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Deconstructing the Laboratory

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NZ J Med Lab Science 2000; 54(1).3-6

As someone more used to being used as a warning, rather than an example, I was somewhat surprised to be asked to give this address. I looked back over addresses given for the last 10 years, and was intimidated by the quality and wisdom displayed in the presentations of my predecessors. I also noted that a high percentage of presenters subsequently go through a career change, not necessarily to their advantage. I then mentioned to a few people whose opinions I respected that I was invited to deliver the Pullar address, and the universal response was, "well for God's sake, whatever you do, don't make it boring." Given the short attention span of most of my colleagues, this is indeed a challenge.

I chose as my title, "Deconstructing the Laboratory" Deconstruction is a term used to describe a process of taking something apart to understand it better. Reconstruction (restructuring) is the process of putting it back together again. If I decided to strip a car down to see how it worked, that would be deconstruction. Reconstruction would be putting my car back together again, a process I am not sure I could carry out. If I wanted to remove one provider from the market, and then introduce competition amongst other providers, I might remove one wheel from the car and then set the remaining three wheels to operate in opposing directions. This would be seen as restructuring the car. So I'm just deconstructing today -don't expect any solutions.

I never met Dr Pullar, and have been unable to establish any link, however tenuous, between us. All agree however, and who am I to argue, that Dr Thomas Pullar, was an exceptional Pathologist, with radical ideas about the elevated place that technologists should occupy in the scientific hierarchy, and the ability and drive to push them into action to achieve it. Boy, do we need more people like him now.

Dr Pullar died in 1966, since his death we have seen major changes in laboratory services.

In the Public Sector, the laboratory can be seen either as a cost centre, part of the cost of treatment of a patient, or a profit centre, earning external revenue for the hospital. The correct role in the current environment is still not clear.

The community laboratories face yet another round of close examination, as well as the pressures of an increasingly competitive marketplace.

Both groups have been affected by common pressures:

- Consolidation: Community providers are forming alliances and mergers. Public Hospitals are merging into larger facilities (Auckland, Wellington, and Christchurch).
- Downsizing: There is a national trend towards reduction of laboratory staffing levels, particularly at provincial level.
- HFA restructuring : The purchaser wants value for money.
- Fragmentation of technical workforce : more staff are going part-time, or lack on-the--job experience .
- Recruitment and retention problems: Staff are more mobile, and are attracted by higher wages in the community sector.
- Capped laboratory budgets.
- Integrated care: This trend will channel money from traditional providers to a range of new options.

In the wider world we have seen the rise of aids, the development of treatments for HIV, the collapse of communism, the invention of the PC, landing on the Moon, the multiplication of bureaucrats, the remote exploration of Mars, and the emancipation of the descriptive analytical word "bugger" by Saatchi and Saatchi

Dr Pullar has been quoted by another speaker as once stating that "if the job is well done, then it is noble." This is a fine sentiment, and I agree with the aphorism. Unfortunately, the reality of 1999 is better summed up as: "Bust your guts and do your best; go down the road with all the rest."

What is wrong with us? First and foremost, we have an identity crisis. We don't really know what we are. Here are some common terms for our profession.

Medical laboratory technologist
Medical laboratory scientist
Microbiologist, biochemist etc
Grade Laboratory Officer
Lab technician
Laboratory worker
Pathology staff

Our professional standing is uncertain, and our fortunes change according to the whims of politicians and our superiors. Right now, our stock is low; as evidenced by the fact that we are now called laboratory workers by the media and some employers, which I consider a demeaning term. Other types of "workers" include sex workers and freezing workers. We don't refer to dentists as mouth workers. - God knows what they'll be calling gastroenterologists. Our professional self-esteem is low, and progress off the bench and into management is mistakenly seen as a step upward by some medical laboratory scientists.

Technologists as a group of professionals rose to prominence during the Second World War. The origins of the technologist are linked to military developments. Military organisation was very lean, partly to allow for the direction of large bodies of troops on the battlefield. The Catholic Church has a similarly lean structure, for similar reasons. Older members of the Institute will recall members of the NZIMLT who were trained in the UK by the British Armed Forces, usually conscripted as part of compulsory military training (CMT) Looking back at previous efforts to manage technologists is interesting, if only to see what not to do. Technologists do well in Wartime.

Britain

Because of the highly technical nature of night bombing and the continual development of countermeasures by the German forces, there was an extraordinary amount of technical equipment aboard a

Lancaster bomber, as I have mentioned in a previous address to the Institute To use this technology, the crew had long and intensive technical training The average crew was older, and more likely than other branches of the armed forces to contain members with tertiary qualifications The formation of a bomber squadron is instructive, given the investment and impact of RAF Bomber Command. Each bomber squadron had a thin senior layer, often with a high percentage of staff who had flown previous tours before promotion to a leadership role. This management layer was responsible for discipline and administrative functions.

An aircrew was self selected during operational training, and recognised as a single entity (what we now call a team.) The statistical odds of surviving a tour with bomber command were 25%; hence there was sufficient inducement to interact quickly and without friction for the survival of the crew. Each bomber crew had it's own ground crew. They were required to maintain the aircraft in top condition at all times, carry out servicing, refueling, bombing up, and instrument maintenance functions

Although an essential component of any operation, they did not participate in operations as aircrew. They were auxiliary support staff. There was a clear distinction between aircrew, groundcrew, and senior command in the squadron hierarchy.

Bomber command was data driven. Raid damage was analysed, and the information used to modify tactics. The horror of area bombing and the toll on civilian populations has been well documented and described elsewhere. Armchair analysts may sit in judgment on the morality of area bombing, but nothing is simple. They were brave men, and no subsequent review can mar the honour of that epitaph

USA

The most obvious example of military use of technical expertise was the Manhattan Project. The aim was to produce the Atomic Bomb. Top scientists and technologists from all allied countries and disciplines were recruited and tightly controlled by a central authority for a single purpose. The project was overseen by the military, but scientists were given full rein on the building of the bomb, and few administrative restrictions were placed on the development of the weapons. The success of that project became clear to the world on the 6th of August 1945. The downside of the Manhattan Project was the proliferation of nuclear weapons and the ongoing World threat of nuclear war.

Germany

Albert Speer was appointed by Hitler to the position of Reichminister for Armaments at the age of 36, Originally an architect, Speer had an extensive background in construction. He was a charismatic individual with an intuitive understanding of the management of scientists. He later commented that his early training as an architect had enabled him to focus on detail and deal with fickle individuals. Speer's job in 1942 was to restructure industry and integrate wartime developmental projects in order to increase efficiency.

Speer freely adapted previous management theories and practices to suit his purposes. He created and led a system for technologists that guaranteed access and interaction with other levels of industry. Scientists were provided with an auxiliary management structure, which allowed free access. Small, independent teams of technical experts were formed to deal with specific projects ranging from development of small arms to rocketry. Speer directed technologists, and protected them from outside interference. During the most intense bombardments of Germany, total armaments production actually rose by 59%. After the War, Speer was tried by the Allies at Nuremburg and sentenced to 20 years imprisonment for his use of slave labour. He was implicated and involved in horrific war crimes. He was lucky to escape the noose. In all of the above examples, the solutions to complex challenges were found through the creation of self-managed teams of technical experts.

In Postwar Japan, the US Occupation Forces began the process of reconstruction of Japanese Industry. W.Edwards Deming was a statistics expert sent by the USA to occupied Japan after the Second World War. In a roundabout way, Deming built on the industrial complex experiences of the Second World War and instituted practices to revolutionise the Japanese economy, in a world no longer preoccupied with destruction. On the basis of his theories and experiences, Deming instituted 14 points for good management. Each of the 14 points precisely addresses a specific aspect of Company culture. These are simple rules for efficient, sensible, and cooperative management.

Dr Deming was interested in data, and critically interested in what people did with it. In his later work, built on the 14 points, he advocated trying to understand and appreciate production as part of an overall system. Appreciation of the system requires some understanding of statistical variation, some understanding of psychology, and an appreciation of the central position of the individual in generation of business. Each of these factors is inter-related and seen as a system.

When the system is in harmony, quality improves. Disharmony creates conflict. The harmonious integration of an individual into a balanced system is a very Japanese concept, thus his ideas were readily adapted in post war Japan, and the implementation of Deming's theories was the single most important factor in the spectacular growth of the Japanese automobile industry.

Deming's ideas have particular application to high-tech specialties and can be discovered easily by a Net Search (using Deming as key word). As examples, the following terse observations taken from his writings on management may ring some bells:

"Fear invites wrong figures"

"Bearers of bad news fare badly. To keep his job, anyone may present to his boss only good news."

"Statistical calculations based on warped figures may lead to confusion, frustration, and wrong decisions."

So, what can we, as Specialists in our various disciplines learn from the mistakes and successes of the past?

Management of Technical Staff

Speer evenly divided technologists into two groups, "some needing stability and security, and the others longing for responsibility, risk, and a chance to compete." The management challenge is to unite these separate personalities and direct each individual according to their psychological makeup. (I classify myself in the latter group, and it came as a bitter truth to me that I would have to accept that key individuals might not willingly wish to adapt themselves to the life of a pirate).

Balance in the workplace is essential. Unless both groups are unified for a common purpose, the organisation will be driving the car with one foot on the accelerator and one hand on the handbrake. Central authority in the management of technical specialists does not, however, seem to be a high priority. Bomber Command and Manhattan project worked under central authority, whereas Speer had remarkable success using an industrial self-responsibility model and limiting central interference. "Remember we have a powerful ally, the enemy also has a General Staff". The common ingredient for success, implicit during the War, and well recognised by successful organisations in peacetime is: Hire the best people, and let them get on with the Job.

The Knowledge-Based Economy

We have heard much recently from the Government on the "knowledge-based economy". Management of technical specialists should aim to ensure complete access to the knowledge produced by the enterprise. The skills of scientists are not easily explained. Our knowl-

edge quotient is high, but our ability to convey the knowledge is low. Additionally, we are discovering the commercial necessity to continually explain what we do, to our customers, our superiors, and to the general public. Knowledge should be easily accessible. Speer once answered a critic of his open office door policy: "Where do you want me to get all this information I need, except by opening myself to all of it, from anybody?"

What is Knowledge?

Knowledge = information + data + technical skills.

Surprisingly, the value of knowledge within a business can be calculated. It is expressed as a ratio of intangible assets (market value) to tangible assets (book value). As an example Microsoft had a book value of 22.4 Billion US dollars in July 1998, at the same period, the share market value stood at 260 Billion US dollars: a ratio of 10:1 The ratio of market value to book value of other business sectors are listed below

Healthcare ratio	= 2.8: 1
Real estate	= 0.8: 1
Tobacco/ beverages	= 2.7: 1

Anything above a ratio of 2:1 is regarded as a knowledge-based industry. Note that healthcare is rated at 2.8:1. (Medical Laboratories were not assessed in the quoted article, and probably have a higher knowledge ratio than general healthcare). We work in a knowledge-based industry.

The knowledge resource

Some business analysts estimate that only 20% of the knowledge available to an enterprise from the employees is utilised. This tacit knowledge is restricted by a hierarchical structure, which tends to resist exploitation of this data simply because the organisation will always resist the bypassing of formal management and hierarchical structures. In other words, hierarchical structures do not encourage a communication pathway that seeks the shortest path between the knowledge holder and the knowledge seeker. (If you think your Organisation has lean flat structure, ask a Diagnostic Company how many different people they have to deal with in the marketing and placement of an instrument. You might well be surprised.)

The mission

All of the above examples of management of technical experts had a purpose, or a mission. What is the mission of a medical laboratory? Put simply, a laboratory helps the doctor to help the patient. (Other functions are add-ons to this task.) In a knowledge-based system, this translates to one crucial step: transfer of knowledge from a knowledge holder to a knowledge receiver. The fewer obstacles interrupting the transaction, the more efficient the exchange becomes.

Direction

It always helps to tell people what the mission is. If technical experts don't know where they are supposed to be going how can you expect them to get there? Deming describes this elegantly in point 1 of his 14 points: "Create constancy of purpose."

Leadership

Once a firm direction is decided, participatory leadership seems to be important. A film director is a good example of participatory leadership. Leaders of climbing expeditions are another. Self-managing teams may rotate leadership according to the situation. Deming stresses that a leader needs to learn the psychology of individuals, the psychology of a group, the psychology of society, and the psychology of change

The System

I assume you understand what a system is, so I won't attempt to define it. The appreciation of a system was seen by Deming as the key to managing it. Knowing how the system works is essential before implementing change. Managing change is difficult. Attempts to restructure any system without extensive knowledge of the internal workings and functional relationships will at best be time-consuming and wasteful, and at worst be doomed.

Knowledge about variation

Deming stressed the need to understand the impact of (statistical) variation on a system. Some understanding of variation, including the appreciation of a stable system and an understanding of causes and consequences of variation are essential skills for management. Assessment of statistical significance will help decide the level of response to a variation. (so will intuition).

What are some variations that can impact on the medical laboratory system?

- Availability of technical labour
- Political will
- Customer behaviour
- Money (funding)
- The unseen (Industrial action, competitive behavior, development of new technologies, etc)

Structure

What management structure is optimal for management of technical experts? Currently the hierarchical management structure is the norm. From time to time, this structure is varied, but radical change is rarely attempted. Most technologists will be familiar with the all too frequent restructuring exercise. My experience is that they may provide justification and meaning for the auxiliary staff, but they destabilise the technical sections and may also distort the information flow.

It is interesting to note the efforts of Barrie Edwards to introduce a commonsense management structure in the early 1990s'. I was impressed by it at the time, but as Barrie would be the first to admit, there was no will or commitment from upper levels to implement the structure. This type of structure is the one most likely to optimise the access to knowledge held within the system. As a rule, flat management structures are difficult to implement, particularly when radical restructuring of management roles threatens the support staff.

