Neonatal imaging: beyond MRI-compatible incubators

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Greening hospitals: Yes we can!

Earlier this year the American Medical Association (AMA) published an article entitled ‘Lower costs by going green!’ aimed at the healthcare sector. They note that, in the USA, 9 - 10 percent of the nation’s total carbon dioxide emissions are generated by the health care industry – and the USA is not alone in this high carbon footprint. In Europe the average emissions is estimated to be about 5 percent. Clearly there is a margin for improvement. The AMA article makes practical, money and energy saving proposals aimed at the small medical practices. The question arises as to how this could be achieved in the larger hospital environment. There is a trove of excellent suggestions for building new energy efficient and environmentally friendly hospitals – but what of existing hospitals?

A very useful source of information is the Global Green and Healthy Hospitals (GGHH) community. The community of almost 1000 members have the aim to transform the health sector and foster a healthy future for people and the planet. To achieve this aim GGHH brings together hospitals, health systems, and health organizations from around the world under the shared goal of reducing the environmental footprint of the health sector.

To achieve their aims, they suggest a 10 goal strategy: Leadership - making environmental health, safety and sustainability key organizational priorities; substituting harmful chemicals with safer alternatives; to reduce, treat and safely dispose of healthcare waste; to reduce water consumption, as well as to source, purchase and serve sustainably locally grown, healthy food. Other goals include implementing energy saving strategies; safely manage and dispose of pharmaceuticals; transportation planning, building efficiency design; and purchasing safe and sustainable products.

GGHH points out that there is not one model of green and healthy hospital but indicate that many health systems around the world are already taking steps to reduce their environmental footprint contributing to public health while at the same time saving money. Initiatives such as the ‘Health Promoting Hospital Network’ originating in Europe and with the support of the World Health Organisation, is developing a set of sustainability criteria. Such initiatives and conferences of greening the health sector are emerging in countries as diverse as Argentina, China, India, South Africa and Sweden – to name a few. The Global Green and Healthy Hospitals agenda sets out to support these existing efforts around the world to promote greater sustainability and environmental health. European hospitals would do well to align themselves with this community, reducing the European healthcare contribution to the carbon footprint, as well as, in many cases, saving money – immediately and in the future.
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Women and diabetes - questions on gender-specific impact

According to the World Health Organization’s ‘Global Report on Diabetes’ 2016, diabetes is directly responsible for 1.5 million deaths around the world. This makes it the eighth leading cause of mortality. However, its impact is higher in women, for who diabetes is the fifth leading cause of death. At present, more than 200 million women are estimated to live with diabetes.

One reason for the problem of diabetes in women is the rise in the number of patients with the disease. The prevalence of diabetes, according to the WHO, has doubled since 1980. Moreover, it is no longer a disease that largely affects rich nations. Indeed, prevalence is now growing quickest in middle-income countries. More than half of the total number of women with diabetes today live in southeast Asia and the Western Pacific.

Another issue here is the lack of healthcare. This means that the management of diabetes is inadequate, particularly for poorer people.

Debate dates to end of 1990s

The debate about gender and diabetes began to intensify at the end of the 1990s, as epidemiology improved, especially outside Western countries. In January 2001, a report by University of Bristol researchers in ‘Diabetologia’ found geography and gender to be a major factor in Type I diabetes. The report found an excess of male patients in regions with the highest incidence of diabetes, above all in populations of European origin. These showed a roughly 3:2 ratio of males to females in the 15-40 age group. On the other side of the equation, lowest risk populations for Type I diabetes (principally non-European) typically showed a female bias.

The Bristol researchers also observed that Type II diabetes had shown an excess of females in the first half of the 20th century but had become equally prevalent among men and women in most populations, with some evidence of male preponderance in early middle age. Men seemed to also be more susceptible than women “to the consequences of indolence and obesity, possibly due to differences in insulin sensitivity and regional fat deposition.” In addition, women were more likely to transmit Type II diabetes to their offspring.

Geography and gender

Recent figures from the WHO on mortality from high glucose confirm the dual impact of gender and geography. The data shows a fork in female mortality, from near equivalence to males in the Eastern Mediterranean, Africa and the Western Pacific, to being about three-fourths of male mortality in Europe, the Americas and South-East Asia.

HIGH BLOOD GLUCOSE AGE-STANDARDIZED MORTALITY RATES PER 100,000 BY WHO REGION, AGE 20+

Women may also be more prone to dying from diabetes due to physiological factors. Data show that women with diabetes are more likely than male patients to have poor blood glucose control and be overweight, along with high blood pressure and cholesterol levels. The latter impact directly on cardiac risk factors, and do so in seemingly different ways for men and women.

Male death rates fall, women’s stays unchanged

In 2007, a study in the ‘Annals of Internal Medicine’ revealed a disturbing fact – that women with diabetes fared far worse than men. The study found that in 1971-2000, death rates for diabetic men fell, while the rate for women hardly changed. Worse, while men with diabetes lived on average for 7.5 fewer years than those who did not have the disease, the difference for women was 8.2 years. This disparity is probably due to a combination of multiple factors, according to the study.

Physiological factors and standards of treatment

Most factors are physiological. However, it seems outcomes for women with diabetes may also be worse due to differences in standards of care and treatment. Some of these were highlighted in 2005 in ‘Diabetes Care’, or two years before the ‘Annals of Internal Medicine’ study mentioned above.

The ‘Diabetes Care’ article covered risk factors in coronary heart disease (CHD) and treatment for Type II diabetes. It found that women with diabetes “received less treatment for many modifiable CHD risk factors than diabetic men.” This included staple therapies such as medication for high LDL cholesterol. The authors concluded that “more aggressive treatment of CHD risk factors” in women offered “a specific target for improvement in diabetes care.”

In 2010, a study in ‘Diabetic Medicine’ found the picture to be similar for Type I diabetes. The study by another Massachusetts General Hospital team, led by M.E Clarkin, found women reported lower use than men of medications to reduce CHD risk. These included glyced hemoglobin, as well as aspirin, angiotensin-converting enzyme (ACE) inhibitors, angiotensin II receptor blockers (ARBs) and statins.

The role of cardiac health

Key physiological differences do indeed concern cardiac health. In the general population, women tend to live longer than men, mainly because of lower rates of heart disease. However, such an advantage becomes insignificant
for diabetic women. Indeed, the risk of heart disease is reported to be six times higher for women with diabetes than those without, compared to an increase of just 2-3 times in men.

This impacts directly on mortality for several reasons. One of the most significant is that women can have heart attacks without its most notable symptom in males, namely chest pain. Indeed, women are more likely to experience only nausea, shortness of breath, and back or jaw pain during a heart attack. Many women and medical practitioners in poorer parts of the world do not recognize the latter as warning signs. This lowers the chance of recovery.

One study published in the 'European Heart Journal' in 2007 found a stronger association between diabetes and death by heart failure for women than men. A Finnish study also found that heart attacks are more often fatal for women with diabetes than they are for men.

Indeed, perception is linked to less effective health care for women with diabetes, and this is best typified by cardiac health. As women are less likely to have heart attacks than men, a woman may not raise the same alarm bells as a man, especially when she does not experience chest pain.

Renal disease

Women with diabetes face complications from renal disease, too. Men have a higher risk for kidney disease, but this disappears with the onset of diabetes. Women with diabetes are just as likely to get kidney disease as men. Moreover, such a likelihood is not dependent on age, although women tend to be unaffected by kidney disease until menopause, when a drop in oestrogen levels makes the female endocrine system more like a male's. Some studies have found that lower oestrogen levels are associated with kidney disease, but the mechanisms of this association are not yet clear. One theory is that high testosterone, which kicks in as estrogen levels drop, is responsible. Should this be proven clinically, it may be possible for women with diabetes to use hormone therapy to restore the balance between estrogen and testosterone, and thereby improve their kidney health.

Mental health

Depression is about twice as common in women as men and is believed to worsen the outlook for women with diabetes. A study of women in the 'Archives of Internal Medicine' in 2010 suggests a two-way relationship between depression and diabetes risk, with each influencing the other. Indeed, some women-only studies have shown women with both conditions are twice as likely to die early as those who had neither. In 2006, a study in 'Public Health' extended the scope to men and found that diabetes and depression were not associated in men, unlike in women.

Polycystic ovary syndrome

Women with diabetes are also likely to have several conditions which are female-specific.

One of these is polycystic ovary syndrome (PCOS), a metabolic disorder caused by hormonal imbalance in the female body. PCOS causes irregular periods and can result in fertility problems. It is also associated with acne, darkening of facial skin and hair growth on the face, loss of hair on the head etc. Females with PCOS are at heightened risk of getting diabetes, and the above signs are thus potential indicators of impending diabetes.

The precise mechanism of PCOS is not known, but there is clinical evidence that women with PCOS develop high levels of resistance to insulin and this then leads to development of Type II diabetes.

What has however been confirmed is that women diagnosed with PCOS at an early age show a higher risk of diabetes and fatal heart conditions later in life.

Gestational diabetes mellitus

Women also face the risk of gestational diabetes mellitus (GDM). This is defined as blood glucose values above normal but below those of diabetes. GDM is diagnosed through screening, since several of its symptoms such as increased thirst and urination needs, dry mouth and fatigue are commonplace in pregnancy and are not necessarily a sign of a problem.

Although the true prevalence of GDM is unknown, it is estimated to affect 1-14% of pregnancies in the US, depending on the population studied and the diagnostic tests used. Recent research has focused on high-risk groups. A pan-European study of women with body mass index greater than 29 kg/m2 found prevalence of 24% in early pregnancy, with another 14% developing GDM at mid gestation (24-28 weeks) and 13% at late gestation (35-37 weeks). The study was published in the October 2017 issue of 'Diabetologia' and covered women at 11 centres across Europe.

GDM increases the risk of certain complications during pregnancy and delivery, both for the women in question and for their infants. One of these is pre-eclampsia, which causes high blood pressure during pregnancy. Others include the baby growing larger than usual and polyhydramnios, which is the presence of excess amniotic fluid.

Though GDM is a temporary condition, affected women have an over-sevenfold increase in the risk of developing Type II diabetes 5-10 years after delivery. Moreover, children born to mothers with GDM are also more likely to develop impaired glucose tolerance.

Early diagnosis of GDM through testing for blood sugar and modifications to lifestyle can be effective in preventing or delaying the condition and treating its consequences.
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Vaginal mesh ban ‘a retrograde step’, surgeons say

Banning vaginal mesh implants would remove an important treatment for some women suffering from a prolapse, says the Royal College of Obstetricians and Gynaecologists. Some women benefit from the implants and should have a choice, it said.

The health watchdog NICE is expected to recommend that the implants be banned.

Around 800 women are taking legal action against the NHS and mesh manufacturers, saying they have suffered from painful complications.

When a prolapse occurs, doctors sometimes insert a mesh into the wall of the vagina to act as scaffolding to support organs - such as the uterus, bowel and bladder - which have fallen out of place. Hundreds of women have reported problems with this plastic mesh, which is made of polypropylene.

Prof Linda Cordozo says banning vaginal mesh is not a good idea. However another smaller device made from the same material, called a tape, which is used to stem the flow of urine from a leaking bladder, has a much lower risk of complications.

Prof Linda Cordozo, a surgeon at King’s College Hospital in London, said there was a misconception that all types of mesh were a problem. She explained that she was not in favour of banning the use of mesh for prolapses.

“I don’t think a total ban on anything is a good idea. It stifles the opportunity to offer the minority something that might benefit them,” she said.

Draft guidelines from NICE say the implants should only be used for research - and not routine operations.

But Prof Cardozo said that a ban would stop any further research as well.

“If mesh is banned, there will be no more clinical trials,” said the professor.

“Banning it is a retrograde step - we will go back to how we were a century ago when we couldn’t offer women a range of options.”

Prof Cardozo pointed out that artificial hips and knees were not perfect when they were first introduced, but thanks to further research and progress they ended up improving lives.

