ONE-TO-ONE

THE HIV EPIDEMIC

Linda-Gail Bekker explains the dangers of complacency: *p.16*

SHOT REPORT

TRANSFUSION ERRORS

Report from the Serious Hazards of Transfusion scheme: *p.22*

THE BIG STORY

PARADISE LOST

The West has left its indelible mark on Polynesia: *p.28*

THE BIOMEDICAL SCIENTIST

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SEPTEMBER 2018

SNIFFING OUT CANCER

How canines could have an important role in discovering disease

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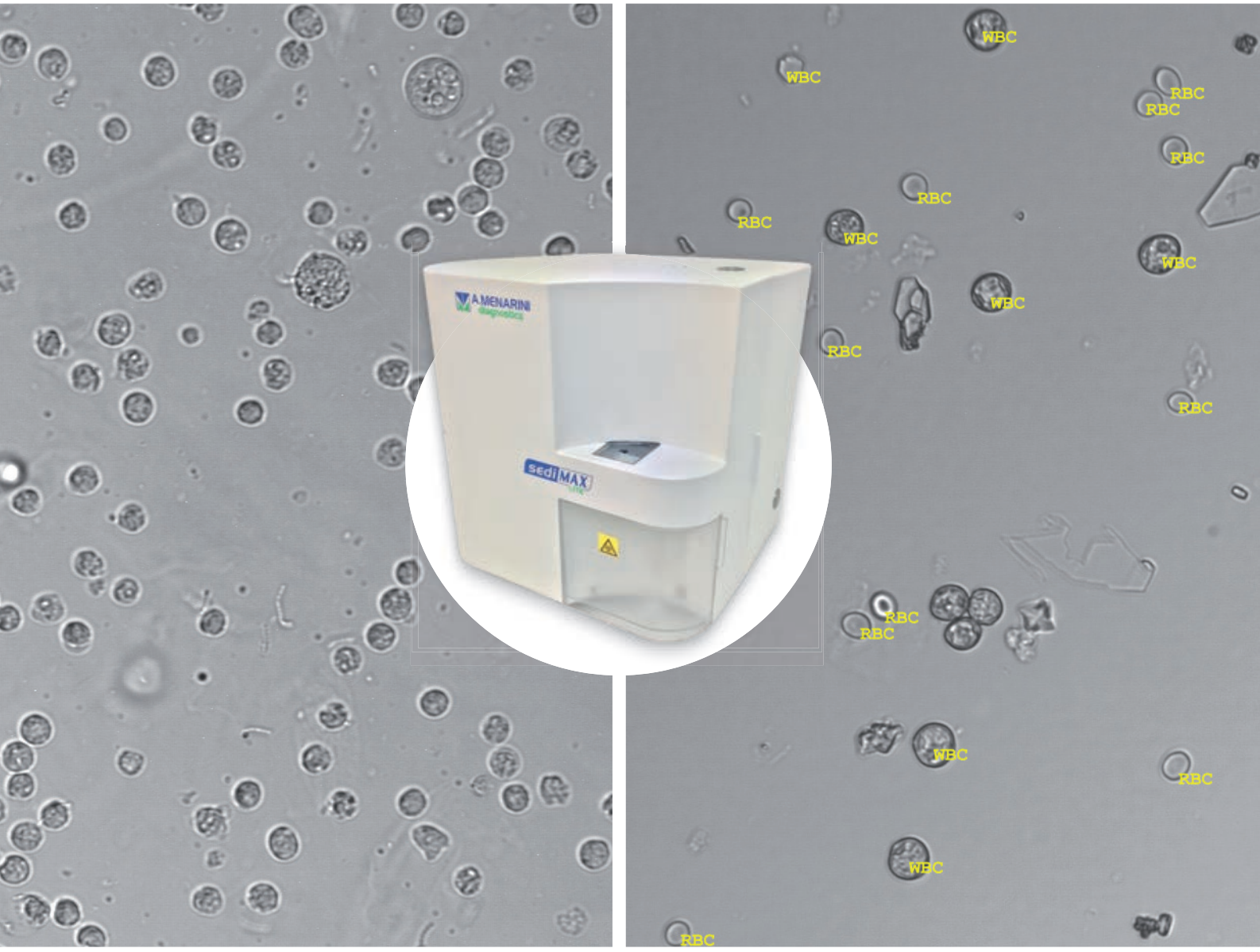

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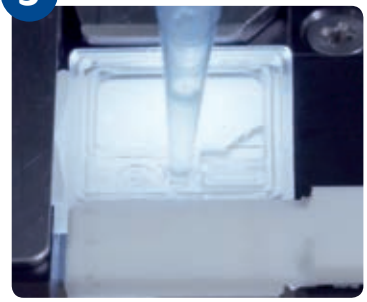

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TECHNOLOGICAL REVOLUTION

How do we get from the low-tech present, to the high-tech future, with an already stretched workforce?

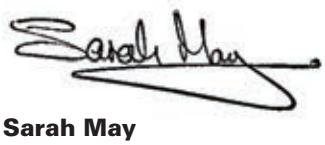
Considerable activity has been happening in the various agencies that fall within the Department of Health and Social Care in England and I am confident that similar thought processes are being followed in Scotland, Northern Ireland and Wales. The object of this activity: workforce.

Workforce is the biggest, most costly and valuable resource in the UK health services, so it is no wonder that the oft-quoted management aspiration is "the right number, in the right place, at the right time". Another requirement has now been added to that mantra: "knowing the right things".

Health Education England is currently undertaking a major consultation (the Topol Review) on how best to prepare the workforce to integrate digital technologies into their daily practice. I have a mix of conflicting thoughts when I consider this issue, similar to the feelings I have about the impact of genomic technologies. It is about how we get to the envisaged high-tech future from where we are at this relatively low-tech present when we have a service that is already stretched to its limits.

I know that our professional practice is constantly evolving and the roles many of us now have, and the knowledge we use, is vastly different from where many of us started our careers; however, I feel that the osmotic assimilation of new knowledge will be too piecemeal and inadequate to deal with the challenges of the technological revolution that is heading our way. This matter is also causing a headache for those that plan and commission services, hence the Topol Review. The key questions that are being asked are: "What needs to be retained? What new things are needed? What needs to be updated, or could be done by someone else?" Herein lies the root of my concerns; technology has the potential to revolutionise healthcare, but the vast bureaucratic machine that is our health service, with its convoluted financial models and ever-tightened budgets, means that a smooth, co-ordinated technology transition is somewhat unlikely. Much can be achieved with sufficient money, but while we continue to struggle with budget cuts and basic issues of IT compatibility I am at a loss to see how the envisaged upskilling of the world's fourth largest workforce is going to be achieved.

Recent headlines concerning the Defence Medical Services' IT problems do nothing to reassure me. At the BMA's conference in June, delegates heard that one member had described the IT system as "the biggest threat to patient safety that I have encountered in my 20-year career". Unfortunately, I think we have a way to go before high-tech and healthcare are natural bedfellows.



Sarah May
Deputy Chief Executive

IBMS

Institute of Biomedical Science is the professional body for the biomedical science profession.

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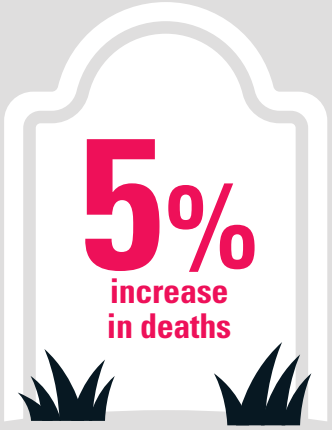
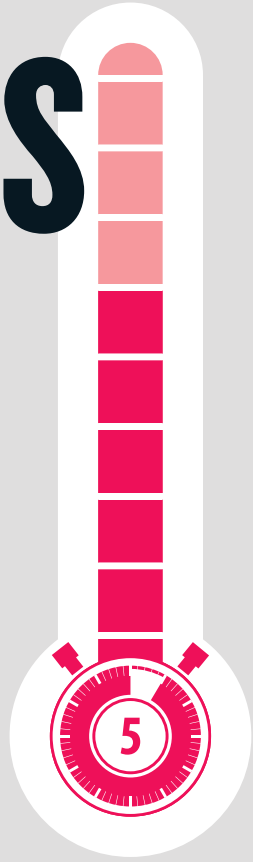
SCIENCE NEWS IN NUMBERS



5% increase in deaths
The Office for National Statistics data for England shows a "statistically significant increase" in the death rate in the first quarter of 2018 – the highest for that period since 2009.

1,187

There were **1,187 deaths per 100,000 of population** in England between January and March, **up 5%** on the same months in 2017.

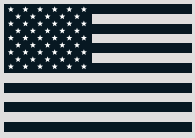


Scientists have stated that just 5 minutes in high temperatures is as good for the body as physical exercise, such as a brisk walk.

70

Researchers reviewed 70 studies on the health outcomes of **Finnish sauna baths** to establish the **health benefits**.

OPIOIDS



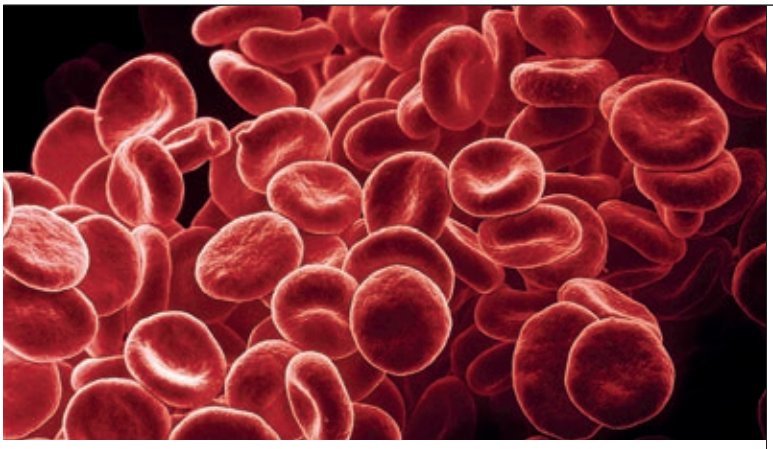
US: In 2016, 11.5 million people misused prescription opioids.
There were **42,249 deaths from overdoses**.

England: GPs prescribed 23.8 million opioid-based painkillers in 2017.
There were **more than 2,000 opioid-related deaths**, but these were largely related to **heroin**, rather than **prescription opioids**.

"Middle-aged drinking may reduce dementia risk"
Those who are teetotal in middle age are around 50% more likely to develop the degenerative condition, compared with those who drink moderately.
Researchers examined data of **9,087 British civil servants** who were **between the ages of 35 and 55** when the study began in the **mid-1980s**.

£10 million

The Department of Health and Social Care has announced a £10m research competition to fund innovations to tackle antimicrobial resistance (AMR) in humans.
The competition follows the **Global AMR Innovation Fund's announcement of £30m** for research and development projects.



SCIENCE NEWS

TRANSFUSIONS

Perioperative red blood cell transfusions

Perioperative red blood cell transfusions appeared associated with new or progressive venous thromboembolism (VTE) in the postoperative setting, according to study results.

Researchers used the American College of Surgery National Surgical Quality Improvement Program database to analyse outcomes from 750,937 patients who underwent surgical procedures in 2014 at 525 hospitals in North America.

Investigators calculated a postoperative VTE rate of 0.8%. This included 4,336 patients who developed deep vein thrombosis (DVT), 2,514 patients who developed pulmonary embolism (PE), and 541 patients who developed both.

Perioperative red blood cell transfusion appeared associated with increased risk of VTE, DVT and PE.

Compared with patients who underwent no transfusions, the VTE risk more than doubled for those who underwent one transfusion, tripled for two transfusions, and increased more than fourfold for those who underwent four transfusion events. The elevated VTE risk remained statistically significant across all surgical sub-specialties.

→ **bit.ly/BS_SepNews01**

GENOMICS

$32M FOR AI DRUGS DISCOVERY START-UP

A Silicon Valley AI and genomics start-up has netted $32m in its first round of funding.

Verge Genomics has been launched with the aim of using artificial intelligence to dramatically accelerate drug discovery.

The bulk of Verge Genomics' research concerns Alzheimer's, Parkinson's, amyotrophic lateral sclerosis, and other neurodegenerative diseases.

It is using machine-learning models trained on patient and lab data that identify genes within disease networks, predicting compounds that might impede their activity.

Researchers test the compounds in animal models and nerves grown from stem cells and use the results to further refine the models.

At least 18 pharmaceutical companies and more than 75 other start-ups are estimated to also be working on integrating machine learning into the drug discovery process.

DRUG DELIVERY

HOW WELL DO CANCER DRUGS HIT THEIR TARGETS?

Scientists have developed a technique that allows them to measure how well cancer drugs reach their targets in the body.

It shows individual cancer cells in a tumour in real time, revealing which cells interact with the drug and which cells the drug fails to reach.

The findings could potentially help clinicians decide the best course and delivery of treatment for cancer patients.

Researchers at the Francis Crick Institute and Imperial College London developed the means to measure and visualise drug-target engagement of individual cells within a tumour, using a miniature fluorescent microscope.

Using their technique, they mapped out how the chemotherapy drug doxorubicin targeted ovarian cancer cells in living mice.

They found significant variation in drug-target engagement between cells within a single tumour, and between different tumours.

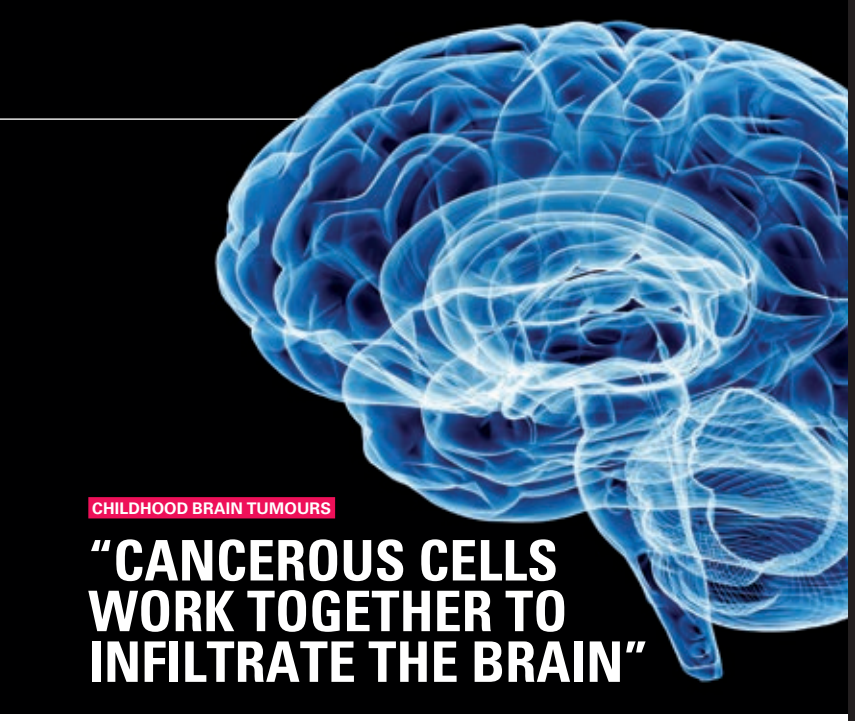
They also found that drug-target engagement was better when doxorubicin was administered via abdominal injection rather than intravenously – the currently preferred method for doctors treating patients in many clinics.