Some labs unconsciously use the industrial self-responsibility model favoured by Albert Speer, particularly in satellite laboratories. The few laboratories brave enough to allow and encourage considerable technical autonomy within and across departmental boundaries see positive spin-offs that are evident both to the employees and the customers.

Psychology of technologists

Deming stresses the need to understand the psychology of the worker. Given that technologists are not good at communicating their wants and needs, this can be difficult for the budding manager. In the unlikely event that any non-technical management wannabe has read this far and still wishes to attempt to manage scientists, I congratulate them for their perseverance, and offer the following observations on the psychology of technologists, if not to encourage persistence, then at least to reduce the potential for damage.

1. Motivation

The non-technical manager may use methods ranging from incentives to horsewhipping in an effort to motivate staff. Motivation without understanding the system is pointless. Speer, responsible for the man-

ufacture of both the V.W. and the V2, when asked about the motivation of his technical experts, had this to say: *"I don't know what their incentive was, except perhaps satisfaction? Pleasure in something worked? In any case, the success was all due to them: I was only a layman who knew how to smooth their path and protect them from interference."* In other words, if you don't understand what they're doing, then leave them alone to get on with it. (At least that way, you won't be held responsible for screwing it up)

2. Behavioural Characteristics
- Critical of traditional hierarchies.
- Uncritical receivers of orders.
- Use of jargon.
- Reactionary.
- Resourceful.
- Adaptable.

3. Needs of technologists
- Synergistic leadership.
- A clear task, and the resources to carry it out.
- Sense of purpose
- Support
- Freedom from interference

4. Skills needed for a technologist
- Technical knowledge to complete a task.
- Appreciation of ethics
- Appreciation (understanding) of a system.
- Ability to network.
- Ability to work unsupervised, and in teams

Ethics

In the health System of today, an ethical perspective is essential. We are accountable for our actions. Familiarise yourselves with the code of practice for our Profession. Remember, someday, somewhere, someone may walk up to you and say:
- Did you know anything about what was going on?
- What did you do about it?
- Why not?

(No further questions; you may step down)

Summary

Our self-esteem as professionals is low. Most (but not all) current management structures deliberately undervalue the role of scientific staff. Remuneration rates, particularly in the public sector, further validate this perception. Hierarchical structures dominated by non-technical managers seriously impede access to, use of, and interpretation of data. The critical factor in the success of any laboratory system is rapid and unimpeded access to, and utilisation of the tacit knowledge held by the technologists, scientists, and clinical staff of the laboratory.

Final thought:

We tend not to learn from the past.

"Most people live on a lonely island,
Lost in the middle of a foggy sea,
Most people long for another island,
One where they know they'd like to be."
-Bali Hai
("South Pacific")

Optimising the Effectiveness of Platelet Transfusion Therapy

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Abstract
Platelet concentrates are the treatment of choice for the prevention of life threatening or debilitating bleeding in severely thrombocytopaenic patients. Platelet concentrates can be prepared by either the buffy coat or platelet rich plasma methods, and issued in doses of four to six concentrates, or through collection of an equivalent dose from a single donor by apheresis. The transfusion of platelets can lead to the development of febrile non-haemolytic transfusion reactions in the patient. These are most frequently caused by inflammatory cytokines which are released by contaminant white blood cells (WBC) and which accumulate during storage. A more serious consequence of platelet transfusion is the development of refractoriness following allo-immunisation to blood group, Human Leukocyte Antigens (HLA) and platelet specific allo-antigens. Pre-storage leukodepletion has been proposed as a means of reducing the risks of both these side effects. This treatise will discuss the advantages and disadvantages of various platelet production methods, the effects of storage on platelets, practices to aid in the reduction of both transfusion reactions and the development of refractoriness, and the provision of platelets for refractory patients. It will also discuss recent developments in platelet transfusion therapy published in recent literature.

Key Words
Platelets, Buffy Coat, Platelet Rich Plasma, Apheresis, Cytokines, Leukodepletion, Refractoriness, Allo-immunisation.

Introduction
Platelet products are used in the treatment of thrombocytopaenic patients with risks of bleeding and to treat patients with trauma or surgery related bleeding problems.

More intense treatment scheduling and a widening indication for the use of chemotherapy have seen the use of platelet concentrates increase dramatically during the last twenty years.(1) Platelet transfusion therapy is expensive, the estimated cost of platelet support for haematologic/oncologic disorders is greater than U.S.$2,000 per patient and in platelet refractory allogeneic bone marrow transplant patients it is more than U.S.$15,000 per patient.(1)

Given the increasing use of platelet transfusion therapy, it is important to optimise the use of platelets without compromising patient care, this is particularly important for patients who are receiving prophylactic platelet transfusions as these patients represent the largest number of patients receiving transfusions. There are several areas which can be looked at when trying to optimise the use of platelet concentrates, these include reducing the number of platelet associated transfusion reactions, reducing the number of patients who become refractory or alloimmunised to platelets and re-evaluating the platelet transfusion trigger.

Preparation
Febrile nonhaemolytic transfusion reactions (FNHTRs) are a common adverse effect associated with the transfusion of platelet concentrates.(2) These reactions are thought to be caused by antigen-antibody reactions involving contaminating white blood cells (WBCs) or from the transfusion of proinflammatory cytokines, such as Interleukin (IL)-1â, IL-6, IL-8, and tumor necrosis factor – â-(TNF-â),released into the plasma fraction of platelet concentrates during storage.(3-8) These contaminating WBCs have also been implicated in allo-immunisation to Human Leukocyte Antigens (HLA), transmission of viral diseases such as cytomegalovirus and human T-lymphotropic virus type I, immunosuppressive effects and the occurrence of graft-versus-host disease.(4) It is desirable therefore to manufacture platelet concentrates with as few white cells as possible to reduce the number of adverse transfusion effects associated with platelet transfusions.

Platelet concentrates may be prepared from whole blood donations by either the platelet-rich plasma or buffy-coat derived methods or by apheresis.(9) Of the whole blood derived platelet methods the platelet rich plasma method is more popular in North America, while the buffy coat derived method is more popular in Europe.(9) The platelet rich plasma method has also been favoured in New Zealand, although the trend now appears to be towards buffy coat derived platelet concentrates.

Buffy Coat Derived Method
In 1988 Högman et al introduced the top-and-bottom bag system for blood component preparation, which in turn led to an alternative approach to platelet concentrate preparation.(10)This method involves pooling buffy coats from four donors, and this pool serves as the starting material for the preparation of the buffy coat-derived platelets. Although the platelet concentrates prepared by this method contain WBCs from four donors, Klüter et al(11) and Flegel et al(12) have both reported that no cytokines seem to be generated from in vitro activation of the WBCs during storage of the platelet concentrates. It should be noted however that the lack of cytokine generation is dependent on the number of contaminating WBCs being less than 1×10^9 per L in the buffy coat-derived platelet concentrates.(13) Preparing platelet concentrates by the buffy coat method is a very effective way of reducing the number of contaminating WBCs, buffy coat-derived platelet concentrates have been shown to contain as few WBCs as those filtered prepared by the platelet-rich plasma method.(13) The study performed by Christensen et al showed that in unfiltered platelet concentrates obtained by the buffy coat derived method contained, on Day one of storage, a median of 0.031×10^9 WBCs per L, which equates to approximately $10\text{-}15 \times 10^6$ WBCs per buffy coat- derived platelet concentrate.(11),(12) This low number of WBCs can be even further reduced by filtration of the buffy coat derived platelet concentrates, this study also revealed a tendency towards a lower WBC count in the platelet concentrates on Day 5 of storage.(13)

A further factor which affects the amount of cytokines in the buffy coat derived platelets concentrates is the length of storage time before the buffy coats are pooled and processed. Klüter et al found that cytokine levels were barely detectable after the first twelve hours of storage, and that after twenty four hours elevated levels of IL-8 were found in 25 percent of the buffy coats, however levels of IL-1-â, IL-6 and TNF-â were low. In conclusion of their study they stated that buffy coats storage should not greatly exceed twelve hours, although they also conceded that the levels of IL-8 released after twenty four hour storage were unlikely to cause severe transfusion problems.(8)

Platelet-Rich Plasma Method

Preparation of platelets using the platelet-rich plasma method consists of an initial centrifugation of the whole blood unit at low speed to separate the platelet-rich plasma from sedimented WBCs and red blood cells (RBCs). Studies have shown that it is difficult to obtain complete separation of platelets from WBCs and RBCs and that approximately 15 to 25 percent of the platelets get sedimented into the buffy coat. Some studies have suggested that these larger and heavier platelets may be more haemostatically effective than the platelets suspended in the platelet-rich plasma. A further disadvantage of this method is that 5 to 25 percent of the WBCs will remain in the supernatant platelet-rich plasma, with centrifugation conditions determining the specific percentage.(14)

It is possible however to prepare a platelet concentrate that is WBC reduced before storage by filtration of the platelet rich plasma. This system involves the filtration of the platelet-rich plasma during expression from the centrifuged whole blood unit. In addition to removing the WBCs from the platelet concentrates, this system also has the potential to recover platelets that are just above the buffy coat layer which are generally left with the RBCs. This is possible because expression of the platelet-rich plasma continues after the buffy coat enters the filter, at which time the expression slows dramatically or stops completely.(14) A study by Sweeney et al using an in-line prototype filter in 1994 showed that platelet filtration resulted in a 1 to 3 log10 reduction in WBC content. The variation in WBC reduction was thought to be due to breakthrough effects (flow of the platelet-rich plasma through he edges of the filter housing and failure to traverse the filter fibres) or to the WBC load in the prefiltration platelet-rich plasma. They concluded that the use of in-line platelet-rich plasma filters should allow the production of prestorage WBC-reduced random-donor platelet concentrates without deleterious effect upon the stored cells. Despite the fact that they also observed a 15 percent loss of platelets during filtration, they found that a pooled component of five filtered platelet concentrates would have a platelet and WBC content comparable to that generally available in low-WBC apheresis components.(14)

Apheresis Platelets

A recent trend in platelet transfusion therapy has been a substantial increase in the use of single-donor apheresis platelets.(4-15) This has been driven by the need for adequate platelet inventory to support cardiac surgery and bone marrow transplantation programs, interest in minimizing allogeneic donor exposure for patients, and the desire for leukodepleted platelet products.(15)

There have been three small prospective randomized trials (involving sixteen to fifty-four patients per trial) to determine the relative benefits of providing single random- donor apheresis platelets compared with pooled random-donor platelet concentrates to prevent platelet allo-immunisation. Of these studies, only one showed a significant decrease in rates of platelet refractoriness and lymphocytotoxic antibody formation despite the fact that the number of donor exposures for the patients who received pooled platelets was up to ten times that of patients receiving single random apheresis platelets. Also the Trial to Reduce Allo-immunisation to Platelets (TRAP trial) did not show any benefit of single donor apheresis platelets compared to pooled random-donor platelets .(1)

Leukodepletion

Posttransfusion side effects to platelet transfusions include not only delayed side effects such as viral infections and platelet refractoriness, but also acute reactions that range from fever, urticaria and breathing difficulties to anaphylaxis. As stated previously, the majority of these are thought to be caused by contaminating WBC in the platelet concentrate and have been reported to be preventable by removal of the WBC before storage.(16),(17)

In animal models, prestorage filtration reduces refractoriness and allo-immunisation as well as reducing cytokines which accumulate during storage. Also, depending upon the type of filter, anaphylotoxins such as C3a and C5a, which can be generated during storage, may be adsorbed during passage through the filter.(17) A randomized study by Chalandon et al comparing pre-storage filtration of platelets with post-storage filtration found that pre-storage filtration had several benefits. They found that pre-storage filtration not only reduced the amount of cytokines present in the platelet concentrate but also maintained the pH of the concentrate above 6.8 more regularly than post-storage filtration, which is important in maintaining platelet function and in vivo recovery which are both adversely affected by low pH.(17)

Treatment of platelet concentrates with ultraviolet (UV) irradiation has been investigated as a possible alternative to pre-storage leukodepletion. UV irradiation has been shown to reduce the proliferative responses of lymphocytes to alloantigens and mitogens and studies have shown that it is possible to irradiate platelet concentrates so that the proliferative responses of contaminating leukocytes were abolished whilst the platelets retain acceptable function. In one study, Pamphilon measured pH, lactate evolution and hypotonic stress response (HSR) after irradiating platelet concentrates with 3,000 Joules/m^2 of UV-B irradiation during five days of storage. He found a significant increase in lactate levels in the irradiated platelet concentrates when compared to the control, but the levels were not unacceptable, there were no differences in pH or HSR. However when higher doses of UV-B irradiation 100,000 Joules/m^2) were used there was a marked deterioration in the HSR after 96 hours of storage and a drop in pH. Increased irradiance also caused a drop in the platelet count due to the formation of small aggregates in the presence of fibrinogen and collagen. This study showed that it is possible to prepare platelet concentrates in UV permeable containers and irradiate them so that lymphocyte reactivity is abolished whilst acceptable platelet function is retained. Larger clinical studies have shown a reduction in both HLA allo-immunisation and platelet refractoriness that is statistically significant and equivalent to that achieved with leukodepletion.(18)

Another study showed that irradiating platelet concentrates with UV-A irradiation in conjunction with the use of psoralens had a negligible effect on in vitro platelet function, as determined by a variety of assays including pH, p-selectin expression , aggregation, shape change, hypotonic shock response, ATP release and morphology. The results also suggested that, in addition to inactivating viral and bacterial contaminants in platelet concentrates, the use of psoralens and UV-A irradiation may reduce cytokine-associated FNHTRs by completely eliminating cytokine synthesis by contaminating leukocytes.(19)

Storage

Temperature

It was once a common practice to store platelet concentrates at 4°C, however it was noted that the recovery and survival of the platelets

stored at this temperature were decreased relative to platelets that had been stored at 22°C. It was found that the cold-induced storage lesions include irreversible loss of discoid shape, caused by the depolymerisation of microtubules and the breakdown of platelet contractile protein with loss of ATP. However, cold stored platelet concentrates are haemostatically effective with the ability to rapidly correct bleeding time, whereas there is a lag period with platelets stored at 22°C, such that they may not correct bleeding time for up to 24 hours following transfusion.(20) The vast majority of platelet transfusions are for prophylactic use in patients receiving chemotherapy and platelets stored at 4°C would clearly not be beneficial to these patients. There is now general agreement that platelet concentrates stored at 22°C combined with continuous agitation to enable good gas exchange in an oxygen permeable bag is essential. A recent comparison of the loss of platelet viability during in vitro storage at 22°C and 37°C indicated that the rate of aging at 22°C is substantially reduced to that shown at 37°C. This may be related to the lower metabolic rate during storage at 22°C.(20)

It is important to maintain the storage temperature range of 22 +/- 2°C for platelet concentrates, platelets stored at temperatures below 20°C rapidly lose their viability after infusion. In addition to the change in shape from disc to sphere the platelets, upon rewarming, demonstrate a reduced response to hypotonic stress, some loss of surface GPIb which may be related to microvesiculation, expression of p-selectin, and mitochondrial damage as suggested by increased glycolysis, decreased oxygen consumption, and the loss of ability to synthesize ATP.