“We need to be very careful that [mesh] is used in the right women by the right doctors... who have explained the risk-benefit ratio and all other types of treatment,” she added.

Some doctors did not have the skills or training to put in vaginal meshes, and the devices have been overused, the professor has argued.

She also said the debate over vaginal mesh was making some women who had had surgery unnecessarily anxious.

“They are panicking because they believe something terrible may be happening inside their body as a result of tape or mesh, but most women are problem-free,” said Prof Cardozo.

BBC https://tinyurl.com/ybmcbqz3

Scientists develop new artificial ovary prototype

Belgian researchers have taken important steps towards creating transplantable artificial ovaries. Once successful, these could be of value to women struggling with infertility or cancer patients who cannot conceive after undergoing radiation or chemotherapy.

The research team has identified a protein formulation that closely resembles the structure and rigidity of the natural tissue lining a woman’s ovaries, says Marie-Madeleine Dolmans of the Université Catholique de Louvain in Belgium, in an article in Springer’s Journal of Assisted Reproduction and Genetics.

Through cryopreservation, it is already possible to store a cancer patient’s ovarian tissue and to transplant it back into her body once her cancer treatment has been completed and she has gone into remission. The technique has already helped 130 mothers who survived cancer to conceive and give birth (NEJM, 2017, Oct 26, Donnez and Dolmans).

Such treatment is, however, not advisable for patients who have a risk of malignant cells in their frozen ovarian tissue. In that case, ovarian tissue cannot be re-implanted because of the chances that their cancer could return.

Developing a transplantable artificial ovary with isolated follicles from their tissue could therefore offer these women more possibilities for them to conceive.

The first step in the process is to remove and freeze some ovarian tissue before a woman starts cancer treatment. When needed, follicles (producers of hormones such as estrogen and the precursors of mature female egg cells) are isolated from the ovarian tissue and encapsulated within a scaffold made of fibrin that is grafted to the patient. This hopefully restores the patient’s hormonal and reproductive functions.

In previous studies, Dolmans’ research team used a type of filamentous protein around which blood clots form called fibrin to construct the necessary artificial ovary tissue scaffolding or matrixes.

“The ideal is that these matrixes should mimic the structure and physical properties of the human ovary in such a way that it could ideally support the growth of follicles within which the egg cell resides,” explains co-author Maria Costanza Chiti.

Dolmans and her team have so far performed tests using mice tissue and follicles. But in this study, the research team turned their attention to the minute characteristics of human tissue. Biopsies taken from three women of child-bearing age were analysed using scanning electron microscopy. The thickness of the layers and characteristics such as the stiffness of the tissue were compared with that of four different concentrations of fibrin.

“This was done to identify the fibrin formulation that best resembles the natural milieu of the human ovary in terms of architecture, porosity and rigidity,” says Chiti.

The research team tested different fibrin matrix concentrations. One -- which is called F50/T50 -- emerged as the combination of choice in terms of ultrastructure and rigidity, as well as the way in which it closely resembles the outer layer of the human ovary.

“These combinations may mimic the physiological environment of human follicles more closely, making them good candidates for the artificial ovary prototype,” says Chiti. “Such findings are essential to help us standardize fibrin matrix architecture.”

Science Daily https://tinyurl.com/ycdn4kdz

HPV testing is better than the Pap test at detecting cervical cancer

A new paper finds that testing for cervical cancer using HPV testing in addition to the Pap smear is unlikely to detect cancer cases that wouldn’t be found using HPV testing alone.

The main goal of cervical screening programmes is to detect and treat pre-cancer before cancer develops. Cytology-based

8
screening, known as the Pap test or Pap smear, is used to detect abnormal cells. The Pap test can also find noncancerous conditions, such as infections and inflammation.

Cervical cancer screening guidelines have changed dramatically over the last 15 years, following introduction of testing for the dozen high-risk human papillomavirus (HPV) types that cause virtually all cervical cancer and its precursors. Despite more research into HPV, and the introduction of preventive HPV vaccines, screening will remain important and comprise many millions of tests annually for decades to come. But improved screening methods have also introduced some confusion, even controversy.

HPV testing is more sensitive than the Pap test for detecting pre-cancer. The HPV test captures the known cancer causing viruses, but there are gynaecologists who believe that there may be unknown cancer causing viruses and so continue to do the Pap smear (plus HPV testing).

However, reports of rare HPV-negative, Pap-test-positive cancers are motivating continued use of both tests (cotesting) despite increased testing costs. An HPV test, in which doctors test a cervicovaginal specimen for the presence of the nucleic acids of carcinogenic types of HPV, is more sensitive than the Pap test (a microscopic examination of exfoliated cells) for detection of pre-cancers. Thus, if a single screening method were chosen to complement HPV vaccination, primary HPV testing likely would gradually supplant the Pap test.

In the US, an interim guidance issued by a committee of experts from several clinical societies recommended primary HPV testing every three years, the same as the Pap test. Alternatively, current guidelines recommend cotesting but, in recognition of the additional reassurance provided by this approach compared with the Pap test alone, the screening interval is extended to every five years. Draft guidelines from the US Preventive Services Task Force recently recommended either primary HPV testing every five years or the Pap test every three years for women 30 to 64, and did not recommend cotesting.

The accumulated evidence supports inclusion of HPV testing in screening; thus, the main choice moving forward is between cotesting and primary HPV testing alone.

Researchers were searching for realistic performance data to quantify the additional benefit of the Pap test component of cotesting, as the costs of intensive screening of all women using two screening tests are substantial.

In January 2003, just prior to US FDA approval of HPV and Pap test cotesting in mid-2003 and interim guidelines in 2004, Kaiser Permanente Northern California, a large integrated healthcare organization, introduced three-year cotesting in women aged 30 years and older. Kaiser Permanente has now screened over a million women by cotesting. This remains the most extensive experience of HPV testing incorporated into routine screening in the world.
Researchers here quantified the detection of cervical precancer and cancer by cotesting compared with HPV testing alone at Kaiser Permanente, where 1,208,710 women have undergone triennial cervical cotesting since 2003. Screening histories preceding cervical cancers (n=623) and precancers (n=5,369) were examined to assess the relative contribution of the Pap test and HPV test components in identifying cases. The analysis found that HPV testing identified more women subsequently diagnosed with cancer and precancer than the Pap test. HPV testing was statistically significantly more likely to be positive for cancer at any time point, except within 12 months. HPV-negative/Pap test-positive results preceded only small fractions of cases of precancer (3.5%) and cancer (5.9%); these cancers were more likely to be regional or distant stage than other cases.

The researchers conclude that the added sensitivity of cotesting versus HPV alone for detection of treatable cancer affected extremely few women.

Bioengineer.org
https://tinyurl.com/y7x5hfp2

Hormone therapy in the menopause transition did not increase stroke risk

Postmenopausal hormone therapy is not associated with increased risk of stroke, provided that it is started early, according to a report from Karolinska Institutet. Roughly three in ten women in the menopause transition are afflicted by symptoms that seriously affect their wellbeing, such as hot flushes, dry mucosa and insomnia. However, although the symptoms can be treated effectively with female sex hormones, prescriptions have been low over the past 15 years as researchers have demonstrated a link between such therapy and an increased risk of certain diseases, including stroke.

There is still, however, a need for more research on the issue, as the risk can be influenced by the time of the treatment and other factors, reasons Karin Leander, researcher at Karolinska Institute’s Institute of Environmental Medicine.

“New research shows us that hormone therapy actually has a positive effect on blood vessels if initiated early on in the menopause, but not if initiated late,” says Dr Leander. “So there was reason to re-examine whether hormone therapy is linked to the risk of stroke, taking, of course, the time of administering into consideration.”

Dr Leander and her colleagues have now analysed data on postmenopausal hormone therapy from five Swedish cohort studies covering a total of 88,914 women, combined with data from national registries on diagnoses and causes of death during a follow-up period.

Hormone therapy was not linked to increased risk of stroke (ischemic and hemorrhagic stroke combined) if the therapy was initiated within five years of menopausal onset, regardless of means of administration (oral, via the skin or vaginal), type of therapy (combination or estrogen only), active substance and treatment duration.

In sub-analyses, however, there was an observable increase in risk for hemorrhagic stroke (the less common form) if the therapy contained the active substance conjugated equine estrogens. Drugs containing estradiol, on the other hand, were not associated with a higher risk. A higher risk was also seen for both ischemic and hemorrhagic stroke if the treatment was initiated later than five years after the onset of menopause and contained conjugated equine estrogens.

“The risk of stroke seems virtually eradicable if treatment commences early, but it’s naturally important to take account of the increase in risk that exists under certain circumstances,” says Dr Leander. “These results provide doctors with a better scientific base on which to take decisions on treatment for menopausal symptoms.”

Karolinska Institute
https://tinyurl.com/ycavy6dg

Acupuncture reduces breast cancer joint pain

In the largest, most rigorous study of its kind, acupuncture was found to significantly reduce the debilitating joint pain experienced by tens of thousands of women each year while being treated for early stage breast cancer, according to SWOG research results.

Investigators from SWOG, the global cancer clinical trials network funded by the National Cancer Institute (NCI), conducted a randomized, blinded, multicentre trial, known as S1200, to test whether acupuncture is effective in alleviating pain caused by aromatase inhibitors, a common treatment for hormone sensitive breast cancers.

Treating this pain effectively, without the use of opioids or other drugs, is a top cancer research priority. Tens of thousands of women each year are treated with aromatase inhibitors (AIs), pills that stop the production of estrogen and essentially starve hormone receptor-positive breast cancer cells. Some women are advised to take these pills daily for up to 10 years. But as a side effect of this therapy, many women – as many as 50 percent – experience joint pain and stiffness. This affects knees, hips, hands, and wrists, and makes it difficult for women to walk, sit, climb stairs, and perform simple tasks like typing or driving.

“Some of my patients have difficulty getting out of a chair,” said Dr. Dawn Hershman, the lead researcher of the study and a SWOG vice chair. “As a result, with no good treatment options for their pain and stiffness, many women stop their cancer treatment. This is probably the most commonly cited reason breast cancer patients stop taking AI medication. So we need a solution – one that doesn’t include opioids or drugs that can be addictive or have serious side effects. We want women to continue their cancer treatment and have a good quality of life.”

SWOG researchers for years have chased a way to relieve AI pain – known as AI-Associated Musculoskeletal Syndrome (AIMSS). Many women don’t want to take pills to relieve symptoms caused by other pills, according to Hershman, leader of the Breast Cancer Program at the Herbert Irving Comprehensive Cancer Centre at NewYork-Presbyterian/ Columbia University Irving Medical Centre and professor of medicine and epidemiology at Columbia. In a single-centre study at Columbia, acupuncture showed promise. Hershman wanted to put it to the test in a larger, more rigorous study. Hershman and her team enrolled a total of 226 patients from 11 cancer centres nationwide and randomly assigned them to one of three arms. One group received true acupuncture. Another received sham acupuncture, a method of superficially inserting needles in different, non-therapeutic locations on the body. Finally, another group received no treatment at all.

Patients got twice-weekly treatments for six weeks, then a weekly maintenance
At any given time, human cells contain about 12,000 proteins that work through signalling pathways to carry out the work of the cell, such as metabolism and the cell’s response to stress. The highly sensitive mass spectrometry system developed by Dr. Yu and his colleagues and first described in a 2013 article can pick out 200 or so modified, or tagged, proteins that form the PARP1 response signature. He compared his system to a shopper buying a watermelon at a grocery store where a bar code scanner is used to identify the particular type of melon being purchased.

In reference to the cancerous and noncancerous cells studied here, the chemical tag (or bar code) takes the form of a cluster of atoms that have a distinctive weight that can be measured with a sensitive mass spectrometer. Because chemical tags are part of the cancer cell’s efforts to set off signalling pathways to repair DNA, a better understanding of those pathways could result in new treatment targets, Dr. Yu explained.