Erik Sahai, senior author, said: "Our findings show that in a mouse model with delivery of doxorubicin through the blood, it does not reach all its target cells in the body, which could help explain why this chemotherapy drug is only partially effective in some cancer patients.

"In contrast, delivering the drug directly into the abdomen adjacent to ovarian tumours improved its target engagement, but this was still not sufficient to kill the cancer cells."

→ **bit.ly/BS_SeptNews02**

IMAGES: ISTOCK/SHUTTERSTOCK



CHILDHOOD BRAIN TUMOURS

"CANCEROUS CELLS WORK TOGETHER TO INFILTRATE THE BRAIN"

Scientists have discovered that cancerous cells in an aggressive type of childhood brain tumour work together to infiltrate the brain.

The researchers investigated a type of childhood brain tumour called diffuse intrinsic pontine glioma (DIPG).

They analysed its ability to leave the brain stem and send cancer cells to invade the rest of the brain.

DIPG is incredibly difficult to treat and nearly all children with this type of cancer die within two years.

The researchers used donations of biopsy tissue and the brains of children who had died as a consequence of DIPG.

They found that DIPGs are heterogenous, which enables the cells to "work" together to leave the original tumour and travel into the brain. The scientists say this shows a multi-pronged attack is likely to be necessary for treatment.

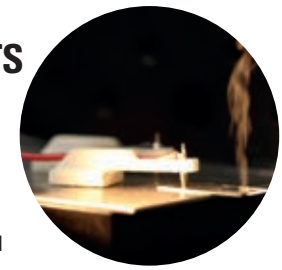
Professor Chris Jones, who led the study, said: "This is the first time we've observed this sort of interaction between different tumour cells in DIPG.

"The idea that the cells are working together to make the disease grow and become aggressive is new and surprising."

→ **bit.ly/BA_SeptNews03**

BIOTECHNOLOGY

ATOMISING DISINFECTANTS FOR HOSPITALS



A team of engineers and physicians has developed a device that diffuses potent disinfectants for airborne delivery.

The device works on a range of disinfectants that have never been atomised before, such as Triethylene glycol (TEG).

In a new study, the device was used to atomise disinfectants onto environmental surfaces contaminated with bacteria and it effectively eliminated 100% of bacteria that commonly cause hospital-acquired infections.

In addition, atomised bleach solution, ethanol and TEG completely eliminated highly multi-drug resistant strains of bacteria, including *K. pneumoniae*.

The device was built using off-the-shelf smartphone components.

→ **bit.ly/BA_SeptNews04**

WHAT'S HOT AND WHAT'S NOT

HOT

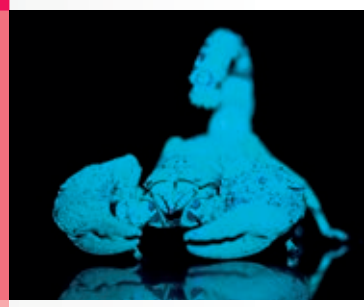
MARIT MOHN

Imperial College is setting up a child health research centre after philanthropist Marit Mohn, who graduated in 1973, gave the college a gift of £25m.

HOT

BLUE SCORPIONS

An R&D programme is underway using venom from blue scorpions in a bid to create preventative therapies that can have an impact against aggressive cancers.



HOT

GLASTONBURY FESTIVAL

Festival founder Michael Eavis is to give away up to 500 tickets to local trainee nurses, to encourage more people into the profession.

NOT

CONDOMS

Durex has recalled 10 batches of non-latex Real Feel and Latex Free condoms sold in the UK and Ireland over fears they could split.

NOT

SMEAR TESTS

Patients claim lives are being put "at risk" after it emerged some women are waiting six times longer than the two-week target to get their smear test results.

NOT

STOCKTON-ON-TEES

Men living in some areas in Stockton have a life expectancy of just 64 years old, while other areas it is 84 years old.

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GENETIC SIGNATURES

Predicting HIV transmission

Computer simulations can accurately predict the transmission of HIV across populations, say US scientist.

Genetic signatures mean it is possible to trace the origin of an infection and its potential path through populations, allowing state health departments to track the disease, it is claimed.

The simulations were consistent with actual DNA data obtained from a global public HIV database, developed and maintained by Los Alamos National Laboratory in the US.

The archive has more than 840,000 published HIV sequences for scientific research in total.

Thomas Leitner, a Computational Biologist at Los Alamos, said: "We looked for special genetic patterns that we had seen in the simulations, and we can confirm that these patterns also hold for real data covering the entire epidemic."

The robust results from the study have led to a collaboration with Colorado and Michigan state health agencies.

The researchers plan to develop public health computational tools to help agencies to track the disease and allocate resources for targeted prevention campaigns.

→ **bit.ly/BS_SeptNews05**

840,000

THE **ARCHIVE** HAS MORE THAN **840,000 PUBLISHED HIV SEQUENCES** FOR SCIENTIFIC RESEARCH

BIOMEDICAL ENGINEERING

MAGNETS ISOLATE CIRCULATING TUMOUR CELLS

Scientists claim that magnets could be used in the body to detect tumour cells that other diagnostic techniques might miss.

Researchers from Stanford University have created a magnetic wire that could be inserted into a person's vein, where it could capture tumour cells that have been magnetised by special nanoparticles.

Current methods for isolating circulating tumour cells or nucleic acids present in a standard clinical sample of only 5-10ml of blood provide inadequate yields for early detection and comprehensive molecular profiling.

However, the researchers claim their flexible magnetic wire can retrieve rare biomarkers from the subject's blood *in vivo* at a much higher yield.

The wire is inserted and removed through a standard intravenous catheter and captures biomarkers that have been previously labelled with injected magnetic particles.

In a proof-of-concept experiment in a live porcine model, the team demonstrated that the wire attracts up to 80 times more tumour cells than current blood-based cancer-detection methods.

The technique can also be used for other diseases in which there are cells or molecules of interest in the blood.

→ **bit.ly/BS_SeptNews06**

UNDER THE MICROSCOPE

This month: alkaptonuria

What is alkaptonuria?
Also known as "black urine disease", alkaptonuria is a very rare inherited disorder that prevents the body fully breaking down the amino acids tyrosine and phenylalanine.

What are the implications?
It results in a build-up of a chemical called homogentisic acid in the body. This can turn urine (and parts of the body) a dark colour and lead to a range of problems over time.

What kind of problems?
Severe damage to the spine and joints, leading to repeat joint surgeries. Also, kidney, prostate and gall bladder stones, and heart valve damage.

What are the treatments?
There haven't been any... until now.

What's happened?
An observational study has shown that a drug called nitisinone stops the progress of alkaptonuria.

What did that involve?
A total of 39 people with alkaptonuria were given 2mg of nitisinone each day for three years.

The results show that the drug stops the disease, by decreasing homogentisic acid. The therapy not only arrested but also partially reversed ochronosis.

What are the health benefits?
Patients who took nitisinone showed major health benefits. Osteoarthritis in the spine, knees and elbows was much less severe and the risk of heart disease was reduced.

IMAGES: ISTOCK/SCIENCE PHOTO LIBRARY

TECH NEWS

BECKMAN COULTER LIFE SCIENCES

CLINICAL FLOW CYTOMETRY SOLUTIONS

Beckman Coulter Life Sciences continues to expand its portfolio of clinical flow cytometry solutions.

It does so with its latest innovations, ranging from portfolio extensions to its range of single-colour antibodies, high-quality IVD panels and customised solutions:

ClearLLab CaseBook 5C, a step-by-step illustrative resource for pattern recognition for leukemia and certain lymphomas.

Enhanced portfolio of single colour CE-IVD and analyte-specific reagents.

DURA Innovations dry reagent technology.

Expanded external resources – the LUCID custom design and cocktailing services.

→ **beckman.com**

MEDICAL WIRE AND EQUIPMENT

FROM SPECIMEN TO SAFE DNA/RNA IN A SINGLE STEP

MWE recently launched its revolutionary new product Sigma MM Molecular Medium, which renders pathogenic material safe within seconds by killing any bacteria and viruses, while preserving intact DNA and RNA ready for molecular analysis.

Sigma MM is a powerful reagent-based liquid medium, safe and stable for transport at ambient temperature. It is effective for bacteria, including mycobacteria, fungi, and viruses. Nucleases are inactivated. Analysis can be performed locally, but the specimen is also rendered safe for long distance national or international transportation.

Effective rapid killing has been demonstrated for bacteria, including *Mycobacterium tuberculosis*, *Escherichia coli*, and *Staphylococcus aureus*, and viruses including Influenza A and B.

→ **mwe.co.uk**

PROMEGA

SUSTAINABILITY AWARD WINNER

Life Sciences Company Promega UK has announced the winners of its first Helix Sustainability award.

Helix is an onsite radio frequency identification laboratory storage system used to support scientists with their biomedical research in fighting diseases such as cancer and Alzheimer's.

The top three institutions are: University of Edinburgh; University of Manchester; and University of Glasgow.

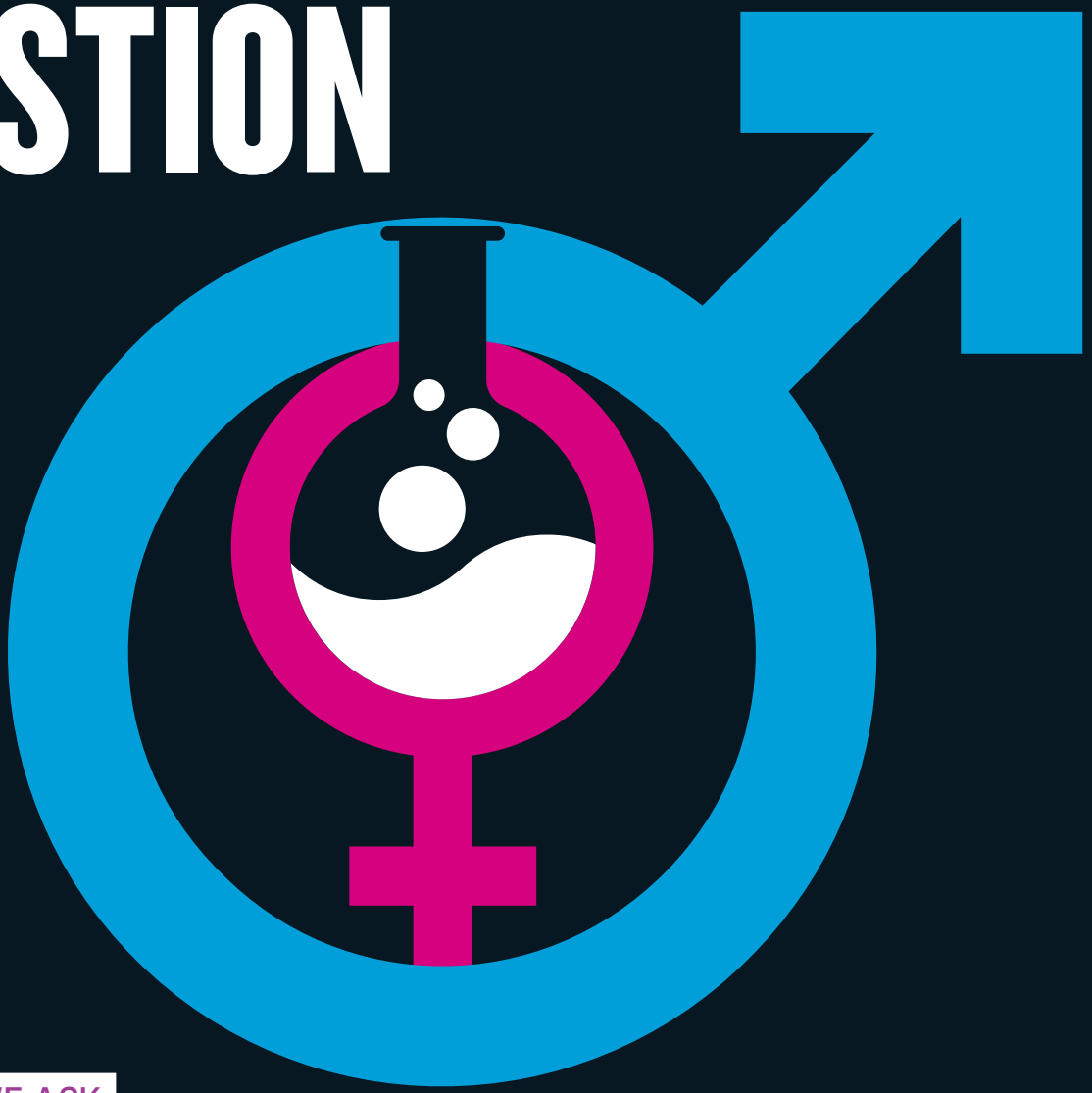
The aim of the awards was to recognise the organisations who had gained the most environmental benefit from having the Helix system.

Calculations were made after considering the number of individual shipments saved and associated packaging costs, including dry ice use.

By using Helix, the top three organisations saved a combined total of 1,000 shipments.

→ **promega.com**

THE BIG QUESTION



THIS MONTH WE ASK

"Is there gender equality in biomedical science laboratories?"

Joanne Motte

Advanced Practitioner in Histological Dissection
Gloucestershire Hospitals NHS Foundation Trust

Absolutely, I think that gender equality is well represented within biomedical science. Currently, this is a predominantly "female profession" – females represent 65% of biomedical scientists. My laboratory alone demonstrates this with a ratio of three females to every one male scientist.

With Agenda for Change, a drive towards flexible working hours and shared parental leave, more women are finding successful employment in laboratories. I believe it is a profession where career advancement is now based on experience and attaining further qualifications, rather than gender.

What must also be considered, however, are the historic setbacks relating to maternity leave and changing working patterns, with many women opting to return to work part-time in order to achieve a work-family balance. This may be reflected in the data showing that three-quarters of IBMS students, associates, licentiates and members are women, but the figure drops quite significantly to 56% at fellow level.

The global movement for gender equality has not incorporated the proposition of genders besides women and men, or gender identities outside of the gender binary. I would like to think our profession is open to all genders and gender designations. This is an exciting time and I am looking forward to seeing how we continue to equally shape our workforce and profession.

Colin Mudd

Higher Specialist Biomedical Scientist
Nottingham University Hospitals NHS Trust

My experience is yes. Of course, there are still areas for improvement and there will probably always be cases of discrimination whilst we have human beings in our laboratories. That, of course, is not to justify or understand it. Perhaps only artificial intelligence will eradicate it completely.

Nearly 42 years ago when I began my career, things were somewhat different. Attitudes thankfully have changed considerably since then. In the 70s and 80s, there were lots of women in working in laboratories but very few were in senior management positions.

I carry out many registration and specialist portfolio verifications around the country and the story today seems quite different. Anecdotally, I see as many women as men in senior managerial positions. My observation also is that women seem to dominate the role of Training Officer/Manager.

The diversity we find in biomedical scientists today is refreshing to see. Having been given over 150 lab tours during my visits to many hospitals, I see so many diverse people, and feel honoured to work in such an environment.

With gender fluidity and non-binary issues at the core of the gender debate these days I do wonder, however, how accepting we all actually are of such differences. Perhaps the answer lies in the hands of the younger generation of biomedical scientists, who tend to be more accepting, more questioning than perhaps those of us of an older generation.

Sheelagh Heugh

Head of Student Experience and Academic Outcomes, School of Human Sciences
London Metropolitan University

There is still a gender equality gap amongst the biomedical scientists. There are more women biomedical scientists, but there is a predominance of males in higher grades, and where women are in the higher grades, they are paid less than their counterparts. Historically, differences were attributed to the flexibility biomedical scientist work gave working mothers, but the change in lab shift patterns has resulted in more parity of hours worked. The number of women in science has increased, but there still remains a predominance of males in higher positions with higher pay packets, but the gap closes steadily.

