed there was no statistical difference ($P > 0.5$) suggesting that this assay, like that on the Cobas Bio, is not affected by turbidity. Again these findings mirror the interference effects seen in the Cobas Bio triglyceride method where bilirubin at a concentration of 68 µmol/L and haemolysis at a concentration of 1200 mg/L affect the method while turbidity has no effect.

The fact that both methods exhibit similar effects of interferences from the presence of bilirubin, haemolysis and turbidity is not surprising as both methods use the same reagents and employ similar bichromatic corrections. It is possible that by replacing the derived "in house" parameters with those published by Boehringer Mannheim, the effect of these interferences could be further minimised.

Beckman quote similar patterns of interference[2] when their system specific reagents and associated software (which includes a complex polychromatic correction algorithm) are used on these instruments, therefore it would be most unlikely that any minor modification of the parameters used here would greatly alter the degree of types of observed interferences.

## Conclusion

This limited study produced data that suggests there is very little difference in performance between the total cholesterol, HDL cholesterol and triglyceride assays run on the Beckman CX7 random access analyser and this laboratory's current batch analysis methods, and as such, these methods must be considered as serious alternatives.

In working these methods up to routine use, a number of points will need to be finalised. Firstly, the calibration protocol. Boehringer Mannheim state a 14 day calibration frequently for their cholesterol and triglyceride reagents on the Beckman CX7 but, as "user defined" assays, they must be calibrated each time the reagents are loaded. This means the actual calibration frequently could be much shorter. During this study, reagent was drawn from compartment "B" of the reagent boat (holding 18 mL) in an attempt to match onboard reagent with the daily requirements and thus reduce waste. As a result the reagents were loaded (and calibrated) daily. It is envisaged that in routine use, compartment "A" of the reagent boats (holding 110 mL), will be used to allow for longer intervals between calibrations, up to a maximum of 14 days. In consultation with our Lipid Reference Laboratory, it is probable that the cholesterol and triglyceride set points of the "CX Multicalibrator" will require modification to eliminate the observed slight biases.

The second point to consider is whether or not the levels of imprecision suggested here are sustainable in the long term; it is most unlikely that a method would be accepted as a replacement if it could not at least equal the imprecision of the method it is intended to replace. By using stable reagents and following all of the prescribed preventative maintenance procedures, it is most unlikely that the imprecision would vary much from the data already achieved. However, unexpected factors, for example damaged sample and reagent probes or changes in water quality, could potentially contribute to less acceptable performance and it is these variables that would be accounted for in a long term evaluation (performed over a number of months).

Thirdly, the control protocol would need to be established. Being batch methods, our current Cobas Bio methods have a control protocol based on the size of each batch whereas this laboratory's protocol for random access analysis is based on time with the majority of chemistries run on the Beckman CX7 controlled every six hours. The Lipid Reference Laboratory may decide that a six hour frequency is not appropriate for these chemistries.

Reagent volumes, and therefore costs, are similar for both methods with the real cost savings of random access analysis likely to come from reduced sample handling and separation by the laboratory scientist and from the operation of one instrument instead of two. It would no longer be necessary to prepare duplicate aliquots of patient samples as one would be sufficient to assay all requested tests, including cholesterol, triglyceride and the aliquot for HDL cholesterol precipitation. A further benefit would be a major saving in consumable costs, for example the Cobas Bio reaction cuvettes. The Beckman CX7 does have consumable costs that must be recovered, but these are able to spread over the large test menu and with the number of samples run, the cost per test would be minimal. Combined with our policy of using the primary tube for analyses (where sample volume permits), further cost savings are possible.

With the support of the Lipid Reference Laboratory, this laboratory would finally be able to deliver the quality cholesterol, HDL cholesterol and triglyceride results of our batch methodology on a 24 hour per day, 365 days per year basis. Turnaround times for cholesterol and triglyceride assays could now be less than 60 minutes from the time of sample receipt. While the analysis time for HDL cholesterol is no different to the total cholesterol assay, there will be an inevitably longer turnaround time for this assay because of the manual preparation step required. Because of this, it is possible that HDL cholesterol may not be offered out of normal working hours, meaning that there may be little reduction in the overall turnaround time from the current method.

## Acknowledgements

I am grateful to Dr R. Johnson, Clinical Biochemistry Department, Green Lane and National Women's Hospital and Mrs P. McNutt of this Department's Lipid Reference Laboratory for their advice in the preparation of this paper.

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# A Probable Case of Neonatal Haemolytic Anaemia Caused by an Unstable Fetal Haemoglobin

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NZ Med Lab Sci 49 15-18

## Abstract

An 11-day-old infant presented with severe haemolytic anaemia. There was no evidence of serological incompatibility or enzyme deficiency. Tests for unstable haemoglobin were positive, and although it could not be confirmed by amino acid "finger printing", a presumptive diagnosis of an unstable Haemoglobin F variant was made. The infant was exchange-transfused, and repeat testing 13 months later showed no evidence of haemolysis.

## Key words

Haemolytic anaemia, unstable haemoglobin, haemoglobin F, neonatal.

## Case Report

Baby LG was the child of a 35-year-old primigravida who had an ante-partum haemorrhage at 16 weeks and premature rupture of the membranes at 31 weeks. Because of a breech presentation and premature labour a Caesarean section was performed at 32 weeks. Baby LG was described as a "vigorous infant" with an Apgar score of 8 9. During the first few days of life she developed mild respiratory distress syndrome, and on the 6th day began to develop obvious jaundice. By the 11th day she was anaemic and severely jaundiced, and blood was sent to the haematology department for the investigation of a possible haemolytic disorder. The following results were obtained: Haemoglobin 9.2g/dl (n 14.5-19.5); Haematocrit 23% (n 44-64); Reticulocytes 070 x 10 /l (n 200-450); White cell count 16.6 x 10 /l (n 13.5-21.5), with a neutrophilia and a left shift. There were no toxic changes. Platelet count 437 x10 /L (n 150-450). The red cells showed a marked increased in polychromasia, very marked anisopoikilocytosis, with many spherocytes, pyknocytes, and bite cells (fig 1). On the basis of this morphology, a presumptive diagnosis of infantile pyknocytosis was made.

The severity of the jaundice and haemolysis became apparent when the biochemistry results were obtained. The bilirubin was 313 umo /l (n 80), and the serum LDH 3330 µ/l (n <450). Free serum haptoglobin and haemopexin were absent. Infantile pyknocytosis seldom causes such severe haemolysis and a full haemolytic investigation was ordered and the results are summarised in table 1. The direct Coombs' test was negative and no maternal antibodies were detected. Serum and red cell vitamin E were normal. The osmotic fragility of fresh blood was normal, but a "tail" of fragile cells was present when blood incubated at 37°C overnight was used. The 48 hour autohaemolysis test was markedly increased, with a partial correction with glucose. The supernatant plasma was noted to be greenish-brown in colour. There was a mild increase in sodium influx. The following red cell enzymes were either normal or showed an increase consistent with a young red cell population: hexokinase, glucose phosphate isomerase, phosphofructokinase, aldolase, triosphosphate isomerase, glyceraldehyde phosphate dehydrogenase, phosphoglycerate kinase, diphosphoglycerate mutase, monophosphoglyceromutase, enolase, pyruvate kinase, lactate dehydrogenase, glucose 6 phosphate dehydrogenase, 6 phosphogluconate dehydrogenase, glutathione reductase, glutathione peroxidase, glutathione S-transferase, NADPH diaphorase, phosphoglucomutase, adenylate kinase, and acetylcholinesterase. Red cell ATP and 2,3 diphosphoglycerate were mildly elevated. The lipid peroxidation and glutathione stability tests were both normal which suggested that there was no abnormality in the red cell antioxidant system. Selenium deficiency is a rare cause of neonatal haemolysis but this was excluded on the basis of the normal glutathione peroxidase, normal lipid peroxidation test, and normal selenium levels in mother and baby. Both parents had normal blood films and their osmotic fragility, cryohaemolysis, autohaemolysis, and sodium influx were normal.

**Table 1**

| Test | Results | Reference Range |
|---|---|---|
| Autohaemolysis test | 19.7% | <2.0 |
| Sodium influx | 3.9 Meq/L RBC/hr | 1.2-2.5 |
| RBC Gluthathione peroxidase | 37.7 IU/gHb | 25.0-35.0 |
| RBC ATP | 5.6 µmol/gHb | 3.4-4.5 |
| RBC 2,DPG | 23.8 µmol/gHb | 10.0-17.0 |
| RBC Lipid peroxidation | 500.0 nmol/gHb | 80.0-560.0 |
| Glutathione stability test | 11.0% | <20.0 |
| Blood selenium | 0.6µmol/l | 0.5-1.1 |

It was decided to widen the investigation of baby LG to include a haemoglobinopathy screen. Haemoglobin electrophoresis on cellulose acetate at pH 8.6, and on citrate agar at pH 6.0 showed no obvious abnormalities. The level of haemoglobin A, A2, and F were normal for age. There was a striking finding in the isopropanol test for unstable haemoglobin. Hb F normally causes a small amount of precipitation, but baby LG's haemolysate produced a copious brown precipitate, much heavier than would be expected with Hb F. The zinc acetate test, which is not affected by HbF, produced a similar result. A methyl violet stain showed many Heinz bodies, and when blood was incubated with methylene blue overnight, almost every red cell contained a large inclusion body (fig 2). When the cellulose acetate strip was carefully re-examined some pale fuzzy bands were found between the HbF and HbA bands. A benzidine stain confirmed that these bands consisted of haemoglobin. A presumptive diagnosis of an unstable haemoglobinopathy was then made.

More blood was then requested for referral to a reference centre for confirmation and identification. Unfortunately the request came too late – baby LG had already received an exchange transfusion. A small amount of pre-transfusion blood was sent to the Australian haemoglobin reference laboratory at Westmead Hospital, Sydney. They agreed that an unstable haemoglobin was probably present, but were unable to do amino acid sequencing to identify the variant. Baby LG required no further transfusions and the jaundice resolved over the next few weeks. A blood test 13 months later showed no evidence of haemolysis.

## Discussion

Although the presence of an unstable haemoglobin F variant could not be confirmed and identified, there is strong circumstantial evidence. No other cause for the haemolysis could be found, and the haemoglobin electrophoresis, unstable haemoglobin tests, and inclusion body stains, were consistent with an unstable haemoglobin. The amount of Hb F usually reduces to less than 2% in the first year of life and baby LG showed no evidence of continuing haemolysis. Lee-Potter et al.[14] reported a very similar case caused by an unstable HbF variant – Hb F Poole. The case of baby LG illustrates two important points. An unstable HbF variant should be considered when investigating neonatal haemolysis, and the need for close liaison between the investigating laboratory and the medical specialists to ensure that if blood for further investigation is required, it is taken before transfusion.


## Acknowledgements

The author wishes to thank the staff of the neonatal intensive care unit, and the department of haematology, Royal Hobart Hospital, Dr Patricia Fleming, haemoglobin reference laboratory, Westmead Centre, Sydney, and the parents of baby LG, for their help in the preparation of this report.


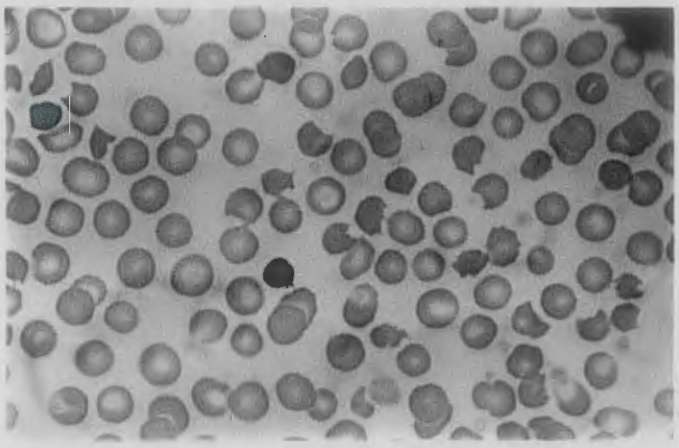

**Figure 1.**
Blood film of subject.

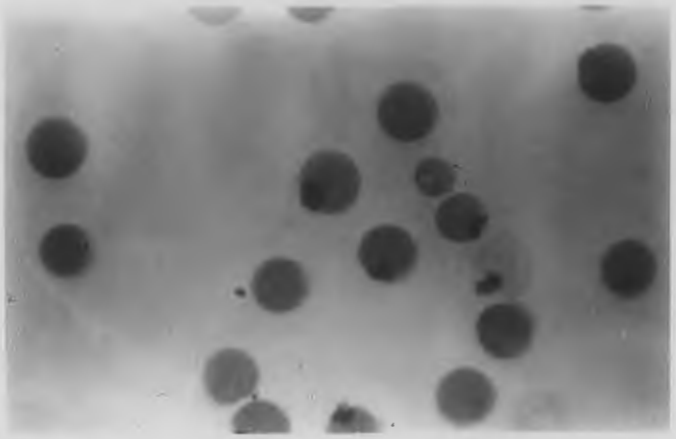

**Figure 2.**
Methyl violet stain.

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# Relationship Between AIDS/HIV Knowledge, and Attitudes, Concerns and Practices of Medical Laboratory Technologists in Fiji

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NZ Med Lab Science 1995 49 : 19-21

## Abstract

The aim of the study was to determine AIDS/HIV knowledge and to compare this with attitudes, concerns and practices of medical laboratory technologist in Fiji in regard to handling HIV positive biological specimens.

An anonymous questionnaire concerning knowledge, attitudes, concerns and practices was distributed to medical laboratory technologists in Fiji. Completed questionnaires were entered into a computer database and results evaluated by least square linear regression analysis and analysis of variance (ANOVA). Sixty medical laboratory technologists returned completed questionnaires. The average total score for AIDS/HIV knowledge was 62.7% (range: 36.4-80.3%), with males (n=24) demonstrating higher knowledge (average score: 66.1%) than females (n=36, average score: 60.4%, p=0.019 by ANOVA). Deficiencies in AIDS/HIV knowledge was the presence of HIV in various biological specimens, the destruction of HIV outside the body, and the risk categories of HIV transmission.

Three respondents were seriously considering leaving their profession because of concern about acquiring AIDS/HIV in the laboratory, 17 respondents would have chosen another career if they had prior knowledge that they could be handling HIV positive biological samples, and 34 respondents stated that their family and/or friends expressed serious concern regarding their laboratory work in relation to HIV/AIDS. The latter group had a lower overall knowledge score than those whose family and/or friends did not express serious concern (60.5% vs 65.3%, p=0.052). Those who treated all biological specimens as potentially HIV positive (n=39) had higher overall knowledge scores than those who did not (64.8% vs 58.7%, p=0.014). Seven and ten respondents respectively thought their employer did not provide adequate safety measures or satisfactory AIDS/HIV education in their work place.

The results from this study show that there are various deficiencies in AIDS/HIV knowledge in Fiji medical laboratory technologists, and is associated with their fears and attitudes. Continuous educational programmes would be highly desirable to improve knowledge, attitudes, concerns and practices regarding AIDS/HIV.

## Key words

AIDS, HIV, education, knowledge, attitudes.

## Introduction

Previous surveys in New Zealand have demonstrated concerns of medical laboratory scientists' regarding handling of potentially HIV positive biological specimens[1,2]. The results from those surveys suggested that a lack of AIDS/HIV knowledge may have contributed towards their concerns and attitudes, and that this needs to be addressed, for instance through appropriate continuous education.

A recent study demonstrated that medical laboratory science degree students at Massey and Otago Universities and laboratory staff at a large New Zealand hospital laboratory section had adequate HIV/AIDS knowledge, but there was room for improvement[3].

Other studies of allied health professionals have demonstrated deficiencies in AIDS/HIV knowledge, and ill-informed attitudes and concerns[4-8]. It has been suggested that effective AIDS/HIV education may remedy these attitudes and concerns, and that various educational interventions have lead to attitudinal changes[9-11].

The purpose of this study was to determine factual AIDS/HIV knowledge of medical laboratory technologists in Fiji, and if it was correlated with their attitudes, concerns and laboratory practices.

## Methods

The AIDS/HIV knowledge questionnaire was essentially that of the "Manual of the ELCAS Questionnaire Concerning HIV and AIDS" which has been statistically validated.[6] The questionnaire tests for among other knowledge of HIV presence in body fluids, methods for destroying HIV and risk categories of HIV transmittance. The attitudes, concerns and practices questionnaire is similar to that used in previous surveys in New Zealand[1,2].

Both questionnaires were distributed to all laboratory staff at the Suva, Lautoka and Labassa Hospitals in Fiji. Laboratory staff were asked to voluntarily and anonymously fill in the questionnaires in their own time, no time limits or other specific conditions being set. Once completed, the responses to the questionnaires were assessed by one of the authors and entered into a database on a Macintosh™ Classic computer. The results were analysed with the Stats View™ statistical package. Potential differences were evaluated by least square linear regression analysis and analysis of variance (ANOVA) or co-variance. A p value of $<0.05$ was deemed statistically significant.

## Results

Completed questionnaires were received from 60 medical laboratory technologists out of a potential pool of 79, giving a response rate of 76%. Of the respondents, 24 were male, and 36 were female, while 27 (9 male, 18 female) had previously attended AIDS/HIV lectures. The total overall score for AIDS/HIV knowledge averaged 62.7% (range: 36.4-80.3%) with males averaging slightly higher scores than females (66.1% vs 60.4% respectively, p=0.019). The age of the respondents showed a direct proportional relationship to the total score (r=0.285, p=0.04).

Lack of AIDS/HIV knowledge was demonstrated in answers relating to the presence of HIV in various biological fluids (Table 1), the methods of HIV destruction outside the body (Table 2), and the risk categories of HIV transmittance. In regard to risk categories various respondents thought that being a blood donor was a high (n=24) or possible (n=11) risk factor for contracting HIV, and 12 respondents

## Table 1

Biological fluids in which HIV has been detected

| | Yes | No | Correct* | Incorrect* |
|---|---|---|---|---|
| Vomit | ✓ | | 7 | 43 |
| Tap water | | ✓ | 56 | 4 |
| Blood/Blood products | ✓ | | 59 | 1 |
| Sweat | ✓ | | 5 | 55 |
| Semen | ✓ | | 55 | 5 |
| Faeces | ✓ | | 8 | 52 |
| Saliva | ✓ | | 13 | 47 |
| Urine | ✓ | | 11 | 49 |
| Menstrual blood | ✓ | | 49 | 11 |
| Smoke | | ✓ | 57 | 3 |
| Vaginal fluid | ✓ | | 53 | 7 |
| Tears | ✓ | | 4 | 56 |
| Air | | ✓ | 55 | 5 |

*No. of correct/incorrect responses (n=60)
Average score: 54.6%, range: 7.7%-92.3%.

## Table 2

Methods which destroy HIV outside the body

| | | Correct* | Incorrect* |
|---|---|---|---|
| Boiling | ✓ | 31 | 29 |
| Bleach | ✓ | 36 | 24 |
| Soap | ✓ | 9 | 51 |
| Freezing | x | 46 | 14 |
| Detergent | ✓ | 23 | 37 |

*No. of correct/incorrect responses (n=60)
Average score: 49.7%, range: 0%-100%.

thought that HIV could be transmitted via insects. Ten respondents (16.7%) thought that a person who is HIV positive would have symptoms of the disease. Ten (16.7%) stated that a person who had not had sexual intercourse in the preceding five years could not be HIV positive. Thirty-eight (63.3%) thought AIDS-related illnesses could not be medically treated. Thirty-four (56.7%) thought that all HIV positive people die of AIDS. Fifteen (25.0%) thought AIDS is more easily contracted than Hepatitis B. Fifteen (25.0%) thought that there was a vaccine against HIV in general use and seven (11.7%) thought that AIDS can be cured.

Table 3 lists the responses to various questions regarding biological specimen handling and concerns. Respondents who regarded all biological specimens as potentially HIV positive had higher AIDS/HIV knowledge scores (64.8% vs 58.7%, p=0.014), while those whose family and/or friends had expressed serious concerns regarding the respondents work in the laboratory in relation to AIDS/HIV scored lower (60.6% vs 65.3%, p=0.052). Those who had previously attended AIDS/HIV lectures tended to have higher scores (66.1% vs 61.7%), though this was not statistically significant. No differences in total scores were apparent in those who would have chosen another career if they had prior knowledge that they could be handling HIV positive biological samples.

All but one respondent either strongly agreed or agreed with the statement that they had the right to be informed if HIV positive specimens were present in their laboratory work area. Regarding the employer's provision of satisfactory safety measures to minimise HIV/AIDS transmission in the laboratory, 51 respondents agreed, 7 disagreed and 2 were uncertain with them; while 39 agreed, 10 disagreed and 11 were uncertain regarding their employer's provision of satisfactory HIV/AIDS education.