The UT Southwestern researchers found significant differences between the signatures of noncancerous breast tissue cells that contained working copies of the tumour-suppressing BRCA1 and BRCA2 genes and breast cancer cells that lacked working BRCA1 and BRCA2 genes. Mutations in those two genes are thought to account for an estimated 10 percent of all breast cancer cases, they said.

“A major hypothesis within the field is that tumours that lack working BRCA genes tend to be more sensitive to PARP1 inhibitors because they are more dependent on PARP1 for DNA damage repair compared to noncancerous cells,” Dr. Yu said.

UT Southwestern Medical Center
https://tinyurl.com/y9wgpnn7

Personalized breast cancer care

UT Southwestern Medical Center researchers have developed a method to map protein changes that occur in different subtypes of breast cancer cells in response to DNA damage from a new class of chemotherapy drugs.

The research could someday lead to a test to predict an individual patient’s response to a particular drug in the class of cancer therapies called PARP1 inhibitors, they said.

“Using patented technology we developed at UT Southwestern, we identified very different PARP1 signatures in various breast cancer subtypes,” said Dr. Yonghao Yu, Associate Professor of Biochemistry and corresponding author of the study.

The signatures, which he compared to bar codes at the grocery store, reveal how proteins from breast cancer subtypes are modified differently by the enzyme PARP1, which stands for poly (ADP-ribose) polymerase 1. This enzyme is critical to the cancer cell’s DNA repair response to chemotherapy that damages DNA, the cell’s genetic material, he added.

PARP1 is the major target for PARP1 inhibitor drugs, the first three of which were recently approved by the Food and Drug Administration to treat ovarian cancer. PARP1 inhibitors are being evaluated against other types of cancer in clinical studies at UT Southwestern and at dozens of other medical centres around the world, said Dr. Yu, a Virginia Murchison Linthicum Scholar in Medical Research. The drugs target cancer cells by blocking the function of PARP1 and crippling DNA repair. Although DNA damage is recognized as a potent activator of the PARP1 response, the cell-signalling cascades that follow PARP1 activation are poorly understood in other contexts, he said.

“I stress that this research is still in its early stages,” he said. “We think these results could have profound clinical implications. Our ultimate goal is to develop a signature, or fingerprint, for the changes in cellular proteins in response to the enzyme PARP1.

A test based on a PARP1 signature could someday help doctors predict a particular patient’s response to a specific PARP1 inhibitor,” he said.

That would be a step toward the era of personalized medicine, he added.

treatment for another six weeks. Patients reported on their pain before, during, and after treatment using a variety of methods. The primary endpoint – or key indicator for the trial – was the patient’s level of worst pain using the Brief Pain Inventory (BPI-WP), a patient-reported measure, at the end of the first six weeks of treatment.

Results showed that, on average, patients experienced less pain on the acupuncture arm compared with the sham and treatment-alone arms. Patients experienced relief for 24 weeks.

“This work strongly shows that true acupuncture results in better outcomes for women,” said Dr. Katherine Crew, a SWOG executive officer, director of the Clinical Breast Cancer Prevention Program at New York-Presbyterian/Columbia University Irving Medical Center and an associate professor of medicine and epidemiology at Columbia and a co-investigator on the study team. “I expect this work to influence medical practice, as well as insurers’ willingness to reimburse for acupuncture during AI treatment.”

SWOG
https://tinyurl.com/ya58napm
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**Spotlight:** Valvular Heart Disease

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[Image of a network or a globe with interconnected nodes, possibly representing a network of connections or nodes in a network diagram.]
Neonatal imaging - beyond MRI-compatible incubators

Diagnostic and prognostic MRI is recommended for infants for a range of conditions. These include gestational age below 30 weeks, in premature infants suspected of metabolic disease, and in term infants who might have sustained perinatal brain injuries or who show Stage 2 or 3 hypoxic-ischemic encephalopathy.

MRI preferred imaging solution for numerous conditions

Although ultrasound (US) is used as first-line imaging in certain cases like intracranial hemorrhage, MRI is indicated for most other infant brain and head neuroimaging. This has been the case for some time. One example is a report published in 1990 in the French-language journal 'Pédiatrie' by a team from the CHU Hautepierre hospital in Strasbourg, which discusses the advantages of MRI over ultrasound in areas such as brain injury. The report, nevertheless, also points out the problems with neonatal MRI, such as the need for immobilization and lack of accessibility. Such difficulties have persisted over the years.

Indeed, in the early 1990s, Britain's Hammersmith Hospital installed a 1T MRI scanner in the NICU. However, it had a limited field of view and was replaced with a conventional adult-sized 3T system. In fairly short order, the 3T system was found not only challenging to use in the NICU due to its long bore and problems of access to infants, but also expensive to operate.

Guidelines for infant MRI imaging

At present, a multitude of guidelines recommend that MRI is used to follow up ultrasound diagnosis of parenchymal brain injury, post-hemorrhage ventricular dilatation as well as US (or clinical) suspicion of abnormalities in the posterior fossa and at the brain’s convexity. Other conditions in infants that indicate MRI imaging include brain inflammation (meningitis, encephalitis, brain abscess etc.) and seizures, abnormal consciousness and/or asymmetry which cannot be satisfactorily explained by US findings.

The case for MRI after ultrasound has also been studied extensively. One report from the Medical University of Vienna in 2010 stated that among infants undergoing cranial ultrasounds after clinical seizure, MRI was able to identify a causative pathology in 42% of cases where US findings were unspecific.

Conventional MRI “not designed” for infants

As mentioned in an Advances in Neonatal Care analysis in 2005, it takes a single look at a typical MRI scanner to know that “it was not designed for an infant.” Technically, a baby's head size poses one of the first challenges. Standard MR head coils lead to sub-optimal picture quality and adult knee coils are often used instead.

Cooperation between neonatal team and radiologists

Given the very small size of a neonate brain, it is especially important to have high signal-to-noise ratios (SNR) for delineation of anatomical details. This was one of the major limitations of smaller, customized low-field MRIs designed for NICUs. At Royal Hallamshire Hospital in Sheffield, for example, a 0.17T system with 15mT/m gradients was installed in the early 2000s, but its low SNR made it impossible to use emerging MRI techniques such as diffusion tensor imaging and MR spectroscopy in neonates.

The best way forward has instead been seen in tailoring MR protocols to the neonatal brain. This is however a complex task. MR protocols involve a wide range of technical factors: echo time, repetition time, flip angle, slice numbers, slice thickness, scan duration, field of view etc. Achieving this “requires close cooperation between the neonatal team, radiographers and radiologists,” according to a study at Ireland’s University of Cork, published in 2012 in the 'British Journal of Radiology'.

The challenge of transfers

The transfer of infants from a continuously-monitored NICU to MRI suites has been one of the most vexatious problems. As discussed in the 2005 edition of ‘Advances in Neonatal Care’ cited above, MRI scanners “are often situated far away from the NICU.” The move of infants to an MRI room involves multiple transfers – from NICU bed to incubator to scanning table, and then backwards. These have to be made in a relatively short period of time, which can add dramatically to physiological stress.

Specific problems during transfer include the chance of extubation and arterial or venous decannulation. Excessive movement in a premature infant is also known to adversely affect cerebral blood flow. This, in turn, can defeat the very purpose of an MRI, by altering results.

Sedation and hypothermia

The question of whether or not to sedate infants before transfer is also a major challenge. Sedation has risks. Moreover, a sedated neonate requires continuous monitoring during an MRI.

There are problems after the transfer, too.
Once in the MRI room, infants must be removed from the warmth of the incubator to a cooler scanning table. Towards this, they are usually swaddled in blankets, accompanied sometimes by neonatal thermal packs to prevent heat loss. The American College of Radiology (ACR) also recommends use of temperature probes for infants to take an auxiliary temperature before and after the examination. Even as the MRI begins, NICU staff need to be on alert to decide if an examination must be halted. This may be due to the impact of the transport, cold, stress, sedation etc...

**MRI-compatible incubators**

Since the early 2000s, attention has focused on MRI-compatible incubators. These are equipped with an integrated head coil and accompanied by auditory shielding, temperature and humidity regulators, a ventilation support system and monitors specifically certified for the massive magnetic environment of the MRI.

In February 2004, ‘Pediatrics’ published a report on the imaging of seven non-sedated neonates via the use of an MRI-compatible incubator. The authors noted that the “constant environment reduces the risk of adverse events occurring during the transport and imaging of the neonate.”

Not all problems, however, were mastered by the incubator. For instance, the infant was not easily visible from the control room and required the presence of a staff member in the vicinity. In addition, in spite of temperature and humidity controls, additional monitoring was required for electrocardiography and oxygen saturation. Nevertheless, interest in MRI-compatible neonatal incubators has continued.

In September 2010, the ‘European Journal of Paediatric Neurology’ published results of a study which found that MRI-compatible incubators reduced the mean gestational age of patients from 44 to 39.7 weeks, and in parallel, more than doubled incubator use from 14.8% to 36% for ventilated neonates.

Advantages of the MRI-compatible neonatal incubator also included halving the time required for handling the infant, a reduction of total procedure time by an average of 20 minutes, and in imaging time by four minutes. Such time savings arose from the fact that there was no need to stabilize the infant. Furthermore, no MRI procedure was terminated due to insufficient sedation or infant instability; previously, one in 10 infants had required additional sedation during the procedure.

**Equipment compatibility and safety**

In May 2013, researchers from Australia’s Royal Brisbane and Women’s Hospital published results of a three-year review on MRI-compatible incubators in the ‘Journal of Paediatrics and Child Health’. Although the overall conclusions were positive, with no adverse incident reported over the period, the authors drew attention to several “practical issues”.

The first was a 30-45 minute pre-warming period required to reach an appropriate temperature setting for babies. The second consisted of difficulties in reading the incubator’s patient monitor interface, including key data such as cot temperature, pulse rate and oximetry readings. Once again, as with the February 2004 ‘Pediatrics’ study mentioned previously, the Royal Brisbane researchers recommended “that staff remain in the scan room throughout the procedure to monitor the well-being of the baby.”

The biggest challenge, however, concerned compatibility of equipment connected to the incubator. For instance, though the ventilator was MRI-compatible, it was not designed to provide humidified or preheated gas. The researchers also noted the need to improve specific procedures, for example, in extending infusion lines from pumps located outside the imaging room, which were not MRI-compatible.

Indeed, the need to use MRI-compatible or MRI-safe accessories, ranging from thermal packs and temperature probes to noise protectors, remains one of the biggest drawbacks with MRI-compatible incubators outside the NICU. The authors of the Royal Brisbane study point to “difficulties in sourcing a gas supplier to refill the portable MRI-compatible air and oxygen cylinders because of their special status outside the usual medical gas cylinder refilling programme.”

The scale of such problems becomes dramatic when intubation or resuscitation is required. In such cases, the infants need to be rapidly removed from the MR system and its magnetic fringe. The only alternative is to ensure that, rather than just accessories, the entire range of medical equipment – from syringes and infusion pumps to laryngoscopes and suction equipment – is MRI-compatible.

**More research needed**

In February 2015, ‘Advances in Neonatal Care’ published results from a systematic review of 13 research studies, two quality improvement projects, as well as practice guidelines and articles on neonatal MRI imaging by the Norwegian Neonatal Network and Oslo University Hospital.

The authors concluded that although results seemed promising and increasingly consistent, “more research is needed before conclusive recommendations” could be established about MRI-compatible incubators and associated techniques.

**Alternatives emerge**

Recently, a system from Aspect Imaging known as Embrace Neonatal MRI has sought to close the gap between NICU imaging requirements and the capabilities of current MRI-compatible incubators. Embrace received authorization from United States Food and Drug Administration (FDA) in July 2017, and in November obtained a CE marking for European Union sales.

Unlike conventional MRI machines, the new system does not require a safety zone or a radio-frequency shielded room. Since it is fully enclosed, medical device implants or equipment in the NICU in close proximity are not required to be MRI-compatible. Other advantages include an always-on permanent magnet; it therefore requires no electrical, cryogenic or water cooling (see also page 33 for more details on this product).