Storage Time

In view of the relatively high frequency of transfusion-associated sepsis from bacterially contaminated platelet concentrates, stored for up to 5 days at 22°C, the issue of the temperature of storage remains a focus of interest. It appears that gram positive organisms reach maximum growth by day 3, which is somewhat quicker than gram negative organisms. Therefore, reducing the length of platelet storage before transfusion, with the hope of preventing bacteriologic complications and reducing the associated storage lesion, may prove beneficial.(20)

Riccardi et al found a positive correlation between the age of buffy coat derived platelet concentrates and the risk of transfusion reactions, with an important increase from the third to the fifth day of storage.(21) This finding is in agreement with other studies showing a progressive increase of frequency of transfusion reactions during storage of platelet concentrates prepared by the platelet-rich plasma method.(7) This increase in risk is probably due to the release of cytokines by contaminating WBCs during storage and may be reduced by pre-storage leukodepletion. In addition, it was found that buffy coat storage for two days prior to platelet concentrate preparation was associated with a risk of transfusion reactions twice that of buffy coats stored for one day, although this difference did not reach significance.(21)

pH

It is well known that pH levels below 6.0 to 6.1 during storage of platelet concentrates are associated with total loss of viability. A lesion associated with a fall in pH is a disc-to-sphere transformation which occurs at pH levels of 6.7 and below, and which is irreversible at pH below 6.2, swelling is also observed together with a reduced HSR. Recent studies have shown that p-selectin expression follows the reversible/irreversible morphological changes observed with fall in pH during storage. The use of gas permeable containers for platelet concentrates combined with continuous agitation aids in maintaining a viable pH. However it has been found that storage of platelets on an elliptical (ferris wheel) rotator results in a loss of viability when compared to storage on a flatbed to-and-fro agitator. Associated with the loss of viability is a loss of discoid shape and a decrease in HSR.(22)

Storage in a Synthetic Medium

The storage of platelets in a synthetic medium was first reported by Rock et al in the mid 1980's and subsequently proposed by others with some slight variation in composition, using a variety of different salt solutions. In principle, the removal of the plasma from platelet concentrates results in the removal of plasma enzymes reducing their proteolytic effect on the platelet membrane, in particular glycoproteins Ib/IX/V and IIb/IIIa complexes that are essential for the adhesion of platelets and for their participation in the aggregation response. It has also been reported that the use of synthetic storage media with inhibitors is associated with improved viability, reduction of bacterial content, and better maintenance of other in vivo parameters.(20)

Holme et al studied storage of platelet concentrates in a synthetic medium composed of a physiologic concentration of electrolytes, fortified with glucose as fuel for energy and bicarbonate for buffer. They found improved in vivo viability, when compared to storage in plasma, which was associated with improved maintenance of platelet discoid shape, improved HSR and a decrease in lactate production per platelet. In addition, better maintenance of oxygen consumption rate, GPIb, and ATP levels were also found.

Storage in a glucose-free synthetic medium resulted in loss of viability at 5 day storage as compared to storage in plasma. Loss of viability was again found to be related to a reduction of discoid platelets and decreased HSR. In addition, decreased ATP levels were found, while the oxygen consumption rate was not affected.(22)

Cryopreservation of platelet concentrates is currently done using 6% dimethylsulphoxide and is generally only performed on HLA or platelet matched platelets required for patients with HLA or platelet antibodies. The in vivo percentage recovery of cryopreserved platelets is only about 50% of that seen in fresh platelets. Several platelet in vitro lesions have been found including reduced HSR, disc to sphere formation, and p-selectin increase when compared to plasma stored platelet concentrates stored for five days under currently optimal conditions. Owen et al also demonstrated reduced GPIb and decreased adhesive properties.(22) It would appear, therefore, that cryopreserved platelets have little place in platelet transfusion with the exception of providing typed platelets for those patients undergoing long term platelet therapy.

Transfusion

Transfusion Trigger

To determine when platelet transfusions are needed, it is important to understand how platelets are involved in maintaining normal haemostasis. It has been postulated that platelets maintain haemostasis by plugging gaps in the endothelium of blood vessels. Electron microscopy studies have shown a thinning of the endothelium cells with gaps between the cells in rabbits with severe thrombocytopaenia.(23) Others have proposed that that endothelial cells retract and expand intermittently leaving uncovered gaps on the subendothelial basement membrane. Thus, there may be a continuous use of platelets to prevent extravasation of red cells through these gaps. Animal studies have shown a clear correlation between the amount of thrombocytopaenia and the amount of spontaneous haemorrhage into the lymphatic system.(1)

Two mechanisms of platelet removal from the circulation have been identified, the majority are lost by senescence after living out their normal lifespan (approximately 10.5 days), however, a small fixed fraction of about 7.1 x 10^9 platelets/L/d are removed randomly, presumably to provide for the endothelial supportive function.(23) There is a direct relationship between platelet counts and platelet survival in

thrombocytopaenic patients with a platelet count below 100 x 10^9/L. As the platelet count decreases, an ever-increasing percentage of the available platelets are required to meet the need for haemostasis, rather than living out their normal lifespan resulting in reduced platelet survival in thrombocytopaenic patients.(1)

There are two issues that are important to consider when planning prophylactic platelet transfusion therapy: one is the trigger level used to initiate therapy; and the other is the dose of platelets used for each transfusion. Both of these factors may directly influence the number of platelets transfused during a thrombocytopaenic interval, and thus, transfusion costs.

Reductions in platelet therapy can be made through changes in indications (trigger or decision points) used to initiate therapy. Most clinicians use the patient's platelet count as an indicator for transfusing platelets rather than transfusing some fixed number of platelets per day. Although a 20 x 10^9/L platelet count has often been used as an indication for prophylactic platelet transfusions in chronically thrombocytopaenic patients with decreased platelet counts, there is little direct evidence to substantiate this practice.

Five recent studies (1). have evaluated prophylactic platelet transfusion therapy given at platelet counts of 10 x 10^9/L versus 20 x 10^9/L. Three of these studies were randomized prospective trials and two were nonrandomized. Uniformly these studies showed no increase in bleeding risk or red cell transfusion requirements using the lower transfusion trigger with substantial decreases in the number of platelet transfusions required and the associated costs.

Another reason for considering the use of a lower transfusion trigger level is the effect of platelet transfusions on thrombopoietin levels.(24) The recent identification of thrombopoietin, the primary regulator of platelet haemostasis, has allowed thrombopoietin levels to be measured in a variety of settings and to also determine the localization of its receptor on different cell. It has been determined that the thrombopoietin receptor cMpl is located on both megakaryocytes and platelets (25). It has been postulated that there is a relatively constant amount of thrombopoietin produced; as long as the platelet count is normal, only a small amount of thrombopoietin produced is not adsorbed by the circulating platelets and remains available to interact with bone marrow megakaryocytes or earlier progenitor cells to stimulate new platelet production. However, at low platelet counts, more thrombopoietin is available to stimulate the production of greater numbers of platelets to re-establish normal platelet counts. In a rabbit model, animals were made thrombocytopaenic by the administration of busulfan.(24) As the platelet count decreased after the busulfan, there was a reciprocal increase in the thrombopoietin level. However, if the thrombocytopaenic animals were given a platelet transfusion, there was an associated dramatic decrease in the thrombopoietin level showing that the transfused platelets adsorbed thrombopoietin.(1) From this, it could be hypothesized that the administration of as few platelets as possible, consistent with the maintenance of adequate haemostasis, would be associated with the earliest return of autologous platelet production.

Transfusion Dose

The circulating platelet count directly influences platelet survival(26), therefore it is not surprising that the higher the post-transfusion platelet count, the longer is the interval between transfusions. Instead of giving large infrequent doses of platelets, an alternate, although untested, strategy might be to just provide the minimum number of platelets needed every day to meet the platelets' endothelial supportive function; e.g. two platelet concentrates per day. This would require no pre-transfusion and post-transfusion platelet counts and, if bleeding occurred, a further transfusion of platelets would be expected to control bleeding. In studies that provided only therapeutic platelet transfusions, these transfusions were able to control bleeding, and there was no increase in haemorrhage, morbidity or mortality compared to a prophylactic platelet transfusion programme.(27) Which of many possible platelet dosing strategies will prove the most cost-effective in terms of the total cost of platelet therapy (e.g. the cost of the platelet product, monitoring platelet counts, transportation costs, nursing and laboratory technician time, order processing, preparation, and distribution charges etc.) will require careful analysis.

ABO Compatibility

A and B antigens are expressed on the surface of the platelets.(28) To determine the effect of ABO mismatching on platelet allo-immunisation, forty leukaemic patients undergoing induction chemotherapy were randomly assigned to receive two sets of paired transfusions of ABO-compatible or ABO-incompatible pooled random- donor platelet concentrates.(29) Although there were no differences in platelet responses to the first set of transfusions, the corrected count increments for the second ABO-compatible transfusions averaged 14 x 10^9/L, compared with 9.5 x 10^9/L for the ABO-incompatible transfusions.

In another study, twenty-six patients undergoing treatment for acute leukaemia or autografting for relapsed Hodgkin's disease were randomly assigned to receive either ABO-compatible or ABO-incompatible platelets.(30) Platelet refractoriness was significantly lower in the group receiving ABO-compatible platelets. Only one of thirteen patients (8%) who received ABO-compatible platelets became platelet refractory compared to nine of thirteen (69%) who received ABO-incompatible platelets.(1)

Patients who received ABO-compatible platelets not only did not increase their anti-A or anti-B titres, but they also developed lymphocytotoxic and platelet-specific antibodies at a much lower rate than the patients who received ABO-incompatible platelets. The repeated administration of ABO-mismatched platelets produced a significant increase in anti-A/B titres in seven of thirteen patients (54%) that were generally correlated with poor platelet increments. In addition five of thirteen recipients (38%)of the ABO-mismatched platelets developed lymphocytotoxic antibodies and four of thirteen (31%) developed platelet-specific antibodies compared with only one of thirteen (8%) and one of thirteen (8%), respectively, of the recipients who received ABO-compatible platelets. The close temporal association between the development of HLA and platelet specific alloantibodies and increases in anti-A/B titres suggests that in the process of responding to the ABO-incompatible antigens, recognition of other antigen incompatibilities also occurred. The data from these two studies suggest that providing ABO-compatible platelets may be a simple method of decreasing the incidence of alloimmune platelet refractoriness.

A further consideration in the use of ABO-incompatible platelet transfusions is the increased use of single-donor apheresis platelets. Whilst a single random-donor unit of platelets contains approximately 50 mls of plasma, a single-donor apheresis unit may contain up to 300 mls. It is my opinion that all group O single-donor apheresis platelet concentrates should be tested for high titre anti-A/B haemolysins and any that found to be positive should only be transfused to group O patients. I believe that this is the safest practice since cases of acute haemolysis following the transfusion of plasma-incompatible platelets have been reported.(31)

Selection of platelets for patients who are alloimmunised or become refractory to random-donor platelets.

Thirty to seventy percent of multiply transfused thrombocytopaenic patients become refractory to random-donor platelets , and patients treated for malignant haematopoitic disorders are particularly likely to

become refractory to platelet transfusions.(32-35) HLA-matched and crossmatch-compatible platelets are two blood components typically used to provide support for alloimmunised, thrombocytopaenic patients who are refractory to randomly selected platelets.(36)

The use of HLA-matched and crossmatch-compatible platelets is theoretically justified for patients in whom platelet allo-immunisation is the cause of refractoriness to randomly selected platelets. Crossmatch-compatible platelets have the advantage of being more readily available and less expensive than HLA-matched platelets(35), and platelet crossmatching by the solid-phase red cell adherence method should detect antibodies directed against ABO antigens and platelet-specific antigens, in addition to antibodies directed against HLA antigens.(37)

There are several alternative solutions for the treatment of patients who have become refractory to random-donor platelets, these include:

High-Dose Intravenous Immunoglobulin (IVIG)

High-dose IVIG increases platelet counts in patients with autoimmune thrombocytopaenia.(38) Several short reports have mentioned more or less beneficial effects after using IVIG in alloantibody-induced platelet transfusion refractoriness.(39) A randomized double-blind placebo-controlled study in twelve alloimmunised patients showed significant higher 1-hour post transfusion increments but there was no difference in platelet survival after 24 hours. Improvement of platelet increments was only seen after very high dosages of IVIG (> 5g/kg) and was less effective in severe alloimmunised patients.(40) Because of the high costs and its transient effect, this approach is not suitable for routine use but can be considered in case of life-threatening bleeding.

