Does CT cause cancer?

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In Europe prostate cancer (PCa) is currently the most commonly diagnosed cancer in men—around one in six in the West will eventually be diagnosed with the disease—but the majority of patients will die of unrelated causes. There are two major problems related to PCa diagnosis: firstly, because of the lack of a highly sensitive and specific biomarker, many elderly men without cancer, or with clinically insignificant tumours confined to the prostate gland, are still undergoing unnecessary biopsies. Secondly because of its random nature, the standard method of biopsy, the transrectal ultrasound biopsy (TRUS), frequently detects low risk cancers that do not need aggressive therapy but fails to detect many clinically significant tumours in the less accessible areas of the gland. Recent studies suggest that multiparametric MRI (mp-MRI) pre-biopsy, to identify suspicious areas, followed by targetted biopsy using MR-ultrasound fusion, which combines detailed MRI scans with real-time ultrasound images of the prostate, is the better approach.

One preliminary prospective cohort study reported last year was carried out at the US National Cancer Institute. During a seven year period more than 1000 men underwent mp-MRI followed by MR-ultrasound fusion and concurrent TRUS. Whole-gland pathology of the prostate was also carried out after any prostatectomies. It was found that MR-ultrasound fusion diagnosed 30% more high-risk tumours and 17% fewer low-risk tumours than TRUS. However data are still needed on disease recurrence and PCa mortality, and the authors consider that random clinical trials should be carried out to determine eventual clinical outcomes. A retrospective analysis involving more than 600 Brazilian patients with suspected PCa was also reported recently with 286 patients undergoing MR-ultrasound fusion biopsies and 331 patients undergoing random ultrasound-guided biopsies. Again the former technique detected significantly more patients with high-risk cancer requiring surgery and significantly fewer low-risk tumours where only surveillance was needed. There are of course financial impacts of purchasing and using such technology, but improved patient risk stratification may well result in a negligible net cost increase. Hopefully MR-ultrasound fusion can replace techniques such as TRUS for suspected PCa diagnosis, but a question still remains. Is it really always necessary to treat clinically significant PCa by radical prostatectomy or radiotherapy of the entire organ when erectile dysfunction, urinary incontinence and intestinal problems are such common side effects? Would it not be possible to utilize appropriate imaging technologies and confine treatment to the affected area of the gland?
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Researchers have discovered how to diagnose Alzheimer’s disease with more than 82 per cent accuracy by evaluating the interplay between four linguistic factors; and developing automated technology to detect these impairments.

The study was led by Dr. Frank Rudzicz of the Toronto Rehabilitation Institute (TR). The method and automated application of the assessment is proven to be more accurate than the current initial assessment tool used by healthcare professionals. It can also provide an objective diagnostic rating for dementia.

Based on the analysis, it was determined that four collective dimensions of speech are indicative of dementia: semantic impairment, such as using overly simple words; acoustic impairment, such as speaking more slowly; syntactic impairment, such as using less complex grammar; and information impairment, such as not clearly identifying the main aspects of a picture.

“Previous to our study, language factors were connected to Alzheimer’s disease, but often only related to delayed memory or a person’s ability to follow instructions,” says Dr. Rudzicz, who is also Assistant Professor, Department of Computer Science, University of Toronto, and a Network Investigator with the AGE-WELL Network of Centres of Excellence. “This study characterizes the diversity of language impairments experienced by people with Alzheimer’s disease, and our automated detection algorithm takes this into account.”

Dr. Rudzicz further adds, “the driving force that makes this analysis so accurate is the large number of measurements, behind the scenes, that are precisely and automatically detected from speech using our software. An advantage of this technology is that it is repeatable – it’s not susceptible to the sort of perceptual differences or biases that can occur between humans.”

In this study, the researchers examined speech samples (including audio files) from a database of patients diagnosed with possible or probable Alzheimer’s disease and additional samples from 97 control subjects.

“Every caregiver knows that people with dementia have good days and bad days - we can tell this by talking to them, because speech is a rich source of information on the brain’s cognitive function,” says Dr. Jed Meltzer, neurorehabilitation scientist, Rotman Research Institute at Baycrest Health Sciences, and co-author of the study. “These methods offer a way to assess speech quantitatively and objectively, so we can use them to test interventions such as novel drugs and brain stimulation.”

“The demand on the healthcare system to support Alzheimer’s disease will continue to grow rapidly,” says Dr. Rudzicz. “Our automated approach will provide an opportunity to give people easier, more cost-effective and accurate access to initial dementia screening.”

University Health Network
http://tinyurl.com/zBo6c9m

**Laboratory in a needle promises rapid diagnosis**

Researchers in the U.S. and Singapore have designed a miniature chemistry laboratory inside a needle that could yield almost instantaneous results from routine laboratory tests, potentially accelerating the diagnosis and treatment of medical conditions.

The prototype device, created by miniaturizing existing “lab on a chip” technology, has shown its capability in studies of mice with liver toxicity, a common side effect of cancer chemotherapy in humans.

“It really integrates the whole laboratory process in one testing without any human in between,” said Stephen Wong of Houston Methodist Research Institute and Weill Cornell Medical Center, who created the idea for the new technology.

Diagnosis of medical conditions depends on the results of blood tests to identify toxicity and potential reactions to drugs. Obtaining the results of the tests can typically take a week. However, Wong said, “Using our approach, it takes less than an hour.”

The patented design combines individual components from a chemistry laboratory into a single small package attached to a conventional 32-gauge needle, a size used for several simple injections.

“This is a change in paradigm – a really disruptive technology,” Wong said. “You are no longer tied down to the lab” to carry out diagnostic procedures. “You can have a wireless device attached to your cell phone.”

Medical specialists could use the technology in healthcare offices, patients’ homes, or even remote locations to carry out diagnoses normally performed in hospitals.

“It’s a point-of-care mobile device,” Wong said. “But it can also be a device that you can use during the surgery to get instant results.”

That would permit doctors and patients to discuss treatment options as early as possible. The technology stems from the “lab on a chip” approach.

Houston Methodist Research Institute
http://tinyurl.com/zd8jsgf

**Promise of protecting fertility and the defence system during chemotherapy**

While targeted cancer treatments have reduced side effects and improved efficacy, chemotherapy remains the backbone of combination therapies for many forms of cancer. Unfortunately, cancer patients may suffer from several side effects from chemotherapy, including infertility and a weakened defence system that makes them susceptible to life-threatening infections.

A study recently published holds hope for cancer patients undergoing chemotherapy to avoid two serious side effects and to stop cancer’s growth.

Researchers at LA BioMed and the University of Southern California found the potent human analogue (HNG) protected male germ cells, which are essential to fertility, and white blood cells, which are the soldiers in the body’s defence system, in cancer research models undergoing chemotherapy. The researchers also reported that HNG reduced metastases, or the spread of cancer cells to other organs in the body.

“Our study suggested that including HNG in chemotherapy may help cancer patients avoid infertility and a weakened defence system against infection while also increasing the effectiveness of the chemotherapy,” said Christina Wang, MD, an LA BioMed researcher and corresponding author of the study. “More research is needed, and we are working diligently to fully document and understand the protective nature of HNG against the side effects of chemotherapy.”

Recent advances in the understanding of cancer cell biology and the use of multiple types of treatments have led to improved...
cancer survival. But to improve the quality of life in cancer survivors, the researchers said there is an increasing need to protect the healthy cells from the toxic effects of chemotherapy without disrupting the treatment’s effectiveness in reducing or eliminating cancer cells.

“Based on our findings, we also believe that HNG could protect other vital cells, including those in the heart and brain, which may be damaged by chemotherapy regimens,” Dr. Wang said. “We will be conducting additional studies to determine how HNG can help guard against some of the most serious side effects of chemotherapy.”

**LA BioMed**
www.labiomed.org/news

### New paste prevents scarring by radiation therapy for cancer

![Anti-scarring paste](image)

An anti-scarring paste when applied to the skin of mice halted fibrosis caused by the radiation used in cancer therapy. That is according to a study led by researchers at Laura and Isaac Perlmutter Cancer Center.

Scarring occurs as key cells lay down tough connective tissue to provide a framework for healing after injury. Fibrosis is a related process that creates connective tissue in the wrong context, often interfering with the architecture or function of tissues as part of disease.

The current study addressed a type of fibrosis called radiation dermatitis, which is a side effect experienced by as many as 95 percent of patients undergoing initial radiation treatment. Radiation applied to the skin causes the build-up of fibrotic tissue and skin thickening, with the effects severe enough in some patients to stop treatment.

The NYU Langone research team says they mimicked the development of radiation dermatitis by exposing the mice’s skin to a single dose of 40 Grays, a similar amount of radiation to what patients undergoing anti-cancer radiation typically receive over five weeks. Some of the irradiated animals were normal mice, while others were genetically engineered to lack a specific protein receptor, known as the adenosine A2A receptor. Signalling molecules fit into certain receptors on cells, like keys into locks, to pass on messages, and the A2A receptor does so in pathways related to fibrosis.