Other approaches to neonate imaging are also under evaluation. Cincinnati Children’s Hospital in the US, for example, has installed a commercial 1.5-T MRI system in its NICU, based on an orthopedic system coupled to custom-built components – most significantly, a high-end scanner. The unit’s gradient coil is about 2.5 times shorter than a conventional adult-sized system. In January 2014, the ‘American Journal of Roentgenology’ published results of a study at the hospital on imaging neonates. Although its scope was small (15 infants), the authors concluded that the system was capable of producing “high quality” images of neonates, not only of the brain but also the abdomen and chest.

As with other efforts to date, the modified system also attained several collateral objectives, such as ease of installation and operation in an NICU, improved visual contact and physical access to the infant, along with the use of advanced imaging techniques, ECG and respiratory gating and triggering. One of “the most important benefits”, according to the authors, consisted of “the reduction of risk associated with transport of the neonate to and from the NICU.” As discussed previously, this has been the single biggest challenge for neonate imaging and a driver of most design and technology development for over 25 years.
Infants, children, and the Zika virus: what primary care providers need to know

With the effects of Congenital Zika syndrome manifesting in infants as more than microcephaly, rather a pattern of congenital anomalies, including intracranial and other brain or eye anomalies, the Centers for Disease Control (CDC) recently updated guidelines for physicians monitoring the development of infants born to mothers with a possible Zika virus infection during pregnancy. Included within this document are instructions for laboratory testing and follow-up evaluation and care based on each patient's lab results and observed conditions. The guidelines can be found in their entirety here on the CDC site.

Children's National Congenital Zika Virus Program is poised to assist physicians with care for infants and children affected by Congenital Zika syndrome during infancy and throughout their childhood. The multidisciplinary team includes representatives from the Children's National Complex Care Program available to provide comprehensive care coordination and help families with children affected by the syndrome—who may be medically complex, see multiple specialists, or are technology-dependent—navigate through the healthcare system.

In addition to complex care specialists, Children's National has over 40 subspecialties under the same roof with top physicians available to work with healthcare professionals through the Congenital Zika Virus Program to provide their patients the best care for their specific conditions, including: ENT, Infectious Disease, Neonatology, Neurology (including Developmental Pediatrics), Ophthalmology, Orthopedics, Physical Medicine and Rehabilitation and Radiology.

Childrens National Health System
https://tinyurl.com/y7vkv6y7

When a common cold may trigger early supportive care

Human rhinovirus (HRV), the culprit behind most colds, is the leading cause of hospitalization for premature babies. However, in very preterm children, exactly how HRV causes severe respiratory disease -- and which patients may need more intensive observation and treatment -- is less well understood.

A new study led by Children's National Health System research clinicians showed that in children who were born severely premature, HRV infections seem to trigger an airway hyper-reactivity (AHR) type of disease, which leads to wheezing and air-trapping (hyperinflation) and more severe respiratory disease. This, in turn, increases the risk for hospitalization. The study found that other signs of respiratory distress, such as low arterial blood oxygen or rapid shallow breathing, were no more common in severely premature children (less than 32 weeks of gestational age) than in kids born preterm or full-term. The findings have implications for administering supportive care sooner or more intensively for severely premature children than for other infants.

“When it comes to how they respond to such infections, severely premature children are quite different,” says Geovanny Perez, M.D., a specialist in pulmonary medicine at Children’s National and lead study author. “We've known they are more susceptible to human rhinovirus infection and have more severe disease. However, our study findings suggest that severely premature kids have an ‘asthma’ type of clinical picture and perhaps should be treated differently.”

The study team sought to identify clinical phenotypes of HRV infections in young children hospitalized for such infections. The team theorized that severely premature babies would respond differently to these infections and that their response might resemble symptoms experienced by patients with asthma.

“For a number of years, our team has studied responses to viruses and prematurity, especially HRV and asthma,” Dr. Perez says. “We know that premature babies have an immune response to HRV from the epithelial cells, similar to that seen in older patients with asthma. But we wanted to address a gap in the research to better understand which children may need closer monitoring and more supportive care during their first HRV infection.”

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In a retrospective cross-sectional analysis, the study looked at 205 children aged 3 years or younger who were hospitalized at Children’s National in 2014 with confirmed HRV infections. Of these, 71 percent were born full-term (more than 37 gestational weeks), 10 percent were preterm (32 to 37 gestational weeks) and 19 percent were severely premature (less than 32 gestational weeks).

Dr. Perez and his team developed a special respiratory distress scoring system based on physical findings in the children’s electronic medical records to assess the degree of lower-airway obstruction or AHR (as occurs in asthma) and of parenchymal lung disease. The physical findings included:

- Wheezing;
- Subcostal retraction (a sign of air-trapping/hyperinflation of the lungs), as can occur in pneumonia;
- Reduced oxygen levels (hypoxemia); and
- Increased respiratory rate (tachypnea).

The research team assigned each case an overall score. The severely premature children had worse overall scores -- and significantly worse scores for AHR and hyperinflated lungs relative to children born late preterm or full-term.

“What surprised us, though, in this study was that the phenotypical characterization using individual parameters for parenchymal lung disease, such as hypoxemia or tachypnea, were not different in severe preterm children and preterm or full term,” says Dr. Perez. “On the other hand, our study found that severely premature children had a lower airway obstruction phenotype associated with retractions and wheezing. Moreover there was a ‘dose effect’ of prematurity: children who were born more premature had a higher risk of wheezing and retractions.”

Among the implications of this study, Dr. Perez sees the potential to use phenotypical (clinical markers, such as retractions and wheezing) and biological biomarkers to better personalize patients’ treatments. Dr. Perez and his team have identified biological biomarkers in nasal secretions of children with rhinovirus infection that they plan to combine with clinical biomarkers to identify which patients with viral infections will benefit from early supportive care, chronic treatments or long-term monitoring.

ScienceDaily
https://tinyurl.com/yd3mz3eu

**Study finds higher dose of vitamin D increases bone density in premature babies**

Results of a University of Nebraska Medical Center study found if the standard supplementation of 400 IUs of vitamin D is increased to 800 IUs daily there are reductions in the number of premature and preterm babies with extremely low bone density.

Physicians have been prescribing vitamin D in premature and preterm infants in neonatal intensive care units (NICU) to prevent rickets, a disease that causes soft, weak bones in children and is often associated with vitamin D deficiency. In spite of this, a sizeable number of infants still develop rickets, said Ann Anderson Berry, M.D., associate professor in the division of newborn medicine and medical director of the NICU at Nebraska Medicine, UNMC’s clinical partner.

She said current recommendations of vitamin D supplementation for preterm infants span a wide range of doses, even among major medical groups such as the American Academy of Pediatrics, the Institute of Medicine, and the Endocrine Society. And response to vitamin D supplementation and impact on outcomes in preterm infants is not well understood, she said.

The study provided more evidence in regards to bone health and ideal supplementation. The objective was to evaluate changes in vitamin D in the blood over four weeks in two groups of premature infants born between 24 to 32 weeks gestation. Researchers studied 32 infants at doses of 400 or 800 IU/day of vitamin D.

Researchers saw an improvement in bone density and vitamin D levels in the blood at four weeks. They also saw improvement in growth that significantly decreased the risk of infants having very low bone density.

“We are hopeful that neonatologists will consider giving preterm infants 800 IUs,” Dr. Anderson Berry said. “We know that even with standard vitamin D dosing, we were still seeing a fair number of pre-term infants who suffered from impaired bone health. This is another form of NICU therapy that can help decrease that risk.”

She said the study is one of the first to look at higher dosing of vitamin D in premature infants. Information will be incorporated as a recommended practice for health professionals.

Dr. Anderson Berry is first author of the paper, senior author is Corrine Hanson, Ph.D., UNMC College of Allied Health Professions, and contributing author is Elizabeth Lyden of the UNMC College of Public Health.

University of Nebraska Medical Center
https://tinyurl.com/y75cfhey
Application of a coordinated-type integration model for vulnerable older people in Québec (Canada): the PRISMA project

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ABSTRACT
PRISMA is a coordinated-type model of Integrated Service Delivery for vulnerable elderly people. The PRISMA model includes the following components to enhance the integration: 1) formal mechanism to manage co-operation between decision-makers and managers of all services and organizations, 2) the use of a single-entry point, 3) a case management process, 4) Individualized Service Plans, 5) a unique assessment tool with a case-mix system, and 6) a computerized system for communicating between institutions and professionals.

The PRISMA model was experimentally implemented in three areas (urban, rural with or without a local hospital) in Quebec, Canada and research was carried out using both qualitative and quantitative data to evaluate its process and impact. Significant impact of the prevalence and incidence of functional decline, satisfaction with services and empowerment was observed. There was a reduction in the number of Emergency Room visits and hospitalisations. The overall cost was not higher in the experimental group, even when implementation cost was included.

The PRISMA model was then implemented all over the province of Quebec from 2005 to 2015. Budget constraints and concomitant reforms (merging of institutions) slowed down the implementation. Many lessons were learned from this implementation: the case managers should be formally trained and accredited, and structural integration by merging is not necessarily fostering functional integration. The PRISMA model is a good illustration of an effective transfer of research findings to a national programme in the context of evidence-informed public policy.
Pathways to transformation in publicly-funded health systems: Experience in Canada’s provinces

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ABSTRACT
Canadian provinces have undertaken repeated health system reforms to better respond to changing needs arising from an aging population and high prevalence of chronic disease. As in other countries, large-scale system reform is considered necessary to meet these challenges. While structural changes, such as hospital closures and the creation of regional health authorities, prevailed in the 1990s, more recent reforms are employing other levers of change. This paper examines three themes that appear in reforms undertaken in different Canadian provinces over the past decade: the cultivation of alternate bases of mobilization to bring about improvement; a quest for increased capacity in governance; and efforts to engage clinical leaders, and notably physicians, in large-scale improvement.

Managing the Myths of Health Care

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ABSTRACT
This article presents a summary of my book published in 2017, entitled “Managing the Myths of Health Care”, in three parts: I. The myths of health care, II. Reorganizing health care, and III. Reframing health care. Two additional notes are included, one about managing with and without soul, the other about a forum for developing health care managers with soul.

Preparing the Ground for Transformation: A Case Study of the MUHC’s Experience

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ABSTRACT
In 2015, the McGill University Health Centre (MUHC), a leading academic health centre located in Montréal, Québec, Canada, inaugurated a CAN$1.3-billion health complex (Glen site) after a planning, authorization, design, finance, building and activation process that spanned nearly two decades. The MUHC was compelled to leverage the transformative project to innovate and share the new information it acquired. Consequently, this turbulent period yielded a considerable body of knowledge. This article draws on the MUHC’s experience and is anchored in the literature. It addresses the topics of complex change, innovation and performance improvements in health care. In particular, it aims to provide organizations, which may be planning or are already engaged in a transformative project such as the one undertaken by the MUHC, with evidence as to why it is beneficial to dedicate resources to support transformation, notably for the transition period. The article concludes with a summary of lessons learned and a possible avenue of additional study.
General Overview for Long-Term Care Centers in the Province of Quebec

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ABSTRACT  
The article provided covers the three major reforms that have affected and influenced developments in the long-term care sector. Various statistics are provided with the objective of providing readers with a basic knowledge of services offered to seniors in Quebec as well as the demographic that they cover.

Whither Canadian Hospitals: Aligning Authorities and Accountabilities.

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ABSTRACT  
The Canadian healthcare system, not unlike many around the world, is undergoing tremendous change. Nowhere have these changes been more dramatic than in what used to be known in Canada as the “hospital sector”. The world-wide symbol of the blue “H” can still be seen in over 1000 communities and different highways across Canada. However, over the past decade, as legal entities, hospitals have been deemed to no longer exist in all provinces save one, our largest province: Ontario. Elsewhere an increasingly broad range of hospital and community-based services are administered through Regional Health Authorities or RHAs. This short piece attempts to provide a high-level description of the nature of these changes and the economic, technological and political forces behind them and briefly assess the implications for the national voice of “hospitals”.

