Medics urged to organise refugee screening

Late-breaking refugee health research at ECCMID 2016 conference

Politicians and health professionals worldwide face a number of unique public health challenges due to migrations.

Thousands upon thousands of humans have taken and are continuing to take flight from wars, persecution and economic stress, seeking the chance of survival in Europe and other countries. They arrive not only physically exhausted, but also in mourning for those killed in their own countries, or during hellish journeys – therefore many also suffer unimaginable mental trauma. Clearly they need healthcare on several levels.

This April in Amsterdam, for the 2016 European Society of Clinical Microbiology and Infectious Disease (ECCMID), 340 late-breaker abstracts were submitted, 25 of which related to refugee health. Seven among those were chosen for airing. What they highlighted is the need for comprehensive screening programmes, improved therapy, and vaccination coverage in countries that have received and/or are receiving refugees.

Why? On top of the obvious physical and mental damage to these newcomers, as Winfried Kern Programme Director of ECCMID said, researchers in various countries have observed an increased prevalence of resistant pathogens, or emerging or re-emerging infectious diseases, including HIV, TB,Salmonella, shigella, scabies and other parasitic infections. 'Healthcare services across the world are facing a number of new challenges as a result of recent mass migration,' Kern confirmed. ‘Refugees may carry both resistant pathogens and microbes, causing the emergence or re-emergence of infectious diseases that have become less prevalent in host countries. These include methicillin-resistant Staphylococcus aureus, HIV and tuberculosis. Infectious diseases carried and transmitted by travellers and migrants increase the disease burden.

We recommend that public health facilities maintain and step up screening programmes and put the appropriate precautions and procedures in place to most effectively protect migrants and domestic populations in host countries.’

Clearly, politicians and health professionals worldwide face a number of unique public health challenges due to migrations. The refugee health researchers presented evidence from health services in Denmark, Germany, Switzerland, Taiwan, Norway, Brazil and the Netherlands regarding some of those challenges.

Denmark
A study of HIV care among refugees and family-reunified migrants compared to Danish-born individuals compared 405 migrants and 279 Danish-born individuals. The incidence of HIV infection among the immigrants proved higher than that of Danish-born individuals. The highest risk was observed in sub-Saharan Africans and heterosexual cohorts, and refugee and family-reunified migrants were also more likely to seek medical treatment late, further increasing the risk of spreading the infection.

The researchers postulated that these results indicate migrants experiencing barriers in accessing HIV testing and call for a more systematic medical reception of newly arrived migrants in recipient countries.

Norway
An analysis of the impact of immigrants and importation in Norway from 2006-2015, showed that the reporting rate of MRSA infections continues to increase there, boosted by imported cases, particularly in younger people and those with an immigrant background.

The presented data suggests that terrorism and immigration may be important drivers for the current rise in MRSA infections.

Germany
A screening of 20,312 stool samples taken at refugee centres in Thuringia, Germany, showed that, in 2015, one in every 300 refugees carried Salmonella or Shigella. As many as six ESBL-positive Shigella strains were isolated from Syrian children – two of them were resistant to ciprofloxacin. As a result of these findings, the surveillance programme with screenings for Salmonella and Shigella was expanded.

The presented data suggests that importation and immigration may be important drivers for the current rise in MRSA infections.

Switzerland
An abstract on the prevalence of drug-resistant pathogens – MRSA and ESBL – at four Swiss refugee centres showed that refugees ( irrespective of origin) had colonisation rates that were ten times higher for methicillin-resistant Staphylococcus aureus (MBSA) and five times higher for extended spectrum beta-lactamase (ESBL) compared to the local population.

The researchers also observed that more than a third of refugees from the Middle East were colonised by ESBL compared with less than a quarter in the general refugee population.

The authors concluded that the increased rate of colonisation at body surfaces with resistant bacteria among refugees from certain areas needs to be taken into account in case of illness and admission to a hospital.
The launch of a novel rehabilitation service bed helps

NHS tackles bed blocking crisis

**Report: Mark Nicholls**

Bed blocking is a major problem within NHS hospitals across the UK, with thousands of patients sitting in hospital beds facing discharge until the necessary next stage of their care becomes available.

A delay may be non-availability of a temporary or permanent space in a residential home, or rehabilitation unit, or a smaller community hospital, or lack of a supportive care package for their return home.

The latest figures from England’s National Health Service (NHS) on Delayed Transfers of Care revealed 199,188 delayed days in January 2016 alone, of which 103,500 were in acute care. This is an increase from January 2015, when there were 150,400 total delayed days, of which 103,200 were in acute care.

This was also the second highest number of delayed days reported in a month since monthly data was first collected in August 2010. Some 61% of all delays in January 2016 were attributable to the NHS, 31% attributable to Social Care and the remaining 6.7% attributable to both NHS and Social Care. The main reasons for delayed discharge were patients awaiting further non-acute NHS care while the main reason for Social Care delays was ‘patients awaiting a care package in their own home’.

An independent review by Labour peer Lord Carter found nearly one in 10 beds was taken by someone medically fit to be released and delays in discharging patients from hospital after treatment could be costing the NHS in England £900 million a year. His report described the issue as ‘a major problem’ causing operations to be cancelled and resulting in the NHS paying private hospitals to see patients.

Critics say the lack of social care in the community is a key reason why people cannot be discharged from hospital and the latest figures come at a time when spending on social care in the UK has fallen by £1.6 billion over the last five years.

However, one health charity in the east of England – working with NHS partners - has taken steps to offset this blockage in the system. The Papworth Trust, a charity for disabled and older people, has opened a £2 million residential scheme designed to ease the growing bed-blocking crisis in hospitals across the surrounding area. This consists of 28 purpose-built, self-contained flats that will bridge the gap between a hospital stay and discharge by replicating a resident’s home, providing each patient with more than four hours of occupational therapy daily.

The accommodation, to be known as MacFarlane Grieve House, will help residents regain practical skills, confidence and independence, while also providing short-term care 24-hours a day.

The new rehabilitation service is run on behalf of Cambridgeshire and Peterborough Clinical Commissioning Group (CCG), Cambridgeshire County Council and United Care, with nursing services provided by the Cambridgeshire and Peterborough NHS Foundation Trust. The Papworth Trust hopes that the NHS and social care providers with a number of organisations ‘as well as research organisations.’

**Sir Andrew Cash, of the Sheffield Teaching Hospitals NHS Foundation Trust, foresees a unifying of healthcare providers with tech and research groups** published in October 2014, and sees the UK Government and the Academic Health Science Networks (AHSNs), and NHS England working with organisations from across the world deploying and testing various innovations.

The Sheffield’s Perfect Patient Pathway test bed includes more than 30 partner organisations; these technology coupled with new ways of delivering care will be used to keep people with long-term conditions well at home, often avoiding hospital admission or further support. A range of home-based monitor- ing devices and smart phone apps will mean patients can be supported to understand their condition and how they can manage at home with data received from the devices being collated and interpreted in an integrated intelligence centre.

Sir Andrew Cash, Chief Executive of the Sheffield Teaching Hospitals NHS Foundation Trust has observed that ‘The Perfect Patient Pathway test bed is a fantastic way of bringing together the region’s health and social care providers with a number of organisations as well as research organisations.’

**The Netherlands**

Researchers observed high rates of scabies and its complications among asylum seekers from Ethiopia, Eritrea and Somalia. This represents a considerable burden for the healthcare system, especially where refugee centres already are under considerable strain due to high numbers of new arrivals, the researchers commented.

They suggest that the scabies must be rigorously controlled in asylum seekers to reduce the risk of complicated cases, the spread of scabies, and to prevent the spread to other patient groups in the proximity of individuals from high-risk countries.

**Taiwan**

Surveillance study of tuberculosis among immigrant workers following pre-entry screening in Taiwan, 2011–2014 identified 2,980 cases of
The free ride is over!
Medtech industry will stop paying physicians to attend medical conferences

At Europe's most prestigious medical conferences, as many as half of the doctors attending are only there because of the generous sponsorship by pharmaceutical and medical technology companies. John Brosky reports.

The practice has been going on for decades, to the point that continuing medical education (CME) in Europe is heavily dependent on the largesse of these companies.

In 2018 it all comes to an end when a new Code of Conduct adopted by the European Medical Technology Industry Association comes into effect.

“We are aligning our association’s code of conduct with the United States, China, and many countries of Latin America where the direct sponsoring of a physician is not allowed and you can only support CME through educational grants,” said Serge Bernasconi, who leads Europe MedTech, an alliance of European medical technology industry associations.

“This is making some of the medical societies very nervous,” he added.

Annual medical congresses with large industry exhibitions have become a rich source of revenue for many professional medical societies, and what is worrying them is that without industry support, many congress participants simply would not have the budget to be able to attend.

The USA enacted the Physician Payments Sunshine Act Sunshine act in 2010, to create greater transparency in doctor-industry relations.

When the law was put into effect in 2013 with enforcement by the Centers for Medicare & Medicaid Services, physician participation at annual congresses dropped by as much as 50 percent.

The European Society of Radiology, which puts on the annual European Congress of Radiology in Vienna, has discussed the impact of the new Code of Conduct internally, but has not made public any decision about actions it will take, according to a spokesperson.

Europe’s interventional cardiologists did go public with their protest with an editorial in EuroIntervention, urgently calling for a delay in enactment of the Europe MedTech rules.

Patrick Serruys, M.D., Editor-in-Chief of EuroIntervention, wrote in an Expedited Editorial Publication published in November, 2015 that the new Code of Conduct ‘will probably not affect key opinion leaders, but will affect the more vulnerable categories of healthcare professionals such as younger colleagues, nurses and technicians. The janitors of today may not benefit from the grants allocated to hospitals, especially at the early stages of their careers, nor will nurses and allied professionals.’

Joining Serruys as co-authors of the editorial were William Wijns, MD, Chairman of the PCR (Paris Revascularisation Course) group that organises a series of highly successful conferences for interventional cardiologists implanting stents and heart valves, and Stephan Windecker MD, President of the European Association of Percutaneous Cardiovascular

Continued on page 4
Physicians will learn assertiveness

Most accidents result from ‘the human factor’ – long acknowledged in aviation. Thus all crew members receive regular safety training to help prevent errors on board and on the ground. Now experts at the German Society for Orthopaedics and Trauma (DGOU) with those from Lufthansa Flight Training have developed a similar training programme for physicians. This Interpersonal Competence Training was presented in Berlin during October’s German congress for orthopaedics and trauma surgery (DKOU)

In the 1970s aviation researchers found out that roughly 70-80% of all aviation accidents were caused by human error. Thus specialized training formats were introduced to help prevent errors both on-board crew members and air traffic controllers on the ground. An important component of this training is Crew Resource Management (CRM), thus it aims to build an extremely important though often neglected factor: social skills. That is not so much about being polite, but being assertive in critical situations.

Neither a comparable research discipline nor a comparable training approach exists in healthcare, despite how much more difficult it is for physicians to detect critical events or incorrect treatments – not to mention identifying their causes. Obviously errors do happen. According to international estimates each year approximately one per million hospital patients die due to avoidable treatment errors. With roughly 19.1 million patients admitted to German hospitals in 2014 that would translate to 19,100 patients who died from avoidable treatment errors.

The fact, as such, is not new. Then why have leading members of the German Society for Orthopaedics and Trauma (DGOU) decide now to approach experts at Lufthansa Flight Training GmbH to develop a CRM-like training for physicians?

It was an idea whose time had come,' said Professor Bertil Bouillon, Director of the Clinic for Orthopaedics, Trauma Surgery and Sports Traumatology in Cologne-Merheim, Germany, who is also a certified trainer for the new programme. He underlined that economic pressure in hospitals increases physicians’ workload – which in turn increases stress and the error risk. In the end, however, it was the individuals’ dedication that made the new training format happen.

What is unique about the interpersonal competence (IC) training is that it was developed jointly by physicians and safety trainers, explained Martin Egerth of Lufthansa Flight Training. A certified CRM trainer he is one of the main architects of the new course format. Egerth sees many parallels between the work environment in aviation and in hospital care: a strict hierarchy, much routine work, complex situations, high stress levels and the need for effective communication.

For Egerth, who seized the chance to gain a bird’s eye view behind the scenes of a hospital, there is one particularly important skill: assertiveness. What is known in aviation

Interventions (EAPCI)
The cardiologists call for a postponement of the phase-out of payments to physicians, as the societies’ congresses are planned far in advance and they need an opportunity to determine how deeply the new rules will cut into attendance at meetings.

The editorial followed a crash meeting held by the three authors and other leading cardiologists with Bernasconi and EuropeMedTech executives in October, 2015 at a hotel in the Charles de Gaulle Airport (Paris, France).

The physicians position in the discussion was that the proposed code of conduct is a one-sided document written by-and-for the interests of industry without consultation from the physicians and that this has provoked, ‘a lot of confusion and misunderstanding within our professional community,’ according to statements in an editorial.

Whilst both parties agree that direct sponsorship can be perceived by the public as an issue in creating inappropriate interactions, we as physicians are concerned that [the] proposal may significantly impact the future of CME, create major restrictions for smaller meetings, and severely impact larger conferences,’ the editorial states.

In Europe, France led the charge toward greater transparency passing a Sunshine Act in 2011 that was enacted in May 2013. Portugal, Denmark, and Slovakia have also enacted rules for greater physician-industry transparency.

The impact of these fragmented actions have not tipped the scale as the reformed Code of Conduct among Europe’s leading companies in the medical technology industry.

While there is not currently a movement by the European Union to enact a pan-European Sunshine law, Bernasconi said, ‘perhaps that would be better.’

‘What we have today are different legislation and recommendations at various country levels, which becomes very complex. We have 28 different ways to manage the relationship. In France every time you buy a cup of coffee for a physician you need to report it.’

The Netherlands says you can subsidise half the expense of a physician going to a congress. The Italians say you cannot pay for a doctor going to a congress, unless he has the approval of his boss. The ‘Nordic countries say you cannot pay for a physician to go to a meeting,’ Bernasconi added.

According to Bernasconi the pharmaceutical industry in Europe has taken an approach to transparency that leaves current practices in place, but requires sponsorships and financial support to be made public.

‘We looked at that, but saying it publicly, posting it on a website does not address the conflict of interest that is evident to anyone, and no one today is going to believe there is not an influence,’ he said.

‘We have gone one step further into what we call transparency-plus. What we want is that if industry is going to continue supporting medical education, we want to be sure we are not going to be criticized for the way we do it,’ he said.

‘The objective of industry is not to suddenly take away its funding of medical education, but to change to a different model,’ he said.