FURTHER READING

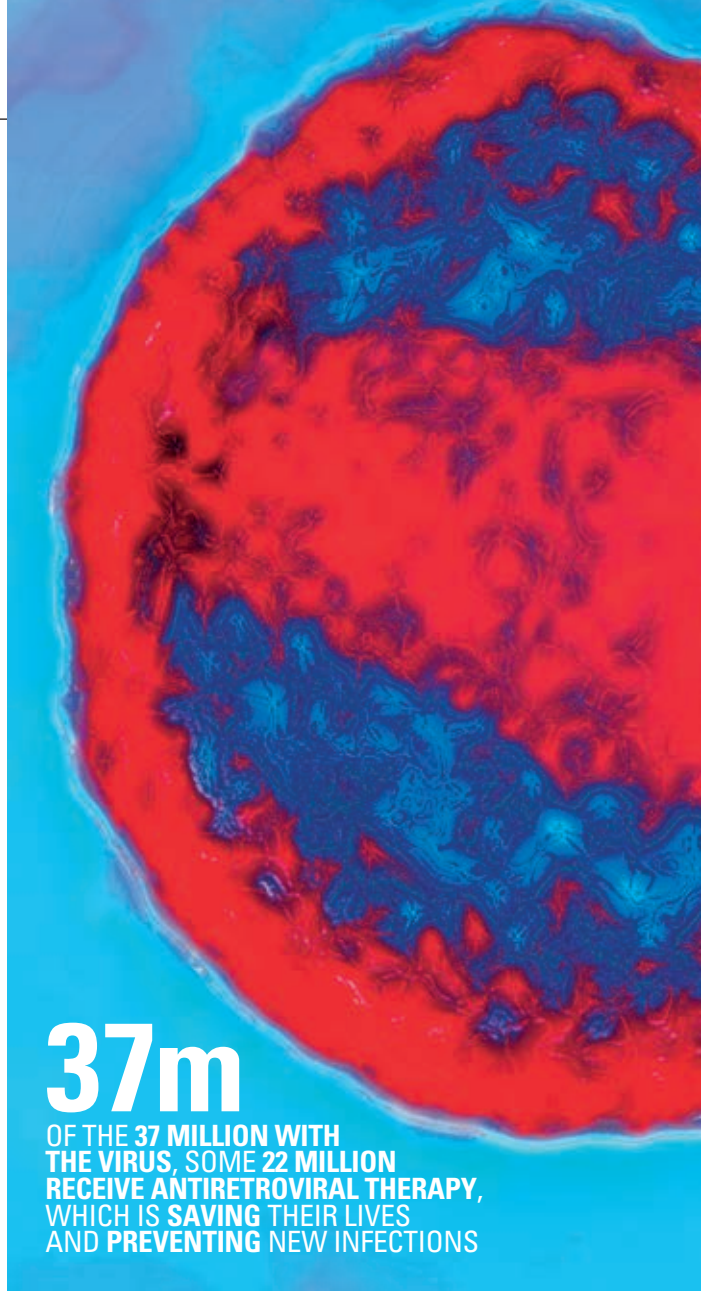
Knowing Her Place: Positioning Women in Science
By Bevan V, Gatrell C. (Cheltenham UK, 2017, Edward Elgar Publishing)

This highly topical book aims to investigate the barriers and influences confining women to "operational/lower level management". The main premise is a series of structured interviews between the authors, in particular Bevan, and volunteers from the healthcare setting who were known to the author. The interviews are detailed and provide a fascinating overview of the perceptions of male and female biomedical scientists and colleagues in the workplace and in the home environment.

Joyce Anne Overfield

RETURN OF THE AIDS EPIDEMIC?

Linda-Gail Bekker, President of the International Aids Society, fears there may be a resurgence of the HIV epidemic.



In October 1987, as fears of a global epidemic worsened, AIDS became the first illness to be debated in the chamber of the general assembly at the UN. While just over 71,000 cases had been reported that year, the disease was not well understood, nobody knew its true extent, nor how widespread it might get. A sense of dread underscored the debate.

Today, the AIDS epidemic is real and has been for many years. In 2017, almost one million people around the world died from AIDS-related illnesses, taking the overall number of deaths from the start of the epidemic to just over 35 million. Close to a further two million people contracted HIV last year, putting the number estimated to have the virus at almost 37 million.

If the figures look shocking today, they would have felt catastrophic 30 years ago. And yet the new regime of drugs, coupled with the wide access to treatment services around the world, mean that many people with HIV are now able to lead normal, healthy lives. Of the 37 million with the virus, some 22 million receive antiretroviral therapy, which is saving their lives and preventing new infections.

The targets

The global response to HIV/AIDS since 1987 has been well-funded and clear in purpose. Its success even gave the UN the confidence in 2016 to green-light an ambitious set of targets. With investment brought forward, HIV services would expand to such an extent that by 2020 they would be able to cut infections and AIDS-related deaths by 75%. The momentum of this would, in turn, end the AIDS epidemic as a public health threat by 2030 – defined as reducing the number of new infections and AIDS-related deaths by 90% against a 2010 benchmark.

Underpinning this is the 90-90-90 target. This says that by 2020, 90% of all people living with HIV will know they have the virus, 90% of those with a diagnosis will receive antiretroviral therapy, and 90% of those on antivirals will achieve viral suppression.

While it looked feasible in 2016, the plan has since hit a snag. A new report, published in *The Lancet*, argues that the global response to HIV/AIDS is at risk from "dangerous complacency" and faces a "moment of uncertainty," which could undo the progress made and trigger a resurgence of the epidemic.

Threat remains

One of the authors is Dr Linda-Gail Bekker, President of the International Aids Society and Professor at the University of Cape Town in South Africa. She believes the complacency, in part, comes from premature triumphalism. "We as a community declared victory. If you go to Europe or cities where AIDS was prominent, such as San Francisco, we

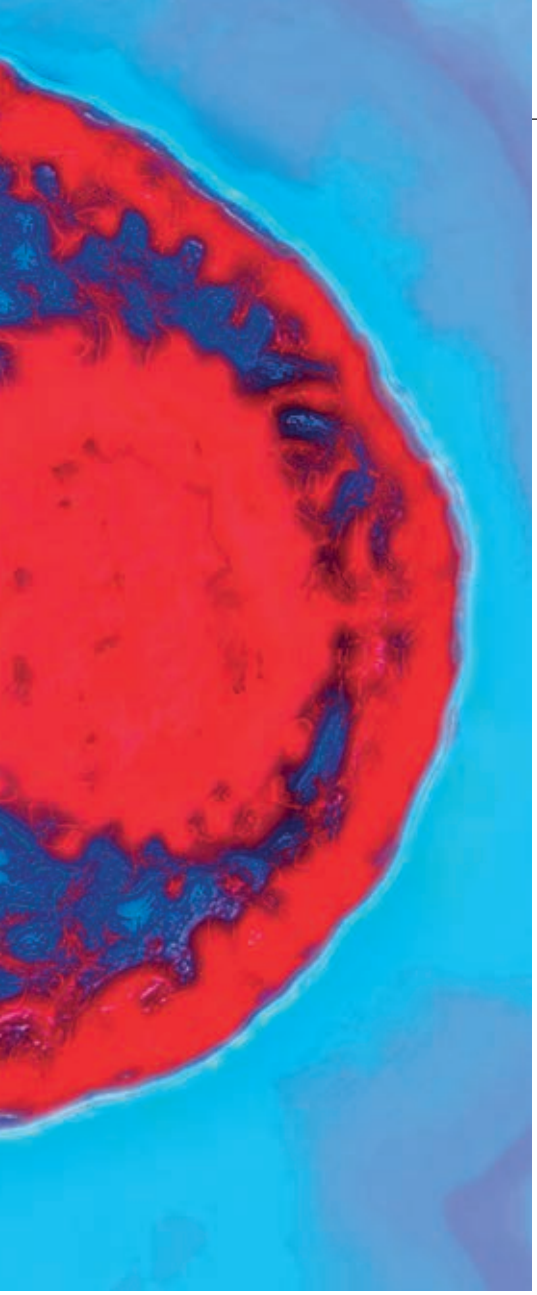


IMAGE: SCIENCE PHOTO LIBRARY

90-90-90

THE 90-90-90 TARGET SAYS THAT BY 2020, **90%** OF ALL PEOPLE LIVING WITH HIV WILL **KNOW THEY HAVE THE VIRUS**, **90%** OF THOSE WITH A DIAGNOSIS WILL **RECEIVE ANTIRETROVIRAL THERAPY**, AND **90%** OF THOSE ON ANTIVIRALS WILL **ACHIEVE VIRAL SUPPRESSION**.

have seen a downturn in the incidence. So it's not unreasonable that policy-makers might see that and say, well, now we can move onto something else."

The problem with this is that the AIDS epidemic is not homogeneous. "It may be under control in a few cities," says Bekker, "but in certain countries we are seeing rises in the incidence. In one whole region, central Asia and eastern Europe, we have seen an enormous upsurge. And in large parts of Africa, they don't have anything near epidemic control. In these high-burdened areas, this is not the time to disengage."

While the threat remains, the funding is not keeping pace. In recent years, the worldwide investment in HIV response has stuck at about $19·1bn, says the report, which is around $7bn short of the sum needed to hit the 90-90-90 targets.

Shifting political landscapes are also having an effect: "In many countries the space for civil society is declining and the human rights environment deteriorating," says the report. "Official development assistance for health has stalled, as an inward-looking nationalism has in many places supplanted recognition of the need for global collaboration to address shared challenges."

Modelling scenarios

All this puts the UN targets in doubt, says Bekker: "We have tried shining a spotlight on policy and political leadership, but unless we see nothing short of a miracle and a great deal of funding, I think we are going to have to recalibrate on some of those goals."

The report also argues that the HIV response needs to stop standing apart from other heath campaigns. "From the earliest recognition of the epidemic... the HIV response adopted an exceptionalist approach," it says. And rather than work with health systems to manage HIV as one of many health problems, it usually had specific funding and services. To address this, the report contains detailed modelling for a number of scenarios where the HIV response works hand-in-hand with related public health drives.

"These models show it is feasible; you are likely to get better health outcomes and it is cost-effective, which we hope will impress some policy-makers," says Bekker. "We don't believe any of the funding should go away from HIV, but if we programme for the wider good, those health dollars could help more than just HIV, they could improve health more broadly. We hope that would be attractive to funders, that they feel they would be getting a double bang for the buck."

First step

This could have other benefits, too, such as overcoming HIV stigma. "For many people, it's easier to get into a mobile testing vehicle ostensibly to test your blood pressure than it is to test for HIV," says Bekker. "Putting it in the context of a broader health agenda can have a big impact in normalising HIV. It becomes like other health screening opportunities."

By advocating such measures, the report is itself a vital first-step in ensuring the global HIV response stays broadly on track. "We need a more sustainable plan," says Bekker. "If we don't do something like this we are at great risk of derailing completely." BMS

LINDA-GAIL BEKKER

- ✔ Studied medicine at the University of Cape Town in South Africa
- ✔ Worked at Rockefeller University in the US on host immunology
- ✔ Won the 2009 Royal Society Pfizer Award for her research into tuberculosis epidemiology
- ✔ Elected President of the International AIDS Society.

SNIFFING OUT CANCER

Claire Guest, Co-founder of Medical Detection Dogs, explains how canines could have an important role in discovering disease.

The association between humans and dogs is long and close. Throughout history, dogs have fulfilled a whole range of different functions and the number and diversity is continually expanding. While traditionally dogs have been trained to hunt, herd and guard, more recently canine roles have grown to a range of medical support and disease-detection tasks.

As medical usage expands, it is imperative that the value of these dogs is objectively assessed, their potential capabilities are optimised and we use these abilities to further our understanding of the diseases in question.

Medical Detection Dogs (MDD) is the world leader at training dogs for this purpose, pioneering both medical assistance and disease detection. The charity is committed to carrying out empirical research to improve training and to inform future medical technologies.

To further this aim, MDD is currently working on a range of NHS-approved clinical trials, exploring dogs' ability to detect cancers – with a promising urological cancer trial ongoing, and a colorectal cancer project in progress. MDD is also researching the volatile detection of the malaria parasite, Parkinson's disease and specific bacterias.

The other arm of MDD, Medical Alert Assistance Dogs uses olfactory alerting ability for day-to-day support for people living with chronic conditions.

Our work

There is growing evidence that elevated levels of a "signature" of volatile organic compounds (VOCs) are associated with disease growth. Our research has shown dogs can be trained to detect these odours. MDD has been at the forefront of canine olfaction work for 15 years and was responsible for the first study of canine detection of bladder cancer, published in the *BMJ* in 2004. Our 2014 research indicated that dogs are capable of detecting odours down to parts per trillion – the equivalent of a teaspoon of sugar in two Olympic-size swimming pools.

Potential

We are on the threshold of delivering an accurate, rapid and non-invasive test to diagnose cancer and other diseases at an early stage, tests that would be offered to clinicians to use alongside existing diagnostic methods.

While we all "know" what coffee smells like, this complex odour which contains over 100 component molecules, would be impossible to describe to anyone who has never smelt it. How can the dogs communicate to technology what the "cancery" smell is?

Together with the Open University, we are developing new technology that enables our dogs to communicate their degree of

certainty when screening a sample. Bio-detection dogs work on a carousel or stand system that consists of metal pads installed on top of sample tubes, which the dog sniffs. If disease is present, the dog indicates this to their handler by sitting in front of the sample. The new technology incorporates a sensor that records the level of pressure the dog exerts whilst sniffing. With training, dogs will apply greater pressure on the pad when they are certain the disease is present.

Therefore, pressure indicates the level of certainty that the dog has. Capturing this data provides us with pressure readouts and will be vital to developing a future screening method, educating experts about the strength of the biomarkers that the dog uses to make his decision.

Future

In a ground-breaking collaboration with the world-famous Massachusetts Institute of Technology (MIT), we are working to develop advanced technologies which will harness the power of the dog's nose in a handheld bio-electronic nose.

Dr Andreas Mershin, Quantum Physicist at the MIT Center for Bits and Atoms, in Cambridge, Massachusetts, was inspired by our study showing dogs could sniff out cancer and plans to use their olfactory ability to develop an easy-to-use electronic nose that can be brought into every doctor's surgery. Dr Mershin is relying on our cancer detection dogs, to teach his prototype device, which uses the latest artificial intelligence (AI) technology, to recognise the odour of prostate cancer.

The device, no bigger than a mobile phone, has been developed to the point where its sensitivity matches the power of a dog's nose – it too can detect parts per trillion – but it is unable to replicate the dog's powers of cognition, which allows them to spot a "cancery smell" even though no two humans' cancer smells exactly alike. Harnessing new AI technology, the machine will "learn" to detect this "cancery smell" rather than rely on being programmed with every possible molecular combination.

BIO-DETECTION RESEARCH AREAS

Urological cancers

- Prostate cancer is the most common cancer in men.
- Over 42,000 men are diagnosed with prostate cancer every year – that's more than 110 men every day.
- Every hour one man dies from prostate cancer – that's more than 10,500 men every year.
- One in eight men will get prostate cancer in their lifetime.
- Over 330,000 men are living with and after prostate cancer.
- MDD research is demonstrating that dogs can detect urological cancer VOCs earlier and with greater accuracy than current test methods.