## Table 3

Biological specimen handling and concerns of Fiji Medical Laboratory Technologists

| Question | | Response* |
|---|---|---|
| 1. Do you wear gloves when handling biological specimens? | Always | : 12 (20.0%) |
| | Sometimes | : 47 (78.3%) |
| | Never | : 1 (1.7%) |
| 2. Do you treat all biological specimens as potentially HIV/AIDS positive? | Yes | : 39 (65.0%) |
| | No | : 21 (35.0%) |
| 3. Which is your main concern about acquiring in the laboratory? | HIV/AIDS | : 5 (8.3%) |
| | Hepatitis | : 6 (10.0%) |
| | Both equally | : 45 (75.0%) |
| | Neither | : 4 (6.7%) |
| 4. Are you seriously considering leaving your job because of concerns about acquiring HIV/AIDS through handling biological specimens | Yes | : 3 (5.0%) |
| | No | : 57 (95.%) |
| 5. Have you had family/friends express serious concerns regarding your work in the laboratory in relation to HIV/AIDS? | Yes | : 34 (56.7%) |
| | No | : 26 (43.3%) |
| 6. Would you have chosen another career had you prior knowledge that you could be handling HIV/AIDS positive biological samples? | Yes | : 17 (28.3%) |
| | No | : 43 (71.7%) |

*Response rates given as actual number of respondents and percentage of total (n=60)

## Discussion

Results from this survey demonstrate a moderate knowledge of AIDS/HIV by medical laboratory technologists in Fiji. Their overall score (62.7%) compares with results from a recent study of 2nd year undergraduate students in medical laboratory science (65.9%) and laboratory staff (73.0%) in New Zealand[3]. In that study[3] various deficiencies in core AIDS/HIV knowledge were noted and similar deficiencies were found in the present study.

Both that study[3] and the present study suggest that there is a need to improve AIDS/HIV knowledge of laboratory staff in order to change their negative attitudes and improve their concerns regarding the various sociological issues of AIDS. Overseas studies have shown that effective AIDS/HIV education for allied health professionals improves their knowledge, changes their attitudes and that they become more tolerant towards AIDS affected people[2,7]. However, AIDS lectures devised purely to disseminate knowledge alone does not alter attitudes[2], these must be considered in conjunction with AIDS/HIV knowledge.

Questionnaires can generate biased and preconceived ideas and attitudes, but can point out areas of concern and lack of knowledge that may be targeted for future educational goals. AIDS/HIV educational programmes for health professionals need to consider attitudes, concerns and practices together with factual AIDS/HIV knowledge. These are best achieved by selecting target groups, such as medical laboratory staff, rather than multidisciplinary groups with different levels of education and training. A forum in which personal fears can be confidentially discussed is increasingly being utilised to both educate health professionals and to extract further information that cannot be obtained from questionnaires[1,3,4].

All but one medical laboratory technologist felt they had the right to be informed if HIV positive biological specimens were present in their laboratory work area. This finding which is similar to previous findings among paramedical health professionals[1,2,8] conflicts with patients' rights to privacy and confidentiality[1,5]. Ideally laboratory staff should treat all biological specimens as potentially infectious[1,6], whether

it be HIV, Hepatitis virus or other infectious agents. The results from this and previous surveys[1,2] show that a major proportion of laboratory staff either do not always wear gloves when handling biological specimens, or do not treat all biological specimens as potentially HIV positive.

The present study has also demonstrated that the degree of AIDS/HIV knowledge has an impact on Fijian laboratory technologists attitudes and concerns. Those with higher knowledge scores tended to treat all biological specimens as potentially HIV positive and also had fewer family friends express concern about their laboratory work in relation to AIDS/HIV. Additionally, those who indicated that they had previously attended lectures on the subject tended to have higher knowledge scores.

In conclusion, this study has documented various areas of lack of AIDS/HIV knowledge and its association with unfounded fears, concerns, and attitudes of medical laboratory technologists in Fiji. From the results obtained, future educational targets can be devised to ultimately reduce their fears and concerns regarding the highly emotive subject of AIDS.


## Acknowledgements

The authors wish to thank the laboratory technologists in Fiji for participating in this study and Mrs H Bark and M Gordon for secretarial assistance. Dr Singh thanks the Secretary for Health in Fiji for permission to publish. This study was supported by a grant from the New Zealand Laboratory Science Trust.


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# Graduation Report: BMLSc Course, Otago University, December, 1994.

The first 23 Bachelor of Medical Laboratory Science students graduated from the Otago University early in December, 1994. It was interesting to note the dramatic fashion change for the majority of students from jeans and t-shirts to more formal attire. It was difficult to recognise some of the students!

John Finlayson, Jan Parker and Les Milligan represented the profession at an Otago Medical School function held to mark the graduation of the first students from this course.

Dr Colin Geary, Head of the University Pathology Department, paid tribute to the late Associate Professor, Colin Watts, who died earlier in the year and who was the first course director. Colin Watts had played a major role in making the degree course a reality. He also made a bequest to establish the prize which bears his name. Kevin Taylor won the Colin Watts Prize for the top overall student in the degree programme.

Steve Hamilton was presented with the James Le Grice Prize for top overall biochemistry marks.

Dr Geary said that the establishment of this degree represented a successful partnership between the University and the Medical Science Profession and co-operation between some Crown Health Enterprise hospitals and private sector laboratories.

Dr Chris Lovell-Smith, the new course director, said that top quality medical tests were vital for public welfare and the establishment of this degree would further help to improve diagnostic testing standards and improve public accountability.

Post-Graduation message: Faine wishes to inform everyone that Irish Rebel has been sold and to place all your overtime earnings on Gild The Lily!

***Les Milligan.***

# Options for Funding Private Laboratory Services: An Attempt to Curb Cost Escalation in the Provision of Private Laboratory Services.

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NZ J Med Lab Science 1995, 49 1 22-26

## Introduction

The cost of providing clinical laboratory services has been an important contributor to the general inflation in medical and health care costs during the last twenty years, resulting in a heightened concern with regulating clinical laboratories and controlling the unnecessary costs associated with laboratory testing. It has also been suggested that the elimination of unnecessary laboratory tests could represent a major contribution to efforts to contain health care costs[1]. This paper looks at the historical background of private medical laboratory testing in New Zealand (NZ). This is followed by a discussion of the reasons for the cost escalation in clinical laboratories both overseas and in NZ with particular reference to private (community) laboratories. The next section covers the solutions available to contain costs by looking at demand and supply side solutions. Various funding options for private laboratories suggested by NZ writers are then discussed. The final section takes a critical view of the Midland Health Regional Health Authorities (Midland RHA) proposal for the funding and provision of Primary-referred Diagnostic Laboratory Services (ie private/community medical laboratory services). This includes covering the positive and negative features of the capitation/competition scheme proposed by the Midland RHA. THE Midland RHA recognises that clinical laboratories are key components of NZ's primary health care sector, but seeks a way to contract for private laboratory services on a basis which limits its risks and encourages appropriate testing rates[2].

Sutton [3] notes that *"without measures to restrain volume, it is possible that laboratory benefit expenditure will continue to increase faster than inflation". "In health maintenance organisations, where financial disincentives for over-utilisation exists, costs are 10 to 40% less than that found in fee for service practice".*[3].

Clinical laboratories perform diagnostic tests on a variety of specimens including blood, urine and tissue biopsies to assist medical practitioners with the assessment and management of clinical conditions[2].

## Historical Background

Initially, clinical laboratory services were provided in public hospitals, but in 1946, the laboratory benefit was introduced which funded private (community) laboratories to perform tests for General Practitioners (GP's). Under the Laboratory Schedule, private laboratories attracted a government subsidy which was disbursed by means of a fee for service as set out in the Social Security (Laboratory Diagnostic Services) Regulations (1981). There are eighteen private laboratories in New Zealand from Northland to Invercargill. The main clients of private laboratories are community based general and specialist practitioners[4]. Because of their focus on providing services for community based practitioners, private medical laboratories are now known as community laboratories and are represented by the Association of Community Laboratories (ACL). When the four Regional Health Authorities (RHA) were established on the first of July 1993, they entered into arrangements with community laboratories in their regions which incorporated all the previous terms and conditions, including the Laboratory Schedule, along with a 5% price increase[5]. Little work has been published in NZ examining the economic aspects of laboratory services[3], but there is abundant evidence overseas that fee-for-service practice does encourage over-utilisation of laboratory services[1].

A comment made by Robinson[1] with relation to the American situation also applies in NZ, namely that *"whereas hospital laboratories have experienced new clinical and financial demands in the DRG (Diagnosis Related Groups) era, hospital-independent commercial laboratories continue to operate in an environment with a lower overhead as a result of handling specimens primarily from a relatively healthy, non-haspitalised population".* While hospital laboratories are contracted to provide laboratory services in return for a fixed payment, there is at present no limit to the total number of tests which a private community laboratory can perform and claim, so it is a true fee-for-service arrangement[2]. Because of this fee-for-service arrangement there is no economic incentive to curb over or misordering, because the more tests a community laboratory performs, the higher its income. The present fee for service method of paying community laboratories is less likely to promote efficient use of laboratory services than other systems[2].

*"Laboratory costs account for nearly 10% of overall health care costs in the United States and exceeded $30 billion annually in 1985, contrasted with $12 billion in 1975, representing a 15% annual growth rate for laboratory testing"* [1]. The Midland Region of New Zealand has experienced an annual 12% increase in the expenditure on community laboratory services over the last four years[5]. The cost of health care has exceeded what the public is prepared to pay for *"especially in view of the growing realisation or perception that increased resource commitments have only marginally improved the gross indicators of health"*[1].

## The Reasons for Cost Escalation in the Provision of Laboratory Services

Before considering the options for containing costs it is useful to examine the reasons for the cost escalation in the provision of laboratory services. The main reason for cost escalation in NZ is due to the fee-for-service payment mechanism for private laboratory services. Because there are few incentives for patients or requesting doctors to weigh up the benefits of tests against their costs, it is not surprising that there is some overuse, ending in increased costs. *"In fact the existing benefit structure may encourage excessive use of tests, for example, general practitioners may order a test where a longer patient history or a more thorough examination would be more appropriate. This is because they will usually get paid no more for the longer consultation, but neither they nor their patients bear the costs of the laboratory tests directly"*[3]. The patient, however, is not usually to blame for the cost increases. There are major differences between health care and most

other goods and services which make a pure market approach inappropriate for health service provision. The differences in the laboratory field include the following: the consumer of the service (the patient) lacks the knowledge to judge the value of the service offered or delivered. Unlike other products, the consumer is unable to regulate the type or amount of their demand on the laboratory service. In fact it is the requesting doctor who decides the level of demand[14].

Herdson[15] also exonerates the patient from blame in increasing demand when he states that *"whereas the patient has a perception of medicines and may put pressure on the doctor for more than necessary, he or she has little or no perception of the place of or necessity for laboratory tests and is unlikely to be seeking unnecessary tests"*. That leaves the blame for increased costs on the medical profession. In the United States small amounts of demand creation for laboratory tests have been noted in ambulatory settings but not in hospital care[1]. Scott[6] accepts that the stewardship of the laboratory benefit in NZ has been vested in the medical profession and that the signs are there that some medical practitioners need to be reminded about the consequences of the thoughtless ordering of laboratory tests and that *"there is no such thing as a free consultation in the hard world of economic reality and that there is no such thing as a free laboratory test"*. His view, a reasonable one, is that laboratory test results should affect the way a patient is treated, and that a shotgun approach to laboratory testing is inefficient and costly.

However, the economic incentives of a fee-for-service system act against any education that would lessen test volume because private laboratory income increases with increased test numbers[16]. Various investigators have reported that between 26.5 and 98% of laboratory tests are unnecessary, figures depending on the specialty and related prejudices of the physicians who conduct the chart reviews[1].

The routine use of screening profiles has increased in the private ambulatory population as a means of early diagnosis, preventative care and provision of baseline laboratory data. *"Screening profile tests can produce unexplained, abnormal results that generate additional work even though the data may represent only extreme values in health individuals"*[1]. She also comments that *"the ample available evidence in the literature does not support a positive association between the extent of laboratory use and either clinical productivity or outcomes of care"*[1].

As well as the cost escalation due to the fee-for-service payment system and the over-utilisation of laboratory services by physicians, competition between medical laboratories has contributed to increased consumption of health care services by the public and to the expansion and duplication of expensive service. Threats to provider income have served to increase marketing efforts to preserve existing revenues[1].

Factors influencing physician over-utilisation of laboratory tests include the following – ease of access to laboratory tests, insufficient knowledge of test characteristics, shotgunning (ordering complex tests without looking at the results of basic investigations), incorrect interpretation of test results, screening for the presence of rare disorders, reliance on test results rather than on clinical skills. Other factors include: use of generic test regimes, innate curiosity, medico-legal considerations, fee schedules that reward doctors for performing tests, lack of cost information and the age of the physician. There is a relationship between laboratory usage and physician age, with less use by older physicians[1]. It is obvious that over-utilisation of laboratory services in a fee-for-service system will lead to increased costs as has occurred in New Zealand[2-4].

## Solutions Available to Contain Costs

Ideally any cost containment measures should maximise benefits and minimise harms[11]. Economic constraints require that a compromise be reached between individual welfare and limited societal resources. Both physicians and the general public believe that cost-control efforts are possible without impairing the quality of medical care[17]. Because laboratory testing has a greater role in acute hospital patient care than in ambulatory care, greater savings are likely in the private sector than in the hospital sector, especially as hospital laboratories already work under capped budgets compared to the fee-for-service system for private laboratories[1,2].

So what economic solutions are available to contain costs in the private laboratory sector? Both demand and supply side solutions are available.

Demand side solutions include the following: part charges for laboratory tests, education of doctors and potential patients, professional standards reviews, and the use of Continuous Quality Improvement programmes. Before expanding on these demand side solutions, it is necessary to understand, as discussed previously in the paper, that the demand for the laboratory tests comes mostly from physicians acting as agent for the patient, rather than from the patient his/herself[4,5]. The suppliers of the laboratory tests are the pathologists who own the community laboratories. Thus in the laboratory situation, demand side solutions affect doctors who request laboratory tests and their patients while supply-side solutions affect the pathologist / community laboratories providing the laboratory services.

Part charges were first suggested seriously for private laboratory services by the Minister of Health[18]. Patients were to pay a $2.00 part charge per laboratory visit. This proposal was eventually dropped. Because patients do not directly ask for laboratory tests it is unlikely that part charges would contain laboratory costs to any large degree.

The education of requesting doctors and the use of professional standards peer review hold some promise in reducing the demand for laboratory services both in the hospital and private sectors[1-6]. Team work is needed between clinicians and laboratory personnel so that the laboratory has a clearer concept of the doctors needs, and the doctor has a clearer understanding of the possibilities and limits of the laboratory's contribution to diagnosis and management[16]. With increasing cost constraints there is a pressing need to get clinician support and involvement in using finite laboratory resources wisely. Doctors need to be educated about the implications of differing styles of practice in laboratory utilisation, and to actively encourage behaviours that conserve resources[16]. Such education could attempt to make doctors think about why they are requesting tests and how the results will impact on patient treatment. *"Clearly the time for clinical relevance is nigh, and resources can no longer be used for procedures of dubious value, including new technology or duplicate costly services"*[1]. Optimal testing strategies can be developed through a dialogue between laboratory professionals and requesting doctors including discussion of the medical, scientific and economic aspects of the decision process[1].

Physician education programmes can use some or all of the following forms: feedback procedures including comparative utilisation data, formal didactic programmes, dissemination of cost information for laboratory tests, the use of written guidelines or protocols and the use of audits of laboratory usage. The last two suggestions, namely the use of written protocols and audits are also part of another section which is the use of Continuous Quality Improvement (CQI). CQI is a mechanism to help eliminate non-essential laboratory and clinical practices. It includes the use of peer review to decide on appropriate testing regimes. The use of standard operating procedures for laboratory testing reduces over-utilisation of laboratory services[1].

Supply side solutions include: Government intervention, capitation, incentive/disincentive systems, schedule/payment modification, creation of more market forces and making doctors (especially suppliers of laboratory services) fiscally responsible for over-utilisation of services[1,3].

The Government, via the four RHAs has signalled that it wants

to cap the budget for laboratory services in the private sector[2]. The use of capitation for payment of community laboratories is the heart of the proposal by Midland Health (1994) which will be covered later in this paper. Capitation is more effective at containing costs than fee-for-service mechanisms[3]. Both requesting doctors and supply doctors (pathologists) need to have incentives and disincentives which limit the use of laboratory testing to appropriate levels. Such incentives are missing in the present system. Modification of the existing Laboratory Schedule to give incentives to pathologists to curb unnecessary testing could be used to dampen demand. Increased competition could also reduce costs by pushing inefficient suppliers out of the market so that only the efficient survive. This has been a key platform of the present government health reforms[2,8]. The above solutions will be covered in more detail in the next section.

*"Successful efforts to reduce the misuse of laboratory resources have included a long term commitment to cost containment, a combination of education progammes, and active intervention to reinforce educational efforts . . . appropriate attitudes can be developed if the rationale for reducing unnecessary ancillary test use is clearly stated. However, the concept of cost containment cannot be used as the sole reason for a cost containment programme. Instead it is important to emphasise the improvement in the quality of care that will occur as a result of reducing over-utilisation, under-utilisation and mis-utilisation of laboratory tests"*[1]. The Government has made only minor use of education for referring doctors. Education is more likely to be effective if it is coupled with information about each doctor's own referring, compared with that of other doctors. It is important to realise that laboratories do not simply do tests to order, they are also meant to provide a pathology consultancy[3].

## Funding Options for Laboratory Services

Options for funding laboratory services in NZ have been previously put forward[2,4,6]. The ground covered by these sources are similar and five main options mentioned by McGrath[4] are representative. They are (i) the status quo – the present fee-for-service options; (ii) a part charge to the patient; (iii) a restricted list of tests; (iv) capitation; and (v) contracting.

The present fee-for-service option is inefficient and raises cost as monitored previously. There are no incentives for the requesting doctor or the pathologist supplying the tests to contain laboratory costs, because laboratory income is directly related to the number of tests done.

The second option is a part charge to the patient. *"With the move towards the so-called user pays principle, it is not surprising that the question of part charges for private laboratory services has again been raised"*[5]. Part charges have been suggested as a way to shift part of the cost of laboratory services from the State to the patient, and of using price signals to modify the use of the services. The Minister of Health[8] also initially intended to introduce part charges for laboratory tests in the same way as they are applied to pharmaceuticals. There are several drawbacks to introducing part charges. Firstly, *"price signals to the patient are not effective in modifying clinicians use of laboratory services. It is the doctor not the patient who decides what tests to order and price signals through the patient would be muted at least"*[4]. Part charges also discriminate against people on low incomes and those with frequent illnesses. Penalising those groups is contrary to the principle of equity[4]. Part charges are also likely to increase administration charges[3].

The third option is to limit private laboratory services to a restricted list of tests. This could also include a "specialist only" list that prevented GPs from ordering expensive tests unnecessarily. Such an option does not put any incentives in place to improve the use of laboratory services by doctors. As the highest volume tests (approximately 18 tests) account for 80% of community laboratory tests it is unlikely that future restrictions of tests could make much of a dent in costs[3].

The fourth funding option is capitation. Capitation can be structured in two ways:

(a) Capitation can be paid to the laboratory to provide services for a defined population for a pre-defined amount of payment. This is the approach taken by Midland Health[2] in their funding proposal for laboratory services. The advantages of this kind of capitation are that laboratory expenditure would be fixed, not open ended. Pathologists would have a strong incentive to influence the clinicians to achieve optimal and cost effective use of the service. There is some concern by doctors that capitation could tempt laboratories to underservice to stay below their capitation income to make a profit[4].

(b) Capitation paid to the General Practitioner (GP). The GP is paid a fixed amount according to the size of his/her practice to purchase laboratory services. The doctor has an incentive to make the most efficient use of laboratory services in consultation with the pathologist supplying the tests. The major disadvantage to this approach is that patients would have to register with a GP and that would limit patient choice[4]. There is no doubt that capitation would provide the economic incentives to reduce over-utilisation or mis-utilisation of laboratory services.

The last option is the use of contracting. A regional funding body such as an RHA could call for tenders for the provision of private laboratory services. Any medical laboratory, community or hospital, could put in a tender. The tendering laboratory would have the incentive to promote both internal efficiency and optimal use of laboratory services by doctors. Levels of quality and service expected could be outlined in an Request for Proposal (RFP). The disadvantage is that *"unlike other markets in which there are numerous suppliers and buyers, there would only be one regional source of contracts, consequently a laboratory that missed out on a contract one year would either go out of business or amalgamate – this would result in a monopolistic rather than a competitive situation"*[4]. The Midland Health[2] proposal combines contracting and capitation elements. All five of the above options have been discussed over the last ten years.

## The Midland Health Proposal for the Funding and Provision of Primary Referred Diagnostic Laboratory Services

In August 1994 the Midland RHA put out a proposal for primary-referred Diagnostic Laboratory and Related Services[2]. This proposal is a substantive move to replace the present fee-for-service system.

*"Midland Health has concerns with the existing arrangements between it and private diagnostic laboratories, because it is exposed to significant risks arising from the fee-for-service payment described previously. There are no controls of total expenditure in this area"*[2]. Total expenditure for the six community based laboratories in the Midland region has risen over the last three years from $18.4 million in the 1992/93 year, to $24.5 million for the 1993/94 year. This represents a 12% annual growth in expenditure. Per capita laboratory tests in the Midland region vary from 1.5 to 3.8 tests per head of population. The average is 2.9. This large variation suggests that service level variations are not primarily driven by population size – or even health status in the laboratories catchment areas[2]. Midland Health is endeavouring to purchase services that give people equal access to services in circumstances of equal need. They *"therefore wish providers to eliminate a number of inconsistencies which currently exist between the various areas in Midland"*[2].