‘They will have two years to figure this out, to create educational activities and programs that industry wants to support,’ he said. Otherwise in a given specialty area, companies will figure out ways to create their own programs for CME.
The ultra high-definition monitor

High-def is suddenly so-yesterday for minimally invasive and endoscopic surgery

The Visera 4K UHD system captures and displays 8.2 million pixels

The Visera 4K UHD system captures and displays 8.2 million pixels in order to demonstrate that its digital OR-over-IP system can easily handle the enormous data packets from the 4K camera and display them in medical-grade 4K monitors.

In early November, Barco demonstrated its ability to plug in the 4K technology to the operating theatre (OT) in AZ Greenhawe hospital in Kortrijk for a laparoscopic liver resection.

Camera images encoded as IP packets can be sent to any display device by cable or wirelessly, which cleans up the clutter in an OT and makes live images available for sharing at any authorised locations, explained Johan Stockman, Barco’s vice president for Strategic Marketing for Surgical Imaging.

Sony-Olympus utilises a similar approach to handle the 4K image files.

In marketing the new products that the consumer end-to-end becomes a key differentiator.

Critically, the images from a live surgery must also be displayed on a 4K screen. Without closing the loop, the vivid value of the captured images is lost.

It is also a signal that hospitals face significant end-to-end investments in cameras, processors and monitors to upgrade to the 4K technology.

‘4K has emerged, it is coming and it will arrive,’ said Stockman. ‘It is on everyone’s agenda in the R&D labs right now, and will be on every surgeon’s wish list,’ he added. ‘If it improves surgical outcomes, hospitals are going to invest in it.’

Medical heads turn to eye 4K and even 5K

The equivalent of HD or Ultra-HD for home television and video is now entering the world of medicine.

Although 4K technology with its high-resolution display quality is already used in radiology, there are arguments to say it is not yet benefit from this advanced technology. However, the Japanese company Totoku Electric Co., Ltd. now offers a simple and effective solution for pathology where 4K technology is yet to be used.

In our interview with Marcel Herrmann, Marketing Manager for the Medical Displays division at Totoku Europe, he underlined: ‘Pathology still works with analogue procedures in many areas, but high definition monitors can turn pathology workflows into digital workflows for pathologists.

Pathologists more than welcome higher resolution images

Pathologists more than welcome higher resolution images. The Synergy UHD4 imaging platform that honour belongs to orthopaedic surgical specialist Arthrex (Naples, Florida), which introduced the Synergy UHD4 in March 2015, at the annual meeting of the American Academy of Orthopaedic Surgeons.

The Synergy UHD4 imaging platform features a programmable camera head, a xenon-bright LED light source, an image management system and fibre optic video over IP (internet protocol) integration all in one tablet-controlled device.

Medical display specialist Barco connects the Arthrex Synergy UHD4 to its Nexxis OR Management Suite, which cleans up the clutter in an OR and makes live images available for sharing at any authorised locations.

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Since talk about 4K technology, and even 5K, is widespread in the medical circles, we asked Marcel Herrman of Totoku Europe, why interest is so keen.

This technology delivers the type of high-resolution images that we already have in our homes and which are now conquering the world of medicine. In certain areas of medicine, such as radiology, high-resolution images are nothing new. Displays with five million to 15 million pixels are standard here. However, other areas, such as pathology, don’t yet benefit from these high-resolution images, although the advantages are obvious. Pathologists need more details in their images than radiologists. To date they have viewed these through microscopes.

‘The current procedure in pathology involves scanning sections and then digitally viewing them at the workstation. Once the sections are digitised it’s easy to obtain a second opinion by digitally sending the sections on. This also makes diagnosis easier. The practical implementation of 4K technology is relatively easy: All you need is a computer, a display and a graphics card that can convert 4K, and almost all graphics cards these days are capable of this.’

With that simplicity, surely this technology should be far more established.

The difficulty is that apart from the computer and technical requirements, the technology display you also need sources that can deliver 4K. The technological solutions for this are comparatively expensive.

Is this where Totoku’s solution comes into play?

‘We know that many people shy away from large investments but still want to jump from working with analogue procedures straight to 4K because they see the huge benefits, particularly for pathology. This is why we have developed a competitive solution, which still offers all the advantages of 4K technology.

‘Many microscopes can connect to a single-lens reflex camera. This interface has been used for documentation. However, if the interface is used to connect a 4K camera, which is then connected to the respective digital display, this delivers an effective and affordable 4K solution, which we presented at the ECR in Vienna.

‘We are basically connecting two different areas here, using the experiences gained in professional broadcasting. TV and video production has long worked with very powerful cameras, which makes post-editing easier. Our technology solution is essentially based on experience with professional video equipment. Our answer to the problem is basically a plug and play solution.

‘It would probably take years, or even decades, until the entire pathology workflow is digitised in the conventional way – and it will be therein lies our key differentiator.’

Could the company venture into endoscopy with this solution?

‘Theoretically, yes, although endoscopy requirements are higher, because even smaller sensors and camera technology are needed. This will most likely be possible in future.

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In sight: greater clarity for pathologists

The equivalent of HD or Ultra-HD for home television and video is now entering the world of medicine.

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‘We are basically connecting two different areas here, using the experiences gained in professional broadcasting. TV and video production has long worked with very
Here is a quick formula for accelerating the time spent reading diagnostic images. If you can see it faster and with greater confidence, you will save time. Asking how much time can really be saved is a fair question, and considering the significant investment Barco has put into improving diagnostic displays, the company wanted to know the answer as well.

‘One day a week,’ said Bjorn Belpaeme, the manager for Barco’s Coronis Fusion portfolio. The evidence comes from a study at the Montefiore Medical Center, a teaching hospital for the Albert Einstein College of Medicine in New York City that compared a dual three-megapixel (MP) display system with the next-generation Coronis Fusion 6MP display. The result was a time savings of 19%, and importantly, a significant reduction in eye strain during reading sessions.

Yet adding more pixels is only one link in the complex chain of elements that need to pull together for sustained improvements in productivity, day-in and day-out, he explained.

‘Nothing else compares with the new line’
Enhancing display ergonomics needs to take into account things like the screen size, viewing angle, image detail, or light calibration and then there are tools and software a radiologist might use to improve workflow.

Belpaeme said that, by revisiting and re-engineering these elements from the ground up, Barco today is bringing forth a next-generation of the Coronis Fusion line with what he called, ‘an unmatched quality that has never been seen’ of what radiologists call JNDs, or Just Noticeable Differences, that reveal more subtle details on the screen, more than just more light. It means radiologists can see details more quickly, such as a small fracture in bone or tiny lung nodules, structures that they simply cannot see on a standard display, and this saves a lot of time,’ Belpaeme explained.

Barco notes there are 10% more of what radiologists call JNDs, or Just Noticeable Differences, that reveal more subtle details on the Coronis Fusion.

The system also offers the highest real estate of any diagnostic display, with 400 candelas brightness that is the industry standard. ‘This means the 400 candela brightness that is the industry standard. This means more than just more light. It means radiologists can see details more quickly, such as a small fracture in bone or tiny lung nodules, structures that they simply cannot see on a standard display, and this saves a lot of time,’ Belpaeme explained.

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According to a recent study by The MarkeTech Group, about 85% of radiologists use three displays or more, which explains why 87% of radiologists complain of physical discomfort, such as back pain, neck strain and eye fatigue when reading images.

Boosting site luminance while dimming the rest
The super screen size and the wide viewing angle of the Coronis Fusion displays helps to reduce head and eye movements as well as minimising image manipulations for a more ergonomic reading experience.

Bundled with the next-generation line of Coronis Fusion displays is a tested and proven suite of intelligent tools to help improve viewing control and enhance reading productivity.

Barco’s proprietary SpotView technology can boost the luminance in a region of interest while dimming the surrounding image area to provide a sharp focus on selected details more efficiently. Filling out the toolkit are DimView, SmartCursor, Find Cursor, Application Appearance Manager, and VirtualView.

Like all of Barco’s medical display systems, Coronis Fusion 6MP comes with MediCal QAWeb, a cloud-based technology for automated calibration and Quality Assurance to ensure maximum up-time of the display with no need for human intervention.

See Every Detail, Every Color
Live surgical video signals in crystal clear 4K UHD resolution.

The stand-out feature of the renewed Coronis Fusion family is a 50% increase in luminance, and a tested and proven suite of intelligent tools to help improve viewing control and enhance reading productivity.

At the speed of light
Pumping up brilliance on the Coronis Fusion accelerates productivity for a next generation of diagnostic displays, John Broksy reports

4K UHD Monitors from FSN let you…
- See sharp, detailed images
- Be closer to the screen
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Optical fiber transmitters and receivers will extend 4K UHD, 60 Hz, over long distances.

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55 in. diagonal screen in quad HD layout mode.
Introducing Sony 4K surgical monitors LMD-X550MD and LMD-X310MD.

4K means detail and lots of it. These 4K surgical monitors from Sony allow medical professionals to see vessels, tissue and organs in detail never before possible with current Full HD technology.

4K delivers four times the resolution of HD for true-to-life clarity that’s so important in minimally invasive surgery and education. The unique OptiContrast™ panel reduces glare and reflections whilst enhancing contrast. All within a robust, slim and modern design chassis.

4K - detail when it matters most
pro.sony.eu/4kmedical
Conferences demand large size and high-res

This means catering for multi-disciplinary team meetings, tumour board and trainings. Efficient communication and discussion between patients and cooperating physicians is crucial for success. ‘Modern medicine is team work,’ explains Dr. Thomas Eggelhöf, head of Radiology in the Merian Iselin Klinik für Orthopädie und Chirurgie Basel, Switzerland. ‘It works best, if you can assess and discuss examination results with the doctors and patients involved. For this purpose, the image display must be so precise that, from the different viewing angles and distances in the meeting room, good conditions are found to carry out and obtain an in-depth analysis.’

The state of the art UHD medical conference room solutions offer a 1:1 resolution clone from an 8MP diagnostic display onto an UHD (3840 x 2160) large format DICOM display, the company adds. The NEC XUHD series is available display sizes ranging from 65” to 98” to meet any size of conference room and viewing distance. The X84U1HD-2 diagonal dimensions of more than two metres allow several images to be shown alongside each other for direct comparison.

‘The sheer size permits groups of up to 10 people to gather in front of the screen with unrestricted views. Thanks to the high display brightness, images remain stable regardless of the ambient room lighting. While in operation, the monitor does not emit any audible sound; therefore concentration is not impaired, even in larger groups, or sensitive meeting situations. The NEC XUHD series delivers unequaled medical image quality combining reliable 10-bit colour reproduction with a high luminance and contrast ratio. A semi-matt surface restricts the effect of reflections on the screen.

‘The internally programmed DICOM curve optimises the display to human visual performance in compliance with the DICOM Part 14 standard, drastically improving the accuracy at which images can be reviewed; the firm continues. ‘The NEC Professional large format displays can be DICOM calibrated with NEC GammaCompMD QA client software and an external MDSV sensor 3. The LED backlit S-IPS (LED) panel technology eliminates colour shift regardless of the viewing angle, which could be an issue for horizontally positioned conference rooms around a commercial PVA (LCD) panel technology large format display.

‘The replacement of projector lamps is eliminated reducing the total cost of ownership (TCO) of the solution. Thanks to the wide variety of connection options, several signal and cable types allow a flexible choice of playback sources alongside PACS display.’

‘Size and resolution are key factors in medical imaging displays, thus NEC points out ‘radiologists will benefit greatly from the 51” sized NEC MD522C8 diagnostic monitor with 8MP (UHD) resolution for daily reporting outside conference sessions’.

Details:
www.medical.nec-display-solutions.com

Out goes pixelation

Continued from page 7

In addition, medical teams using 4K displays have the capability to see a ‘quad-split’ view of four full HD signals (1920x1080) on one display, helping them view different angles and sources. HD monitors on the market today would only be able to display one quarter of HD in each quadrant. This means that surgeons are now able to view four simultaneously fully high definition sources, such as an endoscopic camera, room camera, radiology signal and patient vitals.

Another great example for the use of 4K and high-resolution displays is in patient distraction and entertainment. Hospitals, as well as General Practices, have had increasing success in reducing patients’ anxiety by installing displays in waiting rooms and common areas to provide entertainment and a welcome distraction in an otherwise potentially stressful situation.

Patient distraction is perhaps most important for physicians dealing with children. With the goal of reducing anxiety in pre-surgery patients and parents, the Alder Hey Children’s NHS Foundation Trust, for example, has installed a digital aquarium in the day surgery waiting room, featuring the first digital aquarium in any hospital in the world and the first installation anywhere outside of Japan.

The digital aquarium draws on a combination of exceptional display technology and touch screen capability, resulting in an interactive experience that provides an entertaining distraction and helps to alleviate some of the stress that children and parents experience prior to procedures. Whether for operational use in OTs or entertainment, both 4K and 3-D technologies still have huge untapped potential for medicine, and companies like Sony will continue to innovate and evolve their solutions to fit the ever-expanding increasing needs and requirements of medical professionals, and ultimately support patient care in all forms.
The NEC MDT Room Solution is a complete solution including everything needed to provide the latest medical meeting room infrastructure. The Medical Desktop and Large Format Display – both 8MP – can be cloned on a pixel to pixel level to provide outstanding image quality without any loss of data or visual detail. This solution helps to establish efficient reviewing processes and diagnostic investigations as well as providing hospitals a future-proof investment in a state of the art technology and quality.

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NEC 8 MEGAPIXEL MDT ROOM SOLUTION SETS NEW STANDARD FOR RADIOLOGICAL PRACTICE

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Even displaying a beetle’s hair

‘4K technology is the future - a fact which hasn’t gone unnoticed by Panasonic. The company presented its new 4K Ultra HD Micro camera GP-UH532 in Dusseldorf in November 2015. We are very pleased to introduce this innovative system,’ says Margarita Zoussevitch, European Marketing Manager at Panasonic.

Panasonic reports that the 4K micro camera also offers various options for colour enhancement and can zoom in to previously selected image sections and also is particu larly user-friendly. The new camera’s resolution is 3840x2160/60p and its capacity is up to 1600 TV lines. ‘Our 4K micro camera outclasses everything. It delivers very precise colour reproduction and outstanding sharpness and detail,’ Zoussevitch points out. ‘Previously undetectable areas or objects become visible and sharply. Structures and details which were previously imperceptible – such as the fine hairs on a beetle – become clearly visible.’

Additionally, six different personal profiles for the camera can be stored on, and accessed from, a USB stick.