Half of the irradiated mice were then treated daily with a topical paste made with the research team’s patented A2A receptor blocker. The paste contains 2.5 milligrams of active ingredient per milliliter of 3 percent carboxymethyl cellulose, a gum “binder” used to make drugs and other products. The rest of the mice received a placebo. A month after exposure, normal mice that got the placebo showed a nearly two-fold increase in the amount of collagen, skin thickness, and fibrosis. Those treated with the A2A receptor-blocking paste accumulated only 10 percent more skin-thickening collagen. Mice genetically engineered to lack the A2A receptor developed no skin reaction at all to the radiation.

“Our latest study is the first to demonstrate that blocking or deleting the A2A receptor can be useful in reducing radiation-induced scarring in skin,” says senior study investigator and rheumatologist Bruce Cronstein, MD, director of NYU Langone’s Clinical and Translational Science Institute. “The study also suggests that adenosine A2A receptor antagonists may have broad applications as drug therapies for preventing fibrosis and scarring, not just in the liver but also in the skin.”

NYU Langone Cancer Center
http://tinyurl.com/jctc6kj

### Saline water better than soap and water for cleaning wounds

Many scientific advances have been made in the delivery of care and infection prevention for open fractures, but the standard practice of wound cleaning with soap and water before surgery has remained unchanged. Now, an international team of researchers led by McMaster University in collaboration with the Research Institute of the McGill University Health Centre has found that soap and water is actually less effective than just using saline water.

The findings could lead to significant cost savings, particularly in developing countries where open fractures are particularly common. As part of the study, 2,400 people with open arm or leg fractures had their wounds cleaned with either soap and water, or a saline water solution, and one of three different levels of water pressure. Patients were monitored to see who would need to have an additional operation within 12 months because of infection or problems with wound healing. The researchers found that very low water pressure was an acceptable, low-cost alternative for washing out open fractures, and that the reoperation rate was higher in the group that used soap.

“There has been a lot of controversy about the best way to clean the dirt and debris from serious wounds with bone breaks,” says Dr. Mohit Bhandari, principal investigator and a professor of surgery for the Michael G. DeGroote School of Medicine at McMaster. “All wounds need to be cleaned out – a process known as debridement – but evidence shows that cleaning wounds with soap was not better than just water, which was unexpected.”

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“These findings may have important implications for the care of patients with open fractures worldwide since developing countries deal with a disproportionate number of cases,” adds one of the study’s co-authors, Dr. Edward Harvey, chief of Orthopaedic Trauma at the McGill University Health Centre and a professor of surgery at McGill University. “Most of the time we were using soap and water with a high pressure delivery system to clean the wound, but now we don’t, and that makes the best practice much cheaper.”

The researchers added that their findings may be particularly relevant for low and middle income countries where 90% of road traffic fatalities, and probably a similar proportion of open fractures, occur, according to the World Health Organization.

McGill University Health Centre
http://tinyurl.com/hoczuywr

Diagnosing fetal alcohol spectrum disorder

Diagnosing fetal alcohol spectrum disorder (FASD) is important to help children and adults, and their families, who have the disorder.

FASD is a neurodevelopmental disorder resulting from prenatal alcohol exposure. Individuals with FASD can experience complex behavioural and intellectual problems that persist throughout the lifespan and can become increasingly complicated if unsupported. The need for early and accurate diagnosis is critical for improving outcomes and quality of life.

It is estimated that 1 in 100 people have FASD, translating to more than 330,000 affected individuals in Canada.

Since the publication of the last guideline in 2005, research in this area has evolved. The new guideline incorporates updated evidence for detecting and diagnosing FASD across the lifespan.

“These new recommendations, based on the latest evidence for diagnosing FASD, will improve how we diagnose the disorder and help individuals and their families,” states Dr. Jocelynn Cook, Canada Foetal Alcohol Spectrum Disorder Research Network and the Society of Obstetricians and Gynaecologists of Canada.

The guideline is aimed at health care providers with specialized training and experience in FASD who are part of multidisciplinary diagnostic teams. Family physicians may find the guideline useful, but the diagnosis must be made with input from other experienced health care professionals.

Key recommendations for diagnosis of FASD:

1. Counseling women and their partners about abstinence from alcohol during pregnancy or when planning a pregnancy.
2. Screening of all pregnant women and new mothers for alcohol use by trained professionals using tested tools.
3. Referring individuals for possible diagnosis if there is evidence of prenatal exposure to alcohol at levels associated with adverse brain function.
4. Conducting complete social and medical histories of patients suspected of having FASD.
5. Other recommendations address the sentinel facial features associated with exposure to alcohol during pregnancy, the complex brain injury and differential diagnoses.

The guideline includes an algorithm — a decision-making tool — to help multidisciplinary teams diagnose the disorder based on the recommendations.

“One as diagnosing FASD is important, so too is ensuring the patient and their caregivers receive the support they need to obtain necessary services that may improve quality of life,” states Dr. Cook. “They will need specialized support from a team of experts such as child development specialists, occupational therapists, speech-language therapists, psychologists and specialized physician supports, depending on their ages.”

CanFASD
http://tinyurl.com/no6l2c

One in four new doctors may be depressed

More than one in four doctors in the early stages of their careers has signs of depression, a comprehensive new study finds. And the gruelling years of training for a medical career may deserve some of the blame.

That’s bad news not just for the young doctors themselves, but also for the patients they care for now and in the future. Depressed doctors are known to be more likely to make mistakes or give worse care.

The startling findings come from a careful investigation of 50 years’ worth of studies that looked for depression symptoms in more than 17,500 medical residents.

The team aimed to find definitive answers to questions that have been studied many times and in many ways: What percentage of new doctors might be depressed, and how much does that change over time?

By collecting and combining data from 54 studies done around the world, the researchers concluded that 28.8 percent of physicians-in-training have signs of depression.

There was a small but significant increase in the rate of depression over the five decades covered by the study.

“The increase in depression is surprising and important, especially in light of reforms that have been implemented over the years with the intent of improving the mental health of residents and the health of patients,” says Srijan Sen, M.D., Ph.D., senior author of the new study and a member of U-M’s Depression Center, Institute for Healthcare Policy and Innovation, and Molecular and Behavioral Neuroscience Institute.

Sen runs the Intern Health Study, a major effort to understand stress and mood issues people face in their first year of training after medical school. The study enrolls 3,000 medical interns at 50 sites every year and tracks their progress from before training begins through their first year of training.

Sen worked with the study’s lead author -- Douglas Mata, M.D., M.P.H., of Harvard University -- and the other authors to pull together and analyse a wide range of studies. They focused on the first post-medical school training years, called internship and residency. Those years are marked by long hours, intensive on-the-job learning, low rank within a medical team, and a high level of responsibility for minute-to-minute patient care.

While the percentage of residents with possible depression found by any one study ranged from 20 percent up to 43 percent, the bottom line when all the data were equalized and tallied together came out to 28.8 percent.

Having a definitive number, and definitive evidence that the proportion of new doctors with depression symptoms increases over time, should help spur action to help address these issues, Sen says.

While many medical schools and teaching hospitals have begun to address student and trainee mental health more completely in recent years, more needs to be done, the authors note.

University of Michigan
http://tinyurl.com/hdzd2ly
Does CT cause cancer? Assumptions questioned by new evidence

One of the biggest medical controversies in recent years concerns claims about radiation risks from CT (computed tomography) imaging. Although experts have questioned certain facets of such claims, an especially powerful riposte was published in an article late last year in the ‘American Journal of Clinical Oncology’. The authors took great pains to explain that the “widespread belief” about a link between medical imaging and cancer was founded on “an unproven” and “illegitimate” theoretical model, dating to the 1940s.

Media fuels emotion, fear
The emotive nature of the CT and cancer debate may be best illustrated by an Op-Ed in the ‘New York Times’ on January 31, 2014. Its authors are two Professors at the University of California, San Francisco Medical Center - radiologist Rebecca Smith-Bindman and cardiologist Rita Redberg.

The headline of the article, in one of the world’s most influential publications, clearly seeks to draw maximum attention. “We Are Giving Ourselves Cancer,” it says. The opening paragraph continues in the same vein, closing with the observation that “we” are “silently irradiating ourselves to death.” So too does the final sentence of the Op-Ed - that “we” must find ways to use CTs “without killing people in the process.”

Expert oversights
Professors Redberg and Smith-Bindman acknowledge that “medical imaging can be lifesaving.” Their principal argument is that once rare, CTs have now become routine and that the “current high rate of scans” do not correlate to “better health outcomes.” The reasons for growth in CT use are both good and bad: “desire for early diagnoses, higher quality imaging technology,” as well as the “financial interests of doctors and imaging centers.” However, the authors do not even attempt an informed guess about whether good motives outweigh the bad. In contrast, they state conclusively that there is “evidence of its harms.” This evidence consists of two clinical studies in Britain and Australia where the risks of CT, they say, were “directly demonstrated,” especially in children.

One of their biggest oversights was to avoid mentioning the conclusions of the two studies. Both, in fact, took great care to qualify their verdicts.

Key studies in Britain and Australia qualify judgements
The British study, published in ‘Lancet’ in August 2012, was titled ‘Radiation exposure from CT scans in childhood and subsequent risk of leukaemia and brain tumours: a retrospective cohort study’. It used data on 175,000 children and young adults and found a three-fold increase in the risk of brain tumours and leukemia. However, the cumulative 10-year risk was one excess case of leukemia and one excess case of brain tumour per 10,000 head CT scans.