Some of the specific objectives that Midland Health has formulated for laboratory services after consultation are to ensure availability of appropriate, high quality services throughout the region, purchase laboratory utilisation levels consistent with high quality requirement and cost efficiency within a capped budget for the RHA as a whole; to develop a process to manage test volume as an outcome of benchmarking laboratories and GP/specialist referral rates coupled

with appropriate education programmes to encourage optimal use of laboratory tests; and to develop purchasing strategies that ensure a competitive market and competitive prices driven by providers of laboratory services[2].

It is Midland Health's belief that there are two markets for diagnostic laboratory services, defined by the turnaround time required by doctors, namely a stat market where test results are required as soon as possible and a next day service where results are required in one to two days. Midland Health wishes to change the way in which it purchases services in the next day market[2].

Under its proposal Midland Health will explicitly purchase four kinds of services which in the past have been bundled together. These four kinds of services are (1) PRODUCTS: which includes all of the tests presently on the Laboratory Schedule along with materials provided to practitioners such as blood tubes; (2) SERVICES: which includes the analysis and interpretation of laboratory resits, advice and information, along with education of referring practitioners; (3) ACCESS: relating to agreed access by the eligible service users, agreed serving delivering points and agreed turnaround times; (4) INFORMATION: on areas such as utilisation and throughput data, test volume, details of requesting practitioners, compliance with quality standards and access, quality improvement plans, guidelines for appropriate requesting and provision of and retention of relevant information for 12 months[2]. *"Any new contracts with service providers will explicitly specify the products, services, access and information to be supplied"*[2]

Midland Health proposes to capitate providers of community laboratory services based on the numbers of full time equivalent requesting practitioners who have enrolled with each diagnostic laboratory. Medical practitioners may enrol with any diagnostic laboratory who is willing to provide services in that practitioners area. A practitioner can only enrol with one laboratory at a time, but can change monthly if s/he wishes. Laboratories electing to provide services in any area, are not allowed to refuse enrolment to any eligible requesting practitioner. The laboratory must comply with the same minimum standard of services and access to these services for all enrolled practitioners including turnaround time, access to collection points, test results and practitioner materials[2].

Laboratories wishing to contract to Midland Health for primary referred diagnostic laboratory services will be asked to indicate the areas within Midland in which they are willing to provide services and to quote annual prices per full time equivalent for each type of requesting practitioner in each area. *"Providers will be selected for further negotiation on the basis of their proposed prices and ability to provide the full range of services in the manner required by Midland Health. Three year contracts – incorporating annual price reviews – will be offered to the successful providers"*[2]. All capable providers of diagnostic laboratory services are eligible to compete for a contract, including private (community) laboratories both within and outside the Midland region; private laboratories outside of New Zealand; public (CHE) laboratories within and outside the Midland region along with other parties such as managed care organisations. The only conditions are that providers comply with Midland Health's contractual requirements, and that providers can demonstrate financial viability. Successful providers will be monitored by Midland Health and will be expected to provide detailed activity reports, quality improvement plans, demonstration of turnaround times, identification of changes to key personnel and equipment. Evidence of cost and or activity shifting will also be monitored[2].

This proposal, which has not yet been finalised, has both advantages and disadvantages. The advantages are as follows. Overseas experience has shown that the fiscal restraints imposed by prospective payment systems such as capitation have caused laboratories to reduce their operational costs without an adverse effect on quality[1]. Capitation provides economic incentives for laboratories to ensure that optimal use is made of laboratory services. Every unnecessary test avoided translates to more profit for the laboratory compared to the present system where each unnecessary test raises income. Unbundling of laboratory services into four component areas will yield benefits, especially those relating to educating practitioners and monitoring laboratory activity. Fein[9] states that what is needed are *"data systems that permit closer monitoring and control of provider performance and that provides reassurance (to both providers and patients) that reduced utilisation does not translate to lower quality"*, we need to devote *"greater attention to educating practitioners about the economic and medical implications of variations in style of practice and to encouraging (through both rewards and penalties) behaviour patterns that conserve resources"*. The Midland proposal which is a supply side solution aims to do this. The proposal aims to end the present open-ended system which is causing alarming expenditure growth. The proposal is looking at control of expenditure rather than cost-cutting per se. The advantage for the Government as primary funder is that it will know in advance what its expenditure for laboratory services will be.

The proposal, however, does have some disadvantages. The main demand for community laboratory services comes from GPs. This proposal places risk on the provider laboratories for over-utilisation by GPs. It may be unrealistic for community laboratories to effectively budget for laboratory services may have been more effective. Capitation by GP would probably overwhelm Midland Health's resources at this stage.

*"Continuous effort is needed to control incoming work load, and many laboratories do not have the personnel resources needed to implement and maintain a workload control mechanism"*[1]. A disadvantage of trying to increase competition as outlined in the proposal is highlighted by Robinson[7] in relation to the situation in the US, *"the aggressive commercial orientation of numerous laboratories has led to the conversion of the laboratory industry from one concerned with professionalism to one dominated by marketing strategies and profits"*. Light[11] notes that competition often creates duplication because more competitors think that they can attract or corner a market than is possible. Robinson[7] also notes that a reduction in costs is not proportional to the reduction in test utilisation, because the fixed laboratory costs are not dependent on the volume of testing performed. *"A 10% reduction in utilisation of a high volume test results in an actual cost saving of only 1.3% of total costs and 1.8% of direct costs"*[7]. Thus the Midland Health proposal may reduce test utilisation with only marginal cost savings given that community laboratories deal in high volume testing.

Community laboratories are not happy with the new proposals. In a New Zealand Press Association[12] release it was stated that *"Medical laboratories are planning legal action against Midland Regional Health Authority if it goes ahead with controversial contracting policies. The Association of Community Laboratories (ACL) will go to the courts and the Commerce Commission citing lack of consultation and unfair competition respectively if the plans have not been dropped within the next week"*. The medical profession has done well out of the fee-for-service payment system and obviously is not happy with the potential income drop inherent in a capitation system.

The ACL also disputes Midland Health's assertion of over-utilisation of laboratory services. They believe that growth in number of tests is due to: the increased costs of treatment, which gives a greater incentive for accurate diagnostic testing; investigation of medical disorders without hospitilisation of the patient or following shorter hospital stays; and screening programmes initiated and publicised by the Government[10]. *"The New Zealand Medical Association (NZMA) shares ACL concerns at the possibility of CHE's becoming monopolistic providers and the lack of incentive at all, in the Midland proposals for practitioners to reduce the number of tests ordered, and therefore the*

*proportion of the health budget spent on diagnostic testing*"[10].

## Conclusion

It can be seen that the Midland proposal follows world trends towards capitation and prospective payment instead of fee-for-service[11]. It seems that *"rationing will occur primarily in the area of amenities in the intensity of diagnostic and laboratory investigation"*[7]. The proposal works to limit expenditure of encouraging providers to curb demand (the inverse of supplier induced demand). The proposal goes some way to stopping the inefficiencies in the present fee-for-service system. It is to be hoped that the Government and Midland Health will stick with this proposal and its sound economic basis and not be swayed by medical lobby groups such as the ACL and NZMA. At the end of the day it is the *"quality of the testing and its timeliness and appropriateness, not the quantity of tests that is most important"*[7] and *"in the hard world of economic reality there is no such thing as a free laboratory test"*[6]. Economists will watch with interest to see what effect Midland Health's proposal will have on the escalating costs of private laboratory services.

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# A Report on the Bachelor of Medical Laboratory Science 4th Year Evaluation.


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NZ Med Lab Science 1995 49 : 26-27


## Introduction

In 1994 the first group of students to enrol in the Bachelor of Medical Laboratory Science (BMLS) degree at the University of Otago and Massey University graduated. In the fourth year of their degree students spend two semesters in laboratories receiving clinical training. At the end of the first semester of laboratory clinical training the New Zealand Institute of Medical Laboratory Science (NZIMLS) surveyed students and laboratory tutors from both courses.

Forty three students were canvassed and 21 replied; 7 Massey, 14 Otago. There were 52 replies from laboratory tutors; 19 of these trained Massey students, 29 Otago and 4 did not say which University they were associated with.

When interpreting the results it should be noted that replies were often based on experience with one student and in some cases the same student was being commented on by different people.

## Survey Results

### Laboratory Tutors

| | | | |
|---|---|---|---|
| Which best describes the attitude of the students at the end of the semester? | Excellent | 23 | 44% |
| | Good | 22 | 42% |
| | Adequate | 5 | 10% |
| | Poor | 1 | 2% |
| | Unsatisfactory | 1 | 2% |
| Which best describes the theoretical knowledge of the students at the end of the semester? | Excellent | 6 | 11% |
| | Good | 29 | 56% |
| | Adequate | 14 | 27% |
| | Poor | 1 | 2% |
| | Unsatisfactory | 0 | 0% |
| | No response | 2 | 4% |
| Which best describes the manner in which the laboratory staff were able to cope with the additional workload created from having students present? | Excellent | 2 | 4% |
| | Good | 20 | 38% |
| | Adequate | 19 | 37% |
| | Poor | 9 | 17% |
| | Unsatisfactory | 1 | 2% |
| | No response | 1 | 2% |
| Which best describes the laboratory skills of the students at the end of the semester? | Excellent | 4 | 8% |
| | Good | 18 | 35% |
| | Adequate | 22 | 42% |
| | Poor | 7 | 13% |
| | Unsatisfactory | 0 | 0% |
| | No response | 1 | 2% |
| Which best describes the level of competence of the student in relation to future registration? | Excellent | 7 | 13% |
| | Good | 8 | 15% |
| | Adequate | 18 | 35% |
| | Poor | 14 | 27% |
| | Unsatisfactory | 3 | 6% |
| | No response | 2 | 4% |
| In your opinion what further practical experience is required to allow the student to register? | None | 1 | 2% |
| | 3 months | 3 | 6% |
| | 6 months | 13 | 25% |

| | | | |
|---|---|---|---|
| | 1 year | 28 | 54% |
| | >1 year | 4 | 7% |
| | No response | 3 | 6% |
| **Students** | | | |
| How well did the course overall relate to the work of a Medical Laboratory Scientist? | Excellent | 7 | 33% |
| | Good | 10 | 48% |
| | Adequate | 4 | 19% |
| | Poor | 0 | 0% |
| | Unsatisfactory | 0 | 0% |
| How well did the course meet your expectations according to the following? | | | |
| (a) the theory of the subject? | Excellent | 8 | 38% |
| | Good | 7 | 33% |
| | Adequate | 5 | 24% |
| | Poor | 1 | 5% |
| | Unsatisfactory | 0 | 0% |
| (b) the practical content of the subject? | Excellent | 5 | 24% |
| | Good | 7 | 33% |
| | Adequate | 7 | 33% |
| | Poor | 2 | 10% |
| | Unsatisfactory | 0 | 0% |
| How would you rate the organisation of the course in order to help you gain the following: | | | |
| (a) self directed learning skills? | Excellent | 6 | 29% |
| | Good | 8 | 38% |
| | Adequate | 7 | 33% |
| | Poor | 0 | 0% |
| | Unsatisfactory | 0 | 0% |
| (b) theoretical knowledge? | Excellent | 5 | 24% |
| | Good | 9 | 43% |
| | Adequate | 5 | 24% |
| | Poor | 2 | 9% |
| | Unsatisfactory | 0 | 0% |
| (c) practical skills? | Excellent | 6 | 29% |
| | Good | 8 | 38% |
| | Adequate | 3 | 14% |
| | Poor | 3 | 14% |
| | Unsatisfactory | 0 | 0% |
| | No response | 1 | 5% |
| (d) developing a professional attitude? | Excellent | 6 | 28.5% |
| | Good | 8 | 38% |
| | Adequate | 6 | 28.5% |
| | Poor | 0 | 0% |
| | Unsatisfactory | 0 | 0% |
| How would you rate the assignments? | Excellent | 4 | 19% |
| | Good | 10 | 48% |
| | Adequate | 7 | 33% |
| | Poor | 0 | 0% |
| | Unsatisfactory | 0 | 0% |
| Which best describes the content of the logbook used during the completed semester? | Excellent | 0 | 0% |
| | Good | 12 | 57% |
| | Adequate | 9 | 43% |
| | Poor | 0 | 0% |
| | Unsatisfactory | 0 | 0% |
| Which best describes the time allowed for completion of the logbook used during the completed semester? | Excellent | 2 | 10% |
| | Good | 7 | 33% |
| | Adequate | 6 | 28% |
| | Poor | 4 | 19% |
| | Unsatisfactory | 2 | 10% |
| How would you rate the projects as a learning experience? | Excellent | 8 | 38% |
| | Good | 7 | 33% |
| | Adequate | 5 | 24% |
| | Poor | 0 | 0% |
| | Unsatisfactory | 0 | 0% |
| | No response | 1 | 5% |
| Did the assessment cover the whole semesters work? | Yes | 18 | 86% |
| | No | 3 | 14% |
| How would you rate this form of assessment? | Excellent | 2 | 10% |
| | Good | 12 | 57% |
| | Adequate | 6 | 28% |
| | Poor | 1 | 5% |
| | Unsatisfactory | 0 | 0% |
| How helpful were the: | | | |
| (a) Tutors? | Excellent | 11 | 52% |
| | Good | 7 | 33% |
| | Adequate | 2 | 10% |
| | Poor | 1 | 5% |
| | Unsatisfactory | 0 | 0% |
| (b) Other technologists? | Excellent | 10 | 48% |
| | Good | 7 | 33% |
| | Adequate | 4 | 19% |
| | Poor | 0 | 0% |
| | Unsatisfactory | 0 | 0% |
| (c) Project tutors ... involved with your course? | Excellent | 9 | 43% |
| | Good | 6 | 28% |
| | Adequate | 4 | 19% |
| | Poor | 0 | 0% |
| | Unsatisfactory | 1 | 5% |
| | No response | 1 | 5% |

## Summary of comments.

### Students

When asked what were the most enjoyable and challenging aspects of the course, most students replied that this was gaining practical skills and being part of a laboratory team.

Many students commented that there was too much to cope with log books, assignments and projects and they would like some of this reduced to give them more time to gain practical experience in the laboratory.

### Tutors

Most tutors commented on how good their student was. The most common comments made were similar to those of the students ie. they felt that the students should have more time in the laboratory gaining practical experience and that there should be some readjustment to log books, assignments and projects to allow for this.

### Summary

On the whole both students and laboratory tutors commented favourably on both courses. The BMLS is a new course at both Universities and obviously will be modified as it proceeds. As it is hoped that this type of survey will help the Universities in this process the NZIMLS will repeat the survey in 1995.


## Acknowledgements

The NZIMLS would like to thank those students and laboratory staff who completed the survey and made comments.


## Caption Competition

Winner of the caption competition was Brian Millar from Diagnostic Laboratory, Auckland for his caption "NZIMLS Treasurer – Head in clouds, glass in hand, and bull never far away." Congratulations, the Editor's prize of a bottle of wine is on its way.

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# CURRENT COMMENT

# GMP Good Manufacturing Practice . . . Great Masses of Paper . . . Time to go Windsurfing

*Les Milligan*
*Blood Transfusion Service, Dunedin Hospital.*

If you are coming to Dunedin for a holiday, then your reason for coming should not be for long hot summer days (we do have them!). It is that they are often interrupted by a welcome cool breeze – superb windsurfing conditions! Dunedin is situated on a peninsula with a stunning and picturesque harbour, about 25 kilometeres from the heads and laps on the shores of the city. The harbour has a long bend in the middle which creates many spots suitable for windsurfing in just about any windy conditions – it is also only a convenient tracer call and five minutes from Transfusion Medicine . . . I think I have lost the balmy plot . . .

For the pursuit of accuracy, no better advice will be found than that of Race and Sanger, written over forty years ago: "the importance of placing the right serum and the right cells in the right tube and of correctly recording the results is almost too obvious to mention. Yet to achieve accuracy a long apprenticeship in error seems necessary. A friendly yet silent atmosphere is essential. Given silence, there is still danger of the mind wandering: this it must not be allowed to do however routine the work may be, however primrose the alternative paths."

After many years of focusing on patient care and the clinical significance of a test result, we must now expand our focus to manufacturing as well. Acceptance of this concept requires blood bankers to change their perspective. Blood bankers have traditionally viewed their work as providing an essential medical support service to patients. While this must remain true, blood bankers need now also need to view themselves as operating medicine manufacturing centres. There are a number of philosophical hurdles to be overcome by most blood bankers. Some of these differing philosophical points and opinions will be hotly debated, and probably never resolved, blood bankers must actively shift their focus to include Good Manufacturing Practices (GMP).

There are a number of philosophical hurdles to be overcome by most blood bankers.

Clearly blood, as we draw it from the donor, is not a raw material to be altered by industrial processes nor is it made by hand. Blood is a living tissue that can be removed from the host and after manipulation and storage can be reinfused to the benefit of the recipient. Thus it can be argued, that the idea of good manufacturing practices is based, in some cases, on an incorrect premise.

In an attempt to emulate the pharmaceutical industry, we must evaluate our donors as "raw material on the hoof". In an "IDEAL" society, one should have donors who would weigh 70-kgs, be two metres tall, have a constant blood pressure of 120/80, a pulse of 72, an hematocrit of 45 and have high levels of recoverable Factor 8. These donors would never have sex, travel, take aspirin or any other medication for aches and pains. Such donors would be programmed to reappear at regular defined intervals and would always be group O Rh negative, CMV negative, have normal ALT levels, and be non-reactive for all disease marker tests which would be performed with reagents, methods and staff that never fail.

Since we currently deal with donors that manifest the variability found in humans, we should recognise that each will be different and it is not possible or reasonable to expect that blood and blood products will have the same uniformity found in manufactured drugs. **Each donor is unique** – the components made from each donor are unique. Practices, procedures even inhouse "GMP" guidelines have been in place for years to assure safety of transfusions. These were also designed to provide for uniformity within the variability that is unavoidable.

There is no doubt that blood transfusion will benefit from the introduction of balanced and practical GMP programmes but that some of these benefits will be difficult to measure.

The "old" New Zealand Transfusion Advisory Committee was approached by the Therapeutics section requesting that a code for auditing of Blood Transfusion services in New Zealand be drawn up. New Zealand adopted the Pharmaceutical Industries Convention Code (PIC EUROPEAN) and not the Australian Code as the overall code for medicine manufacture.

The Medicines Act was introduced in 1981 but the operational impact was not felt until 1986. The Act included some named blood products but did not relate to current practice and appeared to originate from British Pharmocopoiea. The Ministry was supposed to inspect the Blood Transfusion Services, but this step was never implemented. The Directors of the major centres were notified of the new structure but their reported concems were never realistically addressed. The task of preparing a "set" of standards was commenced and these were generally implemented as they were being prepared.

There was a Transfusion Advisory Committee, consisting of the Regional Transfusion Directors who met three times a year under the Department of Health umbrella. It was this group's responsibility to advise the Minister of Health on all aspects of Blood Transfusion. This group discussed and agreed on policy which was largely implemented when it was within their power e.g. HIV donor screening policies, but not where the Department recognised a high cost as with the belated introduction of HCV screening. Under the Medicines Act 1981, and the Misuse of Drugs Act 1975, the Minister and the Department of Health are charged with setting and monitoring the standards of manufacture, promotion and distribution of medicines, medicinal devices and other forms of therapy.

With the introduction of these Health Reforms and following the "HCV" debacle, the Therapeutic Service was set up to carry out the following:

(1) licensing of Medicine Manufacturers;
(2) providing licences for the distribution of medicines. It was

insisted that the New Zealand Blood Transfusion Services fit within this Medicine Licensing process. The Australian code of GMP for Blood and Blood Products, with some exceptions and additions, was adopted as the code for New Zealand.

Early in 1993, transfusion services in New Zealand were notified that a preliminary audit was to be carried out in order to establish the degree of compliance with the New Zealand Code of Good Manufacturing Practice for the Manufacture and Distribution of Therapeutic Goods, Part 2: Blood and Blood Products. This was to be carried out by the Therapeutics Section, Department of Health. The Therapeutics Section is part of the Health Regulation and Protection Group of the Department of Health and is funded partly by the Crown and partly from fees charged for its services. The aims of this section are as follows:

1. to minimise the effects of unsafe, poor quality or ineffective therapeutic goods,
2. to improve the acceptance of and compliance with safety and quality standards in the manufacture, distribution, promotion, and prescription of medicines and other forms of therapy.
3. to achieve greater prescriber and public awareness about the rational and safe use of medicines and other therapeutic options.

The pharmaceutical and transfusion industry is obliged to maintain standards and quality control procedures. While the Therapeutics Section's prime responsibility is to the Minister of Health, these services depend greatly upon the **co-operation and goodwill of the clients!**

After the initial audit, licences were issued to each Transfusion Centre. This licence, the licence to Manufacture Medicines pursuant to the Medicines Act (1981) was issued for the duration of one year, unless cancelled sooner. The follow up audit, was to ascertain the Centre's continuing compliance with the Code and that progress in meeting the conditions set out by the Therapeutics section was in hand.

In the Otago Region, it was decided to revisit our Quality Assurance and Quality Control programmes, reporting and documentation systems and adjust them accordingly to fit into the GMP code requirement.