Breast cancer

- Breast cancer is the most common cancer in the UK.
- Breast cancer is the name given to cancers that have first developed in breast tissue, but there are many different types.
- Around 50,000 women are still diagnosed with breast cancer each year.
- More than 80% of women with breast cancer are still alive five years after diagnosis.
- Around 12,000 women die of the disease each year. An MDD proof-of-principle study is underway into whether breast cancer can be detected on a breath sample. The research will be important in helping inform future testing and research into breast cancer.

Other diseases

In addition to urological cancers and breast cancer, MDD is currently exploring the possibility that the dogs can detect a number of other cancers and diseases, including:

- Lung cancer
- Bowel cancer
- Animal cancers
- Malaria
- Parkinson's disease.

Microbiome

There is growing evidence of the role of the microbiome in human health. Changes or damage that occur to our microbiome can result in significant deterioration in health. Research could provide information that alters the future of diagnostics and treatments for many diseases.

Our data indicates that dogs can assess the human microbiome by odour and we believe that dogs can detect individual changes. Our dogs will accelerate the knowledge of the role of the microbiome in human health and will assist in answering crucial questions about its influence on disease process, diagnostics and recovery.

Understanding the microbiome (human, animal and environmental) may be just as important to our future as the human genome. It influences all major health conditions, including cancer, neurology and immunity and we believe will play a crucial part in future diagnostics.

MDD is a fantastic example of how humans and dogs can work together to save lives. The canine model, "active searching" may well remain the mode of choice for some disease, such as malaria at airports, whilst the expertise developed will result in a team of canine and electronic experts that could produce bio-electronic noses for other diseases, bringing the power of the dog's nose into every doctor's consulting room.

We believe that dogs are capable of detecting all disease. Our vision for the future is to harness the power of canine olfaction, to speed the early diagnosis of cancer, neurological conditions, such as Parkinson's and motor neuron disease, enabling medical research to discover more effective treatments and, hopefully, cures. BMS

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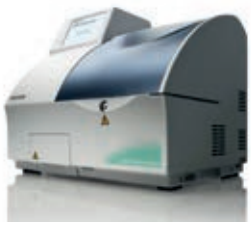

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LABORATORY ERRORS IN TRANSFUSION

Jenny Berryman, **Hema Mistry** and **Paula Bolton-Maggs** from the Serious Hazards of Transfusion (SHOT) scheme explain their latest annual report.

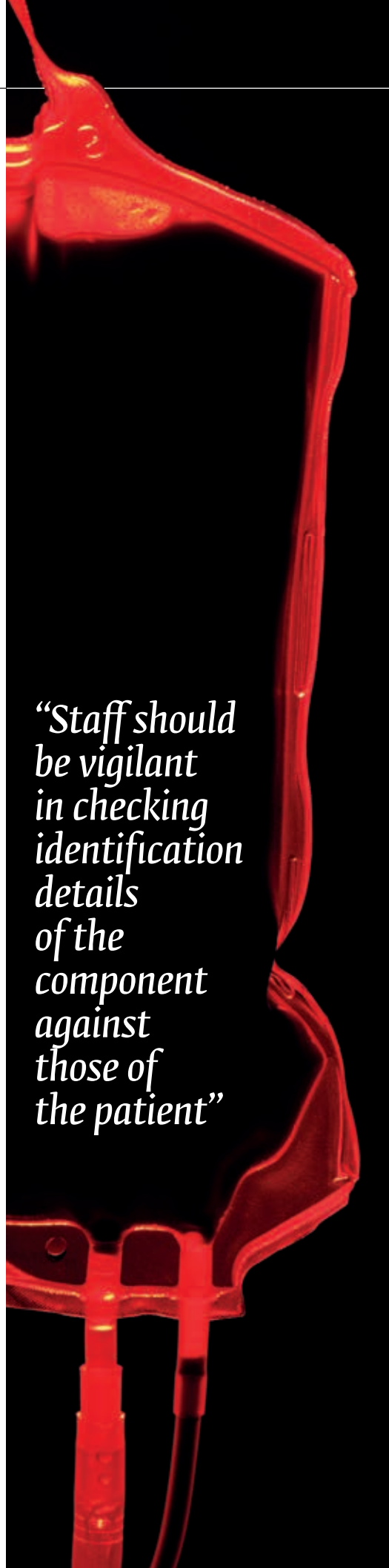
The Serious Hazards of Transfusion (SHOT) scheme has been running for 21 years now. It continues to collect and analyse anonymised information reported in the UK about serious adverse reactions and other serious adverse events (SAE) related to blood transfusion. The cumulative learning from past recommendations has led to the mitigation of many system faults that led to fatal and potentially fatal errors. Errors attributable to "human factors" persist, and so systems and practices must be re-assessed, and re-designed to minimise the effect of human error.

There are nine critical steps in the transfusion process from the point of request, sample taking, sample receipt, testing, component selection, component labelling, component collection, prescription and administration. Each step could potentially be performed by a different person and incorporates independent checks, which, if performed correctly, should detect the errors. The importance of working as a team is illustrated by cases reporting multiple errors at different points of these critical steps (see Case Study 1). SHOT recognises that incidents rarely result from a single point of failure and urges that at each step, staff do not assume that errors have not been made in previous steps but verify for themselves. Poor communication also contributes significantly to the occurrence of errors: Do not assume, verify.

The breakdown of all reports analysed and included in the *Annual SHOT Report 2017* (published in July 2018, and available at shotuk.org) is as shown in Figure 1. The number of preventable errors remains high, with 85.5% in 2017 compared with 87.0% in 2016.

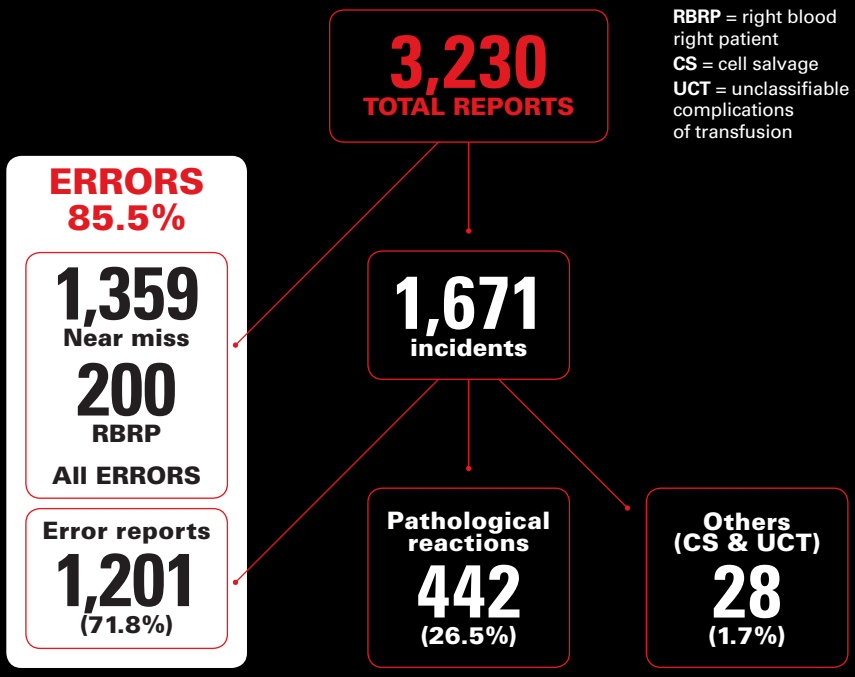
Deaths and major morbidity

There were 21 deaths where transfusion was implicated, and 112 additional cases where patients suffered major morbidity.



"Staff should be vigilant in checking identification details of the component against those of the patient"

FIG 1: CASES INCLUDED IN THE 2017 ANNUAL SHOT REPORT N=3230



KEY LABORATORY MESSAGES

Knowledge and skills

- Laboratory staff should have an understanding of all component types, including their storage conditions, but most importantly their compatibility with the patient and specific requirements for certain patient groups e.g. gender, age, pregnancy and taking disease status into consideration.
- Laboratory staff are responsible for maintaining their own continuing professional development (CPD), including competency assessments.
- Laboratory staff must understand warning flags, know why they have appeared and acknowledge appropriately. Warning flags should never be overridden by laboratory staff without understanding the reason for them.

Shared responsibility and shared care

- Good communication is paramount between staff in the laboratory, between the laboratory and the clinical area and vice versa.
- It is important, when necessary, to look up, understand and maintain patients' historical records and to seek out any further transfusion information that may be available for the patient from a shared care facility e.g. transplant, antibodies, adverse transfusion history. Never assume that something has been done: always double check.

Information technology

- Laboratories should have a contingency procedure for IT failure and perform a simulated situation competency which renders the laboratory information management systems (LIMS) out of action in order to test that the contingency procedures are robust.
- SHOT data continue to highlight that many errors are caused by overriding warning alerts. It is now time for LIMS suppliers to provide software that requires more than a keystroke to override the warning alert and meet transfusion guidelines.

IMAGE: SCIENCE PHOTO LIBRARY

CASE STUDY 1

A demographic data entry at sample entry results in a patient receiving ABO-incompatible fresh frozen plasma (FFP)

Five units of FFP were ordered by telephone for Patient 1. During the laboratory IT process, the copy and paste function was used to populate the sample identification number field. However, the sample ID number pasted into the sample ID field belonged to the previous patient (Patient 2).

At collection, the porter noted the discrepancy. The FFP was then re-labelled for Patient 2, but the biomedical scientist failed to note that the FFP was incompatible. The nurse administering the FFP noted the group was different to the patient but believed that group O components were compatible for all patients. This resulted in group O (Patient 2) FFP being administered to Patient 1 (group A).

There were four errors that occurred:

- **Sample receipt** – biomedical scientist took verbal telephone request but selected the wrong patient.
- **Component selection** – biomedical scientist did not identify that the wrong patient had been selected.
- **Component labelling** – biomedical scientist did not check label against the request. Porter detected the error, but the biomedical scientist re-labelled it for Patient 2 and did not notice the FFP was incompatible.
- **Administration** – nurse noted the group was different but believed that group O FFP was compatible for all patients.

Learning points

Group O FFP should only be issued for group O patients. Group AB is the universal group for FFP (but group A may be used, if group AB is not available).

Clinical staff are required to perform the critical bedside checks, including knowledge of compatibility, prior to administering the component. However, the laboratory staff must perform essential checks in the transfusion laboratory to ensure that the component is correct for the patient prior to it leaving the laboratory.

Twelve of 21 transfusion-related deaths reported in 2017 were due to pulmonary complications. An additional six were related to delays. Laboratory staff in particular should take note of the key SHOT message and laboratory recommendations to facilitate the rapid issue of blood components in emergency situations. Prompt initiation of "concessionary release" policies (enabling emergency issue of components that don't meet best practice guidelines) and good communication are vital in emergencies.

Key recommendations

The very first SHOT report recommendation from 1997-8 states: "The bedside check is vital in preventing transfusion error. Staff should be vigilant in checking identification details of the component against those of the patient." The recommendations from the 2017 SHOT report reflect the persistence of human factors and the roles of the correct application of knowledge, supported by effective use of IT in reducing transfusion error:

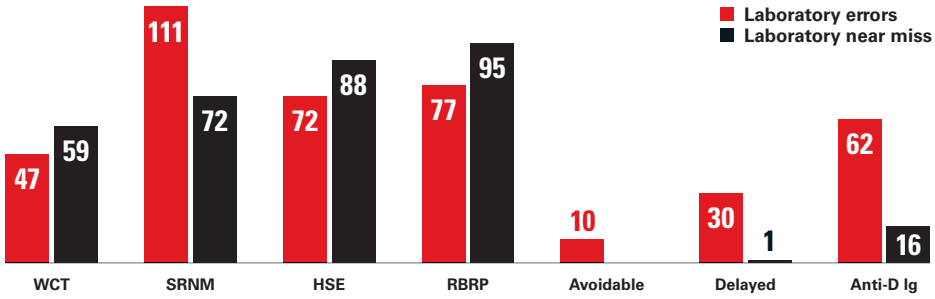
1. Knowledge and skills: Training in ABO and D blood group principles is essential for all laboratory and clinical staff with any responsibility for the transfusion process. This should form part of the competency assessments.

2. Information technology: All available information technology (IT) systems to support transfusion practice should be considered and these systems implemented to their full functionality. Electronic blood management systems should be considered in all clinical settings where transfusion takes place. This is no longer an innovative approach to safe transfusion practice, it is the standard that all should aim for.

3. TACO: A formal pre-transfusion risk assessment for transfusion-associated circulatory overload (TACO) should be undertaken whenever possible, as TACO is the most commonly reported cause of transfusion-related mortality and major morbidity.

FIG 2: LABORATORY INCIDENTS AND NEAR MISSES BY CATEGORY OF OUTCOME N=740

WCT = wrong component transfused; **SRNM** = specific requirements not met; **HSE** = handling and storage errors; **RBRP** = right blood right patient; **Ig** = immunoglobulin



Patients who develop respiratory distress during or up to 24 hours after transfusion where transfusion is suspected to be the cause must be reported to SHOT. The national comparative audit of TACO in 2017 demonstrated that risk factors are being missed.

Key SHOT messages

1. Guidelines or rules? Guidelines must not be translated into inflexible rules. Proportionate application of knowledge and experience may lead to a different course of action in individual circumstances. But the final bedside check is a rule and must be completed in full.

2. Basic training: It is essential that all staff participating in transfusion fully understand ABO groups so that they can recognise potential ABO-incompatibility.

3. IT systems have the potential to increase transfusion safety by minimising human factors and should be considered for all transfusion steps.

Laboratory errors

There were 740 errors reported to SHOT in 2017 that originated from the laboratory comprising 409 errors where the patient was transfused, and 331 near misses.

ABO-incompatible transfusions

There were four ABO-incompatible FFP transfusions due to errors at sample receipt (1), case 1, testing (1) and component selection (2) and 1 ABO-incompatible platelet transfusion due to a component selection error. Two other ABO-incompatible transfusions occurred as a result of clinical errors (red cells due to administration error and platelets due to a wrong blood in tube error).

Improving safety

The relative risks of transfusion today are low. In order to further improve transfusion safety, laboratory staff (and all staff involved in the transfusion process) should take heed of the key SHOT messages and recommendations. Good communication, full understanding of transfusion principles, diligent checking and re-checking, all supported by effective use of IT solutions will help to mitigate the risk of transfusion error. BMS

Jenny Berryman is a Specialist Advisory Panel Representative (Transfusion), **Hema Mistry** is a Laboratory Incidents Specialist and **Paula HB Bolton-Maggs** is Medical Director, all at SHOT.

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TREATING CLOSTRIDIUM DIFFICILE INFECTION

Emmanuel Nwankwo and **Andrew Ward**

ask whether empirical antibiotic therapy can still be relied upon.

Clostridium difficile infection (CDIF) has established itself as the major nosocomial antibiotic-associated diarrhoeal infections in our hospitals today. Antibiotic therapy may predispose patients to CDIF by altering the gut normal microbiome, enabling the causative bacteria to dislodge the normal flora and colonise the patient intestinal tract. The progression of CDIF can lead to pseudomembranous colitis, toxic megacolon and perforation of the colon.

There have been many interventions in UK hospitals to reduce the spread of CDIF. Some of these interventions have been successful, but many have had limited success and contributed to the outbreaks of infectious diarrhoea in hospitals.