Population health management  
A Canadian Perspective on the Future of Health Systems

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ABSTRACT  
Internationally, two trends in health care are becoming increasingly well established. One is the growing recognition that health care is just one determinant of health status. Prevention and health promotion have a large role to play by affecting the social determinants of health and the sectors that represent them. The second trend is experimentation with approaches to systems funding that aim, increasingly, to share risk and benefits between funders and providers. Together, these trends form the impetus for what is becoming known as population health management (PHM). Canada has been a pioneer in developing the concepts, but international experience suggests that it has been a laggard in implementing them. In moving forward, critical success factors for Canada include health information management, multisectoral collaboration, and clinical leadership.
Empowering Nurses in Canada to Deliver Better Care, Better Health and Better Value

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ABSTRACT
The Canadian population is aging and the prevalence of chronic disease and health and social inequities are on the rise. While the challenges posed to our health and health delivery systems are formidable, Canada has excellent resources that can be tapped to support system-level change. Our large, highly-educated and skilled nursing workforce is part of the solution to bringing about system transformation and achieving better care, better health and better value for our public healthcare investments. Through a range of efforts by stakeholders at all levels, nurses are increasingly empowered to contribute to health system improvements. Recent examples include enabling prescribing by registered nurses, promoting advanced nursing practice, and modernizing federal legislation to enable nurses to practice to full scope.

The Evolution of general practice in Canada: a reflection on retirement

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ABSTRACT
Primary care is a key determinant of the health of our population. Family physicians are central to the delivery of primary care in Canada. The perceived value of the generalist in the delivery of medical care has varied since the birth of general practice in the 19th century. I have seen the perceived value of the generalist, relative to the specialist physician, improve, particularly as “full scope” family physicians have become a scare commodity in recent years. Even with improved support for family doctors and a marked increase in the number of graduating family physicians there remains a significant shortage of family doctors across Canada. I believe much of this problem is due to many graduating family physicians choosing to focus their practice within family medicine and give up on being a generalist who addresses the Principles of Family Practice as outlined by the Canadian College of Family Physicians.

The Montreal 2017 Executive Hospital Study Tour: Learning from Others

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ABSTRACT
From June 27 to July 1, 2016, the International Hospital Federation (IHF) and Health Investment & Financing hosted a Hospital Executive Study Tour in Montreal, Province of Quebec and Ottawa, Province Ontario, Canada. The objective of the Hospital Executive Study Tour was to allow participants to learn how the Canadian hospital sector addresses some of the key challenges and solutions to transform the way hospital care is delivered in the 21st Century. The Montreal Study Tour was part of a series of premier events offered by the IHF. This Study Tour was a collaborative effort among Canadian partner organizations in both Montreal and Ottawa who hosted various events to allow an exchange of ideas, knowledge, experiences and best practices in the delivery of healthcare services, and in the leadership and management of their organizations.
Contamination and resistance
Overall, healthcare-associated infections (HAIs) affect up to 15% of hospitalized patients. The main causes are persistent microbial contamination of hospital surfaces, along with a growth of drug-resistant pathogens. Although antimicrobial misuse is believed to be largely responsible for AMR, hospital hygiene has come sharply into focus as traditional cleaning methods begin to encounter limits in their capacity to control infection.

WHO guidelines on hand hygiene
According to the World Health Organization (WHO), good hand hygiene practices could halve the infection level in hospitals. The WHO guidelines are also known as the ‘Five Moments for Hand Hygiene.’ They involve the occasion before a patient is touched, before clean/aseptic procedures, after body fluid exposure/risk, after touching a patient, and after touching the patient’s surroundings. However, much more needs to be done to validate training or control the implementation of the WHO guidelines.

Challenges of compliance
One of the biggest challenges is the time required for the most effective form of hand hygiene, namely alcohol-based hand rubs (ABHR). WHO recommends applying ABHRs for 20 to 30 seconds, while the US Centers for Disease Control and Prevention (CDC) recommends doing so until the hands feel dry, which it states ought to take about 20 seconds. Such time-spans are considered far too long for busy, practising clinicians. However, it seems that such requirements may be unnecessarily arduous. In Dec 2017 / Jan 2018, a clinical observational study in Germany found that reducing the recommended application time for hand rubs improved compliance rates with no significant difference in efficacy. The researchers at the Institute for Hygiene and Environmental Medicine of the University Hospital of Greifswald focused on nurses who applied ABHRs for either 15 or 30 seconds. The study found ABHRs were “equal or even more effective” within 15 seconds versus 30 seconds for a variety of micro-organisms. The only caveat was that the ABHR needed to have a proven efficacy after 15 seconds. This did not extend to all ABHRs available on the market, and particularly not to gel formulations.

Other researchers are approaching the problem differently. In October 2013, an article in the journal ‘Clinical Infectious Diseases’ published results of a meta-study on hand hygiene, which it called “the critical intervention underlying modern infection prevention efforts.” The authors concluded that, in spite of limited research and evidence, “bundles including education, feedback, reminders, access to ABHR and administrative support” would be the most effective at improving hand hygiene compliance.

Three years before this, the ‘American Journal of Infection Control’ reported results from a project at one hospital, where compliance with hand hygiene was improved and sustained through use of a multi-faceted bundle approach. One aspect of the latter was a violation notice letter sent to non-compliant staff and enforced by managers. This appears to have been the key factor in dramatically raising hand hygiene compliance from a rate of 34% to more than 90% in the space of just two years.

Recent developments in hand hygiene
Recent developments related to hand hygiene include new test methods for evaluating hand hygiene products, improvements in ABHR, novel antisepsis techniques...
and new strategies for monitoring hand hygiene practices among healthcare personnel. A host of new methodologies is also being explored to implement hand hygiene at hospitals. These range from new digital tools to robotics, artificial intelligence and genetics.

**Gesture recognition algorithms**

In late 2017, global hand hygiene company GOJO reported results from a ‘smart hospital’ project with two medical technology companies from Ireland, SureWash and MEG Support Tools. The three joined forces with an infection control team at Manchester’s Christie Hospital, to create a live data dashboard using an interactive training kiosk from SureWash, an audit app from MEG and GOJO’s Smartlink dispenser. Analytics were run in real time on the data to provide actionable feedback when hand hygiene standards slipped.

**Patients and infection control**

During the study, hand hygiene education and compliance were also targeted at patients by means of gesture recognition and camera-based algorithm technology. Indeed, patients have recently begun to be harnessed as key actors in infection prevention. So far, there were few resources available for such a task, in spite of a growing body of evidence to suggest that patients’ flora too were a primary source of several infections, and that these could be prevented by correct hand hygiene. Most previous work involving patients had simply included them as monitors of hand hygiene practices by healthcare workers.

**Clean bots**

Germ-killing robots provide a new weapon in the arsenal against health care-associated infections. One study funded by the CDC in the US showed that germ-killing robots (also being described as Clean Bots) could reduce common healthcare-associated infections by 30 percent.

At the end of 2017, Vanderbilt University Medical Center in Nashville, Tennessee, began deploying robots to protect hospitalized patients from two of the toughest strains of resistant bacteria: methicillin-resistant staphylococcus aureus (MRSA) and vancomycin-resistant enterococci (VRE). The first area of application is the burns ward, which hosts some of the most vulnerable patient groups. Rooms are cleaned with traditional liquid disinfectants. After this, hallway doors and curtains are closed, while cabinets and drawers are left open. This is followed by the despatch of a remote-controlled robot, which floods the room with ultraviolet radiation to kill any residual germs. The robot shuts itself down after its sensors detect adequate reflected UV from the room surfaces, which typically takes about 25 minutes. However, longer settings can be used in rooms likely to host hospital-acquired infections.

Nevertheless, authorities at the Vanderbilt Medical Center reiterate that Clean Bots are not a replacement for good hand hygiene. Vanderbilt now plans to monitor the effects of the robots on infection rates and on workflow, and is developing protocols to optimize use of the robots without delaying patients arriving from the emergency department or the recovery room.

**Artificial intelligence**

Artificial intelligence (AI) is also being utilized to enhance hygiene. The magazine ‘New Scientist’ recently reported efforts by a Stanford University research team, which sought to harness AI to spot behaviour that might contribute to the spread of infection. Towards this, the researchers used video cameras at a hospital in a range of hotspots such as patient rooms, hallways and adjacent to hand sanitizing dispensers. The cameras made recordings over the course of one high activity hour. 80 percent of the video was used to train tracking algorithms, while the rest was used to test the algorithms.

During the hour when the recording was made, 170 people entered patient rooms. However, only 30 followed appropriate protocols for hand hygiene. The researchers found that computer vision algorithms were more accurate in making such a judgement than people in the hospital covertly recording hand sanitation practices.

The researchers are now planning to outfit three hospitals for a year to see how the technology and the observations it reports impact infection rates. One of the researchers, Alexandre Alahi, told ‘New Scientist’ that though it may not be affordable to have a doctor in a room round-the-clock, an AI doctor could well be economically viable, freeing up humans to do other jobs.

**Video analytics**

Video analytics has also been used for a study by the Division of Infectious Diseases and Hospital Epidemiology at University Hospital Zurich to make in-depth follow-up of hand hygiene practices, in order to systematically document hand-to-surface exposures (HSE) and delineate true hand transmission pathways. The authors of the study, published in the October 30, 2017 issue of ‘Antimicrobial Resistance & Infection Control’ concluded that the “abundance of HSE underscores the central role of hands in the spread of potential pathogens while hand hygiene occurred rarely at potential colonization and infection events.” They aim to propagate their hand trajectory monitoring approach to design more efficient prevention schemes.

**The trajectories of infection**

One of the newest tools in the fight against infection seeks to provide a first-person view of pathogen transmission. It involves the documentation of hand-to-surface exposures (HSE) by healthcare workers and tracking their trajectories. The process, which was developed by researchers at Zurich University Hospital in Switzerland, uses a head-mounted camera and commercial coding software to code HSE type and duration based on a hierarchical scheme. It identifies HSE sequences with particular relevance to infectious risks, based on the WHO’s ‘Five Moments for Hand Hygiene.’

The Swiss researchers recorded and studied hand movements of 8 nurses and two physicians and confirmed the central role of hands in the spread of potential pathogens. During the study period of almost five hours, a total of 4,222 HSEs were identified, corresponding to one HSE every 4.2 seconds. Of this, 291 HSE transitions were ‘colonization events’, occurring from outside to inside the patient zone. Hand hygiene occurred rarely at potential colonization and infection events.

According to the researchers, an in-depth analysis of hand trajectories during active patient care may help to design more efficient prevention schemes.

**Colour coding bedsheets**

While tools such as video analytics and robotics offers new approaches to the challenge of hygiene, others are turning to imaginative, lower tech solutions. In India, health officials in West Bengal’s Raiganj district hospital recently announced that bedsheets of varying colours would be used on different days a week to check cross infection and ensure that the beds and the wards were cleaned every day. There authorities were responding to complaints that bedsheets were not regularly changed, in some cases even after a patient had been discharged. Using bedsheets of different colours gives an immediate solution to such a problem. The hospital has put up a chart mentioning days of the week and the corresponding colour of the bedsheets, allowing family members of patients to confirm that their beds had been cleaned.
Smartphone case offers blood glucose monitoring on the go

Engineers at the University of California San Diego have developed a smartphone case and app that could make it easier for patients to record and track their blood glucose readings, whether they’re at home or on the go.

Currently, checking blood sugar levels can be a hassle for people with diabetes, especially when they have to pack their glucose monitoring kits around with them every time they leave the house.

“Integrating blood glucose sensing into a smartphone would eliminate the need for patients to carry a separate device,” said Patrick Mercier, a professor of electrical and computer engineering at UC San Diego. “An added benefit is the ability to autonomously store, process and send blood glucose readings from the phone to a care provider or cloud service.”