**Staff felt that the ultimate customer was the patient and that this was not to be forgotten when introducing GMP locally.**

1. We initially assessed the functions performed by our Blood Bank and determined which were to be controlled by GMP. Blood collection, accreditation, component preparation, labelling and possibly distribution are regulated as manufacturing processes. This was to make sure that our regulated products were manufactured by a **controlled and auditable** process. Total process control remains one of the significant keys to ensuring that our manufacturing process will achieve consistent quality, appropriate to their intended use. Without appropriate control points integrated into documented practices and procedures, the reproducibility of quality products will not be achieved. Many debates and discussions followed. A number of issues are still to be resolved!
2. Our Quality assurance base was expanded to meet additional requirements encompassing such tasks as approving Standard Operating Procedures, validating computer software changes and equipment, reviewing quality control standards, developing a system for document control, performing and documenting fully internal audits, documenting, reporting and addressing errors, accidents and adverse reactions.
3. Work flows were modified, so that every step of every process was documented and that manufacturing records were reviewed prior to release of all components for transfusion. Hopefully the modifications introduced assured that every function is performed, with our interpretation, to complete compliance with the appropriate regulations.
4. We created formalised training programmes for new and existing staff.
5. Transfusion Services are required to keep SOP's up to date: **this is a short sentence, but an onerous task.** They must reflect current practice. Health costs continue to soar and the world's forests are disappearing at a frantic and seemingly uncontrolled rate. GMP may equate to customer satisfaction, but they may also mean **"great masses of paper".**

   These new GMP regulations will mean more documents for staff to complete and for auditors to check. **Will they make transfusion safer?** It is doubtful. It is possible that more attention will be paid to getting the documentation right than to getting the procedure right.

The Standard Operating Procedures are set out to provide information on the acceptable minimum standards of operation for a Transfusion Medicine Service and they contain proven systems and procedures for the production of quality products and the delivery of a quality service. The SOP's are based on the following document "Guide to Operating Procedures for Transfusion Medicine Services in New Zealand:1994". This Guide was initially prepared by the Transfusion Directors and Senior Scientists working in Transfusion Medicine in New Zealand and edited by Dr J M Faed. It provides information on the accepted minimum standards of operation for Transfusion Medicine Services and includes guidance on policy which will lead to a good standard of scientific manufacturing, and clinical practice. This Guide is intended to amplify information provided in the New Zealand Code of Good Manufacturing Practice for Manufacture of Therapeutic Goods – Part 2: Manufacture of Blood and Blood Products, 1993. It is also intended to provide a guide to a good minimum standard of practice not covered by the licensing process.

6. We realized that we needed to re-prioritise our expenditures to accommodate compliance with GMP. While quality control, training, and compliance have a real cost they must be considered basic to blood bank operations.
7. The introduction of GMP and the subsequent analysis of work procedures must have some positive and constructive benefits to the patients and staff.

   Staff, including registered and non-registered nursing staff, clerical staff responsible for calling in and booking donor appointments, the donor co-ordinator, laboratory assistants and laboratory scientists, were asked to write comments concerning a retrospective view of GMP paying particular attention to the audits to date, the logistics of the implementation of perceived new requirements and the extent to which the delivery of product or patient care has improved.

Replies from this group, mostly unedited, are as follows:

1. "I spent a large amount of time with paperwork, remembering where and how many times to fill in the results, sheets, notebooks; where and how many times to sign that it was me who read this control and carried out some trivial procedure. I worried more about if I had filled in the correct sheet".

   Generally the workload has increased and the increase in required paperwork has made work slower and more time consuming adding to the workload and stress level. The GMP process focused on paperwork with no proven benefit to the patient. The quality of our 'REAL" work was never in question or looked at in most cases. It showed that their understanding of BTS work practices was superficial.
2. One positive aspect of the GMP audit has been the ability to make changes and alterations carried out where management would have been reluctant to otherwise provide finance. Management became aware that we were a large and well run laboratory with very high levels of expertise – maybe

because we were spending money!

3. Frustration that the people inspecting the laboratory had a limited knowledge of a Transfusion Medicine Department. Frustration that knowing that no matter how well we run our department they will always find fault to justify their jobs. From reports received, it is obvious that no matter how perfect the setup is, small niggling details will be commented upon which have no direct effect on the quality of service delivered. The extent of criticisms did undermine moral-insinuations made that the reasons behind the multiple checks was to make sure that we did not cheat. Blood Transfusion Medicine staff are trained professionals and deserve better treatment. By the way – why are pharmacists overlooking our job – who are they?
4. I have always considered my technical expertise to be of the highest standard and I took umbrage at some of the remarks of the assessor as if I were a first year trainee.
5. Made us look at ourselves, our SOP's, methods, records and QA going into the middle 90's.
6. Increased staff morale as we had to work as a team under extreme pressure to meet the standards and meet deadlines. The staff knowing that they had 100% input meant a lot to the smooth running and staff relationships in the department.
7. This laboratory had always run extremely well and I do not think that the product or service to the patient has been enhanced.
8. I do not think that the patients will receive a better service as a direct result, as we have always strived to deliver the best possible service irrespective of the constraints placed upon us.
9. We now look more professional, tidier and cleaner. This creates a more pleasant environment for donors and staff. The extra checks introduced help towards safer practices and may help prevent mistakes in the future. The patient still receives the same top quality product as before.
10. We do not feel that the huge cost involved could possibly be justified – to be told that Virkon was not the right colour and that bleach was in the wrong coloured bottle (both statements have been refuted by the manufacturer concerned).

Introduction of the Consumer Guarantees Act now requires that goods and services must be adequate for intended purposes. Establishing a committed plan and priorities for controlling a progressive GMP plan will go a long way toward changing the nature of how and why things are performed within our local Blood Transfusion Centre. This process is still evolving in our centre.

*It is apparent that Blood Transfusion Services have ensured the quality of their service and the auditable control of their service, but have not always effectively communicated that quality and control to the auditors, politicians, management, clinical staff and/or the general public.*

All staff must be committed to an ongoing GMP driven cultural shift. Although a tremendous effort will still be required, through the adoption of realistic GMP programme, the quality of components should improve and be of direct benefit to **THE PATIENT. Blood Bank staff should be allowed to feel proud of what they have achieved.**

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

| | |
|---|---|
| **Title** | **Med Bio Journal Award.** |
| **Donor** | Med Bio Enterprises Ltd.<br>P.O. Box 33135 Barrington<br>Christchurch |
| **Nature** | This award is intended to encourage and foster the submission of quality scientific or management papers to the New Zealand Journal of Medical Laboratory Science (NZJMLS). |
| **Eligibility** | All fellows, associate members and members of the NZIMLS are eligible.<br>Applications will not be required and all papers published in each edition of the NZJMLS will be considered for the award. |
| **Frequency** | The award will be made following the publication of each edition of the NZJMLS. |
| **Amount** | The award will be for an annual sum of $600.00 which will be divided evenly between the number of journals published in each 12 month period. |
| **Judging** | Responsibility for selecting the most suitable paper in each journal will rest with the convenor of the awards committee. Where necessary the convenor will consult with the editor of the N.Z.J.M.L.S. The decision of the convenor will be final. |
| **Period of Award** | The Med Bio Journal Award is offered for an initial period of one year and will be reviewed annually thereafter. |
| **Selection** | Factors which will be taken into account when selecting the best paper in each journal will include:<br>(a) Appropriateness of content of paper.<br>(b) Layout and presentation.<br>(c) Evidence of original work or ideas.<br>(d) Previous publication experience of the author(s). Quality papers by first time authors are encouraged.<br>(e) The paper which makes the most valuable contribution to a branch of medial laboratory science. |

Winner of the Med Bio Journal Award for the November 1994 issue was Lynette Jones of Valley Diagnostic Laboratories, Lower Hutt for the paper "Tunga penetrans – an unwelcome immigrant". Jones LC, Pilgrim RLC. *NZ J Med Lab Science* 1994; 48: 171-2.

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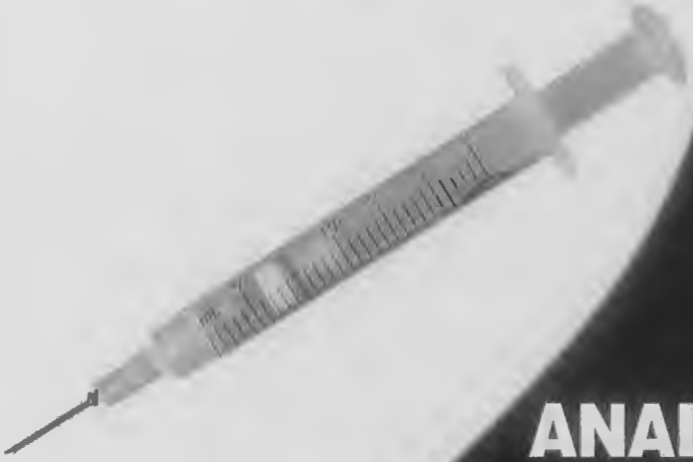

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NEW ZEALAND INSTITUTE OF

# MEDICAL LABORATORY SCIENCE

## *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 (03) 313-4761**

# NEW ZEALAND INSTITUTE OF MEDICAL LABORATORY SCIENCE
# SPECIALIST CERTIFICATE EXAMINATION

## EXAMINATION SUBJECTS

The examination is offered in:

Clinical Biochemistry
Haematology
Histology
Cytogenetics
Virology
Clinical Microbiology
Transfusion Science
Medical Cytology
Immunology

## PREREQUISITES

1. Candidates for the examination must be registered as a Medical Laboratory Technologist by the New Zealand Medical Laboratory Technologists Board and have completed one years practical experience in the examination subject in a laboratory in New Zealand.

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

Copies of the syllabus are available from the Executive Officer of the NZIMLS.

## EXAMINATIONS

1. The examinations will be held annually in New Zealand during November.

2. Candidates must complete the application form and forward this, complete with examination fees, to the Executive Officer of 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.

8. Candidates who have disabilities or injuries at the time of the examination may request the Examinations Committee of the NZIMLS to allow them a scribe. Enquiries should be made to the Executive Officer of the NZIMLS.

# NEW ZEALAND INSTITUTE OF MEDICAL LABORATORY SCIENCE

## Application to sit Specialist Certification Examination
## 15th and 16th November 1995

### SECTION A — TO BE COMPLETED BY THE CANDIDATE

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

Laboratory .....

Laboratory Address .....

.....

Examination Subject .....

I certify that I am registered in New Zealand as a medical laboratory technologist and have completed a years practical experience in New Zealand in the examination subject

Signed .....

EXAMINATION FEE: $400 (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 26 MAY, 1995

**Please forward application forms accompanied by fees to: Executive Officer, 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.*

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

## EXAMINATION SUBJECTS

Clinical Biochemistry
Haematology
Histological Technique
Clinical Cytology
Immunology
Transfusion Science
Transfusion Science - Blood Products
Clinical Microbiology
Clinical Mortuary Hygiene and Technique

## PREREQUISITES

1. Candidates for the examination must be employed as medical laboratory assistants in an approved laboratory in New Zealand and have worked continuously in the subject for two years prior to the examination or accumulated not less than two years practical experience in the examination subject. Candidates who began their practical experience, on or before 31 January, two years prior, will be eligible to sit the examination.

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

Copies of the syllabus are available from the Executive Officer of the NZIMLS, P O Box 3270, Christchurch.

## EXAMINATIONS

1. The examinations will be held annual in New Zealand in November.

2. Candidates must complete the application form and forward this, complete with examination fees, to the Executive Officer of 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 one written paper of three hours duration. Candidates for the Clinical Cytology examination are also required to complete a practical examination.

5. To pass the examination candidates must obtain an overall mark of 50%. Clinical Cytology candidates must pass the practical and theory examinations.

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 QTA 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.

8. Candidates who have disabilities or injuries at the time of the examination may request the Examinations Committee of the NZIMLS to allow them a scribe. Details may be obtained from the Executive Officer of the NZIMLS.

# NEW ZEALAND INSTITUTE OF MEDICAL LABORATORY SCIENCE

Application to sit the Examination of Qualified Technical Assistant
1st November 1995

## SECTION 1 — TO BE COMPLETED BY THE CANDIDATE

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

Laboratory .....

Laboratory Address .....

.....

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

EXAMINATION FEE: $80 (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 26 MAY, 1995

**Please forward application forms accompanied by fees to: Executive Officer, 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) _____

OF,

WORK ADDRESS _____

_____

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, to the Executive Officer, NZIMLS, P.O. Box 3270, Christchurch.

Current Membership Subscriptions are:

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

Member — 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.

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

**Abbott Diagnostics Division**
**New Zealand**

**1995**

**INFECTIOUS DISEASE SEROLOGY**
**ANNUAL GRANT**

## *DO YOU WISH TO ADVANCE YOUR KNOWLEDGE AND UNDERSTANDING IN BLOOD DONATION INFECTIOUS DISEASE SEROLOGY ?*

Through the generosity of ABBOTT Diagnostics Division the trustees of the New Zealand Medical Laboratory Science Trust are pleased to offer the opportunity for members of the New Zealand Institute of Medical Laboratory Science to apply for assistance to advance "their knowledge and understanding of Infectious Disease Serology in the Blood Services of New Zealand".

ABBOTT Diagnostics have again made the sum of $5,000.00 available to the Science Trust to award to members of the Institute to further their understanding in Blood Donation Infectious Disease Serology in accordance with the objectives of the Trust. Applications are invited from financial members of the Institute, not necessarily employed with the New Zealand Blood Services.

Applications will be judged on the expected benefits from an Award and where appropriate, the advancement of knowledge and understanding in Blood Donation Infectious Disease Serology.

Applications must be made on the official form and received by

The Executive Officer,
New Zealand Medical Laboratory Science Trust,
C/- Pathology Department,
Palmerston North Hospital,
PALMERSTON NORTH

**Application forms are available from Abbott Representatives or Heads of Department**

# MEMBERSHIP OF AUSTRALIAN INSTITUTE OF MEDICAL SCIENTISTS FOR NEW ZEALAND BMLS GRADUATES

## REPORT ON THE ASSESSMENT OF MEDICAL LABORATORY SCIENCE DEGREES IN NEW ZEALAND BY THE AUSTRALIAN INSTITUTE OF MEDICAL SCIENTISTS.

*Shirley Gainsford*
*Education Convenor, NZIMLS.*

In 1993 the New Zealand Institute of Medical Laboratory Science requested the Australian Institute of Medical Scientists (AIMS) to assess the New Zealand Bachelor of Medical Laboratory Science (BMLS) degrees for accreditation so that New Zealand graduates would be eligible for graduate and subsequently corporate membership of AIMS. In July 1994 representatives of AIMS visited New Zealand to assess these degrees at Massey University, the University of Otago and the Auckland Institute of Technology.

## Background

For the last twenty years the basic qualification for medical laboratory scientists in Australia has been a Bachelors degree. Currently there are eight institutions offering medical laboratory science degrees, all of which have been assessed by AIMS.

Graduates from medical laboratory science courses that have been accredited by AIMS qualify for corporate membership of AIMS after 2 years practical experience. There is no statutory requirement for registration of medical scientists in Australia although laboratories are accredited. Corporate membership of AIMS is seen by the accreditation agencies as proof that the scientist has an appropriate and worthy qualification to fit them for their job.

New Zealand medical laboratory technologists who qualified before 1974 can apply for corporate membership of AIMS and be employed in Australia as medical scientists. However, those who qualified after 1994 do not qualify for corporate membership and have not been considered equivalent to Australian medical scientists when employed.

## Assessment

Professor Tony Webber, Dean of the Faculty of Science, Queensland University of Technology and Mr Brian Day, Head of School of Applied Biomedical Science, University of Tasmania were the AIMS assessment team. Accompanied by myself they spent a day at Massey University, the University of Otago and the Auckland Institute of Technology. We met course controllers, lecturers and students, examined facilities including libraries and looked at course prescriptions, logbooks and assignments in order to assess the degree programmes according to the criteria used by AIMS.

The following is a summary of the criteria used by AIMS as the minimum criteria for Medical Laboratory Science programmes.

**Academic Staffing.**
Courses should be directed by a person of recognised stature in Medical Laboratory Science. Academic staff should have post degree qualifications and extensive laboratory experience. Part time staff should not exceed 30% of full time staffing.

**Course Structure and Content.**
The course shall be an ordered, integrated study of the basic physical and biomedical sciences followed by medical laboratory science including the pathological basis of disease processes. The course shall be of a depth and intellectual demand normally attributable to a degree.

**Physical Facilities.**
The course shall be conducted in buildings with space and equipment sufficient to carry out all the activities implied in the curriculum.

**Library Facilities.**
The library shall contain modern textbooks covering both basic and applied disciplines ranging from an elementary to an advanced level.

A range of journals related to medical science and non-book material suitable for teaching is also required.

**Support Staff and Services**
Adequate numbers of laboratory staff shall be provided to support the teaching of the course subjects. Other services such as examination, computers etc shall be adequate for the efficient administration of the course.

**Academic Course Accreditation and Institutional Validation.**
The course shall have a course advisory committee which includes at least one medical scientist.

## Summary

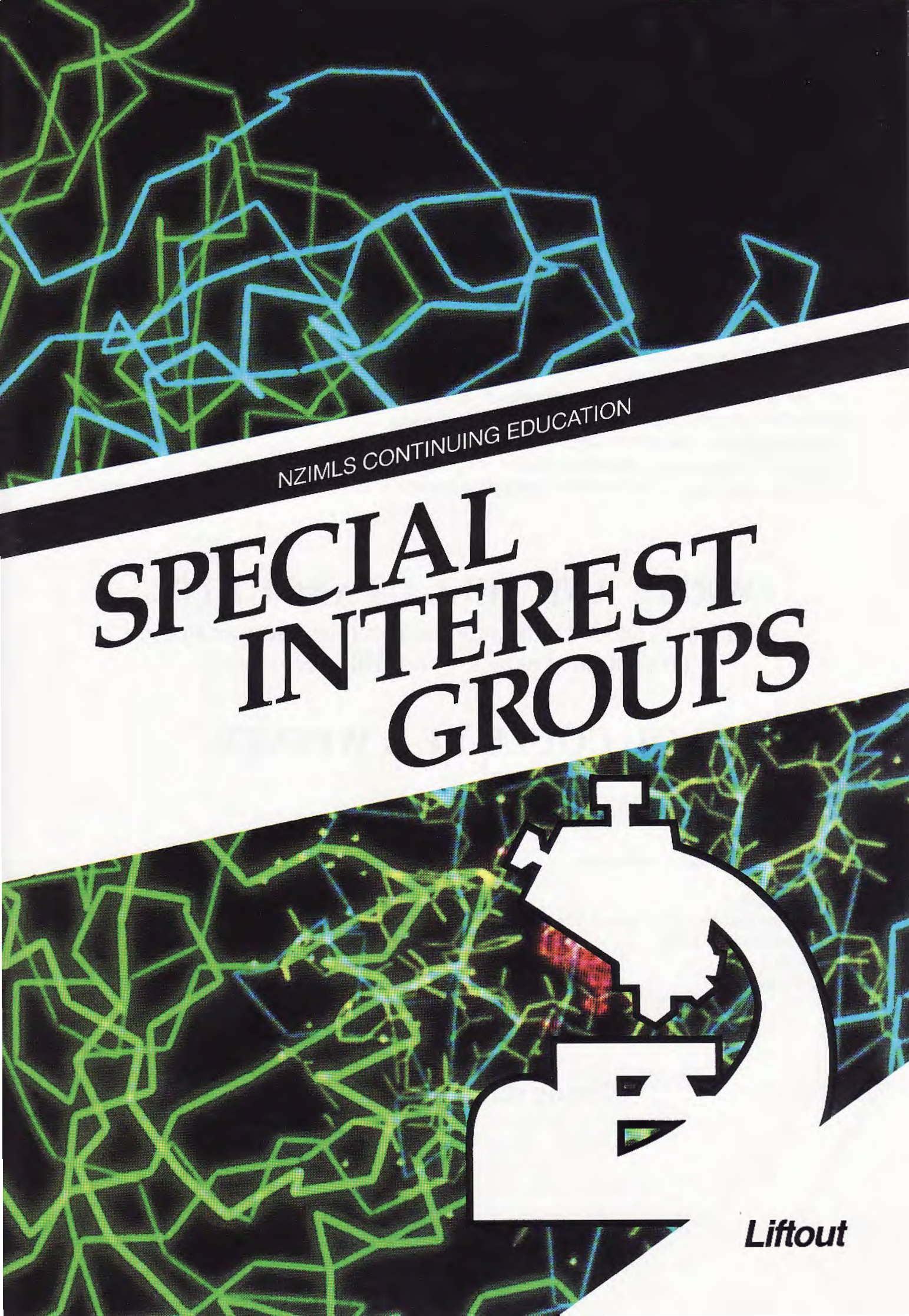
Professor Webber and Mr Day have recommended to AIMS that full recognition be given to graduates who have obtained medical laboratory science degrees from Massey University and the University of Otago.

They reported that the Auckland Institute of Technology course does not quite meet their standard. However, they commented they were confident that by the time the first students graduate the course will be recognised by AIMS.

This means that graduates with a BMLS from the University of Otago and Massey University are eligible for corporate membership of AIMS and employment in Australian hospital and private medical laboratories as medical scientists.

