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TH Pullar Address. Finding Rumplestiltskin by crossing the Southern Alps

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Canterbury Health Laboratories, Christchurch

In 1998, almost 10 years ago to the day, an article appeared in the NZIMLS journal entitled a room full of straw. This was based on the well known fairy tale of Rumplestiltskin, where a young lass was imprisoned by an unreasonable persecutor who made her spin a roomful of straw into gold. Each morning after she had completed the task the room of straw assumed a larger dimension on that evening. Release of course could only be granted if the young lady was able to guess her persecutors name – in this case Rumplestiltskin.

The article itself relates how the world of medical laboratory science replicates the increasing impossible tasks represented in the rooms of straw – it moves from the first room where work volume is constant, staff sufficient for the output of the lab, overheads are covered and a modest profit being made, through to the fifth room where loss of expertise has resulted in deterioration of service, customers noticing prices have increased while quality has fallen, the lab is no longer profitable and has become vulnerable to other providers. Skilled staff responsible for the success of the unit have gone elsewhere and despair has set in.

You may or may not believe that the author had remarkable foresight, but whether you believe you are working in a laboratory that is still in room one or on the steady down hill slide to room five there is a question for us all to answer – what can we do about it.

In the fairy tale to solve the problem the young lady had to discover her captor's name. But how do we go about this?

What's its name?

There is an ancient Chinese proverb that says ìIf you want to know what water is like don't ask a fishî. For those of you that don't like Chinese proverbs you may prefer a quote from Albert Einstein who stated ìThat the thinking that has been used to create a problem cannot be used to solve that problem.

So to try and shed light on this medical laboratory conundrum I will instead look outside the box – sharing experiences of one of my other passions – multisport, or this particular case, the Coast to Coast.

The coast to coast, for those of you not familiar with it is a race that traverses the South Island, starting at the small town of Kumara on the west coast and finishing in the slightly larger town of Christchurch on the east coast. The race begins with a short 3 km run, from the waters edge on the beach to your bike – and its here that the first ìWhat's its nameî point occurs.

I was encouraged into the Coast to Coast and therefore out of my sporting retirement by a friend of mine who wanted me to partner him in the teams' race. There were two reasons why he put up this proposal – the first being he was too fat to do the run section (hence my selection) and the second was that he believed he was a bit of an entrepreneur and had just started a business importing sports supplements. It was for this business that he had been searching for up and coming athletes to sponsor. One such individual had approached him. I can't remember his name, but for the sake of this story we will call him Trevor. Trevor tried hard, but without fail Trevor was not made to be a successful athlete and his results reflected that – except for one result that is, where Trevor had proudly stated he had finished first on the first run stage in the previous years Coast to Coast. Up until that point I had thought that there was only one run stage in the race and on investigation Trevor's name failed to appear anywhere near the top of any stage win. It was at this point it was realised that Trevor was referring to the run off the beach, where he had raced with all his might for the first 10 minutes to his bike, only to find that the following 16 hours were not quite so easy. There is a name for this – politely put it is called ìgoing out too fastî

So here is what's its name point 1 – and you will hopefully note that what's its name forms a rather catchy acronym – work at an even pace, it is the whole journey that counts not just a small part of it.

Having one part of a process within a laboratory working at an exceptionally fast rate will often not benefit the total process. Piling work onto other area's within a laboratory that do not have the resources to cope puts people and resources in that area under pressure – with an even tempo you can ensure the journey in it's entirety is completed to an optimum standard.

At the end of the first cycle stage comes the transition to the run, and also my second what's its name point. The cyclists tend to arrive in rather large groups – and for some reason all support crews believe that their cyclist will arrive in the first bunch. All but about 40 of them are wrong – but even getting 40 bikes and riders through a throng of people frantically looking for someone that is actually not in the group and then getting themselves in the way causes a large degree of chaos and pandemonium.

But there's always one –in every group – that gets a little disengaged from either their support crew or their team mate, or both. In this example – lets call him Tim – now Tim could be a team mate or a support crew member holding a pair of running shoes that are desperately needed – either way, Tim is just not here. The person looking for Tim seems somewhat agitated, and calls his name – Tim ìwhere the hell are youî – only with a few more expletives. Luckily the person who is looking for Tim has a knight in shining armour – his name is Judkins, Robin Judkins, equipped with a mega phone he loudly summons Tim, also displaying a rather extensive vocabulary. Tim eventually appears, and to be honest Tim is not greeted with a lot of love, there are no high fives, no man hugs, just a look that says I have trained my arse off for 12 months, spent an excessive amount of cash on entry fees and gear and was having the race of my life until you shagged it all up!

What's its name point number 2 is Being disorganised wastes time, money and destroys morale.

Losing things in a laboratory is an all too common experience. Like with the transition between the run and cycle but there are several ways to ensure that things run smoothly. In an ideal world components (be they people, samples or anything else you can think of) would arrive one at a time and certainly not in a bunch of 40. You can see this effect demonstrated in later stages in the Coast to Coast when the field has spread out and the pandemonium no longer exists – order has been restored and people know exactly when and from where things were likely to arrive and they are visually easy to identify. It is sole destroying for an individual when they have tried their hardest to get something right but are let down due to a disorganised process.

After the first cycle section the most important part of the race occurs, although I may be a little biased, and that is the run stage. To all intent and purpose the run stage involves running up a river, over a mountain and down a river to the next transition. To try and sex it up a bit, various parts of the course have been given some inventive names such as – the slippery rocks, big boulders, the first gorge, which surprisingly enough is followed by the second gorge and there is even a third gorge which cunningly ends in a waterfall

which can be a bit of a trick for the inexperienced.

Let me let you in on some interesting facts - the race record for the Coast to Coast is held by Keith Murray in a time of 10 hours and 34 minutes and it was in a large part due to the speed with which he was able to complete the mountain run. It is a record that will be difficult to ever beat for three main reasons. First he was very very good, second he had extremely favourable conditions and third the run course was 6 kilometres shorter than it is now. What the record books don't tell us is that someone has completed the race in a faster time. Two years before Keith set his record a South African – Rockley Montgomery - finished in a staggering time of 8 hours and 37 minutes. Again this was largely in part due to the run section. Like Keith he started in Kumara and finished in Christchurch but unlike Keith, Rockley did not have favourable weather conditions – in fact he had terrible weather conditions – so bad in fact that the course was changed from running up a river to running up the Otira Gorge Viaduct. With an average gradient of 16.5% running up Otira Gorge is still hard work, but it's a darn sight easier than going over slippery rocks, through first gorge, second gorge, over big boulders and through third gorge remembering to cross to the true right at the correct time so you are not left standing at the bottom of a waterfall.

So what's its name point three is ìIf you are overworked don't work so hardî And make it easier on yourself!

This doesn't mean that we should all sit down and have slightly longer tea breaks – it refers to that we don't have to do something just because we have always done it a particular way. In a laboratory the process starts at the request from the clinician and ends when information on that request is received back by the clinician – how we do this is up to us. We need to look for our Otira Gorge Viaduct that can make life not only easier but also improve the service that we provide.

After the run section comes a 67 kilometre kayak. In this years Coast to Coast competitors were met with the lowest river levels ever experienced - which was met with some degree of angst and uncertainty among onlookers. This was potentiated when it was also suggested that a large proportion of the river flow was to be diverted off to the Canterbury Plains water scheme to help irrigate a rather thirsty agricultural sector. Interestingly the vast majority of the skilled kayakers appeared remarkably quiet – because for them a low river level was not necessarily the worst thing in the world – for them sure it meant they would have to paddle harder and their times would be slower – but they also knew the advantages they could achieve over the less skilled paddlers would be of a far greater margin than if the river was in high flow.

What's its name point 4 is "Resources are limited for everyone - Learn to work with what you've got"

Like the current in the Waimakariri River our financial flows are becoming somewhat restricted. The resources available to us are not only strictly limited but are also been chased by other groups. This expands out to our pool of available talent in forms of staffing resources – not only do we need to make the best use of what we have, we need to make sure people don't poach those staff we need for the future. We need to value what we have and use it wisely – because we are not going to get any more! We must therefore become like the skilled paddlers whereby it might be a little tougher but we can come out on top.

The two day event of the Coast to Coast, consists of individual competitors - those that don't have attention deficit disorder, and so have no internalised need to do the one day event, and teams, who are made up of team members working to their strengths – those who are too fat – kayak, while those who are too uncoordinated – run. The final stage is a cycle stage that permits drafting. If you have a television sports addiction to the recent Olympics or the Tour de France you may be aware of the advantages to cyclists when they draft. For the rest of you that spend your time somewhat more constructively – drafting is when you bike behind someone else – it is a lot easier – a little bit like biking with a really strong tail wind. With a group of cyclists they will each take a turn at the front pedalling as hard as they can and then will toddle off to the back of the group to have a rest until it is their turn again. By doing this an individual can pedal a lot harder for a short period of time than they would normally as they know they will soon get a rest where they will still travel at the same speed, but with a lot less effort. From personal experience I have been in both groups of cyclists where they are all faster than me and groups where they are all slower than me – but in both cases I got to the finish far faster than I would of if I had been cycling alone. On top of this the group often talks to each other – with a good turn or a well done as you are drifting to the back of the bunch having just taken your turn at the front– which makes your legs just that little bit less tired and your butt hurt not quite so much – allowing just a wee bit more effort when it is your turn to next take the lead. There are also a variety of hand signals to indicate hazards on the road – such as pot holes, glass and wayward street signs, which with a bit of luck will ensure you get to the finish line in one piece.

What's its name point number 5 is "With team work and communication everyone gets to their goal a lot faster".

It is important for us to understand that we are a team. Not only within our departments, but within our laboratories, and within the health sector as a whole and to get to our ultimate goal of improving patient care we need to work together. This means at times some of us will have to do all the work for the team by taking our turn out in front - but it is a lot easy than trying to continuously battle on alone. It is also important to communicate to other groups within the health care team and appreciate a job well done. Like with the lead cyclist that identifies the potholes in the road it is important to make people aware of issues that may be coming up – just because they are obvious to you doesn't mean it will be obvious to someone else in the process – for all you know all they can see is a bum on a seat.

Of course at the end of the last cycle stage you have finally reached your goal – the finish line. In 2008 the longest day event was won by Richard Usher – proudly sponsored by High Five Sports supplements, available from my entrepreneurial friend who lured me into my first Coast to Coast (at www.fifthelement.co.nz – just in case you were wondering). Richard will be recognised in the record books because he won – because he was the fastest, and as time progresses those that raced hard and came close will be forgotten. All of the competitors spend months and months training, improving technique and increasing endurance, spend a small fortune on equipment, plan their race down to almost step by step detail and have a well schooled support crew to help them out. But on the day all of this occurs behind the scenes – because on the day they are judged by the perception of those watching, and that perception will be based on one thing and one thing alone.

What's it's name point number 6 is "At the end of the day you will be judged solely on the time you have taken" and nothing else.

We must understand that how we are judged is from the perception of others not how we perceive ourselves. I think we all know how hard we work to produce quality results, and it is important that we don't compromise our principles, but in a recent survey of clinicians results showed that 42% of them believe that timeliness of result was the only measure of quality – result accuracy barely made it into double figures.

So the journey has been completed – but there is one more what's its name point that we can learn from the coast to coast in an effort to decipher how we can find the Rumplestiltskin of medical laboratory science. On crossing the finish line you are met by New Zealand's version of Santa Claus. A round jolly man with a loud shirt and a loud voice who places in your hand a can of the sponsors product – and you meet up with your sweaty smelly friends that you have spent the last 12 months training with and talk about the if only's and the what if's and thus comes what's it's name point number seven "If at first you don't succeed, Relax, Reflect, Have a beer and try again another day"

The future of medical laboratory science – a personal perspective of Dr Who

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The metamorphosis of the 1950's medical laboratory bacteriologist, the right hand man of the pathologist into the current modern medical laboratory scientist of 2008 has been one of evolution shaped by the ever changing laboratory environment and individual aspirations. It's unlikely the future will be driven any differently, however its doubtful if this process will evolve into medical laboratories stocked full of PhD's or clinical associates. The future role of the medical laboratory scientist will be one based on diversity and agility. It will be the survival of the fittest, a tailor made solution to fit the particular work space, science speciality and laboratory type.

But are we still caught in a time warp and need Dr Who's Tardis to get us out of the QTA, technologist and scientific officer's mind set? These roles, developed in laboratories during the 1960's and 70's, are an anachronism. Unfortunately, I believe they still exist within the culture and structure of the profession, reinforced by collective agreements and a barrier to progress.

Our history will be our path to the future of what's going to happen in 20 years in medical laboratory science is not going to be too different to what's happened in the last 20 years. It will be driven by the science and the environment. This paper will explore the optional roles for the future, where the diversity lies and the change in mind set needed to facilitate this process.

The science

Technology driven

We are a technology driven science, what you could call science with a purpose. Very rarely do we develop the technology or discover the science, we are reliant on the in-vitro diagnostic industry to do that and certainly a great number of our fellow medical laboratory scientists work in that industry. But they provide the tools, rarely would the industry create a product that has no use, or the need for the laboratory to find a use. We would be unable to do a business case to buy the thing if we didn't know what we were going to use it for.

We often do the research and method development for new tests, or prove the efficacy or usefulness or improvement in patient outcomes for new tests. We respond to clinical demand and provide information about a patient's physiological status or what bugs them, where so to speak. When we evaluate a new method or instrument we are more often than not doing validation. We confirm it will do the job or the patient information we produce is clinically useful or is the same as the information from other instrument.

Core functions

In the most part, most laboratories in New Zealand provide core services regardless of whether they are providing information to the primary (community) referred market or the secondary (hospital) referred market. Most of these are routine biochemistry, haematology, microbiology, immunology, histology and phlebotomy. There will also be some form of blood banking/ transfusion service and most of these processes will be automated with a reasonably rapid turn around time once the sample reaches the lab. This would be anything to 80 – 90 % of their workload.

Specialist testing

There will be laboratories where specialist, non-routine analysis are performed. These will include cytogenetics, cytology, molecular diagnostics, virology and specialist areas of biochemistry, haematology, microbiology and histology. Many samples to these laboratories will come from primary and secondary referred sectors. Many of these laboratories will have specialist scientists, equipment and expert clinical advice and much of this referred work is not time dependent.

New sciences

It is in these laboratories the new science areas of DNA analysis in molecular genetics, infectious diseases, chromatography and flow cytometry are developing and where there is still research. Very often new methods are developed in a university research laboratory or during a medical laboratory research project.

If found to be clinically useful, the challenge is then to manage the transition from research method to routine medical laboratory method and that often requires skills outside that of the researcher. Too many of our senior scientists spend careers performing analysis which, when they retire, the laboratory is unable to produce the same information as the transition has not been well managed. Succession planning has been lacking or the sharing of information scant.

New sciences - pharmacoeconomics

However the new sciences within our profession are more around analysis of biological material to determine the suitability of a particular drug for treatment. Determining the sensitivity of a pathogen to an antibiotic was perhaps an early and till most commonly used analysis of this type.

We are now taking this a step further with chromosomal abnormality detection to determine the type of cancer and the most suitable treatment. These include such things as Her2 analysis by FISH to see if Herceptin is of use or not or FISH analysis of brain tumours to determine yes or no to radiotherapy or chemotherapy. Leukaemia diagnosis is made by flow cytometry and cytogenetics. Micro-array technology is being adopted more and more into the labs and will be the auto-analysers of the future. Microscopes will be rarely used in cytogenetics.

So tailor made analysis to provide specific information about a specific disease. Yet what of the traditional medical laboratory departments, haematology, chemical pathology, microbiology, immunology, anatomical pathology, transfusion sciences, phlebotomy, specimen services, forensic science, cytogenetics and virology?

Diagnostic genetics are emerging within haematology, cytogenetics, virology and microbiology and with the number of common processes in molecular analysis, the clinical interpretation / clinical inter-action still remains with those experts who have the competency to act as the information gatekeepers. Rapid PCR is now becoming a reality where almost black box technology is on the market for elegant simple infectious diseases screening including MRSA, VRE, viruses and STD's. This means most laboratories will have access to this type of analysis without the need of specialist reference laboratories.

Automation – routine – time dependant – core laboratory

We have the Medical laboratory Science Board (MLSB) not recognising specimen services as part of the practice of medical

laboratory science, yet tell me where the boundary is going to be between specimen services and the total automation laboratory where pre-analytical processing is indistinguishable from analytical processing? This is where high through-put automation includes what was chemistry, haematology, coagulation and immunology including infectious diseases, all connected electronically to on-line ordering at the clinical / patient interface. Where does the technical and clinical responsibility start and finish? Do you need to have haematologist or biochemist branded on your forehead to put a tube in a rack that's going to be processed by a lot of steel, software and reagent and a lot quicker and more accurately than the scientist doing it manually?

Rapid response laboratory

Time dependent analysis is fundamental to the rapid diagnosis and treatment of patients in the ED / APC / high dependency unit arena. To admit or not to admit, to treat or not to treat, to monitor continually are the key question's and there will be increasing need for laboratories to perform against time frames. If this is done in a core laboratory, a rapid response laboratory or whatever other laboratory label you may have, it is essential that our science is demand driven and must be responsive to the needs of the referrers.

Technology will drive this and manufacturers will develop technology that will facilitate this provided there is sufficient return financially to the supplier or developer. However, the answer is not necessarily in point of care testing because of the cost.

POCT

Some years ago with the advent of Point of Care Testing, the profession came out fighting what was thought to be the end of medical laboratory science as all analyses were perceived to be done by doctors and nurses beside the patient. It did not happen and the guidelines formulated by the NZIMLS in 1993 are still on our website and are a fair indication of what is happening in most hospitals today. The standard ISO 22890 point of care testing has become the norm with those hospitals and laboratories that manage this science. The science will drive the scientists, it is not controlled by the scientists but utilised and managed and adopted by them.

The systems

Environmental

And to maintain the integrity of the information we produce we have all sorts of systems around that. Systems such as accreditation, method standardisation, IT protocols, release of information protocols, how we get rid of the biological material and consent to retain it. All of these are interrelated and interactional, the systems being a pot-pourri of environmental, political, social and clinical needs. The so called ìterms and conditionsî of producing a lab result have changed markedly and have been embroiled in a multilayer of documents, regulations and governance.

Quality

Quality is an endless process of continual improvement with a significant number of different measurements. The drivers are varied, but accountability and performance are key elements and ensuring outcomes that are tangible and satisfies the need for which there are designed. Regardless of the quality frame-work, we are accountable and need to ensure information integrity and relevance.

IT systems

Laboratories are e-organisations and will increasingly become more and more dependent on information technology. The amount of data most laboratories process could not be processed manually nor would be same degree of accuracy be maintained. However, it is also one part of the post analytical process where laboratories are lacking both the skill set and the institutional knowledge. It will be the largest single ongoing investment over time for most laboratories.

Occupational health and safety

We are also obliged to ensure we have systems in place to protect our colleagues from bugs, chemical hazards, body fluid accidents, falling over things and things falling over them. In the world of ACC, regulation and requirement go hand in hand and become more arduous. Repetitive tasks leading to workplace injury will be a continual strain on resources and the need to move from a labour intensive process to more automated processing.

Financial

And who pays for this information we produce? Clearly everything else is financially driven, the recent pathology reforms in New Zealand were not necessarily about better patient outcomes but more about where money can be saved. Essentially cost shifting from one service to another without necessarily determining the long term effects, yet promoted in the name of better patient care. The flow–on effects will continue to be felt in the ensuring years as the profession becomes unattractive to new entrants because of the instability and volatility of the sector.

So we have systems around costs, plotting income versus expenses allocating all these to what sections or departments we happen to have organised our laboratory in. Cost of service is the biggest driver within pathology because too often it is easier to see the tangible than the intangible. We have systems designed to measure financial outcomes or costs, but not the right tools to measure clinical or improved patient outcomes. Driving down the cost of pathology will reduce access which will in time increase the long term cost of chronic diseases such as diabetes and cardiac disease.

Clearly cost effective healthcare when funded by the state is more about value for money, provided the delivery is at the clinical / patient interface and not tied up with resources maintaining politically correct protocols such as the current interface. So what Pathology is allowed or funded to delivery in the future will always be driven by the funder and allocation of the dollars.

The market

The environment in which pathology operates is all part of the systems and very much a key component in determining the future of our science. I believe we will be soon looking at a pathology renaissance, assuming of course that we have been through a dark age recently.

If 60 – 70% of medical treatment and diagnosis is reliant on some form of pathology information, then access is a key component. That has clearly been damaged recently and access to reliant and sustainable information from laboratories is not always guaranteed. So a key determination to the future of medical laboratory science is the market, the systems, the funding. In other words, the environment in which pathology is expected to operate.

Professional governance

The Health Practitioner's Competency Assurance Act is the state ensuring those who are working in the healthcare profession have the competency and ongoing education to do so. Because we do not have medico-legal litigation, then there needs to be safety nets and assurances for the users of the services.

Professional relationships

And what of the political environment of the professional relationships, doctor to doctor and that of the pathologist and the scientists. The future of the science is very much determined by those relationships as much as what, where and how.

Patients

Politics play a part with professional governance and on-going education and competency. The public has a right to ensure those providing their healthcare are registered and competent to

and deliver safe healthcare. We must respect their privacy, ensure they consent to whatever we are doing to their biological material and understand their different cultural needs.

Will this lessen? I doubt it because as a society we are becoming more complex and the relationship between clinician and patient will have a direct effect of the relationship we have with the clinician. I believe our relationship will become more interactive with the patient / client and referrer and access to patient information by the patient more readily accessible.

The staff

A qualification says you are able to do the job, but it does not say how good you are at it. Therefore are all laboratory scientists and technicians created equal? Someone once said ìunless you are producing the information on the bench by doing the analysis, you are there to helpî.

The biggest variable in predicting the future and probably the most demanding is the scientific staff that populate our laboratories. What the future holds for us is very much outside our control because the key drivers will always be the science and the systems. Adaptation to one's environment will ensure survival of our species because essentially it is out of our control. Unless we can adapt or create situations where there is flexibility and agility, we will indeed be exterminated.

We can talk about baby boomers, generation X and generation Y, but all that will be meaning less because unless each generation can adapt to our environment, our labels will not matter. That does not mean we ignore those characteristics, however, what comes first, the needs of the job or the needs of the scientist?

But we are a confused lot and if you look at the number of different job titles in medical laboratories, regardless of what generation you come from, you really would wonder about it all.

Laboratory manager
Practice manager
Technical head
Section leader
Scientific officer
Team leader
Technical specialist
Scientific leader
Scientific director
Director
Medical laboratory scientist
Phlebotomist
Mortuary technician
Forensic technician
Cytotechnologist
Medical laboratory technologist
Laboratory assistant
Charge medical laboratory scientist
Senior medical laboratory scientist
Laboratory scientist
Supervising medical laboratory technician
Medical laboratory technician
Qualified technical assistant
Medical laboratory assistant
Charge phlebotomist
Trainee medical laboratory technician
Intern medical laboratory scientist
Charge mortuary technician
Student, cadet, GAP student,

And yet we have only two scopes of practice!