Immune Suppression

There is some evidence from studies in small numbers of alloimmunised patients and animal models that immune suppressive therapy, such as cyclosporin A and anti-thymocyte globulin may reverse alloimmunisation. However, as decrease of the antibodies requires at least two to three weeks of drug administration, this approach is not appropriate for patients in need of immediate effective platelet support.(41)

Antifibrinolytic Agents

In a double-blind study in twelve patients with acute promyelocytic leukaemia, inhibition of fibrinolysis by the use of tranexamic acid was shown to reduce the number of haemorrhagic periods without the occurrence of thromboembolic complications.(42) Another agent, aprotenin, acts as a potent plasma kallikrein inhibitor and can prevent kallikrein induced fibrinolysis.(41)

Removal of HLA Antigens from Platelets

Elution techniques with chloroquine or citric acid have been used to remove HLA antigens from platelet membranes. Shanwell et al(43) reported the first successful HLA-eluted platelet transfusions in an HLA-alloimmunised patient. It was demonstrated that the degree of HLA reduction varies, which raised doubts about the application of HLA-eluted platelets for transfusion purposes.(44) Recently, developments have been made in the standardisation of HLA reduction after acid elution.(45) Acid-treated platelet transfusions were successfully used on a small scale.(43),(46),(47) Although HLA reduction from the platelet membrane is feasible, platelet quality can become critically affected. Further investigations are still needed to develop HLA-eluted platelet transfusions for routine transfusion purposes.

Cryopreservation of Autologous Platelets

If donor availability is scarce, one can consider taking apheresis platelets from the patient in a period of bone marrow recovery and preserving these platelets for periods of thrombocytopaenia.

Alternative Therapies

Platelet transfusions are associated with several adverse effects, including FNHTR, viral transmission, allo-immunisation and platelet refractoriness, the platelet concentrates also have a very short shelf-life. This has led to a search for alternative therapies for thrombocytopaenic patients.

Thrombopoietin

Thrombopoietin promotes megakaryocyte progenitor expansion and maturation and acts on both early and late progenitor cells. The addition of thrombopoietin to enriched populations of murine haematopoietic stem cells and progenitor cells in vitro results in the generation of megakaryocytes. It also supports the proliferation of megakaryocyte colony forming units (CFU-Meg) in a dose-dependent manner. Thrombopoietin also stimulates megakaryocyte maturation, as evidenced by a large increase in ploidy of megakaryocytes exposed to this factor.(48) Recombinant thrombopoietin (PEG-rHuMGDF) is a form of thrombopoietin that has been modified by the removal of a portion of the protein and addition of polyethylene glycol.

The biological activity and safety of PEG-rHuMGDF for haematopoietic support in patients undergoing cancer chemotherapy has been examined in several trials.(49),(50) The results of these trials are promising, however the role of PEG-rHuMGDF in the prevention of platelet transfusions remains to be determined.

Interleukin-11

Interleukin-11is a thrombopoietic growth factor whose major in vitro actions result from synergistic interactions with other growth factors. IL-11has a key role in the regulation of haematopoiesis and is capable of stimulating haematopoietic progenitors in the myeloid, erythroid, and megakaryocytic lineages(51). Except for mature platelets, all stages of cells in the megakaryocyte lineage are stimulated by IL-11.(52)

Results from studies recently reviewed by Du and Williams(53) indicate that IL-11 acts on primitive stem cells as well as early and late megakaryocyte progenitors. It has no independent effect on murine megakaryocyte colony formation, but it can stimulate the proliferation of human megakaryoblastic cell lines in a dose-dependent fashion. IL-11 also synergises with IL-3 to enhance the growth of both murine and human megakaryocyte colonies as well as the size and ploidy of constituent megakaryocytes. IL-11 also stimulates the maturation of megakaryocytes, ultimately increasing platelet production. Several trials have been carried out to test the efficacy and safety of a recombinant IL-11 (rhIL-11) in patients at risk from thrombocytopaenia.(54),(55),(56) The results of all the trials have been good, with some of the most compelling evidence coming from the trials carried out by Isaacs et al. They carried out a randomized, blinded, placebo-controlled trial of rhIL11 in patients with high-risk primary or metastatic breast cancer undergoing dose-intensive chemotherapy with cyclophosphamide plus doxorubicin. Of the seventy-seven patients entered in the trial and included in the intent-to-treat analysis, forty were randomized to rhIL-11 and thirty-seven to placebo. Sixty-eight percent of the rhIL-11 group avoided platelet transfusions compared with forty-one percent of the patients in the placebo group. Evaluable patients in the rhIL-11 group received an average of 0.8 platelet transfusions as compared to 2.2 in the placebo group. The study showed that rhIL-11 is effective in reducing treatment associated thrombocytopaenia and decreases the need for platelet transfusions in patients undergoing sequential cycles of dose-intensive chemotherapy.(55)

Platelet Substitutes

Several substitutes for intact viable platelets have been investigated

and debated for their clinical potential. Chao et al(57) reported the successful use of platelet membrane microvesicles in rabbits and Galán et al(58) have investigated the use of synthetic phospholipids as a viable substitute for platelet concentrates. Further study is still needed to define whether these substitutes will provide an acceptable alternative and are able to provide a long-lasting haemostatic effect in patients with aplastic thrombocytopaenia.

Conclusion

The requirement for platelet transfusions has increased markedly in the past ten to twenty years and is likely to continue to do so, primarily because of the requirement for platelet support in patients who become thrombocytopaenic while undergoing dose-intensive chemotherapy. Platelet transfusions are associated with many adverse effects including FNHTRs, alloimmunisation, platelet refractoriness, the risk of transmission of bacterial, viral and perhaps other infectious disease. The risk of many of these can be significantly reduced by leukodepletion, especially if it is carried out during the manufacture of the platelet concentrates, or by treatment of the platelet concentrates with UV irradiation.

Whilst many of these risks may be reduced by leukodepletion there are further means by which we can reduce some of the adverse risks of platelet transfusions, transfusing ABO-compatible platelet concentrates has been shown to reduce the risk of platelet refractoriness, and transfusing platelets that are fresh may reduce the number of FNHTRs in transfusion centres where pre-storage leukodepletion is not carried out.

In addition to the adverse effects listed, platelet transfusion therapy is expensive and in addition has the potential to interfere with delivery of chemotherapy, both on time and at desired doses, thus potentially compromising the outcome of the treatment. It is these limitations, combined with the adverse effects mentioned, that has prompted the development of agents with the potential to stimulate platelet production, thus reducing or eliminating the need for platelet transfusions. Both IL-11 and thrombopoietin have demonstrated potential effectiveness in clinical trials, however further research is needed to firmly establish the clinical value of these thrombopoietic growth factors, in the setting of myelosuppressive as well as myeloblative therapy. The ultimate goal of this research would be to develop agents that would completely eliminate the need for platelet transfusions in patients receiving chemotherapy. Until that time arrives we must continue to try and optimise the use of the platelet concentrates currently available, by evaluating our manufacturing processes, particularly in regard to leukodepletion or leukoreduction, ensuring that the platelets are stored under optimal conditions and continually evaluating our current practices.

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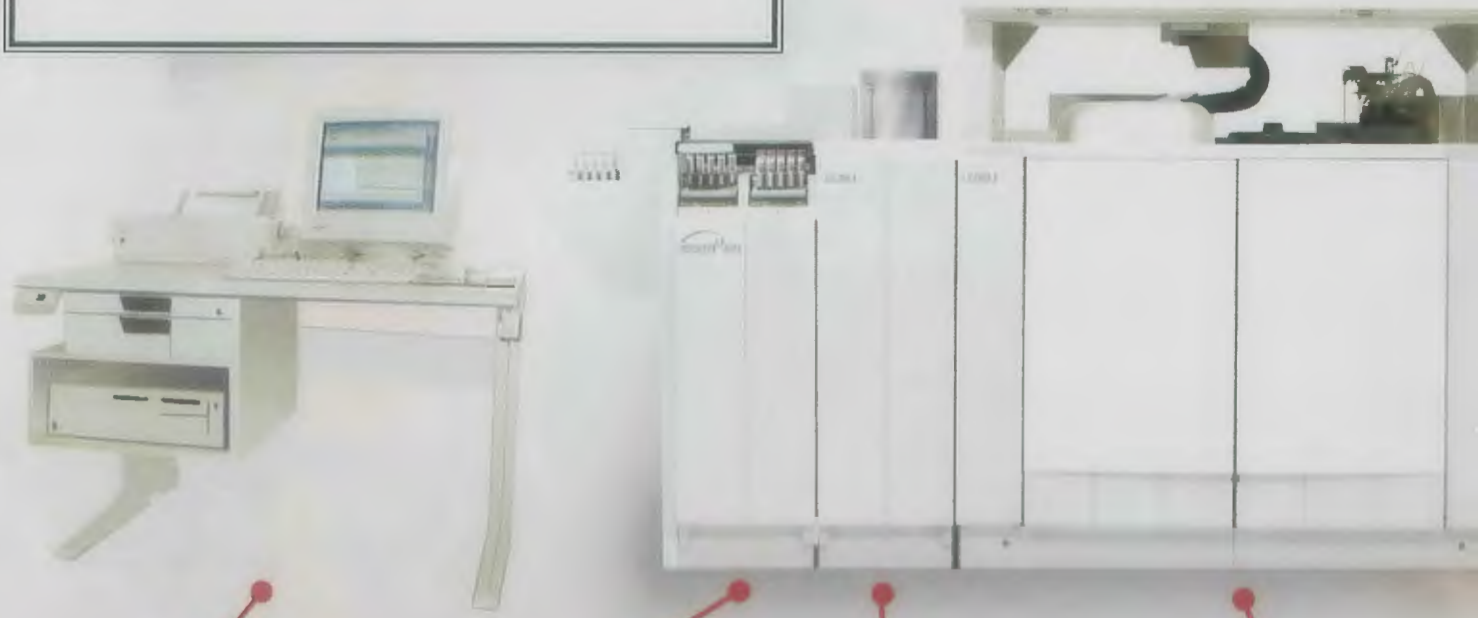

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Editorial
"Have To" or "Want To". Challenges for the 3rd Millennium

Anne Paterson, President NZIMLS
Microbiology Department, Lakeland Health, Rotorua

NZ J Med Lab Science 2000, 54(1) 16, 18

Desiderata includes in its advice: *"...Keep interested in your own career however humble, it is a real possession in the changing fortunes of time. Exercise caution in your business affairs, for the world is full of trickery. But let this not blind you to what virtue there is; many persons strive for high ideals; and everywhere life is full of heroes..."*

The professionals stay interested in their profession, seek to positively evolve and mature the profession and their place in it. They promote and practise the standards and values presented in their Code of Ethics in a world dominated by commercialism.

The first challenge

The first challenge for our profession in the 21st century and the beginning of the 3rd millennium is for all of us to be first, professional. Our training knowledge, skills and developments belong first to the profession. Businesses, whether private or public purchase this expertise by employing professionals. Although clashes may occur from time to time, ultimately it is loyalty to being professional first that strengthens the profession and the place of the profession within the workplace, the health sector and society. Just as a lawyer, accountant or teacher is expected to give the best professional performance, so are we. And just as other professions must deal with poor practise, inadequate standards and factory mentalities of "I'm here for the pay only" so must we. Our challenge is to ensure all mentors of our profession promote and practise Medical Laboratory Science according to our Code of Ethics, for the very survival of our profession. Survival of our, or any profession, requires clear, authoritative and progressive maturation. All practitioners in the field of medical laboratory science must participate in positive evolution, advocating the standards, values and ethics by which our profession and therefore we retain our reputation and standing in society.

To stay interested in our careers what better vehicle to use than our own professional body. The New Zealand Institute of Medical Laboratory Science (NZIMLS). What else unites or has the potential to write professionals if not their own professional body to whom the first commitment is the welfare and benefits of its members. All must recognise that the NZIMLS functions and activities binds us and our unique disciplines together, to affirm our common foundation and claim our right to representation in the national arenas.

The second challenge

The second challenge for our profession in this 3rd millennium is for all medical laboratory scientists to belong to the NZIMLS and all to utilise the opportunities if offers to the full. The NZIMLS is like any vehicle. It can sit in the saleyards, you can buy it and it can sit in your garage but to get the full benefits, one has to get in and drive it. Sometimes being the passenger, perhaps attending the Annual Scientific meeting or reading the Journal (*N Z J Med Lab Science*), and sometimes being the driver, presenting a paper or getting one published. Driving a vehicle takes effort and concentration and so does personal professional growth.

There are so many varied opportunities to be a driver within our profession:

- Testing a hypothesis, refining a protocol and presenting the development to professional colleagues.
- Writing up the interesting case history that struggled to diagnosis to benefit the next patient with that illness.
- Supporting a Special Interest Group (SIG) of the NZIMLS by contributing organisational, treasury or promotional skills that facilitate the dissemination of knowledge within our profession.
- Becoming a part of the governance of the profession administering the various operations and maintaining communications with other relevant groups, eg Ministry of Health, Universities, Registration Board.
- Most importantly, being a worthy role model to others.

The opportunities offered to by the NZIMLS are many and varied, however can be summarised as:

NZIMLS

Opportunity to:
network
socialise
continue education
develop personally
develop professionally

So "network" with fellow professionals - put aside commercial barriers in the pursuit of sharing professional excellence with your colleagues.

"Socialise" - enjoy fun and fellowship as you unwind from a scientific forum.

"Participate" in Continuing Education" - be a learner or leader as appropriate.

"Develop personally and professionally" - be proud of who and what you are.

A professional body, just like a golf club, can only offer opportunity. The ability to take up our professional opportunities is apparent via the qualifications we hold. The third ingredient with opportunity and ability is the motivation to make the most of what the NZIMLS offers and must be triggered within each one of us.