The system has the medical standard IEC60601-1 certification and can be connected to a number of medical devices or procedures via several HDMI- or SDI ports, Panasonic adds. ‘This makes the camera suitable for different medical or microscopic applications in hospitals, research facilities and laboratories.’

The device consists of a micro camera head, control unit, cable and adaptor. ‘It has one of the smallest 1/3 camera heads on the market,’ the manufacturer points out. ‘With different cable lengths of three, six and 15 metres available, the camera head can be used for various applications.’

Patrick Linder, European Product Manager at Panasonic Industrial Medical Vision, adds: ‘The 4K Micro camera GP-UH532 offers simultaneous dual-channel-output in 4K/2K. Users can therefore use the GP-UHK52 with their existing 2K infrastructure without the need for a buck converter.’

The micro camera can be combined with various systems and facilitates many different individual solutions, offering a cost-effective interoperable solution, the manufacturer notes.

Zoussevitch: ‘We cannot expect customers to immediately convert their entire infrastructure to 4K – and this is not necessary with our new system. Thanks to the simultaneous dual-channel-output users can also use the camera in an existing 2K infrastructure.’

www.healthcare-in-europe.com
Morphological medicine and pathology will boom

Professor Klaus Kayser, former Head of the Institute of Pathology at Heidelberg University Hospital's Thorax Clinic, may be retired but he continues to be a leading figure in his discipline, a visionary, famous for his critical and 'out of the box' thinking. During the run-up to the European Congress on Digital Pathology (ECDP), Ralf Matthesfink asked the expert about telemedicine and standards and, even more importantly, a discipline in transition.

As a mere communication tool, telepathology crosses time and space barriers by enabling the specialist physician to consult at any time, no matter where and where the data were generated. The crucial advantages of digital pathology (DP) lie in its time independence and the ability to 'turn back the hands of time': the evaluation of histological specimens involves much more than looking at the slide and wobbling it back and forth; rather, it requires returning to the original, switching between the original specimen and its stained or marked version.

A modern routine lab that processes 50,000 to 60,000 cases per year covers two major areas: lab and pathology. At first, digitalisation creates more work in the lab, since the scanner has to be loaded with slides, a cumbersome procedure that requires some getting used to. The process is speeded up when the pathologist receives his specimens pre-sorted, e.g. by his colleagues in medicine and pathology.

Controversial thoughts of a histotechnologist (Controversial Gedanken eines Restbeschmutzers) from a presentation by Dr Gerhard Stauch at the European Conference on Telepathology 2000, in Aurich, Germany.

The liver and lung specimens. If – and only if – DP is optimally organised, the slides can be moved around, but can perform all necessary steps at the workstation, such as transferring the digitised slides, including suggestions for analysis, to the pathologist. Ideally, results are made available to the departments via the HIS.

Efficiency, however, is not only a matter of the degree of digitisation and organisation; to a large extent it is a matter of having access to pathologists who are specialised in certain organs. They can be found in large institutions such as Charité in Berlin, or the University Hospital in Heidelberg. Currently, 'human' routine pathology, unlike experimental pathology in the pharmaceutical industry, is struggling with standardisation even though defined strategies are available for all parameters in order to reduce imprecise measurements, such as thickness, intensity of the dye, or correct lighting in order to be able to assess suspect areas in a tumour specimen.

In Heidelberg, the algorithms were developed that provide high sensitivity and specificity (95%) for difficult-to-diagnose tumours such as melanoma, glioma, or metastatic adenocarcinoma, and can be applied for breast and lung carcinoma. Even if the software programme itself is not yet perfect, the algorithms work and routine usage is around the corner with confirming parallel studies the only component missing.

Nevertheless, morphological medicine and pathology will experience an enormous boom as scanners with a $100,000 price tag are becoming obsolete: since US-American drones feature iPhone lenses can be combined with scanners – such projects are underway in China, Finland and the US. If these ideas really pan out, scanner prices will drop by factor 10 and high investment costs will be a thing of the past.

While developments in terms of data transmission are stagnating – whether by satellite network or terrestrial terrestrial waveform for example in Africa, who still progress remains to be seen – the imaging market is immense with hardware and software solutions becoming more and more affordable.

What’s really missing is an umbrella organisation bringing together pathologists and lab and IT experts. The wait-and-see attitude of the industry is a definite obstacle: many companies have excellent IT staff who potter about without understanding the work of the pathologist.

On the other hand there are many specialist physicians who are highly interested in this lack of necessary knowledge. Communication does not really happen.

In the now defunct GDR frequently mathematicians and physicists worked in institutes of pathology alongside their colleagues in medicine and to a large extent it was this direct access that enabled them to develop innovations.

The almost philosophical contemplation of the relationship between structure and function is a topic only very few pathologists are interested in. In biology it is a matter of the inside and the outside: When observed long enough, a structure will turn into a function. This approach opens a different view on pathology: Today, no theory, be it energy balance, metabolism, or any of the common physical-chemical concepts, can explain why a cancer lesion of 2 cm of diameter can destroy the entire system and kill the patient: ‘Cardiovascular failure’ is nothing but a catch-all phrase because, in the end, structure-associated functions defined on the gene level determine what does not function and why. Which parameter is it that triggers a domino effect that causes the human system to collapse? Digital pathology may well help to understand the construction of ‘life as such’.

Klaus Kayser MD PhD, Professor of Pathology at Heidelberg University’s Institute for Medical Physics, (Dr. med, Dr. honoris causa mult. headed the Institute of Pathology, Thorax Clinic, University of Heidelberg, Germany, until 2005. The former faculty member of Heidelberg and Berlin University (now Charité Berlin) is a pioneer in electronic medical communication, research on image analysis, lectins, structural entropies, and lung cancer.

Challenges in digital pathology

Strictly speaking, digital pathology has not yet resulted in any groundbreaking changes for clinical diagnostics. The conventional light microscope introduced to pathology around 100 years ago continues to be the most important tool for pathologists. Nevertheless, in the future, according to private lecturer Dr Frederik Klauschen, Head of the Molecular and Systems Pathology Group and Consultant at the Institute for Pathology at the Charité Clinic Berlin, we can expect to see some changes from the introduction of digital technology.

Report: Marcel Rasch

‘Digital pathology is supporting us already in making information from tissue sections more easily quantifiable with the help of computer assisted systems,’ says pathologist Dr Frederik Klauschen. ‘However, when it comes to pattern recognition, and therefore tumour typing and classification into malignant or non-malignant tumours, the pathologist will remain superior to the computer for the foreseeable future.’

Let the computer do the counting

To date, the biggest innovation is a more objective and standardised view and quantification of certain tissue characteristics facilitated by image analysis procedures. ‘One example of this is the measurement of the proliferation index,’ Klauschen says. This can be determined via the immunohistochemical detection of the protein Ki67, which is found in the cell nucleus of proliferating cells.

The result normally shows some individual cell nuclei in the normal histological colour (blue) and other cell nuclei where Ki67 is detected in brown or red shades.

Counting the frequency of the brownish colours was once something the pathologist had to do ‘manually’. Now, however, the counting can be done with the help of a computer, representing image regions. ‘We have developed a specific programme for this purpose, the so-called Ki67® Quantifier. This software supports us with the counting and determination of the proliferation index. It facilitates standardised, automated and precise quantification,’ Klauschen explains. ‘We work very closely with the German Breast Group with regards to breast cancer, for the validation of such procedures. Tumour samples that arrive, from all over Germany and other countries, are examined in the Institute for Pathology at the Charité Clinic, which acts as a pathology reference laboratory. The above-mentioned software is then utilised in the context of these studies and validated based on clinical data.

Digital procedures are currently being developed and tested to examine different types of tissue characterisation and markers. However, many of these procedures are not yet ready for use; the pathologist produces a second opinion on the slides. Some institutes are already using these software solutions it will take some time before these diagnostics will benefit from them.’

Common problem – lack of standards

One big problem with the practical application of image analysis procedures is the lack of standards. Although there is a dialogue and exchange between the various areas...
The digital age in diagnostics dawns

Pathologists in Utrecht step away from the microscope as the first fully digital workflow goes live for primary diagnostics, John Brosky reports.

It was a bold move into the digital age when van Diest convinced the University Medical Center to roll forward the next five years of capital spending for the pathology department to pay for the new system in the first year. ‘We replaced the old scanners, we set up a completely new server architecture and a workflow system, so that we can now do the diagnostics in a different way, but for primary diagnosis we no longer use the microscope, we are looking at a digital image on a computer screen.’

‘I can not give you a precise percentage because, during this transition, the numbers can differ, but my gut sense is that at least 90%, possibly as much as 95% of the diagnostic work, is now done in a completely digital way, which I think is pretty good for the first month.’

In May 2016, a highlight of the European Congress of Digital Pathology in Berlin will be a Roundtable Session on ‘Digital Pathology Workflow Integration,’ where van Diest will share with fellow pathologists his pioneering experience and some lessons learned.

‘Change management will be my first bullet point,’ he said during our interview. ‘Stepping away from the microscope is a revolution for the average pathologist, so you have to make sure you have everyone on board to do something this radical. This means influence and involvement, the key terms.’

Paul J van Diest MD, who leads the Department of Pathology at the Utrecht University Medical Center, Why? In March 2016, the centre began to run a fully digital workflow for primary diagnostics. The centre is now overwhelmed with requests for visits.

Strategies and demands for digital pathology workflow integration

Three-step process for digital pathology

As laboratories in Europe shift to systems for digital pathology, they must ensure the technology not only works, but works for them, says Dr Liron Pantanowitz, director of pathology informatics at University of Pittsburgh Medical Center (UPMC). Lisa Chamoff reports.

On 27 May, at the 15th European Congress on Digital Pathology in Berlin, pathologist Dr Liron Pantanowitz, from the Pittsburgh Medical Center will give the keynote address ‘Strategies and demands for digital pathology workflow integration,’ discussing how to bring digital technologies into a laboratory without disrupting the processes already set up.

‘Just because you’re bringing in new technology doesn’t mean you’re going to do a better job,’ Pantanowitz confirms. ‘The people have to be willing to work with the technology and be efficient.’

Later in that 3rd day of the congress, Pantanowitz will also participate in a roundtable discussion on Digital Pathology Workflow Integration.

In his keynote address, the pathologist will go over the three-step process for digital pathology: ‘You’ve got to have good digital images, providing strategies for incorporating scanning of slides into a lab’s workflow, and discussing the importance of training people to do high-quality imaging to create the best slides and how laboratories can make decisions about saving immense amounts of data.

Going digital could have a negative affect on a laboratory’s workflow if, for example, employees batch all the work of scanning slides, or if there’s downtime, Pantanowitz points out.

If laboratories follow the right integration strategies, he adds, they can take advantage of the many benefits of a digital system – using computer-aided diagnostic tools and conducting image-based searches.

Pantanowitz will also touch on his work with Omny, a company that provides digital pathology technology and is a joint venture between GE Healthcare and UPMC.

Digital pathology is gaining ground in Europe faster than in the USA, Pantanowitz points out, with less stringent regulations governing its use.

The country’s Food and Drug Administration, while it recognises digital devices, states that digital pathology cannot be used for primary diagnosis. While the USA’s laboratories can use digital pathology technology ‘off label,’ they risk being held liable if there should be a malpractice case. As a result, three laboratories in Europe have gone fully digital, according to Pantanowitz, while he is not aware of any fully digital laboratories in the USA.

UPMC runs a digital pathology consultation service, providing second opinions to pathologists, clinicians and patients around the world, which provides the facility with an additional revenue stream.

The Pittsburgh Medical Center is in the process of collecting data regarding the use of digital methods for primary diagnosis to help make the case for using digital technologies for primary diagnosis, Pantanowitz adds.
Digital Pathology (DP) is the fastest growing area of medicine, with molecular pathology. However, the use of digital tools such as scanners and analysis software, as mentioned in a previous article, is mainly limited to academia (volume 24, issue 6/15). Academic medicine benefits most in teaching and research where larger investments can be applied for without the pressure of daily clinical routine, or the economic pressures of the health system.

In Erlangen, DP has been an established part of teaching in human, molecular, and dental medicine. Using an online microscope, students from Würzburg, Regensburg and Erlangen (Cooperation partners the universities and university hospitals as well as the Fraunhofer Institute Erlangen) can access digital slides from their respective courses browser-based via the internet, from anywhere and can study with superimposed texts and annotations (image 2). In addition, in recent research some projects have also been driven with the help of DP within the Comprehensive Cancer Centre Erlangen-Nuremberg, addressing problems from different clinical fields. DP already plays an important part in national and international cooperation projects.

 Naturally, new and fast-paced technology also has its limitations, which need to be clearly stated. The error rate of the scanners with slides or low contrast, or errors in digital image analysis (DIA) caused by artefacts can negatively impact on trust in this new technology. Therefore, there is also some criticism and scepticism amongst pathologists.

Furthermore, next to the many advantages of DP there are also clear disadvantages, such as high initial investment costs for scanners and data storage, as well as the ongoing costs for maintenance and support. Pathology will be confronted with similar problems to those seen in radiology years ago, during the initial conversion to digital image processing. Although terabyte (TB) mass storage is now comparatively affordable, the amount of data involved in DP is extremely high. One case with five sections can take up between 2.5 to 20 gigabytes (GB), i.e. the equivalent of a vast storage requirement of several 1,000 TB, which converts to several PB per year, assuming all cases from growing areas of pathology are only stored every year. This new dimension of data exceeds the requirements in radiology by tenfold and would therefore be unprecedented in clinical medicine.

By contrast, there is the new dimension of the interpretability of an immeasurable number of cells with their colourings for immunohistochemistry, CISH or FISH. New analysis software – digital image analysis (DIA) – from companies such as Deinseins or IndicaLab, can quantitatively evaluate all cells from one section. This can be a routine section for one patient or samples from many patients via tissue micro arrays (TMAs), where more than 400 samples can be put on one slide (such as GrandMaster, S-D-histo, Humana). This will deliver completely new and detailed views of digital pathology is already an important part of teaching at the Institute for Pathology, Erlangen University Hospital. Via the internet, students can access all course contents, browser-based with annotations and texts, as well as for monitoring achievements (online microscope based on development in cooperation with Fraunhofer IIS Erlangen, www.pathostore.de).

The death of the microscope; not yet! (Image 1)

Pathology departs from a dark back room

Report: Mark Nicholls

A UCD-based neuropathologist has highlighted how the digitisation of pathology will play a pivotal role in taking patient care on to a new and more efficient level. Speaking in a recent Webinar under the heading The Adoption and Benefits of Digital Pathology for Primary Diagnosis, Dr Daniel du Plessis also noted how the digital era would raise the profile of pathology and 'bring it out of the dark backroom'.