Much of this is in the terms and conditions the various awards throughout the country, many of which have historical connections to the days when all there was in a lab was:

A Principal Technologist
Charge Technologists
Graded Medical Laboratory Technologists also known as Graded Officers!
Medical Laboratory Technologists
Trainee Medical Laboratory Technologists
QTA's, QTO's and Lab Assistants.
With a smattering of Scientific Officers...
And life was good...or was it?

However while we remain in historical time warps wither through MECA's or re-enforcement of status by whoever, we will never move forward. Many of the baby boomer generation still refer to some Med Lab Scientists as Technologists, lab assistants and the like.

Unfortunately many senior staff in status or decisional positions are the barrier's to professional advancement and quite often guilty of disempowering colleagues. They are often there not because of their ability to manage colleagues, but more likely because they have been around the longest or have academic qualifications not necessarily suited to management.

The inter-action for example between the Scientific Officer and the Medical Laboratory Scientist (Technologist) has historically been difficult where differentiation was always made on qualification rather than ability and lead to a perception of elitism within the scientific officer community.

Yet the same applies to the relationship between Scientist and Technician although many technicians these days in the specialist areas are those non- BMLS science graduates who can't get registration as a medical scientist.

Many of the finest practitioners of medical laboratory science have been those whose origins were on the bench being trained under the old technologist programme. Of course we now have a four year degree and only those without his degree, but who have specialist knowledge or skills in the molecular sciences or chromatography have a place in the modern medical Laboratory at Masters or PhD level.

However we still live in an anachronistic world and many of the structures still in place are those created in historical times. Those old hierarchical systems and attitudes still exist in some laboratories where egalitarianism and collegiality are not often displayed.

However the future needs of the laboratory workforce will be far more diverse. The increasing demands of the science, systems and environment will determine the future type of scientist, and they will be far more diverse.

However the skill's needed are in managing the science, the systems and the staff. Specialist knowledge is needed in managing automation as systems rather than boxes, managing electronic connectivity, quality systems, processes and how to manage a diverse work-force. But as we need specialists, we will also need generalists, diversity and agility being the key.

The biggest challenge for anyone working in a laboratory is, and will continue to be, managing fellow scientists. Yet managing will not be elemental to success but more leadership and the evolution to self managed teams based on decentralised processes and quality frame-works. The level of emotional intelligent within an individual rather than their IQ will determine their place in a lab.

We over use the ìteamî word in our labs, work groups are more acceptable and certainly more realistic. Often those with the team leader title don't know the difference in definition between a team and a work group and lack the leadership skills to create a team.

We are excellent at managing and maintaining instruments or scientific process; however the most valuable component of any laboratory, the scientist or the technician, we maintain and manage miserably.

There is no point talking about whatever whizz bang technology that's about to revolutionise our playgrounds until we learn to manage interpersonal relationships between ourselves and our science and our environment.

Fig.1 Baby Boomers
In most of the senior positions in the Lab
Key characteristics (1946-1955): experimental, individualism, free spirited, social cause oriented,
Work Values: quality of life, nonconforming, seeks autonomy, loyalty to self
Key characteristics (1955 – 1964): less optimistic, distrust of government, general cynicism,
Work values: loyalty to career, success, achievement, ambition, hard work; loyalty to career

We Baby Boomer's **(Fig 1.)** populate by far the senior management and scientific positions within most Laboratories in New Zealand and we have our own characteristics'.
What will make our science attractive will be the ability to create flexibility, job satisfaction, and a balanced lifestyle with workplace loyalty to fellow scientists. Those are the needs for Generation X (fig 2), those born from approx 1964 – 1980 and who are now sitting in middle management positions waiting to talk over from us baby boomers and some of us aren't ready yet.

Fig. 2 Generation X
Currently in middle management positions in labs waiting to take over from the BB's.
Key Characteristics (1965 – 1981): described as "don't believe in God, dislike the Queen and don't respect parents". Reject the values of the baby boomers and have a hazy sense of their own identity.
Work values: Flexibility, job satisfaction, balanced lifestyle, loyalty to relationships.

So the question is this? Do the next generation of scientists, so called generation Y **(Fig 3)** compatible with the values and practice of a Medical Laboratory. They have been described as being techno-savvy, are especially tuned to their own value in the market, have limited loyalty to any particular employer and insist on working in a stimulating job environment.

Fig 3. Generation Y
Are they suitable for the current lab environment, especially those from western culture.
Who will be suitable for the strict lab environment?
Key Characteristics (1980 – 1994): children of the baby boomer generation. Techno savvy, ambitious, brand conscious, peer-orientated.
Work Values: Tuned to their own value in the job market, have limited loyalty to any particular employer and insist on working in a stimulating job environment.

Yet our adherence to process, quality frameworks, the often and precise work we do is more in conflict to that required by our younger scientists who are looking for diversity, flexibility and not staying in one place for very long..

Are the scientists from the more traditional cultures seen in the East more suitable to work in our laboratory environment than those from a Western culture? Will the ethnic and social background pre-determine who will be coming into our profession?

But what about scientific and clinical leadership? I fully endorse the role extension proposals and training for Medical Laboratory Scientists who wish to become more involved in the clinical interface between laboratory and referrer; however will the system allow it?

We have midwives and nurse practitioners using the laboratory service and quite ably. Who do they go to for clinical advice?

There will probably be little choice as clinical leadership, especially with the decline in numbers of Clinical Pathologists in Chemical Pathology, Haematology and Microbiology needs to be managed some how.

But this pathway is very limited and arduous and quite frankly may not be preferable to doing a medical degree and without clinical endorsement and governance, of little use. Acceptability at master's level may be sufficient for endorsement of clinical competency and role extension.

However, the need for post-graduate study is essential to learn new skills and provide an academic foundation for new roles. In addition to higher level learning in the traditional medical laboratory sciences, alternatives such as quality management, information technology, education, human resources, accountancy and organisational behaviour are subjects more in line with the future needs of med lab science.

These can be sought through tertiary institutions and don't forget NZIMLS fellowship.

Not everyone would want to or can be a Lab Manager, a technical head, do a MBA or a business diploma, however strong leadership skills in the workplace will be essential for future section leaders and supervisors where inter-action and integration of various types of scientists is fundamental to success.

How much effectiveness and efficiency are we loosing now because those who are currently providing the leadership in Laboratories are unable to create an ideal work environment to maximise the human potential for which they are responsible? Is the decline in numbers within the lab due to retention issues more a reflection of current management skills than workplace drivers?

Scientists will continue to evolve as technology replaces labour in the routine processing of human biological material. Skill sets will expand into management of processes, broader generalist labour skills over a number of disciplines, as well as specialist systems and science skills within regulatory and organisational parameters.

Conclusion

So the future of Medical Laboratory Science will be determined by two major influences, the science and the environmental systems.

The science will be driven by clinical need and financial necessity, the systems and processes within the environment by regulation and social need.

We as scientists have an obligation to create pathways by which our younger colleagues can adapt and evolve in this ever changing environment.

The pathways must be flexible, but maintain duty of care responsibilities and professional standards.

But as the Tardis lands in 20 years time, glucoses will continue to

be a glucoses, a creatinine a creatinine and urines, full blood counts, swabs and bits of tissue will still be there.

You may not recognise the scientists or the technology, however I think you will recognize the lack of funds, lack of good staff, pathology reviews and current restructures.

Our history is the pathway to our future, our continual evolution the pathway to our survival.

Ross Hewett,
Manager, LabPLUS,
Auckland City Hospital

In this issue

Each year the NZIMLS Council honours a prominent medical laboratory scientist to deliver the TH Pullar Memorial Address at its Annual Scientific Meeting. The recipient this year was Kevin Taylor from Canterbury Health Laboratories who's Address is in this issue. In his Address, Kevin draws on his sporting activities experiences to give some pertinent points on how we can learn from the coast to coast endurance race in to decipher how we can find the Rumplestiltskin of medical laboratory science. In other words how the world of medical laboratory science replicates the increasing impossible tasks represented in the rooms of straw of this fairy tale.

Ross Hewett, Laboratory Manager of LabPLUS Auckland gives his personal perspective of the future of medical laboratory science in the viewpoint article in this issue. To quote Ross, 'The future role of the medical laboratory scientist will be one based on diversity and agility. It will be the survival of the fittest, a tailor made solution to fit the particular work space, science speciality and laboratory type'.

Jaine Duncan from Canterbury Health Laboratories presents a retrospective review of homozygous haemoglobin E patients. Jane originally presented this data as a poster presentation at the 2007 Annual Scientific Meeting and was the winner of the Hugh Bloor Memorial Prize for the best poster presentation. She reviewed the Canterbury Health Laboratory thalassaemia patient database and found 43 patients who had been diagnosed as homozygous Hb E. However, seven of these patients had equivocal results. She stresses the importance of reviewing the blood count, blood film and clinical findings of patients with equivocal results.

Yeu-Sheuan Khor, a 4th year medical laboratory science student evaluated the immature reticulocyte fraction as an early indicator for bone marrow engraftment in seven patients who had undergone a bone marrow or stem cell transplantation in Auckland Hospital. He found that the immature reticulocyte fraction may be an early sign of haematological recovery, and thus may reduce the use of growth factors in patients undergoing bone marrow or stem cell transplantation.

Two prominent members of our profession recently passed away. In this issue is an obituary on Rod Kennedy who worked in Auckland Hospital and served on the Institute's Council from 1963 to 1975, first as Council Member and then as Secretary. The other member of our profession who recently passed away was Barry Edwards from Canterbury Health Laboratories. His obituary will appear in the April 2009 issue of the Journal.

Abstract of oral and poster presentations at the NZIMLS Annual Scientific Meeting in Dunedin in August 2008 are in this issue. Only abstracts that are informative to the reader are included. Any abstract which stated that results will be presented or that results will be discussed, have been excluded.

At this year's Annual Scientific Meeting, Olympus sponsored a photography competition. Seventeen photos were submitted and all are reproduced in this issue.

A retrospective review of homozygous haemoglobin E patients

Jaine M Duncan, Dip MLT, Medical Laboratory Scientist

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Abstract

Haemoglobin E (Hb E) is a common β chain haemoglobin (Hb) variant prevalent in South East Asia (SEA). Homozygous Hb E is usually an asymptomatic condition which on investigation shows a hypochromic microcytic blood film, an absence of Hb A, and a slight increase in Hb F of usually less than 5% (1), with Hb E constituting the remainder of the haemoglobin.

Patients presenting with equivocal results may prove problematic in differentiating a diagnosis of homozygous Hb E from one of Hb E/β° thalassaemia. A review of the Canterbury Health Laboratory thalassaemia patient database found 43 patients who had been diagnosed as homozygous Hb E. However, seven of these patients had equivocal results. Review of the blood counts and blood films for the seven patients, in conjunction with the results of the haemoglobinopathy investigations, showed the following. One patient was reported as homozygous Hb E with a comment that Hb E/β° thalassaemia could not be excluded, one fitted the criteria for Hb E/β° thalassaemia, one could possibly meet the diagnostic criteria for Hb E/β° thalassaemia and four patients were probably homozygous for Hb E but a diagnosis of Hb E/β° thalassaemia could not be excluded.

These findings highlight the importance of reviewing the blood count, blood film and clinical findings of patients with equivocal results. Investigation of other family members or sequencing of the β globin gene may prove helpful in establishing a definitive diagnosis.

Key words: haemoglobin E, beta thalassaemia, abnormal haemoglobin

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Introduction

Haemoglobin E is a common β chain haemoglobin (Hb) variant prevalent in South East Asia (SEA), resulting from a point mutation that creates an amino acid substitution of glutamic acid for lysine at position 26 ($\alpha_2\beta_2^{26Glu\ Lys}$). The point mutation results in a false splicing site within an exon, leading to some mRNA transcripts being spliced abnormally, and a reduced rate of synthesis of β^E chains. This reduced rate of synthesis is responsible for the thalassaemic red cell indices associated with the inheritance of Hb E.

Homozygous Hb E is usually an asymptomatic condition without anaemia, or any evidence of haemolysis (1). The blood film appearance is similar to beta thalassaemia trait, with hypochromia, microcytosis and the presence of target cells. On alkaline haemoglobin electrophoresis there is no Hb A, with the majority of the Hb migrating in the Hb A_2/Hb E position (Figure 1). Haemoglobin F levels may be normal or elevated, with levels usually less than 5%. (1) On acid electrophoresis the Hb E band migrates in the Hb A position.

Hb E/β^0 thalassaemia demonstrates variable severity, ranging from a condition similar to β thalassaemia minor to something approaching thalassaemia major. The blood count shows a hypochromic microcytic anaemia with the Hb varying from 25 to 130 g/L and an increased RDW (1). The blood film shows hypochromic microcytic red cells with varying degrees of anisocytosis and poikilocytosis, together with target cells and polychromasia. Basophilic stippling is often present and nucleated red blood cells are generally seen (2). On alkaline haemoglobin electrophoresis, there is an absence of Hb A with only haemoglobins E, A_2 and F present. The Hb F level is variably ranging from 5 - 87% (1).

Patients presenting with equivocal results may prove problematic in differentiating a diagnosis of homozygous Hb E from one of compound heterozygosity for Hb E and β^0 thalassaemia (Table 1).

Methods

For this review a computer search of the Canterbury Health Laboratory thalassaemia database was run using a diagnosis of homozygous Hb E as the search criteria. The database uses a Microsoft Access program, the haemoglobinopathy screen results, patient details and red cell indices together with a diagnosis are entered once investigation are complete. The search retrieved data on 43 patients with a diagnosis of homozygous Hb E.

Haemoglobin F quantitation was performed by either alkaline denaturation (3) or by high performance liquid chromatography (HPLC) on the Bio-Rad Variant II HPLC system using the Variant II-β thalassaemia short program (Bio-Rad Laboratories, Hercules, CA, USA).

Results

On review of the data for each of the 43 patients diagnosed as homozygous Hb E, seven patients were found to have equivocal results (Table 2).

Patient 1 was reported as homozygous for Hb E with a comment that Hb E/β^0 thalassaemia could not be excluded, and family studies were suggested. Patient 2 was reported as homozygous Hb E with a comment that the abnormalities of the blood count and blood film seemed more severe than those normally associated with homozygous Hb E. On review, this patient appears to fit the criteria for Hb E/β^0 thalassaemia. Patient 3 was a 24 month old who was reported as homozygous Hb E with G6PD deficiency (confirmed by abnormal G6PD screening test and reduced assay level). At the time it was assumed that the Hb F of 15% was attributable to a combination of the patient's age and recovery from an oxidative haemolytic crisis. However, on review a diagnosis of Hb E/β^0 thalassaemia cannot be excluded. Patient 4 was only 11 months old at the time of testing, and the Hb F of 9% is quite possibly related to the age of the patient. This is probably a case of homozygous Hb E but Hb E/β^0 thalassaemia is not excluded. Patients 5,6 and 7 were all reported as homozygous Hb E but again a diagnosis of Hb E/β^0 thalassaemia cannot be excluded.

Discussion

In each of the seven cases the Hb F level is somewhat less than that usually associated with Hb E/β^0 thalassaemia, but is at the upper limit or slightly higher than that expected for homozygous Hb E. Atypical Hb F levels, together with an increased RDW, make a definitive diagnosis difficult. For some cases, blood film results or clinical findings were not available. No information was available on the iron status of these patients. Additional clinical information or the opportunity to investigate other family members, could have been helpful in establishing a definitive diagnosis.

Homozygous Hb E is a clinically benign disorder, the diagnosis of which is usually straightforward. However, patients may present with Hb F levels that overlap those seen in Hb E/β^0 thalassaemia. It now appears that although the Hb F level in homozygous Hb E

usually less than 5% it may comprise up to 15% of the total Hb (1). In Hb E/β^0 thalassaemia the Hb F level is usually 30-60% but the range is extremely variable with levels from 5-87% being documented (1). The variability in the Hb F level highlights the importance of considering Hb E/β^0 thalassaemia in the differential diagnosis. Before making a diagnosis of homozygous Hb E the Hb F level needs careful consideration. In cases where the Hb F level approaches that seen in Hb E/β^0 thalassaemia, it may be necessary to consider other laboratory and clinical information in the differential diagnosis. Full blood count and blood film findings should be reviewed with particular emphasis on the RDW and red cell morphology. Clinical details may indicate other reasons for any anaemia, or may confirm a history of anaemia, jaundice or hepatosplenomegaly. In these cases investigation of other family members can provide important information regarding the inheritance and segregation of Hb E or beta thalassaemia alleles within the family. Sequencing of the globin gene may prove helpful in detecting a beta thalassaemia mutation.

It is important to recognise the difference between the clinically benign homozygous Hb E and the more severe condition of Hb E/β^0 thalassaemia. A correct diagnosis of Hb E/β^0 thalassaemia is important, not only for disease monitoring and treatment for the patient, but also in regard to reproductive choices, especially in the context of a partner who also carries a gene for either Hb E or β thalassaemia.

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Table 1. Differential diagnosis of homozygous Hb E and Hb E/ß° thalassaemia.

	Homozygous Hb E	Hb E/ß° thalassaemia
Hb (g/L)	normal	25 – 130
RDW	normal	increased
Blood film	hypochromia microcytosis target cells	hypochromia microcytosis anisocytosis poikilocytosis target cells polychromasia often basophilic stippling usually NRBC
Hb F (%)	usually < 5	5 – 87
Reticulocytes (%)	usually normal	4 – 6

Table 2. Laboratory results for patients with an equivocal diagnosis of homozygous Hb E.

	Hb (g/L)	MCV (fL)	MCH (pg)	RDW	Film comment	Hb F (%)	Comment
Patient 1	113	72	24			8	
Patient 2	94	56	17.4	25.7	poikilocytosis anisocytosis target cells spherocytes fragments NRBC	9.6	
Patient 3	101	63	20.4	20.7	target cells spherocytes polychromasia blister cells	15	24 month old, G6PD deficient
Patient 4	87	57	18.3	21		9	11 month old
Patient 5	127	67	20.7	18.3		5.7	
Patient 6	107	65	21.1	16.7	target cells polychromasia spherocytes	4.8	
Patient 7	89	65	21.3	16.3		5	pregnant

Evaluation of the immature reticulocyte fraction as an early indicator for bone marrow engraftment in patients treated with bone marrow/stem cell transplantation

Yeu-Sheuan Khor, 4th Year Medical Laboratory Science Student
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Abstract
Engraftment following bone marrow/stem cell transplantation is indicated by a rise in the absolute neutrophil count (ANC). Current haematology analysers, such as the Sysmex XE-2100, provides accurate and precise measurements of reticulocytes by use of flow cytometry which has enabled the subdivision of reticulocytes into three categories, namely medium fluorescence reticulocytes (MFR), high fluorescence reticulocytes (HFR) and low fluorescence reticulocytes (LFR), based on RNA content within the red blood cells from which the immature reticulocyte fraction can be calculated.

In this study, seven patients underwent bone marrow/stem cell transplantation and were monitored until engraftment, indicated by an ANC of ≥0.5 x 109/L. An ANC of ≥0.5 x 109/L was achieved by patients in a mean of 14.7 days (range: 8-22 days), and an IRF of >5% with a mean of 11 days (range: 7-20 days). In 86% of patients the increase in IRF preceded a rise in ANC. Thus, the IRF may be an early sign of haematological recovery, and thus may reduce the use of growth factors.

Key words: immature reticulocyte fraction (IRF), absolute neutrophil count (ANC), bone marrow engraftment, bone marrow transplant (BMT), stem cell transplant (SCT), Sysmex XE-2100 haematology analyser, medium fluorescence reticulocytes (MFR), low fluorescence reticulocytes (LFR), high fluorescence reticulocytes (HFR) .

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Introduction

Normally reticulocytes are present at about one percent of the red cells in the peripheral circulation. However, their release into the circulation may be enhanced by intense erythropoietic stimulation. The reticulocyte count is used, therefore, in the evaluation of erythropoiesis or haematopoietic recovery in a wide range of clinical interventions, including bone marrow engraftment (1,2). This mechanism of increased red cell production is activated in response to increased red cell destruction in conditions such as haemolysis, haemorrhage, anoxia or high attitude (3), and by the stimulation of erythropoietin production and release from the kidney, liver and rarely the spleen. Erythropoietin sequentially stimulates erythroid proliferation at different levels. In the process of erythropoiesis, erythroid cells matures from pronormoblasts, characterised by the loss of nucleus, condensation of chromatin to form coalescent clumps, formation of siderotic clusters, and the cessation of DNA and RNA synthesis, and optimized haemoglobin production. Further maturation leads to the penultimate stage, where reticulocytes are produced and are characteristic cells with no nucleus and contain RNA, ribosome and some mitochondria, leaving the cell able to synthesis, at a limited capacity, haemoglobin (3). At the final stage of maturation haemoglobin synthesis ceases and the immature cells become mature reticulocytes and mature into erythrocytes, which have no mitochondria, RNA and ribosomes, while retaining the ability to utilize glucose in glycolytic pathways.

The Sysmex XE-2100 haematology analyser (Sysmex Kobe, Japan) utilises flow cytometry to differentiate reticulocytes and nucleated red cells based on cell size and uptake of fluorescent nuclear dyes and has facilitated the characterisation of reticulocytes subpopulations, namely the HFR, MFR and LFR, with IRF = HFR+MFR. This study attempted to relate the immature reticulocytes fractions with bone marrow engraftment or recovery in patients post bone marrow transplant. Following bone marrow transplant it is important to monitor for bone marrow engraftment in order to provide a prediction of successful bone marrow transplant when patients are taken off antibiotics and growth factors. Previous reticulocyte maturity studies show the usefulness of IRF in the monitoring of bone marrow suppression post chemotherapy, monitoring of bone marrow engraftment post transplantation, classification of anaemia, and monitoring of erythropoiesis (1, 4-6).

In marrow engraftment the usual and most accepted mode of monitoring success is ANC, but a previous study has indicated that the IRF is a parameter which provides earlier and closely related information than ANC on engraftment (4). IRF is a parameter which is less likely to be influenced in cases of sub-clinical and clinical infections, which might lead to the decrease in ANC, bringing about the possibility of pseudo-unsuccessful engraftment. In a similar study by the Spanish Multicentric Study Group comparing the recovery of the ANC and IRF, it was shown that haematopoietic recovery is indicated by an ANC of ≥0.5 x 10^9/L or an IRF of > 5% or HFR of >3%' (6). The present study investigated the utility of the Sysmex XE-2100 haematology analyser in providing the IRF for monitoring bone marrow transplants.

Materials and Methods

Bone marrow engraftment was evaluated in seven patients who were diagnosed with disorders that required bone marrow/stem cell transplantation as a form of treatment, by means of haematopoietic progenitor cell (HPC) infusion, peripheral blood stem cell (PBSC) infusion, or cord blood (CB) infusion, following a fixed regiment of chemotherapy.