NZIMLS CONTINUING EDUCATION

# SPECIAL INTEREST GROUPS



Liftout

**N.Z.I.M.L.S.**
**BIOCHEMISTRY SPECIAL INTEREST GROUP**

# WINNERS REQUIRED
## FOR
## PRIZES of up to $250
**and this may be only the beginning .....**

If you are working or involved in a Clinical Biochemistry Department and, for example:

— are doing, or have done in the last couple of years, a Project,
— are investigating a method or a new piece of equipment
— have established a reference range
— have an interesting case you would like to tell people about
— have any other topic or information that would interest even one other Clinical Biochemist

# WRITE AND TELL US ABOUT IT!

All that is needed is an outline, it can be hand written, can contain sketches — no frills necessary.

# YOU COULD BE A WINNER

Further information from, or entries to:-

Alison Buchanan
The Convenor, Biochemistry Special Interest Group
Clinical Biochemistry Dept
Main Building
Auckland Hospital

Phone: (09) 307 4949 Ext 7553
Fax: (09) 307 4939

## Closing date: March 1995

**Biochemistry Special Interest Group**
**and the**
**N.Z. Branch of the A.A.C.B.**

*present*

# 2 days of Interest and Education

at the Marion Davis Centre, Auckland Hospital

# Emergency Medicine

Saturday 29th April 1995 commencing at 8.30 am

# AACB Education Update

Sunday 30th April 1995, commencing at 9.00 am

| | | | |
|---|---|---|---|
| **Registration details** | Fee: | NZIMLS and AACB members | Non-members |
| | One day | $30.00 | $40.00 |
| | Two days | $55.00 | $70.00 |
| **Closing date:** | 14th April 1995 | | |

**For further information write to:-**

**Emergency Medicine:-**
Alison Buchanan
Clinical Chemistry Dept.
Auckland Hospital
Park Rd.
AUCKLAND

**AACB lectures:-**
Don Mikkelson
Clinical Biochemistry Dept.
Pathology Dept.
Waikato Hospital
HAMILTON

## NZIMLS Biochemistry Special Interest Group Meeting, April 29 1995
## Australasian Association of Clinical Biochemists, NZ Branch April 30 1995

| | | | | |
|---|---|---|---|---|
| **Registration Fees** | For one day | | For both days | |
| | Members | $30 | Members | $55 |
| **Registrations close on 14 April 1995** | Non members | $40 | Non members | $70 |

**Mail your completed forms and cheques to** L Kilminster
Chemical Pathology Department
Middlemore Hospital
Private Bag 93311
Otahuhu, Auckland 6

**Accommodation is available at:**

Grafton Oakes Motor Inn
121 Grafton Road
Ph (09) 309 0167
Fax (09) 377-5962

Domain Lodge
155 Park Road
Grafton
Ph (09) 303-2509

Huia Residence Hostel
110 Grafton Road
Grafton
Ph (09) 377-1345

**Please make your own arrangements.**

---

## REGISTRATION FORM

Title _____ First name(s) _____ Surname _____

Hospital/Company _____

Address _____

_____

Phone _____ (Bus/Home) Fax _____

Preferred text on name badge

I would like to register for Saturday ☐ Sunday ☐ Both Saturday and Sunday ☐

# NZIMLS Microbiology Special Interest Group

invites you to a

## POTPOURRI SEMINAR

to be held on 25/26 March 1995

at Rotorua Hospital

### Saturday 25 March

| | |
|---|---|
| Welcome Morning Tea | 10.00am |
| Seminar | 10.30am – 17.30 pm |
| Dinner | Ride on the gondola to the Skyline Restaurant |

### Sunday 26 March

| | |
|---|---|
| Antimicrobial Meeting | 9.00am – 12.00pm Auckland Antimicrobial Group |

| | |
|---|---|
| Registration (Includes teas, lunch, dinner, and gondola ride) | $60.00<br>$50.00 reduced price for NZIMLS members |

### Prizes

Best presentation will receive $500 towards attending a Medical Conference. Certain conditions apply.

# MSIG POTPOURRI SEMINAR REGISTRATION

## *Register and Start Preparing Your Talk NOW!!!*

Name:.....

Address:.....

Laboratory:..... Phone/Fax:.....

Registration fee enclosed (please tick)
*Please make cheques payable to MSIG*

☐ $60.00

☐ $50.00 reduction for NZIMLS member

I intend to give a talk YES/NO Topic:.....

☐ Greater than 10 minutes Approximate time:.....

☐ Less than 10 minutes

I intend to bring a problem YES/NO Topic:.....

Post to: Jan Deroles-Main
Medical Diagnostics
PO Box 293
PALMERSTON NORTH *by 10 March 1995*

## PROGRAMME

An informal gathering of medical laboratory assistants and scientists held along the same lines as the successful Taupo seminar. Short talks of 5-10 minutes including case studies, assessment of equipment, new test trials, bringing along your problems – anything that is Microbiological.

We are not insisting that all registrants speak, but we do need your participation for this to be successful. We would like at least one talk from each laboratory.

A certificate of attendance and credit points will be issued to all NZIMLS members that attend.

# Biochemistry

## Special Interest Group

Convenor: Alison Buchanan
Clinical Biochemistry
Main Building
Auckland Hospital
Ph: (09) 307 4949
Ext: 7553
Fax: (09) 307 4939

A seminar on Emergency Medicine in relation to Biochemistry is being held in April. Please see the full page advertisement in this journal for further details.

This seminar should be of interest to both small and large laboratories around the country.

A reminder to get your entries in for the BISIG prize. Entries close March.

The Journal editor is compiling a list of experts in their respective fields whom he can approach to both referee submitted papers to the Journal and also to possibly write leading articles, reviews, current comments and continuing education articles for the journal.

These experts can be either medical laboratory scientists, pathologists or other health care professionals.

If you think you can contribute or can recommend suitable people please write to Alison Buchanan, convenor of BISIG, at Clinical Chemistry Department, Auckland Hospital, Park Rd, Auckland.

# Transfusion Science

## Special Interest Group

Convenor: Sheryl Khull, Transfusion Medicine, Palmerston North Hospital
Members: Ray Scott, Auckland Regional Blood Centre; Roger Austin, Blood Bank, Taranaki Base Hospital, New Plymouth; Sue Barid, Blood Bank, Lakeland Hospital, Rotorua; Marie Wilson, Blood Bank, Gisborne Hospital; Zandra Mitchell, Blood Bank, Napier Hospital; Kevin McLoughlin, Transfusion Medicine, Christchurch Hospital; Diane Whitehead, Transfusion Medicine, Christchurch Hospital; Les Milligan, Blood Bank, Otago Hospital, Dunedin

### Memoirs of Some NICE Australians

In November last year I (Sheryl) attended the Australian N.I.C.E. Weekend in Wondonga. Where is Wondonga you ask? About five kilometres south of Ettamogah, of course! (On the Victoria/New South Wales border). I was very privileged to be able to attend since places are so limited (like our New Zealand version, but of course there are many more Australian blood bankers to compete for them).

We had a busy, fun-filled and informative weekend. I learned a lot, refreshed my memory about a lot of red cell serology, and made a lot of new friends. I'm sure they won't mind if I reproduce here some extracts of what were for me the highlights.

### Genomic Imprinting and the Loss of ABO Antigens in Leukaemia

Elaine Batchelder of St Vincent's Hospital has been looking at the loss of A and B blood group antigens which occurs occasionally in the red cells of patients with haematological malignancy. Changes at the molecular level may be a signpost to genetic changes occurring in chromosome 9 where the ABO gene as well as ABL and other oncogenes are located. Genomic imprinting is a rather incredible situation where the maternal or paternal origin of a gene has some bearing on its expression, changing in different generations if they are of a different gender. (Roll over Gregor Mendell) Recent reports have indicated that the Philadelphia translocation associated with chronic myeloid leukaemia involves the paternal chromosome 9 and the maternal chromosome 22.

In four cases of ABO antigen loss for which Elaine was able to gain complete information, the allele that was involved could

only have been maternally derived.

Elaine is interested in receiving blood samples from any un-transfused patients you may have with ABO antigen depression due to leukaemia.

### Microwave Elutions

Suzie Marosszeky of the National Blood Group Reference Laboratory in Sydney demonstrated that the published microwave elution techniques are not as easy to perform as they might seem – her lab's ceiling has paid the price!

### Electronic Blood Release System

Wal Johnson told us about an elcetronic blood release system now in use at the John Hunter Hospital in Newcastle which enables medical staff at offsite locations to access compatible blood after group and screen testing at the central laboratory.

### Curiouser and Curiouser

Dot Stern of the National Blood Group Reference Laboratory has got some most peculiar results in the urea lysis test using cells suspended in Celpresol. Some known Jk(a+b+) cells from a commercial cell panel resisted lysis for much longer than normal. Other commercially available cells gave similar results but not consistently and no conclusions could be drawn. Perhaps with New Zealand's greater richness of Jk(a-b-) cell samples and the more widespread use of the urea lysis test, we could help shed some light on this phenomenon.

### Organisational Change – The People Perspective

Craig Newton from CSL Bioplasma discussed the effects on people of the changes being felt now in the Australian health system. Much of what he said is taken from a book called "Making Sense of Life's Changes" by William Bridges. It seemed to me so useful and relevant that I have ordered a copy to read for myself.

### Trivia

I have often been confused by the terminology but now I learn that

Thiomersal
Thimerosal
Merthiolate

are all the same thing.

## 47th Annual Scientific Meeting of the AABB

Roger Austin was one of the 6000 registrants at the San Diego meeting in November. He sends in this report.

### DAY 1 – WORKSHOP: Transfusion Medicine 1994 and Beyond.

Covered Transfusion Transmitted Infection; new diagnostic technologies, recombinent protein for coagulation factor replacement, vaccines in transfusion medicine and therapeutic Apheresis. Points of significance: Artificial Blood (RBC) is still just over the horizon as it has been for 30 years, however a change from use of Hb solution and fluorocarbons toward use of recombinent technology may make it happen. Use of a solven detergent system to remove viruses from RBC and platelets with UV light looks to be only a few years away. Many new techniques were presented such as HIV p24 antigen testing and PCR Pouch Technologies that may become commonplace in blood banks in the future if the price comes down or legislative/public pressure goes up.

### DAY 2 – Management and Supervision

Focused on customer focus improving our service, dealing with negative criticism and negative people as well as empowering of staff. Very useful as it it showed the distance that management is moving from the power structure of the hierarchy to the interactive empowering structure that 70% of the Fortune 500 companies have moved to resulting in 69% increase in productivity and profits. Speakers in this forum Richard Brinkman, Nancy Stern, Bob Treadway and Alan Zimmerman come from a variety of management and quality backgrounds and provided innovative ways of dealing with staff and customer related issues.

### DAY 3 – Trade Exhibits

Huge range of supplies and products. I focused on getting information and blood indicators, temperature alarms and maintenance validation systems, heat sealers, waste systems and other associated products. I have information and quotes coming on most of the above.

– Donor recruitment seminar – looking to strategies to use in the future – ie doing more with less, using our data base better, promotional aids, equipment available and apheresis programmes.

– Internation Forum: Opportunity to meet with people from places outside the USA (the AABB has a superior attitude yet probably has the greatest "AT RISK" blood supply of most of those present) Canada, UK, France, most South American countries, Austria, Germany, Italy etc. were represented at this forum and I had the opportunity to discuss matters of common interest with a number of them. I met with the two Russian delegates and received an invitation to speak at their conference in April 1995. Also an invitation from Dr John Watson-Williams to consider involvement in Africa setting up Blood Transfusion Services.

### DAY 4 – Poster Section

Viewed the poster section; approximately 350 Scientific Posters covering the full range of Transfusion Medicine topics. Of interest – there are now appearing a number of papers deliniating the negative aspects of autologous transfusion. Heavy focus on leucocyte removal filters and serological testing. Very little on red cell serology which was the primary focus of the AABB conference in past years.

### Scientific Abstract Plenary Session

An interesting session; however the most interesting was from Bristol in the UK. "Human Monoclonal Anti-Rh-D antibodies can prevent RhD immunisation in Volunteers", BRAD 5 (IgG1) and BRAD 3 (IgG3) compare favourably with human polyclonal antibodies. 0/24 produced anti-D at 6 months, 21 percent were subsequently shown to be responders. This could see the end of our need to produce polyclonal anti-D that is in very short supply throughout the world. The other paper of interest related to the decreasing efficiency of lookback programme. It confirms my view that the HCV lookback programme that we are required to undertake is of limited value. Apparently 70 percent of searches will be unproductive. This paper was from the New York Blood Centre and showed their HIV and HTLV lookback programmes and showed data relating to HCV.

### Scientific Oral Presentations
### Red Blood Cell Biochemistry/Molecular Biology

Papers covering the cloning of XG, ABH and Colton antigen on aquaporin chip, Gerbich and Vel, En(a-) cells, chido and Rodgers phenotypes. These papers demonstrated the continuing investigation being carried out on red cell antigens and their functions, presenters included most of the "Gods" of blood banking Patricia Tippett, George Garratty, Peter Issitt, John Judd. It is interesting that a high proportion of these papers are not of US origin. It would appear that most of the US research is now centred on viral markers rather and red cell antigens.

### Hepatitis B and C

Papers covering factors associated with Hepatitis C prevalence in the USA: higher in poorer educated minority males in the USA. Comparison of Immunoblot assays: What is used in NZ is satisfactory. Hepatitis B (DNA) method comparison, HCV genotypes in the Italian population and infectivity of anti-HCV Eliza positive Blood Products: 81 percent of EIA+, RIBA+, PCR+ became infected. 0 percent of indeterminates became infected.

General discussion with a number of emminent American blood bankers based on the deep concern they have about the role of the FDA. The FDA has improved many many restrictions on laboratory practice and collection services – the benefits of such restrictions have yet to be proven in spite of the horrendous costs involved. The

therapeutics division of the Ministry of Health in New Zealand must avoid the "overreading" of our code of G.M.P. to ensure that blood and blood products in this country remain cost effective.

During the evening I spent a considerable amount of time in discussion with a number of internationally recognized blood banking experts including Malcolm Beck, Patricia Tippett, Delores Mallory, George Garratty, John Watson-Williams, John Case, Emanuel Hackett, John Judd, and Peter Issitt. This was a very worthwhile evening and I was privileged to be invited into the company of such people.

### DAY 5 – Scientific Oral Presentation

Covering methods and case studies of mixed red cell populations, flow cytometry, RPR false positive, examples or rare antibody/antigens and auto immunohaemolytic anaemias.

It is this range of work "Blood Group Serology" that first stimulated my interest in blood banking and I enjoyed these sessions immensely.

### cGMP. Current Good Manufacturing Practice

A very popular and useful forum that is very pertinent to the New Zealand scene. The FDA will not go away in spite of the wishes of many. This forum covered quite comprehensively how four different centres undertook to meet FDA requirements (handout available). At Taranaki Base Hospital we would be well positioned to gain such accreditation in a number of areas but would find it difficult in others. For example in-house training and validation of staff and ongoing (continuing) education.

### Viral Inactivation Seminar

Six presentations covering the incidence of transfusion transmitted diseases and the efficiency of various techniques of removing viral contaminants from cellular and noncellular components. The use of psoralens to inactivate the DNA of retrovirus' in the presence of UV light is 100% effective in eliminating HIV, HCV, HBV and bacteria along with a buffered synthetic media for 5 day storage of the product. This gives safe functional platelets. Solvent/detergent systems appear to be equally effective for noncellular products but it would appear that cost may reduce the usefulness of this technology.

FDA inspectors faced an audience covering one football field in size. I think it is the one real chance that the blood banks get each year to try and get the FDA to justify themselves. They do not seem to listen very well. They have the attitude that they cannot be wrong. The format of this meeting is such that the audience has no interaction with the FDA heads of the six FDA departments that deal with Blood Banks. A waste of time.

Talking with the Russian delegates, they were surprised that the USA is becoming more and more regulated, as in Russia they become more and more deregulated.

The Annual President's dinner and ball was held in a huge hall in the Marriott Hotel with 2,500 people seated in a jungle scene with stuffed bears, gorillas, lions and tigers and waiters wearing pith helmets. This evening honours were bestowed upon distinguished members of the AABB and on people and organisations who have helped over the past number of years. I was seated with a varied mix of American and International guests and had many discussions on a wide range of Blood Bank related topics.

The final day covered the Karl Landstein Memorial Lecture "Understanding factor VIII" and covered the history of discovery of haemophilia and its treatment a long with future developments in this field. The only other session, the W. Quinn Jordan Memorial Lecture involved the AABB attorney talking about the traditional liability law and its reluctance to heed the wider needs of comtemporary health care.

The scientific meeting presented an incredible amount of information to be absorbed. I am impressed with the amount of research going on in a number of establishments but I am also aware that in New Zealand we will introduce the more appropriate and useful techniques a lot quicker than in the USA. They may lead the field in research but they are at the back of the field with practical application of that research. A good example is the Gel system that we have been using for a year, and has been available throughout the world for four years has only just (October 1994) received FDA approval for use in the USA.

## Literature Review

**"A Review of Progress in Understanding Non-HLA Antigens on Blood Cells"** was published by the Biotechnology Work Group in the July 1994 issue of News Brief. Extracts are reproduced here.

Erythocytes, platelets and neutrophils bear a number of surface structures that can become targets for alloantibodies after immunization via transfusion or pregnancy. These structures may be carbohydrate or protein in nature. Over the last 50 years, detection of antigens on red cells via examination of the reactivity patterns of alloantibodies has led to the identification of hundreds of antigens, many of which have been classified as belonging to blood group systems. However, the techniques required for detection of neutrophil and platelet antigens have been less easily standardized, and progress in identification of non-redcell antigens has thus been slower.

Over the last decade, with the advent of monoclonal antibodies and the techniques of molecular genetics, the biochemical and genetic bases of many blood cell antigens have been delineated. In some cases, results have led to redefinition of blood groups and linkage of specific antigens to functionally defined molecules. Use of monoclonal antibodies has already become commonplace in blood centres and transfusion services, and this has brought both greater availability of well-standardized reagents as well as a new set of unique problems due to the differences among naturally occurring human and monoclonal murine and human antibodies.

Finally, molecular techniques for identification of blood group genotypes are becoming established, and it can be expected that these will be more commonly used in the future, especially for prenatal diagnosis and paternity and forensic investigations.

### Red Cell Antigens

During the past decade, the biochemical and genetic bases of a number of erythocyte blood group antigens have been delineated (Table I). The expanding vocabulary and methodology used to advance our knowledge of this field has been well reviewed by Lutz and Dzik.

**ABO Antigens.** The molecular basis of the ABO phenotypes has been elucidated primarily by Yamamoto and colleagues. They have shown that a small number of 'mutations in a glycosyltransferase gene underlie these phenotypes: *O* genes contain a single base pair deletion when compared to *A* genes, while *B* genes differ from *A* genes at four nucleotides. These investigators have also found a number of other mutations that can be responsible for variant ABO phenotypes, including $A_x$, $B_3$ and cis-AB. In addition, other workers have cloned the fucosyl transferase gene responsible for synthesis of the H antigen; this gene is unrelated to the gene for ABO transferase.

**Rh Antigens.** Elucidation of the molecular basis of the Rh antigens has progressed rapidly in the last few years. Two closely linked Rh genes have been identified; one encodes the protein that bears the D antigen, while the other encodes protein(s) bearing the C/c and E/e antigens. These two proteins are highly homologous. Both cDNAs have identical 5' – and 3' – coding regions, and the proteins lack all glycosylation and have multiple membrane-spanning domains. In D-negative individuals, most or all of the *D* gene is absent, and this can easily be detected by Southern blotting. The point mutations that differentiate E from e and C from c have also been identified. The protein bearing the C or c antigen appears to represent one or more

splice variants produced from the single *CE* gene.

**MNSs Antigens.** Although the basis for the MN and Ss polymorphisms of glycophorins A and B, respectively, had been identified at the protein level for some time, extensive work has not been done on the structure of the glycophorin genes and the molecular basis of the so-called Miltenherger variants. The glycophorin A *(GPA)* and glycophorin B *(GPB)* genes have been well studied, and a third gene, *GPE*, has been identified. The molecular basis for most of the Miltenberger phenotypes has been demonstrated, although some, such as $St^a$, have multiple genetic causes. This work has also led to identification of the peptide structures responsible for some of the unique antigens expressed by Miltenberger variants, including Hil, Hop and Mur

**Identification of Antigens on Proteins of Known Structure and/or Function.** Identification of the biochemical and genetic basis of a number of blood group antigens has led to demonstration that many of these antigens reside on proteins of known function. Recently, the Duffy antigens have been shown to reside on an erythrocyte chemokine receptor, while the Kell antigens reside on a protein with homology to the CALLA family of zinc-binding neutral endopeptidases. The Diego antigens reside on band 3 (anion channel protein), while the Wright antigens involve polymorphism of band 3 as well as interaction of band 3 and glycophorin A. The In antigens reside on the hyaluronidate receptor protein CD44. The Cartwright antigens have now been located on acetylcholinesterase, while the Cromer antigens reside on another glycophosphatidylinositol (GPI)-linked protein, decay accelerating factor (DAF). The Dombrock and Holley/Gregory antigens have recently been shown to reside on the same protein, although characterization of this GPI-linked protein is incomplete. Finally, the Knops/McCoy antigens have been shown to reside on the complement receptor type 1 (CR1).