Using a Sectra digital pathology system within his department at Salford Royal NHS Foundation Trust in north-west England, a pilot study highlighted how digital pathology speeded up diagnosis and workflow, and particularly had advantages within the context of the multi-disciplinary team (MDT) meeting.

With his neuropathology unit at the 728-bed Salford Hospital used to pilot the system by Sectra – which has an established track record in PACS systems for radiology – the benefits quickly became apparent, the digital system was used to navigate through a slide on screen. 'We soon felt far more confident and at ease navigating through a digital image than the slide on the platform,' du Plessis said. 'I’ve been doing microscopy for 20-30 years, but it only took me 2-3 days to almost abandon one in favour of the other. The digital screen was definitely my preferred first port of call and, for most of the lab staff, was happy to do all reporting on the screen without having to look at slides under a microscope. What was so enjoyable about the Sectra system was the speed of access, you felt more in control of a slide on a screen than using a standard microscope.'

Currently, his network is not fully digitised, for real-time diagnostic smears, surgeons send a sample to the lab and await a rapid stain and assessment, but digitisation will speed up that considerably and also facilitate wider information sharing over secure internet links, such as with neighbouring centres in Liverpool and Preston.

With storage space at a premium within the NHS, having everything digitised rather than on glass slides will avoid the expense of maintaining a large slide archive, either on-site, or with a commercial storage organisation off-site, and from a clinical governance perspective obviates the think of slides breaking, being lost or misplaced.

The ultimate driver in having a hospital move to digital pathology, he said, is cost and time; more rapid turnaround and more efficient use of pathologists’ and lab staff time. This was particularly visible in MDT meetings, where previously slides had to be retrieved by support staff, carried to the meeting, shown on microscopes and then re-filed.

With images digitally available, they can be retrieved and easily displayed with a focus on specific areas of interest. 'It rekindles people’s interest in histology because it’s done in such an efficient and quick way,' he said. 'You can show how a tumour has changed over time, with just a few clicks; you can’t do that with the microscope setup.'

It enables the MDT to be linked to different centres, with second or third opinions, and the pathologist can marry images with radiology on the same platform.

It has boosted pathology, which has become a far more efficient partner in the MDT meeting,’ said du Plessis, adding that there are also work-life balance opportunities, with pathologists able to do some of the reporting at home, and there are also patient benefits in that a growing proportion of cases need to be double reported.

‘Neuropathologists tend to be in smaller units within a larger general pathology unit, so there might be only one or two people to look at a case,’ he pointed out. ‘Digital pathology allows units to link up and benefit from forums that can contribute to consensus diagnosis. Difficult cases can be quickly shared in a network that enhances diagnostic accuracy and reliability."

This has huge advantages for the patients in terms of quality assurance, robust objective reporting, and less subjective vagaries of individual reporting.

Significant benefits at his practice: Our basic skills will remain the same, but I think we will become far more efficient. As said, it will bring us out of our dark backrooms, allowing for far greater cross talk than in an individual isolated practice and giving far greater benefit for patients.

Pathology digitisation is inevitable, du Plessis believes, concluding: ‘If a number of high profile departments implement digital pathology, word will spread about how beneficial this system is, then there will be peer pressure on other departments to conform.’
Digital pathology is evolving...

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The digital age in...

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Digital diagnostics system presents. Reaching 800 terabytes the archival system was pushing the technical capacity. We had a chance to be part of a bulk central storage initiative at this big academic we are part of, so we joined as a customer,' the professor explained. 'The archives were transferred to the new system, which he said is safer, more secure and more affordable than maintaining a dedicated storage facility. Also, it is faster: flashing requested images on the screen in seconds, rather than in minutes.

Challenges and compromises

If the transition to working digitally has been fairly smooth, there remain both challenges and compromises. 'There are things that are simply not possible for digital processes yet,' van Diest pointed out. 'Here we simply go back to the slides. It is always possible to return to the slides. This does not mean the images are not good. It may be a difficult case. We certainly don't force someone to do a diagnosis in a digital way only to make a wrong diagnosis.'

There also remains the controversy of depth-of-view on digital slides versus the microscope view, which he said is a compromise we have to live with today.

'We prefer to have three to five focus layers within every image. Yet where a diagnosis can only be done in a subjective way, digital diagnostics is still a long time coming.'

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The digital age in ...

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Measles, mumps, rubella threaten youngsters

In a European Hospital interview before his presentation at ECCMID 2016, Infection Disease Specialist Dr Guillaume Béraud spoke of the results from his modelling of the three ‘childhood’ diseases, measles, mumps and rubella.

In the 1950s and ’60s, when epidemics were common, the potential seriousness of these infections was better understood and people did not consider protection against them as a priority. ‘Also, of course, there is the anti-vaccine lobby, which is extremely articulate and convincing in its arguments and can sway a parent who has fears about vaccine safety. Of course the importance of vaccine safety is now primordial as the fear of the disease is so low. ’

‘As a profession, healthcare providers need to learn to communicate our message to the public in an equally meaningful way, we need to learn what excites us, and our colleagues!’

In this 21st century, why are these viral diseases potentially dangerous?

‘These diseases are entirely preventable by vaccine. The vaccines are very effective and provide immunity for life and, therefore, no research has been directed towards specific antiviral therapy for measles, mumps or rubella. Today, our standard of care for patients with these infections is much as it was in the 1950s and ’60s, when epidemics were frequent in the under 5s, meaning standard symptom control; fluids, rest, control of fever etc.’

Dr Guillaume Béraud, at the Centre Hospitalier Universitaire de Poitiers, says this was an ‘organisational short cut on the part of the ECCMID organisers, or we could reconsider our opinion of these common and benign childhood viral infections.’ Because, such epidemics were common in the 1960s, these can certainly no longer be considered as “common and benign”.

‘Also, and this is of particular importance’, he stressed, ‘one effect of widespread vaccination – which has been extremely effective but has not, of course, achieved 100% coverage – is that these viruses have not, unlike smallpox, been eradicated. To do so, we’d need to reach 95% vaccine coverage. This has had an interesting impact on the spread of these viruses, none of which has an animal reservoir, they can only survive by infecting humans, and this is why their spread has slowed down. From a modelling point of view, we can see that the circulation of the viruses is slower than in the pre-vaccine era, therefore the population being infected has changed. The population now at risk to get infected is no more children, but teens and young adults. Why? Because, in addition to the shift in age of onset due to a slower viral circulation, these are the generation that socialise the most and therefore are the most likely to come into contact with the virus and, if they have not been vaccinated, develop the disease.

‘One important downside of catching measles, mumps or rubella, when older, is that the disease is much more severe than in a younger person (<5 year old). These cases are often much more serious, with far more risk of sequelae and, in the worst case scenario, mortality and therefore, from this perspective these can certainly be considered as new emerging viral diseases.’

Why, if adequate vaccination exists, is there resurgence?

In France vaccination has been recommended for all children since 1985 and is 100% reimbursed by Social Security. The MMR vaccine requires two doses to be given before the age of 24 months. However, vaccination is not obligatory and therefore a number of children each year either receive only one, or no dose of vaccine, which enables the virus to propagate. The actual vaccine coverage (which is highly variable by region) never exceed 90% for the first dose and 85% for the second dose, with much lower coverage for some departments, which is far too low for herd immunity to be protective (>90-95% is required). Therefore outbreaks can and do occur, particularly in areas where coverage is lowest, such as in south-east France. With continued suboptimal coverage the risk of epidemics can easily be modelled – and are a real threat for 2016.

Why are vaccination rates low?

The reasons for low vaccine uptake are multiple and complicated. One real problem is because vaccine so successful and so long, the potential seriousness of these illnesses has been forgotten and people do not consider protection against them as a priority. ‘Also, of course, there is the anti-vaccine lobby, which is extremely articulate and convincing in its arguments and can sway a parent who

Modern insight into an old pathogen

Clostridium difficile remains a difficult foe

Hospital-acquired Clostridium difficile infection (CDI) is on the rise. Symptoms range from non-typical mild diarrhoea that can develop up to a toxic megacolon, which often leads to death. Not only are there hardly any efficient antibiotics nowadays, the use of antibiotics has turned out to be a significant risk factor in the spread of CDI. Since CDI occurs in many countries, rich and poor, an international team of researchers, supported by the German state of Lower Saxony, compared the incidence of CDI in countries with different levels of antibiotics use.

When patients carry the bacteria upon admission to the hospital and the infection develops during the patient’s hospital stay, the body not only has to fight the original disease, which was the cause for the hospital admission, but also CDI. Particularly older and immune-compromised patients are at risk: the extended hospital stay also translates into a considerable increase in treatment costs. CDI furthermore has a high recurrence rate and can develop into a chronic disease because most antibiotics destroy healthy as well as harmful bacteria, which can cause allergies, autoim- mune, metabolic or psychological disorders, with the latter ones rarely diagnosed as being tied to the status of the colon.

According to the Robert Koch Institute, every year around 65 million adults worldwide suffer some form of gastrointestinal disease. While only one third of the people affected consult a doctor, those who do seek treatment should be aware of the risks associated with antibiotic use. The German Gastroenterological Society (DGVS) points out that antibiotic use can cause diarrhoea and recommends limiting their use to certain cases, such as chigella or salmonella infections. While antibiotics do cure diseases they can cause long-term damage to the enteric flora – not to mention environmental damage.

For hospital therapy the DGVS guideline recommends judicious use of antibiotics and strict compliance with hygiene rules. In particular, several cases, the patient must be isolated – with unavoidable additional staff and treatment costs.

Despite many warnings from physicians there are only a few pharmaceuticals left whose efficacy has not been wasted by over-prescription. These drugs of last resort are limited to particularly severe cases. Understandably pharmaceutical companies are urged to develop new antibiotics. However, the call goes largely unheeded despite steadily progressing research. Obviously in the future an antibiotic has to attack the pathogens rather than damaging the entire microbiota. Indeed, an active ingredient for fighting against Clostidium difficile aureus already exists.

In Europe, the influx of young medical students in the field on the pharmaceutical companies to intensify efforts – particularly since the Zika virus, for example, is spreading without a vaccine or a therapy in sight.
Scientists gain ground against resistance

British-based scientists report a breakthrough in combating antibiotic resistance

As part of the EU ‘ID Lyme’ project, the infection, the infection in the bacteria causing Lyme disease (Borrelia), is early, thus improving the ability to detect an active infection earlier than before, so that healthy people with Lyme disease antibodies in their blood do not receive unnecessary antibiotic treatment and so that appropriate treatments can begin early. Unfortunately, the current standard laboratory test is often unable to detect Lyme disease at an early stage of the infection,” explains Hannes Stockinger, Head of the Institute for Hygiene and Applied Immunology at the Centre for Pathophysiology, Infectology and Immunology at Vienna’s Medical University. “On top of that, the current test often interprets a mere antibody reaction as an infection and people are treated with antibiotics unnecessarily, because the infection is way in the past or is already completely resolved.”

The current test can only analyse part of the human immune system, namely B-cells but not T-cells, which are needed to fight infection and whose activity indicates infection. The experts are therefore helping to develop the world’s first point-of-care test to detect an active infection so that patients could start appropriate treatment. The test, known as the ‘Tudes Kit’ should be available in the autumn of 2016, said the scientists, speaking on the occasion of World Immunology Day 2016.
First the good news: the most severe ebola outbreak ever has been contained. Last December, Guinea, where the first infection was reported in late 2013, was declared free of ebola cases. Liberia was considered free of ebola in mid-January after no new case had been reported for 42 days (the WHO criterium for ‘free of ebola’).

For a ‘post mortem’ to know what could be improved for next time – and experts do not doubt that a ‘next time’ ebola outbreak will come. The first lesson learned: the WHO needs to be strengthened – more money, more power, more support. Second: in poor countries sustainably healthcare structures should be established and targeted efforts are needed to raise awareness among the people about health risk. Third: the outbreak compelled the pharma- ceutical industry to develop and distribute medication and vaccines at a previously unknown speed. However, apart from success for one particular vaccine, research efforts did not yield successful results.

The survivors
According to the WHO, 11,000 people survived the 2014 ebola epidemic in West Africa. 17,000 patients, more than during any previous outbreak, survived ebola virus disease (EVD) but are struggling with a range of sequelae, such as eye pain and decreased visual acuity, head and joint pain, hair loss, abdominal pain, loss of appetite, nausea, sleeping disorders or chronic fatigue. Neurological symptoms include short-term memory impairment and disorientation and women report menstrual abnormalities. The virus may persist in the eye, liver (meningitis) and, nine months after the infection, even in semen. It is only due to the large number of survivors that the sequelae become visible. Now, that the disease itself has been contained, the post-ebola syndrome is the next healthcare challenge that needs to be mastered.

What exactly causes the symptoms is unclear – the virus itself, the immune response to it, or the use of aggressive disinfectants.

Currenty, data on the type, frequency and duration of symptoms are being collected and analysed. Maybe we are dealing with a chronic phase that follows the acute phase.

Studies of survivors
A study involving 49 patients who survived the 2007 Ugandan outbreak pointed at a number of long-term sequelae that persisted as long as two years post infection. Whilst in Uganda a different sub-type of the ebola virus caused the infection, the symptoms are very similar to those reported by survivors in West Africa. In Liberia, researchers are collecting data on the long-term sequelae of the ebola infection. The team of the Partnership for Research on Ebola Virus in Liberia (Prevail) is trying to find out whether survivors develop immunity and whether, after the acute phase of the disease, they transmit the virus to sexual partners and other close contacts.

Over a five-year period the Prevail team will regularly examine 1,500 survivors and 6,000 people in those survivors’ immediate vicinity and analyse blood, tears, sweat and semen. Another focus will be vision disorders that appear to be a typical sequel of an ebola infection. Lassa fever patients report similar sequelae of the disease, which can weaken a patient over a long period of time. On the other hand, different symptoms can have very different causes.

While all these physical issues need clinical care, the mental effects must not be neglected. The disease itself, the loss of loved ones or social marginalisation upon discharge from the treatment centres – these are traumatic experiences, which leave scars. Moreover, tight family units were torn apart and many children are orphaned. For example, ‘back to normal’ – to a day filled with hard physical labour – is impossible, in view of the long-term sequelae.

Addressing the medical and psycho/social needs of EVD survivors should be one of the major focus of the WHO action plan.

Winners on the firing line

Jens Hahn MD is an Internal Medicine and Intensive Care Specialist who works with the international, independent, medical humanitarian organisation Médecins Sans Frontières (MSF in English: Doctors Without Borders). Here he describes his work in Afghanistan and South Sudan, and the use of rapid diagnostic tests in the field.