On its part, the Australian study was published in the ‘British Medical Journal’ in May 2013 and titled ‘Cancer risk in 680,000 people exposed to computed tomography scans in childhood or adolescence: data linkage study of 11 million Australians.’ The authors found a 24% increase in childhood cancer risk over a 10-year period - from 39 per 10,000 young people to 45, after a CT scan. These findings were, like the British study, put in perspective by an accompanying editorial: the incidence of cancer in children “is extremely small and so a 24% increase makes this risk just slightly less small.” In addition, the authors observed that almost 60% of CT scans were of the brain and “in some cases the brain cancer may have led to the scan rather than vice versa.”

Indeed, unlike the ‘New York Times’ Op-Ed, the two studies provided a balanced view. Above all, they took great care to avoid drawing alarmist conclusions.

The need for balance
The British study stated that “immediate benefits of CT outweigh the long-term risks in many settings and because of CT’s diagnostic accuracy and speed of scanning ..., it will remain in widespread practice for the foreseeable future.” Lead author Mark S. Pearce of Newcastle University’s Institute of Health and Society echoed this forcefully, noting that “CT can be highly beneficial for early diagnosis, for clinical decision-making, and for saving lives. However, greater efforts should be made to ensure clinical justification and to keep doses as low as reasonably achievable.”

The Australian study, too, concluded that practitioners “will increasingly need to weigh the undoubted benefits of CT scans in clinical practice against the potential risks to justify each CT scan decision.”
Dosage: wide margins for error

Meanwhile, one of the biggest issues of concern with CT is a lack of clarity - and some uncertainty - about dosage and exposure. The British study, for example, underscored that the increase in risk followed “two or three CT scans of the head” under “current scanner settings” for brain tumours and “five to 10 head CT scans” for leukemia.

Radiologists have in fact not reached a consensus on how to define a dose, according to Michael McNitt-Gray, an associate professor of radiological sciences at the University of California, Los Angeles. Doses per indication vary by institution and by patient size. As a result, no national average is available.

An additional problem is that effective, organ-specific doses relate to how much radiation the body absorbs. However, CT scanners do not report the absorbed fraction, says McNitt-Gray. Instead, they report only what the machine emits, which is less than what is absorbed by the body.

Australian study urges validation of risk model

Nevertheless, in general, there is widespread agreement that CT scans should be limited to situations with a definite clinical indication and that scans should be optimized to provide a diagnostic CT image at the lowest possible radiation dose. The editorial accompanying the Australian study in the ‘British Medical Journal’ called for further validation of risk models, and stated that “more accurate risk assessment “can be performed to “better inform imaging decisions.”

Missing nuances

Such nuances seem to have been missed out by the Op-Ed in the ‘New York Times.’ A “single CT scan,” the authors wrote, “exposes a patient to the amount of radiation that epidemiologic evidence shows can be cancer-causing.” They also asserted that CT radiation was “100 to 1,000 times higher than conventional X-rays.” Their certainty stands in some contrast to a quote from the British study used to justify the authors’ views: “The ‘amount of radiation delivered during a single CT scan,’ it said, “can still vary greatly and is often up to 10 times higher than that delivered in a conventional X-ray procedure.”

French study in 2014 raises new doubts

In October 2014, nine months after the ‘New York Times’ Op-Ed, a French study of 67,274 children raised further doubts about the strength of the correlation between CT and childhood cancer. The objective of the study, published in the ‘British Journal of Cancer’, was to estimate how cancer-predisposing factors (PFs) affected assessment of radiation-related risk in CTs.

The authors found that adjusting for PF “reduced the excess risk estimates related to cumulative doses from CT scans” and that “no significant excess risk was observed in relation to CT exposures.” The study concluded that there was a need “to avoid overestimation of the cancer risks associated with CT scans.”

The 2009 NCI study

Aside from the British and Australian studies, an authoritative and oft-cited source for most of the alarms about CT have their origins in a 2009 report from the US National Cancer Institute (NCI). This report was referenced by the authors of the ‘New York Times’ Op-Ed, in their statement that “CT scans conducted in 2007 will cause a projected 29,000 excess cancer cases and 14,500 excess deaths over the lifetime of those exposed.”

BEIR and Lifetime Attributable Risk

The NCI figures were based on the US National Research Council’s Biological Effects of Ionizing Radiation (BEIR) report in 2006 and estimated the mean number of radiation-related incident cancers with 95% uncertainty limits (UL).

The so-called BEIR VII model generates what it calls lifetime attributable risk (LAR) factors. These estimate the likelihood of cancer in hypothetical individuals as a function of dose. Multiplying LAR by the number of people exposed to a given dose yields an estimate of expected cancers from that exposure in the population.

BEIR VII was also used by Smith-Bindman, one of the authors of the ‘New York Times’ Op-Ed, who used it in a study of four San Francisco facilities to estimate that one cancer might appear for every 270 middle-aged women undergoing CT coronary angiography, and that women aged 20 who underwent the procedure had twice the risk as middle-aged women.

Dosing fruit flies after 70 years

The article painstakingly re-examines the original studies, dating back over 70 years, which led to adoption of LNT. The experiments involved exposure of fruit flies to various doses of radiation, and concluding there was no ‘safe’ level of radiation - the basis of the LNT model which is used to this day. However, such a conclusion was unwarranted as the experiments had not been done at truly low doses and there is growing evidence that the human body has evolved the ability to repair damage from low-dose radiation - such as that which occurs naturally in the environment.

Indeed, as the authors argue, the first study to expose fruit flies to low-dose radiation was conducted only in 2009 and its findings did not support the LNT model. Other sources too suggest that the dose-response relationship between radiation and somatic mutation has a threshold, and that biological defence mechanisms come into play at low radiation levels.

Abandoning LNT

Use of the LNT model, according to the authors of the article in the ‘American Journal of Clinical Oncology’, disuades many physicians from using appropriate imaging techniques and “discourages many in the public from getting proper and needed imaging, all in the name of avoiding any radiation exposure.” They conclude that the LNT model “should finally and decisively be abandoned.”
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Risk management in cancer clinical trials - new recommendations for imaging biomarkers

In recent years, there has been rapid growth in the use of molecular and functional imaging for clinical cancer research. Experts have focused their attention on devising risk management methodologies to optimize the use of such modalities. However, the rapid pace of progress in technology and new insights into cancer mean that risk management itself is permanently under re-development.

**RECIST: driven by growth of imaging techniques**

At present, the most widely used tool to assess treatment response and risk versus benefit in clinical trials is known as RECIST (Response Evaluation Criteria In Solid Tumors).

The original RECIST criteria date to the year 2000, following a collaborative effort between the US National Cancer Institute (NCI), the European Organization for Research and Treatment of Cancer (EORTC) and the Cancer Institute at Canada Clinical Trials Group. RECIST was the first major effort since World Health Organization definitions in 1979, published in the WHO Handbook. By the early 1990s, the WHO definitions began to confront major limitations, above all with respect to changes in the size and minimal number of ‘measurable’ lesions. In turn, the key reason for this was the rapid development and growth of new imaging techniques such as CT and MRI, as well as confusion about how to integrate their far more precise data into response assessments.

**Criteria are tumour-centric, not patient-centric**

RECIST criteria define when treatment leads to tumours improving, stabilizing or progressing. They are principally intended to evaluate tumour response as a prospective endpoint in clinical trials. Although concurrent benefits are obtained by clinicians who use imaging studies to determine the success of a particular therapy and whether to continue or discontinue it, this is not the intention of RECIST. Indeed, one of the most significant elements of RECIST is that the criteria are tumour-centric, rather than patient-centric.

**NCI guidelines in mid-2000s**

The mid-2000s witnessed some technology-specific imaging guidelines for clinical trials. The best known of these followed workshops by the Cancer Imaging Program of the US National Cancer Institute. They included guidelines on dynamic contrast MRI (DCE-MRI) and on the use of 18F Fludeoxyglucose (FDG) PET as an indicator of therapeutic response in clinical trial patients.

**2009: RECIST 1.0 upgraded to 1.1**

The RECIST criteria were updated in 2009. While the original set are now commonly known as RECIST 1.0, the revised criteria are called RECIST 1.1. The reasons for the revisions were manifold. During the 2000s, numerous prospective analyses confirmed the validity of substituting uni-dimensional for bi-dimensional or even three-dimensional criteria. In spite of some exceptions (such as mesothelioma), uni-dimensional criteria seemed to perform adequately in solid tumour studies up to phase II.

However, several questions had also arisen over the past decade and these demanded further clarity. Key questions, which the revised RECIST guidelines address, include:

- whether it was possible to assess fewer than ten lesions without affecting the overall assigned response for patients
- making an assessment of lymph nodes
- ways to apply RECIST in randomized phase III trials where progression rather than response is the primary endpoint (especially for patients who do not demonstrate measurable disease)
- the applicability of RECIST in trials of targeted non-cytotoxic drugs
- the need for response confirmation

**Qualified endorsement of FDG-PET**

Finally, RECIST 1.1 provides guidelines on newer imaging technologies, especially FDG-PET (where preliminary efforts on its use as a “qualified biomarker” had already been made by the Cancer Imaging Program of the US National Cancer Institute in 2006).