Perhaps most significant among all the progress in understanding the biochemistry of the many erythrocyte blood group antigens is the linkage of specific blood group phenotypes with molecules believed to have roles in certain diseases. The molecular basis of glycophorin C and D deficiency (Leach phenotype), which is associated with hereditary elliptocytosis, has been determined. The molecular basis of Inab ($Cromer_{null}$) phenotype, in which cells are completely lacking DAF, a complement regulatory protein, has also been determined., The study of complement regulation in this phenotype showed that DAF deficiency was not the major cause of hemolysis in paroxysmal nocturnal hemoglobinuria, in which all GPI-linked proteins are missing from red cells as well as other circulating blood cells. Awaiting to be explored is the basis of hereditary JMH deficiency, which has been linked to congenital dyserythropoietic anemia in two families, as well as the roles of other antigen-bearing proteins in other tissues.

The identification of blood group antigens on functionally important molecules may lead to increased use of detection of antigen expression as markers for certain medical conditions or diseases. For example, in the acquired hematologic disorder paroxysmal nocturnal hemoglobinuria, demonstration of the absence of glycophosphatidylinositol-linked proteins and the blood group antigens they bear is diagnostic of this condition.

## Chromosomal assignments of blood group antigens.

| System | Gene product(s) | Chromosomal location of blood group genes |
|---|---|---|
| ABO | Glycosyltransferase | 9q34 |
| MNS | Glycophorin A, B | 4q28-q31 |
| P | Glycosyltransferase | 22q11-qter |
| RH | CcEe and D polypeptide | 1p36-p34 |
| LU | Lutheran glycoprotein | 19q12-q13 |
| KEL | Kell glycoprotein | 7q33 |
| LE | Glycosyltransferase | 19p |
| FY | Fy glycoprotein | 1q22-q23 |
| JK | Jk glycoprotein (urea transporter) | 18q11-q12 |
| DI | Anion AE1 Transport protein (band 3) | 17q* |
| YT | Acetylcholinesterase (AChE) | 7q22 |
| XG | $Xg^a$ glycoprotein | Xp22.3 |
| SC | Sc glycoprotein | 1p34-p32 |
| DO | Do glycoprotein | ??? |
| CO | Aquaporin-1 (CHIP) | 7p14 |
| LW | LW glycoprotein | 19p13-p11 |
| CH/RG | Complement component 4(C4) | 6p21.3 |
| H | Glycosyltransferase | 19q |
| XK | Kx glycoprotein | Xp21.1 |
| GE | Glycophorin C/D | 2q14-q21 |
| CROMER | CD55 (DAF) | 1q32 |
| KN | CD35 (CR1) | 1q32 |
| INDIAN | CD44 | 11P13 |

• based on association with band 3.

## Protein Blood Group Antigens That Have Been Biochemically Defined*

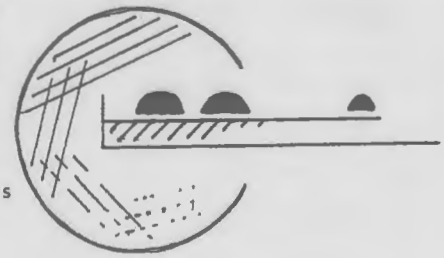
| Blood Group | Protein Characteristic | Function or Significance | cDNA Cloned |
|---|---|---|---|
| Rh | 30-32 kD integral membrane protein | Unknown; possible related to lipid transport | Yes |
| LW | 37-47 kD glycoprotein | Unknown | Yes |
| Duffy | 35-43 kD glycoprotein | Chemokine receptor | Yes |
| Kell | 93 kD glycoprotein | Structurally part of zinc-binding metallo-proteinase family | Yes |
| KX | 32 kD | Unknown | No |
| Kidd | 50 kD | Possibly urea transporter | No |
| MN | 43 kD† integral membrane protein | Glycophorin A | Yes |
| ]N'Ss | 25 kD† integral membrane protein | Glycophorin B | Yes |
| Lutheran | 78, 85 kD | Unknown | No |
| $Xg^a$ | 22-29 kD | Unknown | No |
| Diego | 95-105 kD | Band 3 (anion transporter) | Yes |
| Cartwright | 160 kD phosphatidyl-inositol (PI) linked homodimer | Acetylcholinesterase | Yes |
| Scianna | 60 kD | Unknown | No |
| Dombrock | 47-58 kD PI-linked glycoprotein | Unknown | No |
| In | 80 kD integral membrane protein | CD44 adhesion molecule | Yes |
| Gerbich | 39 kD† | Glycophorins C and D | Yes |
| Gregory-Holley | 47-58 kD PI-linked glycoprotein | Possibly same as Dombrock | No |
| Cromer | 70 kD PI-linked glycoprotein | Decay accelerating factor (CD55) | Yes |
| $Ok^a$ | 46-58 kD | Unknown | No |
| Chido/Rodgers | 200 kD glycoprotein | Complement component 4 (C4) | Yes |
| Knops/McCoy | Variably sized glycoprotein (170-220 kD) | Complement C3b/C4b receptor type 1 (CR1) | Yes |
| JMH | 76 kD PI-linked glycoprotein | Unknown | No |

* Reprinted from: Telen MJ, Rao N. Recent advances in immunohematology; Current opinion in hematology. Current Science 1994; 1(2): 143-150.
† Glycophorins migrate anomalously in SDS-PAGE (sodium dodecyl sulfate olyacrylamide gel electrophoresis).

# Microbiology

**Special Interest Group**

**Convenor: Jan Deroles – Main Contact Address: Medical Diagnostics Palmerston North**



**Audiotapes: Audiotapes of the Hamilton Conference are available at a cost of $8 each. Send your order to: Joy Miller, 5 Alana Place, Ellerslie, Auckland**

Titles are as follows:

**Tape A.**

"Infection Control the Laboratory Role". (Jennifer Mitchell).
"Establishing infection control programs in Private Hospitals" (Frances Morgan)
"Public Health Relationship with the Microbiology Lab." (Dr Dell Hood)

**Tape B.**

"Case Study – Mycetoma caused by *Nocardia asteroides* Complex. (Cathy King)/
"Case Study Aspergilloma." (Dr Andrew Curry).
"Summer Itch" (Pamela Lane-Parr)
*"Cyclospora cayetanenisis:* A new and emerging Gastro-intestinal Pathogen. (Michele Dougherty).

**Tape C.**
"Case study *Mycobacterium fortuitum* isolated from Blood Culture. (Sarah Thirlwall).
"Waikato outbreak of TB" (Pam Nielson).
Gen-Probe M.tb Direct Test: An interim report of a trial undertaken at Wellington Hospital. (Mary Carr).

**Tape D.**
"A Comparative Study of the Abbott Microparticle Enzyme Immunoassay MEIA) versus Cell Culture for the detection of *Chlamydia trachomatic* from Endocervical Samples (Mike Brokenshire).
"History and Future of C.A.P.D. and Haemodialysis." (Dr M. Wallace.)
"Clearance of Bacterial Challenge to the Peritoneal Cavity in subjects undergoing Peritoneal Dialysis." (G. Findon).

**Tape E.**
"Clinical Isolates of Staphylococci falsely identified as *Staphylococcus aureus* by rapid agglutination test kits". (Sharron Bowers)
"Microbiology Around the World" (Sue Burton, Murray Smith, Susan Mahar.)

**Tape F.**
"Pseudobacteraemia with Gram Negative Bacilli associated with Blood collected in One Department". (Carol Jarvis).
"An Update on the Auckland MRSA Outbreak." (Mary Bilkey)
"Acanthamoeba, Bacterial and Fungal contamination of Contact Lens Storage Cases." (Jane Shewan).
*"Haemophilus parainfluenzae*, an infrequent cause of Endocarditis." (Carrie Swanson)

**Tape G.**
"Rationalising testing of Faeces Microbiology". (Dr A. Morris)
"Eastern Bay of Plenty Gastrointestinal Pathology Project." (Jackie Wright)
Panel Discussion.

**Tape H.**
"Antimicrobials. Working Together, Problem Solving."
Panel Discussion and Problem Solving. (Keith Shore, Maggie Brett, Jackie Wright, Jane Shewan.

## M.S.I.G. TELECONFERENCE:

Tuesday 11th November.

Those participating were:

| | |
|---|---|
| Jan Deroles-Main | Shirley Gainsford |
| Mary Carr | David Scarrow |
| Janet Wilson | Tom Henderson |

A warm welcome was extended to Tom Henderson of Medlab South, who has joined the committee.

The main topic for discussion was the 1995 Seminar. Arrangements for this are more or less complete. (See notice below). It was agreed that the prize for best presentation should be increased to 500 dollars, to allow the recipient to attend a medical laboratory science conference of their choice. The winner would also be encouraged to write up the paper for the journal.

The question of prizes for Microbiology papers published in the journal is to be discussed further at our next meeting.

Examiners for Certificate level examinations: It was felt that as this was to be the last year for the certificate level examination, the same examiners should be kept as far as possible. An examiner and moderator for QTA were also required and proposals for this were agreed to.

## M.S.I.G. JOURNAL CLUB

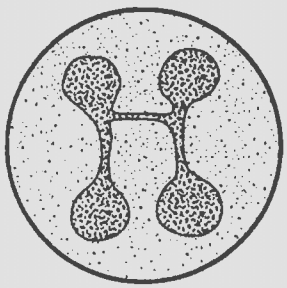
Would you like to see the contents pages of current Microbiology journals? For $20.00 you will be sent a copy of the contents pages for each of twelve different journals for all issues for 1995.

**To Join:**
Send Name, Laboratory, Address to Philippa Skellern, Microbiology Department, Medlab, P.O. Box 4120, Auckland. (For members of N.Z.I.M.L.S. only).

# Haematology

## Special Interest Group

Convenor: Ross Anderson
c/o Diagnostic Laboratory,
Symonds Street,
AUCKLAND.



The H.S.I.G. Core Committee meets bi-monthly to plan and discuss the continuing education needs of technologists in the discipline of Haematology.
1995 plans include:

1. A one day seminar.
   Topic: To be decided.
   Date: Saturday May, 6th.
   Venue: Ernest and Marion Davis Post Graduate Medical Centre, Auckland Hospital.
2. Longer term plan to run practical workshops in blood film morphology.
   A pilot "Blood Cell Morphology" Workshop is to be held in the Auckland area probably in March. Date to be decided at the next meeting scheduled for Wednesday February 14th.

Major questions which need to be addressed re these workshops are:

Is the requirement for mini-morphology workshops in various centres throughout New Zealand?

Should the format be a major morphology workshop run in one centre on an annual or bi-annual basis with limited numbers attending to enable maximum benefits to be obtained?

Morphology Workshops are run twice a year in Australia by the R.A.C.P. They are well attended and successful. These major workshops are not always held in the same city.

The HSIG Committee would be very interested to hear suggestions from all interested people for future seminar topics and ideas you may have re the format and location of Morphology Workshops.

**Don't leave it to the Committee or wait for your Regional Representative to do something.**

**Send your suggestions to Ross Anderson today c/- Diagnostic Laboratory, Symonds St, Auckland. Do it now.**

# ANNUAL REPORT
# NEW ZEALAND MEDICAL LABORATORY SCIENCE TRUST

The Science Trust has managed to maintain its position over the current year thanks to the generosity of those Medical Laboratory Science Institute Examiners who so generously donated their examination fees to the Trust, and a small surplus from the Abbott Diagnostic and Infectious Disease 1993 Grant.

The Trustees and Abbott Diagnostics are encouraged by the interest in the 1994 Abbott Grant and the Trustees are pleased to be able to confirm that Abbott Diagnostics Limited have agreed to again offer the award for 1995. The Trustees, and on behalf of the membership of the New Zealand Institute of Medical Laboratory Science, sincerely thank Abbott Diagnostics for this very positive declaration of support for Medical Laboratory Science in New Zealand.

The Trustees are very aware of the current economic and political situation within the Medical Laboratory industry in New Zealand and are confident that the general economic improvement will flow through to the health industry and will enable the Trust to expand its capability in supporting the development of Medical Laboratory Science in New Zealand.

**TRUSTEES**

The Trustees are –
Mr J S Beattie of Wellington
Mr C H Campbell of Palmerston North
Mr B T Edwards of Christchurch
Mr D J Phillip of Auckland
Mr W J Wilson of Auckland

**GRANTS**

In the 1993/94 year five grants were approved from the Abbott Study Award. Two to allow Technologists to attend the 1994 NICE Weekend, two to allow attendance at the ASBT Meeting in Perth, and one to support a research project into HIV.

The Trust invites applications for the 1995 grants and reminds members of the Institute that application forms are available from the Executive Officers of the Institute and the Trust.

Grant and Awards available for 1995 are –

1994 Abbott Study Award – Two closing dates 27 January 1995 and 2 June 1995

NZMLST Travel Grant – Closing date 2 June 1995

NZMLST Research and Development Grant – Closing date 2 June 1995

NZMLST 1995 Medical Laboratory Science Annual Scientific Meeting – Closing date 2 June 1995

Unless there are very extenuating circumstances, grants are not considered at other times of the year.

*W J WILSON*
*CHAIRMAN*

***Income and Expenditure Account***
***for Year ended 31 December 1993***

| | | | |
|---|---|---|---|
| **INCOME:** | | | |
| Interest Received | | 308:40 | |
| Grant: Abbott Laboratories | 5,000: | | |
| Donations: Examiners | 200; | | |
| Other | 20; | | |
| | | 5,220:00 | |
| Total Income | | | $5,528:40 |
| **EXPENDITURE:** | | | |
| Grants: J. A. Mills | 200:00 | | |
| S. Williams | 400:00 | | |
| J. Payne | 410:00 | | |
| C. Pheloung | 400:00 | | |
| H. Richards | 2,000:00 | | |
| Total Expenditure | | | 3,410:00 |
| Excess Income | | | $2,118:40 |

**N.Z. Medical Laboratory Science Trust (Inc)**
**BALANCE SHEET**
**as at 31 December 1993**

| | | |
|---|---|---|
| **Accumulated Funds:** | | |
| Balance as at 1 January 1993 | $13,639:03 | |
| Add Excess Income | 2,118:40 | |
| | | $15,757:43 |
| **Represented by:** | | |
| A.N.Z. Banking Group: Current account | | $15,757:43 |

**Auditor's Report:**

**To the Trustees of the N.Z. Medical Laboratory Science Trust.**

I have examined the financial records of the Trust and confirm that the Balance in the Trust's Bank Account with the A.N.Z. Bank is $15,757:43. In my opinion the above statement gives a true and fair view of the financial transactions of the Trust for the year ended 31 December 1993.

*David R. Gordon*
*Hon Auditor*
*Palmerston North*
*13 January 1994.*

## MICROSCOPY CONFERENCE
## (In conjunction with the 18th National Conference of the New Zealand Society for Electron Microscopy)
## Dunedin, New Zealand
## 4th-8th September 1995

A Microscopy Conference will be held in Dunedin, 4th to 8th September, 1995. The conference will be held in conjunction with the 18th National Conference for the New Zealand Society for Electron Microscopy (NZSEM) however will cover all aspects of Microscopy with emphasis on the techniques of both Light Microscopy and Electron Microscopy.

The venue for the conference will be the Otago Medical School.

Workshop sessions will run on Monday and Tuesday (Sept 4th-5th); the conference proper will run from Wednesday until midday Friday (Sept 6th-8th).

Guest speakers include:

Professor John M Robinson, Ohio State University, U.S.A.
Professor Robinson has published widely on the practical aspects of enzyme cytochemistry (in particular the recently developed cerium-based techniques) and immunocytochemistry. His application of these techniques utilises many forms of microscopy including conventional light microscopy, confocal microscopy, transmission electron microscopy and scanning electron microscopy.

Professor Anthony S-Y Leong, University of Adelaide, Australia.
Professor Leong is well known for his work with microwave techniques, both at the light microscope and the electron microscope level. His application of microwave technology includes fixation and processing for LM. and T.E.M., and the use of microwaves in immunocytochemistry.

Dr Brian Brooker, Institute of Food Research, England.
Dr Brooker is a food scientist particularly interested in the structure and behaviour of oil-in-water emulsions and the influence of emulsifiers on their functions. He applies many microscopy techniques to study these difficult samples including conventional light microscopy, confocal microscopy, freeze fracture, X-ray microanalysis, cryofixation and electron microscopy.

Dr Brendon Griffin, Centre for Microscopy and Microanalysis, Perth, Australia.
Dr Griffin's field of interest are the microscopy of rare minerals. He is experienced in microprobe analysis particularly EDS, environmental SEM and field emission SEM. He has a particular interest in EM education. Dr Griffin is currently president of the Australian Society for Electron Microscopy.

Trades displays will be a feature of the Conference. We are also planning a techniques forum with the invited guests forming the panel. If you are interested in receiving more information about this conference you are invited to contact the organising committee at the address below:

Allan Mitchell
Oganising Committee, 1995 Microscopy Conference
C/- Department of Anatomy and Structural Biology
Otago Medical School
P.O. Box 913
Dunedin
New Zealand.

Tel; National 03 479 7301 International 64 3 479 7301
Fax; National 03 479 7254 International 64 3 479 7254
email address; allan.mitchell@ stonebow.otago.ac.nz

# The 1994-95 Council

The council operates with four committees covering the areas of professional affairs, education, communications and membership, under the directorship of the President.

### President: Dennis Reilly

Principal Technologist, Diagnostic Laboratory, Auckland.

Dennis as Convenor of the Professional Affairs committee has interest in overseas aid. Dennis also chairs the QTA/ACC working party and is one of the NZIMLS representatives on the Medical Laboratory Technologists Board.

### Vice President: Shirley Gainsford

Charge scientist, Microbiology Department, Valley Diagnostic Laboratory, Lower Hutt.

Shirley is Convenor of the Education and Special Interest Group committees. She is also Chairperson of the National Diploma Medical Laboratory Science Advisory Committee at Auckland Institute of Technology.

### Secretary/Treasurer: Paul McLeod

Charge Technologist, Microbiology Department, Nelson Hospital.

Paul has a joint role of Secretary/Treasurer and is one of the NZIMLS representatives on the Medical Laboratory Technologists Board.

## Regional Representatives

### Region 1: Leanne Mayhew

Representative, Abbott Diagnostics Division, Auckland.

Leanne is convenor of the Communications Committee.

### Region 2: Ted Norman

### Principal

Principal laboratory scientist, Pathology Department, Rotorua, Hospital.

Ted is Convenor of the Awards, Rules and Membership Sub-Committees.

### Region 3: Chris Kendrick

Lecturer, Medical Laboratory Science, Massey University, Palmerston North.

Chris is a Member of the Fellowship and Communications Sub-Committees, and is the NZIMLS representative on the Board of Studies for the BMLS degree at Massey University.

### Region 4: Trevor Rollinson

Technical Manager, Clinical Biochemistry Unit, Canterbury Health Laboratories, Christchurch.

Trevor is a Member of the Education Committee and is responsible for review of Fellowship and Specialist examinations. He is also a TELARC Technical Assessor.

### Region 5: Les Milligan

Principal Technical Officer, Transfusion Medicine, Dunedin Hospital.

Les is Convenor of the Examinations Committee and represents the NZIMLS on the University of Otago Board of Studies supervising the BLMS degree course.

### Executive Officer: Fran van Til

Fran is the Executive Officer of the NZIMLS, PO Box 3270, Christchurch. Tel/FAX: (03) 313-4761.

### Editor: Rob Siebers

Research Fellow, Department of Medicine, Wellington School of Medicine.

Rob is Editor of the New Zealand Journal of Medical Laboratory Science, the official publication of the NZIMLS.

Standing from left to right: Rob Siebers, Les Milligan, Ted Norman, Chris Kendrick.
Seated from left to right: Paul McLeod, Fran van Til, Leanne Mayhew, Shirley Gainsford, Dennis Reilly, Trevor Rollinson.

# INSTITUTE BUSINESS

## Office Bearers of the N.Z.I.M.L.S. 1994-1995

### President
Dennis Reilly
Diagnostic Laboratory, Auckland

### Vice President
Shirley Gainsford
Valley Diagnostic Laboratory, Lower Hutt

### Secretary/Treasurer
Paul McLeod
Microbiology Dept, Nelson Hospital

### Council
Leanne Mayhew, Chris Kendrick, Les Milligan, Ted Norman, Trevor Rollinson

### Executive Officer
Fran van Til
P.O. Box 3270, Christchurch
Phone/Fax (03) 313-4761.

Please address all correspondence to the Executive Officer, including Examination and Membership enquiries.

### Editor
Rob Siebers
Dept. of Medicine, Wellington
School of Medicine, P.O. Box 7343
Wellington South.

### Membership Fees and Enquiries
Membership fees for the year beginning April 1, 1994 are:

For Fellows – $88.40 GST inclusive

For Members – $88.40 GST inclusive

For Associates – $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 Executive Officer at the address given above.
Members wishing to receive their publications by airmail should contact the Editor to make the necessary arrangement.