The device, called GPhone, is a new proof-of-concept portable glucose-sensing system developed by Mercier, nanoengineering professor Joseph Wang, and their colleagues at the UC San Diego Jacobs School of Engineering. Wang and Mercier are the director and co-director, respectively, of the Center for Wearable Sensors at UC San Diego.

GPhone has two main parts. One is a slim, 3D printed case that fits over a smartphone and has a permanent, reusable sensor on one corner. The second part consists of small, one-time use, enzyme-packed pellets that magnetically attach to the sensor. The pellets are housed inside a 3D-printed stylus attached to the side of the smartphone case.

To run a test, the user would first take the stylus and dispense a pellet onto the sensor—this step activates the sensor. The user would then drop a blood sample on top. The sensor measures the blood glucose concentration, then wirelessly transmits the data via Bluetooth to a custom-designed Android app that displays the numbers on the smartphone screen. The test takes about 20 seconds. Afterwards, the used pellet is discarded, deactivating the sensor until the next test. The stylus holds enough pellets for 30 tests before it needs to be refilled. A printed circuit board enables the whole system to run off a smartphone battery.

The pellets contain an enzyme called glucose oxidase that reacts with glucose. This reaction generates an electrical signal that can be measured by the sensor’s electrodes. The greater the signal, the higher the glucose concentration. The team tested the system on different solutions of known glucose concentrations. The results were accurate throughout multiple tests.

A key innovation in this design is the reusable sensor. In previous glucose sensors developed by the team, the enzymes were permanently built-in on top of the electrodes. The problem was that the enzymes wore out after several uses. The sensor would no longer work and had to be completely replaced. Keeping the enzymes in separate pellets resolved this issue.

“This system is versatile and can be easily modified to detect other substances for use in healthcare, environmental and defense applications,” Wang said. The system stores a considerable amount of data so that users can track their readings over long time periods. However, there is a trade-off in price. While the reusable glucose sensor and 3D printed parts are inexpensive, refill pellets may be slightly more costly than test strips in today’s glucose monitoring kits.

Jacobs School of Engineering
https://tinyurl.com/y8ijy998h

Cancer imaging aid from horse chestnuts

Research at The City College of New York shows that cancer imaging can be simplified by a photonic process utilizing molecules derived from horse chestnuts. The study with potential to better detect the presence of cancer is led by George John, professor in City College’s Division of Science, in collaboration with Jan Grimm, a physician scientist at Sloan Kettering Institute who is also affiliated with Memorial Sloan Kettering Cancer Center and Weill Cornell Medical College.

The team has developed a radiation-responsive, esculin-derived molecular gel, that is both scintillating and fluorescent, to enhance the optical photon output in image mapping for cancer imaging. Esulin is a coumarin glucoside that naturally occurs in the horse chestnut, a plant extract. It is beneficial to circulatory health.

A challenge currently in cancer imaging is that optical imaging of radiotracers through Cerenkov light (the Grimm lab is one of...
Areas of hypoxia, or low oxygen in tissue, are hallmarks of fast-growing cancers and of blockages or narrowing in blood vessels, such as stroke or peripheral artery disease. University of Illinois researchers have developed a way to find hypoxic spots noninvasively in real time.

The researchers developed an oxygen-sensitive molecular beacon that emits ultrasound signals in response to light, a process called photoacoustic imaging – a less invasive, higher resolution and less costly method than the current clinical standard, which uses radioactive molecules and positron emission tomography scans. In a paper the researchers demonstrated the probe’s ability to image hypoxic tumours and constricted arteries in mice.

“We could give a doctor a three-dimensional, real-time view into the tissue to guide surgical procedures and treatment plans,” said chemistry professor Jefferson Chan, the leader of the study. Graduate student Hailey Knox and bioengineering professor Wawrzyniec Lawrence Dobrucki were co-authors of the paper. “The ability to detect this in a way that doesn’t require surgery or doesn’t rely on indirect methods is really powerful, because you can actually see it as it’s developing,” Chan said.

Current methods for detecting hypoxia in tissue can only identify chronic hypoxia, and thus cannot help doctors find aggressive cancers or acute conditions like a stroke that require immediate intervention, Chan said. Such methods are limited to invasive procedures involving large electrode needles or indirect imaging with radioactive probes, which has the added challenges of off-target activation and interference.

The molecular probes Chan’s group developed only become active when oxygen is lacking. When excited by light, they produce an ultrasound signal, allowing direct 3-D imaging of hypoxic areas. They tested the system on cell cultures, and then in live mice with breast cancer and mice with constricted arteries in their legs.

“The system that we used in this study is a preclinical system for animals. However, in a clinical setting, you can take a regular ultrasound machine and equip it with a light source – you can buy LEDs for around $200 that are powerful enough and safe for clinical applications,” Chan said. Physicians would administer the photoacoustic molecules to the patient, either by injecting into a vein or directly to a tumour site, then use the modified ultrasound machine to visualize the area of interest.

The researchers found that their photoacoustic method could find hypoxia mere minutes after a mouse’s artery was constricted, showing promise for quickly finding stroke sites or blood clots in deep tissue. In the mice with cancer, the probes enabled detailed, 3-D ultrasound imaging of hypoxic tumours.

University of Illinois
https://tinyurl.com/ycreuahp

Percutaneous coronary intervention is a well-justified treatment option also in severe coronary artery disease

The treatment of left main coronary artery disease by percutaneous coronary intervention is associated with a smaller risk of severe cardiovascular events than coronary artery bypass grafting in the weeks following surgery. A meta-analysis of several trials and nearly 5,000 patients revealed no differences in mortality between the two treatments. The finding is significant when it comes to selecting the form of treatment: percutaneous coronary intervention is less burdensome on the patient, as it does not require long-term hospitalization and enables rapid return to work.

The prognosis of left main coronary artery disease is worse than in any other form of coronary artery disease. The treatment options include percutaneous coronary intervention and coronary artery bypass grafting. In European and American treatment guidelines, coronary artery bypass grafting is generally regarded as the first-line treatment for severe left main coronary artery disease. However, some studies have suggested that percutaneous coronary intervention with drug-releasing stent implantation would also be a recommendable course of treatment in the severe form of the disease, but the evidence has been inconsistent.

A new study by investigators from the University of Eastern Finland and Oulu University Hospital compared percutaneous coronary intervention with drug-releasing stent implantation and coronary artery bypass grafting in the treatment of left main coronary artery disease. The authors pooled evidence from six comparable, randomized, controlled trials involving 4,700 people.

The researchers analysed all available randomised studies among patients who had undergone percutaneous coronary intervention or coronary artery bypass grafting, comparing their risk of all-cause mortality, major adverse cardiac and cerebrovascular events, and other cardiovascular events at time points of 30 days, one year and three years after surgery. There were no differences between the treatments as regards the risk of death, or cardiac or cerebrovascular events. Percutaneous coronary intervention patients needed repetitive interventions more often over the years.

According to the researchers, the findings suggest that percutaneous coronary intervention with drug-releasing stent implantation should be more frequently considered as a treatment option for patients suffering from left main coronary artery disease. There are no differences in mortality between patients of percutaneous coronary intervention and patients undergoing coronary artery bypass grafting, and as percutaneous coronary intervention is less burdensome on the patient both from the viewpoint of quality of life and functional capacity, it is an option worth considering.

University of East Finland
https://tinyurl.com/y75tll7d
Spinal tap needle type impacts the risk of complications

The type of needle used during a lumbar puncture makes a significant difference in the subsequent occurrence of headache, nerve irritation and hearing disturbance in patients, according to a study by McMaster researchers.

As well, they found the pencil-point atraumatic needle with the better tip design has been available for about 70 years, but few physicians have been using it because they have not been aware of its benefits over the conventional bevelled traumatic needles.

The implications on clinical care are huge, said Dr. Saleh Almenawer, the senior author of the study and a neurosurgeon at Hamilton Health Sciences who worked with a team of researchers at McMaster University including Sheila Singh, Alex Koziarz and Siddharth Nath.

“There is a more than 50 per cent reduction in the occurrence of headaches with the atraumatic needles, and also more than a 50 per cent reduction in patient readmissions and return to emergency rooms for narcotics or blood patches,” said Almenawer.

Post-dural puncture headaches appear in about 35 per cent of patients, sometimes causing debilitating pain that can lead to a return to hospital for painkillers or more invasive treatment.

The study says using atraumatic needles rather than conventional traumatic needles for lumbar punctures is just as effective and results in a significant decrease in complications such as the headaches.

“The two needles differ in how they penetrate the thick membrane, called the dura, surrounding the nerves,” said Almenawer.

He explained that the sharp edges of the tip of a conventional needle cuts its way through, while the tip of an atraumatic needle causes the tissue to dilate and contract around it. The tiny hole left in the dura by the atraumatic needle makes it significantly more difficult for cerebrospinal fluid to leak through, thus diminishing the frequency of headaches, readmissions and treatment.

Atraumatic needles have been around for decades, but their use remains significantly limited, according to the researchers. They also found the atraumatic needles cost the same or up to three times as much as the more conventional type.

“Several surveys from around the world showed that only a fraction of physicians know atraumatic needles exist, and among those even a smaller portion use the atraumatic type,” said Almenawer.

McMasters University
https://tinyurl.com/y9qmsmm6
Belgian researchers report on the first large-scale longitudinal imaging study to evaluate BACE1 inhibition with micro-PET in mouse models of Alzheimer’s disease. PET imaging has been established as an excellent identifier of the amyloid plaque and tau tangles that characterize Alzheimer’s disease. Now it is proving to be an effective way to gauge treatment effectiveness.

The tracer makes it possible to image the effects of chronic administration of an inhibitor for an enzyme, called beta-(β)-site amyloid precursor protein-cleaving enzyme 1 (BACE1), which cuts off protein fragments that can lead to amyloid-β development and is more prevalent in brains affected by Alzheimer’s. It does this by binding to BACE1. The study compared control mice with those genetically-altered to have Alzheimer’s, and tested 18F-florbetapir (18F-AV45) along with two other tracers, 18F-FDG PET and 18F-PBR111. The mice received the BACE inhibitor at 7 weeks, then brain metabolism, neuroinflammation and amyloid-β pathology were measured using a micro-PET (μPET) scanner and each of the tracers. Baseline scans were done at 6-7 weeks and follow-up scans at 4, 7 and 12 months. 18F-AV45 uptake was measured at 8 and 13 months of age. After the final scans, microscopic studies were performed.

While all three tracers detected pathological differences between the genetically modified mice and the controls, only 18F-AV45 showed the effects of inhibitor treatment by identifying reduced amyloid-β pathology in the genetically modified mice. This was confirmed in the microscopic studies.

The team of the Molecular Imaging Center Antwerp, Belgium, however warns, “This study clearly showed that accurate quantification of amyloid-beta tracers is critically important and that the non-specific uptake in the brain of subjects might be underestimated for some existing Alzheimer’s tracers that have fast metabolism and imaging profiles. The aim of this translational research is advancing results discovered at the bench so that they can be applied to patients at the bedside.”

The statistics on Alzheimer’s are sobering. Approximately 10 percent of people 65 and older have Alzheimer’s dementia, according to the Alzheimer’s Association. More than 5 million Americans are living with the disease, and that number could rise to 16 million by 2050.

**PET tracer gauges effectiveness of promising Alzheimer’s treatment**

**First line combination therapy improves progression-free survival in advanced lung cancer**

A new combination therapy for the first-line treatment of advanced non-squamous non-small-cell lung cancer (NSCLC) improves progression-free survival (PFS), according to results of the phase III IMpower150 trial presented at the ESMO Immuno Oncology Congress 2017.

“This is the first phase III trial to report on the combination of chemotherapy, antiangiogenic treatment and immunotherapy as first-line treatment for advanced non-squamous NSCLC,” said lead author Professor Martin Reck, chief oncology physician, Department of Thoracic Oncology, Lung Clinic Grosshansdorf, Germany.