Although RECIST 1.1 cautions that FDG-PET response assessments need additional study, the revised criteria do note that “it is sometimes reasonable to incorporate the use of FDG-PET scanning to complement CT scanning in assessment of progression (particularly possible ‘new’ disease).” RECIST 1.1 also provides an algorithm to identify new lesions from FDG-PET imaging.

As mentioned previously, one of the key questions considered by the Working Group revising RECIST was to determine whether it was appropriate “to move from anatomic unidimensional assessment of tumour burden to either volumetric anatomical assessment or to functional assessment with PET or MRI.” The Working Group concluded that there was (still) not enough standardization or evidence “to abandon anatomical assessment of tumour burden.” The only exception was
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to use FDG-PET imaging as an adjunct to
determination of progression, and pursue
appropriate clinical validation studies for
new technologies.

Imaging hybrids such as PET-CT, how-
ever, remain strongly qualified. The revised
criteria state that “the low dose or attenu-
ation correction CT portion of a com-
bined PET–CT is not always of optimal
diagnostic CT quality for use with RECIST
measurements.”

**Immunotherapy poses specific challenges**

Almost in parallel to the RECIST revision, another recent initiative has sought to take
into account the fast-emerging new field of
immunotherapy.

Immunotherapy is also known as biological-
therapy and biotherapy and uses the
body’s immune system to produce anti-
tumour effects and fight cancer. It works by
either stimulating a patient’s immune sys-
tem to attack cancer cells or providing the
immune system with what it needs, such as
antibodies, to fight cancer.

Examples of immunotherapeutic agents
include monoclonal agents, cancer vac-
cines and man-made versions of cytokines,
the chemical agent in immune cells.
However, the clinical response to an immu-
notherapeutic agent can sometimes mani-
ifest only after “an initial increase in tumour
burden or the appearance of new lesions
(progressive disease).” In other words,
such drugs would fail in clinical trials
which measured response using WHO or
RECIST criteria, because they fail to take
account of the time gap in many patients
between initial treatment and the appar-
ent action of the immune system to reduce
the tumour burden. Such a failure would
occur in spite of the fact that these drugs
ultimately prolonged life.

**IrRC Criteria**

The so-called irRC (Immune-Related
Response Criteria) consists of a set of pub-
lished rules for evaluating anti-tumour
responses with immunotherapeutic agents.
It seeks to define when tumours respond,
stabilize or progress during treatment.
irRC was developed by a team of research-
ers from the US and Austria, France, Ger-
many and Italy on the basis of experi-
ence with the CTLA-4 function blocking
antibody ipilimumab in phase II trials in
patients with advanced melanoma. Other
immunotherapeutic anti-cancer drugs to
have recently been approved in the
US and Europe include pembrolizumab,
sipuleucel-T and nivolumab. These drugs
offer considerable promise for patients
with advanced lung cancer, prostate cancer,
renal cell carcinoma and melanoma.

**Molecular and functional imaging**

The advent of new drugs offering new
promise for some of the toughest can-
cers is likely to continue in the coming
years. Meanwhile, imaging biomarkers
are expected to provide invaluable infor-
mation on disease staging and charac-
terization. Increasingly, researchers are
enthused about the fact that molecular
and functional imaging permits the detec-
tion or absence of response within days
after the onset of treatment. In turn, early
stage detection makes it feasible for non-
responding patients to avoid unnecessary
toxicity associated with therapy.

The development and use of imaging
biomarkers, however, is a complex process
with complex data acquisition methods as
well as specific regulatory issues for the tri-
alling of new imaging agents. Quality con-

trol issues associated with image process-
ing and the use of multi-vendor software
are major, additional challenges - which
can impact on data standardization. Such
problems are clearly going to be more acute
in the case of multicentre international
trials.

**Improving the use of imaging biomarkers**

At the end of 2015, experts from Europe
and the US published a paper in ‘Lan-
cet Oncology’, aimed at “improving the
implementation and utilization of imaging
biomarkers in cancer clinical trials.” The
authors represented the EORTC and the
United States NCI - both of which have
been associated with RECIST - as well as
the European Society of Radiology (ESR)
and the European Association of Nuclear
Medicine (EANM).

The authors explicitly noted the promise
of novel imaging modalities on disease
staging and characterization and the rapid
detection interval offered by molecular and
functional imaging. Their aim is to “pro-
pose a practical risk-based framework and
recommendations on imaging biomarker-
driven trials that allows identification of
risks at trial initiation so that resources
can be better allocated and key tasks pri-
oritized.” The paper also recognizes the
“essential roles” played in clinical trials
by other stakeholders such as “regulatory
bodies, pharmaceutical companies, and
patients.”

Dr Yan Liu, lead author of the paper and the
Head of Translational Research, Radiother-
apy and Imaging at EORTC, noted that can-
cer clinical trials have always sought to find
a right balance between maximizing data
quality and minimizing cost. Here, he said,
“risk management can be an extremely help-
ful tool, because it can help us to prioritize,
reduce costs, and decrease attrition rates.”

The Risk Assessment Plan would be best
realized via a multi-disciplinary team
which includes imaging experts, oncolo-
gists, as well as study project managers.
It should be reviewed and updated
throughout a trial.

**Towards personalized medicine**

The need for robust risk management
approaches in imaging was illustrated
shortly before publication of the above
paper in ‘Lancet Oncology’. On December
9, scientists at the University of Manches-
ter and the Institute of Cancer Research in
London announced development of a new
oxygen-enhanced MRI test which mapped
areas of hypoxia (or oxygen deprivation)
within tumours - often a sign that a cancer
is growing aggressively. The aim of the test
is to enable doctors identify more danger-
ous tumours before they spread around the
body - and tailor treatment accordingly.
Researchers used the technology to pro-
duce hypoxia maps within tumours in
mice. It is now being further developed
through clinical studies of cancer patients.
According to study co-author, Dr. James
O’Connor of the University of Manchester:
“There is currently no validated, afford-
able and widely available clinical imaging tech-
nique that can rapidly assess the distribu-
tion of tumour hypoxia.” He hoped that
oxygen-enhanced MRI will not only help
identify the most dangerous tumours, but
also assist in the monitoring of treatment
response. On his part, Nell Barrie of Cancer
Research UK noted that “this early-stage research
in mice will help to find new ways to use exist-
ing scanning technology to monitor and
personalize each patient’s treatment ...”

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**Imaging Biomarkers in Cancer Clinical Trials**

**EORTC, ESR, EANM and NCI Recommendations**

**Develop an initial Risk Assessment Plan before start of study**

**Performed during:**

- Protocol development
- Site activation
- Accrual
- End of trial
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Early trial shows injectable agent illuminates cancer during surgery

Doctors at Duke Medicine have tested a new injectable agent that causes cancer cells in a tumour to fluoresce, potentially increasing a surgeon’s ability to locate and remove all of a cancerous tumour on the first attempt. The imaging technology was developed through collaboration with scientists at Duke, the Massachusetts Institute of Technology (MIT) and Lumicell Inc.

According to a trial at Duke in 15 patients undergoing surgery for soft-tissue sarcoma or breast cancer, they found that the injectable agent, a blue liquid called LUM015 (loom – fifteen), identified cancerous tissue in human patients without adverse effects.

Cancer surgeons currently rely on cross-sectional imaging such as MRIs and CT scans to guide them as they remove a tumour and its surrounding tissue. But in many cases some cancerous tissue around the tumour is undetected and remains in the patient, sometimes requiring a second surgery and radiation therapy.

“At the time of surgery, a pathologist can examine the tissue for cancer cells at the edge of the tumour using a microscope, but because of the size of cancer it’s impossible to review the entire surface during surgery,” said senior author David Kirsch, M.D., Ph.D., a professor of radiation oncology and pharmacology and cancer biology at Duke. “The goal is to give surgeons a practical and quick technology that allows them to scan the tumour bed during surgery to look for any residual fluorescence.”

Researchers around the globe are pursuing techniques to help surgeons better visualize cancer, some using a similar mechanism as LUM015, which is activated by enzymes. But the Duke trial described in the journal is the first protease-activated imaging agent for cancer that has been tested for safety in humans, Kirsch said.

In the operating room after a tumour is removed, surgeons would place the handheld imaging device on the cut surface. The device would alert them to areas with fluorescent cancer cells.

Duke Medicine
http://tinyurl.com/zazzpo4

European biobank for medical imaging

The European Society of Radiology (ESR) and the Biobanking and Biomolecular Resources Research Infrastructures – European Research Infrastructure Consortium (BBMRI-ERIC) announce the beginning of an official collaboration.

The ESR has in the course of its European Action Plan for Medical Imaging launched in November 2014 highlighted the importance of integrating imaging and ‘omics’ data and the need for a structured repository for imaging data in order to facilitate personalized medicine, clinical trials, and the evaluation of new drugs towards the EU institutions and other stakeholders.