### Membership Report – March 1995

| Membership | 20.02.95 | 14.09.94 | 12.08.94 | 02.05.94 |
|---|---|---|---|---|
| | 1177 | 1159 | 1138 | 1172 |
| Less resignations | 5 | 4 | 22 | 35 |
| Less G.N.A. | – | – | 48 | 21 |
| Less deletions | – | – | – | – |
| Less deceased | – | – | – | – |
| Less duplications | – | – | – | – |
| | **1172** | **1155** | **1067** | **1116** |
| Plus applications | 10 | 22 | 88 | 21 |
| Plus reinstatements | – | – | 4 | 1 |
| **Total** | **1182** | **1177** | **1159** | **1138** |

| Composition | | | | |
|---|---|---|---|---|
| Life Member (Fellow) | 12 | 12 | 12 | 12 |
| Life Member (Member) | 9 | 9 | 9 | 9 |
| Fellow | 21 | 20 | 20 | 20 |
| Member | 684 | 684 | 671 | 662 |
| Associate | 373 | 368 | 365 | 355 |
| Non Practising | 56 | 57 | 56 | 56 |
| Honorary | 27 | 27 | 26 | 26 |
| Total | 1182 | 1177 | 1159 | 1138 |

### Applications for Membership

C. GOODYER, Wellington, J. GALLAGHER, H. BALTOV, Overseas, R. NICHOLLS, Medlab South, R. COSTELLO, Nelson Diagnostic, K. CAMERON, Southland, A. CRAWFORD, Valley Diagnostic, S. FIELDS, Greenlane/National Womens, E. LAZAREV, Palmerston North, J. BRADLEY, Diagnostic

## NEW ZEALAND INSTITUTE OF MEDICAL LABORATORY SCIENCE 1995 CALENDAR

| | |
|---|---|
| 3-5 March | Council meeting/South Island Seminar – Akaroa |
| 30 April | Committee Annual Reports to be with the Executive Officer |
| 30 April | All accounts to National Treasurer for auditing |
| 30 April | Proposed rule changes and remits to be with the Executive Officer |
| 26 May | Applications close for Specialist Certificate examinations |
| 26 May | Applications close for QTA examinations |
| 28 May | Nomination forms for the election of Officers and Remits to be with the membership (60 days prior to AGM) |
| 17 June | Nominations close for elections of Officers (4 days prior to AGM) |
| 1 July | Annual Staffing Survey |
| 6 July | Ballot papers to be with the membership (21 days prior to AGM) |
| 4/5/6 July | Fellowship examinations |
| 13 July | Annual Report and Balance Sheet to be with the membership (14 days prior to AGM) |
| 20 July | Ballot papers and proxies to be with Executive Officer (7 days prior to AGM) |
| 27/28 July | Council Meeting – Wellington |
| 27 July | AGM – Wellington |
| 10 October | Council Meeting – Australia |
| 9-13 October | South Pacific Congress – Australia |
| 1 November | QTA examinations |
| 15/16 November | Specialist Certificate examinations |

# NEW ZEALAND INSTITUTE OF MEDICAL LABORATORY SCIENCE
# ANNUAL STAFFING SURVEY
# AS AT 1 JULY 1994

## Medical Laboratory Technologists

| Currently Employed | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|
| Clinical Biochemistry | 186.0 | 187.0 | 187.0 | 175.0 | 208.0 | 182.0 | 202.0 | 221.5 | 241.4 |
| Microbiology | 172.0 | 176.0 | 186.0 | 189.0 | 204.0 | 183.0 | 206.0 | 209.8 | 232.0 |
| Haematology | 163.0 | 168.0 | 176.0 | 174.0 | 180.0 | 163.0 | 167.0 | 184.6 | 205.9 |
| Transfusion Science | 92.0 | 97.0 | 102.0 | 96.0 | 105.0 | 101.0 | 120.0 | 126.7 | 132.9 |
| Histology | 24.0 | 24.0 | 28.0 | 26.0 | 29.0 | 34.0 | 35.0 | 32.9 | 36.5 |
| Cytology | 7.2 | 5.7 | 7.8 | 9.5 | 22.0 | 26.6 | 23.5 | 23.0 | 28.7 |
| Nuclear Medicine | 8.0 | 5.8 | 9.0 | 7.0 | 8.4 | 9.2 | 12.2 | 9.4 | 8.0 |
| Immunology | 28.0 | 22.0 | 21.0 | 30.0 | 31.0 | 34.0 | 38.0 | 47.4 | 48.6 |
| Cytogenetics | 6.5 | 7.5 | 8.0 | 6.4 | 5.8 | 12.6 | 14.7 | 12.4 | 15.7 |
| Virology | 6.0 | 4.5 | 6.5 | 10.0 | 12.0 | 13.5 | 13.6 | 8.8 | 10.2 |
| Administration (full time) | 39.0 | 34.0 | 33.0 | 33.0 | 30.0 | 29.0 | 39.0 | 36.2 | 37.9 |
| On rotation | 55.0 | 41.0 | 44.0 | 40.0 | 31.0 | 31.0 | 34.0 | 40.6 | 28.4 |
| Other | 2.4 | 3.0 | 11.0 | 7.8 | 13.0 | 8.6 | 9.7 | 6.4 | 9.9 |
| Total | 789.1 | 775.5 | 819.3 | 803.7 | 879.2 | 826.5 | 914.7 | 959.7 | 1036.1 |

## Medical Laboratory Assistants

| Currently Employed | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|
| Clinical Biochemistry | 183.0 | 169.0 | 174.0 | 177.0 | 154.0 | 133.0 | 135.0 | 127.3 | 158.8 |
| Microbiology | 168.0 | 152.0 | 188.0 | 176.0 | 185.0 | 156.0 | 150.0 | 140.6 | 181.8 |
| Haematology | 143.0 | 117.0 | 112.0 | 118.0 | 120.0 | 92.0 | 85.0 | 84.8 | 106.9 |
| Transfusion Science | 118.0 | 114.0 | 112.0 | 100.0 | 98.0 | 83.0 | 87.0 | 86.1 | 95.2 |
| Histology | 85.0 | 76.0 | 96.0 | 76.0 | 74.0 | 56.0 | 66.0 | 36.4 | 72.1 |
| Cytology | 36.0 | 40.0 | 35.0 | 56.0 | 59.0 | 49.0 | 56.0 | 47.3 | 64.0 |
| Nuclear Medicine | 16.8 | 11.0 | 13.0 | 9.0 | 4.0 | 3.2 | 5.0 | 3.2 | 3.1 |
| Immunology | 42.0 | 31.0 | 48.0 | 46.0 | 42.0 | 31.0 | 29.0 | 31.7 | 27.1 |
| Cytogenetics | 7.5 | 5.5 | 13.0 | 3.5 | 3.5 | 1.2 | 2.0 | 1.2 | 2.5 |
| Virology | 7.0 | 8.0 | 6.5 | 5.5 | 6.5 | 6.5 | 1.0 | - | 1.0 |
| Blood Collection | 91.0 | 91.0 | 75.0 | 77.0 | 71.0 | 68.0 | 108.0 | - | - |
| Administration | - | - | - | - | - | - | - | 11.2 | 10.5 |
| On rotation | 51.0 | 56.0 | 67.0 | 64.0 | 28.0 | 40.0 | 26.0 | 41.5 | 32.5 |
| Other | 44.0 | 49.0 | 49.0 | 66.0 | 50.0 | 47.0 | 52.0 | 11.2 | 98.0 |
| Total | 992.3 | 919.5 | 988.5 | 974.0 | 895.0 | 765.9 | 802.0 | 622.5 | 853.5 |

## Medical Laboratory Trainees

| | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|
| Medical Laboratory Technologists | 177 | 114 | 72 | 84 |
| Scientific Officers | 18 | 6 | 63 | 71 |

## Students (as at 1 February 1995)

| | Year | 1993 | 1994 | 1995 |
|---|---|---|---|---|
| Auckland Technical Institute | 2 | 10 | - | - |
| (NDMLS) | 3 | 20 | 11 | - |
| | 4 | 31 | 20 | 11 |
| *(BMLSc) | 1 | - | - | 24* |
| | 2 | - | - | 20* |
| | 3 | - | - | 6* |
| Massey University | 2 | 30 | 30 | 30 |
| (BMLSc) | 3 | 20 | 20 | 16 |
| | 4 | - | 18 | 18 |
| Otago University | 2 | 40 | 40 | 34 |
| | 3 | 30 | 33 | 34 |
| | 4 | - | 25 | 30 |

*These are approximate numbers of students for the Bachelor of Applied Science course who are awaiting to cross credit to the proposed Bachelor of Medical Laboratory Science degree course.

# LEAVING ON A JET PLANE??

Are you about to leave your current address?

Or are you about to do your "O.E."?

The executive office is keen to keep its membership records up to date. So if you are on the move contact Fran at PO Box 3270, Christchurch or Telephone/Fax Rangiora 03 313 4761.

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

| | |
|---|---|
| **Title** | **Jim Le Grice Award** |
| **Nature** | An annual award in memory of Jim Le Grice to sponsor a full time student, qualified staff technologist or qualified technical assistant to the Annual Scientific Meeting. |
| **Eligibility** | 1. Any student who is a member of the NZIMLS and in full time tertiary education.<br>2. Any qualified technical assistant or staff technologist with less than 5 years total work experience. (Work experience to be verified on application form). |
| **Conditions** | No conditions apply to student applications. However, qualified staff will present a paper or poster at the Annual Scientific Meeting. |
| **Applications** | Applications should be completed on the official application form published in the NZIMLS Journal and available from the Executive Officer, NZIMLS, PO Box 3270, Christchurch. |
| **Selection** | Will be made by ballot by the convenor of the NZIMLS Awards Committee. |
| **Amount** | The prize awarded will vary yearly and will consist of travel to and from conference, accommodation and registration with the successful applicant making all arrangements. |
| **Term of Award** | Initially offered in 1995 and subsequent 9 years with a review at that time. |

# JIM LE GRICE MEMORIAL AWARD

## APPLICATION FORM

**Date** (Month/Year):.....

**Name:**.....

**Contact Address:**.....

.....

.....

.....

Full time students, please complete Section A.

QTA, Staff Technologists, please complete Sections B, C, D.

A. Which institution are you attending as a full time student?.....

Signature:.....

B. What year did you gain your qualification?.....

Signature of applicant:.....

C. I declare that the applicant has total New Zealand work experience of less than 5 years since qualification.

Signature:.....
(To be verified by Charge Technologist)

D. Please provide a brief outline (abstract) of the paper or poster you will be presenting at the Annual Scientific Meeting.

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Send your completed application to the NZIMLS Executive Officer, PO Box 3270, Christchurch to be received no later than 5pm, 31st March 1995.

# Letters to the Editor

## MEDICAL LABORATORY SCIENCE AND THE NZQA FRAMEWORK.

Dear Sir,

In 1993 Ann Cooke and Gillian McLeay published an article in the NZIMLS journal that explained what the National Qualifications Framework being developed by the NZ Qualifications Authority (NZQA) was and how the NZIMLS should be a part of this process.

**What has happened since then as far as medical laboratory science and the framework is concerned?**

In 1993 I attended a meeting in Wellington where NZQA attempted to sell the idea of forming a Health Industry Training Organisation (ITO), to representatives of virtually every organisation that has something to do with health that you can think of. The NZIMLS was not actually invited to the meeting and we have had no communication from the organisers since.

The Council made a commitment to be involved with the development of units in Medical Laboratory Science for the framework by making this one of its goals in its 1994/95 strategic plan. At that stage the commitment was to have our QTA qualification on the framework. The universities were against having their degrees being part of the framework so there did not seem any point in writing unit standards for these. However, since then a ministerial tertiary lead group has released a report that "recommends that all degrees be incorporated into a single harmonised qualifications framework" and it remains to be seen if it will be favourably received by the tertiary institutions. The following sets out chronologically what has happened in most cases with medical laboratory science and NZQA.

December 1993 A Science and Technology Advisory Group meets which a representative of the Clinical Biochemists attends. The minutes record that a framework development officer is to contact the medical laboratories advisory group.

December 1993 The Association of Community Laboratories (ACL) appoints Dr Michael Gill as a representative to the Health Advisory Group on Unit Standards. This group is to advise on "core" units to be part of any qualification in health. NZQA said to be shortly setting up a Medical Laboratory Advisory Group.

**So at this stage medical laboratory science is to be included in two advisory groups.**

May 1994 Letter to Dennis Reilly from Mr Chisholm of the NZQA Framework development team. NZQA is interested in setting up an advisory group to look at concept of the framework and setting medical laboratory science standards to go on the framework. The letter asks for details of other interested parties ie employers, professional association, regulatory bodies etc.

**On behalf of the NZIMLS Dennis Reilly replied to the above letter. However, there was no more communication between NZQA and the NZIMLS despite numerous phone calls to Mr Chisholm. In November 1994 I finally find out from Mr Chisholm's staff that NZQA has run out of money and a subsequent letter says that we are on hold until 1995.**

November 1994 CHE employees receive a letter from their CHE regarding the formation of a Health ITO. This letter states that the NZ Private Hospitals Association and 18 CHEs will form an ITO and meetings will be held nationally to "give all interested parties the opportunity to have input into the formation process".

**The NZIMLS does not receive an invitation.**

**Does this proposed ITO have any link with the Health Advisory Group Dr Gill is involved with?**

December 1994 A letter from the Science and Technology Advisory Group is circulated to "interested parties" informing them of meetings to explain the process of redeveloping current science and technology education into unit standards for the framework.

**The NZIMLS is not included as an interested party.**

It is of the utmost concern to me that the NZIMLS which is the body that has been advising medical laboratory science programmes and running its own examinations for the last 40 years is not informed of any meeting to discuss medical laboratory science and the framework. Any development of medical laboratory science units to go on the framework must be done in a coordinated way and must involve our employers (ACL and CHES), professional societies (NZIMLS) and regulatory bodies (MLTB).

We cannot have any person putting themselves on a committee however well meaning they are. We must be involved with ONE advisory group and I believe this should be Health. At the lower level there will be some commonality with the Science and Technology group but we have so much in common with the other health groups that we belong with them.

Philosophically I think the framework is a wonderful concept but I have become very cynical about NZQA's ability to implement it. I do not blame them for lack of progress due to inadequate funding but their communication with our professional body has been abysmal.

I write this letter to inform members that the Council of the NZIMLS made a commitment to be involved with the development of medical laboratory science into unit standards for the framework. We are interested to hear from medical laboratory scientists who would like to help with this task but I would urge such volunteers not to put their names down for various committees but give their name to their regional representative or myself and allow the Council of the NZIMLS to work with the MLTB, ACL and CHEs to coordinate such a large and important project.

*Shirley Gainsford,*
*Education Convenor,*
*NZIMLS.*

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# Publications by NZIMLS Members

**From the Departments of Transfusion Medicine, Auckland Regional Blood Centre; Clinical Chemistry and Transfusion Medicine, University of Göteborg, Sweden; and INSERM U178, Villejiuf, France:**

Henry SM, Oriol R, Samuelsson BE. Detection and characterization of Lewis antigens in plasma of Lewis-negative individuals. *Vox Sang* 1994; 67: 387-96.

Henry SM, Oriol R, Samuelsson BE. Expression of Lewis histo-blood group glycolipids in the plasma of individuals of Le(a+b+) and partial secretor phenotypes. *Glycoconjugate J* 1994; 11: 593-99.

Henry SM, Samuelsson BE, Oriol R. Immunochemical and immunohistological expression of Lewis histo-blood group antigens in small intestine including individuals of the Le(a+b+) and Le(a-b-) nonsecretor phenotypes. *Glycoconjugate J* 1994; 11: 600-7.


## PACIFIC PARAMEDICAL TRAINING CENTRE (PPTC) NEWS.

The Annual General Meeting of the Pacific Paramedical Training Centre was held in Wellington on Friday 2nd December, 1994. The past year's activities were discussed with members of the organisations concerned and represented at this meeting.

Plans for the P.P.T.C. in 1995 were outlined.

The P.P.T.C. Committee elected for 1994/95 is as follows:

Co-Chairman: Assoc. Prof. HC Ford, Representing Wellington Hospital; Co-Chairman: Dr. R McKenzie, Representating NZ Red Cross; Mr D Will, Representing Ministry of Foreign Affairs & Trade; Ms M Chamberlain, Representating NZ Ministry of Health; Ms M Eales, Representing NZ Institute of Medical Laboratory Science Inc.; Mr J Elliot, Representing Medical Laboratory Scientists, Wellington Hospital; Rev. Sam Poutasi, Representing the Pacific Island Community.

## 1994 ANNUAL REPORT OF THE P.P.T.C.

(compiled by Dr Ron McKenzie)

## PPTC OPERATIONAL OVERVIEW.

The activities of the PPTC remained constant with its core business during 1994 – that of providing development assistance to the medical laboratories and blood transfusion services of the Pacific Islands.

The objectives set for the year were largely met and planning is well advanced for new training and development projects to be introduced in 1995.

## MAIN ACTIVITIES UNDERTAKEN IN 1994.

### Training

Twenty Pacific Island medical laboratory technicians were involved in PPTC training programmes in 1994. Two courses took place at the Centre, Blood Bank Technology in February/March and a Medical Laboratory Update Course was held in September/October.

Training attachments to gain experience in special laboratory topics have become an important component of the Centre's activities and a number of Pacific Island technicians received specialised training in medical laboratories throughout New Zealand.

1994 was year two of the second cycle of the Samoan technical training course at the National Hospital Laboratory in Apia. This course continues to run well under the direction of the PPTC. Mr Michael Lynch, Tutor-Co-Ordinator, has just returned from a WHO visit to Apia to review this programme and will report at the AGM of the PPTC.

## THE PACIFIC REGION HEALTH LABORATORY QUALITY ASSESSMENT PROGRAMME

This programme remains one of the most important commitments of the Centre and it has continued with an increased level of activity during 1994. This activity is reflected by the increasing participation of medical laboratories in the Pacific Region and assay material postings. Tuvalu and Kosrae are again participating and Nauru and Lae (PNG) joined the programme during 1994. The format of the programme has remained unchanged and there are now a total of eighteen hospital laboratories taking part.

Result returns from the participants have greatly improved in the past year and the return rate over all disciplines average 82%. In addition to the Quality Assurance Programme run from the Centre, Mr Gilbert Rose undertook a microbiology QA Consultancy visit to the Rarotonga Hospital Laboratory, Cook Islands, in July.

Ms. Clare Murphy, Clinical Chemistry Co-ordinator for the PPTC, has continued valuable liaison work with the Royal College of Pathologists of Australia/Australasian Association of Clinical Biochemists (RCPA-AACB) Quality Assurance Programme. In addition, she has established two new international links for the PPTC QA Programme. They are the Asian and Pacific Federation of Clinical Biochemistry and the Wolfson EQA Laboratory, Birmingham, UK. Both of these organisations are linked to the WHO Clinical Chemistry International Programme.

## OTHER ACTIVITIES

An innovative step in the teaching programme saw the production of an 18 minute video entitled "An Introduction to Blood Component Therapy". This is a technical brief designed to promote the use of red cell concentrates and fresh frozen plasma in Pacific Island Hospitals. This project was funded by the Central Region of the New Zealand Red Cross. Special thanks must also go to Mr Ben Stewart, Audio Visual Unit, Wellington School of Medicine. Dr John Carter, Haematologist, Wellington Hospital and Mr Ian Johnstone, television presenter.

Under a contractual arrangement between the PPTC and MFAT, Dr McKenzie visited Papua New Guinea to review the Rural Health Medical Laboratory Service and develop a training programme for Rural Laboratory Assistants. Agreement was reached with the PNG Ministry of Health, The Faculty of Health Sciences, University of PNG, and the PPTC to provide ongoing training in the form of five week training courses in PNG. It is proposed that this should be a New Zealand Overseas Development Aid Project and funding arrangements and terms of agreement have yet to be finalised.

An expression of interest in PPTC Training Programmes was received from the Republic of Vietnam and Kingdom of Bhutan. Both of these have been responded to and replies are awaited.

## PROJECTED ACTIVITIES FOR 1995.

Two Wellington based courses are planned for 1995. They are Blood Bank Technology in February-April and a three week STD/HIV Course to be held in October.

In 1995 there will be an emphasis "on location training" by the PPTC. Planning for a two week Quality Assurance Course to be held at the Vaiola Hospital, Tonga, is complete and it is expected that this will take place in March/April, 1995.

Subject to funding approval two five-week courses for Rural Medical Laboratory Assistants will be held in Goroka and Port Moresby, PNG.

The Pacific Regional Health Laboratory Quality Assurance Programme will continue unchanged during 1995 as will the supervision of the Samoan Technical Training Project.

Preliminary negotiations have taken place to assist with the upgrading of medical laboratory training in Vietnam. This will be pursued in 1995.

A request was received in November from the Pacific Desk of the Federation of Red Cross and Red Crescent Societies to assist with blood transfusion service development in the Pacific. This too will be followed up in 1995.

Finally, 1994 has been a progressive and busy year for the PPTC, much has been


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achieved and we look forward with enthusiasm and confidence to the new tasks scheduled for 1995 and beyond.