Group 1 consisted of three paediatric patients who had undergone a regiment of chemotherapy, followed by either an autologous haematopoietic progenitor cell (Auto-HPC) marrow infusion, matched unrelated donated haematopoietic progenitor cell (MUD-HPC) infusion, autologous peripheral PBSC infusion, or CB infusion together with the administration of G-CSF. Characteristics of the group 1 patients are shown in Table 1.

Table 1. Group 1 - type and date of treatment undergone and diagnosis of the paediatric patients.

Patient	Age	Diagnosis	Treatment	Date
1	5	Malignant lymphoma	Autologous PSC infusion	01/02/2008
2	5	Primary thrombocytopenia	Allogenic CB infusion	12/02/2008
3	4	Neuroblastoma	Autologous HPC, marrow infusion	05/03/2008

Group 2 consisted of four adult patients who had undergone a regiment of chemotherapy, followed by an Auto-HPC infusion, allogenic haematopoietic progenitor cell, (Allo-HPC) infusion, or MUD-HPC infusion. Characteristics of the group 2 patients are shown in Table 2.

Table 2. Group 2 - Type and date of treatment undergone and diagnosis of the adult patients

Patient	Age	Diagnosis	Treatment	Date
4	44	Grade II follicular non-Hodgkin's lymphoma	MUD-HPC infusion	23/04/2008
5	41	Mantle-cell lymphoma	Autologous HPC, marrow infusion	27/03/2008
6	63	Multiple myeloma	Autologous HPC, marrow infusion	28/03/2008
7	49	Stage IV A follicular non-Hodgkin's lymphoma	Allogenic HPC, donor Lymphocytes TC-T-cells	06/05/2008

Specimens from patients in Group 1 were micro-collected fresh K_3EDTA blood samples and were sampled using the manual sampler mode of the Sysmex XE-2100 , thus providing information on the total white cell count (WCC), absolute neutrophil count (ANC), and immature reticulocyte fraction (IRF), as well as other normal full blood count parameters.

Group I patient samples data was collected retrospectively from the analyser data storage records. Data collection for patients in Group 1 was initiated several days before their bone marrow or stem cell transplants and continued up until bone marrow engraftment had taken place, indicated by the rise in IRF, ANC and total WCC. These results were then plotted on graphs with the three parameters, IRF, WCC, and ANC, where the IRF and ANC were compared **(Figure 1).**

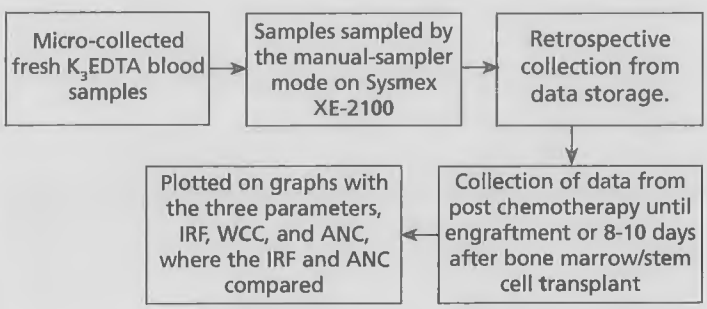


Figure 1. Data collection process for the Group 1 children samples

Specimen data from the Group 2 patients were collected prospectively. The samples are normally sampled through the auto-sampler mode, which excludes the reporting of IRF. In order to obtain an IRF measurement specimens, which range from 0-7days old they must be retrieved from the specimen storage and reanalysed through the manual-sampler mode. IRF, WCC, and ANC, are recorded, plotted on a graph, and compared **(Figure 2).**

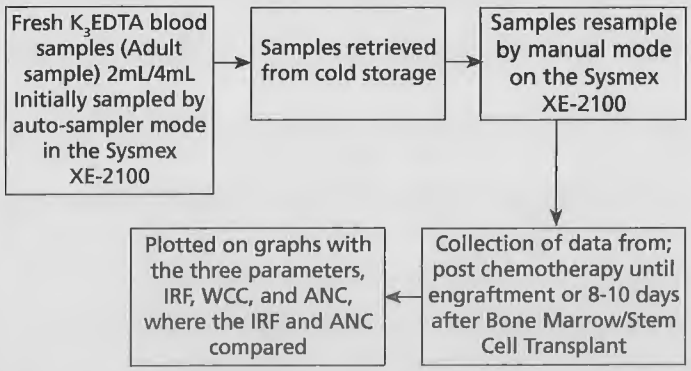


Figure 2. Data collection process for the Group 1 children samples

In both groups, investigations were continued from the time of bone marrow transplant until the ANC was ±0.5 x 10^9/L, indicating engraftment.

A time check was performed to determine the stability of a sample stored for up to seven days. This was done by the use of one randomly selected normal sample being sampled on a daily basis from day zero to day seven (graph 8). A precision check was performed on the Sysmex XE-2100 to assess the precision of the IRF parameter, achieved by sampling three normal samples 10 times consecutively (Table 5). The treatment process of patients who require bone marrow/stem cell transplant, with an indication of the duration of data collected for this study is shown in **Figure 3.**

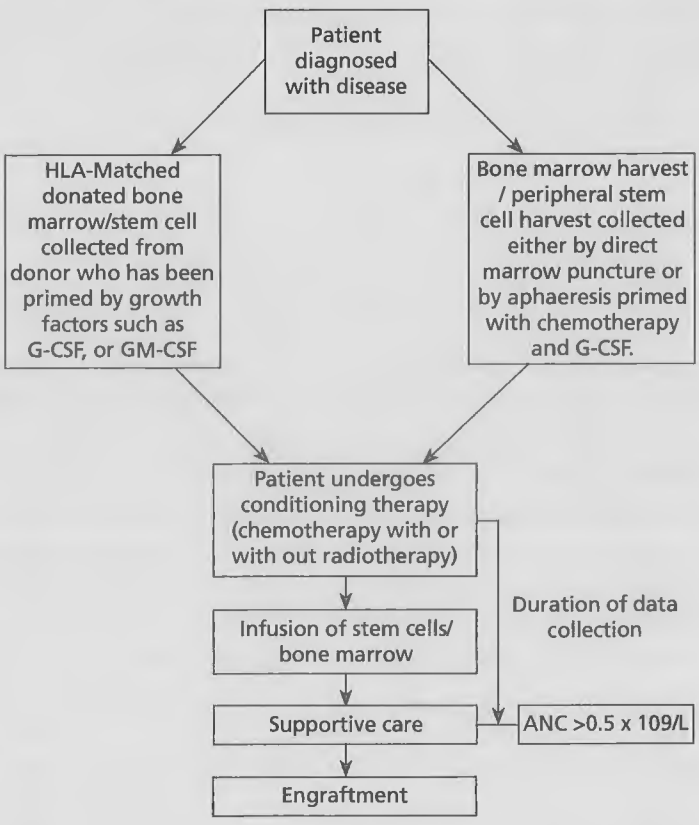


Figure 3. Treatment process of patient who require bone marrow/ stem cell transplant, with an indication of the duration of data collected for this study.

Results

Engraftment was monitored by an ANC of ±0.5 x 10^9/L and the time when IRF >5% was reported in the two groups of patients. In the group 1 paediatric patients it was observed that two out of the three patients achieved an IRF of >5%, preceding an ANC of ±0.5 x 10^9/L by 2 to 3 days, as indicated in Graphs 1 and 2, while patient 3 showed a significant increase in ANC of ±0.5 x 10^9/L and an IRF of >5% at approximately the same time, as shown in Graph 3. The paediatric patients recovery times were variable, possibly due to the variability in transplantation material used on these patients, with a mean recovery time of 17 days and a mean ANC of ±0.5 x 10^9/L at 13 days, a mean IRF of >5% at 11 days, and a mean lag period between ANC ±0.5 x 10^9/L and IRF >5% at 2 days. This data, along with the time it took for ANC and IRF to reach significant level to call an engraftment is shown in **Table 3.**

Table 3. Time taken for ANC and IRF to reach significant levels to call engraftment, with duration of sample collection in child patients.

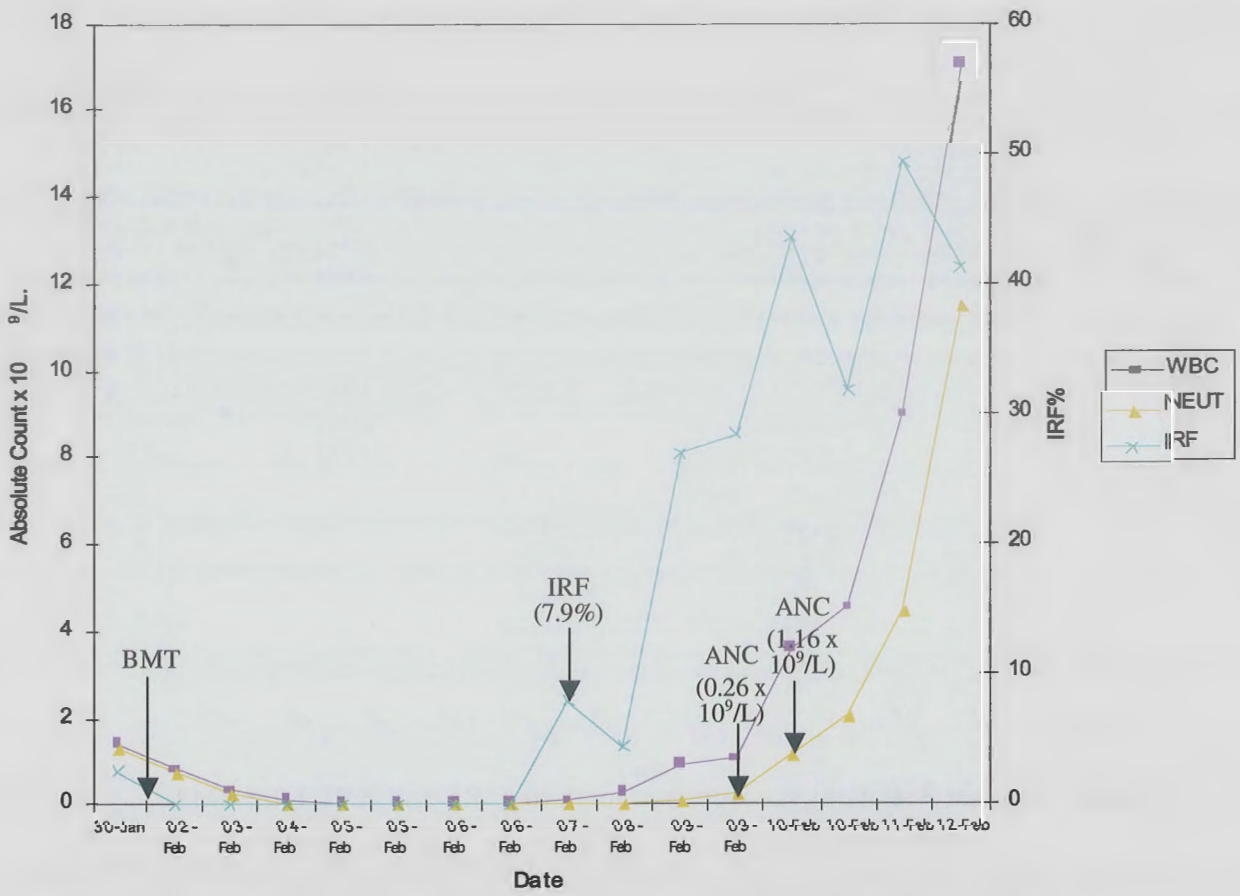
Children BMT	Time after BMT to recovery	ANC ± 0.5 x 109/L	IRF ±5%	Lag period
Patient 1	12 days	10 days	7 days	3 days
Patient 2	31 days	21 days	18 days	3 days
Patient 3	8 days	8 days	8 days	0 days
Mean	17 days	13 days	11 days	2 days
Range	8-12 days	8-21 days	1-18 days	0-3 days

In the group 2 adult patients we observed that all four patients had an IRF of >5%, which preceded an ANC of ±0.5 x 10^9/L by around 2 to 7 days, as shown in Graphs 4 to 7. These patients had a mean recovery time of 17.25 days and a mean ANC of ±0.5 x 10^9/L at 16 days, a mean IRF of >5% at 11 days, and a mean lag period between an ANC of ±0.5 x 10^9/L and an IRF of >5% at 5 days. This data, along with the time it took for the ANC and the IRF to reach significant level to call an engraftment is shown in **Table 4.**

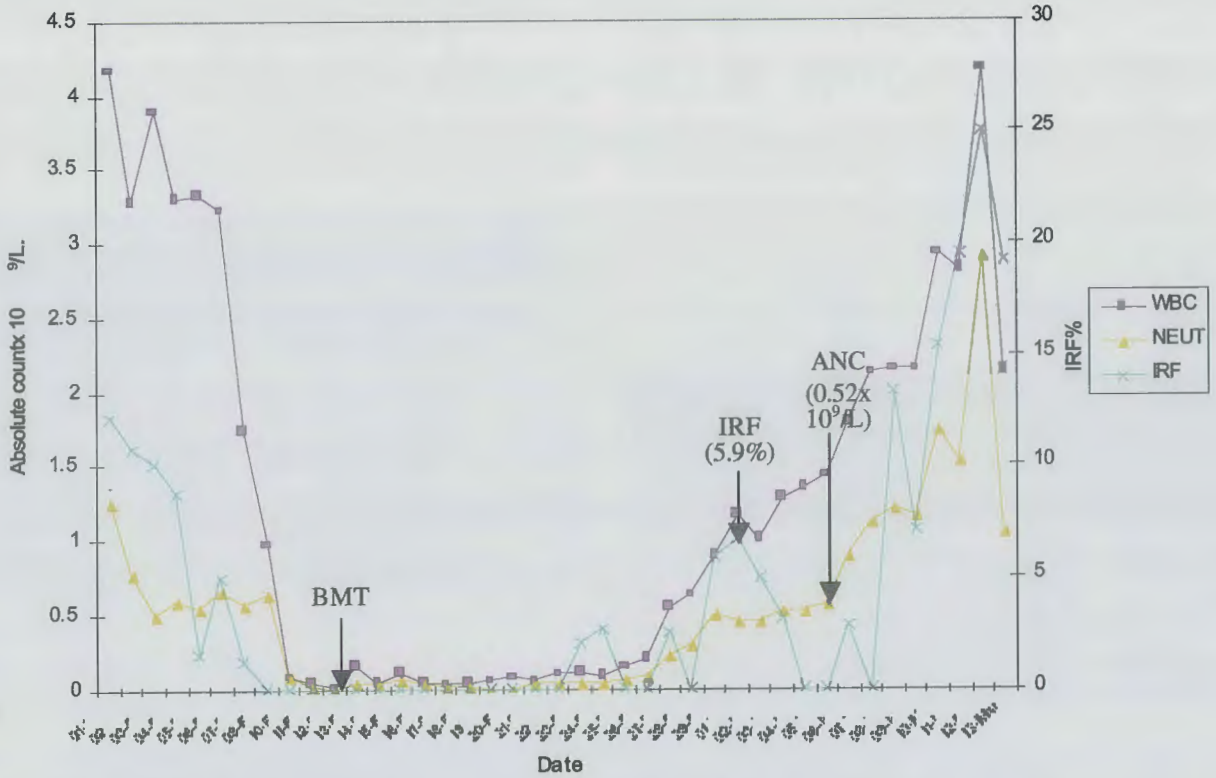
Table 4. Time taken for ANC and IRF to reach significant levels to call engraftment, with duration of sample collection in the adult patients.

Adult BMT	Time after BMT to recovery	ANC ± 0.5 x 10^9/L	IRF ±5%	Lag period
Patient 4	25 days	22 days	20 days	2 days
Patient 5	13 days	13 days	9 days	4 days
Patient 6	16 days	14 days	7 days	7 days
Patient 7	15 days	15 days	8 days	7 days
Mean	17-25 days	16 days	11 days	5 days
Range	13-25 days	13-22 days	7-20 days	2-7 days

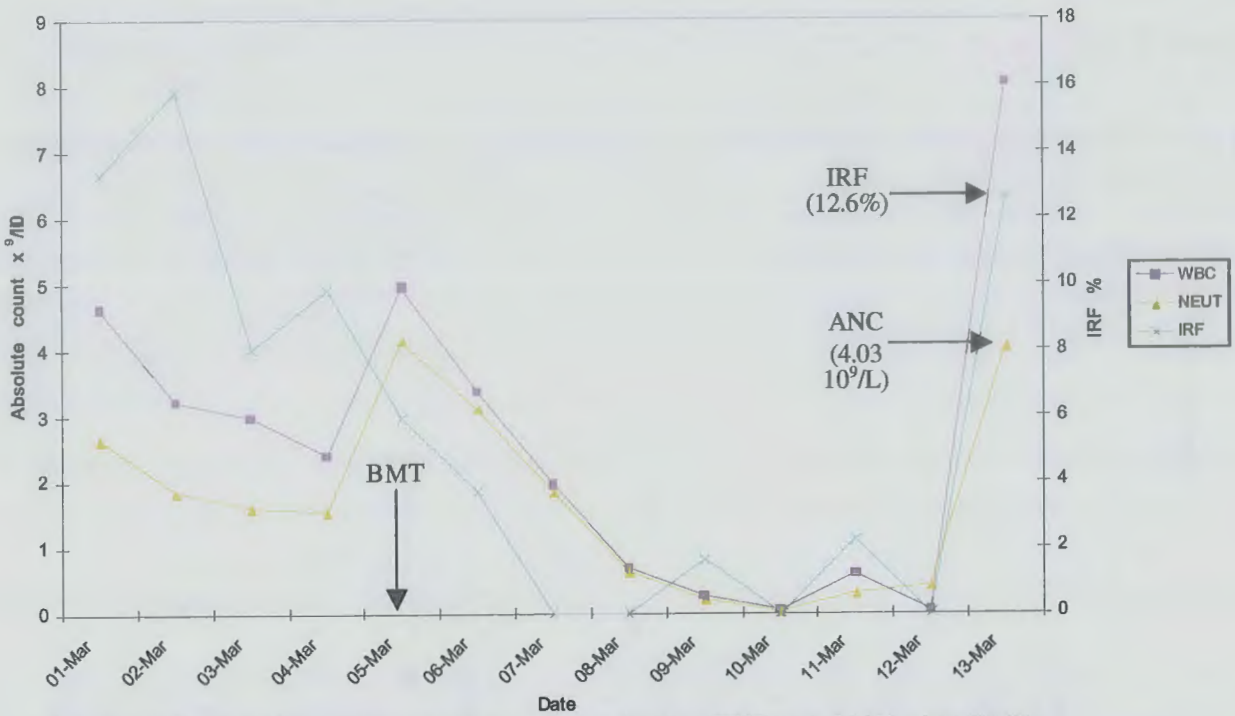
Combined data shows that in six out of seven patients monitored there was an IRF of ±5% preceding an ANC of ±0.5 x 10^9/L, indicating that in 86% of the patients the IRF is an earlier indicator of engraftment, in contrast to the ANC. Data obtained from the precision check indicated that the IRF measurements from the Sysmex XE2100 were precise. Data from the time course indicated that samples are only stable up to the first two days when left in storage for up to seven days. The decrease in IRF over that time period ranged from 3.3% to 7.1%. indicating that some specimens in Group 2 patients analysed later than two days post-collection may present with erroneously lower results. Regardless of the expected reduced IRF in these samples, we were still able to observe an IRF of >5%, which preceded the ANC of ±0.5 x 10^9/L.zz



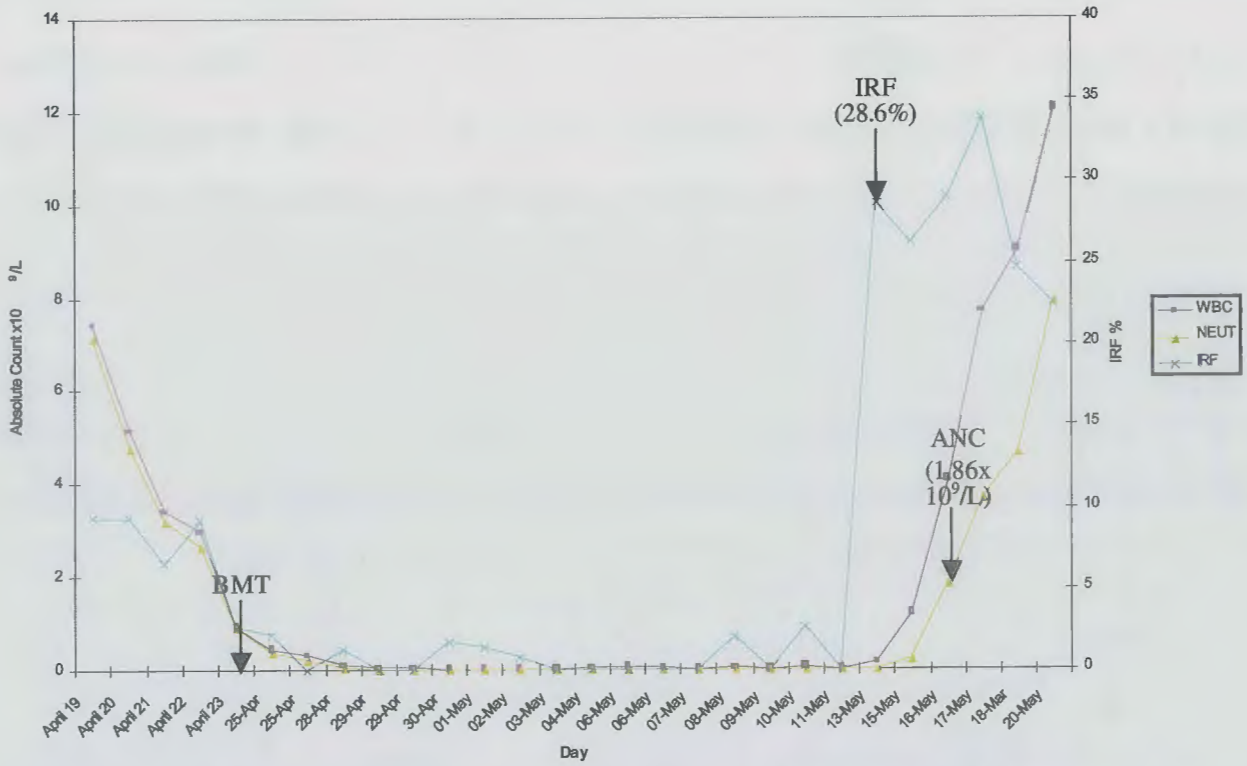
Graph 1. Patient 1 showing recovery by monitoring IRF and ANC after BMT.