The ESR has since been working on a strategy to support the development of European biobanks in medical imaging to simplify access to knowledge, improve interoperability, standardization, and data management, and to ensure a harmonized approach to quality assurance of data. The immediate purpose of imaging biobanks will be to allow the generation of imaging biomarkers for use in research studies and to support biological validation of existing and novel imaging biomarkers.

The ESR is particularly pleased with the collaboration with BBMRI-ERIC that will facilitate the development of integrating imaging data with biobank databases.

In a joint workshop on October 7, 2015 the two partners discussed their collaboration in detail and identified their common objectives under the guide of the ESR President, Prof. Luis Donoso, the ESR Research Committee Chairperson, Prof. Hans-Ulrich Kauczor and the BBMRI-ERIC Director General, Prof. Jan-Eric Litton.

The main goals of this collaboration are to promote the importance and visibility of imaging biobanks, to coordinate efforts to establish a European imaging biobank infrastructure and to ensure its linking to existing biobanks.

The two organizations will work together on the linking of MIA-BIS 2.0 (Minimum Information About Biobank data Sharing) with DICOM (Digital Imaging and Communications in Medicine) and with regard to the BBMRI-ERIC Directory 2.0, a tool to share aggregate information about the biobanks that are willing to start external
collaboration. In order to identify existing large population cohorts (LPC) with imaging biobanks and encourage them to link them to BBMRI-ERIC. In line with the ESR survey on imaging biobanks carried out in December 2014 among heads of radiology departments across Europe, the ESR will keep its national member societies informed about the joint activities with the BBMRI-ERIC, in order to make sure that all European imaging biobanks will be involved in this important collaboration.

BBMRI-ERIC
http://tinyurl.com/zak46yq

Breast density alone not a risk factor for cancer

Breast density may not be a strong independent factor for breast cancer risk, according to a new study presented today at the annual meeting of the Radiological Society of North America (RSNA).

Prior research has shown an association between breast density and breast cancer. In addition, cancers in dense breast tissue are more difficult to see on mammograms. As a result, some women with dense breasts are advised to get supplementary screening with ultrasound or MRI. Some U.S. states have enacted legislation mandating breast density reporting to women undergoing mammography.

“In our study, we found that there was no significant difference in breast density between breast cancer patients and the control group in the screening program,” said Natasa Katavic, M.D., from the Department of Radiology at Health Center Osijek in Osijek, Croatia.

For the study, Dr. Katavic and colleagues looked at data from 52,962 mammography exams performed in women aged 50 to 69 over five years at five different mammography facilities. Women in Croatia in this age group are invited every two years for mammography by the country’s Institute of Public Health.

“We wanted to find out if breast cancer patients had more dense breast tissue than the healthy women,” Dr. Katavic said. “Also, we wanted to see what the percentage of dense breasts was in our postmenopausal population and, consequently, determine the value of mammography screening for this group.”

Two radiologists read the mammograms independently and determined breast density according to standard criteria. The researchers compared data between patients in the low-density breast tissue group and the high-density group.

The majority of screened women had low breast density. Of the 230 detected breast cancers, almost half were from the group with the lowest ranked breast density, while slightly less than 3 percent came from women in the highest breast density category.

When the researchers matched the women who had a detected cancer with control participants of the same age and from the same locales who did not have cancer, they found no significant difference in mammographic density. Women with low mammographic density made up 83 percent of the patients in the breast cancer group, compared with 89 percent in the control group, while high mammographic density was found in 17 percent of the breast cancer patients and 11 percent of women in the control group.

The study did not find a strong association between higher mammographic densities and a higher risk of breast cancer among postmenopausal women, according to Dr. Katavic.

Radiological Society of North America
http://tinyurl.com/hp7zk9l

Metamaterials boost sensitivity of MRI machines

A group of researchers from Russia, Australia and the Netherlands have developed a technology that can reduce Magnetic Resonance Imaging (MRI) scanning times by more than 50%, meaning hospitals can drastically increase the number of scans without changing equipment. This extraordinary leap in efficiency is achieved by placing a layer of metamaterials onto the bed of the scanner, which improves the signal-to-noise ratio. This patent-pending technology is currently being co-developed by MediWise, a UK-based company that specializes in commercializing metamaterials for medical applications.

Scientists from ITMO University, Australian National University, Ioffe Physical-Technical Institute, University Medical Center Utrecht and Institute of Experimental Medicine RAMS demonstrated that the quality of MRI images could be substantially increased with the aid of metamaterials - artificial periodic structures that can interact with electromagnetic radiation in an extraordinary fashion.

“This is the first real demonstration of the practical potential of metamaterials for MRI imaging enhancement and scanning time reduction. Our research may evolve into new healthcare applications and commercial products,” - says Yuri Kivshar, coauthor of the study, head of the Nonlinear Physics Centre at the Australian National University.

By placing a specially designed metamaterial under the studied object in an MRI scanner it is possible to increase the signal-to-noise ratio in the scanned area. The result of this increase is that either a higher resolution image can be obtained over the same time slot or faster examination can be performed with the same resolution as in an ordinary MRI scanner. In addition, the metamaterial suppresses the electric field, which is responsible for tissue heating - a phenomenon that may compromise the safety of the whole MRI procedure.

The problem of tissue heating has recently become even more relevant with the arrival of high-field and ultra-high-field MRI scanners in the medical practice. A drive for high-field MRI is mediated by the benefits of better image resolution. However, tissue heating becomes substantial at higher fields due to an increase of the radiofrequency energy absorption. Therefore, the issue of safety in high-field and ultra-high-field MRI scanners remains open.

The scientific group managed to entirely avoid tissue heating, at the same time preserving high resolution. The solution, in essence, does not require any intervention into the hardware of the MRI scanner, but rather represents an inexpensive functional add-on device that can be used with any existing MRI scanner.

“Our metamaterial can be embedded directly into the patient table of any commercially available MRI scanner. However, in the future we see even more potential in the concept of special smart clothing for MRI scanning,” says Alexey Slobozhanyuk, first author of the study and researcher at International Laboratory “Applied Radio-physics”, - “Stripes of our metamaterial can be sewn in the clothes. The examination of patients, wearing such clothes, would lead to higher resolution MRI images, while the special design will enable a homogeneous enhancement of the signal-to-noise ratio, which does not pose any risk to the patients’ health. As a result, with metamaterials you will be able to improve the characteristics of low-field MRI to the extent that their functionality is comparable to high-field MRI.”

ITMO University
http://tinyurl.com/jr4s25w
Leading hospital in Cyprus offers Digital Breast Tomosynthesis

YGIA Polyclinic’s Radiology Department has been operating for 27 years and its staff is actively involved in ongoing clinical research and training to ensure the best possible services to all patients. A year ago, it embarked on setting up a breast imaging unit equipped with state-of-the-art technology, culminating in the installation of the Hologic Selenia Dimensions DBT system. Dr. Annie Papoutsou, Head of the X-ray Department gives us the full picture.

How has your hospital expanded in recent years?
In 2007, after major renovations and an extension of its building facilities, the YGIA Polyclinic private hospital boosted its capacity to 152 beds, extended the number of operating theatres to 12, established and extended the capabilities of its Clinical Laboratory Department, Radiology Department (X-ray, Mammog, Fluoroscopy, MRI, CT, Ultrasound), produced a multi-dynamic Intensive Care Unit (ICU), Obstetrics & Gynecology, and Pediatrics Departments. Furthermore, from mid June 2012, a state-of-the-art Cardio-Vascular Catheterizations Centre was established at the hospital offering the only 24-hour acute percutaneous coronary intervention (PCI) service in Cyprus. Moreover, the hospital has a range of fully equipped ambulances working 24 hours in order to be able to best respond to emergencies.

What type of equipment is used by your department?
Most of our X-ray rooms use the latest DR digital detectors providing superior quality images almost instantly, and are linked to an enterprise-wide fully integrated RiS/PACS.
Last year we organized a breast imaging unit, equipped with the latest technology, FFDM Hologic Selenia Dimensions, a GE ultrasound with strain and shearwave elastography and a Hitachi ultrasound with high frequency linear probe.
In our department we performed more than 90,000 exams yearly.

What was the rationale for selecting the Hologic Selenia Dimensions system?
The decision was based on the special features offered by the Selenia Dimensions; these include:
- 2D imaging or combo mode (2D+3D) imaging in the same compression.
- Exceptionally sharp images with minimal dose.
- Streamlined workflow.
- Ergonomic design for comfort and ease of operation.
- We believe that it offers the best technology available.

What are the advantages of Digital Breast Tomosynthesis?
The use of Digital Breast Tomosynthesis in breast screening enables us to find more invasive cancers than conventional 2D mammography alone.
The masses, distortions and asymmetric densities are better visualized with the Selenia Dimension.
But also it can reduce the costs associated with unnecessary recalls and it can reduce the incidence of negative biopsies.

Has the number of exams been affected by the adoption of DBT?
Since the installation the number of mammography exams has increased up to 50%. The recalls rate has decreased and also additional views have decreased.

When did you decide to acquire the C-View software and what are the benefits?
C-View software was installed from the first day of the equipment installation, giving us the possibility of eliminating the need for conventional 2D exams after 6 months. The combined tomosynthesis and C-View exam makes lower patient radiation dose possible. Tomosynthesis exams with C-View software offer a patient dose similar to a 2D only exam with superior clinical performance for all breast types.