The NZIMLS provides the infrastructure to ensure scientific meetings at regional, national and international levels. It financially underwrites these meetings and through the executive office provides administrative support as appropriate and/or required. For example, laboratory contact lists. In the current climate of takeovers, mergers, joint ventures and alliances, just maintaining a list of current laboratory titles, addresses and contact people requires significant voluntary effort and time commitment from colleagues in the workplace coordinated by the work of the Executive Officer employed by the NZIMLS.

The national laboratory list is utilised by SIGs, conference organisers, graduates looking for employment etc.

The Executive Officer and Executive Office of the NZIMLS is the central mechanism and constant point of reference in a voluntary and therefore changing succession of representatives whether they be the President, Regional Representative or a SIG Convenor, staffed during all business hours, it is the administrative work horse and reference resource for all NZIMLS business, from examination timetables and syllabi to the various scientific events and their programmes. An alternative source of communication is the NZIMLS website www.nzimls.org.nz maintained through the efforts of volunteer colleagues and our executive office.

All professionals and their societies must continually strive for 100% of their potential members to achieve challenges one and two. Our profession has many that do toil to achieve these, congratulations to you.

The third challenge

The third challenge facing our profession is peculiar to medical laboratory science at this particular point in time is a here and now challenge. This hurdle is that of the pure discipline specialist and a need to progress to the multi-expert or multi-expert team. We need to rethink and possibly repackage how we present medical laboratory science.

Having spent the past 50 years proving just how different the specialist disciplines are, we need to take note of the emerging trends. Public drivers are dictating that care is more seamless and illness focussed. In serving our clients, chiefly clinicians, we must become more flexible to respond to the demands of specialist investigative work.

We need to increase our communication, co-operation and spectrum of expertise across our disciplines to offer a coordinated valued laboratory science service. For example, while the diagnosis of the leukemia, breast cancer or diabetes may be within one discipline, the management and monitoring of that patient does not. Specialist expertise will still be needed but our challenge is to respond to this illness oriented management trend and seek to co-ordinate our various expertise into packages that will pre-empt client demand or worse miss the opportunity to fill the niche. So while SIGs have a deservedly recognised role within our professional body, the challenge for this century will be to find the balance between the specialist expert and the multi-expert team.

A good starting place may be to maintain SIGs and devote the Annual Scientific meeting to multi-discipline fora on specific illness. This learning and sharing of expertise can be transplanted back into the workplace thus taking us a full circle to the first challenge of being a responsive proactive evolving professional. Disciplines within medical laboratory science wax and wane through technological advances and economic drivers but although the boundaries and structures within our work may change, the purpose and need for the medical laboratory scientist does not. All of us are in the business of the translation of some form of organic material into words and/or numbers. The clinician needs and uses all of us in combinations that change with the disease and the patient. So lets not leave it just to the doctors and nurses to run seminars on management of the patient with respiratory illness, arthritis or the aged. We have the resources and ability to cohesively present the medical laboratory scientist(s) as a constructive contributor to any and all of these illnesses focussed teams.

It will mean breaking down barriers of ownership, such as the New Zealand Blood Service is establishing and recognising the need for increased overlap of knowledge between superficially separate disciplines. It will mean expanding our expertise and constantly adjusting to accommodate our different clients. But the return will be an enhancement of our status within the health team.

We are professionals!

As professional, all of us are obliged to uphold our Code of Ethics. We devalue ourselves if we are not firstly professional.

We need everyone to be active in our professional body, NZIMLS. As the only vehicle totally dedicated to serve our interests. Each one of us should seek to take up the opportunities for personal and professional growth.

Having achieved such a depth of specialist knowledge, we must now be responsive to current trends of disease focussed care and adapt ourselves to fill these niches, without losing our depth of expertise.

We are a complicated team of diverse skills and knowledge who must synchronise our efforts to fulfil our own NZIMLS mission statement

"The New Zealand Institute of Medical Laboratory Science is the professional organisation that represents medical laboratory scientists. It has an ongoing commitment to promote professional excellence through communication, education and a code of ethics to achieve the best possible laboratory service for the ultimate benefit of the patient."

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ADVIA™

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Dear Customer,

April 2000

Welcome to Bayer Diagnostics New Zealand!

The purpose of this letter is to inform you of the mutually agreed decision that Bayer will acquire the business of SCIANZ Corporation and integrate it with Bayer NZ Ltd to create Bayer Diagnostics as a direct organisation in New Zealand.

Bringing Bayer Diagnostics in New Zealand direct to you the customer will be under the leadership of Mr Paul Gibson, Customer Relations Manager who is based in Auckland. Mr Barry Jones, Managing Director of SCIANZ Corporation will continue in the New Zealand operations keeping close contact with you as well as ensuring a successful transition to the new structure. Barry is also responsible for the Australasian Region business development programs, sourcing new products for the portfolio of Bayer Diagnostics.

The prompt but careful completion of these changes ensures that you will experience no disruption to existing support levels, rather, we are now planning for improvements in our service to you.

Bayer Diagnostics is committed to providing the best support in our industry, as measured by you, our customers. You will find that the people in our new organisation are outstanding in their skills and drive to satisfy your requirements. In most cases, the same dedicated people you've known before with SCIANZ Corporation will continue to address your needs as part of Bayer Diagnostics.

What does Bayer Diagnostics offer to you? With a portfolio covering clinical chemistry, immunoassay, laboratory automation, haematology, urinalysis, haemostasis, critical care, histology and infectious disease serology, we provide one stop service for meeting the broadest range of needs. Especially exciting is the incredible selection of new products just released, or coming soon in 2000. New stand alone and integrated platforms for biochemistry, haematology and immunoassay offer break-through solutions to all laboratories. We also will continue to combine this extensive range with our Lab Consulting services, to ensure you get the maximum benefit from workflow and productivity improvements.

In closing, we look forward to sharing a very exciting and successful 2000 with you. To make this happen we believe that proactive and ongoing communications is one of our highest priorities during the introduction of Bayer Diagnostics. If you have any questions, please contact us directly and we invite you to visit our website, www.bayerdiag.com, for continuous updates on Bayer Diagnostics.

I'd appreciate your feedback on concerns or issues you may have regarding the change from SCIANZ Corporation to Bayer Diagnostics.

Please contact our office directly on **(09) 415-4240** or **0800 724 269**

Yours Sincerely

George Nearchou

General Manager
Diagnostics Business Group – Australia & New Zealand

How Accurate is Data in Abstracts of Research Articles?

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NZ J Med Lab Science 2000, 54(1):22-23

Abstract

Objective. A previous study has identified errors in abstracts of published scientific articles. The aim of this study was to determine the accuracy of abstracts of scientific articles published in the New Zealand Journal of Medical Laboratory Science.

Methods. All abstracts of scientific articles published in the New Zealand Journal of Medical Laboratory Science from March 1995 to November 1999, that had data, were checked for accuracy by the author.

Results. Five out of 17 scientific articles contained one or more errors in the abstract, giving an abstract error rate of 29.4%.

Conclusions. Some articles published in the New Zealand Journal of Medical Laboratory Science have erroneous abstracts. Authors have a responsibility to ensure accuracy of their abstracts.

Keywords.

Abstracts, accuracy

Introduction

A published article represents the final account of a scientific study. The reader can be expected to assume that the article is accurate in all aspects. Previous studies have shown that references in published articles frequently are erroneous (1-5). Also, references cited in the article are often misquoted (3-5). One major component of a scientific article is the abstract. It is the most frequent and often the only part of the article that is read. The abstract should provide a concise summary of the article. It comprises the rationale of the study, the methods used, the main results obtained, and the main conclusions or recommendations of the authors.

A recent study has shown that errors also occur in abstracts (6). Pitkin and colleagues studied the abstracts of research articles in six leading medical journals (the *Annals of Internal Medicine*, the *British Medical Journal*, the *Journal of the American Medical Association*, the *Lancet*, the *New England Journal of Medicine*, and the *Canadian Medical Association Journal*). They found that between 18% to 68% of scientific articles contained errors in the abstracts in these six journals. Abstract deficiencies were defined as data in the abstract being inconsistent with that in the article's body, or data being included in the abstract that was not mentioned in the body of the article.

The purpose of this study was to determine the accuracy of data in abstracts of research articles published in the New Zealand Journal of Medical Laboratory Science in the preceding five years.

Methods

All articles published in the *New Zealand Journal of Medical Laboratory Science* from March 1995 to November 1999 were selected for the study. Only scientific articles that had an abstract, and data in the abstract, were studied. For each article, the abstract was carefully scrutinised by the author. Data, and other information, in the abstract were verified for accuracy against the source of the data and information in the body of the article (methods, results, figures, and tables). An abstract was deemed inaccurate if the data or information in the abstract differed from that in the body of the article, or if data or information present in the abstract did not appear in the body of the article.

The number of articles with errors in the abstract was recorded together with the number of errors per abstract, and the percentage abstract error rate was calculated.

Results

During the five-year period chosen for the study (1995 to 1999), there were 17 scientific articles published in the *New Zealand Journal of Medical Science* that contained abstracts with data. Of these 17 articles, five contained errors in the abstract, giving an abstract error rate of 29.4%.

Of the five articles containing errors in the abstract, one article' abstract contained four errors, the other four articles contained only one error in the abstract. All but one error involved data in the abstract which differed from that in the body of the article.

Discussion

The main finding of this study was that five out of 17 articles with abstracts containing data, had one or more errors in the abstract. The 29.4% abstract error rate compares to the only other published study on abstract accuracy, which found an abstract error rate of between 18% to 68% in six leading medical journals (6). A limitation of the present study may be the small number of articles studied, making a direct comparison with Pitkin and colleagues study (6) possibly not valid. They studied 44 articles in each of the six journals. This was calculated from their previously published preliminary observations that to find between 25% to 50% of articles with abstract errors, a sample size of 44 articles would have to be studied to detect a statistically significant difference at the 80% power level (7). Despite the limitation of the present study in only studying 17 articles, a significant number of these articles contained errors in the abstract.

The abstract of a scientific article is frequently the only part of an article that is read. Because it is in reality a mini-article in itself, the results and conclusions contained therein are often quoted in subsequent articles. This is especially so as it is nowadays easy to extract abstracts from electronic databases, eliminating the need to obtain the full printed article. Thus it is of utmost importance that data and other information in the abstract is accurate.

Although data in five of the abstracts in the present study was erroneous, the errors in general were minor. For instance, Siebers and colleagues stated in the abstract that 60.5% of respondents had a lower overall knowledge of AIDS (8). In the results section the percentage of respondents was reported as 60.6%. Other errors were more major. For instance, Pottumarthy and colleagues stated in the

abstract that six isolates were susceptible to aztreonam (9). In the results section only two isolates were reported as being susceptible to aztreonam.

What can be done to minimise abstract errors? Pitkin and Branagan conducted a randomised controlled trial in which the intervention arm was to provide authors of accepted manuscripts an instruction sheet stating three types of errors commonly found in abstracts (7). The control group was not given this instruction sheet. The authors in the intervention group were then urged to carefully check their abstracts for any mistakes. Of the 250 manuscripts randomised to either the intervention group or the control group, there was no difference in the rate of published abstracts containing errors (28% and 26% respectively). The authors concluded that many abstracts contained errors, that simple intervention was ineffective in reducing these errors, and that abstracts should be checked for accuracy by Editorial staff.

Based on the findings of the studies by Pitkin and colleagues (6,7), the *Journal of the American Medical Association* has set quality criteria to improve the accuracy of data in abstracts (reviewed and edited by Editorial staff), and to set the minimum of what is expected of an abstract submitted to that journal (10). After implementation of their quality criteria, no discrepancies between the abstract and the body of the text of 27 articles published in their journal in November 1998, were found. This compares to more than 50% of erroneous abstracts of 27 articles published in November 1997, before quality criteria were implemented.

An Editor's job is already difficult and time consuming enough without adding additional tasks. A possible solution for journals without extensive Editorial staff or resources, would be for them to ask reviewers of submitted manuscripts to include a check of the abstract to ensure that data and other information contained therein, is consistent with what has been reported in the body of the text. This will now be the author's intention as Editor of the *New Zealand Journal of Medical Laboratory Science*. This, however, does not absolve authors from being primarily responsible for accuracy of the submitted manuscript, not only in the abstract, but also in the cited references, methods, results, and conclusions.

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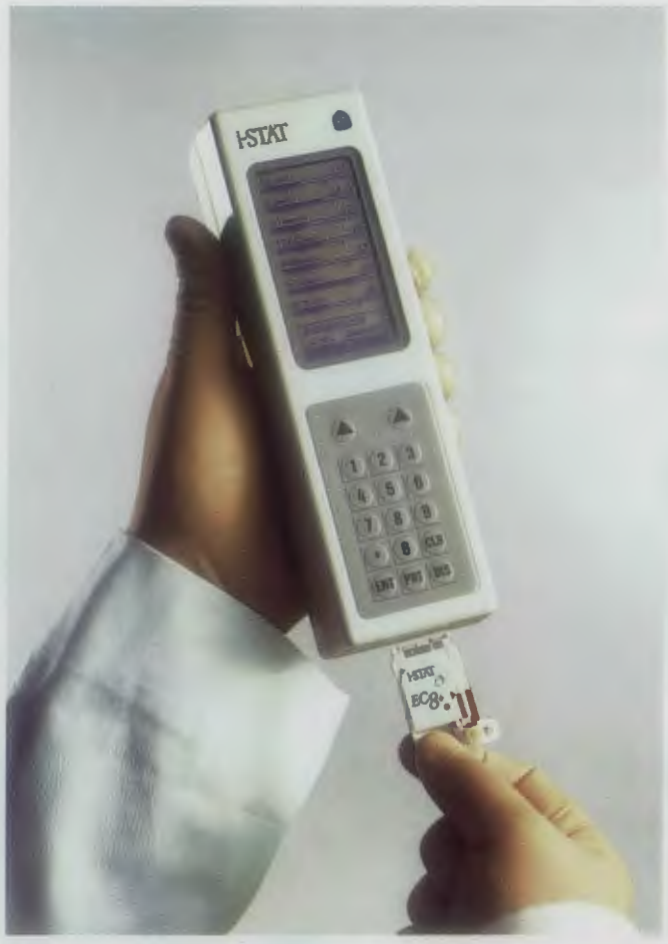

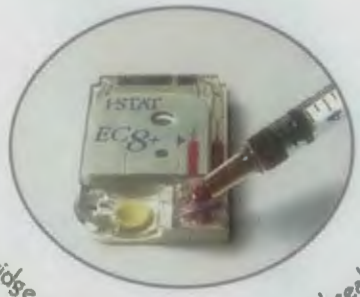

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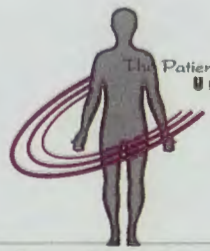

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MRSA

New from Denka Seiken, a slide latex agglutination assay for the detection of PBP2' protein of *Staph.aureus*. The MRSA Screen test is a rapid method for the detection of MRSA. Results are available in 15 minutes. The latex particles are coated with a monoclonal antibody against penicillin binding protein 2', for high sensitivity and specificity.