Interview: MEDICA.de

Infectious diseases are widespread in conflict areas, and without basic medical care on location, people cannot be appropriately treated. Laboratory tests are limited in the field. However, rapid diagnostic tests enable medical personnel to test patients for several infectious diseases, e.g. for the presence of malaria or tuberculosis.

Speaking of the Sudan and Afghanistan, Jens Hahn said it is hard to generalise about the work involved: ‘Every conflict area has its own structure that depends on the respective security situation. How freely can you move as a medical team? Can you actually perform the classic work of MSF? Can you drive to the site with your jeep and provide primary healthcare to people, or does the security situation not allow it? In Afghanistan for example, treatment needs to focus on the centres. Here you can move freely only in the hospital or your living quarters.

What diseases and injuries do you prepare for there?
That also depends on the situation. In classic settings, like in South Sudan, these can be tropical diseases such as malaria, hepatitis or tuberculosis. A large number of war wounds is added in the increasing conflict areas with violent battles. Here you need to increasingly treat gunshot wounds. Infections that result from bullet or stab wounds and other acts of violence are also a part of our daily routine.

The battle involves classic infectious diseases such as transmissions of bacteria, viruses and parasites. But there are also many cases where people with bullet wounds cannot be medically treated until after a few weeks have gone by.

‘The severely infected wounds need to first receive first aid and then generally require subsequent surgery.’

Resources available on location
‘You also need to differentiate in this instance: when we need to drive a long way from our base camps to a village, we can only take a limited amount of material with us, meaning only those items that fit into two jeeps, for example.

‘In terms of primary healthcare, malaria or respiratory diseases in children, for instance, can be treated on a larger scale. Therapeutic foods for malnourished children and hygiene products, like soap, also have room in the jeep. Many infectious diseases can occur because the simplest resources are not available on site.

On site lab testing
‘Laboratory tests can only be done on a limited scale, especially in remote areas. Small test kit, for example, could make it possible to detect anaemia on location. Yet this requires technical knowledge, because typically, you can’t perform a blood transfusion in this kind of setting. By now, we commonly use rapid tests that can detect malaria within a few short minutes, for instance. You can envision this like a pregnancy test, only the test isn’t done with blood but with one drop of blood and an indicator.

The WHO rapid diagnostic test also plays a relatively big role in the field. These types of tests are not available for all diseases, however. From a medical point of view, it is rewarding to fall back on your manual skills and get away from just treating people with medical devices.

Which rapid diagnostic test is used most frequently?
The malaria test is in the best-case scenario, we regularly visit different places where we’ve informed the community about the dangers of malaria. Oftentimes, about 250 children are waiting for us in a malaria-infested area.

‘If a child exhibits an increased body temperature or other symptoms, we perform a malaria diagnostic test. Since this is often the case for at least one-third of the people or children who are seeking help in these places, we have dozens of tests. Yet not all of them turn out positive. The children frequently also have other diseases.

In conflict areas, are you personally more susceptible to infections and take special precautions?
That strongly depends on the area. During the Ebola epidemic, for example, where MSF could set up tents very quickly, you definitely had to protect yourself. We are dealing with a disease where drugs don’t provide any protection. This is why we are just as vulnerable as the people that live in this area.

‘I didn’t perceive the risk as much greater in Afghanistan than I did at home. Sure, TB is a major problem there but this is a disease that persists even with weak immune systems. Yes, there is an increased risk in some countries for certain diseases, such as malaria, for example. However, the risk to get sick yourself is not exorbitantly high.

‘We need to pay more attention to hygiene. The local standards often don’t meet our own standards.’
Biotherapeutics strike cancer cell growth

As well as different cancer types, the approach could be used to target inherited genetic diseases and infectious diseases such as tuberculosis. TB is a potential target, he explained, because it hides within macrophages (immune cells) and the antibody to the inside of the macrophage ‘to hit the tuberculosis where it is hiding’. Having highlighted the ‘universality of the approach’, the Jones’ team would now like to see other researchers try it with specific antibodies and models on which they are working. ‘Our approach is about more effective delivery of therapeutic molecules into diseased cells such as those in stomach cancer, breast cancer and tuberculosis. In this new approach, called ‘receptor crosslinking’, the team specifically worked to improve the delivery of a relatively new class of drugs called biotherapeutics.

The researchers explain that cancer cells often contain a unique protein on their surface that acts as a barcode, identifying these cells as cancerous against their healthy counterparts.

In their findings, they characterised new ways of targeting breast cancer cells with Herceptin, which interacts specifically with a barcode protein called HER2 – a protein barcode widely recognised to be a major driver of cancer cell growth and division.

Lead author Professor Arwyn Jones, from the School of Pharmacy and Pharmaceutical Sciences, said: ‘The striking thing is that we have tested our approach on both HER2, as well as other barcode proteins, and each one gave the same result.

“It looks like this could be a universal strategy to increase the uptake of drugs into different kinds of cells involved in many types of diseases.”

The research team has manipulated how Herceptin interacts with HER2, which results in both being rapidly engulfed by the cancer cells that then proceed to destroy the protein barcode.

Professor Jones: ‘The fact the same approach has worked for three very different receptors suggests that we should be looking at many different targets here, to do the same with them, spreading it away from cancer to other diseases.’

However, he added: ‘If you can force this interaction and have the receptor and antibody driven to the inside of a cell, you have a much better chance of getting that drug to its target site.’

Still, the expert acknowledges the approach is a long way from clinical use, despite its wide-reaching potential, but this a critical step forward. ‘The next stage,’ Professor Jones pointed out, ‘is to understand what happens inside a cell and then design drugs that specifically target that process.’

Arwyn T Jones is Professor of Membrane Traffic and Drug Delivery at Cardiff University’s School of Pharmacy and Pharmaceutical Sciences. He is closely involved in the school’s main research themes of experimental therapeutics and pharmacological sciences; and drug discovery, design and synthesis. With a major interest in cancer and cell biology, his current projects fall under the overall themes of breast cancer cell biology, drug delivery and regulation of endocytosis. These include targeting and endocytosis of plasma membrane receptors, design and characterisation of drug delivery vectors and cellular delivery of therapeutic macromolecules.
Fast, efficient, cheaper microbiology

A fully automated clinical microbiology laboratory system went into service at Heidelberg University Hospital this April. Produced by the Dutch medical technology firm BD Life Science, this first installation at a German university hospital will play a major role in a study exploring the potential benefits of lab automation in containing the spread of pathogens in a hospital.

The new system is not only expected to speed up processes but also to increase safety and the quality of the results. The incoming specimens are prepared right away and processed after a defined incubation period. Whilst previously incubation times differed due to a wide variety of workflows, TLA offers a standardised procedure that provides homogenous results and documents them – thus serving as a helpful quality assurance tool.

Patients will benefit from lab automation through faster treatment onset, e.g. antibiotics therapy, while the hospital expects to reduce length of stay. With this new lab solution we want to show that even a university hospital can offer efficient, quick and inexpensive microbiology diagnostic services,’ says Imtraut Gürkan, Commercial Director of the University Hospital Heidelberg.

‘Whenever a diagnosis is unclear, the patient is separated which hampers clinical workflows and hinders capacities. Thus a quick diagnosis is always desirable in terms of economics.’

At this point, the hospital is leasing the lab solution, which comes with a price tag of €3 million, since public funding was denied. However, by the time the leasing contract runs out, the initial results of the study will be available – and hopefully support a second application for public money.

New tube with powder additive aids diabetes diagnoses

Inhibiting rapid glucose breakdown

Along with the increasing need to diagnose diabetes mellitus cases, gestational diabetes (GDM), the most common disease during pregnancy, needs to be detected/ruled out at an early stage. If not identified, GDM can lead to complications such as infections, premature births and long-term effects for the mother and child.

However, the rapid breakdown of glucose (glycolysis) in venous blood samples complicates accurate diagnosis of diabetes and can lead to a false negative result. Thus it is necessary to inhibit glucose breakdown immediately after blood collection.

Various institutions, such as the Deutsche Diabetes Gesellschaft (German Diabetes Society), Deutsche Gesellschaft für Gynäkologie und Geburtshilfe (German Society for Gynaecology and Obstetrics), and the American Diabetes Association have drafted guidelines, which recommend the addition of a citrate-fluoride additive to maintain the in vivo glucose level.

For this reason, Greiner Bio-One has launched a new tube, explaining: ‘The special feature of the new Vacutette FC Mix tube is the powder additive. It stabilises the glucose level immediately after collection for 48 hours. This allows a reliable diagnosis of diabetes conditions and avoids false negative analysis results. The stabilisation is carried out in the whole blood and therefore does not require immediate centrifugation. Unlike in tubes where liquid is added, the finely granulated additive does not cause a dilution effect. There is no need to convert the measurement result.’

How the additive works

‘The citrate/citric acid buffer reduces the pH value in the sample,’ the manufacturer reports. ‘As a result, enzymes needed for the glycolysis process are inhibited and the actual “in vivo level” is stabilised from the start. The additive is completely dissolved, and therefore optimally mixed with the sample, after swirling ten times. In the case of storage between 4°C and room temperature, a further sodium fluoride additive ensures long-term stabilisation for 48 hours.’

The transparent PET plastic, shutterproof tube comes with either a grey or pink security cap, allowing differentiation from standard glucose tubes. The cap is particularly easy to open and allows for hygienic working in the laboratory.

Further details: www.gbo.com

Company banishes white from medical

Colour up your lab!

This January, Kugel Medizintechnik, from Regensburg, Germany, announced an interesting new venture. Although a leading manufacturer of equipment for pathology, histology and the laboratory for over 15 years, the firm launched its new Colour up your Lab design service.

A month later, at the German Pavilion at ARAB LAB 2016 in Dubai, the firm was presenting lab personnel with this concept and reports: ‘We received a lot of questions: What's the high pressure laminate? What makes it eco-friendly? What kind of laboratory furniture can be colour matched? Why is it antibacterial?

Along with a ‘Colour up your lab’ leaflet, the company showed its histo-pathology equipment, e.g. grossing tables, staining tables, preparation cabinets, stainless steel furniture and more, and also presented a new brochure about exhaust systems for histo-pathologies.

Leave behind those sterile white worlds

However, Kugel was keen to point out that it not only manufactures this equipment but also provides planning. ‘No matter if you're looking for a partner for a sophisticated furnishing of an entire building complex or perhaps a partial fit out, we are your point of contact concerning the design, developing and planning,’ Kugel is encouraging medical personnel to leave those traditional sterile white worlds behind, stating that the ‘design possibilities are almost endless. The combination of different materials like wood with granite or the mixture of cold and warm tones gives your laboratory design that little extra something.’

‘We do not limit ourselves to laboratory furniture and laboratory table plates, but rather we also colour match our preparation cabinets with the corporate identity of your laboratory. All woods and raw materials that we use for our eco-friendly high pressure laminate solution come from sustainable managed forests with PEFC and FSC certificates.’

Additionally, daily adjustments of production processes guarantee that 10 times less water and 40% less energy are used and 75 % of the waste is recycled or recovered.

‘During production of high-pressure laminate, fine paper layers as basis for the production process are recycled; plastic waste is recycled or recovered. In addition, the company uses only raw materials of natural origin. The company produces its own electricity from sustainable managed forests and the company is very conscious of the environmental effects of transportation. At Kugel, we not only manufacture the furniture but also work with the environment.’

‘For your laboratory, we provide eco-friendly furniture and provide training for your personnel in the use of the furniture. Our technicians help you to get the best out of your furniture,’ Kugel promises.

Further details: www.kugel.com

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The study, a joint project by the hospital research team and BD, is designed to evaluate how the new system combined with a newly developed imaging procedure can help to significantly speed up diagnosis. The study will also show whether a fully automated lab solution can handle the gigantic sample throughput in a microbiology lab of a top-tier hospital. At Heidelberg University Hospital every newly admitted patient who is considered likely to carry resistant pathogens is routinely tested. This group encompasses patients transferred from care facilities, senior citizen homes, other hospitals or patients who had previously stayed in countries where widespread resistances are reported—a total of 40,000 patients per year. Additionally, Heidelberg is presently conducting a large countrywide resistance-screening programme, which translates into around 8,000 specimens being processed and read every single day.

More than 18,000 clinical laboratory innovators will convene in Philadelphia this year. Join them to experience education on the hottest scientific and practice areas in laboratory medicine while evaluating hundreds of new cutting-edge products that are transforming the lab and patient care.

Immerse yourself in what’s now and what’s next.
Advanced photo-dynamic therapy

Researchers develop an oxygen-independent, photoswitchable molecule and successfully test this in the lab to observe effects on tumours. Photoswitchable agents may reduce chemotherapy effects

So far, photodynamic therapies have been dependent on oxygen in the tissue. But hardly any oxygen exists in malignant, rapidly growing tumours. A group of researchers at the KIT Institute for Biological Interfaces and the University of Kiev has now developed a photo-switchable molecule as a basis of an oxygen-independent method.

The researchers' successful laboratory tests on tumours have been reported in the journal Angewandte Chemie International Edition. (DOI: 10.1002/ange.201605056).

Photodynamic therapy (PDT) in medicine usually uses a substance that reacts to light and converts the oxygen in the tissue into aggressive radicals. These reactive substances are toxic and damage neighbouring cells, in such a way that tumours, for example, are decomposed. As a result of their quicker growth, however, many tumours have a high oxygen consumption. This reduces the concentration of oxygen available in tissue, which may aggravate conventional PDT.

What the researchers at the KIT institute and the University of Kiev have developed is a new photoswitchable molecule for oxygen-independent PDT. The effect of the GS-DProSw molecule can be "switched off" by ultraviolet light prior to therapy. Only upon application is it "switched on" in the tumour tissue by visible light to damage the tumour tissue there. 'The surrounding organs remain in the dark and are not affected by the active substance', Anne N Ulrich, Professor of Biochemistry and Director of the KIT Institute for Biological Interfaces, explains. 'As a result, side effects are reduced significantly.'

Animal testing
Now, For the first time, this new concept has been tested on animal models.

Once per day, the photo-switchable GS-DProSw molecule was administered. Then, the tumours were irradiated locally with visible light for a period of 20 minutes. After ten days of PDT treatment, the tumours were found to be far smaller than comparable groups not treated with light.

To initiate an oxygen-independent reaction in PDT, the molecule applied has to be of a cytotoxic nature. This means it has to directly attack the tumour tissue irrespective of other reaction partners. A suitable molecule with cytotoxic properties against tumours is the gramicidin S (GS), which is a natural antibiotic.