The cost of clinical isolation, treatment and management of CDIF in NHS hospitals places a significant burden on hospital finances, with Public Health England (PHE) annual statistics showing that between April 2015 and end of March 2016, more than 14,100 cases of CDIF were reported across all NHS hospitals in England, with an estimate of over £4,000 per case in the UK, which could be higher in the current financial climate. The NHS in Scotland estimated that between October 2015 and October 2016 there were 1,150 cases of CDIF, at a cost of more than £8.6m.

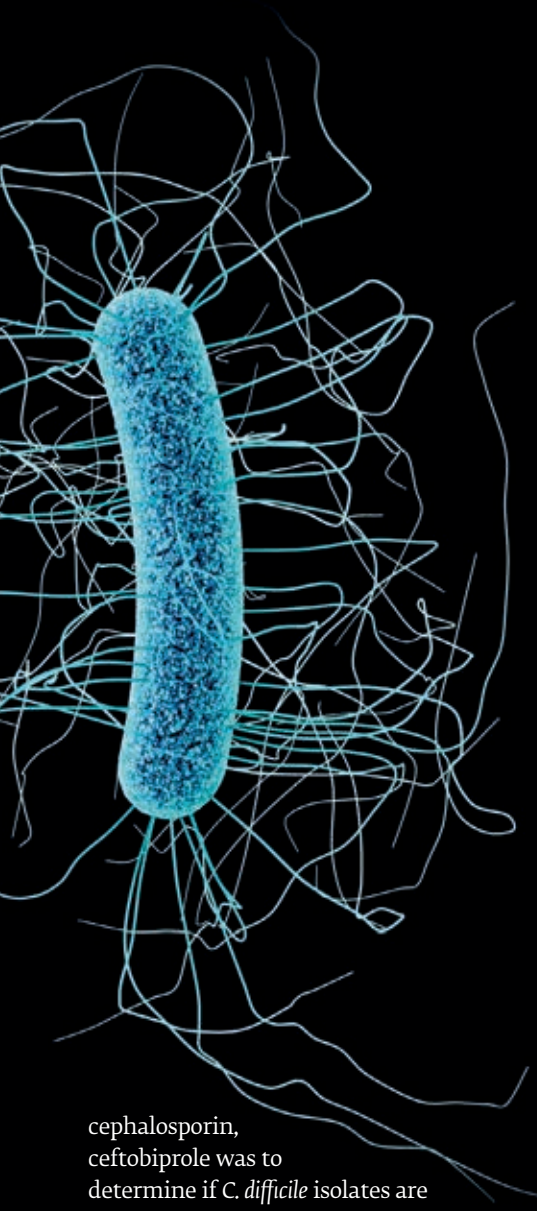
The gradual emergence of antimicrobial resistance in the treatment of CDIF has become a concern. It is estimated that there are about 10% to 30% of reoccurrences of CDIF in treated patients, which could be due to either a relapse of the first infection or re-infection by a different *C. difficile* strain. However, there have been a few treatment suggestions in multiple reoccurrences, including the use of higher dose of oral vancomycin on its own or in combination with rifampicin, albeit with the risk of potential increase in vancomycin resistant *Enterococci* infections. Faecal microbiota transplant is considered when all treatment options fail. This is the prompt reinstitution of healthy donor stool with possible disease resolution in 92% of cases.

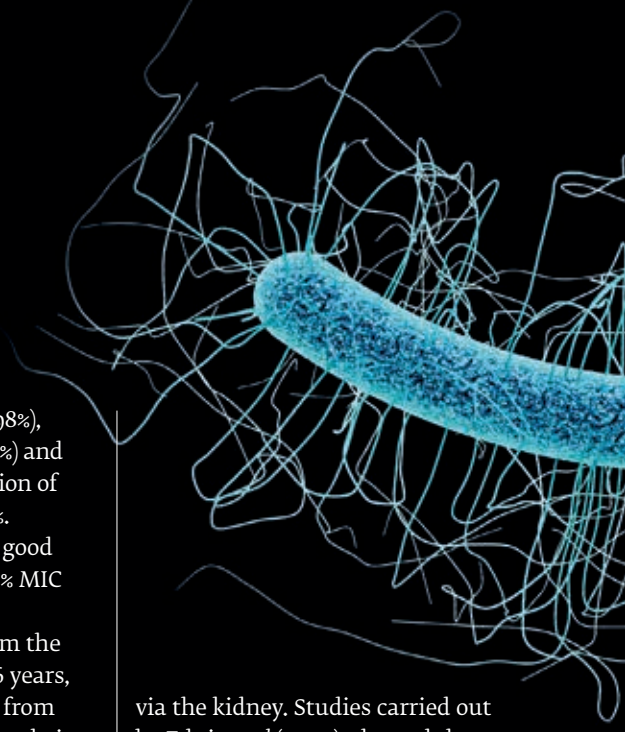
Susceptible or not

From a 2018 study, 160 clinical faecal specimens of known *C. difficile*-colonised patients with diarrhoea were cultured on Colorex *C. difficile* chromogenic agar (E&O Laboratories Limited, Scotland).

After identification, the *C. difficile* strains were tested against a variety of antibiotics, using antimicrobial minimum inhibitory concentration (MIC) gradient strips, following the methodology recommended by EUCAST.

Metronidazole, vancomycin, rifampicin and clindamycin were chosen because of the emergence of their reduced susceptibility. Teicoplanin, levofloxacin and clindamycin were included to check their susceptibility rate in the local area of the hospital. The inclusion of a new broad-spectrum fifth-generation





cephalosporin, ceftobiprole was to determine if *C. difficile* isolates are sensitive to the antibiotic, and so the introduction of this antimicrobial agent in the local hospital of this study should not significantly increase the risk of CDIF for patients. Ceftobiprole also has lesser potential than other broad-spectrum cephalosporins in promoting *C. difficile* growth and toxin production, due to its excretion route through the kidneys.

There are currently no EUCAST interpretation guidelines for determining the susceptibility to teicoplanin, rifampicin, ceftobiprole, levofloxacin, clindamycin and linezolid; however, information from similar research was used to determine the susceptibility rate of *C. difficile*.

Results

The prevalence of *C. difficile* resistance to the two first-line antimicrobial agents for treatment was found to be 22% for metronidazole, 16.6% for vancomycin and 8.3% for a combination of both. Low MICs were observed in linezolid (98%), teicoplanin (96.6%), rifampicin (89%) and clindamycin (53.8%) with observation of levofloxacin resistant rate of 63.4%. Ceftobiprole was shown to have a good activity against *C. difficile* with 79.3% MIC of ≤4 mg/L.

The average age of patients from the 160 faecal specimens used was 76 years, with 67.5% from female and 32.5% from male patients, with 54% recorded as being hospital in-patients and 46% community-acquired CDIF. However, we could not determine whether the number of in-patients was actually hospital acquired or community acquired, as this is a retrospective study.

This study included a new broad-spectrum fifth-generation cephalosporin, ceftobiprole, with the aim of showing that *C. difficile* isolates are sensitive to the antibiotic and so the introduction of this agent in the hospital of study should not significantly increase the risk of CDIF for in-patients.

However, that should not be the case, as not all antibiotics within a given class should be considered a risk factor to CDIF, as there are differences in pharmacokinetics and excretion routes with cephalosporins – as in the case of ceftobiprole, which is excreted via the kidney. Studies carried out by Ednie *et al* (2007), showed that ceftobiprole exhibits a good activity against *C. difficile* isolates, with MIC of 2-4 mg/L. Nerandzic *et al*, 2011, suggest through their study that ceftobiprole may have low tendency to promote CDIF due to its greater activity against *C. difficile*. Similar results were seen in a recent study, with 79.3% of ceftobiprole MIC of 2-4 mg/L and 20% MIC of >4 mg/L. Regardless of ceftobiprole's good activity against the *C. difficile* strains obtained from this study and other studies, although a number of hindrances may play a role, which includes administration by IV infusion, the two-hour infusion time and cost.

The results of the author's study may necessitate a review of empirical treatment of C. difficile

The results of the author's study may necessitate a review of empirical treatment of *C. difficile*.

There is also an apparent need to set up a periodic antimicrobial surveillance plan for CDIF, which will be helpful for optimising antimicrobial stewardship programmes in hospitals, especially in the treatment of CDIF and in particular with instances of increasing local treatment failures. BMS

Emmanuel Nwankwo is a Specialist Biomedical Scientist and **Andrew Peter Ward** is a Senior Biomedical Scientist, both from the Microbiology Department at University Hospital of North Tees and Hartlepool NHS Foundation Trust.

To view the article with full references, visit **thebiomedicalscientist.net**

PARADISE LOST

The islands of Polynesia are known to be some of the most beautiful in the world, but the influence of the colonising West has left its indelible mark, writes **Stephen Mortlock**.

According to some genomic studies, around 800 to 900 BC, settlers from Southeast Asia migrated into the vast area of the Pacific Ocean called the Polynesian triangle (sometimes referred to as "Oceania"), which consists of three island groups, Micronesia, Melanesia and Polynesia.

The islands vary in size and type from tiny atolls only a few feet above sea level, to small tropical islands and vast volcanic islands. There is no doubt that these settlers were superb mariners, completing their voyages in large ocean-going canoes to the more distant and isolated islands, adapting to and mastering the numerous hazards of a marine environment. They took with them food, animals (pigs, chickens, dogs and unfortunately rats), seedlings and everything they would need to colonise new islands. Once settled they developed societies with a strict social organisation,

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In pre-colonial times, records show that health in most of the Pacific islands was good, compared with that of Europe

including religion, food production, and most other facets of their culture.

Within these Pacific communities there were often diverse perceptions of health and disease and how they originate, from a divine punishment to interpersonal conflicts, natural disasters and supernatural insult all manifesting in some form of ill health, like many parts of Europe at the time they did not consider biological agents, such as bacteria and viruses, as the causes of disease. If a person got sick, he might conclude a spirit was displeased with his or one of his relative's behaviour. Or perhaps he was suffering from a hidden guilt or secret wrongdoing. He might even suspect another individual of hexing him with sorcery. Although this may be seen as an ancient belief, it is still considered valid in some communities.

But the islanders do seem to share two health fundamentals: a holistic notion of health and health as a family concern, rather than an individual matter. During this time, they developed strong social mechanisms for coping with the human problems of shipwreck, to help support separated families with the sudden loss of large numbers of the group.

Polynesian culture

In pre-colonial times, records show that health in most of the Pacific Islands was good, compared with that of Europe. Certainly it seems that all Polynesians had a healthy appreciation for bathing, using certain leaves which lathered like soap and wadded fibres from coconut husks and other plants to scrub themselves. Communicable diseases between the islands was rare, but once introduced could easily become epidemic. When Europeans first came into contact with Polynesians, the islanders had never previously been exposed to diseases such as measles, influenza and syphilis, which later decimated whole populations and jumped from island to island. Contemporary records do suggest however, that there were a number of tropical diseases endemic on the islands including, filariasis, malaria, dengue and scrofula.

Most Polynesian societies had special healers and the ability to heal was considered a reward and most healers were not paid but instead "gifted" with presents of gratitude and status, such as food, household furniture, or clothing. In 1806, the British privateer vessel Port-au-Prince, was seized and stripped of all valuables by the islanders, while it was anchored off the Tongan island of Lifuka. Only four crew survived including the ship's clerk 15-year-old William Mariner who became the chief's adopted son taking the name Toki 'Ukamea.

He lived on the islands for four years until he returned to the UK and dictated a detailed account of his experiences of Tongan society and some of the traditional healing techniques, which included ritual amputation, mutilation and even sacrifice as part of the healing process. He himself witnessed two five-year-old children competing for the privilege of undergoing the amputation of a finger for a sick relative.

The removed finger was wrapped in unfinished tapa (cloth made from the bark of the paper mulberry) then taken to a priest or priestess to affect a cure. For the more serious illnesses, the family might resort to human sacrifice. The chosen victim was generally of a lower rank than the sick individual and they were garotted by the family members with strips of tapa. The supplicants would then take the sacrifice to the priest or priestess who waited at a sacred house.

Once they had received the sacrifice they would enter a trance-like state, with violent convulsions when they became possessed and the god's will would be communicated through revelation and prophecy and the illness would be gone. If the person did not get better it was assumed that the god must have changed his mind or had intentionally deceived them.

In Polynesian myths, plants, fruits and vegetables came from human bodies and as a consequence humans and plants are linked. Due to this, healers throughout Polynesia thought that plant medicines in the form of potions and applications were the best remedy to cure diseases, as illness was considered an alien fluid that upset the balance of the body. Acquaintance with plants and their properties was, and still is, widely used and often quite sophisticated; a study identified over 50 different indigenous plants that were used in the treatment of diseases. Most commonly, the healer would prepare these medicines from these selected plants by pounding the material in a wooden bowl and straining the juice. Sometimes the juice would be sweetened with sugar cane sap, and drunk with water, inhaled or applied to an injury.

Throughout Polynesia, islanders have used the juice of the Noni tree (*Morinda citrifolia* L. Rubiaceae) in a variety of medicinal preparations and as a famine food, it is assumed to have originated in Southeast Asia and subsequently distributed to the islands of the Western Pacific. Noni is now becoming an increasingly popular wellness drink in North America, Europe and Australia, and has been promoted as a treatment for a vast array of

medical conditions, ranging from cancer to sexual dysfunction.

Roots of the Kava plant (*Piper methysticum*) were crushed and drunk to relieve headaches, tension and sleeplessness, while in Hawaii a kava poultice was used to stop toothache. Certainly, over centuries, kava has been used in the traditional medicine of the South Pacific Islands for urogenital conditions (gonorrhea infections and cystitis), reproductive and women's health issues. Along with tropical staples, such as yam (Dioscorea spp.) and taro (Colocasia spp.; Alocasia spp.), kava grows throughout much of the tropical Pacific. Polynesians, many Melanesians, and some Micronesians used the plant historically, and large numbers continue to do so today.

Modern techniques have identified the active ingredients as a class of lactone compounds: the Kavalactones, which seem to have the potential for various psychotropic effects, including an anti-anxiety and sedative/hypnotic activities. Raw kukui or candlenuts (*Aleurites moluccanus*) were eaten as a laxative in Hawaii and in Tonga women scraped the bark of the kukui tree to derive sap which was applied to the tongue and mouth of children with fungal infections. Mashed candlebush (*Senna alata*) leaves are still used today to eliminate ringworm and other skin rashes. The leaves are ground in a mortar to obtain a kind of "green cotton wool". This is mixed with vegetable oil and rubbed on the affected area two or three times a day. Its active ingredients include chrysophanic acid, which has very effective fungicidal properties. Senna pods also contain anthraquinone, which has a well-proven laxative effect. The roots of the monarch fern (*Phymatosorus scolopendria*) or *Laua'e* were boiled and the mixture cooled and used to bathe babies to cool fevers. Fijians and Hawaiians would clean, pound and mix turmeric root with hot water, which was then strained and squeezed to produce a juice that was administered to relieve diabetes and coughs. The people of Rapa Nui, or Easter Island, would use sweet potatoes to quench their thirst, while Hawaiian women used the vines as a necklace to ensure an abundant flow of breast milk. The juice of the moist husk of green coconuts was squeezed and administered to newborn babies to clear their systems of "womb" food, while coconut oil scented with fragrant leaves and flowers was used in massaging for aches, pains, injuries, vitality, and beauty.