Suspect colonies can be taken from 18-24 hour culture on Blood Agar, Mannitol Salt Agar, etc. A simple extraction and latex agglutination procedure follows.

MRSA Screen can be used for diagnostic, surveillance, epidemiological and research purposes.

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Production Line Inspection System Gives Full Quality Control of Blood Tests

A British-designed volume measuring microtitre plate dispensing system using optical density can now be fitted onto the production line for the first time, to ensure that the manufacture of blood test trays can be inspected automatically 100% of the time. The test accuracy is similar to that for offline reading systems – for every plate. The system also detects foreign particles, such as a shard of cardboard, that may have dropped into a well.

Using digital camera technology, connected to a PC, the *IQIS* fill volume inline quality inspection system from Modular Vision measures the volume of reagents dispensed into industry-standard 96-way microtitre plates. It is fitted onto the production line so every manufactured plate is inspected automatically and the results stored in a database. The cameras 'look' at the product to located individual test wells and measure how dark they are – the darker the well, the more liquid is present.

OD measurement requires an appropriate narrow-band optical filter for standard dye colours. *IQIS* performs an advanced calibration algorithm that identifies and corrects mis-pipetted wells to allow tolerance for some operator error at the calibration stage. Correlation coefficients are calculated and displayed with individual well calibration graphs and a graphic of the pipetting.

The system, which can be retrofitted to production lines, provides operators with a choice during production, of viewing either a statistical process control (SPC) graph, showing mean fill and range together with process limits tramlines, or the individual plate matrix of fill volumes. The inkjet-marked plate number is read by an optical character recognition (OCR) camera and displayed.

Any well filled outside the selected process limits automatically produces an audible alarm and provides an electrical signal that can be used to stop the conveyor.

A full database with search features is maintained throughout and, once a production batch is completed, a full report can be printed on any standard printer. Information available includes which plates were incorrectly filled and what was done with that plate. The batch database can be viewed at any time with the SPC graph viewer or plate matrix viewer to assist in tracing production problems.

Modular Vision Ltd, Sunderland Business and Innovation Centre, Wearfield, Enterprise Park, Sunderland, United Kingdom SR5 2TA. Company contact: Mr Brendan Ruff. Telephone: +44 191 516 6311; Fax: +44 191 516 0688; E-mail: brendan.ruff@modular-vision.co.uk

DNA Probe for the Detection of MecA Gene

The Alexon-Trend Velogene™ Rapid MRSA Identification Assay is an innovative, user-friendly DNA Probe for the detection of the MecA gene that codes for methicillin resistance in *Staphylococcus aureus*. Since results are available within 90 minutes post culture, the Velogene™ Rapid MRSA Identification Assay has potential clinical utility in preventing the spread of infections and reducing empirical vancomycin usage.

The assay consists of three stages – sample preparation, cycling and detection. No special equipment is required to perform this test and results may be interpreted visually.

For further information on the Velogene™ Rapid MRSA Identification Assay please contact the New Zealand Distributors for Alexon-Trend:
Ngaio Diagnostics Ltd
PO Box 4015
Nelson South
Email: ngaio@xtra.co.nz

New Latex Agglutination Test for Detection of *Staph. aureus* from Primary Cultures

Alexon-Trend now have available a new latex agglutination test for detection of *Staphylococcus aureus* from primary culture. Reagent detects both Protein A and Clumping Factor. Features of this new reagent are excellent open-vial stability, long shelf life and excellent specificity and sensitivity. Blue latex on a white card enhances readability and controls are included in each kit. Pricing is competitive.

For further information please contact the New Zealand Distributor:
Ngaio Diagnostics Ltd.
PO Box 4015 Nelson South
Email: ngaio@xtra.co.nz

Rapid Test Cards for Detection of Vaginosis

Ngaio Diagnostics are pleased to be appointed exclusive New Zealand Distributors for Litmus Concepts Inc. Litmus Concepts Inc. manufacture rapid tests for improving the clinical evaluation of Infectious Vaginitis.

These FemExam® Test Cards are rapid and easy to perform and interpret. They are stored at room temperature and have a long shelf life.

The FemExam® pH and Amines Test Card is performed in two minutes or less. No reagents additions are involved and controls are built in. Positive results are shown as two plus signs appearing on the credit card sized device.

The other Test Card is the FemExam® *Gardnerella vaginalis* PIP Activity Test Card. This Card detects in 5 minutes or less elevated levels of *Gardnerella* which are found in nearly all BV positive patients.

For further information please contact the New Zealand Distributor:
Ngaio Diagnostics Ltd.

PO Box 4015 Nelson South
Email: ngaio@xtra.co.nz

Biolab Scientific Acquires Science & Technology (NZ) Ltd (SCI TECH)

Science & Technology (NZ) Ltd, a privately owned scientific instrument distributor, has been acquired by Biolab Scientific.

Mr Denholm Patterson, Managing Director of Sci Tech, said "Sci Tech has a very strong technical competency particularly in the development of applications for high tech instrumentation in industry. Our staff and our supplier base are supportive of the move to join forces with Biolab who have a broader market coverage both in New Zealand and Australia."

Biolab will be taking on the Sci Tech sales, marketing and technical staff and will develop a business unit devoted to the higher technology products. The Sci Tech Dunedin office and technical centre will be retained as a support base for the strong relationships with customers in the lower South Island.

Catherine Calarco, New Zealand General Manager of Biolab Scientific comments "for some time we have been targeting to expand our product portfolio into the higher technology area. As new technology replaces current in-lab methods we want to be able to offer our customers the benefits the newer technologies offer. Over the last couple of years we have developed a solid logistics, service support and E-Commerce capability which is the base for further expansion of the business. The Sci Tech product range is a good fit with our current range and we look forward to the addition of their technical capabilities to enhance our offering to customers."

The acquisition will be completed at the end of February.

For Further information please contact:
Catherine Calarco
General Manager, NZ
Biolab Scientific Ltd
Ph: (09) 980 6741
Email: catherinec@biolabl.co.nz

Phadebact Products

Med-Bio Ltd is very pleased to announce that we are the newly appointed distributors for Phadebact products, manufactured by Boule Diagnostics, Sweden.

Med-Bio Ltd also provides technical support for all their product range along with the excellent service that we have become known for.

Boule Diagnostics is a leading supplier of high quality microbiology agglutination products, including Strep Grouping Kits, Monoclonal antibody for *Neisseria gonorrhoeae*, direct Meningitis Kit, direct tests for *Strep. pneumoniae* and Haemophilus influenzae.

For more information please contact:
Med-bio Limited
Rose-Marie Daniel - North Island
Julie Vincent – South Island
0800 MEDBIO (633 246)
Fax: 0800 101 441
Email: Jvincent@medbio.co.nz

Microgen New Product

New from Microgen, Cryptosporidium IFA. FITC-conjugated monoclonal antibody for the detection of Cryptosporidium oocyts in clinical, veterinary and water samples.

The Microgen Cryptosporidium IFA has been validated for both water and faeces testing. The results show excellent fluorescence intensity and clean background, ensuring accurate results at all times.

For more information please contact:
Med-bio Limited
Rose-Marie Daniel - North Island
Julie Vincent – South Island
0800 MEDBIO (633 246)
Fax: 0800 101 441
Email: Jvincent@medbio.co.nz

Finntip BioCon

The new BioCon pipette tips are free from Endotoxin, DNA, DNase and RNase. They are presterilised with gamma irradiation. Invividually wrapped tips are available in boxes of 50 or 100 pieces.

Contact Medica Pacifica Ltd 0800 106 100 or visit our web page www.medica.co.nz

Automated DNA and RNA purification with Kingfisher from Labsystems

Contact Medica Pacifica Ltd for a demonstration on CD-ROM of the Labsystem Kingfisher System.

Phone 0800 106 100 or visit our web site www.medica.co.nz.

THE NEW ZEALAND INSTITUTE OF MEDICAL LABORATORY SCIENCE [Inc]

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
Virology

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 18 months prior to the examination or accumulated not less than 18 months practical experience in the examination subject.

   Upon completion of two years continuous or accumulated practical experience in the subject, the certificate of Qualified Technical Assistant will be awarded.

2. Candidates who have passed a Qualified Technical Assistant examination and who wish to sit a second Qualified Technical Assistant examination must fulfil the above criteria but need only to have worked continuously or accumulated experience of one year in the examination subject.

3. **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.

EXAMINATION

1. The examination will be held annually 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 NZIMLS 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 NZIMLS. 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.

APPLICATION TO SIT THE EXAMINATION OF QUALIFIED TECHNICAL ASSISTANT

1st November 2000

SECTION 1 - TO BE COMPLETED BY THE CANDIDATE

Title:Mr, Mrs, Miss, Ms

Surname:..... First Names: .....

Of, Laboratory:

LaboratoryAddress: .....

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

EXAMINATION FEE: $125 (GST Inclusive) The full examination fee must be paid with the application.

SECTION B - TO BE COMPLETED BY THE PATHOLOGIST OR CHARGE SCIENTISTS

Date candidate commenced work in examination subject:

"I certify that the above candidate meets the requirements of the QTA 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: .....

Laboratory Address:.....

.....

APPLICATIONS CLOSE FRIDAY 26th MAY 2000
Please forward application forms accompanied by fees to:
NZIMLS, P O Box 3270, Christchurch

NO LATE APPLICATIONS WILL BE ACCEPTED

Special Note to Applicants
If no already members of the NZIMLS applicants to sit this examination must submit a valid membership application along with this examination application.

For Office Use Only

Date received:..... Cheque number: .....

Bank: ..... Branch:.....

Drawer:..... Amount:.....

NZIMLS – membership application

PO Box 3270, Christchurch, New Zealand
Email: nzimls@exevents.co.nz

Please complete and return to PO Box 3270 Christchurch

Surname: .....

First Names: .....

Laboratory Address: .....

Employed as: .....

Specialty: .....

Address for correspondence: .....

.....

.....

Membership category:

Fellow or Member	$ 101.40 / annum
Associate	$ 48.10 / annum
Non-practising	$ 44.20 / annum

Nominated by: .....

Guidelines for membership categories:

Member	Any person who is registered with the NZ Medical Laboratory Technologists Board.
Associate:	Any person engaged in Medical Laboratory Science who is not eligible for any other class of membership eg. QTA
Non-practising:	1. Any person who has been a Fellow, Member or Associate, but is no longer engaged in Medical Laboratory Science and who wishes to become a non-practising member. 2. Any person not engaged in Medical Laboratory Science

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Payment:

Charge to: **Visa** ☐ **Mastercard** ☐

Credit card No. .....

Expiry Date: .....

Name of cardholder: .....

Date: .....

NZIMLS membership 1999-2000

Seminar

BSIG

(on behalf of the NZIMLS)

Not to be missed by Today's Medical Laboratory Scientists — exciting updates on Heart disease, lead poisoning, and inborn errors.

Where Nelson
When Saturday 29th April, 2000
Registration 9.30 – 10.00am.

Invited speakers:-

Lead poisoning —
Dr Nick Baker, Paediatrician, Nelson Hospital, and **Mr. Trevor Walmsley,** Canterbury Health Laboratories.

A testing time for Heart Disease —
Dr Andrew Hamer, Cardiologist, Nelson Hospital, and **Dr Peter George,** Chemical Pathologist, Canterbury Health Laboratories.

Inborn Errors of Metabolism —
Dr Richard MacKay, Paediatrician, Nelson Hospital, and **Dr Chris Florkowski,** Chemical Pathologist, Canterbury Health Laboratories.

Plus Proffered Papers...

Best Proffered Paper Award
...sponsored by Abbott Diagnostics.

We would recommend that each attending laboratory present a 10 - 15 minute presentation.

Costs: -

Registration	Members	$40.00
	Non members	$45.00
Seminar dinner		$25.00
Accommodation	Single room	$85.00 pp. per night

BSIG Seminar reply form

Attention: Nicola Thomas
Fax number: 09 573 1106

Name: .....

Laboratory: .....

Title of Paper: .....

Number of people wishing to attend:.....

Please indicate what you will be attending below...

	Yes	No
Seminar		
Dinner – Saturday night		
Accommodation		
Number of nights		
Cheaper accommodation required		

If you would like transport arranged from the Airport, there is an airport transfer facility that costs $10.00.

special interest in platelet disorders, clinical coagulation problems and the therapeutic manipulation of adhesion molecules.