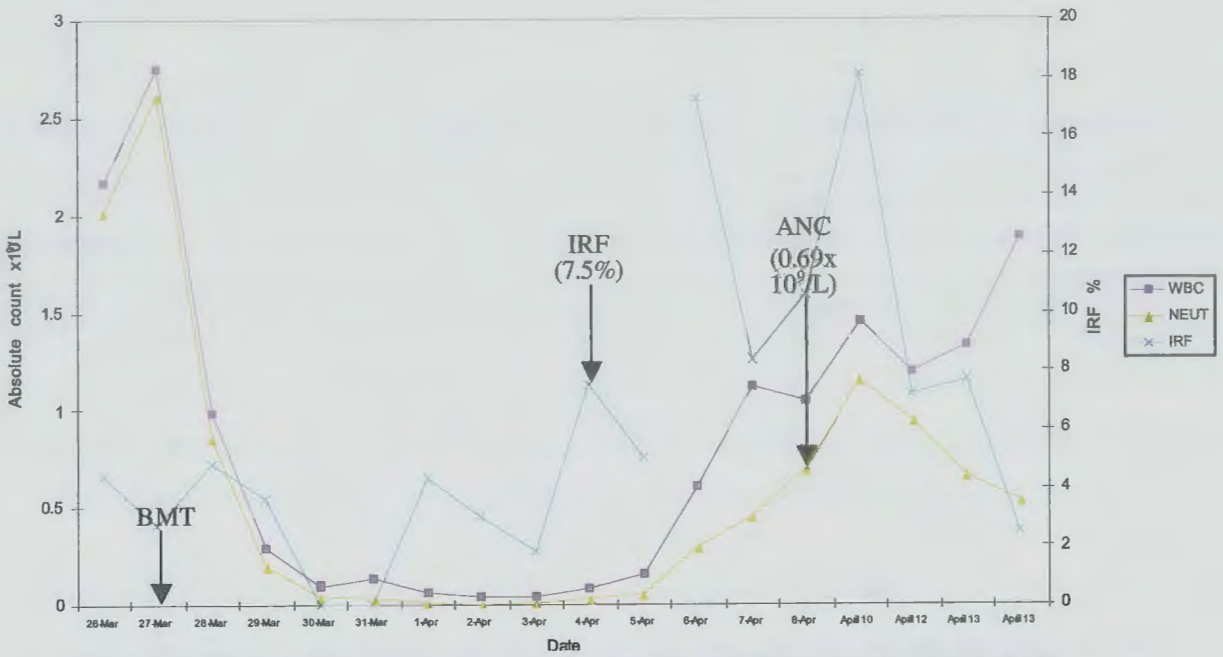
Graph 2. Patient 2 showing recovery by monitoring IRF and ANC after BMT.



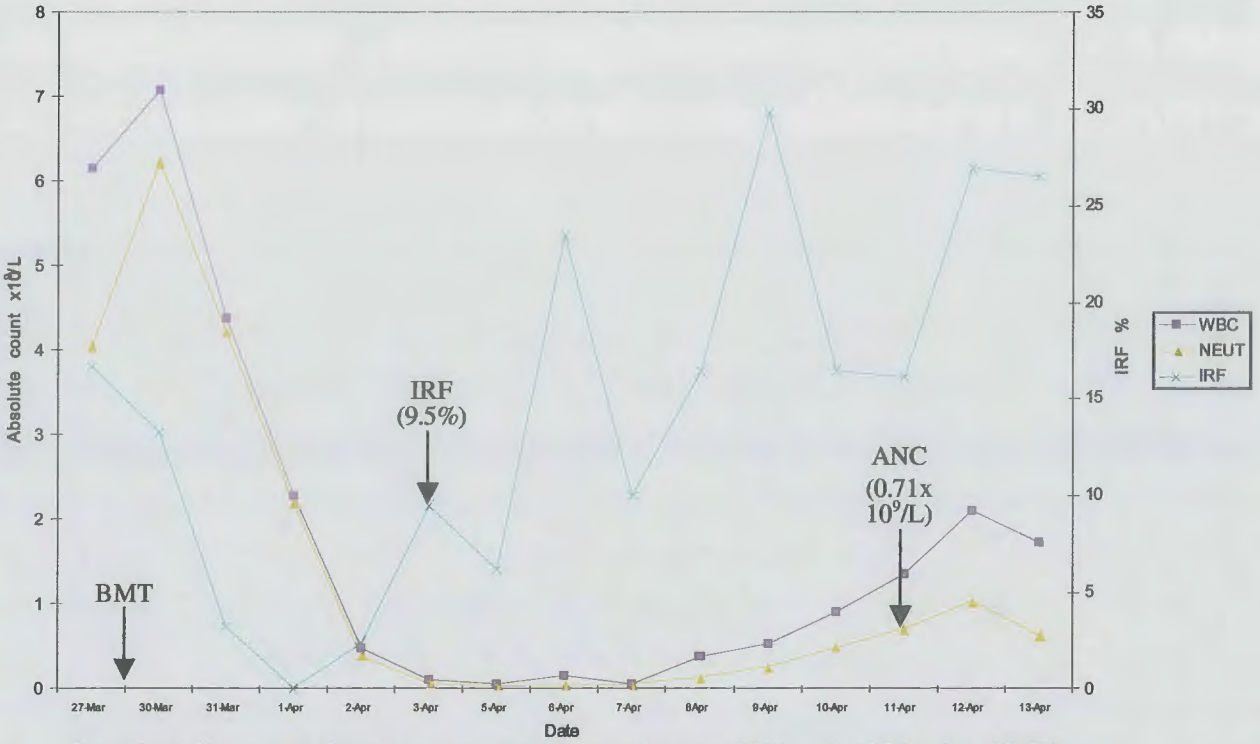
Graph 3. Patient 3 showing recovery by monitoring IRF and ANC after BMT.



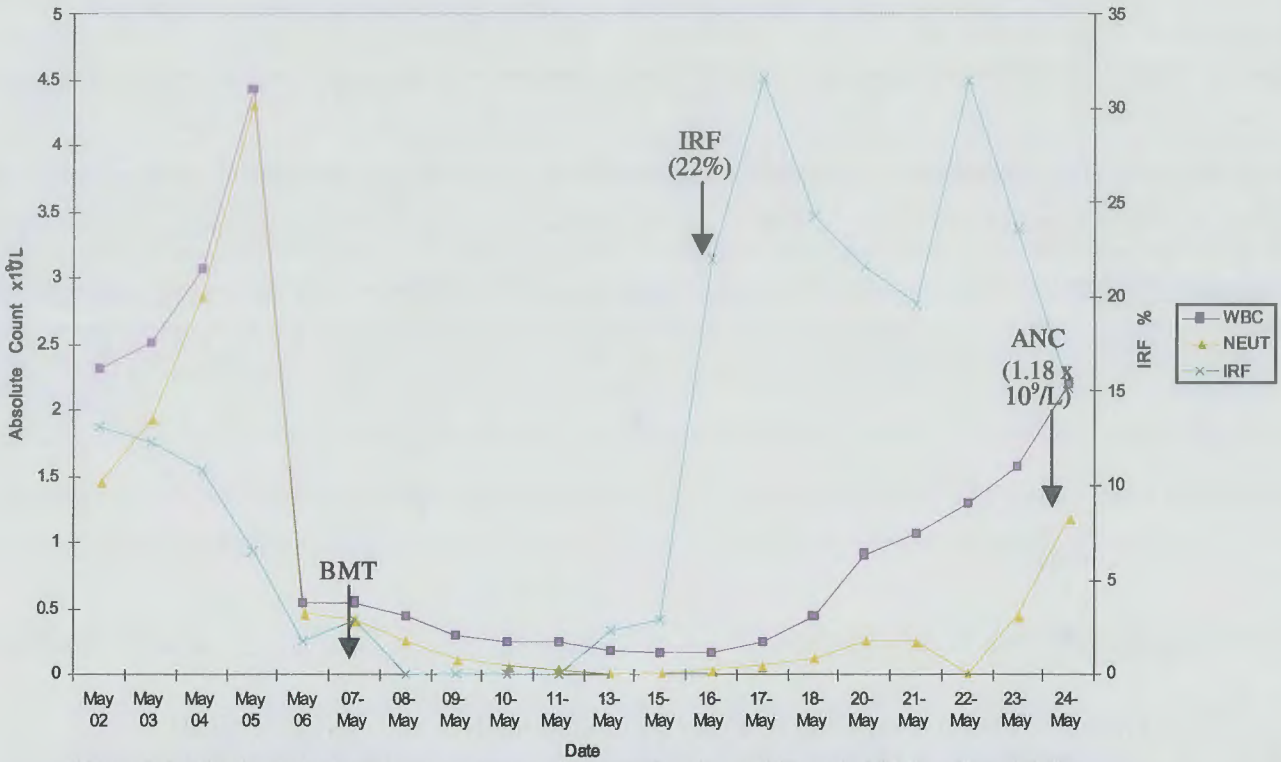
Graph 4. Patient 4 showing recovery by monitoring IRF and ANC after BMT.



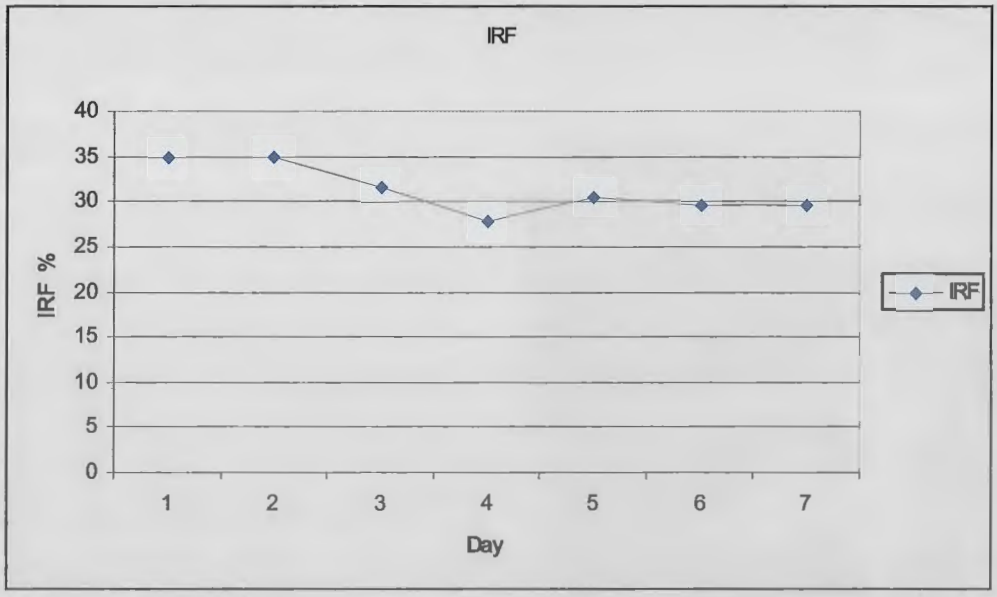
Graph 5. Patient 5 showing recovery by monitoring IRF and ANC after BMT.



Graph 6. Patient 6 showing recovery by monitoring IRF and ANC after BMT.



Graph 7. Patient 7 showing recovery, by monitoring IRF and ANC, after BMT.



Graph 8. Stability of IRF in an EDTA sample for 7 days.

	IRF-1	IRF-2	IRF-3
Mean	20.03	20.35	12.81
SD	3.36	2.60	1.73
% CV	17	13	13
UOM	0.34	0.26	0.26

Table 5. Results to determine the 95% chance that the true result lays within the range covered [result number ± the uncertainty of measurement (UOM)]. These results show that the mean UOM is 0.29 for the IRF parameter.

Discussion

The immature reticulocyte fraction (IRF) is an accurate and reliable parameter easily obtained from automated cell counters such as the Sysmex XE-2100' (2). The IRF is obtained by applying flow cytometry to automated cell counters which differentiates reticulocytes into three subdivisions; based on their physical characteristics, namely the MFR, HFR, and LFR and IRF being derived from the sum of the MFR and HFR.

In this study we have demonstrated that post bone marrow transplant patients show an increase in IRF of >5%, which preceded the increase of ANC ±0.5 x 10^9/L in 86% of the patients by 2 to 7 days, with an ANC of ±0.5 x 10^9/L taking around 8 to 22 days and an IRF of >5% taking around 7 to 20 days. This indicates that the IRF might be a useful parameter in the monitoring of engraftment.

Although this study was limited by time and patient numbers, we were able to reach similar conclusions to those published by George and colleagues who found that immature reticulocytes indicate engraftment, and the use of immature reticulocytes might enable the cessation of antibiotics and growth factors and could lead to the earlier discharge from hospital, with cost savings (2). The Spanish Multicentric Study Group for Haematopoietic Recovery also concluded that a rise in IRF indicates haematopoietic recovery (6), while Luczynski and colleagues state that the IRF is the first sign of haematopoietic recovery and might be used as a parameter of bone marrow function in clinical studies (7). Results from our small study are in agreement with these published studies.

In conclusion, we propose that both IRF and ANC measurements should be reported together in patients who have undergone bone marrow transplants as the IRF might be an earlier indicator of bone marrow engraftment. This could aid in the reduction of growth factor usage in these patients and thus result in savings in medical costs and resources.

Acknowledgements

The author is appreciative to his supervisor, Marion Lyne, and the medical laboratory scientists of the Department of Haematology, LabPLUS Auckland District Health Board for their assistance.

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Rodney Terrence Kennedy. 23rd December 1933 – 6th September 2008

Rod Kennedy died in Auckland on Saturday 6th September 2008.

Rod was a prominent figure during his long career in Medical Laboratory Science in New Zealand. He made a substantial contribution to the profession through his enthusiasm and leadership and was a mentor for many young people as they started their own careers as trainees in the laboratory.

He began his laboratory training in Auckland in 1951, qualifying in 1956 with a COP before going on to work in haematology, virology and radio-assay. Before long he became involved in training junior staff.

As first assistant to the Charge Technologist, Douglas Whillans, Rod developed a tutoring programme and also ran a correspondence course up to 3rd year level, which eventually extended to include most hospitals in the top half of the North Island. By 1961 the course had evolved into The School of Medical Laboratory Technology with Rod as its senior tutor.

On the social side, the Christmas parties of the Central Laboratory at Auckland Hospital at that time (early 60's) were legendary. No one who saw Rod dressed as the Sugar Plum Fairy will ever forget it. He could be completely informal at parties, but the next day would be as formal and deserving of respect as any Senior Laboratory Technologist.

In 1968, on the retirement of Mr Whillans, Rod was appointed Principal Technologist of the Auckland Hospital Laboratories. Rod was an innovator in this role and under his management the laboratories moved into a new era of modern equipment. Many practical management decisions were made, resulting in a much improved laboratory service to clinicians. This involved practical studies, such as the effect of laboratory-derived information on clinical decision making. Rod introduced the 'Canadian Workload Units' method of quantifying laboratory work. This was to lead on to a more business-like management of the laboratory resources and appreciation of the true cost of our work.

In 1963 Rod was elected on to the council of the NZIMLT (as it was then) and continued as Secretary from 1969 until he resigned from council in 1975. During this time he was widely active and poured his considerable energies into the work of furthering the profession. Rod delivered the 12th TH Pullar Memorial Address entitled 'Plotting a proper course' at the 1978 conference held in Nelson.

As laboratory automation became a reality, so also came the need to handle large amounts of data. Delays by the Department of Health in making decisions on a standard computer system for the country encouraged many laboratories to develop their own independent systems. Rod, along with Bert Nixon, Eric Johnston and a team from Auckland Hospital took part in the development of an IBM punch card system for use in the Chemistry and Haematology Laboratories at Auckland Hospital, but by 1985 Rod led the decision to move to the 'Delphic' computer system that had been developed in house by Diagnostic Laboratories Ltd. This was modified by the IT staff at Diagnostic Laboratory, working alongside the Auckland Hospital team, to suit the hospital environment.

In 1987 Rod relinquished the Principal Technologist role and became the Information Services Manager for Auckland Hospital, In this role he completely reorganised the Hospital's patient admission and discharge system. Rod, with his great knowledge and pragmatic approach was greatly respected by management and clinicians and so they supported him in all the major projects he embarked on. In 1990 Rod became Project Leader Clinical Systems, where he managed special projects for Laboratory, Radiology and Pharmacy. Rod retired from Auckland Hospital in April 1998

No discussion of Rod Kennedy's life would be complete without mention of his involvement with sport, He was very involved in weightlifting and won many medals as well as contributing in every way he could to the betterment of the sport. His commitment to weightlifting continued for many years into his retirement with him publishing programs and editing the national weightlifting magazine. In weightlifting, as in all areas of his life, Rod was an instigator and a mentor. He encouraged young people into the sport and looked for ways to take weightlifting out into the community. He decided to offer his services to selected secondary schools and in doing so he brought some Penrose High students up to competition level. He worked with SPARC and their consultants, to obtain finance for the sport. A week before he died Rod was a referee at a weightlifting competition.

Rod's other sport was hockey. He was a very keen hockey player until an injury kept him off the field. He passed his hockey playing ability on to his son Stephen. Rod took much pleasure from watching him play.

He also developed great interests in other areas and carried out in-depth research which equalled what would be required for a Masters degree in Literature. One of these topics was Napoleon Bonaparte and when he visited important places that featured in Napoleonic history in Europe, small bronze busts of Napoleon would begin to appear around the house. More recently, he did a lot of research into and wrote a great exposition on the Iraq war, which he felt very strongly about.

He became a gardening expert and established a magnificent garden of multicoloured dahlias. His garden was a source of great pride to him. He was a perfectionist and any dahlia that in his opinion did not measure up would be culled and not planted the following year.

About 4 years ago, he decided to sell his Hillsborough family home and move into a retirement village. All through his life Rod could rapidly make important decisions like this and once made, bring them into effect. He threw himself into all the activities at Hillsborough Heights Retirement Village, such as organising barbeques for the residents. Rod enjoyed Village life and when walking around the grounds with him, I was amazed at the number of people he knew and there was always a cheerful exchange of greetings. He kept the reception area supplied with dahlias, organising and singing in the Village men's choir, completely re-cataloguing their library and took his turn at serving in the bar.

It surprised many of us when he announced about this time that he was going to learn ballroom dancing. It transpired he had met a lady who loved dancing, so his sudden interest was explained. Nancy Moore (nee Eccles) who saw them dancing said the two of them could best be described as 'gliding' across the floor. Another interest of Rod's was successfully accomplished.

One never knew what he was going to get up to next, but through his whole life he showed great devotion to his family and they loved him in return. A lasting memory of Rod will be of him standing at a large barbeque, wearing a ships captain hat, with the grill loaded with steak, chicken and sausages, granddaughters watching closely, and always laughter and bonhomie amongst the many guests and family.

Rod lived his life to the full in every respect and influenced many people during his career, sporting and family life.

Stuart Duncan and Bruce White

Book review

Pulmonary Pathology by Dani S. Zander and Carol F. Farver.

A volume in the series Foundations in Diagnostic Pathology. Published June 2008. Churchill Livingstone. 852 pages. ISBN 9780443067419.

Pulmonary Pathology covers both tumour and non-tumour pathology of the lung and pleura in a compact format. This latest book in the Foundations in Diagnostic Pathology series retains the popular and effective layout seen in previous books in the series, with coloured text boxes highlighting fact sheets and pathologic features.

The book begins with a discussion of normal anatomy, tissue artefacts and incidental structures. This is a very useful addition, not usually seen in textbooks, and helpful to those just beginning their study of pulmonary pathology. Similarly the chapter on uses and abuses of the lung biopsy should be of considerable guidance to both pathologists and clinicians when deciding whether biopsy is appropriate.

The chapters on non-tumour pathology logically begin with a discussion on patterns of injury. In most textbooks this would have then been followed by a discussion of idiopathic interstitial pneumonias. Instead, the authors then choose to discuss paediatric non-neoplastic and neoplastic disease, followed by vascular diseases, acute lung injury, and infectious diseases. In each of these areas the discussion is comprehensive enough for use by experienced histopathologists, yet easy enough to follow by pathology registrars, clinical specialists or others with an interest in lung pathologies. The illustrations are beautiful with no faults in exposure or colouring. They are well chosen to illustrate important points.

The discussion of each topic is not supported by direct reference to the research literature. Instead, at the end of each chapter there is a collection of suggested readings. While this improves the flow and readability of the text it can make it difficult for the reader to go back to the literature. In these days of Google and fast moving evidence however, this may not be a disadvantage.

The chapters on lung neoplasms occupy the latter part of the book. The chapters begin with usual lung cancer and are followed by neuroendocrine neoplasia and then by unusual primary malignant lung neoplasms. There is an excellent chapter on precursors of malignancy, a topic not covered well in many textbooks.

The penultimate section of the book is devoted to pleural pathology; this includes both neoplastic, inflammatory and fibrosing pleural processes. Again this is comprehensive and extremely well illustrated.

The book closes with a chapter on cytology followed by chapters on techniques and applications of immunohistochemistry and immunofluorescence, and immunologic testing. This final chapter was especially interesting to read by someone such as myself, a general histopathologist, who sometimes struggles with the interpretation of the chemical pathology and immunology tests ordered by our clinical colleagues.

In summary this is a comprehensive and beautifully illustrated book. It brings together in one volume both neoplastic and non-neoplastic change in the lung and pleura. The layout makes it easy to assemble facts useful to the everyday diagnostic process. It is comprehensive enough that it covers unusual and rare cases encountered occasionally in clinical practice. The presence of ancillary chapters on cytology, laboratory techniques and approach to diagnosis puts it ahead of other textbooks in its coverage of the subject of pulmonary pathology. I would heartily recommend purchase of this book for any department that deals with pulmonary pathology, and by any medical library.

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Histopathologist
Wellington Hospital
Capital & Coast District Health Board

The above title is available from:
Elsevier Australia
Ph: 02 9422 8500 or 1 800 263 951
Website: shop.elsevier.com.au
Or your medical bookshop
Price: AU$199.00 (inc. GST)

President's Report 2008

Robin Allen

It is traditional for the President's annual address to highlight the activities of the Institute over the last year, as well as comment on some of the current issues for the profession. It is not my intention to deviate from this well-proven format this year.

The Health Practitioners Competence Assurance Act was introduced in 1993. The principal purpose of the Act is to protect the health and safety of members of the public by providing for mechanisms to ensure that health practitioners are competent and fit to practice their professions. Before a person may practice as a registered health professional, they must gain registration with the appropriate registration authority. Registration, and the issuance of an Annual Practicing Certificate, provides the public with an assurance that a practitioner is competent to practice within a prescribed scope of practice. However, before a practitioner can renew their Annual Practicing Certificate, they may be required by way of participation in a recertification programme, to demonstrate to the registration authority their continuing competence to practice.

Section 171 of the HPCA Act requires the operation of the Act to be reviewed as soon as possible, three years following its commencement. In September 2007 Cabinet approved the terms of reference which set out the process for how the review would be conducted. The initial stage of the review involved the gathering of information, and this occurred in the latter part of 2007 and early 2008. A survey document was sent to a wide variety of groups working with the Act across the health sector. The NZIMLS received a copy of the consultation document and submitted a response on behalf of the profession. Additionally, the Ministry of Health provided a web-based questionnaire aimed at canvassing individual health practitioners on the operation of the Act. Given that the Act has introduced significant changes for our profession, Council felt it was important for as many medical laboratory scientists and technicians as possible to have the opportunity to respond. Details of the on-line survey were forwarded by email to all members of the Institute and promoted in the Council Newsletter.