Certain islands also produced a love potion, "Omung", said to made from crushed stingray tail, black ants and centipede legs, the over-use of which could lead to madness and hysteria.

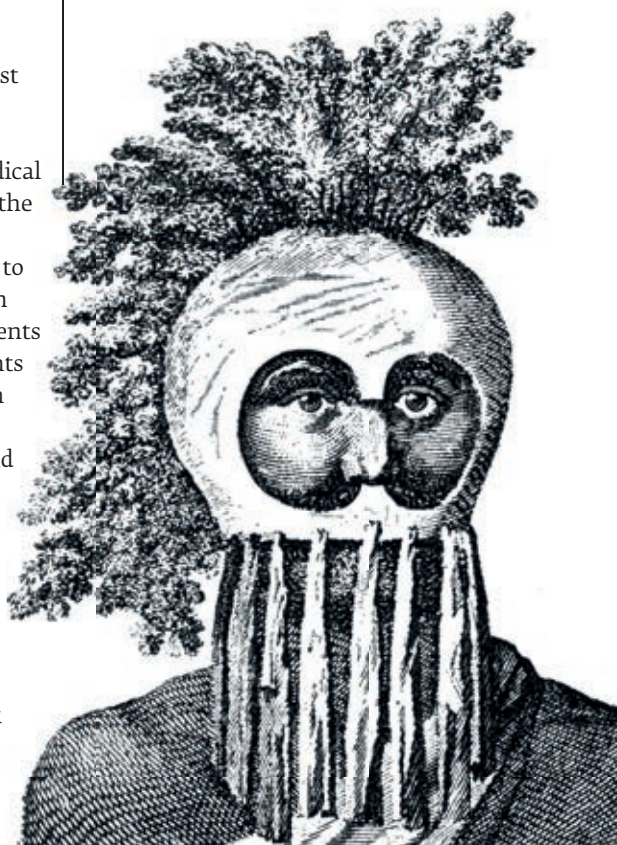
Western influence

Prior to outside influences, there was thriving culture in many parts of Polynesia, with its own governments, language, and religion. However, in the sixteenth century, contact with the outside world began and some islands became early stopping points for voyagers, while others remained almost untouched well into the twentieth century. Unfortunately, even the friendliest visitor could precipitate radical changes in these societies, as some of the visitors judged the native ways of life based on Western standards and tried to change the indigenous systems, which led to conflicts and caused some elements of their culture to be lost. Early accounts by Jean-Francois Surveille's expedition of 1769 regarded the Polynesians as "extremely dirty with skin diseases and a type of scab or itch". While one voyager explained that Melanesia was generally unhealthy for human habitation because there were "plagues of insect pests and their attendant ills... that deface the skin... and poison the blood".

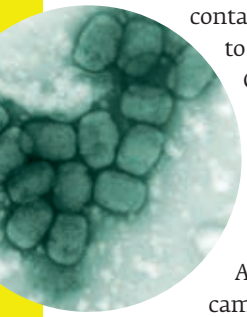
In contrast, the explorer James Cook wrote in 1774 that the Marquesans were "the finest race ever beheld... tall and well proportioned". While in 1795 James Mortlock of the ship Young William on a two-year voyage from London to China (via Australia) described the health of the Mortlock Islanders as good, as he noted that they had a physical strength and healthy appearance, with "strong white teeth" and "smooth skins".

But European contact introduced many diseases which transformed what was a balanced, if occasionally precarious, existence into situations of dramatic population decline.

A single measles epidemic in 1866 killed thousands in Vanuatu, and one in 1875 is estimated to have reduced the population of Fiji by a third. Measles was particularly dangerous on isolated islands because a large proportion of the adult population were simultaneously ill, leaving few to care for the sick. Smallpox was largely

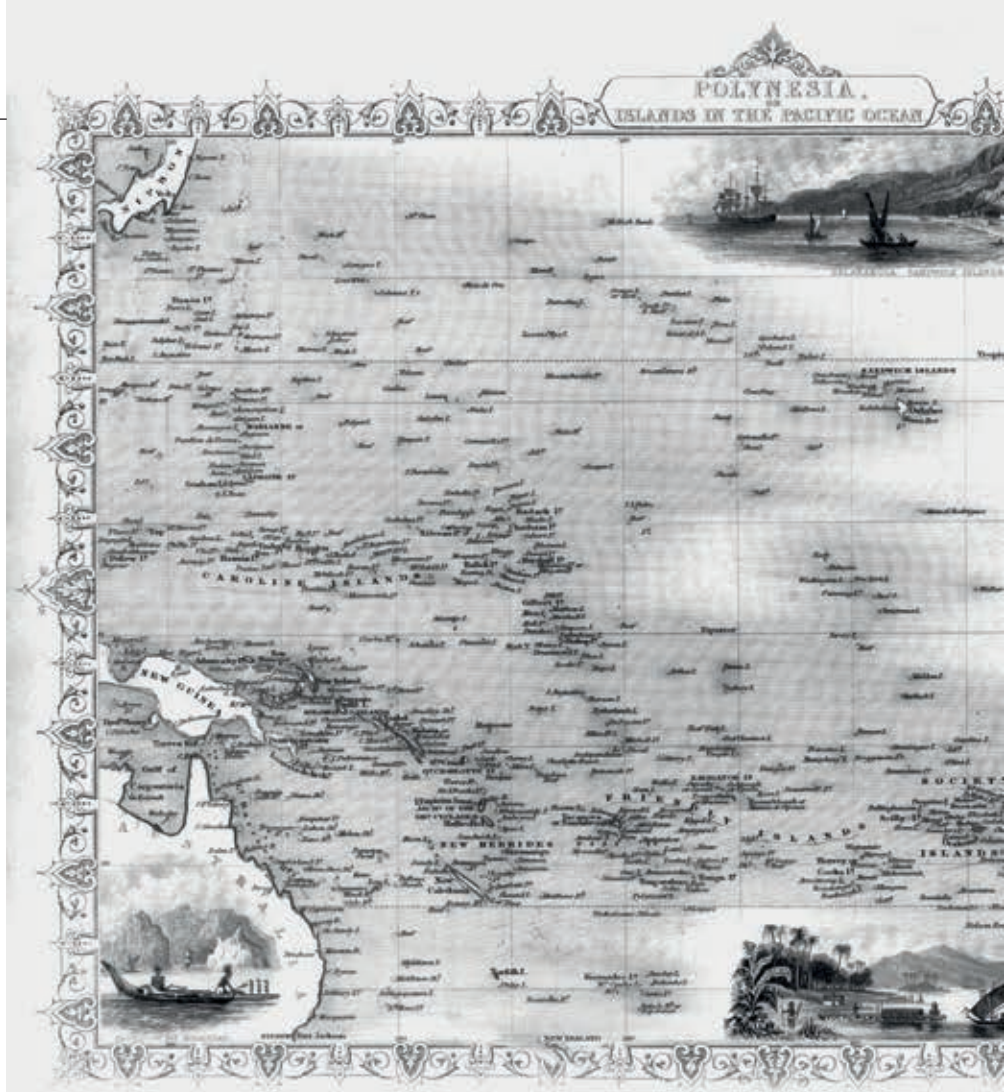


IMAGES: BRIDGEMAN/ ALAMY/ISTOCK/SHUTTERSTOCK



contained by quarantine efforts to Hawaii, Guam, the Caroline Islands, French Polynesia and Papua New Guinea. There was the smallpox epidemic that first broke out in Pohnpei in 1854. When the American whaleship Delta came to anchor off the island, it put ashore two of its crew members who had contracted smallpox during the voyage and they buried another victim. According to the remaining crew the Pohnpeians stripped the diseased men of their clothes and, according to one version of the tale, dug up the body of the other. The result was a severe outbreak of the disease, which raged through the island for several months and killed half the population in just five months. In 1854, 2,000 of 5,000 persons died on the Caroline Islands from smallpox, and a third of the population of Guam perished in 1856. There were still other devastating smallpox epidemics along the northern coast of New Guinea in 1872 to 1895 during the German colonial establishment of a plantation economy.

The arrival of these ships also brought with them influenza and dysentery. Tahiti recorded a lethal dysentery outbreak following the arrival of the Vancouver in 1792 and again in 1807 after the whaler Britania visited. In 1804, a dysentery epidemic in Hawaii is said to have killed so many (estimates range from 5,000 to 15,000) that the living were unable to bury the dead. Records from 1890 suggest that dysentery was a common problem on contract labour ships sailing between the islands and was probably spread from ships' crews to the indigenous population. Half of those infected died within 10 days. Benjamin Snow, the resident American missionary on Kosrae, lamented the rate at which "our benighted people sicken and die" with influenza. In 1854, two years after his arrival, he remarked that "Hardly a week and sometimes hardly a day passes



The disease raged through the island for several months and killed half the population in just five months

without hearing that someone has died." In 50 years, the population of Kosrae declined by 90% – a loss comparable to that suffered by the Marianas over a century earlier. Reports from American missionaries in the Marshalls around the mid-19th century had a familiar ring to them. On Ebon in 1859, influenza broke out; the disease "has worked its way into the lungs, and a number of the people have died of bronchitis". In a single month, the island of only a thousand lost a hundred people. There was another outbreak of influenza there just two years later. Lethal influenza outbreaks with secondary bacterial pneumonia were particularly apparent on the Pacific Islands in 1890 and during the 1918–1920 pandemic, contributing to the devastating mortality on Fiji, Nauru, Samoa, Saipan and Hawaii. There were also epidemics of TB and typhoid which devastated the Marquesas from 1791 to 1863-64, when 80% of the population died.

Modern problems

Over the years, the Polynesians have raised many questions about their culture from the oldest known human settlement on Samoa located two metres below sea level, where they found elaborate Lapita pottery shards from around 1000 BC, to the giant Moai of the Easter Islands and the stone money of Yap Island. Illnesses and diseases have emerged in Pacific countries since European intrusion, but fortunately the predicted demise of the Polynesian race, widely anticipated through the nineteenth century by Alfred Tetens, has not happened.

During the twentieth century, public health measures served to reverse population decline, and high fertility led to rapid population growth, which has now brought its own threat to the region. But the legacy of morbidity and mortality from introduced diseases still remains. More recently the traditional diet of the region has been replaced by canned fish, biscuits, white flour products, and sugar-laden food. Purchasing imported food goods has for some become a sign of social status in some communities, and traditional foods have decreased in importance. Though malaria is still the primary cause of death in Vanuatu, diabetes, hypertension, obesity and coronary heart disease are now prime health concerns in some Pacific countries.

Dr Waqanivalu, Technical Officer for Nutrition and Physical Activity at the Office of the WHO representative for the South Pacific, certainly blames poor diet for many of the region's health problems, where the consumption of traditional foods has declined. More importantly micronutrient deficiencies have become common in this region, with more than one-fifth of children and pregnant women showing signs of anaemia. In Fiji and the Solomon Islands, surveys have indicated alarming levels of diet-related disease, and health education campaigns have been introduced to highlight the need for nutrition through community participation and integrated health programmes, including salt iodization to reduce iodine deficiency and related goitre.

Today, some form of environmental disaster always seems just over the horizon, and certainly the socio-ecological systems of Polynesia are being threatened by the rapid changes in an increasingly globalised world with destruction of the rainforests, the overexploitation of the oceans, industrial and agricultural pollution, the growing volume of toxic waste products and plastics, climate change and the loss of biodiversity and human diversity. There are no new islands to discover and as a people we need to learn how to conserve resources and control population growth within the limits of the Earth. BMS

Dr Stephen Mortlock is Pathology Manager at the Nuffield Health Guildford Hospital. He would like to thank the matron and all the staff at Nuffield Health, Guildford Hospital, for their continued support. To see the article with full references, visit **thebiomedicalscientist.net**

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Sample to Insight

AN UNUSUAL PREGNANCY

Yvonne Webb, a Specialist Biomedical Scientist from NHS Greater Glasgow and Clyde, looks back over a case study.

The patient was a 37-year-old female with a history of pre-eclampsia, HELLP syndrome (which is the acronym for "haemolysis, elevated liver enzymes, low platelets") and a medical termination of pregnancy at 23 weeks the previous year. At the booking visit, the patient grouped as an A Negative, antibody screen negative.

Three months later, the patient arrived in the Maternity Assessment Unit with pre-eclampsia and was admitted for monitoring. This is a condition that can develop from 20 weeks in pregnancy. It is usually identified by a high blood pressure measurement in women who have previously not experienced high blood pressure. They will have a high level of protein in their urine and often swelling in the feet, legs, and hands.

HELLP syndrome is a life-threatening liver disorder that is thought to be a type of severe pre-eclampsia. It is characterised by haemolysis, high levels of liver enzyme, which can indicate liver damage, and a low platelet count. The only way to treat severe pre-eclampsia and HELLP syndrome is to deliver the baby.

The ward had sent down a Group and Save sample. The initial three-cell antibody screen was positive: 1+ in screen cell 2. Antibody identification panels were also done.

The results

Anti-D by enzyme and inconclusive by IAT (not present in screen cell 1 and panel cell 2).

The patient's phenotype was ccdee K- and the titre was 1/1. The midwife looking after the patient had confirmed she had not had any prophylactic anti-D this pregnancy. A sample was requested from the partner and two samples sent to

IMAGE: SCIENCE PHOTO LIBRARY

Scottish National Blood Transfusion Service (SNBTS) for quantification. The partner sample was tested and found to be Group O RhD Neg, phenotype ccdee K-.

I carried out the testing in the early hours of the morning, so double-checked all my work. After a discussion with the midwife, she double-checked with the patient again that she hadn't had any anti-D and was concerned about how this was even a possibility. The midwife and the medical registrar investigated further and discovered that the patient was undergoing an IVF pregnancy and was a recipient donor egg.

Post-analysis

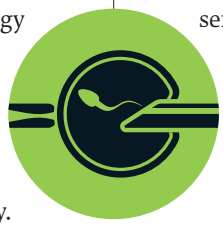
There was miscommunication by an inexperienced biomedical scientist who was on shift that day, as they had spoken to the SNBTS consultant. As per British Society for Haematology guidelines, and in the absence of SNBTS being able to determine whether the anti-D was immune or prophylactic, anti-D was issued.

Verbal results from SNBTS

No red cell antibodies present by IAT. Irregular results present in enzyme – possible weak anti-D specificity.

This difference was due to SNBTS using different analysers (ORTHO used in SNBTS, BIORAD used in our lab) and manufacturers of antibody identification panel cells.

Later that night, the biomedical scientist passed all these details on to me. I had discussed with them that the patient had not had any prophylaxis anti-D and, therefore, had to be immune if they have proceeded to look at patient notes in our LIMS system. I had a conversation with our haematology consultant and had agreed that the patient did not require any prophylaxis. However, the patient had already been given the anti-D authorised by the SNBTS consultant earlier that day.



The patient's pre-eclampsia was getting worse and the consultant decided to deliver baby at 28 weeks, rather than sending sample for cffDNA genotyping. The patient had a unit of A Rh Neg blood (rr, K-) following her caesarean section.

Prophylactic anti-D was given and we are unable to determine if the patient's own immune anti-D was still present. After further bleeding post-caesarean section, the patient had another two units given A Rh Neg (rr, K-). An antibody investigation indicated the possibility of a new antibody forming. Was this from the units transfused or from the baby?