You are also using the Affirm biopsy device—what is the typical biopsy procedure followed in your department?
Up until now we are using the Affirm stereotactic biopsy device and in the next few days we are going to install the Affirm stereotactic tomosynthesis biopsy device to target lesions seen only with tomosynthesis. The typical biopsy procedures followed in our department are the biopsy under the stereotactic guidance and hookwire localization for subtle masses clusters of microlcalcifications and architecture distortion.

What do you see as the next step for improving the performance of your department?
Installing I-view with the contrast media. I-View is a contrast-enhanced mammography technique that may be a viable alternative to breast MRI in performing contrast agent breast imaging. It offers certain advantages over MRI, including reduced cost and shorter procedure times. The imaging combination of contrast-enhanced 2D imaging (CE2D) along with a 3D tomoscan, gives additional information beyond a CE2D examination alone, and may allow localization and morphologic evaluation of an enhancing lesion, further increasing the value of the CE2D procedure.
Imaging centre boosts patient care services in Sicily

With investments in two new, top-of-the-line DR solutions plus the innovative Portal, the imaging centre owned by Dr. Francesco Fiumara offers a higher level of healthcare service in Sicily, Italy.

Established in 1986, the Centro di Diagnostica per Immagini Dr. Francesco Fiumara is today recognized as the best diagnostic centre in the eastern region of Sicily, and is contributing to enhancing the level of healthcare services in the area. As a private clinic fully dedicated to diagnostic imaging, and accredited by the Italian National Healthcare System, it must offer first-rate services while controlling costs. Agfa HealthCare’s solutions have been key in helping the clinic achieve this goal.

Spread over two floors and 1,200 m² of a building in Santa Teresa di Riva, some 40 km from Messina, Sicily, the diagnostic imaging clinic carries out diagnostic imaging and medical examinations for about 150 patients every day. The clinic strives to offer patients high-quality services, delivered with competence and compassion. This is reflected in the extended 8 am to 8 pm opening hours, the team of 14 specialists in a total staff of 40, and the use of the most advanced imaging technologies: including digital radiography, mammography, CT, ultrasound and MRI.

The clinic was already a customer of Agfa HealthCare; based on this positive experience, in 2015 it installed the DX-D 800 and DX-D 300 direct radiography (DR) systems. These have supported the clinic to increase and improve its radiology services as well as to reduce patient radiation dose. The clinic also implemented Agfa HealthCare’s Portal solution, giving patients the ability to remotely access and share their own exams.

A broad range of high-quality, dedicated exams

The centre performs a broad range of digital exams. One of the four radiography rooms contains a DR system specifically for mammography, while another is used for dental radiography. The last two rooms house the two new Agfa HealthCare DR systems, used for skeletal imaging, and for digestive and urogenital imaging using contrast media.

The DX-D 300 is installed in the skeletal radiography room; its fully-motorized arm easily accommodates a number of configurations, making it ideal for orthopedic studies. The remote-controlled DX-D 800 can handle general radiography and fluoroscopy, and has a detachable, tethered detector for portable exposures. “We only needed one investment to handle a broad range of applications,” says Dr. Fiumara, owner of the centre. The system is used for functional examinations such as barium enemas and esophagus tests.

Increased efficiency and faster throughput

“Diagnostic radiography has become a strategic service for our clinic to offer. We began working with Agfa HealthCare on this project in 2009, installing the IMPAX RIS/PACS solution, which was continuously updated in the following years. With these tools, we could already increase the efficiency of our imaging workflow and archive all patient exams in our database.”

The centre was one of the first in Sicily to adopt digital radiology. “We installed our first Agfa HealthCare computed radiography (CR) system, the DX-S, in 2012,” says Dr. Fiumara. “Our CR solution was a big innovation in efficiency and quality compared to conventional radiography. The challenge was to keep up a high standard of image quality while simultaneously reducing examination time and - consequently - patient waiting times.”

Once the clinic had experienced the quality of Agfa HealthCare’s technology and support services, Dr. Fiumara was keen to continue this partnership. “Working with Agfa HealthCare makes us feel confident for the future.”

“We considered several aspects when we were looking at the Agfa HealthCare DR solutions,” confides Dr. Fiumara.
“Reducing exam time was a significant attraction, but so were the high resolution and the MUSICA image processing software. So we chose both the DX-D 300 and DX-D 800.”

“With these two DR solutions we have increased the number of exams we can perform every day, and at the same time we have enhanced our imaging reputation.”

The agreement with Agfa HealthCare includes full 24-hour service with a local engineer for any hardware problems and remote support for the software. “We have a single point of contact, so if something goes wrong I can directly speak to the technical contact and have an immediate solution,” continues Dr. Fiumara. Expertise in operations and workflow is another advantage; he says: “The specialized knowledge of the local technical and commercial Agfa HealthCare team is very valuable and helps us identify specific needs.”

Reducing patient dose

“As we learned more about dose reduction, we started to look for dose reduction potential in all our radiography systems. This became our strategic objective.”

The clinic’s four digital radiology systems and CT system all feature very low levels of radiation dose. “The I-Dose system in the CT device, for example, reduces dose by 60%. That’s the highest reduction we have reached so far with our devices.”

“Patients today are better informed and ask questions about patient dose. We are proud to offer not only an efficient and high-level radiology service, but also the safest in our area,” continues Dr. Fiumara.

A Portal to better patient care and satisfaction

To further expand its patient services, Dr. Fiumara implemented the Agfa HealthCare Portal solution, which gives patients access to information from different sources inside and outside the hospital. This overview of information and actions can help enhance operational efficiency while improving the overall patient experience. “Integrating the Portal with the RIS/PACS solution means patients can access their exams and get an online consultation, instead of needing to return to the clinic just for this. It also speeds up a therapy.”

Patients can look at their own images, results and other aggregated information; and can share them in a secure way with a caregiver or another doctor. By empowering and satisfying patients, the Portal will also support the clinic to increase patient loyalty and to attract new patients.

“With our Agfa HealthCare solutions, we can offer a higher-quality service to patients, with low downtime,” concludes Dr. Fiumara. “We have increased the number of exams we conduct, whilst reducing our costs. Our partnership with Agfa HealthCare puts us in a better position for further growth.”

“DX-D 800 is not available in the US and Canada

Med-e-Tel is the annual event of the International Society for Telemedicine & eHealth (ISfTeH), THE international federation of national associations who represent their country’s Telemedicine and eHealth stakeholders.

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More information at www.medetel.eu or contact info@medetel.eu.
Disaster medicine: French lessons in the age of terror

It is now clear that casualties after the November 2015 terror attacks in Paris were reduced by a superbly conceived and coordinated response. While 130 people died in the tragedy, another number deserves attention, too. As many as 302 people were wounded, several seriously. They were triaged, treated on site and then shifted to hospital. Of these, two died during transport and another two in the first 10 days after admission. In other words, the casualty rate in the aftermath of terror was less than 1.5%.

by Ashutosh Sheshabalaya and Antonio Bras Monteiro

Plan Blanc - a collaborative blueprint for disaster medicine

Much of the credit for such an achievement goes to France’s ‘Plan Blanc’ (White Plan), created to respond to disasters. In Paris, the White Plan was activated within an hour after the first incident, namely the bomb explosions at the Stade de France. It mobilized some 40 hospitals, 200 operating rooms, 22,000 beds and 100,000 health professionals. The White Plan is essentially a collaborative blueprint for disaster medicine. Although its conceptual roots go back several decades, November 2015 was the first time it was put to use. The White Plan effectively places the entire French hospital system on a war footing, with the ability to pool resources on demand. It establishes a lean/quick response command, control, communication and information system, mobilizing and synchronizing hospital/clinic bed and staff availability to anticipated victims, postponing chronic surgeries and interventions while readying operating rooms, and providing rolling plans for augmenting resources - both human and material. The White Plan also establishes a specialized unit for informing families and communicating with the media.

No surprise about French leadership

According to us, France is among the world’s best prepared countries to deal medically with the aftermath of a terrorist attack. This laurel should be no surprise, given that the concept of ‘disaster medicine’ (médecine de catastrophe) was developed in the 1980s by three French physicians - René Noto, Alain Larcan and Pierre Huguenard. The French Society of Disaster Medicine/Société Française de Médecine de Catastrophe (SFMC) was founded in 1983.

Emergency medicine versus disaster medicine

Both emergency medicine and disaster medicine deal with the kind of challenges seen in Paris: gunshot wounds, blast wounds caused by explosions with organ and tissue damage, contusion and embolisms, multiple penetrations, pulmonary damage, and last but not least, shock. The key difference between the two, however, involves the subject for medical attention. In emergency medicine, the subject is an individual patient, while disaster medicine deals with a group of patients. Disaster medicine begins on site and, given extreme constraints in human resources and equipment, is devoid of any element of personal medical care. It also uses specialized equipment, such as portable ultrasound and minimalistic lightweight stretchers, while first responders are trained to improvise - for instance, carrying patients by their arms and legs. All this was evident in Paris.