An analysis of the web-based survey of health practitioners was published in March 2008.
It is informative to review some of the data submitted, particularly that attributed to responses from medical laboratory professionals. There are 75,137 registered health professionals in New Zealand, and 963 completed the survey. This is an overall response rate of 1.28%. Medical Laboratory Scientists and Technicians had a response rate of 5.7%, which was the third highest. While the sample size is small, those MLS who did respond clearly felt that the current registration requirements, including the scopes of practice, are appropriate and supported mandatory continuing education (CE). Although specific recertification programmes were not mentioned, 64% of MLS thought that the requirement for continuing education was about right, but 24% believed it was somewhat too much. However, 26% of the MLS respondents reported that difficult access discouraged them from participating in continuing education. This is a disappointing response, particularly given the facilities the Institute has developed in recent years for on-line learning and CE activities. It is now possible for any scientist, even part time and casual workers, to achieve 30 of the mandatory annual 40 CE points by taking three NZIMLS classroom multi-choice tests and answering three journal-based questionnaires. It should not be difficult to achieve the balance of points through in-house seminar or journal club attendance, or by reading a few journal articles.
One of the issues targeted in the survey was that of fitness to practice, related to concerns about either the competence or health of a fellow practitioner. The responses revealed that medical laboratory professionals have a low awareness of the protection from civil or disciplinary proceedings, afforded by the Act, when making the registration authority aware of concerns about another registered health practitioner's fitness to practice. Also, less than one third of MLS respondents were aware that they are required by law to report any concerns on fitness to practice related to the health of a fellow health practitioner. The Medical Laboratory Science Board may need to draw the attention of practitioners to this aspect of the Act.

During the year the Institute responded to a request from the Board for consultation on a proposal for professional development for medical laboratory technicians to become a compulsory programme. Council strongly supports the requirement for continuing education for technicians, and subsequently submitted an appropriate programme to the Board for technicians, based on the current NZIMLS CPD programme for medical laboratory scientists. This was not approved by the Board, with the Board resolving to set its own programme. Council is of the opinion that alternative recertification programmes for technicians should be approved by the Board, as is the case for the current programmes for the recertification of scientists. The introduction of hours as a unit of measurement for technician CPD has lead to some confusion and does not correlate with the relevancy or learning potential of the CE activity. While technicians may enroll in the NZIMLS programme for scientists, and thus have access to the benefits afforded by the journal and the learning opportunities of the classroom and journal questionnaire, it is unlikely that the majority of employers will fund such enrollment. Of concern, technicians currently enrolled in the NZIMLS programme, and meeting the requirements for the CPD activities of a scientist, will not be able to submit their points tally sheets if selected by the Board for audit.

I would like to move onto promotion. Following on from discussion at the 2007 Annual General Meeting, where it was agreed that a key issue is the low profile of the profession amongst students, Council this year considered the options for targeting students, particularly those at the point of a career choice. Given the current healthy financial position of the Institute's finances, Council resolved that probably the greatest benefit could be achieved by investing in the major career expos held annually in the main centres. The cost of site bookings is not insignificant and additionally Council approved the design and production of two portable pull-up NZIMLS banners. Members of Council, along with Institute volunteers, manned stands at the expos in Auckland, Hamilton, Christchurch and Dunedin. Regrettably, NZIMLS involvement in the Wellington expo had to be cancelled due to an inability to find members willing to man the stand. This was extremely disappointing. The expos provided a very significant opportunity to gain exposure of the profession to a huge number of students, parents and education professionals. In Hamilton, more than 25,000 visitors attended the expo and, as at the other centres, there was considerable interest both from students who were already considering Medical Laboratory Science and those who were totally unaware of this as a career option. In a number of instances visits to a laboratory were arranged. Council is agreed that the career expos have been a very successful initiative, and will commit to attendance in future years. Most of the expos provide the opportunity for participation in promotional seminars as part of the programme, something we didn't opt for in this the first year of attendance, but which would provide additional promotion. Resultant from the Institute's participation in the career expos, we have been approached to advertise in a major career guidebook used in secondary schools, and this is currently being considered.

With regard to promotion of the profession to a more general audience, Council is considering the Labs are Vital Programme. This is an international programme that looks to partner with professional associations with the aim of spotlighting the value of medical laboratory professionals both inside the health care system and to the general public, as well as addressing important professional issues such as workforce shortages. In the US a National Laboratory Professionals Week has been promoted by Labs Are Vital, and this year the New Zealand Blood Service ran an internal programme to recognise the value of their laboratory workers, using some of the Labs Are Vital tools. While the environment and regulatory

conditions for medical laboratory science differ between the US and New Zealand, key issues such low professional profile and workforce shortages are universal, for this reason the Institute is giving serious consideration to the benefits for our members of a partnership agreement between the NZIMLS and Labs Are Vital.

As well as initiatives instituted by Council to generate interest in medical laboratory science, it is encouraging to see employers being proactive in developing programmes to foster students with an interest in science. I particularly compliment Canterbury Health laboratories on the laboratory intern scheme that they have recently introduced, whereby post-year 13 students work on a gap year in the laboratory. On rotation for 12 months, the interns gain exposure to the major laboratory disciplines and experience at first hand the opportunities and rewards of a career in medical laboratory science. Serious pursuit of a tertiary qualification is supported by the laboratory with casual employment during semester breaks and priority for choice of disciplines at the time of clinical placements. I am aware of other laboratories that offer scholarships or similar programmes for BMLS students, but at a time when the profession is facing serious workforce issues I encourage laboratories with the appropriate resources, to consider developing intern programmes along the lines of the Canterbury Health model. The benefits are not one-way. Experience to date shows the interns are enthusiastic and productive members of the laboratory team. By working semester breaks they provide valuable cover at a time when laboratories often experience significant demand for annual leave. The funding of an intern programme can effectively be achieved through the natural turnover of staff.

I would like to conclude my report with reference to matters of workforce planning. As with other health professions, we have an aging workforce looking to retirement and young people for whom the world is wide open. Last year the NZ Institute of Economic Research modeled workforce growth in the health sector. Based on their medium population growth projection they estimate that by 2021 New Zealand will need another 23,000 health professionals. That is a 35% increase in just 13 years, and given the current skill shortages, can probably only be met by significant changes to job roles over the next 20 years.

With this in mind, you will recall that last year I reported on the DHBNZ Future Workforce project, and in particular the Medical laboratory Science project investigating role extension for medical laboratory scientists. A key piece of work for the project team in 2007 was an email survey that was circulated to the profession. Although the survey elicited a relatively low response rate, there was clear support for the concept of role extension, and a work plan was developed for the next 12 months. This has resulted in the establishment of a ìthink tankî, with representation from the profession and the universities, and is tasked with scoping out the feasibility of a role extension pilot. In January Mike Legge, a member of the think tank, produced an important report on the current status of the pathology workforce and the international imperatives and initiatives for the development of clinical scientists. The report has been widely circulated within the profession and is available on the Institute's website. It has stimulated considerable discussion within the sector and, importantly, has resulted in engagement with the RCPANZ. Two RCPA nominated pathologists are now represented on the think tank and the first face-to-face meeting of the enlarged group was held at the end of July. I am pleased to report that this meeting was highly constructive with an agreement that a joint approach on workforce issues in New Zealand pathology would be beneficial. With regard to possible routes to qualification as a clinical scientist, it was agreed that the BMLS qualification is the most appropriate entry point. However, critical to the further development of the project is the involvement of the RCPA for the provision of appropriate professional examinations. The group is now further developing a proposal to present to the college as well as liaising with AIMS and the AACB on possible joint initiatives. The concept of the clinical scientist is now well established in the UK and our desire is for a New Zealand or trans-Tasman initiative with the potential to provide an improved career structure for those medical laboratory scientists interested in advanced scientific training and extension into clinical involvement.

As this, the second year of my term as President comes to a close, it is appropriate to acknowledge the support I have received from the Council executive, fellow Council members and the staff of the executive office. I would also like to thank those Institute members who willingly give of their time for the betterment of the profession.

New Zealand Institute of
Medical Laboratory Science

Minutes of the 64th Annual General Meeting held at the Staff Club, University of Otago, Dunedin on Thursday 28th August 2008 commencing at 7.30am

Chairman
The President (R Allen) presided over the attendance of approximately 65 members.

Apologies
Nil

Proxies
Motion:
Moved R Hewett, seconded W Dellow
That the list of proxies as read by the Secretary be received.
Carried

Minutes of the previous AGM
Motion:
Moved R Siebers, seconded M Legge
That the minutes of the 63rd Annual General Meeting held on 23rd August 2007 be taken as read.
Carried

Motion:
Moved C Pickett, seconded K Taylor
That the minutes of the 63rd Annual General Meeting held on 23rd August 2007 be confirmed as a true and correct record with spelling and a grammatical error corrected.
Carried

Business arising
The President advised the meeting that Council did consider employing a PR Company to promote the NZIMLS and the profession. However, Council considered that the greatest issue facing the profession was retention and promotion to students. The production of pamphlets, posters and pull-up display posters was completed and exposure was implemented at careers expos in Auckland, Hamilton, Christchurch, Timaru and Dunedin.

Remits
Motion
Moved R Hewett, seconded W Dellow
That Policy Decision Number 3 be reaffirmed.
Policy Decision No 3 (1972): Council will make and administer awards to members of the Institute, the details of each award will be recorded and may be amended from time to time by resolution of Council. The summary of these details shall be published annually in the Newsletter.
Carried

Motion:
Moved R Hewett, seconded K Taylor
That Policy Decision Number 5 be reaffirmed.
Policy Decision No 5 (1978): That medical supply companies should not be approached to aid in the finance of SIG meetings; companies may be invited to NZIMLS seminars and although donations may be accepted money is not to be solicited.
Carried

President's Report
Motion:
Moved R Allen, seconded R Siebers
That the President's Report be received.
Carried

Annual Report
Motion:
Moved K Taylor, seconded M Matson
That the Annual Report be received and adopted.
Carried

Financial Report
Motion:
Moved R Hewett, seconded C Pickett
That the Financial Report be received and adopted.
Carried

Election of Officers
The following members of Council were elected unopposed:

President:	R Allen
Vice President:	K Taylor
Secretary/Treasurer:	R Hewett
Region 1 Representative	M Matson
Region 2 Representative	C Pickett
Region 3 Representative	J Wypych
Region 5 Representative	A Buchanan

The results of the election for Region 4:

Region 4 Representative	S Woods at 20 votes
	K Beechey at 41 votes

K Beechey was therefore elected as the Region 4 Representative.

Motion:
Moved R Hewett, seconded A Buchanan
That the Election of Officers be approved.
Carried

Presentation of Awards
The award winners were announced and the following awards were presented by the President

Qualified Medical Laboratory Technician

Clinical Biochemistry Hruoje Major, Diagnostic Medlab, Auckland
Haematology Chrisyl D'Silva, Diagnostic Medlab, Auckland
Histology Kiri Pitama, Hutt Hospital, Lower Hutt
Immunology Eleanor Hooper, Southern Community Laboratories, Christchurch
Microbiology Adele Adair, Diagnostic Rotorua, Rotorua
Transfusion Science Vivien Robinson, Hawkes Bay Hospital, Hastings
Virology Eliza Sanderson, Canterbury Health Laboratories, Christchurch

Qualified Phlebotomy Technician
QPT Geraldine Sequeira, Diagnostic Medlab, Auckland
Qualified Specimen Services Technician
QSST 1st equal:

Angelita Garcia, North Shore Hospital, Auckland
Rachael McLeod, Canterbury Health Laboratories, Christchurch

Honoraria
Motion:
Moved R Siebers, seconded J Broadbent
That no honoraria be paid.
Carried

Auditor
Motion:
Moved R Hewett, seconded C Kendrick
Hilson, Fagerlund & Keyes for the 2008/09 year
Carried

General Business
Nil

Venue for 2009 Annual Scientific meeting
Conference Centre, Blenheim.

Venue for 2010 Annual Scientific Meeting
It was suggested that either Rotorua or Palmerston North would be suitable. The Executive Officer to follow up these suggestions.

There being no further business, the Chairman closed the meeting at 8.00am

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Labscapes photography competition

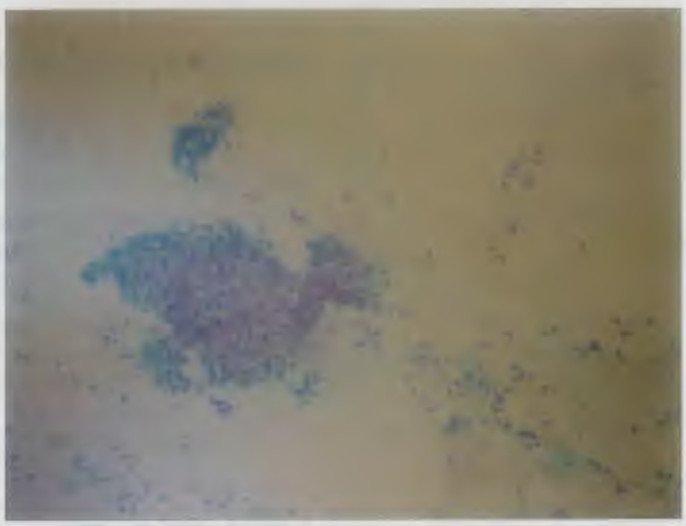
This year's NZIMLS conference in Dunedin featured a photography competition kindly sponsored by Olympus. The idea behind Labscapes was to encourage people to think outside the square and look at things in their workplace from a different angle. There were some great entries, from weird to wonderful.

Some 17 photos were submitted and the winners were Suzi Flack, Haematology SCL Dunedin (Photo 11: Coagulation Kaleidoscope) and Neil Wood, DML Auckland (Photo 8: Tyrosine Crystals).

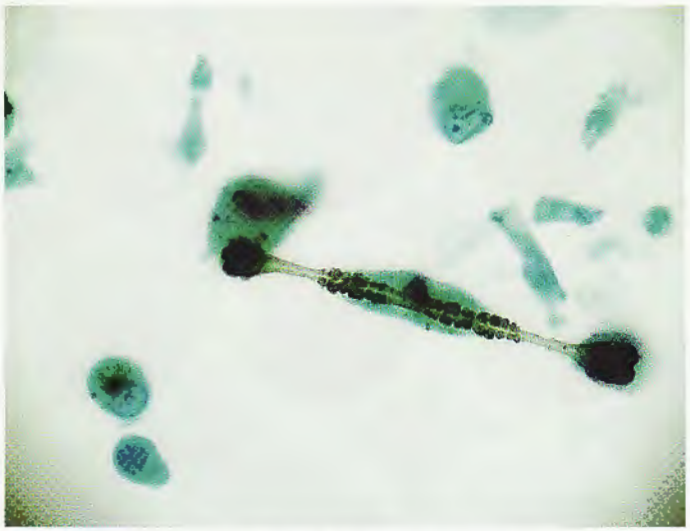
1. Amy Christie, NZBS Dunedin. **United Colours of Blood Bank.**

2. Amy Christie, NZBS Dunedin. **One cool Customer.** A creation made from the frost in our -80oC freezer.

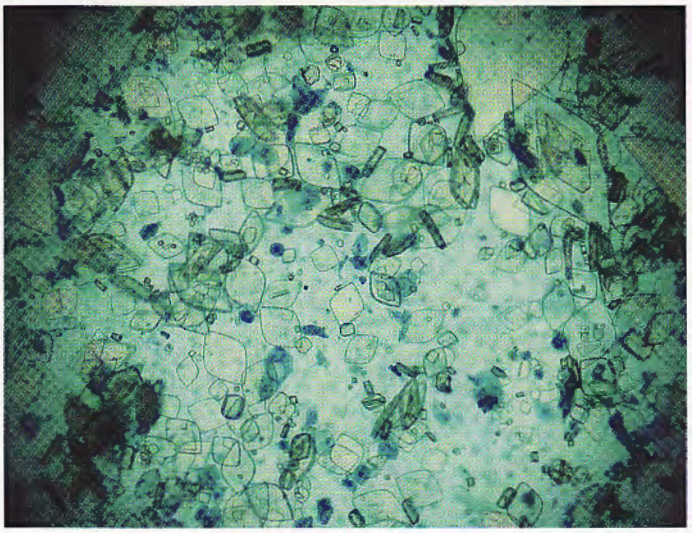
3. Amy Christie, NZBS Dunedin. **Every Drop Counts.**



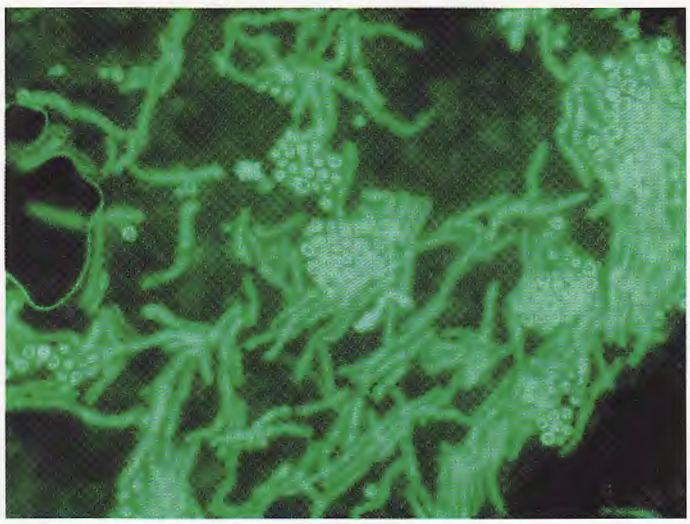
4. K Rajashri, Cytology SCL Dunedin. **Dodo or Duck.** Cervical smear.



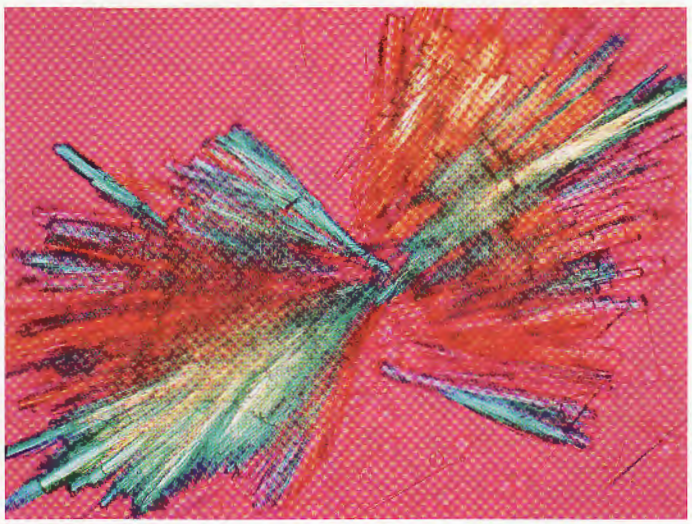
5. Charles Fisher, Cytology SCL Dunedin. **Ferruginous body.** Ferruginous body in a bronchial washing.



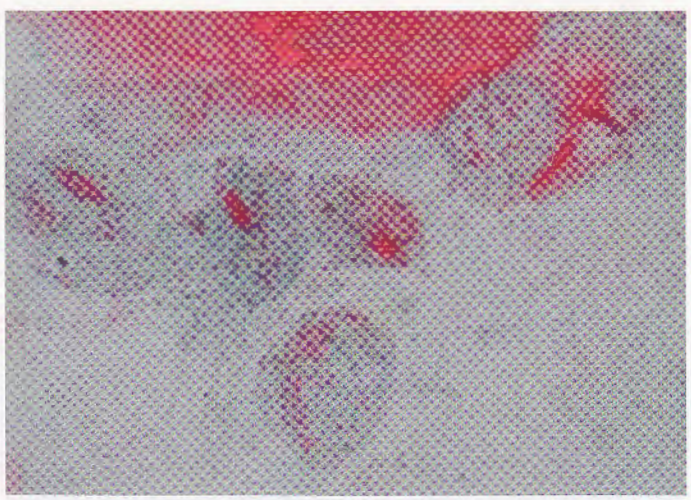
6. Charles Fisher, Cytology SCL Dunedin. **Kaleidoscope.** Urine deposits on a Millipore filter.



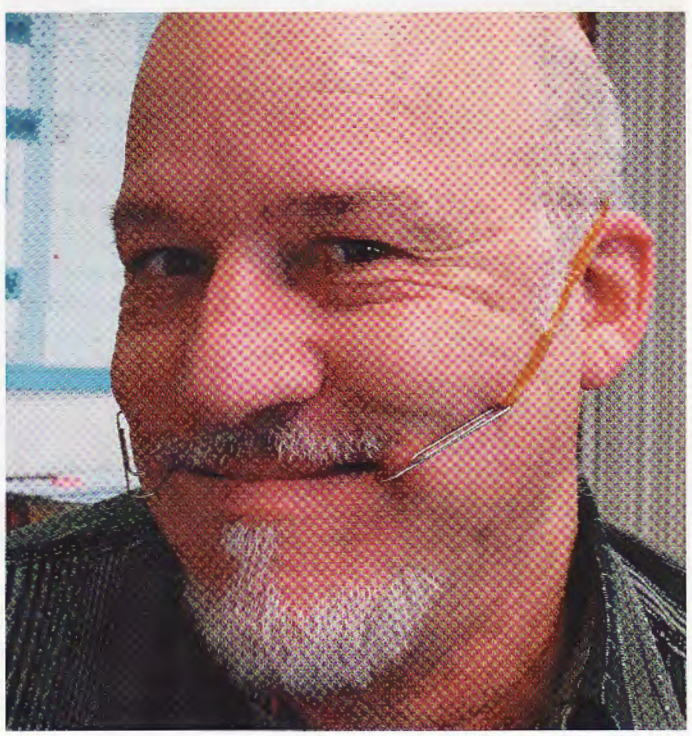
7. Neil Wood, DML Auckland. **Malassezia furfur.** Direct film of M. furfur using KOH and Blankophor using fluorescent microscopy.



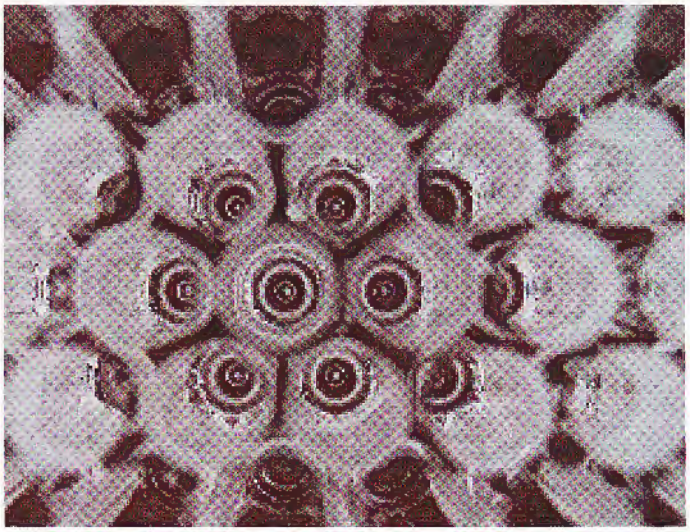
8. Neil Wood, DML Auckland. **Tyrosine Crystals.** Polarised microscopy showing tyrosine crystals in a urine from a patient with cirrhosis.