A Kleihauer was carried out after delivery and the patient was found to have 5.1ml bleed. The SNBTS consultant advised to give anti-D. The baby's group was analysed urgently– blood group: O Rh Pos. Phenotype: CcDee

I spoke briefly and exchanged a few emails with the patients' consultant, who confirmed that the patient hadn't been aware that the egg was RhD positive and it wasn't stated in her pregnancy management notes. The consultant had stated foetal free DNA typing (cffDNA) wouldn't be required as the IVF clinic had told the patient the egg was RhD positive when she contacted them after the results of her antibody screen and her partner testing results.

Unanswered questions

How did the IVF clinic know the egg was Rh Pos? What were their guidelines and did they adhere to them? Would the IVF clinic give Rh Neg woman a Rh Neg egg?

Mandatory IVF requirements

The donors must be negative for HIV1 and 2, HCV, HBV and syphilis on a serum or plasma sample tested as follows, namely:

- HIV1 and 2: Anti-HIV – 1, 2
- Hepatitis B: HBsAg and Anti-HBc
- Hepatitis C: Anti-HCV-Ab

In certain circumstances, additional testing may be required depending on the donor's history and the characteristics of the gametes donated (for example, RhD, Malaria, T.cruzi).

> *An antibody investigation indicated the possibility of a new antibody forming*

I had briefly spoken to a Quality Manager from an IVF clinic about the mandatory requirements and the response was that they don't screen and consider Rh of the donor egg unless the patient has antibodies. So my question to that was: "Why did the clinic tell the patient they knew her egg was Rh Pos if they don't routinely test for it?" The Quality Manager couldn't answer that question.

Follow up

The laboratory haematology consultant has written to the obstetrician looking after the patient to have a repeat sample done six-months post-delivery to try to confirm whether the antibody is immune or not and to identify the possibility of any new antibodies which were developing following the delivery and multiple transfusions. BMS

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SEBIA USER GROUP MEETING

Wednesday 17th October
&
Thursday 18th October
2018

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Tel. : +44 (0)1276 600636
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Chairs:
Chris Lambert, *Service Delivery Manager, Haematology, Viapath Analytics, Kings College Hospital, London*
Professor John Geen, *Professor of Clinical Science (University of South Wales) and Lead Consultant Clinical Biochemist, Cwm Taf University Health Board*

Day 1

- **Hb A_2 Standardisation: Where to Next?**
  Barbara De la Salle, PhD, Director, UK NEQAS Haematology
- **Haemoglobin Variant Identification by Tandem Mass Spectrometry**
  Jason Eyre, Lead Biomedical Scientist, Haemolysis Laboratory, Sheffield Teaching Hospitals NHS trust
- **Established and Novel Applications of vWF Multimer Analysis in the Haemostasis Laboratory**
  Stephen MacDonald FRCPath MPhil, Principal Clinical Scientist, The Specialist Haemostasis Unit, Cambridge University Hospitals NHSFT
- **Changing from HPLC to Capillary Electrophoresis – The Edinburgh Experience**
  Patricia Ryan, BMS Team Leader, Royal Infirmary of Edinburgh, NHS Lothian

Day 2

- **Evaluation of the Sebia Free Light Chain ELISA: Method Comparison with the Serum FreeLite Assay for the Investigation and Monitoring of Monoclonal Gammopathy**
  Melissa Blaylock, Biomedical Scientist, Immunology, Carlisle
- **The Importance of Earlier Diagnosis for all and the Future Landscape of Myeloma Treatments**
  Rosemarie Finley, CEO of Myeloma UK
- **When is a Band not a Paraprotein?**
  Dr Joanna Sheldon, St Georges Hospital, London
- **Protein Quiz**
  Dr Joanna Sheldon, St Georges Hospital, London
- **Round Table Sessions; Small Expert Led Groups for in Depth Discussion**

For the full agendas and to register for one or both days of the meeting email:
usergroup@sebia.co.uk

MY IBMS NEWS

ANTENATAL CARE

GROUP B STREP AWARENESS

The IBMS supported Group B Strep Awareness Month, highlighting the vital role biomedical scientists play in identifying the bacterium that can cause a potentially deadly infection in newborns.

Group B Streptococcus (GBS) is a normal bacterium which is carried by 20% to 40% of adults, most commonly in the gut, and for up to 25% of women in the vagina, usually without symptoms or side-effects.

But occasionally it causes infection, most commonly in newborn babies, sometimes in adults and, very rarely, during pregnancy and before labour.

→ **For more information, visit gbss.org.uk**

DRUG SAFETY

IVD TEST RESULTS

The IBMS has alerted members to a drug safety update that has been issued by the Medicines and Healthcare products Regulatory Agency (MHRA).

It is regarding interference with IVD test results by eltrombopag.

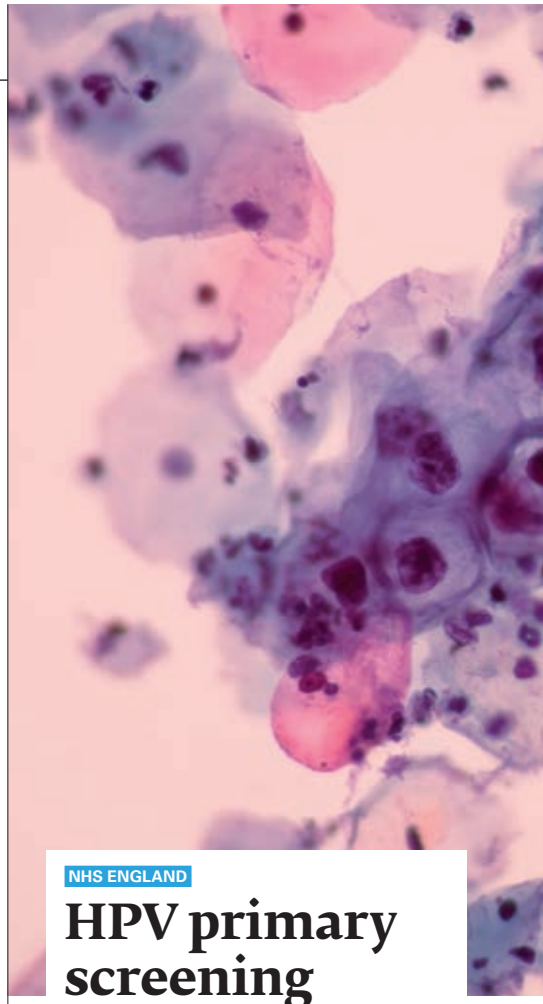
It states that should bilirubin or creatinine laboratory results be inconsistent with clinical observations, re-testing and using another method to determine the validity of the result is advised.

It states that the likely cause of this interference is the colouration of serum caused by eltrombopag.

Therefore, the degree of the affect is likely to be related to the concentration. However, the affect on bilirubin assay is minimal. The cause may be method- and analyser-specific, but

the MHRA does not have any information on which methods or analysers may be creating the inconsistent results.

→ **To read the full update, visit bit.ly/BS_MHRA**



NHS ENGLAND

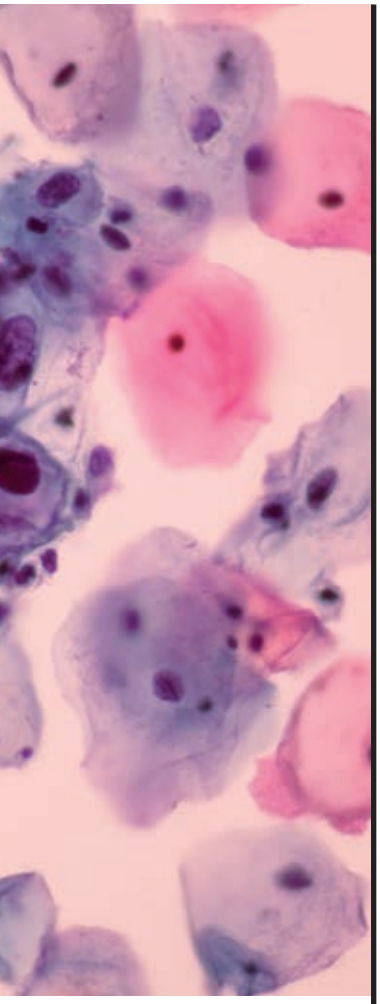
HPV primary screening

Following a review of its delivery strategy, NHS England has agreed to begin a one-stage procurement process to reconfigure provider laboratories to support the roll-out of Human Papilloma Virus (HPV) primary screening into the NHS Cervical Cancer Screening Programme in England.

In coming to this decision, NHS England has taken advice and support from the IBMS, the Royal College of Pathologists and the British Association for Cytopathology.

This decision, based upon learning from market engagement events held earlier this year, will see the procurement commence in November 2018.

To ensure the NHS Cervical Screening Programme continues to deliver a quality service to women during this period of change, NHS England will work with NHS Improvement to give all laboratories that meet the quality criteria the opportunity to implement HPV primary screening ahead of the start of the procurement process.



QUALIFICATIONS

APPLY FOR CERTIFICATE OF EXPERT PRACTICE

Applications for IBMS Certificate of Expert Practice distance-learning courses (online) are now open. The courses enable biomedical scientists with two years' post-registration experience to specialise in management, training and quality roles, or broaden their knowledge of molecular pathology. They are run with Ulster University's Blackboard Learn site and are delivered in a student-centred format with continuous assessment. Places are limited to 60 people per course.

→ **For information, visit ibms.org/education**

PRESIDENT'S PRIZES

Continuing the coverage of winners from around the country

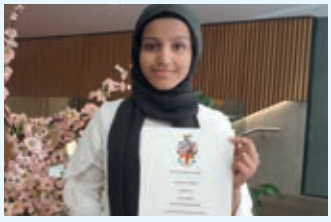
PRESIDENT'S PRIZE WINNERS

These prizes are awarded to students graduating from IBMS-accredited BSc Hons programmes who have achieved academic distinction

UNIVERSITY OF ESSEX

Hannah Stagg was this year's President's Prize winner at the University of Essex. Following graduation, Hannah, who hopes to pursue a career in histology, said that she thoroughly enjoyed her BSc (Hons) Biomedical Science degree, which included a placement year in the histology department at Queen's Hospital Romford. Robert Keeble, a long-standing Chartered Fellow of the IBMS, presented the Prize on behalf of the President.

OXFORD BROOKES

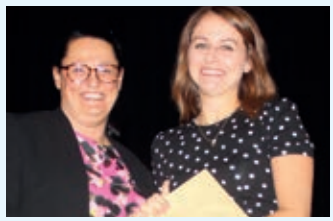


Samra Shabir was awarded the IBMS President's Prize at Oxford Brookes University. Samra, who transferred from another university at the end of the first year of her degree, kept up her dedication to hard work and achieved First-Class Honours. Her final-year project looked at the possible association of gene expression for histamine receptor H1 (HRH1) with invasion and metastasis in ovarian cancer. This involved the identification of proteins from extracellular vesicles (EVs) in ovarian cancer cell lines for any correlation with level of invasion, and the possibility of using them as a therapeutic target. Samra is hoping to continue her studies with an acceptance for Graduate-Entry Medicine in 2019.

ULSTER UNIVERSITY

Kirby Hempsey, a final year BSc (Hons) Biomedical Science with Diploma in Professional Practice (Pathology) student was awarded the IBMS Presidents Prize at Ulster University at her graduation. Kirby, who hopes to find a biomedical scientist position in Northern Ireland, was presented with her prize by Ruth Boyce, Chair of the Northern Ireland IBMS branch.

UNIVERSITY OF SALFORD



Louise Foster, the President's Prize winner at the University of Salford, graduated with a BSc (Hons) Biomedical Science with Professional Experience. During her degree, Louise completed a placement working as a medical laboratory assistant in the microbiology laboratory at the Salford Royal NHS Foundation Trust, where she was able to complete the Registration Portfolio for the IBMS certificate of competence. As a high achiever, Louise was selected by her university to undertake an eight-week studentship, with the support of a grant from the Physiological Society, and was involved in investigating the cellular basis of cardiac dysfunction in sepsis. Since graduation, Louise has gained HCPC registration and has secured a band 5 biomedical scientist position back in the microbiology laboratory at Salford Royal NHS Foundation Trust. Louise was awarded the President's Prize by IBMS National Council Member, Jane Harrison-Williams.

JOURNAL-BASED LEARNING EXERCISES

Each article's contents should be read, researched and understood, and you should then come to a decision on each question. The pass mark is 17 out of 20 questions answered correctly. JBL exercises may be completed at any time until the published deadline date. Please select your choice of correct answers and complete the exercises online at: **www.ibms.org/cpd/jbl**

DEADLINE WEDNESDAY 5 DECEMBER 2018

Iron deficiency without anaemia is a potential cause of fatigue: meta-analyses of randomised controlled trials and cross-sectional studies. Yokoi K, Konomi A. *Br J Nutr* 2017; **117** (10): 1422–31 (www.cambridge.org/core/journals/british-journal-of-nutrition/article/iron-deficiency-without-anaemia-is-a-potential-cause-of-fatigue-metaanalyses-of-randomised-controlled-trials-and-crosssectional-studies/F7E59D4BFC154E9687E42CDCC4968EAF). Assessment No 090418

01	There is no established diagnostic method for iron deficiency without anaemia (IDNA) in patients with inflammatory diseases.
02	Mast *et al.* found that 30 ng/mL of serum ferritin (sFer) gave higher sensitivity for iron deficiency compared with 12 ng/mL.
03	Fatigue not associated with known causes is a very common complaint in the general population.
04	All subjects in the Goldenberg 2013 cross-sectional study were female.
05	A significant covariate in the Lasocki 2014 cross-sectional study was Hb <10 g/dL.
06	In the Japanese cross-sectional study included in the analysis that targeted young women aged about 20, IDNA and non-ID groups were well matched.
07	The Comin-Colet 2013 cross-sectional study showed that subjects in the IDNA group complain less of fatigue than those in the non-ID group.
08	All cross-sectional studies on the relationship between IDNA and fatigue have found an association between them.
09	In some of the studies, some participants with IDNA according to the authors' own definitions of iron deficiency would be considered as having normal iron status according to the accepted IDNA definition.
10	Iron deficiency is more prevalent in Japan than in other developed countries.
11	All RCTs in the study had identical inclusion criteria for Hb level.
12	It is not possible from the study to know the threshold effective in finding fatigue patients who benefit from iron treatment because the study accepted various authors' sFer thresholds to define IDNA.
13	There was >15 g/L difference between the mean Hb level for IDNA in the Beck 2012 and Lasocki 2014 cross-sectional studies.
14	One possible mechanism for how IDNA causes fatigue is increased VO_2 by tissues, creating cardiopulmonary stress.
15	All six RCTs in the study were double-blind, placebo controlled and exclusively focused on younger adult women.
16	Iron treatment was effective to reduce fatigue in the Verdon 2003 RCT.
17	The study by Greminger and Mayer-Pröschel showed that rats exposed to a marginal Fe diet through gestation and weaning exhibited abnormal auditory brainstem responses.
18	The Sawada 2014 cross-sectional study adopted the same definition of iron deficiency as the Vaucher 2012 RCT study.
19	For cross-sectional studies, the influence of unobserved/unobservable confounders was removed because effect sizes were corrected for confounders by multivariate analysis.
20	The RCTs of Beutler 1960 and Vaucher 2012 had no inclusion criteria.