Specialized military medical practices

What also was seen in Paris was a full range of specialized techniques. Some of these are derived direct from military medicine - hemorrhage control with tourniquets, hypertensive resuscitation and hypothermia prevention. Another battlefield practice deployed in Paris (and debated subsequently by clinicians in many other countries) was to let the blood pressure of thoracic primary blast injury victims fall to levels which avoided exsanguination, but not below that required to maintain perfusion.

Anticipating frictions

Although considerable attention was paid to the White Plan, other Plans too rolled into place in the immediate aftermath of the first attack in Paris. Taken together, they highlight how potential conflicts on roles and responsibilities, jurisdiction etc. between different sets of professionals, in a period of extreme personal and systemic stress, had been anticipated, with interdisciplinary protocols already in place to minimize confusion between the police, the fire brigade, ambulance drivers, physicians and other hospital staff as well as the media and the public. The police, for example, provided perimeter security and crowd control, taking charge of clearing and organizing pathways to and from incident scenes. The fire brigade was responsible for victim search and extraction as well as certain types of emergency first aid. Though based in principle at field stations, doctors and nurses attended on site as and when required to the severely wounded, conducting triage and handing over patients for transport to ambulance drivers. On their part, specialist Red Cross teams had set up counselling services for victims and their families by midnight - in other words, within just 2-3 hours of the attacks.

The impact of such preparation cannot be under-estimated. In many cases, it allowed BRI special police forces to ignore pleas for help from victims, without disrupting their conscience or composure. Knowing that qualified medical professionals would shortly be taking responsibility for the wounded, the armed intervention teams instead concentrated on their job - to neutralize the terrorists.

All this, it must be underlined, was undertaken in the face of anticipated dislocations due to a strike by thousands of medical professionals protesting a health reform bill in the French Parliament on the very same day as the terrorist attacks. The strike was subsequently called off.

Other plans also implemented

The Alpha Red Plan is designed to deal with extreme emergencies at multiple sites. It sets up an ad-hoc, quick-operational
many federal initiatives, which leaves decentralization simply means far too

ter preparedness in the US complain that

Nevertheless, critics of hospital disas-

and is top-down and centralized.

systems. Th e US system is built around

point organization for overseeing a

pre-hospital system. Within an hour of

original parent, FEMA. One of the supra-

entities tasked with overseeing a disaster response is The National Response Frame-

work, a multi-agency initiative run by FEMA for the Department of Homeland Security.

As Beltway insiders know, the rivalry between Homeland Security and HSS is considerable.

In 2005, a then-confidential report pre-

pared for the Secretary of Homeland Security evaluated US disaster medical readiness. The 103-page report found that “the nation’s medical leadership works in isolation, its medical response capability is fragmented and ill-prepared to deal with a mass casualty event and … HHS lacks an adequate medical support capability for its field operating units.”

NDMS was specifically targeted, as lacking the medical leadership and oversight “to effectively develop, prepare for, employ, and sustain deployable medical assets,” relying on an overtaxed volunteer network and experiencing “critical shortfalls in doctrine, training, logistics support and coordina-
tion” with other emergency responders and federal agencies.

The US National Disaster Medical System

The point organization for overseeing a

US federal medical response to disaster is the National Disaster Medical System (NDMS). NDMS is staffed by more than 8,000 civilian volunteer medical personnel. It is tasked with supplementing medical professionals and equipment should local medical resources become overwhelmed. It also has the responsibility to move injured patients to areas unaffected by a disaster.

NDMS was originally under the Depart-

ment of Health and Human Services (HHS) but was moved as a result of the 9-11 terror attacks to the Federal Emergency Manage-

ment Agency (FEMA), which is part of the Department of Homeland Security.

After Hurricane Katrina in 2005, amidst allegations of mismanagement, NDMS was removed from FEMA and sent back to HHS, where it now remains parked within the Office of Preparedness and Emergency Operations (OPEO). OPEO is responsible for developing operational plans, analysis and training to respond to public health emergencies and acts of terror.

HHS versus Homeland Security: Turf wars and more

It is evident that there is room for consider-

able conflict between OPEO and NDMS’s original parent, FEMA. One of the supra-

entities tasked with overseeing a disaster response is The National Response Frame-

work, a multi-agency initiative run by FEMA for the Department of Homeland Security.

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tion” with other emergency responders and federal agencies.

ER capacity shortfalls in the US ‘truly alarming’

The impact of such inter-departmen-
tal rivalry and the seriousness of the

allegations drew the attention of a Con-
gressional Committee a few years later. The Committee chose a very specific target, namely emergency room (ER) capacity in cities considered to be at greatest risk of a terror attack.

Its findings, released in May 2008, were described as “truly alarming”. The hospi-
tals surveyed did not have “sufficient ER capacity to treat a sudden influx of victims from a terrorist bombing.” The situation in Washington DC and Los Angeles were described as being “particularly dire.”

Aside from capacity, the Congressional investigation also revealed what appeared to be “a complete breakdown in communications between the Department of Homeland Security and the Department of Health and Human Services.” When the Committee requested information on hospital emergency surge capacity, “neither department was able to produce a single document.”

In France, some ironies too

There are several lessons to be learned from the French response to the November 13 terror attacks. The most salutary one brims with irony.

The French ‘system’, in the Anglo-Saxon mind, is believed to be statist, bureaucratic, top-heavy and inflexible. The White Plan response in November was based largely on the Parisian APHP, Assistance Publique - Hôpitaux de Paris, Europe’s largest hospi-
tal system.

Many critics have questioned the concept of the APHP, particularly its enormous size, as “an obstacle to adaptation in a rapidly changing technological, medical, and social context.” However, the rapid response of the APHP after the Paris ter-
or attacks negates such criticism.

According to APHP Director General Martin Hirsch: “We sensed ... that the size, as “an obstacle to adaptation in a rapidly changing technological, medical, and social context.” However, the rapid response of the APHP after the Paris ter-
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or attacks negates such criticism.
The rise and rise of superbugs - are only industrialized countries to blame?

In April 2011, the World Health Organization (WHO) warned that indiscriminate use of antibiotics was giving rise to resistant ‘superbugs’ which could render the drugs useless. Three years later, it warned about the arrival of a ‘post-antibiotic era.’ In autumn 2014, US officials termed antibiotic resistance a threat to national security.

However, awareness of this challenge has been present for decades. In the early 1990s, ‘Newsweek’ dramatically highlighted the threat in a cover story titled ‘End of the Miracle Drugs.’ A few months later, ‘Time’ magazine followed up with a feature on the ‘Revenge of the Killer Microbes.’

Bug resistance too knows no frontiers

The Centers for Disease Control and Prevention (CDC) has estimated that resistant bacteria lead to 23,000 deaths in the US every year. In Europe, the ‘British Medical Journal’ has urged authorities to harmonize antibiotic prescribing practices in order to tackle resistance. In spite of little effect on patients’ recovery times, an EU-funded study called GRACE identified wide variations in antibiotic use. For coughs, for example, antibiotic prescribing by physicians ranged from 20% in some countries to 90% in others.

Nevertheless, according to a report in the ‘The New York Times’ at the end of 2014, efforts to crack down on “inappropriate antibiotic use in the United States and much of Europe have been successful,” with prescriptions dropping from 2000 to 2010. Such a drop has, however, been “more than offset” by growing use in the developing world, according to ‘The Times’. Indeed, like bugs themselves, drug-resistant bugs seem to know no frontiers.

Large emerging markets drive global drug sales

The ‘Times’ reports that sales of antibiotics for human consumption worldwide rose by 36% in the 2000-2010 period, with more than three-fourths of this increase accounted by the BRICS group of major emerging markets (Brazil, Russia, India, China and South Africa).

Such findings have been endorsed by an authoritative study, published in September 2015 by the Center for Disease Dynamics, Economics and Policy (CDDEP). The CDDEP report, which has drawn up a global Resistance Map for antibiotics, found sharp growth in resistant bacteria in developing countries, notwithstanding much lower per capita use of antibiotics.

India: highest risk case

The respected journal ‘New Scientist’ has recently also covered the CDDEP report, singling out culprits as countries with growing wealth - “especially India,”... “where more people are demanding antibiotics for minor infections.”

Indeed, the CDDEP highlights the case of E. coli in contaminated water or food, where India shows the world’s highest rates of resistance to nearly every available drug. Other problems in India include MRSA, where isolates have shown prevalence rising sharply, from 29% in 2009 to 47% in 2014 and Klebsiella pneumoniae, which can cause fatal lung infections. In 2014, 57 per cent of Klebsiella pneumoniae samples tested in India were resistant to carbapenems, an antibiotic used as a last resort. By comparison, the figure six years ago was virtually zero.

Resistant bacteria and infants

Antibiotic resistance has an especially dramatic impact on Indian infants. According to the ‘New York Times’ article in December 2014, bacterial infections resistant to most known antibiotics led to the death of more than 58,000 newborns in India compared to the previous year. The head of Sir Ganga Ram Hospital, one of India’s top medical facilities, stated that such infections were unheard of just five years previously. “Now, close to 100 percent of the babies referred to us have multi-drug resistant infections,” he lamented.