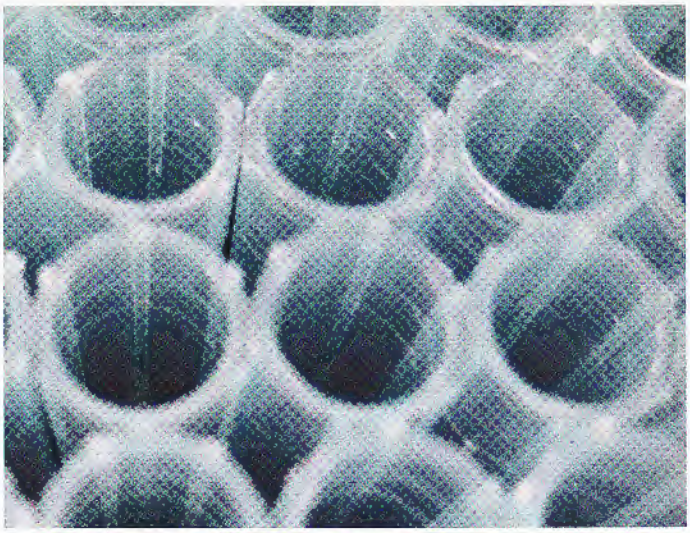
9. **(above)** Kiran Mistry, DML Auckland. **Trichrom Grammed Trichomonas.** This picture is from a Gram stain positive with Trichomonas vaginalis, then restained with the modified trichrome.



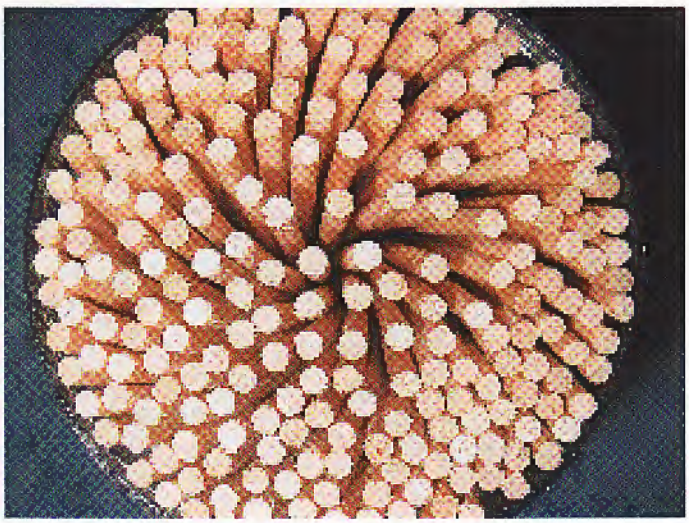
10. **(right)** Qian Eva Li, Cytology SCL Dunedin. **Forever Lasting Smile at Work.** An interesting workmate – a smile is important in the laboratory.



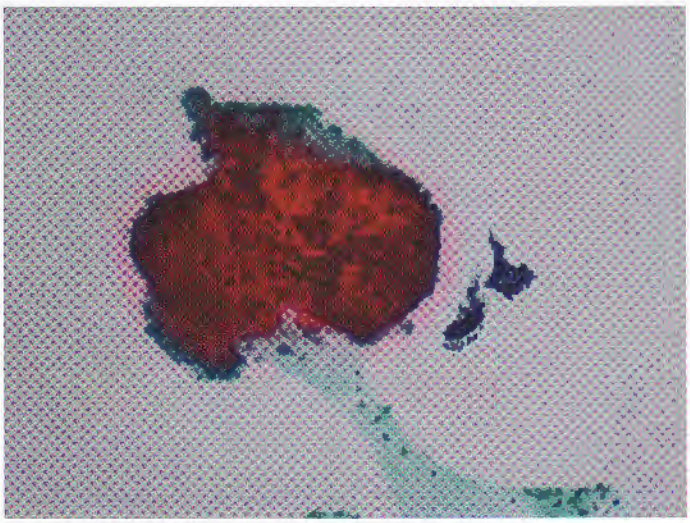
11. Suzi Flack, Haematology SCL Dunedin. **Coagulation Kaleidoscope.** Reaction trays for the Sysmex CA 1500.



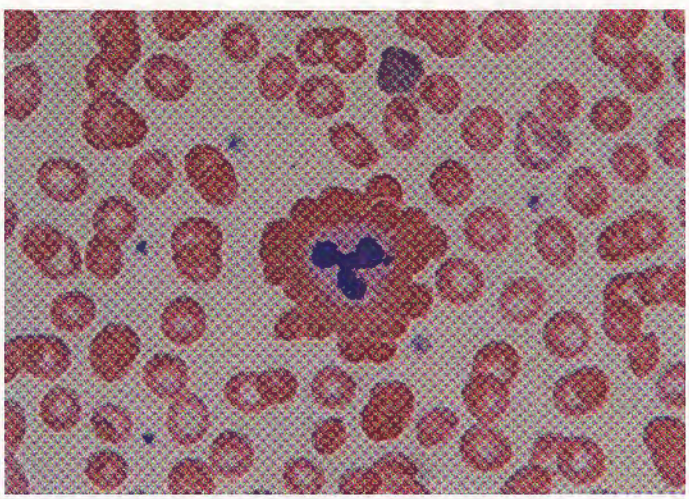
12. Suzi Flack, Haematology SCL Dunedin. **Organ Pipe Pipettes.** Micropipettes.



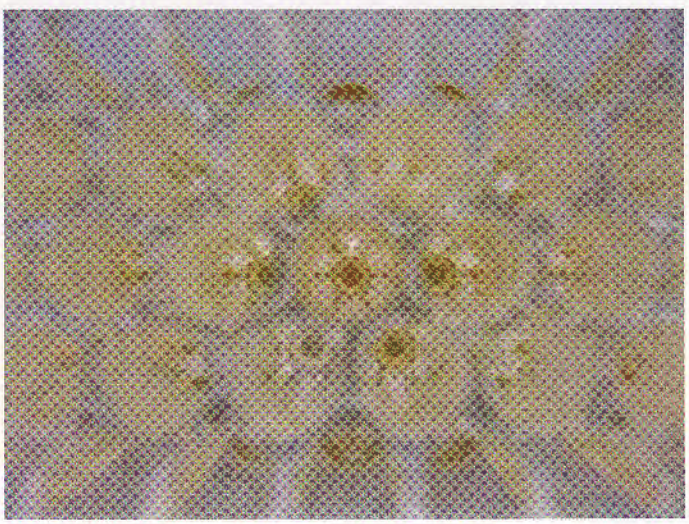
13. Suzi Flack, Haematology SCL Dunedin. **Clockwork Orange.** Orange sticks/mixers.



14. Lorna Whyte and Sharon Waldvogel-Thurlow, Cytology DML Auckland. **Kiwi Cytologists Put Australasia on the Map.** 40x objective on Olympus BX41 microscope. Australia is a low grade transitional cell carcinoma in a urine and New Zealand is endocervical cells in a thin prep.



15. Cat Ronayne, Haematology SCL Dunedin. **Roses are Red.** Red cell resetting in a patient with non-Hodgkins lymphoma and an auto-immune haemolytic anaemia.



16. Cat Ronayne, Haematology SCL Dunedin. **Coag Kaleidoscope.** A reaction tray from the Sysmex CA-1500.

17. Cat Ronayne, Haematology SCL Dunedin. **Pipette Curtain.** Glass pipettes.

NZIMLS Journal Prize

Council of the NZIMLS has approved an annual Journal prize for the best case study accepted and published in the Journal during the calendar year. The prize is worth $200.

Case studies bring together laboratory results with the patient's medical condition and are very educational. Many such studies are presented at the Annual Scientific Meeting, SIG meetings, and the North and South Island Seminars, yet are rarely submitted to the Journal for wider dissemination to the profession. Consider submitting your case study presentation to the Journal. If accepted, you are in consideration for the NZIMLS Journal Prize and will also earn you additional CPD points. Please contact the Editor or any Editorial Board Member for advice and help. Contact details are on the NZIMLS web site (www.nzimls.org.nz) as are instructions to authors.

No formal application is necessary but you must be a financial member of the NZIMLS during the calendar year to be eligible. All case studies accepted and published during the calendar year (April, August and November issues) will be considered. The Editor, Deputy Editor and the President of the NZIMLS will judge all eligible articles in December each calendar year. Their decision will be final and no correspondence will be entered into.

Med-Bio Journal Award

med·bio

Med-Bio offers an award for the best article in each issue of the New Zealand Journal of Medical Laboratory Science. All financial members of the NZIMLS are eligible. The article can be an Original, Review or Technical Article, a Case Study or a Scientific Letter. Excluded are Editorials, Reports, or Fellowship Treatises. No application is necessary. The Editor and Deputy Editor will decide which article in each issue is deemed worthy of the award. If, in their opinion no article is worthy, then no award will be made. Their decision is final and no correspondence will be entered into.

Winners of the Med-Bio Journal Award from the April 2008 issue were Anna Denholm and David Patterson from the Haemostasis Laboratory, Canterbury Health, Christchurch for their article ìAccurate diagnosis of high-affinity vWF-platelet disorders: a case study of pseudo von Willebrand disease. N Z J Med Lab Sci 2008; 62 (1): 7-9.

News from the PPTC

Blood bank technology course

A very successful blood bank technology course was held at the PPTC during September. There were five participants: Likiak Alik from Kosrae Memorial Hospital in Kosrae, Federated States of Micronesia; Francis Timani from Vaiola Hospital in Tonga;
Pamela Kertou from Belau National Hospital, Palau; Makerita Sooalo from Medcen Hospital, Samoa; and Talalelei Suesue from Malietoa Tanumafili II Hospital, Savai'i, Samoa.

This year the lectures were given by staff of the Wellington Region NZ Blood Service. The PPTC is very grateful to these staff members who gave their time willingly to pass on valuable theoretical and practical knowledge to the Pacific Island participants for them to take back home to their hospital laboratories and put into practice to improve their blood transfusion services.

2008 Blood Bank Technology Course Participants and staff from Wellington Region, New Zealand Blood Service

The participants were lectured on topics covering basic immunology, blood group Genetics, ABO, Rh and other blood group systems, Antibody screening and identification, compatibility testing, transfusion reaction investigation, haemolytic disease of the newborn, blood products, blood donors and screening blood for infectious agents. During their time here the participants had tours of the Wellington Hospital Laboratory and also the NZ Blood Service Wellington Centre. Jacqui Jones, Product Support Specialist from Ortho Clinical Diagnostics visited the PPTC and spoke to the participants about column agglutination technology.
One weekend near the end of the course we took the students up to the Hawke's Bay region. The NZ Red Cross from this area have for a number of years sponsored a student to this course and this year it was Pamela Kertou from Palau. This visit gave an opportunity for members of the Hawke's Bay Branch to meet Pamela and the other students when they put on a special lunch and also a tour of a farm on the back of a Hilux ute, a very exciting and anxious experience going up very steep farm tracks for people who come from very flat and low lying islands! It was a great opportunity for all of the participants to see the NZ countryside in springtime.

At the end of the course we were very privileged that Dr Peter Flanagan, National Medical Director, New Zealand Blood Service, came to the PPTC to present the certificates to the course participants. He talked to the students about this course being a two-way affair. Them being able to come to New Zealand to learn about safe blood for transfusion but also an opportunity for the New Zealand lecturers to learn about laboratories in the Pacific Islands. Makerita Sooalo from Samoa spoke on behalf of the course participants thanking everyone who had contributed to making the course a success.

Haematology Special Interest Group
Journal article questionnaire

Review
Complex phenotypes in the haemoglobinopathies: recommendation on screening and DNA testing
Ronald J. Trent, Boyd Webster, Donald K. Bowden, Anne Gilbert, P. Joy Ho, Robert Lindeman, Ahti Lammi, John Rowell, Marcus Hinchcliffe, Allison Colley, Meredith Wilson, Mona Saleh, Jennifer Blackwell and Vicki Petrou.

Pathology (December 2006), pp. 507-519

Questions:

1. On what chromosome are the
   a) α globin gene clusters?
   b) β globin gene clusters?
2. Although DNA sequencing is the "gold standard" for mutation testing, how can a mutation be missed using this technology?
3. What should be included in a comprehensive haemoglobinopathy screen and when should this screen be performed?
4. When should DNA testing be undertaken?
5. Which ethnic groups should be considered at risk of Hb S?
6. Define a normal Hb A_2β Thalassaemia.
7. What other clinical conditions can raise Hb A_2 to borderline levels?
8. What clinical condition can lower Hb A_2 levels?
9. What are the causes of a raised Hb F?
10. What are the differences between HPFH and δβ thalassaemia?
11. What is the phenotypic difference between HbH disease due to the usual deletional forms of α thalassamia, and Hb H disease due to a combination of non deletional and deletional defects?
12. What level of Hb E would you expect in a patient who has coinherited
    a) –α/αα
    b) --/αα
13. What genetic modifiers influence the severity of Hb E/β Thal?
14. Why does the presence of triple ααα or quadruple αααα genes make β thal more severe?
15. Why can cationic ion exchange chromatography used on most HPLC equipment give a falsely elevated Hb A_2?
16. How does Hb S coinherited with α thal phenocopy Hb S/β thal?

Questions prepared by Sheila Ryken, Haematology Dept., Diagnostic Medical Laboratory, Ellerslie, Auckland. For a copy of the journal article, ph 09 5714000 ext 9123 or e-mail sryken@dml.co.nz.

Answers on page 92

Biochemistry Special Interest Group

Preliminary notice
The BSIG meeting next year will be on Saturday 27 June 2009 at the Millennium Hotel in Taupo.

Detailed information to appear in the next Journal issue (April 2009) and on the NZIMLS web site.

All biochemists, keep this date free and attend/contribute.

Sandy Woods, BSIG Convener

Journal-based questionnaire

Below are 10 questions based on articles in the November 2008 issue of the Journal. Read the articles fully and carefully, most questions require more than one answer.

Answers are to be submitted through the NZIMLS web site. Make sure you supply your correct email address and membership number. Due to a number of members experiencing problems in submitting it is recommend that you write your answers in a word doc and then cut & paste your answers on the web site.

The site will remain open until Friday 23rd January 2009. You must get a minimum of 8 questions fully right to obtain 5 CPD points.

Journal questions

1. What is the typical blood film appearance in Homozygous Hb E patients and what other condition is it similar to.
2. What are the usual levels of Hb F in Hb E/ 0 thalassaemia and what range of levels have been documented in the literature.
3. What may prove helpful in detecting a beta thalassaemia mutation.
4. Why is a correct diagnosis of Hb E/ 0 thalassaemia important.
5. At what percentage are reticulocytes normally present in the peripheral circulation and what can enhance their release.
6. In the quoted study by the Spanish Multicentric Study Group what was haematopoietic recovery indicated by.
7. What was the diagnosis and treatment of the paediatric patients in the study by Yeu-Sheuan Khor.
8. How many and what percentage of patients had an immature reticulocyte fraction of 5% and what parameter at which level was this fraction preceded by.
9. In Ross Hewett's viewpoint article what does he perceive to be the biggest challenge for anyone working in a laboratory.
10. Where and when is the next NZIMLS Annual Scientific Meeting and what is its theme.

Questions and answers for the August 2008 journal questionnaire.

1. Morphologically, into which varieties can diffuse large B-cell lymphomas be divided into. **Centroblastic, immunoblastic, histocytic rich or anaplastic varieties, depending on the cell line of origin.**
2. What are the classic CSF findings in malignant meningitis. **High opening pressure high protein and low glucose levels, and raised white blood cell count.**
3. What did the H & E stained sections of the bronchial biopsy of the pulmonary mucormycosis case show. **Aggregates of broad, aseptate hyphae with right angled, irregular branching and a few rosettes of needle shaped crystals.**
4. What are the common fungi genera causing mucormycosis. **Rhizopus, Mucor and Abssidia.**
5. In which tissues is mucormycosis normally involved in. **Rhinocerebral, pulmonary, gastrointestinal, and subcutaneous tissues.**
6. What are the main symptoms of pulmonary mucormycosis. **Fever, cough, shortness of breath, and initially signs of consolidation which mimics bronchitis and pneumonia.**
7. What is the cytologic diagnosis of mucormycosis based on. **Recognition of the characteristic mucorales fungal hyphae (15-20um in diameter, aseptate, branching at irregular intervals and at right angles).**
8. Overall, what was the predominant uropathogen isolated in Benin City, Nigeria and what were the next two predominant uropathogens. **S. aureus followed by Candida albicans and E. coli.**
9. What has been reported to increase the risk of asymptomatic bacteriuria in diabetics. **High glucose concentration in urine which may create a culture medium for pathogenic micro-organisms and immunologic impairment resulting in lower host defence system.**
10. What is the plasma half-life of intact parathyroid hormone and where does its biological activity reside in. **The plasma half life of intact parathyroid hormone is less than 10 minutes. The biological activity of intact parathyroid hormone resides in the first 34 amino acids of the N-terminal.**

Abstracts of oral and poster presentations at the NZIMLS Annual Scientific Meeting, Dunedin, August 2008

Mutations in ABCA1 cause HDL deficiency and show variance in phenotypic expression

Associate Professor Sally McCormack, University of Otago, Dunedin

Mutations in the ATP-binding cassette A1 (ABCA1) transporter are the most common genetic cause of the high density lipoprotein (HDL) deficiency syndromes of Tangier disease and familial hypoalphalipoproteinemia (FHA). A 42 year old female of European decent was identified from a routine lipid test as having severe HDL deficiency (0.04 mmol/L). Clinical evaluation of the proband revealed previous symptoms of Tangiers disease including peripheral neuropathy. There was no evidence of coronary artery disease. Sequencing of the entire ABCA1 gene of the proband revealed a new mutation (R1068H) in homozygous form within the first ATP-binding domain. The mutation was present in several family members although the phenotypic expression in HDL levels was variable amongst carriers. Subsequently, a 76 year old male was identified from a routine lipid test as having a very low HDL (0.23 mmol/L) but no evidence of Tangiers disease or coronary artery disease. Sequencing of the proband's ABCA1 gene identified that the proband was a compound heterozygote for a previously identified N1800H mutation and a new mutation (T1512M). Subsequent testing of the family revealed a brother with a low HDL and daughter with normal HDL that both carried the N1800H mutation and a son with a low HDL that carried the T1512M mutation. Our studies have shown that low HDL levels are not necessary associated with heart disease and can be caused by ABCA1 mutations that show phenotypic variance in expression.

A New Zealand family with a novel form of thrombocytopenia reveals an unexpected mutation

Dr Ian Morison, Southern Community Laboratories, Dunedin

A young healthy female with unexplained mild thrombocytopenia led to the detection of a large pedigree with similar thrombocytopenia (with normal MPV). While following a genealogical trail back to Cornwall, we searched the family's genome for the causative mutation. Surprisingly, we discovered the first mutation of human cytochrome c, a protein that is critical for mitochondrial energy production, and for programmed cell death (apoptosis). Examination of bone marrow by electron microscopy, and culturing of megakaryocytes in vitro, revealed abnormal premature platelet formation. The family's cytochrome c caused enhanced activation of apoptosis when added to cytoplasm. Given that cytochrome c-dependent apoptotic pathways are essential for platelet formation, we conclude that the mutation causes thrombocytopenia because of premature release of platelets into the bone marrow space, instead of into the blood stream.

Novel genetic variants that impact on thiopurine drug responses

Associate Professor Martin Kennedy, Christchurch Clinical School of Medicine

Thiopurine S-methyl transferase (TPMT) is a cytosolic enzyme that catalyses the S-methylation of the thiopurine immunosuppressants. Many mutations have been identified that are predictive of decreased TPMT activity, and it is common to carry out screening for common mutations or enzyme activity prior to drug treatment. In contrast, no molecular explanation has been found for the 15% of patients who have normal TPMT activity but appear to be resistant to the effects of the drugs, or the 1-2% of Caucasians that exhibit ultra-high TPMT activity. Several studies from our laboratories have yielded novel mutations which impact on activity of TPMT or other enzymes involved in the metabolism of this class of drugs. These studies have identified mutations or polymorphisms in two genes relevant to metabolism of thiopurines, and in the promoter of TPMT itself, which offer the potential for improved pharmacogenetic prediction of drug response in conditions such as inflammatory bowel disease.

Creatinine standardisation and e-GFR

Dr Mohammed Saleem, Canterbury District Health Board, Christchurch

Most Australasian laboratories now automatically report an estimated glomerular filtration rate (e-GFR) using the MDRD formula. The Australasian Creatinine Consensus Working Group published updated recommendations on the implementation of e-GFR in August 2007 (MJA 2007;187:459-63). Creatinine methods have evolved towards better alignment with the IDMS reference method.

Hereditary red cell membrane defects - the utility of flow cytometry in diagnosis

Robin Allen, Waikato Hospital, Hamilton

Hereditary spherocytosis (HS) is a heterogeneous group of disorders with regard to clinical severity, protein defects and mode of inheritance. Diagnosis is based on typical clinical features (splenomegaly), family history, and peripheral blood film examination (spherocytes), along with other laboratory procedures. The laboratory tests routinely used include the osmotic fragility test, the autohaemolysis test, the acidified glycerol lysis test and the Pink test. These tests depend upon the alteration in osmotic fragility of spherocytic red cells secondary to their decreased surface area-to-volume ratio. The tests have poor sensitivity and specificity due to failure to detect atypical or mild cases of HS. The hypertonic cryohaemolysis has improved sensitivity, identifying asymptomatic carriers of the disease.

Recently, a flow cytometric assay has been proposed as an alternative diagnostic test for identifying HS. The test measures the fluorescence intensity of intact red cells labelled with eosin-5'maleimide (EMA) which reacts covalently and specifically with Lys-430 on the first extra cellular loop of the anion transport protein (band 3 protein) of the red cell membrane. The red cells of patients with HS demonstrate a greater degree of reduction of the mean channel fluorescence than patients with other disorders, when compared to normal controls. Recently published guidelines for the diagnosis and management of HS recommend the EMA-binding test, besides the cryohaemolysis test, as the preferred screening tests for HS.

Analysis of warfarin enantiomers

Dr Berit Jensen, Clinical Pharmacology, University of Otago, Dunedin

Background: Warfarin is a coumarin anticoagulant drug administered as a racemic mixture. The anticoagulant activity primarily resides in the S-enantiomer and the metabolic clearance of the S-enantiomer is almost twice that of the R-enantiomer. When relating warfarin concentrations to clinical results, it is therefore important to measure S- and R-warfarin separately. In addition, warfarin administration is complicated by genetic polymorphism in relation to the metabolism (CYP2C9) and the effects (VCORC1).