Andrew Butcher
Institute of Medical and Veterinary Science, The Queen Elizabeth Hospital, Microbiology and Infectious Diseases, South Australia

Andrew has been working in medical laboratory science for the past 23 years having worked in Microbiology, general pathology and teaching laboratories in both Australia and Canada. He has been employed in public, private and university laboratories specialising in microbiology and medical parasitology. Over the past 10 years his focus has been predominantly enteric microbiology and medical parasitology. He has been involved in teaching parasitology through continuing education programs and workshops as well as lecturing for undergraduate students.

Over these years, Andrew has been involved in a number of parasitology research and development projects. From a diagnostic view point he has attempted to improve fixation and staining methods for protozoa, having modified the combination iron haematoxylin stain to provide a cost effective and efficient screening method for routine laboratories. His other main research area is the investigation of a new human fluke worm infection caused by Brachylaima sp.. This fluke worm infects humans via the ingestion of a small land snail which are infected with the metacerarial stage of this parasite. Brachylaima sp. has infected a number of children and adults in South Australia and these infections represent the only known human cases. This research is concentrating on understanding the natural life cycle, reproducing the life cycle in the laboratory, investigating the host-parasite relationship and improving diagnosis of further human cases both in Australia and overseas.

Professor Peter Molan *B.Sc. Hons (Wales), Ph.D. (Liverpool) Associate Professor of Biochemistry and Director of the Honey Research Unit, University of Waikato*

Prof Molan joined the staff of the University of Waikato in 1973 to establish the teaching of Biochemistry. He has been involved since 1973 in research on natural antibacterial substances and became interested in the antibacterial properties of honey in 1981. He discovered the unique antibacterial properties of manuka honey in 1982.

Prof Molan has published 13 research papers and 4 review papers in international scientific and medical journals on the antibacterial properties and medical usage of honey, and has been invited to speak at numerous conferences on the medical usage of honey. Awarded an MBE in the Queen's Birthday honours list 1995 in recognition for work on honey.

Dr Selwyn Lang
Clinical Microbiologist and Infectious Disease Physician Diagnostic Laboratory/Middlemore Hospital, Auckland

Dr Laing is a graduate of the University of Otago, he attributes his interest in microbiology to his lasting association of undergratudate laboratory time with the hospital squash court. His interest in infections was furthered by two years at Sir Edmund Hillary's hospital in Nepal. Post-graduate training was at the University of Washington, Seattle and Duke University, North Carolina. He has produced the usual number of 'scientific' papers, mostly best forgotten, with an emphasis on antibiotic treatment and he maintains an interest in this area. His expertise in veterinary microbiology is limited to caring for two cats and a dog (recently deceased).

Karen Rogers
Mycology Reference Laboratory, Starship Children's Hospital

Karen has been working under the guidance of Dinah Parr since 1982. The Auckland Mycology Unit has performed the reference work for New Zealand since October 1997; offering a service for the identification and confirmation of: dermatophytes; saprophytic moulds; yeasts and aerobic actinomycetes. They also perform antifungal susceptibility testing.

Craig Lehmann, PhD, CC(NRCC) Professor and Dean of the School of Health, Technology and Management

As a registered clinical chemist and while in the department of Clinical Laboratory Sciences, Craig established a national and international reputation for his contributions in lipid research, clinical laboratory integration, diagnostic technology, clinical laboratory economics, and clinical laboratory science education.

Craig's publication list is quite extensive and continues to add to the literature. In addition to his journal articles he has contributed an educational video on clinical laboratory technology. He has co-edited and edited two clinical laboratory science textbooks. His latest text "Saunders Manual of Clinical Laboratory Science" has been rated by Doody's Rating Service: A Buyer's Guide to the 250 Best Health Science Books as one of the top two hundred and fifty top health science texts. The two hundred and fifty texts were chosen from 3200 titles. Because of these endeavours and others, he has made numerous presentations at national and international professional meetings.

Craig has had numerous honours bestowed upon him over the years and his professional service endeavours have been numerous as well as diverse.

Mr Noel G Porter
Plant & Food Composition Team, NZ Institute for Crop & Food Research Limited, Lincoln

Dr Porter is a senior scientist at Crop & Food Research's Lincoln campus, with 33 years research experience in the physiology of crop plants and the chemistry of their products. Over the last 10 years, he has run a small multi-disciplinary research group which has focussed on basic and applied research on new concepts, classes of information and measurement methods for the quality of crop products. Recently, he has been involved in transferring R&D results and expertise on a wide range of natural products to commercial projects as a TechLink consultant for Technology New Zealand. He has also served as technical consultant to FAO and UNIDO projects in Iran and North Korea.

His work over the last 20 years has covered all aspects of essential oil research and consultancy from market research and quality criteria through extraction technology to crop management. He has been involved in commercial production projects of 7 different essential oils in NZ. He has worked on manuka essential oils over the last 12 years, developing information on the chemistry and bioactivity of oils from different parts of the country, and working with commercial projects to develop production for export and domestic markets. One focus has been to reduce oil production costs by improving extraction technology and methods and selecting elite lines of plant material for intensive cultivation. Most recently, his research interests have focussed on exploring the range of anti-bacterial activity of the oil and obtaining some initial information on the mechanism of action of the active oil components.

NZIMLS Bay of Plenty Conference - Programmme	
Wednesday	**Workshops** Occupational Health & Safety Coagulation (Dry Workshop) - *Haematology Special Interest Group*

Thursday	OPENING CEREMONY PLENARY SESSION I **Paradigm Shift - The Motivation to Change** The Health Reforms in Economic Terms - *Pim Borren* The Health Reforms : A Political View - *Minister of Health or Funding Authority* The Health Reforms : A Patients or Laypersons perspective - *Sandra Coney* The Social Changes/Aging Populations - *Craig Lehmann, PhD, Dean, School of Health Technology & Management, Health Sciences Centre, State University of New York*
	MICROBIOLOGY/HAEMATOLOGY **Emerging Tropical Diseases - New Imports to New Zealand** *Dr Rod Ellis-Peglar, Infectious Disease Physician, Auckland Hospital*
	HISTOLOGY & CYTOGENETICS
	HAEMATOLOGY **"A *Cell*ibration of Haematology"** Transplantation - *Dr Robyn Rodwell, Mater Hospital, Brisbane* Apoptosis - *Graeme Findlay, Auckland School of Medicine* Myelodysplastic Syndromes - *Dr Elayne Knottenbelt, Haematologist, Medlab Central*
	OCCUPATIONAL HEALTH & SAFETY **Clinical Incident Stress Debriefing** (The Lakeland Health Model) - *Ray Bloomfield, Chaplin* **OSH Management** - *Dr Max Robertson, Auckland*
	NZIMLS AGM / Presentation of Examination and Journal Awards

Friday	PLENARY SESSION II **The Paradigm Shirt - The Outcomes. The Changing Laboratories** Re-engineering the Clinical Laboratory for the Millennium - *Craig Lehmann, Dean, School of Health Technology & Management, Health Sciences Centre, State University of New York* Automation .... Juggernaut or Opportunity - *Helen Martin, Australia* Hospital Outcomes - *Dr Ross Boswell, Middlemore Hospital, Auckland*
	LABORATORY INTEGRATION **Managing a Diagnostic Service in a Decentralised Community based System** - *Craig Lehmann, Dean, School of Health Technology & Management, Health Sciences Centre, State University of New York*
	HAEMATOLOGY **Thrombophilia** **Factor V Leiden** **Platelet Function - Homocysteine**
	MICROBIOLOGY **Identification of Common Pathogenic "Non-dermatophyte" Fungi** - *Karen Rogers, Mycology Reference Laboratory, LabPlus Starship Children's Hospital, Auckland* **Parasitology Protozoa Workshop** - *Andrew Butcher, Institute of Medical & Veterinary Science, The Queen Elizabeth Hospital, South Australia*

	PCR IN INFECTIOUS DISEASES • Tb • Chlamydia • HIV • HBV / HCV • CMV • Toxo
	TRANSFUSION MEDICINE **New Blood Products**
	OCCUPATIONAL HEALTH & SAFETY **Sleep/Wake Research** - *Dr Phillippa Gander,*
	IMMUNOLOGY/VIROLOGY **Cardiolipin Testing & Clinical Management** - *Dr Allan Sturgess, Royal North Shore Hospital, Sydney* **Use of ANA, ENA, RF in Clinical Management** - *Dr John Petrie, Rotorua* EBV Serology
	BIOCHEMISTRY **PSA Total & Free. Role of Ratio's in Prostatic cancer** • Diagnosis and treatment - *Mr Peter Gilling, Urologist, Tauranga* **Diabetes and the role of the laboratory** • Predeterminants Anti-GAD - *Dr Steven Morris, Diabetologist, Tauranga Hospital*

Saturday	BIOCHEMISTRY **Drugs in the Workplace** • Auckland Hospital - *Dr Ron Couch, Toxicology, Auckland Hospital* • Employer Perspective • Legal Aspects of Compulsory Drug Testing and Uses
	MICROBIOLOGY **Antibiotic Use/Abuse and Alternative Treatments** • Agricultural Use - *Dr Selwyn Lang, Diagnostic Medical Laboratory, Auckland* • Manuka Oil - *Dr Noel Porter, Christchurch* • Honey - *Prof Peter Molan, Associate Professor of Biochemistry, Director, Honey Research Unit, Department of Biological Sciences, University of Waikato* • International resistance • National resistance - *Dr Selwyn Lang, Diagnostic Medical Laboratory, Auckland*
	TRANSFUSION MEDICINE **Triage Issues and the use of Blood Products - A Clinicians Perspective**
	VETERINARY DIAGNOSTICS
	HAEMATOLOGY **Aspects of Veterinary Haematology** *Dr Phillip Clark, Massey University* **Paediatric Morphology**
	INFORMATION TECHNOLOGY

Proffered Papers and Posters

The Organising Committee extends an invitation to registrants to participate in the programme through presentation of an oral paper or a poster.

N.Z. Medical Laboratory Science Trust
Income and Expenditure Account
for year ended 31 December 1999

INCOME:			
Interest Received:			
Current Account	44.83		
Term Deposit	1,412.98		
TOTAL INCOME			**$1,457.81**
EXPENDITURE:			
Grants: J. Wypych	1,000.00		
J. Wypych	1,000.00		
G. Herd	1,000.00		
M. Bevan	1,000.00		
A. Haywood	1,130.00		
R. Siebers	1,000.00		
K. Marson	632.00	6,762.00	
Administration Expense		10.00	
TOTAL EXPENDITURE			**$6,772.00**
EXCESS EXPENDITURE			**$5,314.19**

N.Z. Medical Laboratory Science Trust
Balance Sheet
as at 31 December 1999

ACCUMULATED FUNDS:		
Balance as at 1 January 1999	$16,003.12	
Less Excess Expenditure	5,314.19	$10,688.93
Represented By:		
ANZ Banking Group		
Current Account	$3,770.80	
Term Deposit	6,918.13	$10,688.93

Auditors Report:

I have examined the records and financial accounts of the N.Z. Medical Laboratory Science Trust and report and confrim that the balances in the Trust's Bank accounts are as recorded in the above Balance Sheet as at 31 December 1999.

In my opinion the above Income & Expenditure account, for the year ended 31 December 1999 and the Balance Sheet as at 31 December 1999, give a true and accurate view of the Trust's affairs as at 31 December 1999.

David R Gordon
Hon Auditor
14 January 2000

Obituary
Karen Jane Hastie
1974-1999

It is with sympathy and deep sadness we note the passing of a popular and much loved fellow workmate. "Kazz", as she was affectionately known was well respected by all as a conscientious and dedicated colleague. Her fun loving character and motivational drive was a great asset to the workplace and ensured social events and activities were well organised.

A keen surfer and competitive swimmer she loved the outdoors and salt air, often seen by many running her dog along the sands of Ohope. Her stories and antics brightened and entertained many a day on the workbenches of the Hospital Laboratory.

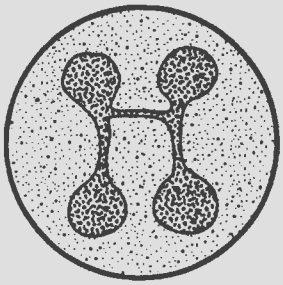
Karen qualified with a Diploma of Medical Laboratory Science through AIT in 1995, that year being the last of the diploma qualification and majored in Microbiology. After completing her training at Palmerston North Hospital she journeyed to the Bay of Plenty and in early 1996 took up a Staff Technologist position in Whakatane Hospital.

As a Technologist, Karen was always eager to learn and enthusiastic. Her unselfish attitude and hard work was easily recognisable and well appreciated. Always with a warm smile and friendly manner, she won many friends from both staff and public. More recently, Karen was involved in the working committee for the forthcoming NZIMLT conference in the Bay of Plenty.

The "Lab Surfer Girl" will be well remembered for her special humour, warm character and professional dedication. Our hearts go out to her parents, Bill and Helen, and her sister Rachel, whose encouragement and support was overwhelmingly evident throughout her career.

Karen kept us youthful and filled our days with joy, she was a pleasure to work with, taking great pride in her profession. It was a privilege for all of us to have her as a friend and working colleague.