“The trial met its co-primary endpoint of progression-free survival (PFS), according to the combination of chemotherapy, immunotherapy and antiangiogenic treatment. The results show that there is a way to improve the efficacy of platinum-based chemotherapy in patients with advanced non-squamous NSCLC. There were no new safety signals with the combination therapy. Due to prespecified testing hierarchy, Arm A versus C has not been formally tested yet.

Reck said: “There was a significant and clinically relevant improvement in progression-free survival favouring the addition of atezolizumab to bevacizumab and chemotherapy. The results show that there is a way to improve platinum-based chemotherapy in patients with advanced non-squamous NSCLC. There were no new safety signals or toxicity issues with this combination so it appears to be a feasible approach for this group of patients.”

**Existing cancer medication offers potential to treat Huntington’s disease**

A drug already used to treat certain forms of cancer may also be an effective therapy for Huntington’s disease, according to a new study. The same study also increases our understanding of how this drug, and other medications like it, may offer hope for other neurodegenerative diseases like Alzheimer’s disease, amyotrophic lateral sclerosis (ALS), and Parkinson’s disease.

Huntington’s disease is a devastating, inevitably fatal disease, with no medications that slow or stop disease progression. In this
study, mice with the equivalent of Huntington’s disease became more mobile, recovered from neurodegeneration, and lived longer after being treated with bexarotene. The same research builds on a 2016 study where La Spada and his team showed that the drug KD3010 is an effective treatment for Huntington’s disease in mice and in human patient neurons made from stem cells.

Senior author Al La Spada, MD, PhD, said the study results are exciting not just because these drugs worked, but because of how they worked. “It’s not just the response from the drugs, but the mechanistic pathways these drugs are targeting,” said La Spada, director of the forthcoming Duke Center for Neurodegeneration and Neurotherapeutics. “These pathways are relevant to other neurodegenerative disorders and potentially the aging process, itself in addition to Huntington’s disease.”

Bexarotene and KD3010 function by activating PPARδ, a transcription factor that keeps neurons functional in two ways: by keeping mitochondria healthy and active, and by helping neurons remove dysfunctional proteins. Mice—and humans—with Huntington’s disease have problems activating PPARδ. When La Spada and colleagues treated Huntington’s mice with bexarotene or KD3010, they observed improved mitochondrial health in neurons, as well as increased removal of damaging misfolded proteins. The same factors of impaired mitochondrial function and protein misfolding are recognized as increasingly important in diseases like Alzheimer’s disease, Parkinson’s disease, and ALS.

The study doesn’t mean that patients with Huntington’s disease or other conditions should rush to get bexarotene or KD3010. Further research needs to determine how to use these drugs in human patients. Bexarotene can have difficult side effects at high dosages, and optimal doses aren’t known, while KD3010 has only been tested in human subjects for type II diabetes.

Instead, future therapies for Huntington’s disease and other neurodegenerative conditions may take a cue from HIV treatments and involve a “cocktail” approach of combined medications. Lead author Audrey Dickey, PhD, found that, taken together, bexarotene and KD3010 produced better results in cells even when given at lower doses.

“With this approach, we could minimize side effects with lower doses of each compound, even when together the treatments provide a higher effect than either one alone,” said Dickey. “We are carrying out further research on the underlying mechanisms of neuroprotection and applying this research to other diseases with similar issues of mitochondrial dysfunction and protein quality control, such as Parkinson’s disease, Alzheimer’s disease, and ALS.”

Duke University School Of Medicine
https://tinyurl.com/y73s5wfd

Breakthrough technology to further understand eye damage from eclipse

In a first-of-its-kind study, Mount Sinai researchers are using adaptive optics (AO) to analyse retinal eye damage from the August solar eclipse on a cellular level. The research could help doctors develop a deeper understanding of this rare condition, called solar retinopathy, which has no currently accepted treatment.

Adaptive optics is a sophisticated technology that allows clinicians to examine microscopic structures of the eye in living patients with extreme detail in real time. Before the development of AO, researchers could only see this level of detail on glass slides with a microscope.

“We have never seen the cellular damage from an eclipse because this event rarely happens and we haven’t had this type of advanced technology to examine solar retinopathy until recently,” said lead investigator Avnish Deobhakta, MD, Assistant Professor of Ophthalmology at the Icahn School of Medicine at Mount Sinai. “NYEE is one of the few sites in North America with access to this technology, and using this to get an exact look at the patient’s retinal damage on such a precise level will help clinicians better understand the condition.”

Mount Sinai investigators used AO imaging on a patient who looked at the sun during the eclipse for 21 seconds without protective eyewear. Four hours later, the patient developed blurry distortion in both eyes and could only see the colour black. NYEE specialists examined her three days later and found she had burned a hole in her retinas and diagnosed her with solar retinopathy and photochemical burns.

Using this technology, researchers obtained high-resolution images of the damaged photoreceptors, which may provide a deeper understanding of the condition that could one day lead to the development of treatments.

“It’s exciting to be able to see such a correlation between the patient’s symptoms and the photoreceptor injury on a cellular level. Hopefully this research allows us to potentially develop future therapies for solar retinopathy and other forms of photic injury to the retina,” said Chris Wu, MD, a resident physician at New York Eye and Ear Infirmary of Mount Sinai. “This study can prepare doctors and patients for the next eclipse in 2024, and make them more informed of the risks of directly viewing the sun without protective eyewear.”

Mount Sinai Health System
https://tinyurl.com/y8cge588

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Extremity Cone Beam CT imaging demonstrates value of weight-bearing scans

Commercially launched in early 2017, the Carestream OnSight 3D Extremity System is a Cone Beam Computed Tomography (CBCT) scanner designed for point-of-care extremity imaging in weight-bearing patient position for orthopedic clinics, imaging centres, specialty offices, hospitals and emergency departments. The system uses a high-performance amorphous-Silicon (a-Si(H)) flat-panel detector and a unique three-source X-ray tube design. This detector allows for the rapid acquisition of X-ray projections, which helps minimize the negative impact of patient motion. The three-source X-ray tube was designed to reduce the “cone beam” artifact that has traditionally impacted large volume CBCT reconstructions as reported in scientific literature.

The detector and source rotate around the patient’s anatomy, acquiring a multitude of projections from different angles, axially and rotationally. The images are then reconstructed into a 3D volume using advanced software reconstruction techniques. This produces high resolution volumetric 3D images that have the same spatial resolution in any plane.

Cobalt Health, a leading UK medical charity, has installed the world’s first Carestream OnSight 3D Extremity Cone Beam CT system at their Imaging Centre in Cheltenham, Gloucestershire UK.

Founded in 1964, Cobalt provides a wide range of oncology services across the south-western UK counties of Herefordshire, Worcestershire and Gloucestershire. Cobalt has a history of early investment in new technologies such as MRI and PET/CT. A long-standing Carestream customer, Cobalt was the first facility in the UK and Ireland to implement the Carestream MyVue Patient Portal and currently has both Carestream Vue RIS and Vue PACS installed. Peter Sharpe, CEO of Cobalt Health said: ‘As a charity we’re very used to introducing new technology to support our patients and referring clinicians and this seemed like an ideal opportunity. The Carestream OnSight 3D Extremity CBCT scanner really fitted very nicely, particularly in supporting our orthopedic clinics. It provides something that we couldn’t offer previously, in terms of image resolution and flexibility; it seemed like a really good fit.’ It provides you with true weight bearing images, high resolution and low radiation dose. I think there’s a huge opportunity to embed it in the patient pathway in A&E and orthopaedic clinics across the UK. To introduce the benefits of the OnSight system to the patient pathway, Cobalt held a series of evening seminars where they showed case studies and orthopedic surgeons demonstrated how patients could benefit from the cone beam CT system. ‘It’s the best way of marketing the new technique,’ said Peter Sharpe. ‘The referrers need to come and understand how it works, what the image quality is, and what the benefits are.’

One-stop clinics

Cobalt runs regular one-stop clinics with orthopedic surgeons who refer their patients on the same day for X-rays, MRI or CT scans. Roisin Dobbin-Stacey, PET CT and CT Manager for Cobalt Health explained: ‘The Carestream On-Sight 3D CBCT doesn’t discriminate; it’s not just for sports injuries or for one-stop clinics, it will be available to all patients.’ ‘The weight-bearing feet and ankle exams that we’ve been doing, on people of all ages, have been made considerably easier; it only takes 25 seconds to get these incredible images. They step into the scanner and all they have to do is keep still for 25 seconds.’

‘In the past, when you had a patient who said they had a pain in their foot or ankle when they were walking or running, you would lie them down and do a CT scan and it wouldn’t show anything. You can now put them into the CBCT scanner and see the true condition of a patient who’s got all their weight going through that joint and you can see the difference; you can see why they’ve got that pain.’

‘The dose, of course, is something else that is talked about a lot; referrers ask why they would send their patient for a CT scan when they can have an X-ray; but actually if a patient is having a CBCT scan, the dose is only slightly higher than with an X-ray, and it’s a weight bearing exam. And it’s a lot less than with a CT, so that again is very encouraging.’

Exquisite detail

Consultant Radiologist, Prof. Iain Lyburn, has had a very positive experience with the Carestream OnSight 3D scanner. ‘It’s very high quality, very high resolution,’ he said. ‘The detail is exquisite, so you can see very small bony defects, very small osteophytes, with great clarity. It’s also much quicker than some other investigations, taking less than a minute for many body parts, so you get a cross sectional slice through the area in a relatively quick time.’ We recently examined a young man with hind foot pain and, whereas an MRI scan showed some edema, with the Carestream CBCT image you could see the bony detail wit absolutely exquisite clarity and what we hadn’t appreciated properly was an ill-defined irregularity around the os trigonum, which was the cause of the pain. It was a very small detail that you couldn’t pick up on the MRI, these small fragments of bone causing the pain.
CASE STUDY

was very helpful. We had another patient with pain below the ankle joint whose MRI showed some edema across the joint in the calcaneum, so we thought that was probably the cause of the pain. Remember the MRI would be done with the patient lying supine with their ankle on the bed, whereas with the CBCT the patient was standing in the functional position, and what it highlighted beautifully was a prominence in the subtalar joint. We could see the impingement far more clearly demonstrated because of the way the image was taken and realized that it was going to be the cause of the symptoms. There was possibly a suspicion of it on the MRI with the edema, but having the cone beam CT showing it in position clarified that that was the source of the symptoms. And that might change the management of the patient, because many times we would do a plain radiograph, see how the patient gets on then get them back. With the Carestream OnSight CBCT you would get the diagnosis straight away and would see most fractures earlier than you would on an X-ray. In imaging, as with many other aspects of medical technology, you’ll look back in a few year's and see that the Carestream CBCT is irreplaceable.

Plug and play
Installing the OnSight 3D Extremity system at Cobalt’s Imaging Centre was straightforward, as Roisin Dobbin-Stacey explained. ‘Planning and getting the room ready for delivery of the equipment was very easy; the room size had to be a minimum of 8 feet by 12 feet (Ed. 2.5m x 3.7m). The equipment arrived, it was brought up in the lift, wheeled in and plugged into a 240 volt socket. It literally is plug and play!’ ‘The Carestream engineers were fantastic, they got it all up and running within a couple of days, and the Apps training was brilliant. I think the system itself, how it’s been designed, is so user friendly. As a radiographer you want something that’s easy to use, and for me it’s fantastic, it’s such good fun to use. Cobalt CEO Peter Sharpe summed up his feelings about the Carestream OnSight CBCT system: ‘we have no regrets. It’s an excellent device, it works well and uptime has been 100 per cent. It’s easy to use, patients love it and the image quality is superb so yes, it’s been a great investment.’