As part of a study to investigate the free clearance of warfarin in young and elderly, an assay was needed to measure the free concentrations of S- and R-warfarin in plasma and ultrafiltrate. Warfarin is highly protein bound (~99%), meaning that the free (unbound) concentrations in ultrafiltrate will be ~100 fold lower than total concentrations in plasma. A sensitive technology such as LC-MS/MS (liquid chromatography with tandem mass spectrometric detection) was therefore required.

Purpose: To develop and validate a sensitive and reliable LC-MS/MS assay for measuring S- and R-warfarin in human plasma and ultrafiltrate.

Methods: Warfarin was extracted from plasma and ultrafiltrate samples by liquid-liquid extraction. The enantiomers were separated by chiral chromatography and detected by MS/MS (m/z 307,â??161) using d6-warfarin as internal standard.

Results & Conclusion: An LC-MS/MS assay for measuring S- and R-warfarin in human plasma and ultrafiltrate has been developed.

Hazards of transfusion

Dr Dorothy Dinesh, New Zealand Blood Service, Wellington

Blood transfusion therapy is a well-established component of modern medicine. Haemovigilance encompasses the surveillance of unexpected events or reactions in blood donors or transfusion recipients. The National Haemovigilance Programme was established in New Zealand in May 2005. The overall demand for blood components remains stable, however Intragam P use continues to rise.

A total of 455 events were reported to the National Haemovigilance Programme in 2007. These reports involved 419 patients. The most frequent reported reaction was non-haemolytic febrile transfusion reaction (NHFTR), followed by allergic reactions. There were 17 reports of transfusion associated circulatory overload (TACO), 9 reports of transfusion-related acute lung injury (TRALI), 12 delayed haemolytic transfusion reactions (DHTRs)and 21 incorrect blood component transfused (IBCT). There were no reports of transfusion-transmitted infection (TTI), transfusion associated graft vs host disease (TA-GVHD) or post-transfusion purpura (PTP). The rate of adverse events reported per 10 000 transfusions varied between the DHBs.

Platelet concentrates had the highest rate of reported adverse events and the overall rate of an adverse event related to transfusion of a blood component is 1 in 317 units transfused. Overall 1 in 74 recipients (of red cells, platelets or plasma) in 2007 had an adverse event reported.

The good, the bad and the ugly of clinical roles

Suzi Rishworth, New Zealand Blood Service, Dunedin

In August 2003 a new clinical project was launched by New Zealand Blood Service (NZBS) to support the vein to vein philosophy. A team of four nurse specialists were employed to join the nurse working in Waikato. The aims of the new clinical roles included supporting clinical staff within the District Health Boards (DHBs) in the field of transfusion medicine and improving transfusion practices and effectiveness via education, audit and expert knowledge. Five years on the roles continue to evolve and the number in the team has grown to six NZBS nurses and two DHB positions. The team of eight meet regularly and work together to support their local DHBs and on a number of national projects. The key focus however remains the same, the nurse acts as liaison between NZBS and the DHB and functions as an auditor, educator, problem solver, advisor and manager of change.

Profiling the logistic system at work

Trilby van Bree, New Zealand Blood Service, Christchurch

Logistics is the process of planning, implementing and controlling the efficient, effective flow and storage of goods, services and related information from point of origin to point of consumption for the purpose of meeting customer requirements. Within this process there are a number of key logistical activities that facilitate the process. These include customer service, demand forecasting and planning, inventory management, materials handling, order processing, purchasing, transportation and warehousing.

Understanding the responsibility of Logistics means understanding the essential relationship Logistics have developed with external Blood Bank customers and internal functional areas within NZBS.

In conclusion, getting the right product at the right place at the right time is a critical activity provided by Logistics. This activity doesn't just happen by itself. It has to be planned, synchronised, reliable, efficient, visible and responsive.

Interactions of our immune system with the microbial world: threats and opportunities

Dr Alex McLellan, Department of Microbiology & Immunology, University of Otago, Dunedin

All animals possess some form of innate immune system for the rapid recognition of conserved microbial structures. About 500 million years ago, rapidly evolving pathogens evolved ways to colonise the specialized tissues of multicellular organisms and forced the emergence of a more flexible and specific immune system. The first walking fishes carried this new 'adaptive immune system' onto the land and modern vertebrates possess essentially the same immune system as the first fishes. The success of our immune system is due to the close co-operation between the innate and adaptive arms of the immune system. Toll-like receptors (TLR), a class of bio- sensor present on phagocytes, detect minute amounts of pathogenic material and are essential for the co-operation between the different arms of the immune system.

Changing times: Vancomycin resistant Enterococci (VRE) outbreak at Auckland City Hospital

Susan Dalley, LabPLUS, Auckland City Hospital

Vancomycin-resistant Enterococci (VRE) were first reported in New Zealand in 1996. Between 1996 and 2006 a maximum of 6 VRE were reported throughout New Zealand annually. Some of the patients with VRE had been hospitalised or had travelled overseas but others had no identifiable risk factors. Outbreaks in New Zealand hospitals had not been reported.

In 2007 four patients colonised with VRE were identified at Auckland City Hospital (ACH). The isolates were shown to be identical on genotyping by PFGE. In an effort to contain the spread of VRE within ACH a hospital wide screening program began in October. All current patients were screened followed by new admission screening of all adult patients and weekly screening in clinical areas identified as high risk. Over a 30 week period > 12,500 screening samples were collected. One hundred and eighteen patients were found to be infected or colonised with VRE.

Strict environmental cleaning was undertaken. All patients found to be colonised or infected with VRE were placed in Contact Precautions. The huge influx of screening samples into the Department of Microbiology, LabPLUS resulted in the development of a more stream-lined screening method.

Neural network - artificial intelligence in microbiology

Julie Creighton, Canterbury Health Laboratories, Christchurch

Microbiology is a labour intensive discipline, with few areas applicable to automation. However, urine processing, with high volumes, involving multiple steps and labour intensive manual microscopy analysis, is one area where walk-away automation could benefit, resulting in standardised results, quicker turn around times, streamlined workflow and reduction of both labour and associated costs. The IRIS iQ200 Elite utilises a microscope and camera to capture digital images of urine particles. Auto-particle recognition software uses size, shape, contrast and texture features of each image to classify particles into many different categories and sub-categories such as red blood cells, white blood cells, casts, epithelial cells, crystals, mucus, yeasts and bacteria. Urine particles can be reported in quantitative counts per litre or per High Power Field or as semi-quantitative values. Auto-release thresholds can be set by the user, allowing rapid reporting of results. Sample throughput is 70 urines per hour. The IRIS iQ200 Elite has been a welcome addition to our laboratory. It is easy to use, has minimal maintenance, has real labour saving and frees up staff for more urgent samples. This is one instrument that has delivered on its promises.

Cyptic crypto

Krystle Robinson, Southern Community Laboratories, Dunedin

A 49 year old man presented in March this year with a 20mm, round, mobile, firm subcutaneous mass on his right chest wall. He had been unwell since December 2007 having severe headaches, malaise and weight loss. Histology of a fine needle aspirate of the mass revealed abundant fungal elements. Material referred to microbiology subsequently grew Cryptococcus neoformans.

This is a case study of a HIV negative, Hepatitis C positive man with multiple lesions growing Cryptococcus neoformans.

Fellowship of the NZIMLS

Rob Siebers, School of Medicine & Health Sciences, University of Otago, Wellington

Fellowship is the highest professional qualification of the NZIMLS. Routes of qualification are by examination, by submission of a thesis, and by publications. For the examination route candidates may be exempted the written exam part and progress to the treatise part if they hold an approved postgraduate qualification.

At present Fellowship is not officially recognised in industry agreements and some members feel that it is better professionally to obtain academic post-graduate qualifications. Academically, Massey University recognises Fellowship for enrolment for their Post Graduate Certificate of Science (leading to a Masters in Medical Laboratory Science) and there have been some individual instances of Fellows obtaining part exemptions for post graduate studies at other universities.

Currently there are 24 Fellows out of a total membership of 1,990. At present seven members are enrolled for Fellowship. In the future it is hoped that there will be official recognition of Fellowship by industry, academic institutions, overseas organisations, and by members of the profession.

DHBNZ workforce strategy group; medical laboratory scientist innovation project

Robin Allen, President, NZIMLS

District Health Boards New Zealand (DHBNZ), a part of the Future Workforce framework, has identified the medical laboratory workforce as a priority workforce. Key future workforce issues for the medical laboratory scientist (MLS) workforce include an aging professional group, recruitment and retention problems and limited career progression opportunities for those not pursuing a management pathway.

There is a worldwide shortage of pathologists, and workforce analysis by the New Zealand Committee of Pathologists (affiliated to the RCPA) clearly identifies a present and likely future pathologist shortage. This shortage will impact future capacity to sustain service delivery, and has the potential to become a rate-limiting process for many clinical activities

In February 2007 the DHBNZ Technical Workforce Strategy Group established a working party to identify investigate extending the role of medical laboratory scientists in diagnostic laboratories to provide for the anticipated shortage of pathologists. The working party was tasked with identifying DHB sector development for MLS that responds to the pathologist workforce shortage and providing support for career pathway development opportunities for MLS.

To gain the views of the profession on the concept of role extension for medical laboratory scientists a sector survey was undertaken in 2007. The survey results identified that there is reasonable support for progressing the exploration of role extension for MLS, although there was a common concern around current pressure on the MLS workforce being increased.

The medical laboratory workforce innovation project team subsequently proposed the setting up of a "think tank" to scope the feasibility of a role extension pilot. This "think tank", with cross-sector representation, has been established.

Comparison of five lactate analysers

Chris Budgen, Canterbury Health Laboratories, Christchurch

Purpose of the study: A study was undertaken, using previously analysed human arterial blood gas samples, to select the handheld lactate analyser best suited to analysing scalp vein samples at the Birthing Suite, Christchurch Women's Hospital (CWH), Christchurch, New Zealand. Scalp vein blood samples were analysed for pH and pCO2 on a Siemens 348 blood gas analyser and reported together with lactate. The average sample size for a scalp vein sample was 30µL. The lactate handhelds used approximately 3µL.

Basic procedures: Lactate was analysed by: Abbott Architect 8200i plasma analyser (laboratory); Siemens 800 blood gas analyser with lactate electrode enabled (Neonatal ICU, CWH); Abbott i-STAT 1 blood analyser (CG4+ cartridges- pH, pCO2, pO2 and lactate)-(Neonatal ICU, CWH); Koala Scout handheld lactate analyser (Birthing Suite, CWH) and the Arkray Lactate Pro handheld lactate analyser (Birthing Suite, CWH).

Main findings: All results were subjected to Bland-Altman difference plots and linear regression analysis. R values were calculated. Bland-Altman differences were insignificant (-0.453 - +0.02) except for the Koala Scout handheld analyser (+0.31 - +0.81). Linear Regression correlations between the methodologies showed slopes between 0.86 and 1.00 except for the Koala Scout (1.21 0.1).
R values were >0.98 except the Koala Scout (R= 0.89). The lactate test strips for the Lactate Pro and Koala Scout analysers were compared for packaging and storage requirements. The Lactate Pro and the Koala Scout analysers were also compared for ease of use and simplicity of calibration.

Conclusions: The Lactate Pro results compared favourably for accuracy, precision and correlation to the Abbott c8200i, Siemens 800 and Abbott i-STAT 1 analysers, whereas the Koala Scout overestimated lactate by ten to twenty percent. Subsequently, the Lactate Pro analyser was chosen for use in Birthing Suite, CWH.

Glioblastoma multiforme - identifying new prognostic factors and potential molecular markers

Dr Anna Wiles, School of Medicine, University of Otago, Dunedin

Glioblastoma multiforme (GBM) is both the most malignant and the most common form of primary brain tumour, with approximately 250 new cases per year in NZ. The prognosis of these patients is extremely poor, with a median survival of typically 9 months after diagnosis. Definitive treatment includes surgery, radiotherapy, and chemotherapy; all of which are acknowledged as palliative measures. Even with "complete" surgical resection of the tumour, combined with other current treatment modalities, the survival rate remains very low. Despite the poor prognosis, there is significant variability in patient outcome, with a proportion of patients exhibiting a longer term of survival. GBM arises either de novo, as a spontaneous 1∫ high-grade lesion, or via a 2∫ pathway evolving from a lower grade precursor lesion. Tumourigenesis is associated with the acquisition of an immortal phenotype requiring a telomere maintenance mechanism (TMM) that is usually provided by the enzyme telomerase, but can also be provided by a less common mechanism known as the alternative lengthening of telomeres (ALT). The presence of ALT TMM is shown to be associated with the 2∫ pathway of glioma development, affecting a younger age group and conferring a longer survival in GBM patients, suggesting there are different molecular pathways leading to the same disease phenotype. Further molecular characterization of these glioma subtypes could have potential impact on the management of patients, convey predictive and prognostic information, and be useful in identifying potential targets for specific therapies. Molecular markers will become increasingly important in the diagnosis and treatment of glioma, guiding patient therapy and resulting in significant improvement with respect to patient survival.

Current trends in electron microscopy

Allan Mitchell, Otago Centre for Electron Microscopy, University of Otago, Dunedin

At the end of the 20th Century it seemed that the importance of electron microscopy in the biology sciences may have been coming to an end. The ultrastructure of many biological systems was thought to be well described and many EM Units around the world had closed. The increasing use of high resolution light microscopy, for example confocal microscopy, and the increasing ability to experiment with live cell interactions, made the continued contribution of electron microscopy in the biological sciences seem expensive and less important.

However, continued technical developments in electron microscopy have extended the resolution limits of the earlier instruments. Corresponding advances in specimen preparation techniques, and in particular cryopreparation techniques, are allowing the study of cells, particles and molecular machines in their fully hydrated state.

These advances are allowing new insights into cell structure and function and, in particular, organelle relationships. Some of the traditional concepts have to be revisited with the improved technology. Electron microscopy has entered a new era of importance.

Bouwer murder case: A case of felonious hypoglycaemia

Professor Han Seung Yoon, Pathologist, Southern Community Laboratories, Dunedin

A 47-year-old woman was repeatedly admitted to DPH because of intermittent confusion, visual disturbance and poor coordination. The plasma glucose concentration was consistently low. Intravenous 10% dextrose was given and her mental state improved. After a series of tests an insulinoma was suspected. At surgery, 2/3 distal pancreatectomy and splenectomy were performed with no evidence of insulinoma. The patient died during the night 12 days after discharge. One day prior to death a venous blood sample was obtained by her husband and revealed a plasma glucose concentration of 1.9 mmol/L. At post mortem no insulinoma was identified in the remaining 1/3 of pancreas or extra-pancreatic organs or tissues. Six months later post mortem blood and gastric contents toxicology results returned revealing the presence of hypoglycaemic drugs such as Metformin, Glibenclamide, Glipizide and sedatives of Clonazepam and Citalopram. Police investigation identified false prescriptions had been written for both the oral hypoglycaemic drugs and sedatives by the patient's husband dating back to prior to the onset of her illness. The day prior to her death a prescription for 1,000 units of Humalog insulin and Metformin had also been written.

HPV testing

Dr Lance Jennings, Canterbury Health Laboratories, Christchurch

Human papillomavirus (HPV) is a very common sexually transmitted infection. In women under 30 years the prevalence is very high, however the majority of the high risk HPV (HrHPV) infections clear within two years of infection and are of little clinical significance. The commonly accepted high-risk (oncogenic) types include 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 68, 73 and 82. As age increases, persistence of HrHPV subtypes increases the risk of developing a high grade cervical lesion.

HrHPV testing has been shown to have a high negative predictive value (~99%) and is more sensitive for detecting risk of high grade abnormalities than conventional cytology which is generally a more specific test. It is the strong negative predictive value of HrHPV testing that has the most clinical use. For this reason the National Cervical Screening Programme (NCSP) is to introduce HPV DNA testing for HrHPV as an integral part of the management of asymptomatic women with abnormal cervical smears (ASCUS/LSIL) from July 1st 2009. Internationally validated commercially available tests for HPV DNA detection include the hybrid capture signal amplification methods (Digene Hybrid Capture 2) and the PCR amplification techniques (Roche Products Amplicor HPV Screening Assay). In-house and other commercial assays are available. However, the Digene and Roche assays have advantages which include their adaptability to high volume processing. The use of HPV DNA testing as a primary screening test is not currently recommended.

Coeliac disease – overview of aetiology, incidence and risk groups

Dr Michael Schultz, Gastroenterology, Dunedin Hospital

Coeliac disease, also known as endemic sprue or gluten-sensitive enteropathy, is a genetically determined multi-systemic disease characterised by incompatibility of the wheat gliadin fraction and other alcohol-soluble proteins of rye and barley.

The disease was first mentioned in 1887 by Samuel Gee who described the typical symptoms of diarrhoea, faintness and growth retardation. Already at that time it was postulated that a relationship to food intake might exist.

However, it was not before 1954, when Paulley and colleagues described an atrophy of the villi of the small intestine as a typical pathological finding which is accompanied by a chronic inflammation of the mucosa.

A biopsy of the small intestine is renowned gold standard for the diagnosis of celiac disease. More recently, less invasive serological test methods became established. The introduction of the detection of anti-endomysial and anti-gliadin antibodies together with combined determination of IgG and IgA made more reliable screening methods available. In 1997, tissue transglutaminase was identified as the antigen of the specific autoimmune response of

celiac disease, shortly followed by commercially available assays which allowed to perform population-wide large-scale screenings and thus to diagnose also asymptomatic pathologies and non-classic presentations. It was soon demonstrated that the prevalence of this disease is considerably higher than previously assumed. The previous assumption was that the maximum prevalence in Western populations would be 1:3000 - 1:10,000, but a recently performed analysis demonstrated a prevalence of up to 1:105 with an even higher prevalence of 1:20 - 1:7 in risk groups. This led to a revise of the diagnostic and management guidelines.

MLSB perspective on cultural competence

Chris Kendrick, Medical Laboratory Science Board

With the passing of the HPCA Act in 2003 came many new requirements for registered health practitioners in New Zealand. A number of these have been introduced by the New Zealand Medical Laboratory Science Board and have already impacted upon the MLS profession. In 2006 the MLSB released the "Code of Competencies and Standards for the Practice of Medical Laboratory Science" in NZ. This document provides NZ registered MLS and MLT and the public of NZ with the requirements for practice of the MLS profession. Within the Code was a section specifying the need for culturally competent practice. The inclusion of this section had people asking questions about cultural competence, the need for culturally competent practitioners and how cultural competence could be measured.

Emotional labour and its relevance to scientists working in health care

Dr Ruth Fitzgerald, Social Anthropology, University of Otago, Dunedin

This paper explores the concept of emotional labour in relation to all forms of health care work. It is argued that emotional labour is becoming increasingly relevant in the working lives of scientists as they take up positions within hospitals and other health care facilities which place them in direct contact with patients. By drawing on previous ethnographic studies of the importance of emotional labour to New Zealand based Embryologists, Cytogeneticists and a variety of clinical health care workers such as X-ray workers, the author argues for the relevance and importance of this concept in explaining both worker burnout and worker satisfaction. The frequent popular characterizations of scientific labour as unemotional in its nature, work directly against scientific workers' own recognition of the value and risks of emotionality within the clinical encounter. The author concludes by suggesting that Medical Laboratory Scientists would benefit from interior reflection on the meaning of 'care' for them within their work and the role of emotional labour in the delivery of that care.

Ethical issues in diagnostic pathology

Professor Gareth Jones, Department of Anatomy & Structural Biology, University of Otago, Dunedin

One of the ironies of bioethics is that, until recent years, neither anatomists nor pathologists have given much thought to the ethical issues underlying their practices. In both cases, they have assumed the rightness of their practices on the basis of their legality. In New Zealand this was the Human Tissues Act 1964, which in many respects mirrored similar legislation in comparable societies. While legislation like this proved remarkably useful for many years in many countries, its lack of specificity proved a hindrance, and it was found wanting by a variety of body parts and organ retention scandals, as well as by the increasing demands being made upon it by technical advances in tissue preservation and genetic analysis. These in turn revealed how important it is to understand the historical context within which these Acts emerged, as well as the centrality of ethical principles such as informed consent. The 2008 Human Tissue Act in New Zealand as well as equivalent recent legislation in other countries attempt to address such considerations, These include the nature and limitations of informed consent, the relationship between uses of tissues in diagnosis, teaching and research, the significance of anonymization of tissues, and retention of tissues for future research uses including genetic analyses.

Occupational transmission of blood-borne pathogens: risk and prevention for phlebotomists in daily practice

Catherine White, Healthcare Safety, BD Medical, South Asia Pacific

One second is all the time it takes to place a healthcare worker at serious risk of contracting a disease that may take them out of the workplace and cause significant change to their life. WHO estimates that more than 16,000 Hepatitis C infections and 1,000 HIV infections annually among healthcare workers are attributable to percutaneous injuries in the work environment. A high percentage of these injuries and therefore disease transmission are preventable. Epidemiology and risk stratification are key to preventing these injuries, and therefore minimising disease transmission.

Vitamin D - the sunshine hormone - what is the desirable range?

Professor Ailsa Goulding, Otago School of Medicine, Dunedin

This is a controversial topic. There are few natural foods with a high vitamin D content and most vitamin D is derived endogenously after short exposure of skin to ultraviolet light. Vitamin D status is best assessed by measuring serum 25-hydroxyvitamin D levels and as 25-OHD assays have become more widely available more frequent requests for this measurement have been made. Serum 25-hydroxyvitamin D levels show wide seasonal variations and values are considerably lower in dark-skinned people and obese individuals. It is clear that large sections of the population have serum 25-OHD values below 50 nmol/l (20 ng/ml), a value most authorities would consider desirable for good health. Even larger numbers of people have values below 80 nmol/l (32 ng/ml), a level some researchers now advocate. While severe vitamin D deficiency is associated with unequivocal evidence of ill effects for alimentary calcium absorption, bone mineralisation and muscle function, claims for a variety of benefits to health from elevating values above 50 nmol/l are less clear. Evidence to support supplementation of the population to achieve 25OHD values above 50 nmol/l is not in my view convincing. However, every housebound person should receive vitamin D therapy from their clinicians and many people in the community may also benefit from modest supplementation in winter. Widespread fortification of a variety of foods with vitamin D is not justified on present evidence.

How can we get enough Vitamin D to protect against cancer and other chronic diseases?

Dr John Liversey, Canterbury Health Laboratories, Christchurch

Vitamin D is essential for health and is made only by the action of ultraviolet light (UV) on pre-vitamin D. Although humans evolved near the equator with plenty of skin exposure to UV, many of us now live at mid to high latitudes in cloudy climates, wear clothes and spend most of our time indoors. Consequently, plasma vitamin D levels show a winter minimum. So does our present lifestyle still provide us with sufficient vitamin D?

Several lines of research on major chronic diseases including cancer, heart disease and diabetes, suggest that optimal levels of 25-hydroxyvitamin D (25(OH)D in the blood are at least 75 nmol/L. However surveys in New Zealand, including our own in Christchurch, and in other temperate regions of the world have shown that few people maintain this level year round. None of our Christchurch volunteers did so in winter and only 12% managed this level in summer.