Laboratory Staff
Whakatane Hospital



Journal Questionnaire

Clinical Laboratory Haematology, 1999, Vol 21, 77-92
Review: The Investigation and Management of Inherited Thrombophilia.
AM Cumming,CR Shiach

1. Antithrombin (AT) inhibits primarily thrombin and also other activated serine proteases including factors Xa, IXa, XIa, XIIa and kallikrein. TRUE/FALSE
2. Type I deficiency of AT is the production of a variant protein. TRUE/FALSE
3. Type II deficiency of AT is characterised by low levels of functionally and immunologically determined AT. TRUE/FALSE
4. Immunoassay alone will not permit the identification of many type II AT variants. TRUE/FALSE
5. The following acquired states will give a reduced plasma AT level;
   a) Heparin therapy. TRUE/FALSE
   b) Warfarin. TRUE/FALSE
   c) Liver disease. TRUE/FALSE
6. Activated Protein C together with Protein S, inactivates membrane-bound factor Va and VIIIa. TRUE/FALSE
7. Currently commercially available functional assays have low specificity and the presence of Activated Protein C resistance may give rise to spuriously high PS values. TRUE/FALSE
8. Name three conditions associated with a reduction in functional (plasma) Protein C levels.
9. Name one important factor that should be considered when determining a reference range for Protein S?
10. Screening for Protein C and Protein S deficiencies should be delayed until 14 days after the completion of oral anticoagulant therapy. TRUE/FALSE
11. Activated Protein C resistance is shown (in 90% or more cases) to be associated with a gene mutation related to which factor? And what is it known as?
12. Which risk factor for inherited thrombophilia is recognised to be the most common cause of venous thromboembolism?
13. _____ contamination of plasma samples should be avoided as this will reduce the Activated Protein C ratio.
14. Phenotypic determination of Activated Protein C resistance is relatively inexpensive and easy to perform. TRUE/FALSE
15. Factor V Leiden mutation can be determined by using the modified APTT-based screening test, which is very sensitive and specific. TRUE/FALSE
16. Genotyping of Factor V Leiden is the more definitive method and can be performed in any laboratory due to easy sample preparation and handling. TRUE/FALSE
17. Factor V Leiden mutation in isolation is associated with a _____ fold increased risk of venous thrombosis in heterozygous carriers, and an _____ fold increased risk in homozygous carriers.
18. The risk of carriers of Factor V Leiden using a desogestrel containing oral contraceptive is increased almost 50 fold. TRUE/FALSE
19. Lupus anticoagulant screening is recommended in patients with Activated Protein C resistance who proves to be _____ negative.
20. Hyperhomocysteinaemia is recognised as a risk factor for venous thrombosis, and arterial disease, including stroke, myocardial infarction and peripheral arterial disease. TRUE/FALSE
21. Individuals with levels of Factor VIII greater than _____ IU/dL have a relative risk for thrombosis of 4.8. What is the prevalence in the general population?
22. In isolation, the prothrombin gene 20210 AG genotype appears to be a major risk factor for venous thromboembolism. TRUE/FALSE
23. Venous thromboembolism is the most common cause of maternal death in many western countries. TRUE/FALSE
24. Thrombophilia is less likely to be associated with _____, _____ or AT deficiencies in patients who present with a first thrombosis aged over 40 years. But either _____ or _____ may result in a first thrombosis at an older age.

For the answers turn to page 40.

For copies of this article please contact Pip Sarcich,
Email: akspechaem@ahsl.co.nz
Phone: (09) 307 4949 ext 5591
Fax: (09) 375 4321

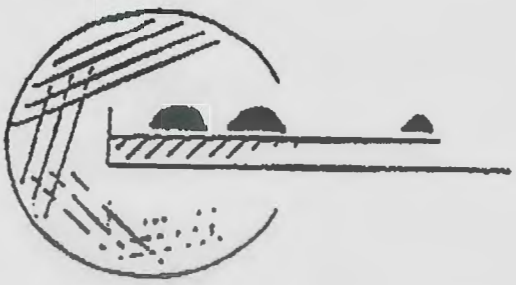
Report on Blood Film Morphology Workshop

I attended a very well run and organised third HSIG Morphology Workshop in Auckland at the end of November 1999. Having worked in a small rural hospital laboratory for many years now, the opportunity to participate in such a course is invaluable. The course consisted of approximately 100 films covering a large number of disorders, involving abnormalities in the white cells, red cells and platelets. Malaria and microfilaria were also covered.

A hands on course like this enhances our skills, brings us up to date with any changes, helps to standardise our reporting of films and stimulates us to improve our knowledge and to do more research. Another bonus is that it brings those of us who are more isolated in touch with others in the same position and we also learn what is happening in the large central laboratories.

My personal thanks go to all those who organised an excellent course.

Lesley Wiggins
Te Kuiti Hospital



MICROBIOLOGISTS!

SATURDAY 13 MAY 2000

Keep this date free for the

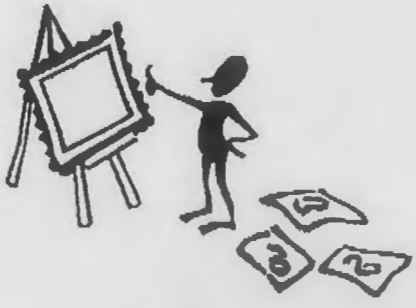
ANNUAL S.I.G MEETING

To be held at the "Marion Davis Library" at Auckland Hospital

Registration and morning tea from 9:30am

Presentations starting at 10:00am

- The programme this year will be similar to last year's with an opportunity to discuss and share any concerns or problems.
- Dinner is included in the one-off registration at an undisclosed venue.
- For accommodation, contact Brendon at Auckland Visitors Centre
  ph: 09 979 2337
  email: reservations@aucklandnz.com
  (for credit card bookings only)



Registration Form – MSIG Meeting — 13 May 2000

Registration Fee $70 institute member
$90 non-member

Name Laboratory Ph/fax/email

_____ _____ _____

_____ _____ _____

I enclose a cheque made out to MSIG $ _____

I would like to contribute by presenting a paper on:

Topic: _____

Title: _____

Please send Registration Form and cheque to Sandie Newton, Microbiology Department, Diagnostic Medical Laboratory, PO Box 14743, Panmure, Auckland.

Answers of the Journal Article
Clinical Laboratory Haematology, 1999, Vol 21, 77-92
Review: The Investigation and Management of Inherited Thrombophilia.
AM Cumming, CR Shiach

1. True
2. False
3. False
4. True
5. a)True b)false c)True
6. True
7. False
8. Liver disease, Vitamin K deficiency, oral anticoagulant therapy and
9. Difference between the sexes (in healthy individuals), women on oral contraceptives, pregnancy, post-partum period or oral anticoagulants.
10. True
11. Factor V.... Factor V Leiden
12. Activated Protein C resistance/Factor V Leiden
13. Platelet
14. True
15. True
16. False
17. Seven fold... Eighty fold...
18. True
19. Factor V Leiden
20. True
21. 150 IU/dL... 11%
22. False
23. True
24. Protein C, Protein S... Factor V Leiden or Prothrombin G20210A variant...

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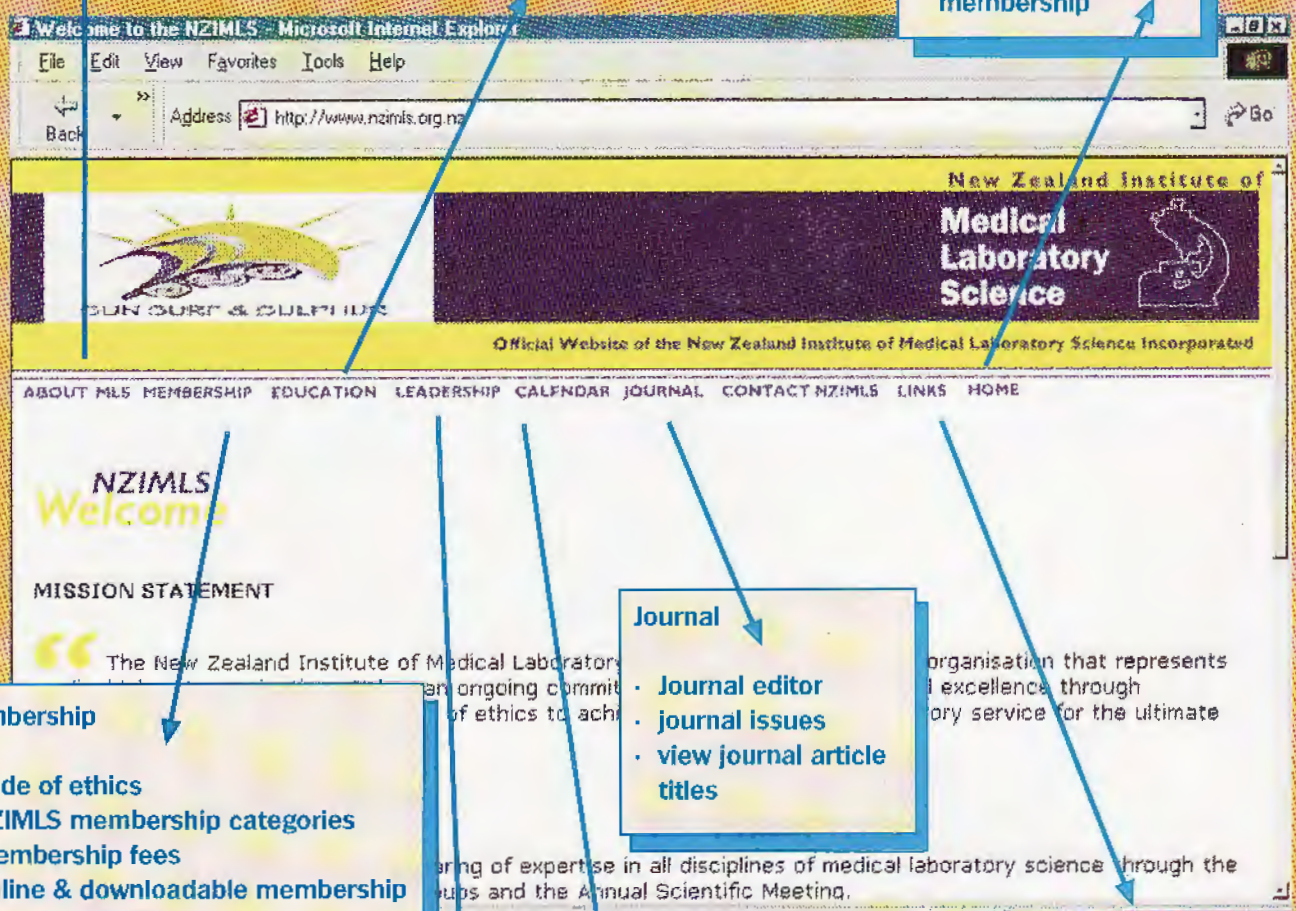

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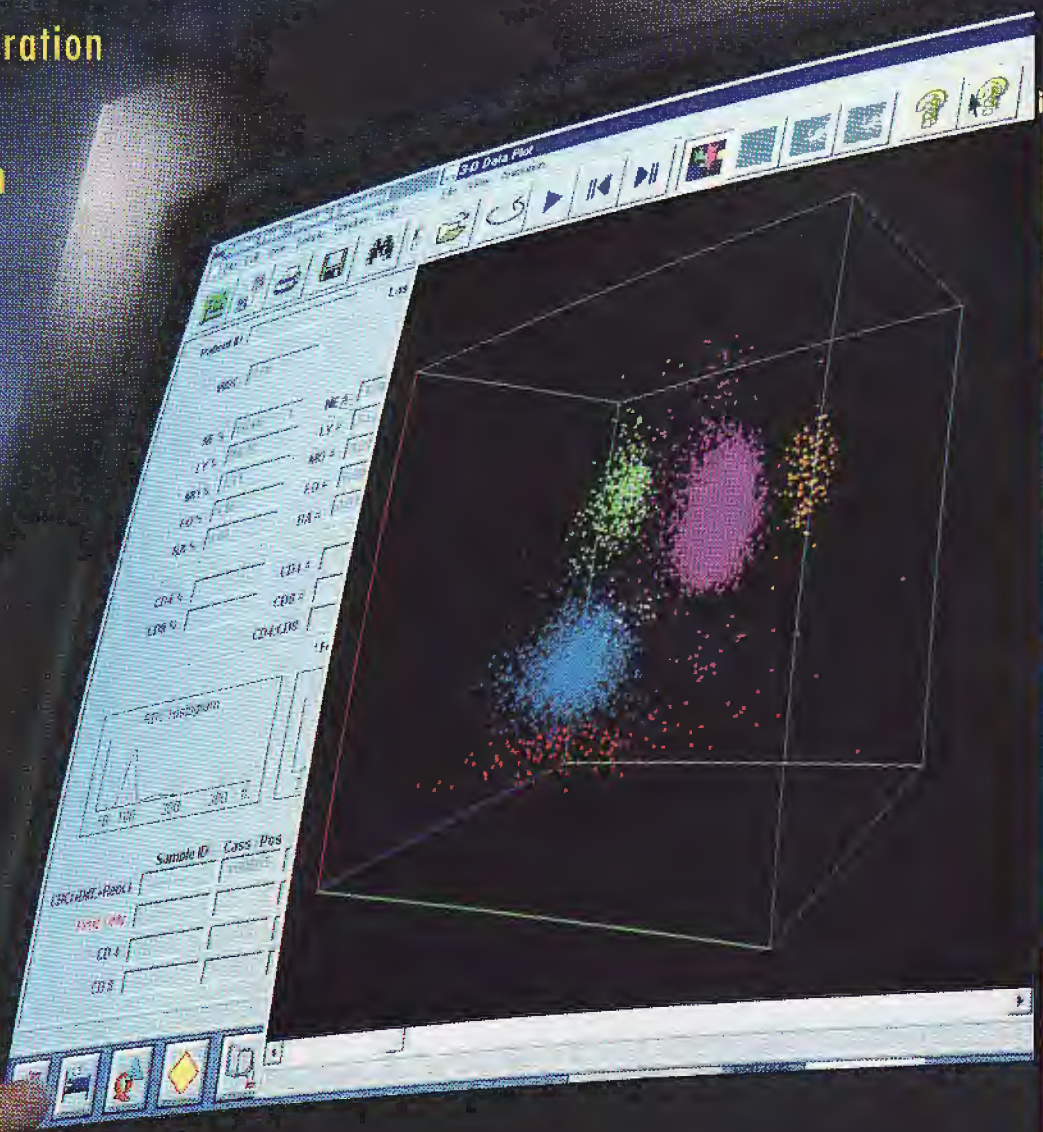

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