Relative resistance index (RRI) – a scoring system for antibiotic resistance in *Pseudomonas aeruginosa* Ewing J, McCaughan J, Moore J *et al. Br J Biomed Sci* 2017; **74** (4): 198–202. Assessment No 090118

01	The most commonly isolated pathogen from cystic fibrosis (CF) airways according to the authors is MRSA.
02	Mucoid *Pseudomonas aeruginosa* (PA) colonies can form a matrix where microcolonies can exist; these are thought to provide protection against antibiotic therapy but not the host immune response.
03	To determine the potential clinical relevance of the RRI, BMI was considered as a clinical variable.
04	Within the study those patients colonised with both PA and *Burkholderia cepacia* were included in the study.
05	Mucoid PA phenotypes are protected from the selective pressure of antibiotics.
06	The findings suggest that it is likely that individuals with lower FEV_1 % predicted probably develop more resistant forms of PA.
07	The results showed a moderate positive correlation of RRIs with number of IV days for mucoid strains.
08	Initial colonisation in patients is generally with non-mucoid strains of PA, with mucoid strains predominating at a later stage.
09	The authors suggest their proposed RRI is a means of combining single antimicrobial susceptibilities into a single index that can easily be interpreted by clinicians.
10	RRI was not shown to be significantly correlated with duration of colonisation with chronic PA or BMI.
11	PA showing multiple antibiotic resistance has been associated with a higher FEV_1 % predicted.
12	The authors propose that poor lung function is caused by increasing RRIs.
13	The expectation of the study was that RRIs would be higher for non-mucoid PA.
14	Ceftazidime resistance had the strongest positive correlation with number of IV antibiotic days, followed by meropenem.
15	As part of the statistical analysis used, the differences between median RRIs between 2010 and 2011 were assessed using the Mann-Whitney test.
16	Overall scores for mucoid PA did not correlate with FEV_1 % predicted.
17	In the study, 85 patients met the inclusion criteria.
18	Resistance to meropenem had the strongest negative correlation with FEV_1 % predicted, followed by aztreonam.
19	During the trial those cultures of PA that were deemed resistant were given a score of 1.
20	The results showed that there was a strong positive correlation of RRIs with age for non-mucoid strains.

REFLECTIVE LEARNING

01	Discuss the evidence for an association between fatigue and IDNA.
02	Discuss the evidence for a therapeutic effect of Fe on fatigue in IDNA.
01	The study carried out was in response to the need for accurate resistance data to inform CF patient management. With reference to your local data, what problems do you encounter using traditional or non-traditional susceptibility testing for mucoid PA phenotypes?
02	How could your laboratory adapt the approach taken in this study to better inform clinicians?

EVENTS AND TRAINING COURSES

A wide range of training courses, CPD and local events and activities is listed below. Members are advised to contact organisers for further information. A full list is available on the IBMS website.

DATE	TITLE	VENUE CONTACT
September		
4 – 6 Sep	**Three-day update for cervical cytology**	Bristol I SWRCTC@nbt.nhs.uk
11 Sep	**Mycology teaching workshop**	London I organiser@ukneqasmicro.org.uk
12 Sep	**Mycology teaching workshop**	London I organiser@ukneqasmicro.org.uk
12 – 13 Sep	**Beginners immunohistochemistry course**	Sheffield I l.baxter@sheffield.ac.uk
12 – 13 Sep	**UK NEQAS Cellular Pathology Technique mohs/BMT/renal workshop**	Gateshead I chantell.hodgson@nhs.net
13 Sep	**Laboratory aspects of haemoglobinopathy diagnosis**	London I b.bain@ic.ac.uk
13 Sep	**Mycology teaching workshop**	London I organiser@ukneqasmicro.org.uk
14 Sep	**Morphology update**	London I b.bain@ic.ac.uk
19 – 20 Sep	**UK NEQAS Cellular Pathology Technique muscle/neuropathology and electron microscopy introduction workshop**	Liverpool I chantell.hodgson@nhs.net
21 – 22 Sep	**Advanced course in EBUS/mediastinal EUS and rapid on-site evaluation for chest physicians and cytopathology teams**	Watford I winnie.tang@whht.nhs.uk
28 Sep	**Update course in gynaecological cytology – MDT cases and squamous lesions**	Birmingham I amanda.lugg@bwnft.nhs.uk
October		
4 Oct	**UK NEQAS reproductive science semen analysis one-day workshop**	Manchester I repscience@ukneqas.org.uk
4 Oct	**ISO accreditation for POCT October 2018**	Leicester I nichola.cadwallader@sbk-healthcare.co.uk
8 – 12 Oct	**Introduction to the principles and practices of working safely at ACDP containment Level 3**	Porton Down I nadp.training@phe.gov.uk
9 Oct	**HPLC troubleshooting**	Reading, Scotland, Manchester I jsumner@hichrom.com
9 Oct	**Intermediate immunohistochemistry**	Sheffield I l.baxter@sheffield.ac.uk
10 Oct	**BSAC antimicrobial susceptibility testing user day**	Birmingham I ecarruthers@bsac.org.uk
10 Oct	**HPLC method development**	Reading, York, Scotland, London, Manchester I jsumner@hichrom.com
13 Oct	**Biomed online learning courses**	London I c.e.ronan@gre.ac.uk
17 Oct	**One-day update in cervical cytology audit**	Bristol I SWRCTC@nbt.nhs.uk
17 Oct	**UK NEQAS Cellular Pathology Technique tissue morphology and recognition workshop**	Gateshead I chantell.hodgson@nhs.net
18 Oct	**UK NEQAS Cellular Pathology Technique tissue preparation techniques workshop**	Gateshead I chantell.hodgson@nhs.net
19 Oct	**Educational workshops 2018: the ongoing challenges of MRSA**	Cardiff I ecarruthers@bsac.org.uk

DATE	TITLE	VENUE CONTACT
19 Oct	**Going overboard with microbiology – "women and children first"**	Liverpool I swallis@mastgrp.com
22 Oct	**Update course in gynaecological cytology – HPV update and glandular lesions**	Birmingham I amanda.lugg@bwnft.nhs.uk
30 Oct	**Educational workshops 2018: the ongoing challenges of MRSA**	Newcastle I ecarruthers@bsac.org.uk
November		
5 Nov	**Educational workshops 2018: the ongoing challenges of MRSA**	Birmingham I ecarruthers@bsac.org.uk
6 Nov	**Educational workshops 2018: the ongoing challenges of MRSA**	Salisbury I ecarruthers@bsac.org.uk
7 Nov	**Educational workshops 2018: the ongoing challenges of MRSA**	Dublin I ecarruthers@bsac.org.uk
7 Nov	**Update in cervical cytology for pathologists, consultant BMS and holders of the Advanced Specialist Diploma in Cervical Cytology**	Bristol I SWRCTC@nbt.nhs.uk
7 – 8 Nov	**Essentials in microscopy**	Southend on Sea I debby.dawson@olympus.co.uk
7 – 8 Nov	**Update in Cervical Cytology – Scottish Cytology Training School**	Glasgow I scts@nhslothian.scot.nhs.uk
8 Nov	**Educational workshops 2018: the ongoing challenges of MRSA**	London I ecarruthers@bsac.org.uk
12 – 16 Nov	**Biosafety practitioner Level 1 (ISTR accredited)**	Porton Down I nadp.training@phe.gov.uk
13 – 14 Nov	**Advanced immunohistochemistry**	Sheffield I l.baxter@sheffield.ac.uk
14 Nov	**FNA cytology**	Bristol I SWRCTC@nbt.nhs.uk
19 Nov	**Educational workshops 2018: the ongoing challenges of MRSA**	London I ecarruthers@bsac.org.uk
22 Nov	**UK NEQAS Reproductive Science Semen Analysis one-day workshop**	Manchester I repscience@ukneqas.org.uk

HERE TO HELP

AN EVIDENCE-BASED APPROACH

Jocelyn Pryce, Head of Registration and Training at the IBMS, says keeping your portfolio pristine may not be the best way forward.

Anyone who follows this column will know that I enjoy myth-busting whenever I can. During the first half of this year, I travelled extensively, being involved in a number of training days across the UK. I often hear comments that all IBMS training is London-centric, but this is not the case, albeit many of my earlier training sessions were closed and by invitation, rather than open to all.

More recently, whenever I have been invited to speak at a training event, I have requested that it is opened to interest from outside the group. This has meant that a greater number of people have been able to attend, we are able to encourage networking and some strong relationships have been built as a result. The focus of the training days has been to discuss what "good evidence" should look like and how to achieve it.

We receive a large number of emails asking what evidence would be suitable for particular standards and, although I try to describe what good evidence should look like, it is difficult to answer whether a specific piece of evidence would be suitable without actually seeing it.

To help with this, our aim is to empower the training teams to have the confidence to know what good evidence looks like and to ask themselves whether a certain piece fits the bill. At our sessions we talk about approaches to evidence, using examples as discussion points, and looking at how we could improve them. There is a fundamental approach to evidence gathering and that should be "does this piece of evidence meet the standard?" If the answer is "no" then it should not be used in its current form.

Many trainees prefer their portfolios to be pristine, without feedback, but the verifier is expecting to see evidence of the relationship between the trainee and the trainers. It is only by seeing this interaction within the evidence that the verifier is able to get a feel for the relationship that exists between the two and what type of experience the trainee has had. So, if your trainee pressurises you to allow them to produce a pristine version of their portfolio, please try to impress upon them the value of displaying their earlier works along with the feedback you have given them along the way.

Ideally, evidence should be produced by the trainee, with feedback by the trainer shown, and, where possible, work should show evidence that the trainer's feedback has been taken on board and acted upon. This demonstrates far more than just what is on the page in front of the verifier, it shows that there is a relationship built on trust where the trainee is working with the trainer to progress; that the trainer has spent valuable time guiding the trainee and facilitating their development.

Although on the face of it the verifier is purely assessing the trainee, a large proportion of the verification is concerned with the verifier satisfying themselves that the whole period of training has been robust and meaningful.

THE DOCTORS LABORATORY

SENIOR BMS ROLE IN NORTH WEST LONDON

We are looking for enthusiastic, forward thinking applicants to join our Senior BMS team at Northwick Park & Central Middlesex Hospitals. Applications are invited from individuals with Haematology and/or Blood Transfusion experience.

The Department includes two Haematology and Coagulation sections and two Blood Transfusion Departments offering 24 hour services - we also house a haemoglobinopathies section.

You will be required to participate in the analytical service across all shifts including early, late and night shifts, following a period of initial training, and weekend cover. The post holders will be responsible for the day-to-day operation of one of the departmental sections, overseeing a team of BMS and MLA staff and ensuring targets, turn-around-times and training needs are met.

When applying, please use ref: **NWPHM3107**

For further details, e-mail: victoria.moyse@tdlpathology.com

Closing Deadline: Friday 14th September 2018

THE DOCTORS LABORATORY

SENIOR BLOOD TRANSFUSION BMS ROLE

An opportunity has arisen for an experienced HCPC-registered Senior Biomedical Scientist wishing to work in pathology at our Laboratory situated at the London Independent Hospital. The successful candidate will be expected to play a leading role in the Blood Transfusion Service.

Working as part of a small team, this is an excellent opportunity to further develop your skills, knowledge and experience within a multidisciplinary laboratory. Duties will include routine operation, maintenance and troubleshooting of various analysers including; Roche, Sysmex and Diamed instruments, technical validation and authorisation of results and stock management.

The laboratory operates 24/7 with overnight on-call from home weekdays and weekends. A 30 minute locality is therefore required.

For further details, e-mail: kelly.thwaite@tdlpathology.com

Closing Deadline: Friday 14th September 2018

CPS

TEAM LEADER BIOMEDICAL SCIENTIST - HISTOLOGY & NON-GYNAE CYTOLOGY – 1 vacancy

Band 8a/b + 10%, Benefits & Performance related bonus

To lead the Laboratory team and to take an active role in QMS and Staff Training
External Courses are supported

Cellular Pathology Services Ltd is a fully UKAS ISO15189:2012 accredited private laboratory with IBMS-approved training status, providing quality driven laboratory services to the independent and NHS sectors. Our facility is located in west Watford within modern premises.

Due to expansion we are looking for an enthusiastic, forward thinking experienced Biomedical Scientist to lead our busy laboratory that provides routine Histology and Non-Gynae Cytology services. A proven track record in management at senior BMS or above would be a serious advantage, experience in frozen section or Mohs sectioning is essential.

Our staff have strong team spirit and show initiative with a "can do" attitude. You need to be a self-starter who has a flexible approach to the required hours of work and thrives under pressure. Flexible working patterns are in place to cover the laboratory from 7am to 7pm which you will be required to participate in.

The successful applicant must be state registered with HCPC and must have a wide experience in routine histological techniques, including immunohistochemistry, cut up, special stains and have knowledge of tissue recognition. Candidates must be eligible to work in the UK. You will need to have a driving licence as satellite laboratory support may be required.

Staff benefits: a competitive salary, annual performance bonus, pension scheme & health insurance.

For information/visit, contact the Laboratory on 01923 233299.

Application forms are available on: www.cellpathservices.co.uk

Completed applications and your current CV should be sent to: Human Resources, Cellular Pathology Services Ltd, Unit 12 Orbital 25 Business Park, Dwight Road, Watford WD18 9DA

Alternatively these can be scanned and sent to: HR@cellpathservices.co.uk

MY LAB

MORECAMBE BAY BLOOD SCIENCES

Biomedical Scientist **Danny Gaskin** gives a guided tour of his blood sciences lab at Furness General Hospital.

With a population of around 60,000, Barrow is the home of Furness General Hospital, one of the three hospitals that make up the University Hospitals of Morecambe Bay NHS Foundation Trust. It's here in the blood sciences laboratory you will find me, working hard with my colleagues to provide the people of South Cumbria with an excellent and effective blood sciences pathology service.

At the trust, there's over 100 staff working in blood sciences, including medical consultants, clinical scientists, technical services managers, quality managers, biomedical scientists, healthcare science assistants, trainees and administrative staff, all working together to make the trust a great place to be cared for and a great place to work. I'm proud to be here at Furness General Hospital, developing my skills and knowledge, surrounded by a wealth of experience and rising talent.

The trust is committed to the training and development of staff. Our department is approved by the IBMS to provide pre- and post-registration training for our biomedical science staff. Currently, we have four trainee biomedical scientists working towards completion of the registration portfolio, other newly-qualified biomedical scientists studying towards the specialist portfolio and a number of our more experienced staff undertaking the Higher Specialist Diploma. We're passionate about training and development and work closely with a number of universities, providing placement opportunities for students to develop their professional skills and complete the registration portfolio. More recently, we have collaborated with Kendal College to introduce the apprenticeship entry route to the profession, and have since recruited two apprentices, who are now working with us in the department.

Blood sciences recently welcomed UKAS to our department and we continue to work on continuous quality improvements across the service. For a district general hospital, we have a relatively wide repertoire of haematology, transfusion and biochemistry tests and continue to be innovative in the way we meet service user requirements.

In June 2017, the department introduced new rapid serum testing tubes, which have significantly improved A&E turnaround times. This initiative has been very successful, with turnaround time targets having been met every month since the introduction of these tubes. Now we are able to perform this rapid analysis on about 20 commonly requested biochemistry tests.

The installation of new analysers means we can now offer faecal calprotectin and faecal immunochemical testing, and sexual health serology. As a department, we welcome collaboration from other departments and want to work closely with clinical colleagues from other services to ensure we provide a service that is fit for patients and for the future.

I recently curated the @NHS twitter account for a week and was absolutely humbled by the response I received from healthcare professionals and the public alike. On the back of that success, we have revived the @UHMBT_Pathology Twitter account and I invite you all to follow and join in the discussions and to keep up to date with what's happening here in the department.

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or visit our website:
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THE POWER OF KNOWING

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