## TRAINEES WHO COMPLETED PACIFIC PARAMEDICAL TRAINING CENTRE COURSES DURING 1994.

**Blood Bank Technology – 7 February-1 April, 1994.**

1. Mr Havila Kavo, NZ Overseas Development Aid, Papua New Guinea.
2. Mr Tekaibeti Tarataake, WHO Fellowship, Kiribati.

**Medical Laboratory Technology Update – 5 September-28 October, 1994.**

3. Mr Matuiana Aviata, WHO Fellowship, Western Samoa.
4. Ms Katherine Ksano, WHO Fellowship, Palau.
5. Mr Jeffrey Vutilolo, NZ Overseas Development Aid, Vanuatu.

**Training Attachments.**

6. Mr Mosese Ma'u, WHO Fellowship, Tonga. Wellington Hospital – Histology/Cytology Department 10 May-30 July, 1994.
7. Mr Tebuku Toatu, WHO Fellowship, Kiribati. Wellington Hospital – Histology/Cytology Department 10 May-30 July, 1994.
8. Mr Palauni Mauinata, NZ Overseas Development Aid, Western Samoa. Wellington Hospital – Histology/Cytology Department 10 May-30 July, 1994.
9. Mr Baibuke Tauro, WHO Fellowship, Kiribati. Blenheim Hospital – Laboratory 21 September-11 November 1994 Hawera Hospital – Laboratory 12 November-9 December 1994.
10. Ms. Rosemary Tekitanga, WHO Fellowship, Kiribati. Nelson Hospital – Laboratory, 29 October-9 December, 1994.
11. Mr Matuiana Aviata, WHO Fellowship, Western Samoa. Tauranga Hospital – Laboratory 26 September-9 December 1994.
12. Ms Katherine Ksano, WHO Fellowship, Palau. Wellington Hospital – Haematology &Microbiology Departments.
13. Ms Paula Matyed, WHO Fellowship, Yap Federated States of Micronesia. Wellington Hospital – Cytology Department 24 October 1994-10 February, 1995. Blood Bank 13 February-7 April, 1995.
14. Mr Benjamin Nena, WHO Fellowship, Kosrae, Federated States of Micronesia. Masterton Hospital – Laboratory Management and Quality Control. 21 October-25 November, 1994.

**Trainees completing second year of PPTC/WS Medical Laboratory Technicians Three Year Training Course at National Hospital, Apia, Western Samoa in November, 1994.**

15. M. Leolaga
16. L. Maa
17. I. Lelei
18. M. Schwenke
19. F. Vasa
20. T. Lopa

## EQUIPMENT

**Teaching Laboratory.**

All equipment remains in good condition. No major items of new equipment were purchased or repairs to equipment required

**Seminar Room.**

Teaching equipment all in good order. No major purchases or repairs required.

**Computer**

Present equipment adequate for all present requirements.

**Filing System**

The filing system was purged and updated during 1994. Suitable filing cabinets were obtained for the new system. More file data are now kept in computer storage.


## ACKNOWLEDGEMENTS

The Management Committee of the PPTC are indebted to a number of organisations and individuals for ongoing support and encouragement.

To the following the PPTC extend sincere thanks for greatly valued assistance:

The New Zealand Ministry of Foreign Affairs and Trade.
The New Zealand Ministry of Health Capital Coast Health
New Zealand Red Cross, Central Region.
New Zealand Institute of Medical Laboratory Science.
John Ilott Charitable Trust.
The Norman Kirk Memorial Trust.
The Royal College of Pathologists Australasia.
Australasian Association of Clinical Biochemists.
CITEC Training Solutions Ltd.

The Management Committee of the Centre wish to acknowledge with sincere thanks the group of voluntary lecturers and advisers who gave so generously of their time and expertise during 1994.


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Below are printed two of the papers presented at the Fiji Medical Laboratory Technologists Association 11th Scientific Meeting held in Nadi in 1994. Elsewhere in the Journal is another paper presented at this Meeting on AIDS/HIV knowledge of Fiji Medical Laboratory Technologists.

## PAP SMEAR QUALITY CONTROL


Abelardo J. Alera, M.D.
Consultant Pathologist
Colonial War Memorial Hospital
Suva, Fiji


Pap smear has saved a lot of lives through early diagnosis and treatment of cervical cancer. It is one of the most cost-effective screening procedures currently available to modern man. Its effectiveness, however, is limited by factors like: proper collection, meticulous processing and accurate evaluation of the smear.

A simple quality control procedure can be implemented in order to promote consistently accurate cytology reports. This can be summarised by answering four basic questions: (1) What can go wrong? (2) What is wrong now? (3) What went wrong? (4) How can we do things better?

**What Can Go Wrong?**

Future problems can be avoided by sticking to a well-written plan that will guarantee complete accuracy in cytology reports. Essential factors to consider are:

1. Employing the best chap. Only qualified cytoscreeners should be given the job.
2. Quality supplies and equipment should be used.
3. Cytoscreeners should not be over-worked or under-worked.
4. A cytopathologist should assist in difficult cases.
5. Set time for cytoscreeners to learn more through continuing education or by participating in quality assurance scheme either internally or externally
6. A system to re-evaluate normal smears needs to be implemented.

**What is Wrong Now?**

Quality can be ascertained in a day-to-day basis through what is known as management by "walking around". The following can be checked out:

1. Are written procedures followed to the letter?
2. How are queries handled?
3. Is the working area safe, quiet and clean?
4. Is everyone happy?
5. Is there any problem?

**What Went Wrong?**

The best learning process for the cytoscreeners is comparison of previous

smears with present smear or biopsy result. This will give them a better understanding and appreciation of their work and at the same time equip them better in evaluation of the next difficult smear.

**How Can We Do Things Better?**

A regular check on every cytoscreeners' performance should be done, ideally documented, to identify who needs more supervision or assistance. The cytology section should have a system of getting feedback from the laboratory users to find out if the results are satisfactory. A system for an immediate notification of abnormal smears to the clinicians should be made.

In this age of continuously improving medical laboratory technology, there is no substitute for quality results. Pap smear will never be an exception. There is no way for quality to go but up.

## A mini review of Viral Hepatitis

Glenn Chabot, Sales Manager – Pacific Region, ADD/Australia

During the 11th annual FMLT seminar at Nadi, FIJI, a quick review of the types were discussed, as well as a demonstration of the latest 15min quick test from Abbott Diagnostics – the *SPx HBsAG. Diana.Screen* dip test for Hepatitis B Surface Antigen.

Over the past few years there has been some developments in the identification of Viral causes of Hepatitis, and we now have at least five identifiable agents for Viral Hepatitis. The last two types, Hepatitis C Virus and Hepatitis E Virus were classified as Non A, Non B types until the causative viral particle were found. The detection of Hepatitis B Surface antigen (HBsAG) and Hepatitis C Virus antibody (HCV AB) are the more important types currently investigated in donor blood screening. There is a high prevalence of carrier status of HBV, 5-10% and up to 50% of HCV. These carriers are often without symptoms.

In the Pacific region, HBsAG is mainly transmitted to recipients both parenterally in contaminated donor blood and perinatally from mother to baby at time of birth. It is important therefore to screen all donors before transfusion with a sensitive, rapid method and also all prenatal mothers to ensure that babies are immunised, normally within 12 hours of birth. Hepatitis C testing is not yet common for screening donors in the Pacific, but rapid, manual testing methods and automated testing are now becoming available. In the absence of routine HCV testing, the use of liver function tests, such as ALT, can be used to indicate potential levels of abnormal liver activity seen in cases of HCV presence. Vaccinated individuals against HBV infection should also have their levels of Hepatitis B antibody checked, as it has been demonstrated that people with post vaccination levels of anti-HBs titers of 10-100 miu/l had a decline to sub immune levels of less than 10 miu/l after 3 years.

# BOOK REVIEWS

Reviewed by Dr Rohan Ameratunga, Immunologist Auckland Healthcare Services Ltd

## Paediatric Rheumatology

By Jerry Jacobs
Paediatric Rheumatology for the Practitioner
2nd edition, Springer

This is the second edition of this book. It deals with the spectrum of rheumatic disorders seen in childhood. The book is divided into 9 chapters. The first chapter deals with the clinical approach to patients with rheumatic disease. The second chapter deals with systemic disorders which may have rheumatic manifestations as part of their clinical presentation. The next six chapters deal in depth with Lo rheumatic disorders presenting in childhood. The last chapter deals with the psychodynamics of chronic disease and the importance of the physician's own approach to dealing with these patients.

The book is pitched for the general paediatrician with an interest in joint disorders of chidhood. It would also be of interest to adult rheumatologists who may have a small number of children in their practice. The book provides a broad overview of the subject and each chapter contains a large number of references.

## The Principles and Practice of Diagnostic Immunology

By David E Normansell
VCH 1994. 149 Pages

This is the first edition of this single author book. It is written in 8 chapters. Each chapter gives an overview of a specific area of diagnostic immunology.

The first chapter deals with protein chemistry relating to immunology and gives an overview of protein separation and analysis techniques. The second chapter outlines cellular aspects of immunology and deals with areas such as flow cytometry and assays of cell proliferation in response to lectins and antigens. The third chapter covers immunological aspects of infectious diseases while the fourth chapter outlines diagnostic tests of autoimmunity. The last four chapters cover immune deficiency disorders, the HLA system, tumour immunity and IgE-mediated disorders.

The main function of this book is to provide a clinical explanation for laboratory tests. It is not a clinical immunology or a laboratory immunopathology reference book. It would be of use to students of medical laboratory technology who are preparing for examinations. It would also be of use to clinicians attempting to understand the indications of tests performed in immunology laboratories.

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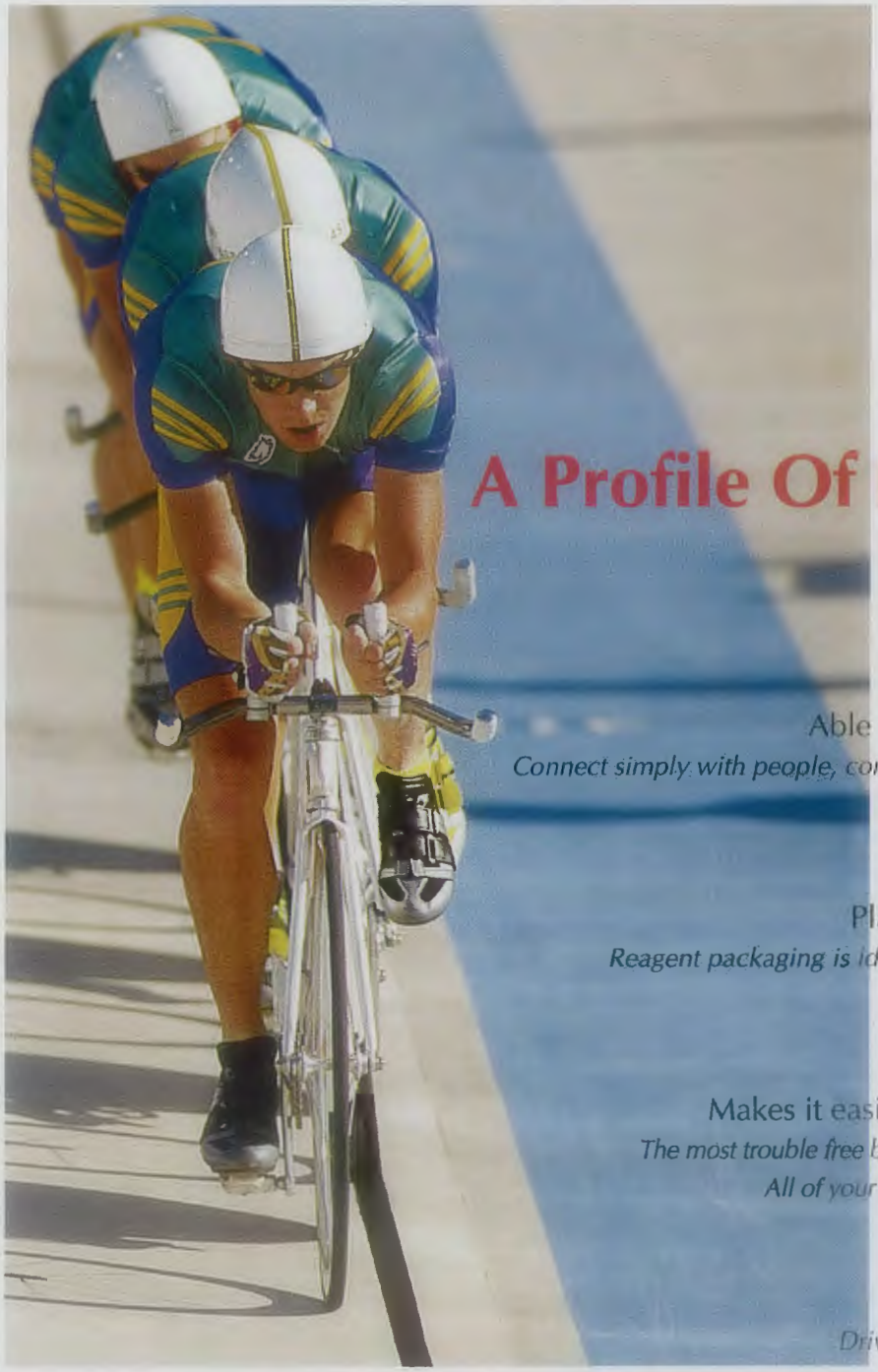

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For further information contact:

***Carol Gardiner, Diagnostic Representative, Bio-Rad Laboratories, PO Box 100-051, NSMC Auckland 10. Phone toll free: 0508 805 500.***

## Immunoassay Focus
## Ciba Corning ACS; 180 Plus SCIANZ Corporation

Laboratories in the immunoassay market remain under pressure to reduce costs while providing better service. The introduction of automated immunoassay systems has not always delivered the benefits needed by the laboratory.

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The availability of complete test panels for thyroid, anaemia and reproductive assays means that all patient tests can be completed from one primary tube. This minimises the need to handle hazardous samples in order to aliquot specimens, and lowers the risk of sample mixups.

Not only can stat samples be introduced at any time, it is also easy to change the testing priority of any onboard sample such that any result is available to the physician in 15 minutes. This combined with the highest throughput available (180 tests/hour), allows the early initiation of patient treatment regimes, and highlights the ability of the ACS:180 Plus to provide patient orientated output.

Ciba Corning continues to develop assays for the ACS:180 Plus which provides improved patient outcomes. The ACS PSA detects disease regression several months before other methods can, because the ACS PSA value relates directly to tumour burden.

The authors of a recent clinical chemistry paper concluded that the ACS digoxin assay "set the standard for future digoxin assays". The third-generation sensitivity of the ACS TSII means that all patient TSII tests can be done on a single analytical system. With an extended menu of more than 50 assays, the direct chemiluminescence technology of the ACS:180 Plus has no restrictions on the molecular size of the analytes that are, or will be, measured in patient samples.

Oncology assays, markers for bone metabolism and therapeutic drug assays will be released in the coming months.

The strategic partnership between Ciba Corning Diagnostics and Chiron Corporation sees another big step forward for both organisations. Chiron's outstanding R & D expertise in serology and other areas, combined with Ciba Corning's worldwide marketing network and manufacturing experience, will see the accelerated introduction of innovative new products and assays on ACS:180 systems.

For further information on the ACS:180 telephone Alan Cocks on (09) 480 7060.

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The glucose electrode is a self-correcting biosensor, employing a patented 2 channel design to actively eliminate the effect of interfering substances such as bilirubin, urea, urate, lactate and others.

It is claimed that this unique design has allowed Ciba Corning to provide glucose performance not seen before on a bloodgas system. The 860 system needs a single shot of sample, syringe or capillary (125 µl) for full gases, electrolytes ($Ca^{++}$ and Cl), glucose and lactate (available 1995). Future developments include full co-oximetry still on a single shot of sample.

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# Publications in Overseas Medical Laboratory Science Journals

We exchange journals with various overseas medical laboratory science organisations. These journals are kept in the Philson Library of the Auckland Medical School. Members wishing to obtain articles of interest should forward their requests through their own institution's medical library through the Interloan service.

## Clinical Laboratory Science. 1994; Volume: 7. Number: 3

Williams AL Health care reform and rationing: process lessons from the States. p. 136-43.
Sowell AL Simple, rapid method for assessment of serum vitamin A concentration. p. 160-1.
Summers SH, Clark VL Teaching educational techniques within the SBB curriculum. p. 161-2.
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# SCIANZ IMMUNOASSAY AWARD

## APPLICATION FORM

Applications are invited for the Award (of $1,000) from all members of the NZIMLS using immunoassay techniques.

The Institute and SCIANZ anticipate that the Award will be used by the successful applicant to foster their knowledge and/or career in medical laboratory science (i.e. attend a course, conference or specialist laboratory).

**All** members of the NZIMLS are eligible to apply for this Award.
Applications must be received by the Executive Officer, NZIMLS, PO Box 3270, Christchurch on the official application form by

**5pm, 31st MARCH 1995**

Late applications will **not** be accepted.

Selection of the successful applicant will be on professional and academic ability, performance/application of immunoassay techniques and benefit of the Award to the applicant.

The decision as ratified by the Council of the NZIMLS will be final.

The successful applicant will be notified by mail.

**Date** (month/year): .....

**Name:** .....

**Contact Address:** .....

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A. Experience with immunoassay techniques:

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B. Other achievements in your discipline of medical laboratory technology:

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C. What do you intend to do with the Award (200 words or less):

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D. Please provide a brief outline (abstract) of a paper/review to be offered for publication in the NZIMLS Journal:

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**OA** = Original Article; **CE** = Continuing Education Article; **LA** = Leading Article; **R** = Review Article, **CC** = Current Comment Article; **E** = Editorial; **L** = Letter to the Editor.


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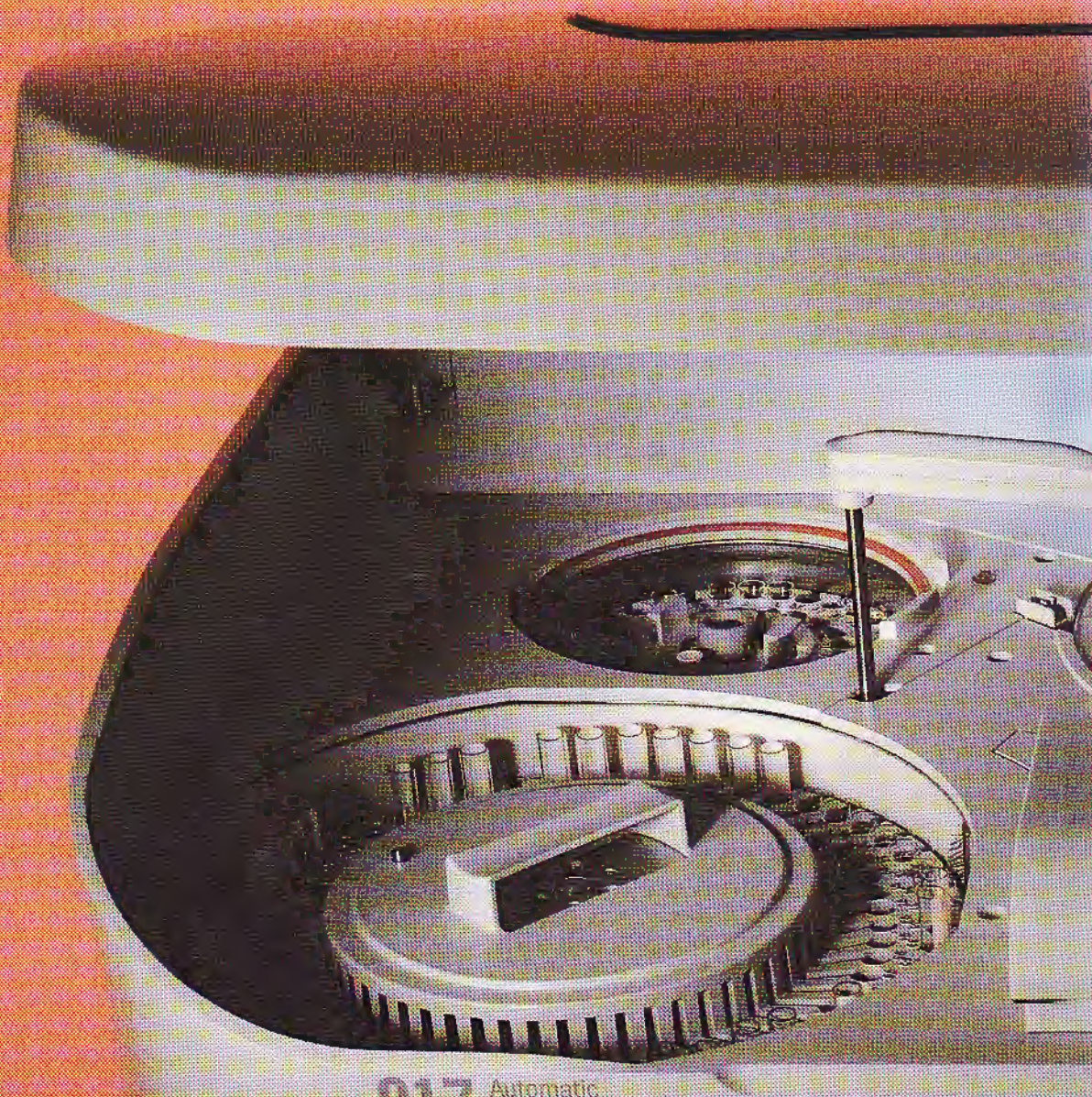

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