To prevent it from damaging healthy tissue, the research team inserted a photoswitchable diaryl ethene segment into the ring structure. As a result, the GS-DProSw molecule can be switched between the inactive state and is activated at the so-called alpha-synuclein plays an important role. We assume that, at the beginning of the disease, there's a change in the amyloid-beta. The oligomers develop into fibrils and finally into visible plaques.

Along with other scientists, Gerwert has developed a test to detect change in amyloid-beta peptides and thus diagnose Alzheimer’s earlier.

How does the test, or procedure, work?
‘We have developed an infrared sensor. This detects the secondary structures and differentiates between alpha-helix and beta-pleated sheet form. However, various different types of proteins are found in the blood or spinal fluid. The difficulty is being able to look only at the amyloid-beta. Other substances impair this and interfere with the actual signal. We utilise antibodies as 'interceptors' to specifically bind amyloid-beta peptides. These are covalently bonded to the surface of the infrared sensor, meaning that we have a type of ELISA-test (Enzyme-Linked Immuno-sorbent Assay).

‘We then measure the bonded amyloid-beta peptide with the infrared sensor and analyse whether it is present in its healthy or diseased form. We utilise structure-sensitive infrared bands, i.e. so-called amide bands. When these bands are below a certain threshold we know that Alzheimer’s disease is present.

‘We determined the threshold level based on experimental investigations.

What does the importance of amyloid-beta peptides distribution mean?
‘This is the key part of the test: There are antibodies that can selectively bind one form of amyloid-beta peptides – either the healthy or diseased form. The blood of a healthy human contains a large number of healthy amyloid-beta peptides, but also some diseased ones. An antibody that only selectively looks for the beta plaques in the blood would therefore also find diseased forms in a healthy person. Therefore the test is initially only selectively looking for the beta plaques, not only for the Alzheimer’s disease.

The advantage of our technology is that we can determine the secondary structure distribution of all amyloid-beta peptides extracted from body fluids label-free. When the peptides are healthy we can see alpha-helical dominated bands above the threshold level. When the majority of peptides are of the beta plaquetted sheet form, the band goes below the threshold level. Unlike the ELISA procedures we measure the distribution of all amyloid-beta peptides and not only specific conformations.

Early detection timescale
‘Our primary objective was to detect an early stage of Alzheimer’s, i.e. before the onset of clinical symptoms. Therefore, we selected the amyloid-beta peptide, because the change occurs around 15 – 20 years before the beginning of clinical symptoms.

‘We’ve already carried out a mini-study which, although not yet statistically significant, has delivered some promising results. We analysed samples from a cohort from the year 2000, at the Heidelberg-based German Cancer Research Centre (DKFZ). We could analyse, conclusively, which of the initially healthy study subjects developed Alzheimer’s disease within the following 8-15 years. To substantiate our analysis with statistical accuracy, we are currently examining 1,000 samples from study participants. Once we can make this prediction for all 1,000 samples we’ll have achieved the necessary statistical significance. So far we have tested 300 out of the 1,000 samples."

Other neurodegenerative disease
The sensor is also potentially suitable for the detection of Parkinson’s disease. In the case of Parkinson’s the so-called alpha-synuclein plays an important role. We assume that this protein also converts from an alpha shape to a beta shape. We are currently looking for a specific antibody for alpha-synuclein, allowing us to use the sensor for the detection of Parkinson’s disease.

When might the test enter clinical routine?
‘The procedure is very robust in the laboratory. It is suitable for the detection of Alzheimer’s. It is a good, additional clinical-chemical test to confirm an Alzheimer’s diagnosis.

‘We need to await the results of the current study to assess its use for early detection. We are currently optimising the sensor and are trying to increase the sample throughput so that large collections can be measured in short periods of time.'
Identifying a likely heart attack

UK researchers have identified a new approach, which could make it easier to identify fatty plaques that could cause heart attacks or a stroke, Mark Nicholls reports

A team from Imperial College London is using fluorescence molecular tomography (FMT) optical imaging technique to determine oxidised LDL (OxLDL) – known to play a major role in atherosclerosis and present in high quantities in plaques most likely to lead to a heart attack or stroke. The method proved promising when identifying atherosclerotic plaques in mice models and potentially could show how likely an atherosclerotic plaque is to rupture in human patients. Once identified doctors could then treat those plaques, either with targeted drugs or a stent implanted in the affected areas.

Atherosclerosis is the build-up of fatty plaques in arterial walls that lead to the brain or heart. If an atherosclerotic plaque ruptures, it can form a clot, causing either a heart attack or stroke. Over 100,000 people die annually in the United Kingdom after suffering such events.

The team’s method to detect and visualise amounts of oxidised LDL (OxLDL) in atherosclerotic plaques involves near infrared optical imaging. For this, the researchers experimentally used a specially designed antibody that targets OxLDL, adding a fluorescent marker to visualise plaque areas that contained large amounts of OxLDL. The first part of the research utilised Fluorescence Molecular Tomography (FMT), which is new technology that allows full-body optical molecular imaging of murine models. During a second part of the research, performed with mice, researchers demonstrated that atherosclerotic plaques can be imaged in vivo using FMT.

Researchers hope that this approach will make detailed visualisations not only found a possible new diagnostic tool, we may also have discovered a new way to treat this deadly disease.

Exporting more Asian medical imaging devices

Neusoft Medical Systems, a limited company, is the leading supplier of medical imaging equipment in China, a country with more than 46,000 hospitals. The firm also provides equipment to hospitals in 109 other countries, amounting to 9,000 customers. Now Neusoft reports preparations to tap into European market

‘China remains our home market and is definitely our largest base of customers, yet we have expanded with great success establishing operations not only across Asia but in South America, South Africa, and the Middle East,’ Neusoft Medical Systems CEO Patrick Wu pointed out. The company is now turning strongly to building on a customer base in North America, he said, and this year he will oversee the opening of Neusoft installed its flagship product NeuViz 128 CT in January 2016. At the USA’ Food & Drug Administration is both CE certified and approved by the NeuSight PET/CT worldwide that is used in patients to detect dangerous plaques.

For smaller hospitals, Neusoft also provides equipment to 46,000 hospitals. The firm also provides equipment to hospitals in 9,000 customers, yet we have expanded with a complete portfolio, Neusoft Medical Systems can present a very competitive package,’ said CEO Wu, adding: ‘Customers find that we are exceptionally strong with healthcare informatics to support our systems in image processing capabilities and image management, including a cloud-based technology for storage as well as technical support.’

New technique shos OxLDL in atherosclerotic plaques

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Chinese firm reaches into Europe’s market

Neusoft Medical Systems, a limited company, is the leading supplier of medical imaging equipment in China, a country with more than 46,000 hospitals. The firm also provides equipment to hospitals in 109 other countries, amounting to 9,000 customers. Now Neusoft reports preparations to tap into European market

‘China remains our home market and is definitely our largest base of customers, yet we have expanded with great success establishing operations not only across Asia but in South America, South Africa, and the Middle East,’ Neusoft Medical Systems CEO Patrick Wu pointed out. The company is now turning strongly to building on a customer base in North America, he said, and this year he will oversee the opening of

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New technique shos OxLDL in atherosclerotic plaques

Identifying a likely heart attack

UK researchers have identified a new approach, which could make it easier to identify fatty plaques that could cause heart attacks or a stroke, Mark Nicholls reports

A team from Imperial College London is using fluorescence molecular tomography (FMT) optical imaging technique to determine oxidised LDL (OxLDL) – known to play a major role in atherosclerosis and present in high quantities in plaques most likely to lead to a heart attack or stroke. The method proved promising when identifying atherosclerotic plaques in mice models and potentially could show how likely an atherosclerotic plaque is to rupture in human patients. Once identified doctors could then treat those plaques, either with targeted drugs or a stent implanted in the affected areas.

Atherosclerosis is the build-up of fatty plaques in arterial walls that lead to the brain or heart. If an atherosclerotic plaque ruptures, it can form a clot, causing either a heart attack or stroke. Over 100,000 people die annually in the United Kingdom after suffering such events.

The team’s method to detect and visualise amounts of oxidised LDL (OxLDL) in atherosclerotic plaques involves near infrared optical imaging. For this, the researchers experimentally used a specially designed antibody that targets OxLDL, adding a fluorescent marker to visualise plaque areas that contained large amounts of OxLDL. The first part of the research utilised Fluorescence Molecular Tomography (FMT), which is new technology that allows full-body optical molecular imaging of murine models. During a second part of the research, performed with mice, researchers demonstrated that atherosclerotic plaques can be imaged in vivo using FMT.

Researchers hope that this approach will make detailed visualisations not only found a possible new diagnostic tool, we may also have discovered a new way to treat this deadly disease.
Towards personalisation of ovarian cancer care

By Andrea G Rockall

Advances in the imaging and treatment of ovarian cancer are urgent, says Professor Andrea G Rockall

Towards personalisation of ovarian cancer care

Breast tomosynthesis imaging, Hologic calls it 3-D mammography, is proving to be the best modality to image breast cancer. The Hologic tomosynthesis system has demonstrated superior clinical performance to conventional 2-D mammography in a number of metrics, in particular showing improved detection of invasive cancers and reductions in recall rates, the manufacturer reports, adding: ‘Now Hologic is offering its tomosynthesis technology on a dedicated, prone breast, biopsy table.’ The CE-marked ‘Affirm’ prone biopsy table provides enhanced 2-D/3-D biopsy imaging and fast, easy access to the breast,’ Hologic points out. ‘The new product is an important step forward in biopsy technology — allowing radiologists to better target lesions found with 3-D mammography exams, as well as other screening modalities — with exceptional imaging, improved workflow and seamless, 360-degree access to the breast.’

Clinicians trust prone patient positioning for breast biopsy because it supports the patient stably throughout the procedure while isolating them from the biopsy needle – certainly improving patients’ experience. The Centro de Patologia de la Mama, Tejerina Foundation, in Madrid, Spain became one of the first sites in the world to offer the new system, Alejandro Tejerina MD, a radiologist with the Centre, reports that the feedback from the first wave of patients is very positive. ‘We are performing these [prone biopsy] procedures now with an average of 20 minutes,’ he said. ‘That’s a big change, not only for our time but also for the patient experience. I have a colleague in the Netherlands who also had one of the first systems installed, and she said she did one procedure in just 12 minutes. That is perhaps exceptional, but it shows what is now possible.’

According to Tejerina, conventional breast biopsy systems are restricted to 2-D imaging with a narrow window for targeting the lesion. Often it requires multiple X-ray exposures to find and position the suspect tumour for the biopsy needle. With tomosynthesis imaging on the new Affirm table, he said there is a much wider field of view and, critically, the biopsy device can now be positioned anywhere in a 360-degree circle.

Hologic built many other innovative features into the new Affirm prone system to make it easier to work with and faster for the procedure, Tejerina noted. The Hologic MultiCare Platinum system had to be positioned manually, now the system does this for us automatically, which saves time. The software really streamlines our workflow, so that goes faster. The paddles for compressing the breast are clear instead of metal, and this makes things easier.

Even the positioning of the patient improves the experience, he said. With upright systems, the woman undergoing the biopsy is looking directly at the biopsy needle. If the woman is lying down, she does not need to witness the procedure directly.

The new Affirm prone system offers a more efficient, more accurate procedure and the woman’s breast is under compression for less time, which adds to her comfort, he said. The Foundation has led the way in women’s breast health for over 40 years. Offering tomosynthesis guided breast biopsies on the Affirm prone 2-D/3-D biopsy system first for the Centre, Hologic pointed out. ‘In 2000, the Centre pioneered the use of digital mammography in Spain. It was the first centre to install a stereotactic guided prone biopsy table in 1997. In 2015, it led the way again, installing a Hologic Selenia Dimensions mammography system, the first site in Spain to use the innovative technology to improve the early detection of breast cancer. Later in 2010, the Centre was the first site in Spain to combine the Hologic Affirm upright biopsy system with the Hologic tomosynthesis system.

‘In 2015 the Centre began offering Hologic’s EVS contrast enhanced 2-D imaging along with a 3-D scan, further increasing the value of a contrast mammography procedure. The Affirm prone biopsy system expands the Centre’s breast biopsy portfolio, complementing their Selenia Dimensions 2-D/3-D mammography system and Affirm upright biopsy system, Hologic concludes.

NEW: The dedicated prone breast biopsy table

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Imaging the invisible killer

Andrea G Rockall, Consultant Radiologist at the Royal Marsden Hospital and Visiting Professor of Radiology at Imperial College in London, delivered the prestigious Wilhelm Conrad Röntgen Honorary Lecture at ECR 2016 on ‘Imaging the invisible killer: towards personalisation of ovarian cancer care’. The radiologist offered several suggestions to improve early detection, such as MRI-supported ultrasound, which may lead to successful screening and a radiological lexicon. Rockall introduced an algorithmic approach for the characterisation of masses, which is currently being validated in large multi-centre studies. Furthermore, the professor introduced current radiomic studies that are exploring imaging characteristics of underlying tumour biology. They aim to stratify ovarian cancer into distinct gene expression subtypes that may enhance therapeutic targeting.

‘I hope I could convince you that imaging can personalise chemotherapy. Early detection of non-responders using advanced imaging techniques and potentially radiomics may play a significant role in the future. Imaging can indeed personalise the planning of surgery. The challenges of CT, which are very real, may be overcome through multiparametric MRI allowing optimisation of the surgical approach,’ Professor Andrea Rockall concluded her presentation.

* The Royal Marsden Hospital was founded by Dr William Marsden in 1851 as the Free Cancer Hospital, London, in 1990 and received its title from King’s College Hospital, London. The professor was president of the International Cancer Imaging Society for 2015 and is a member of numerous organisations, including the British Gynaecological Cancer Society, the RCE and the National Cancer Intelligence Network.
The combination of nuclear medicine and modern imaging procedures such as CT and MRI is becoming increasingly important in the diagnosis, treatment planning and after-care of cancerous diseases, explains Professor Katrine Abdítrion Riklund, Deputy Head of the Department for Radiology, Senior Consultant at the Department of Nuclear Medicine, and Director of Sweden’s Umeå University Medical School, who also presides over the newly established European Society for Hybrid Medical Imaging, ESHM.

Hybrid Imaging was among the main topics at this year’s European Congress of Radiology (ECR 2016) in Vienna this March, Riklund, this year’s congress president, said. ‘The molecular, biochemical and structural information obtained through hybrid imaging is greater than the information gathered from the respective individual procedures.’ Or, as Aristotle put it: ‘The whole is greater than the sum of its parts.’