How can levels be raised to be optimal? Dietary sources are few, and are either of low concentration (eggs, dairy) or are ecologically unsustainable and contain excessive vitamin A (oily fish).

Using a simplified mathematical model, we have examined other possibilities. A doubling of the average annual sunlight exposure was predicted to raise the annual winter average minimum 25(OH) D only from 29 nmol/L to 37 nmol/L. Thus increasing sun exposure is likely to be of limited effectiveness for most people.

Assuming that a population average plasma 25(OH)D of 100 nmol/L would get most people above 75 nmol/L, we predict that supplementation with 2600 IU/day of vitamin D is required. The most practical way of achieving this is probably to take one 50,000 IU vitamin D tablet fortnightly, although mandatory supplementation of some foods with vitamin D could contribute

Laboratory methods (Vitamin D)

Dr Geoff Smith, Southern Community Laboratories, Christchurch

Vitamin D assays have come a long way since the first bioassay using calcification of the rat tibial epiphysis. Despite advances in the last 20-30 years, significant problems remain in the standardisation of Vitamin D assays with significant biases evident between the different assay groups in EQA schemes. Some of this appears to be due to differential recognition of 25-hydroxyvitamin D2 and 25-hydroxyvitamin D3 in competitive assays. In addition a number of the assays have greater than ideal coefficients of variation. Various expert bodies have issued guidelines that contain cut-offs for levels of serum 25 OH D denoting deficiency and sufficiency. However, because of the variability and inherent biases of assays it is difficult determine how these values should be interpreted when using specific methods.

Blood and bone marrow changes following chemotherapy for solid tumours

Gillian Rozenberg, Prince of Wales Hospital, Sydney

A series of events may induce changes in the peripheral blood and bone marrow of patients being treated for solid tumours. Cytotoxic chemotherapy induced neutropenia and cytokine induced leucocytosis will be evident in both the peripheral blood and bone marrow. Exposure to alkylating agents and/or radiotherapy may induce dysplastic changes in the peripheral blood and bone marrow. Changes in all three cell lineages, erythroid, myeloid and megakaryocytic may occur.

A leucoerythroblastic blood picture indicative of metastatic carcinoma and microangiopathic haemolytic anaemia secondary to the palliative drug Mitomycin C will be evident in the peripheral blood. Acute myeloid leukaemia and myelodysplastic syndromes may occur following the use of chemotherapy and/or radiation therapy some five to six years following treatment.

The above series of events should be recognised and understood by the morphologist examining and reporting blood and bone marrow changes.

McLeod phenotype plus X - linked chronic granulomatous disease - an overview and case study

Lorna Wall, New Zealand Blood Service, Auckland

This 18 month old male presented at 3 months of age to hospital with a liver mass. A biopsy showed he had a granuloma and subsequent workup confirmed the diagnosis of X-linked multisystem disorder - McLeod syndrome and chronic granulomatous disease.

Bone banking within the New Zealand Blood Service

Kaye Stewart, New Zealand Blood Service, Dunedin

When the New Zealand Blood Service formed in 1998, included were 5 bone banks in Auckland, Waikato, Manawatu, Christchurch and Dunedin.

These bone banks have been operating on local protocols and procedures based on a variety of International standards. As part of the NZBS standardisation process and in response to the pending tissue regulations, the New Zealand Blood Service commenced standardising the NZBS Bone Banks processes following the Council of Europe Guidelines for Tissue Banking. By adopting one set of standard operating procedures and utilising Progesa to provide full traceability of the donation, this allows NZBS Bone Banks to transfer stock to the different bone bank sites as required without having a conflict in standards or operating procedures.

The implementation of the new National Tissue Bank processes commenced at the Auckland site in September 2007, since that time NZBS has progressively implemented Wellington, Dunedin, Manawatu and Christchurch, with Waikato to follow.

Systemic lupus erythematosus: from the lab to the clinic

Dr Jo Dockerty, Rheumatology Consultant, Dunedin Hospital

SLE is an inflammatory multi-system disease with diverse clinical and laboratory manifestations. Its course and prognosis varies from mild to fatal. There are numerous immune defects in patients with SLE. The mediators of SLE are autoantibodies and the immune complexes they form with antigens causing immune inflammation.

Ninety five percent of patients with SLE have an abnormal titre of antinuclear antibody (ANA). However, approximately 8% of the general population also have a positive ANA. ANA is often requested as part of a diagnostic work up for non specific symptoms such as fatigue, arthralgia and skin rashes. Clinical features and laboratory results are both useful in confirming the diagnosis of SLE. The American College of Rheumatology criteria for the classification of SLE include the following manifestations; cutaneous (discoid and malar rashes, photosensitivity); oral ulcers, arthritis, serositis (pleuritis, pericarditis); renal, neurologic, haematologic (haemolytic anaemia, leucopenia, lymphopenia, thrombocytopenia); and immunologic disorders (positive anti-dsDNA antibody, anti-Sm antibody, positive antiphospholipid antibody, and positive ANA by immunofluorescence). Other laboratory features are supportive of the diagnosis in an appropriate clinical setting, including raised ESR with normal CRP, hypergammaglobulinaemia, hypocomplementemia, and an abnormal urinary sediment.

Leave no stone unturned - a thorough look at renal stone analysis by XRD

Sandy Woods, Canterbury Health Laboratories, Christchurch

For the past 10 years Canterbury Health Laboratories (CHL) has used X-Ray diffraction (XRD) to determine renal stone composition. We currently participate in the University College London Hospital Renal Calculi Assurance Scheme. The XRD demonstrates many practical advantages over chemical analysis including greater efficiency, with more information provided, at a lower cost.

Preanalytical variables at haemostasis

Dr Emmanuel J Favaloro, Westmead Hospital, Sydney

Preanalytical variables represent an often under-recognised problem within laboratory testing, although they can lead to significant and inappropriate, incorrect or misleading test results; these will compromise patient care and management. In particular, the appropriate collection and preparation of suitable specimens

for testing comprises a clear and common preanalytical variable, although in fact this is just one of a long list of possible variables. Moreover, how the blood sample is processed will also influence test results (eg, time and speed of centrifugation, use of braking or not, and whether refrigeration is used). For plasma based testing, plasma preparation and storage conditions become important. For the latter, length of storage, and temperature of freezing are two of the more commonly recognized factors. For the former, some tests have special additional considerations. For example, some tests are influenced by even small contamination with platelets (eg lupus anticoagulant [LA] testing).

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Investigation of mild bleeding disorders

Dr Emmanuel J Favaloro, Westmead Hospital, Sydney

In the normal, healthy population, excessive bleeding is rare except in situations of clear haemostatic challenge (eg trauma or high-risk surgery). In stark contrast, the classic, severe bleeding disorders are characterised by frequent and spontaneous bleeding, and markedly reduced levels of either a coagulation factor (eg factor VIII in haemophilia A) and/or other haemostasis factor (eg von Willebrand factor in von Willebrand disease) and/or a component of platelet function. Severe inherited disorders are life-long and usually show a clear family history. Severe acquired disorders are usually of recent onset and associated with an underlying disease or drug therapy. Mild bleeding disorders may be considered to lie somewhere in between the wide spectrum of the normal group and severe disease.

Tissue typing profile

Jonathan Downing, New Zealand Blood Service, Auckland

Tissue typing is the testing of histocompatibility molecules and their involvement in transplantation and disease. Typing of the Human Leucocyte Antigen (HLA) system is essential in determining compatibility between potential recipients and donors during life saving stem cell and solid organ transplantation. HLA molecules, occurring on most nucleated cells, are integral in determining self and non-self during the process of immune monitoring, and trigger a number of processes on the detection foreign antigen.

High resolution HLA typing is required for stem cell transplantation. Precise matching of class I and II HLA at the DNA or allele level leads to far superior patient survival for several haematological disease conditions.

Matching at the HLA antigen level improves the longevity of kidney, heart and lung transplantation. In addition, crossmatching between potential transplant recipients and their donors is essential to identify donor specific HLA antibodies that can cause immediate organ rejection. The accurate elucidation of the presence of these HLA antibodies is required in order to assess risk of transplant rejection.

HLA antibodies are responsible for a number of cases of platelet transfusion refractoriness. The elucidation of these antibodies is crucial in the ability to provide HLA compatible platelet transfusions in the ongoing transfusion support of these patients. HLA molecules are associated with a number of diseases such as ankylosing spondylitis and coeliac disease. Determining the presence of the associated HLA molecules aids the diagnosis of these diseases.

Dr Who, Charles Darwin and the Lableks

Ross Hewett, Laboratory Manager, LabPLUS, Auckland City Hospital

The metamorphosis of the 1950's Medical Laboratory Bacteriologist, the "right hand man" of the Pathologist into the current modern Medical Laboratory Scientist of 2008 has been one of evolution shaped by the ever changing laboratory environment and individual aspirations. It's unlikely the future will be driven any differently, however its doubtful if this process will evolve into medical laboratory's stocked full of PhD's or clinical associates.

The future role of the Medical Laboratory Scientist will be one based on diversity and agility. It will be the survival of the fittest, a tailor made solution to fit the particular work space, speciality and laboratory type.

But are we still caught in a time warp and need a Tardis to get us out of the QTA, technologist and scientific officer's mind set? These roles, developed in labs during the 1960's and 70's, are an anachronism. Unfortunately, I believe they still exist within the culture and structure of the profession, reinforced by collective agreements and a barrier to progress.

The new genetics now includes epigenetics: whole genome genetic and epigenetic analysis in the future diagnostic laboratory

Dr Ian Morison, Southern Community Laboratories, Dunedin

Whole genome sequencing can now be performed with ease in specialised research laboratories, but it is only a matter of time before it becomes accessible for diagnostic studies. In addition to the genetic influence on disease, a further layer of modification, called epigenetic modification, can inappropriately silence or activate genes, causing cancer, developmental disorders and possibly adult disease. Epigenetics, especially DNA methylation will be introduced. The potential of DNA methylation to modify the genome in response to the developmental environmental has been demonstrated in mice, and is now an emerging frontier of human pathology. High throughput sequencing can now be used to assess DNA methylation, paving the way to a new era of discovery for human disease.

A rapid assay of ADAMTS-13 activity and its utility in patients with Thrombotic Thrombocytopenic Purpura

Anna Denholm, Canterbury Health Laboratories, Christchurch

Thrombotic thrombocytopenic purpura (TTP) is a disease presenting with microangiopathic haemolytic anaemia and thrombocytopenia, with variable combinations of neurological involvement, renal impairment and fever. TTP can be congenital but is most commonly acquired due to formation of antibodies to the metalloproteinase ADAMTS-13 (previously known as VWF-cleaving protease). The resulting deficiency leads to formation of unusually large multimers of von Willebrand Factor. These can spontaneously induce platelet aggregation and formation of microthrombi. Severe ADAMTS-13 deficiency has been suggested as a diagnostic marker of TTP.

In the past, assays of ADAMTS-13 activity have been very time consuming and labour intensive however a rapid fluorescent assay method (FRETS-VWF73) has been developed which enables rapid quantitative measurement of ADAMTS-13, with absence of ADAMTS-13 activity reported to be 89% sensitive and 100% specific for TTP.

Effectiveness of home monitoring of diabetes in Fiji

Brijesh Kumar, Fiji School of Medicine, Suva, Fiji

Recognition of the importance of glycemic control in diabetic patients has generated interest in developing effective and cost-effective strategies to improve such control. Most strategies to improve glycemic control include patient education and active involvement of the patient in self-care activities, which mostly involves home monitoring of diabetes. This study attempted to determine the effectiveness of home monitoring of diabetes in maintaining good glycemic control in Fiji. HbAlc levels were measured in diabetic patients to determine the level of glycemic control. The influence of home monitoring compared to non-home monitoring in maintaining good glycemic control was determined. In addition the onset of diabetic complications in both groups was identified.

It was established that patients with good glycemic controls were less than 10% more likely to be using home monitoring. There was no statistical difference between the two groups observed. Despite home monitoring not being effective, some patients found that it enabled them to understand and take control of their diabetes. Interviews with the 100 patients revealed that many diabetic patients were performing inaccurate tests. The interviews further indicated the need for better diabetes education. No significant evidence that home monitoring improves glycemic control in Fiji was found. Therefore, it can be suggested that it may be appropriate for some patients to solely rely on regular laboratory estimations of HbAlc. Home monitoring of diabetes should be performed when it serves an identified purpose, which should be achievable through better diabetes education in Fiji.

Under-recognised Vitamin D deficiency: cases from rehabilitation

Beryl Dawson, Balmain Hospital, Sydney

Purpose: Low serum levels of vitamin D are often seen in hospitalized older people, especially those housebound or in residential care, and dark skinned women (particularly if veiled). It is generally assumed, however, that younger people are less likely to be Vitamin D deficient.

Method: We report two cases of unrecognised severe vitamin D deficiency in two middle-aged men presenting for rehabilitation.

Results: A 41-year-old morbidly obese man with a history of diabetes was admitted following a comminuted distal femoral fracture. Despite a vitamin D level of 11 nmol/l (severe deficiency <12.5 nmol/l) with elevated PTH, replacement therapy post fracture repair was not commenced. Four months later, depressed and weighing >200kg, he was admitted for 8 weeks nonweight bearing rehabilitation, found to be hypoalbumaemic (albumin 20g/l; RR 40-50) and vitamin D was <10nmol/l.

The second case, a 56-year-old man with a history of progressive leg weakness, long term sodium valproate usage (a known VitD antagonist) and previous humeral fracture, was admitted with a necrotic foot requiring an emergency through-knee amputation. Albumin was 30g/l and pre-albumin 0.13g/l (RR 0.17-0.35). Vitamin D status was initially reported as 12nmol/l, increasing rapidly on replacement therapy.

Conclusion: Vitamin D status is rarely assessed in younger (at risk) people. Levels should be part of a detailed assessment in younger people with a history of fractures, especially those obese but poorly nourished individuals with reduced mobility or those on anti-convulsant medication.

Evaluation of the Nova Biomedical Statstrip glucose meter

Barbara Mohn, Middlemore Hospital, Auckland

We evaluated the Nova Statstrip glucose meter for precision, accuracy and interferences from haematocrit and maltose. The Nova Statstrip was also compared with three other meters and two reference methods.

Heparinised whole blood samples were analysed on the meters. These results were compared with whole blood samples analysed on the Radiometer ABL835 for the interference studies. Plasma samples, obtained from these whole blood samples, were measured on the Abbott CI8200 for accuracy studies.

Glucose meters used:
- Nova Biomedical Statstrip
- Arkray Glucocard
- Roche Accu-Chek Advantage
- Abbott Precision PCx

Reference methods used:
- Abbott CI8200
- Radiometer ABL835

Results:
There were significant differences in the degree to which the meters correlated with the reference method. With the exception of the Nova Statstrip, all meters were affected by variable haematocrit. Of the two glucose meters tested, the Nova Statstrip did not show any maltose interference.

Conclusion:
The Nova Statstrip glucose meter did not show clinically significant interference from maltose or varying haematocrit levels. In addition, the Nova Statstrip demonstrated the best correlation with the reference glucose method.

Detection of Vancomycin resistant Entercocci isolated in Western Australia using the BD GeneOhm VanR assay

Carmen Ho, Canterbury Health Laboratories, Christchurch

Vancomycin-resistant enterococci (VRE) are recognised as a growing nosocomial pathogen worldwide. The need for rapid screening procedures has become an important factor in the hospital setting and infection control methods. We evaluated the performance of the VanR Assay, a rapid real-time polymerase chain reaction test, which detects the presence of vanA and/or vanB genes for probable VRE against a panel of clinical strains of vanA and vanB positive Enterococcus species isolated in Western Australia (WA). The VanR Assay was evaluated against a panel of 70 vanA and 148

vanB isolates that had previously undergone characterisation by species confirmation, phenotypic susceptibility testing, van gene and molecular strain testing at the WA Gram-positive Bacteria Typing and Research Unit. A 0.5 McFarland suspension of each strain was prepared and processed according to the manufacturer's guidelines. 97.1% of vanA isolates were correctly detected as possessing the vanA resistance gene, and 98.0% of vanB isolates were correctly detected as possessing the vanB resistance gene. The VanR Assay reliably detected vanA and vanB genes in multiple genetic lineages of VRE. Although turnaround time is considerably shorter, approximately 1.5 hours compared to up to 72 hours that culturing methods may take; the assay does not perform species identification. However, as a screening tool, the VanR Assay is fast and effective.

Overcoming the inaccuracy in the measurement of sweat electrolytes - a salty solution to small samples

Melissa Ioane, Southern Community Laboratories, Dunedin

SCLOS use the ion selective electrode method on the Roche Modular to measure electrolytes. Small sweat samples, obtained for the diagnosis of cystic fibrosis, require dilution in order to have sufficient sample to run on the modular. When diluted in water, the electrolyte concentration can fall below analyser sensitivity, resulting in inaccurate results, hence potential false positive or false negative outcomes.

Patient samples were pooled and 1/2, 1/3 and 1/4 dilutions were made with water and with saline of known electrolyte concentration. Sweat electrolytes were then calculated and the sweat diluted in saline consistently gave more accurate results over the different dilutions than those made in water. By diluting samples in saline, the analyser is measuring within the range dictated by the manufacturer and there can be every confidence that the results obtained will give a true picture of a patient's cystic fibrosis status.

From HE to IHC

Hongmei Mao, Diagnostic Medlab, Auckland

Purpose: Immunohistochemistry (IHC) is a method for localizing specific antigens in tissues or cells based on antigen-antibody recognition, which can be exploited at a light microscopic level. The recent introduction of IHC into diagnostic pathology has made a tremendous impact on patient treatment and management. Sometimes we have to take the challenge to apply IHC on stained HE slides when no more unstained section is available.

Method: Take off the coverslip, bring the slide to water, and perform IHC on Bond machine from antigen retrieval stage.

Results: Successful IHC stain.

Conclusion: We have performed this technique on several different circumstances, which provide proper classification of tissue for pathologists.

Specificity of IsdB expression in Staphylococcus aureus biofilms

Amy Ou Yang, North Shore Hospital, Auckland

Staphylococcus aureus is an important opportunistic human pathogen that causes a broad spectrum of infections ranging from superficial abscesses to life-threatening diseases like endocarditis and toxic shock syndrome. Staphylococcus aureus biofilms forming upon vascular cannulae are an important cause of common hospital acquired infections and often have serious consequences. Staphylococcus aureus is associated with 9% mortality in adult patients with intravascular cannula-associated S. aureus bacteraemia. The consequences of S. aureus infections are serious, associated with high morbidity and mortality, prolonged antibiotic treatment, longer hospital stay, and increased cost per patient to the hospital.

Various biofilm studies have used laboratory-adapted strains grown on nutrient rich laboratory media. Cell wall proteins contain adhesion and virulence factors that are expressed differently in biofilm and planktonic cells. Such studies lead us to hypothesise that pathogenic S. aureus would have distinct protein profiles for biofilm and planktonic cells, but within this variation a common set of essential biofilm determinants would be present.

Clinical isolates were grown as static biofilms in plastic Petri dishes and as planktonic shaken cultures. Lysostaphin was used to release cell wall proteins and comparison was made between biofilm and planktonic cultures of each strain grown in RPMI and RPMI with Iron supplementation. 92% of cultures demonstrated biofilm specific expression of a 70 kDa protein. The proteins from three clinical isolates (BC03, BC06, and BC02) were excised from a 1D SDS-PAGE stained with collided coomassie blue stain and identified successfully by MS of Trypsin digested fragments as Iron-regulated surface determinant protein B precursor (ISDB). This suggests further investigation of the clinical strains for the distribution of iron acquisition mechanisms.

Editor's note: Any abstract containing the phrase ìResults will be presentedî or ìResults will be discussedî have been omitted or have had that phrase removed. Only abstracts that are informative to the reader have been included.

Answers for the Haematology Special Interest Group journal article questionnaire

1. a) α globin – chromosome 16 on 'p' arm.
   b) β globin - chromosome 11 on 'p' arm
2. i) Technical issues or failure to detect the mutation on the sequence trace.
   ii) Mutations outside the α and β globin gene loci.
   iii) Large deletions of one allele or deletions/point mutations affecting primer binding sites can interfere with DNA amplification by PCR.
3. i) Low MCV and MCH.
   ii) Partner has a haemoglobinopathy.
   iii) Ethnic background involves risk.
4. i) equivocal haemoglobinopathy screen
   ii) Relevant ethnic group, identifying mild α thal when partner is a carrier α^0 or non deletional form of α thal and consequently offspring could be at risk of Hb H disease.
   iii) Mutation detection to confirm haemoglobinopathy.
   iv) Prenatal testing.
5. Black African
   Mediterranean
   Middle Eastern
   Indian
   Pakistani
   South American
   Caribbean
6. A subgroup of β thal in which carriers (heterozygotes) have normal levels of Hb A_2, some have thalassaemic red cell indices, some have normal red cell indices.
7. Thyrotoxicosis
   Megaloblastosis
   Unstable haemoglobin
8. Iron deficiency.
9. Pregnancy
   Deletional and non deletional HPFH
   δβ Thalassaemia
10. HPFH causes no clinical problems even when co-inherited with β thal or β globin variants.
    HPFH has a normal MCV and MCH and the Hb F is generally higher.
11. The combination of non-deletional and deletional globin defects is more severe.
12. -α/αα (there was a misprint in the article here) - 20-25% HbE
    --/αα 17-20% Hb E.
13. α thal reduces severity
    β^+/Hb E reduces severity
    The ability to make Hb F. Increased amounts of Hb F reduces severity.
14. α:β ration becomes more imbalanced.
15. With Hb S the Hb S1d band (the 'ageing' band) elutes from the HPLC column with Hb A_2.
16. Differential affinities of α globin chains for non α globin chains. In α thal with limited α globin chains, there is a greater affinity between α and δ compared with β^s chains. This produces an elevated Hb A_2.

Reviewers for 2008

The Editors would like to thank the individuals listed below for refereeing submitted articles to the Journal during 2008. All submitted articles undergo peer review in order that the Journal maintains its high standard since 1948. Additionally, thoughtful comments and suggestions made by referees help authors in ensuring that their paper, if accepted, is put in front of the reader in the best possible light.

Not all papers submitted to the Journal are accepted for publication. In the last five years about 20% have been rejected as being either scientifically unsound, not novel enough, not applicable to the broad subject of medical laboratory science, or have previously been published in full in other journals (duplicate publication definitely not allowed!).

The Editors are not, and cannot be experts in the many different disciplines of medical laboratory science and thus rely on quality peer review by referees. The following have generously and professionally given their time and experience in peer reviewing articles submitted to the Journal during 2008 (some more than once).

Chris Bowden, Christchurch
Mike Legge, Dunedin
Kevin Taylor, Christchurch
Harold Neil, Christchurch
Chris Kendrick, Palmerston North
Robin Allen, Hamilton

Rob Siebers, FNZIMLS, Editor
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