CARESTREAM ONSIGHT 3D EXTREMITY CBCT
The Carestream OnSight 3D Extremity System uses cone beam technology to provide pristine 3D images at the point of care, with an easy-open bore and patient access to allow weight-bearing studies not possible with traditional CT. Minimal site and install requirements enable a fast, affordable, convenient imaging process for timely diagnosis and commencement of treatment.
Strong presence of Nordic skills and innovations in life science at Arab Health 2018

Danish, Finnish and Swedish organizations join forces to facilitate business partnering and networking at Arab Health 2018. At the event, 75 Nordic companies bring innovative life science solutions aiming to add sustainable value to the Middle East healthcare sectors and to build lasting relations between the Nordic participants and local stakeholders.

Business Finland, Business Sweden, Danish Health Tech Group and Global Pharma Consulting are coordinating four national pavilions at Arab Health 2018. To kick off the trade fair, the organizations announce an exclusive Nordic Business Partnering and Networking Reception for invited guests on Monday 29 January 2018 at 7-10 pm at the Sofitel Dubai Downtown.

“This is the only opportunity for stakeholders in the MENA region to talk to so many decision makers, officials and experts from the Nordics in one place in a relaxed setting,” explains Senior Consultant Paula Hassoon at Global Pharma Consulting, organizer of The Innovation Pavilion by Sweden.

“Joining forces with our Danish and Finnish colleagues to host a Nordic partnering and networking event brings added value to all of the participating companies,” she says.

Digital health from Finland

At the four national pavilions, the Nordic companies will showcase cutting-edge med-tech solutions and technologies to the MENA region. According to Meria Heikelä, Director at Business Finland and co-organiser of the Finnish pavilion, Finland ranks among the three strongest health technology economies in the world, with digital health being its largest high-tech export. "Finland's world-class research and technology competencies are the pinnacle of its health sector and one reason why Finland has one of the most efficient healthcare systems in the world. Preventive healthcare and rehabilitation solutions are among the key focus areas of Finland at Arab Health 2018," explains Meria Heikelä.

Danish innovations in med-tech

With the annual Pavilion of Denmark at Arab Health and a recent business delegation visit to UAE and Saudi Arabia healthcare sectors, Danish Health Tech Group is committed to share the Danish med-tech strengths with stakeholders in the MENA region.

“In Denmark, we prioritize design and quality, and innovate through an inherent focus on public-private sector cooperation and by proactively involving patients and staff in the healthcare sector,” says Thomas Andersen, Head of Danish Health Tech Group.

Swedish world-class healthcare

While all the Danish companies are exhibiting with Danish Health Tech Group, Sweden offers two different pavilions.

The Innovation Pavilion by Sweden and the official Swedish pavilion each has representatives from 20 Swedish healthcare and life science companies.

“Sweden is known for its world-class’ innovations within the healthcare sector. Much of this success derives from the tradition of entrepreneurship through the close collaboration between the government, academia and industry,” says Fredrik Bodin, Trade Commissioner of Sweden to the UAE, co-organizer of the official Swedish pavilion.

The national pavilions at Arab Health 2018

- The Innovation Pavilion by Sweden, organized by Global Pharma Consulting, located at Za’abeel Hall 6 Z6.E30
- The Finnish Pavilion, co-organized by Business Finland and Business Oulu, located at Hall H3 A10
- The Pavilion of Denmark, organized by Danish Health Tech Group, two pavilions located at Trade Center Arena SA.F50-59 and Za’abeel Hall 6 Z6.E30
- The official Swedish pavilion, organized by Business Sweden and the Embassy of Sweden in Abu Dhabi, located at Za’abeel Hall 1, Z1.G50

More information to be obtained from:
- Business Finland (Finpro) at www.finpro.fi
- Business Sweden’s at www.business-sweden.se
- Danish Health Tech Group at www.dk-healthtech.com
- Global Pharma Consulting at www.globalpharma.se

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ProbeHunter is the multi-brand real-time testing device with innovative technology designed to assure the quality of ultrasound probes.

TEST ALL BRANDS
GE, Philips, Siemens, Toshiba, Mindray, Carestream, HitachiAloka, Zonare, Sonosite and many more.

FUTURE READY
Already designed to meet future ultrasound probe technologies.

NEW FEATURES
- Motor controller for Volumetric probes
- Extended mping control
- New testing capabilities the market never seen before
Pristina has other design enhancements to ensure images are seamlessly assigned to patients and easily stored in a way that allows doctors and technicians to examine multiple patients easily. By working in auto-detection mode, the new Pixium Portable 3543 DR does not need to connect to any external devices, making it easier and quicker to operate than legacy portable systems. This makes for higher efficiencies since practitioners can examine multiple patients at minimal dose, anywhere in the hospital. Thanks to its optimized workflow, errors and stress are minimized and time and money are saved. Images and patient files can be uploaded directly to the radiology room, eliminating the need for numerous CR cassettes and answering the growing need of reducing system total cost of ownership.

THALES

www.interhospi.com & search 47282

Patient-controlled mammography system

Senographe Pristina features an option to use a first-in-industry patient-assisted compression remote control to enable the patient, with the help of a technologist, to set the compression that feels right for her. The handheld wireless remote control, called Pristina Dueta, allows patients to adjust the compression force after breast positioning. The technologist then guides the patient while she operates the remote control to adjust compression until she reaches an adequate compression level. The design strives to minimize women’s perceived pain and discomfort by giving them an active role in the application of compression.

In a patient survey conducted with 160 patients in two sites in Europe, 4 out of 5 patients who received their mammogram on the Pristina coupled with Pristina Dueta found it improved the comfort of their exam. Pristina has other design enhancements to improve exam comfort. The gentle, rounded corners of the image receptor or “bucky”, where the woman places her breasts, helps reduce discomfort and anxiety. It is also thinner so there’s less hard metal pushing into the patients’ ribs. The design also changes the way the patient is standing: Instead of requiring patients to grab conventional handgrips, which may cause tensing of pectoral muscles and therefore make it harder for the technologist to acquire clear images, patients can instead lean comfortably on armrests and relax their muscles to simplify positioning, compression and image acquisition. By improving patient comfort, technologists can focus on precise positioning, potentially making the exam easier and faster. Poor positioning is a leading cause of retakes, and the lack of proper positioning may decrease mammography sensitivity. Pristina also includes the latest in 3D digital mammography technology, also known as digital breast tomosynthesis, which delivers superior diagnostic accuracy at the same low dose as a 2D mammography exam – and the lowest patient dose of all FDA-approved 3D mammography systems.

GE HEALTHCARE

Arab Health 2018 S3.B01, S3.B10, S3.A10

www.interhospi.com & search 47284

Premium ultrasound now FDA-cleared

Hitachi’s latest premium ultrasound system, the ARIETTA 850 received FDA 510(k) clearance last November and offers a collection of features designed to improve image quality, speed workflow, and extend the utility of ultrasound in radiology departments. ARIETTA 850 also supports the world’s first widely-available probe that uses capacitive micro-machined ultrasound transducers (CMUT) rather than piezoelectric crystals to transmit and receive the ultrasound signal. The new system builds upon the advanced capabilities of Hitachi’s ARIETTA family of ultrasound scanners, adding features like eFocusing, which removes the need for focal zone adjustments by dynamically focusing from the near to far-field of the image. It also expands interventional capabilities through a collection of features that work in conjunction with Hitachi’s Real-time Virtual Sonography fusion software to automatically perform fusion registration, compensate for needle flexion during biopsy procedures, and deliver real-time visual maps of estimated RF ablation zones. RVS (Real-time Virtual Sonography) offers superior real-time navigation for treatment, merging real-time ultrasound with previously acquired CT, MR images. 3D Sim-Navigator, an advanced function of RVS, provides assessment of the three-dimensional positional relationship between multiple electrode needles and the target lesion at the time of Radio Frequency Ablation (RFA). The E-field Simulator provides a pre-treatment simulation of the treatment area superimposed on the CT or MR, from the given location of the multiple electrodes. Advancements in real-time RFA needle guidance can bring significant improvements to the treatment technique. The monitor arm and operating console of ARIETTA 850 have both been developed to provide a wide range of movement allowing ergonomic alignment so that the users’ comfort is maintained even during lengthy examinations. Additionally, Protocol Assistant, enabling prior examination protocol registration, promotes efficient workflow.

HITACHI

Arab Health 2018 S1.J50

www.interhospi.com & search 47281
Multi-purpose digital imaging system

Supporting general radiography, fluoroscopy and free exposures, the DR 800 is a highly versatile, fully integrated three-in-one digital imaging solution which offers performance, ease of use and flexibility. Suitable for a broad range of applications, the system encompasses all types of exams, eliminating the need for additional specialist rooms. Remote-controlled capability, auto positioning, 180 cm maximum Source Imaging Distance (SID) and radiation-free positioning enhance patient and operator satisfaction and comfort. Generator and digital imaging functionality are seamlessly integrated in the table control console, while the powerful dynamic MUSICA image processing assures superb image quality and a more efficient workflow.

AGFA HEALTHCARE
Arab Health 2018 S1.C20
i www.interhospi.com & search 47285
Premium ultrasonic diagnostic device

The RS85 is a new premium ultrasound diagnostic device that provides enhanced image quality, usability, and convenience for medical and radiology professionals. Among its features, the RS85 includes the MV-Flow and S-Shearwave Imaging technologies. The MV-Flow is able to detect the blood flow in microvascular tissues which is hard to be detected via a conventional Doppler ultrasonic wave. This allows researchers to check for indication of any type of lesion related to cancer or inflammation. The S-Shearwave Imaging feature provides new indicators for clinical diagnosis by quantifying the elasticity of human anatomy via shear wave elastography which will increase the accuracy of diagnosis for diseases such as hepatocirrhosis and tumours.

Premium mammography system

The unique 50 degree 3D HD Breast Tomosynthesis provides the highest depth resolution in tomosynthesis, and thus delivers excellent quality 3D images. Now also biopsies can be performed leveraging this wide tomosynthesis angle. The HD Breast Biopsy solution allows targeting suspicious areas with one click with a +/- 1mm accuracy. The new integrated specimen imaging tool facilitates the immediate control of the biopsy directly at the mammography system. The new Mammmomat Revelation also provides automated breast density measurements at the point of examination. This allows for personalized risk stratification and necessary adjunct imaging exams can be triggered before the patient leaves. As soon as the tissue sample has been taken, it has to be X-rayed to confirm that the biopsy was successful. In current settings, samples have to be imaged to a second system or a dedicated specimen scanner, usually in a different room. For this entire time, the patient’s breast has to remain compressed – an uncomfortable or even painful situation that the Mammmomat Revelation can substantially reduce. The system has an integrated specimen imaging tool called InSpect. Biopsy samples can be controlled within 20 seconds directly at the system without radiation exposure to the patient, improving the biopsy workflow and shortening the compression time for the patient. In case of high breast density, additional examinations such as tomosynthesis or breast ultrasound might be indicated. Radiologists currently have to visually estimate breast density during the image reading process, which usually takes place after the patient has left. If additional imaging procedures become necessary, the patient has to be called back. Mammmomat Revelation is the first mammography system that provides automated breast density measurements at the point of examination. This enables direct, personalized risk stratification and adjunct imaging can be initiated before the patient leaves. Patients get results faster, which also minimizes uncertainty. Purely morphological information from a mammogram or tomosynthesis may sometimes be insufficient for a precise diagnosis. For example, it can be difficult to distinguish scar tissue from new tumours in a post-surgical examination. In addition to purely morphological information, there can be a need for functional information that can be obtained using contrast-enhanced imaging, currently usually performed using breast MRI. Mammmomat Revelation now makes functional imaging possible directly on the mammography system. As contrast-enhanced mammography is still not a standard procedure, the modular arrangement of the new system enables it to be expanded to include this to suit customer requirements. With Personalized Soft Compression, the breast compression process is softened and the compression force is automatically and individually adjusted. Coupled with ergonomic SoftComp Paddles, Personalized Soft Compressions allows for better breast positioning, and a more consistent image quality while reducing discomfort.

CALENDAR OF EVENTS

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For more events see [www.interhospi.com/events/](http://www.interhospi.com/events/)

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