PET/CT, the combination of positron-emission-tomography and CT, and SPECT/CT, the combination of single photon emission CT and CT are already fixed components of radiological and nuclear medical diagnostics. However, there are also new developments in this area of medicine.

Researchers from the Statistical Imaging Group at University College Cork, Ireland, as well as researchers from the Department for Radiology and the PET/CT Unit at the University Hospital Cork, reported on statistical methods they have developed to analyse IRF-FDG-PET/CT examinations.

With the help of the tracer 18F-FDG, a lot more information can be gained about heterogeneous tumours than with conventional PET/CT imaging. The disease, for instance is characterised by a particularly high tumour heterogeneity, i.e. the tumours contain a number of genetically different cancer cells with different biological characteristics – a fact that must be considered during treatment.

Even more is happening in PET/MRI, i.e. the combination of positron emission tomography and magnetic resonance tomography. PET and MRI are still in their “honeymoon period”, Professor Goh, Chair of Clinical Cancer Imaging at King’s College London, points out, although she can also see a shift in paradigm. ‘The times where we simply used to measure whether a tumour has grown or shrunk are over. Now we actually have access to the biology of the tumour.’

Professor Gary Cook, Chair of Clinical PET Imaging at King’s College London is somewhat less euphoric: ‘It’s not yet clear how important PET/MRI will become as a diagnostic tool.’ However, even he ultimately sees a rosier future for PET/MRI. ‘There is mounting evidence that PET/MRI delivers a more precise anatomic positioning of their PET images, and radiologists should not only see PET and CT as types of additional contrast media,’ Antoch believes; ‘We need training programmes that cover both sides of hybrid imaging.’

The whole is greater than the sum of its parts.

Top topic: Hybrid imaging

The crucial point is the detection of beta-amyloid in vivo,’ emphasises Dr Valentina Garibotto, specialist in nuclear medicine at the University Hospital Geneva. There are no fewer than four tracers that can be utilised to detect typical plaques of beta-amyloid, which accumulate in the nerve cells and blood vessels of the brain in Alzheimer sufferers.

‘PET/MRI opens up new possibilities in oncological radiotherapy,’ confirms Professor Ursula Nestle, of the Department for Diagnostic and Therapeutic Radiology at the University Hospital Freiburg (Germany). ‘The hybrid procedure facilitates very precise therapy planning. This applies in particular to tumours which can only be visualised with difficulty with CT but very well visualised with MRI and which can also be examined very well with PET, such as those found in the upper abdomen, prostate and brain.’ Nestle is expecting a lot from the combination of molecular PET and MRI.

Recently launched is a new EU breast cancer research project, ‘Digital Hybrid Breast PET/MRI for Enhanced Diagnosis of Breast Cancer’ (HYPMED). The European Institute for Biomedical Imaging Research (EIBIR) runs this, as project coordinator, and the University Hospital Aachen, Germany is scientific co-ordinator. The project envisages the integration of a PET detector into an MRI surface coil so that high resolution PET/MRI imaging can be carried out synchronously in breast cancer patients – including the opportunity to carry out minimally invasive MRI- and PET-guided biopsies. ‘This approach is basically aimed at upgrading any conventional MRI scanner into a high resolution PET/MRI system,’ confirms Professor Volkmar Schulz-Duering, from the Institute for Experimental Molecular Imaging at University Hospital Aachen.

The growing importance of hybrid imaging also has an impact on the relationship between radiologists and nuclear medics. This combination of nuclear medical and radiological procedures requires specialist knowledge of both disciplines and also respective training, emphasises Professor Osman Raith, Head of the Department for Nuclear Medicine and Molecular Imaging at University Hospital Geneva.

However, this is not quite so easy: ‘While hybrid imaging is developing at a rapid pace there is still room for improvement when it comes to the cooperation between both disciplines involved,’ believes Professor Gerald Antoch, Director of the Institute for Diagnostic and Interventional Radiology at the University Hospital Düsseldorf. Nuclear medics should not simply regard CT or MRI as tools for the precise anatomical positioning of their PET images, and radiologists should not only see PET and CT as types of additional contrast media, Antoch believes: ‘We need training programmes that cover both sides of hybrid imaging.’

ESHM president Riklund taps it in a nutshell: ‘In the future hybrid images should be interpreted by one single specialist.’
Go biometric or risk a botch up

Today, most healthcare systems rely on text-based matching: A patient's identity (ID) card or driver's license is considered sufficient proof of identity. However, this 'identification system' puts patients at risk of death, improper treatment, insurance abuse and lawsuits the provider and hospital cannot defend.

Informetrics expert Dr Raymond D Aller, a renowned authority on the use of information technology (IT) to enhance and ensure patient safety and operational efficiency, urges healthcare providers: 'Move toward biometrics as the mainstay for patient identification!' Questioned about the risk of current identification systems for hospitals and insurance cover, informetrics expert Dr Raymond D Aller explained, 'If patient "A" comes to our hospital and we mistakenly identify him as patient "B", we risk treating him for diseases he may not have, giving him medications to which he is allergic and could have a serious or fatal reaction and we might fail to give him vital medical treatment or treatment because we do not realise the conditions he does have.

In that scenario, the misidentified patient might sue the hospital. It's very difficult for a hospital to convince a jury that it was excusable to treat the wrong patient. Typically, such cases are settled out of court. 'If patient "F" lacks medical insurance, his brother "G" has good coverage, our present practices make it possible for patient "F" to give the name "G". "F" then receives treatment, let's say knee replacement, and the bill is sent to "G"'s insurance company – which constitutes insurance abuse. Furthermore, the hospital may not recognize critical conditions in "F" such as a pre-existing atypical blood bank antibody and give a blood transfusion that could be harmful or fatal.' Biometric identifiers are used to identify and authenticate patients. Biometric identifiers currently used in healthcare include iris pattern, palm vein pattern, face recognition and fingerprints – all of which might change if the patient is admitted comatose, or confused, obtaining text information may be difficult.

Secondly, clerks tend to treat close text matches as exact. Third, different patients may have different names, differently, Hispanic women, for example, have two surnames one of which might change when they get married, or some Hindus of southern India who consider it heretic practice to provide the family name. Moreover, as the number of patients in the database is expanding, the likelihood of matching non-corresponding people increases.

Even the US Joint Commission on the Accreditation of Healthcare Organisation (JCAHO), and others, promulgate the fallacy that matching two text identifiers is somehow "positive" identification. Unfortunately, a driver's licence is not much better than other forms of text. Humans are not very good at unique matching of a picture on a driver's licence. Interestingly, biometric face recognition algorithms do a much better job. Last but not least, don't forget that if a patient is admitted comatose, or confused, obtaining text information may be difficult.

Shortcomings in text-based patient identification and matching

Text-based patient identification has several critical shortcomings. Firstly, there's a high possibility that more than one person in the population served has the same name, some times even the same date of birth.

Interview: Sascha Knutel

A futuristic communication strategy cuts nurse ward walks by 2 km daily

Humber River Hospital is oh so smart

'Humber River Hospital, Toronto, Canada, could come straight out of a science fiction series that provides Star Trek-like healthcare services with hull-cruising robots delivering food, medications and supplies to staff, electrochromic windows, video conference capabilities at patients' bedside and real-time location systems, to name but a few futuristic features. Yet, this is now and for real!' Cornelia Wels-Maug reports

Workflow automation at the centre

Open in October 2015, the new Humber River Hospital in Toronto is a 564-fed acute care facility aims to offer a new level of staff and patient experience with the highest level of being 'lean, green and digital'. The hospital's underlying mantra is workflow automation to maximise efficiency and patient outcome. More than three-quarters of its supply chain are automated. Physicians order tests, deliver samples and receive results completely electronically. Given its high level of computerisation to support the day-to-day care delivery, this could well be called a 'smart' hospital. To achieve that, a high degree of integration efforts had to be mustered to connect the various pieces of technology into a coherently working system and using technology to advance high quality, safe and efficient patient-centred care,' says Kevin Fernandes, CTO for Humber River Hospital. When it comes to communication, it makes it clear. 'Our technology strategy includes equipping our care team with some of the latest communication tools at the point of care (POC).'

To this effect, the hospital chose to work with Ascom Wireless Solutions, which provides wireless on-site communication system and has built up an international presence in hospitals, senior care and independent living. The hospital installed this vendor's nurse call system, Myco, and its Unite software platform, both designed to improve quality and efficiency of care. Myco's seamless integration with other hospital systems enables us to deliver everything from time sensitive, bedside nurse calls and notifications to real-time electrocardiogram and waveforms directly to the mobile caregiver device. Fernandes adds, 'Ascom Myco increases the time our staff and physicians have to meaningfully interact with patients at the bedside.'

Communication experience

Why did Humber Hospital choose Ascom? Claes Odman, General Manager of Wireless Solutions at Ascom, explains: 'The Myco is already used by other technically advanced institutions, such as the Cancer Centre in Melbourne, Australia. In particular, we have a strong presence in North America, due to Ascom purchasing GE's nurse call system back in 2011.'

His colleague, Fritz Mumenthaler, CEO of Ascom Switzerland, adds to this: 'We have an extensive mobile portfolio. What sets us apart is that we bring mobile devices, middleware, connectivity and infrastructure together. When it comes to the execution we also have a strong local deployment operation and local technical presence.'

Myco and middleware optimise workflow

The Ascom Myco is a purpose-built smartphone geared for deployment in hospitals. 'It's a workflow optimising tool,' Tim Whelan, President & CEO of Ascom North America, points out about the product's core feature. Combined with the vendor's middleware 'Unite', it supports access to information from medical equipment and hospital systems – e.g. patient monitoring devices and patient health records – when on the move. The patient-related information is available whenever needed to take decisions at the POC, extending the hospital's capabilities well beyond those of a pure nurse call system. 'Using the Myco helped one of our clients to bring down the time spent running around the wards from 11.5 km per day to 9.5 km just by optimising the workflow', Whelan points out.

The phone is based on Android open-source OS and supports the integration of existing hospital apps. 'We chose an Android platform to make it open for developers. Currently, there are about 80 apps working on the platform,' Whelan explains. 'The system can support up to 250 different workflow systems on the Unite platform.'

Furthermore, by filtering alerts so that nurses are only notified of alarms triggered by their assigned patients, or those devices that monitor their patients, the solution significantly contributes to reducing alarm fatigue. Although the solution's functions to either call the patient or their caregivers, or those devices that monitor their patients, the solution significantly contributes to reducing alarm fatigue. Although the solution's functions to either call the patient or their caregivers, or those devices that monitor their patients, the solution significantly contributes to reducing alarm fatigue. Although the solution's functions to either call the patient or their caregivers, or those devices that monitor their patients, the solution significantly contributes to reducing alarm fatigue.
Managing the risk of cyber crime

Cybercrime cases grow annually, which demonstrates the possibility, not only for banks or companies, but also for insurers, because criminals also steal data and whole databanks containing private information.

There are well-documented security vulnerabilities, many security breaches come about because basic security measures were not correctly, or not uniformly, applied. More than one major breach has been announced as “a sophisticated nation state attack”, but later found to be much more mundane in origin and execution.

Who is responsible in a case of abused data?

There are multiple parties and different levels of responsibility involved in data handling. A hospital may collect and store information about a patient, but send some of that data to a billing company, which then shares it with an insurance company. If criminals break into a hospital’s network and steal data then the hospital is responsible, even if it has outsourced its data processing.

It is important when considering the risks in cloud computing. However, the data processor may also be held responsible. Cobb adds. If personal information, or a medical record, is stolen from an insurance company that is processing a claim, then that insurance company is responsible. This shows that data security is an important topic that involves every organisation dealing with personal data. In other words, you cannot outsource responsibility. Cobb concludes, and is apprehensive: “I worry that the level of criminal activity targeting personal data will erode trust in digital technologies, although these have great potential to improve quality of life and living standards around the world.”

Now more than ever we need to manage the risks in an appropriate way. If we move forward with technologies.

The Advisory Board Company is a global technology, research and consulting firm serving healthcare and higher education. They serve more than 230,000 leaders at 5,200 member organisations, enabling them to elevate performance and solve their most pressing problems. The Company provides strategic guidance, actionable insights, cloud-based software solutions, and comprehensive implementation and management services.

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The Advisory Board Company has identified that intelligent machines in healthcare ‘include intelligent service assistants, remote patient monitoring systems, intelligent symptom checkers, (semi) autonomous medical devices, robot hospital or home assistants, and predictive modelling systems’.

These are different types of technological approaches used in intelligent computing. For example, constraint-based reasoning is often used for scheduling problems; inference-based systems are used where experts can describe their knowledge in terms of rules but not the specific order that they need to fire; and machine learning and neural networks are often used where past data is available to train a model to produce useful results in new yet similar situations.

Kleinberg has categorised six key areas in which intelligent computing are affect the healthcare system and kinds of issues they can address:

- Intelligent Information Gathering and Sensing (Internet of Things) - What do we know about the patient and his/her changing environment to aid in his/her health? Example: Humble River Hospital in Toronto, working with CGI and ThoughtWire to help the hospital respond more efficiently to “code blues.”
- Intelligent Interaction and Service - How can we communicate with our systems in a more natural manner? Example: MD Anderson’s Patient Conierge using technology from Cognitive Scale to assist patients in choosing restaurants and housing.
- Intelligent Diagnosis and Care Plans - What’s wrong with the patient and what kind of evolving treatment plan would be most effective? Example: Modernising Medicine using technology from IBM Watson to assist in diagnosis.
- Intelligent Medical Devices - How can we automate and adjust medical devices to be more real-time, accurate, and responsive? Example: Johnson & Johnson’s Healtym that provides ranked options and alternatives for care, and predicts outcomes, adjust with new data, and reduce and eliminate unnecessary workflows and rework for patient care. However, do they have the potential to affect the health care industry? Kleinberg is positive: Absolutely - there are many tasks from the simplest to the most complex that can potentially be done more accurately, efficiently and rapidly than by poorly trained, overworked, or overwhelmed healthcare workers and providers.

As Managing Director for the Advisory Board Company, Kenneth Kleinberg has spent 25 years on computer science, software engineering, and computer security and data privacy research and regulatory approvals. He has spent 25 years on computer science, software engineering, and computer security and data privacy research and regulatory approvals.
Extracorporeal technology eases stress

Conventional therapy for ARDS patients and for patients with exacerbation of chronic obstructive pulmonary disease (COPD) has relied on invasive mechanical ventilation. Mechanical ventilation, however, has several major drawbacks: sedation has to be induced and the air being pressed into the lungs with positive pressure can damage the pulmonary alveoli or the diaphragm. Moreover, even maximum ventilation frequently does not provide adequate gas exchange.

Innovative artificial lungs, which breathe for the patient, offer less trauma and for patients with exacerbation of chronic obstructive pulmonary disease (COPD) has relied on invasive mechanical ventilation. Mechanical ventilation is usually comprised of a pump-driven pulmonary support system that removes carbon dioxide and adds oxygen.

A key component of such a device is the so-called membrane ventilator, which 'breathes' outside the patient's body to perform some of the gas exchange work of the native lung, at the same time relieving the respiratory muscles.

A plasma-tight diffusion membrane is connected femorally, for example, to the body via a vascular access. The blood pump can be adjusted precisely and instruments control blood flow. The membrane ventilator can be used on a patient for up to 29 days. Because the lung assist system does not require sedation, in that period the patient is actively involved in the therapy and can eat and communicate.

The hardware fits on a trolley, providing patient mobility during the therapy, the manufacturer adds. The membrane ventilator height can be adjusted quickly, for example, when the patient wants to lie down, sit up or be moved around. In addition, subcutaneous therapies can follow sooner, bringing length of stay reductions and thus reduced costs.

The next generation of lung assist systems might well be portable, the report continues. The platform-based design enables further developments, such as smaller and other types of vascular access plus increased efficiency as site-of-the-art gas exchanges provide better performance with a smaller footprint.

What might the far-off future bring? Perhaps bio-hybrid systems that mimic nature and are even colonised with cells.

New MRI system results in bigger throughput

Measures to improve the MRI scanning experience for young patients have had a dramatic impact on waiting times for a British hospital, according to a paper by Mark Nicholls reports the Royal Sussex County Hospital, in Brighton, has installed a Siemens Healthcare Magnetom Aera 1.5-Tesla system incorporating special features to help relax younger patients. Within months of the installation of the wide bore machine, which has comfort enhancing features, there has been a significant fall in the number of patients aged 4-17 requiring general anaesthetic ahead of undergoing an MRI scan.

Other devices to help children relax include a TV – donated by the Rocking Horse Children’s Charity – to watch DVDs, and lighting control for young people to select the ambient hue.

John Wilkinson, the hospital’s Imaging Services Manager, explained that in the nine months since the Siemens machine was installed, clinicians have found the number of children needing general anaesthetic for their MRI procedure has fallen by between one third and a half due to the increased compliance and comfort.

This has led to increased capacity, falling anaesthetic costs, and benefits to younger patients.

In the bore, TV is key to patient relaxation

Under general anaesthesia (GA), the hospital can conduct MRI scans on three children per session, but up to ten children per session – depending on the nature of the scan – when they do not require GA because they feel more relaxed with the Aera’s enhanced child-friendly features.

This negates any anaesthetic risk for the children completely,’ he said. ‘The in bore TV is key, enabling children to lie down and watch their favourite DVD during a scan, which the wider bore makes the scanner much more tolerable from a claustrophobic point of view.

‘It is also quiet, which is much more acceptable to a child and the Siemens model has a variable LED lighting system, where children can say if they want blue, yellow or purple lighting. This way they feel as though they have more control of the scanning environment and as a result they are happier and more relaxed.

One of the main benefits is a reduction in waiting times. If a child needs anaesthetic, anaesthetic and radiology teams must be coordinated, with the child admitted to hospital as a day patient, and the wait for an MRI slot can be up to five weeks.

Without GA, the wait is around two weeks and sometimes only three to four days, so we have been able to increase our capacity for paediatric scanning,’ Wilkinson added. ‘It is less resource intensive and from a patient – and parent – experience, so much better with the new Scanner. It creates a more acceptable environment for a child to go into an MRI scenario.’

The trust has located the scanner between the adult hospital and The Royal Alexandra Children’s Hospital, to use the equipment also for adults, and finds it has improved patient flow.

This particular move is part of the hospital’s threefold operation to provide enhanced MR access to paediatric patients, and relocate the neurology department as well as ensure a better experience for the in-patients.

Two further Aera 1.5-Tesla systems have been installed as part of the planning to upgrade technology and further enhance the facilities within the hospital’s radiology department.

Systems will be in use for seven days a week

The systems are intended to be used for a range of services which include cardiac, breast, orthopaedic and prostate, and will also be used to ensure better throughput for neurosurgery patients following the move of neurosurgical procedures to the Royal Sussex County Hospital campus.

‘We will be using the systems seven days a week, which will greatly impact the out-of-hours MR service with patients being seen more rapidly,’ Wilkinson pointed out.

The three new Magnetom Aera will support a twenty percent rise in demand at The Royal Sussex County Hospital for imaging services compared to nine percent nationally in the UK.

Interventional lung assist is efficacious and allows a broad range of application.

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A plasma-tight diffusion membrane is connected femorally, for example, to the body via a vascular access. The blood pump can be adjusted precisely and instruments control blood flow. The membrane ventilator can be used on a patient for up to 29 days. Because the lung assist system does not require sedation, in that period the patient is actively involved in the therapy and can eat and communicate.

The hardware fits on a trolley, providing patient mobility during the therapy, the manufacturer adds. The membrane ventilator height can be adjusted quickly, for example, when the patient wants to lie down, sit up or be moved around. In addition, subcutaneous therapies can follow sooner, bringing length of stay reductions and thus reduced costs.

The next generation of lung assist systems might well be portable, the report continues. The platform-based design enables further developments, such as smaller and other types of vascular access plus increased efficiency as site-of-the-art gas exchanges provide better performance with a smaller footprint.

What might the far-off future bring? Perhaps bio-hybrid systems that mimic nature and are even colonised with cells.
POC ultrasound flies to work

The massive earthquake in Nepal in April 2015 killed more than 9,000 people and injured more than 23,000. Within days, medical teams from other countries had offered services to the disaster relief effort, among them a team from the UK’s James Paget University Hospital (JPUH) in Gorleston-on-Sea, East Anglia. Here consultant anaesthetist Andreas Brodbeck explains how point-of-care ultrasound technology helped the team to provide long-term pain relief for earthquake victims, and support Nepalese doctors performing surgical procedures.

Spring 2015 saw vast areas of Nepal destroyed by an earthquake with a magnitude of 7.8, leaving doctors trying to cope with huge numbers of seriously injured patients requiring urgent treatment. With a global relief effort underway, a team from the James Paget University Hospital volunteered to visit the earthquake zone, where they could use their medical expertise to assist Nepalese doctors dealing with an overwhelming workload.

Along with three other consultants from JPUH – orthopaedic surgeon Mike Flores, trauma consultant Emeaka Nnene, and general surgeon Kirtipur – I offered my services to Nepal – I offered my services to Kirtipur Hospital in Kathmandu. I had no idea what drugs and anaesthetics would be available at the hospital, but I knew that regional anaesthesia would be beneficial and so I took a Sonosite point-of-care ultrasound system with me, along with some local anaesthetics, needles and an Ambu-bag.

At Kirtipur, facilities were limited and the environment far from ideal. The majority of the patients we encountered were waiting for surgery to upper and lower limb injuries. Many were injured trying to escape from buildings, often jumping from some height, and so ankle, wrist and clavicular fractures were common. POC ultrasound was invaluable for treating these people; the instrument’s small size and light weight made it easy to transport, and I used it from the first day to the last.

With just one probe – a linear transducer – I could visualise the upper and lower limbs, allowing me to administer regional anaesthesia to one patient in the recovery room while another was in theatre undergoing surgery.

It’s such a wonderful way to give an anaesthetic; you don’t need general anaesthesia, which means people are not sick afterwards and recover faster. Patients are pain free after the procedure and experience fewer side effects, and it’s safer, too, with a lower risk of developing complications. Using ultrasound, you can perform reliable blocks one after the other and, as the onset of anaesthesia is much faster, you don’t have to wait a long time to find out whether or not it has worked. This quality is something that you can only get using ultrasound guidance.

The local anaesthetists, who were already very skilled at performing blocks with nerve stimulation, were fascinated by the use of ultrasound-guided anaesthesia and, after watching a few procedures, they were ready to use the technique themselves. It became a really good teaching experience.

The Sonosite system is very robust, intuitive and simple to use, and they picked it up so quickly. They saw how much the quality of the blocks improved, and I’m sure they will ask the hospital managers to invest in an ultrasound system at the earliest opportunity.

Within a couple of weeks, the workload was manageable and we could return home. Nepal has since suffered a second earthquake and the monsoon has started. While the medical situation is reasonably well under control – there were fewer deaths and injuries during the second quake, largely because so many people were homeless and living under tarpaulins in the open air – there is still a great deal to do and it will be many years before the country is restored to its previous state.

The Nepal aid programme was a real team effort, with medical staff from many countries working together to treat as many patients as possible, providing support to our Nepalese colleagues, allowing them to take a much needed break. As anaesthetists at Kirtipur and another hospital have expressed an interest in learning more about ultrasound, I plan to return to Nepal in a few months’ time, accompanied by Mr Arty, to run a workshop on regional anaesthesia. This time I will take a newer point-of-care ultrasound system and more probes, allowing a range of additional ultrasound topics – echocardiography, abdominal and lung ultrasound, laparoscopic procedures and the use of ultrasound in ICU – to be covered, depending on what people want to learn.

I really appreciate the support we receive from Sonosite for our work in Nepal; it’s a company that genuinely cares. Being able to contribute to the initial relief effort, with the backing of JPUH and the charity Nepal in Need, was very satisfying, and I look forward to returning to the country later this year.
Embracing robotic technology in the realms of microsurgery will have significant benefits for patients, clinicians and hospitals, Mark Nicholls reports

**Loading hand and peripheral nerve specialist Professor Philippe Liverneaux believes using robots will not only enhance patient outcomes and improve cosmetic appearance but also bring significant cost benefits to health systems.**

As Professor of Orthopaedics & Hand Surgery in the Hand Surgery Department at Strasbourg University Hospitals, he outlines his vision for bringing robotics and microsurgery closer together at the Advances and Controversies in Reconstructive Microsurgery (ACRM) 2016 conference (5-6 May, Norwich, UK).

During his presentation ‘New horizons in robotic nerve microsurgery,’ he discusses how the future of peripheral nerve microsurgery should be robotic and bring additional benefits within minimally invasive surgery (MIS).

Speaking in our pre-conference interview Professor Liverneaux said: ‘The goal is for microsurgery to become endoscopic super-microsurgery; we want to highlight the attraction of robotics for microsurgery within the philosophy of MIS. He also points to RAMSES (Robotic-Assisted Microsurgical & Endoscopic Society) – a group of plastic, hand and orthopaedic specialists - which advocates the future benefits of microsurgery being robotic.

A particular aspect of this is the work of plastic surgeon Jesse Selber, who directs clinical research and is an Associate Professor in the Department of Plastic Surgery at the University of Texas MD Anderson Cancer Center in Houston, Texas. A pioneer of robotics use in harvesting flaps, primarily from the latissimus dorsi and the rectus abdominis, to provide substance to cover other injured body regions, at the conference he tackles the subject of simultaneous skull, scalp, kidney, pancreas transplants.

Professor Liverneaux: ‘Usually you have to make very large incisions to harvest these muscles but, with the robot, we can make small incisions. This is important from a cosmetic point of view and patients will be happy with a small incision. A second advantage with small incisions is that patients will have less complications and recover faster, which will be cost effective because they will stay fewer days in hospital.’

**A robot improves the surgeons’ skill**

As a hand micro-surgeon, Liverneaux finds the advances of robotic control offer particular benefits when patients sustain deep nerve injuries, such as a tear of the brachial plexus nerve network from the neck and shoulder down the arm, or injuries sustained by babies during some difficult births.

He explains that the operation to restore movement by making a nerve graft in the brachial plexus traditionally requires a large incision often of 20-30cm. These incisions are very bad from a cosmetic point of view and for nerve recovery; he said ‘The goal of robotic microsurgery in peripheral nerve surgery is to avoid this large incision.’

While data comparing robotic surgery to conventional techniques remains limited, Liverneaux says common sense suggests it is preferable to make smaller, rather than larger, incisions.

Another area in which robotic surgery has benefits is in the long thoracic nerve responsible for the motion of muscle that gives stability of the scapula.

‘With the robot, incisions are small and precise, fractionally away from the nerve to ensure when we suture we don’t affect the nerve,’ he adds.

**Micro-surgeons still often use large incisions to carry out the finely detailed surgery within the body but Liverneaux suggests the robot can conduct this with small incisions and precise instruments within the body.**

With the robot, instruments can move in three dimensions and have 3-D vision within the body, offering excellent optical magnification – currently one-to-five but potentially one-to-100 in the future – underlining the importance of imaging in robotic microsurgery.

A critical advantage of a robot in microsurgery is the facility of motion scaling and tremor filtration. ‘In microsurgery, because all the tissues that you are dealing with are so small, less than 1mm, if you can increase the scaling of our movement this will increase the surgeon’s precision. Motion scaling is very important for micro-surgeon because it makes the operation easier,’ Liverneaux points out.

‘Motion scaling and tremor filtration are two key features provided by robotic systems that is impossible to obtain with conventional human skills. The future of micro-surgery is to make the technique easier and what else than a robot can do.’

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**Lighting up medical procedures**

**The smart Italian LED lamp**

Solit5 T-E, which supplements the Sturtel range of lamps manufactured by ACMER Medical Company, is a focussed LED examination light for diagnostics, minor precision surgery, intensive care, recovery room and first aid. The lamp provides a uniform distribution of light and can focus the light beam with perfect illumination both on the surface and in depth providing the operator with the best working conditions,” the company reports.

The high technological level combined with the use of high-powered LEDs allow the lamp to have a very linear yield and a negligible performance decay for its entire life duration: ‘The light beam is IR-free.

Light intensity is 50.000 lux (large spot light beam) increasing up to 77.000 lux (small spot light beam) and with low power consumption (24 W). Colour temperature (CCT) is 4.500°K. The colour-rendering index (CRI) is 95.

The LED’s layout gives visual comfort and produces a uniform, homogeneous and shadow-less light,’ ACMER reports. Adding, ‘The high technological level combined with the use of high-powered LEDs allow the lamp to have a very linear yield and a negligible performance decay for its entire life duration.

The lamp’s round shape also makes it handy and functional when in use and being moved, and so the structure features work in diagnostics, test labs and dental surgery.

With an ‘iSmell touch panel to control all functions, the lamp also has an easy-to-grip removable and sterilizable handle, making it suitable even for critical sanitary applications.’