Ironically, due to high rates of infant mortality, the Indian government has been encouraging women, sometimes with financial incentives, to deliver babies in hospitals. The programme seems to have worked. Within a decade, the share of babies born in hospitals has more than doubled to over 80%.

However, the government has spent little to increase hospital capacity. As a result, maternity wards are overcrowded, sometimes with two or three women per bed. Apart from overcrowding, many hospitals are unhygienic. A UNICEF survey of 94 district hospitals and health centres in the Indian state of Rajasthan found 78% lacked soap at hand-washing sinks, while 67% of toilets were unsanitary.

The impact of bacterial resistance is, however, not just confined to newborns. Resistant bacteria cost the life of Uppalapu Shrinivas, one of India’s most famous musicians, at the age of 45.

Indeed, according to Dr. Timothy R. Walsh, a professor of microbiology at Cardiff University, India is creating a “tsunami of antibiotic resistance that is reaching just about every country in the world.”

NDM1: New Delhi’s global export

Researchers have already tracked superbugs with the so-called NDM1 (New Delhi metallo-beta lactamase 1) genetic code, first identified in India. NDM1 makes bacteria resistant to almost all antibiotics, including carbapenems - the drug of last resort.

The first report about NDM1 was published in ‘Lancet Infectious Diseases’ in April 2011, and made headlines due to the fact that this was the same time when the World Health Organization warned about superbugs.

The ‘Lancet’ study was sponsored by the EU and reported that NDM1 was found in about one fourth of water samples in New Delhi, the Indian capital. The authors speculated that, since many Americans and Europeans travelled to India and Pakistan for elective medical procedures, it was likely the superbug gene could eventually spread worldwide.

Since then, NDM1 has been found in Europe, the Middle East, Japan and the United States.
Meanwhile, back in India, what worries public health experts is “that the NDM 1 gene appears to have spread to germs that cause cholera and dysentery, two common and dangerous ailments in India.” In other words, it may be no exaggeration to say that the drug resistance problem is about to explode.

From toilet deficits to untreated sewage
The roots of the problem are complex. Bacteria spread relatively easily in India, since an estimated half of Indians defecate outdoors. Meanwhile, much of the sewage generated by the other half, who use toilets, is also left untreated. The result is expected: Indians have some of the world’s highest rates of bacterial infections - and resistance.

Cardiff University microbiologist Dr. Walsh says up to “95% of adults in India and Pakistan” carry bacteria that are resistant to ‘last-resort’ antibiotics such as carbapenems. By comparison, only 10% of adults in the Queens area of New York carry such bacteria.

The answer to no sanitation: use antibiotics, preventively
Ironically again, rather than building better infrastructure for sanitation, the response in India to growing bacterial infections has been to resort indiscriminately to antibiotics, which are often sold without a prescription. According to the December 2014 report in ‘The New York Times’, Indians collectively take more antibiotics than any other group of people.

Together, the lack of sanitation and overcrowding in hospitals may well have catalysed the superbugs. Doctors across India too have lent the crucial helping hand by responding to the hospital sanitation crisis through doling out antibiotics. In the Indian State of Haryana, for example, almost every baby born in hospitals in recent years has been injected with antibiotics - “whether they showed signs of illness or not,” Dr. Suresh Dalpat, deputy director of child health told ‘The New York Times’.

Completing the circle is the fact that the resistant bacteria, created by indiscriminate use of antibiotics, find their way into hospital sewage. As mentioned, much of this is untreated and dumped into canals and pits in nearby communities, leading to the infection of pregnant women, the delivery of ill infants - and more antibiotics.

A perfect storm
Although some Indian health experts believe drug-resistant bacteria to be largely confined to hospitals, some of India’s top epidemiologists suspect the bacteria have begun “thiving in communities and even pregnant women’s bodies.”

“India has a perfect storm,” says Dr. Ramanan Laxminarayan, author of the CDDEP report. “You put all the things together and it’s this gigantic petri dish of experimentation that is resulting in highly pathogenic strains.”

Nevertheless, rushing to blame India alone (or India and other developing nations) for the growing drug resistance may not be helpful, or entirely accurate. Carbapenemases like NDM-1 have also been discovered elsewhere. For example, Klebsiella pneumoniae carbapenemase (KPC), currently the most common carbapenemase, was detected in the US in 1996 and has since spread worldwide. In addition, enterobacteriaceae which produce KPC bapenemase, was detected in the US in 1996 and has since spread to other countries.

Drug industry in India adds to the problem
In India, nevertheless, yet another growing area of concern seems to be loose compliance with regulations by Indian manufacturers of antibiotics. In early 2011, ‘Scientific American’ reported high levels of antibiotic resistance in bacteria downstream from a waste-water treatment plant in the southern Indian State of Andhra Pradesh.

Citing findings by a Swedish-led research team, the article noted that drugs in the effluent water from the plant were “sometimes equivalent to the high doses that are given therapeutically.” The antibiotic-rich water originated from the plants of 90 bulk drug manufacturers in the region.

The next wave: animal antibiotics in India
The other area for attention does not concern human use of antibiotics. Their overuse in chicken, pig and cattle farms in the US has also provoked the growth of resistant strains. Research has not only shown that “as much as half of antibiotic prescriptions in the United States are unnecessary,” but also that an estimated 80 percent of antibiotic sales remain directed at animals.

In Europe, unlike the US, antibiotics for animal growth have been banned since 2006. However, their use in medicated feeds continues. This, in turn, fuels resistance to antibiotics, and not just through animals. One study in Poland discovered high levels of resistant bacteria in gardens, orchards and forest soils, largely due to manure from antibiotic-fed animals.

Unfortunately, India does not seem to be heeding such lessons. Its booming economy has led to rapid growth of industrialized animal husbandry, where antibiotic use is widespread. A science group in New Delhi found antibiotic residues in 40 percent of chicken samples.
Newborns in intensive care exposed to third-hand smoke residue

Despite hospitals operating a smoke-free policy, newborns in intensive care may still be exposed to third-hand smoke residue from their smoker parents, suggests a small study. The residue of second-hand smoke, referred to as third-hand smoke, is easily transported and deposited indoors, where it may take weeks or even months to degrade. It has been linked to cardiovascular and lung diseases in experimental research. The researchers wanted to find out if third-hand smoke residue would be detectable in a neonatal unit of a smoke-free hospital, and consequently, whether this type of exposure would be evident in the newborns being treated there. They therefore measured surface nicotine on the fingers of five mothers who smoked, and whose newborns had been admitted to neonatal intensive care at one hospital. The mothers, most of whom visited their babies daily, said they were light smokers, smoking fewer than 10 cigarettes a day. Surface nicotine was found on all of the mums’ fingers sampled. They also tested the surfaces of the babies’ incubators/cots and other furniture in the unit, such as chairs and couches. And they took urine samples from the five babies to check for the chemical by-products of nicotine. The analysis showed that nicotine was detectable on the surfaces of the incubators, cots, and other furniture tested. The quantities found on the incubator and cot surfaces were lower than those on the unit furniture, which were at levels comparable with residue detected in the homes of smokers, where indoor smoking is banned. In one case the unit furniture sample was at a level normally associated with smoking indoors. This discrepancy might be because of the tougher cleaning regimes for hospital cots and incubators, suggest the researchers. Detectable levels of several nicotine metabolites were also found in the babies’ urine samples, with the highest levels in one baby, who was still being breastfed. This is an observational study, so no firm conclusions about cause and effect can be drawn. And the researchers point out that some of the nicotine by-products found in the babies’ urine might have been accumulated while in the womb, as it is not clear how long it takes for these chemicals to clear a newborn’s system. The study is also small.

But the findings reiterate the pervasiveness of third-hand smoke, even in highly protected environments, they say. It is not known what the health consequences of this exposure might be, but given that premature newborns are so vulnerable, it may be harmful, say the researchers.

ScienceDaily / UTHHealth
http://tinyurl.com/gq3brdl

A better way to open an airway

With nearly 25 million intubations performed each year in the U.S., and at least 1 percent ending in failure, there is a pressing need for improved technology. So a team of Ohio State engineers began working with Dr. Hamdy Awad, an anesthesiologist at The Ohio State University Wexner Medical Center and associate professor in the College of Medicine.

A laryngoscope—invented in the late 19th century—or other intubation tools currently available require human visual guidance. According to Awad, medical professionals often are unable to see important parts of airway anatomy because of the presence of blood, vomit, swellings, and lesions.

“During intubation, it is critical to locate or identify the vocal cords so that the breathing tube passes between them into the trachea instead of into the esophagus,” he added.

Encouraged by common interest and motivated by a healthcare problem in need of a solution, Mechanical Engineering Professor Emeritus Bob Bailey and Dr. Awad formed an interdisciplinary team.

“Hamdy shared the difficulty he experiences in some of the intubations he performs,” Bailey recalled, “and I suggested that with machine vision and automatic controls being what they are today, it is not out of the question that a robotic device could more accurately perform intubations than a human.”

The team set out to develop a robot that would intubate patients with greater accuracy by using more than human vision as a guide, thereby reducing or eliminating the number of failures and other problems in airway management. An autonomous device also increases the likelihood that first responders and military personnel could intubate during medical emergencies.

Having just completed proof of concept testing, their robotic endoscopic device is propelled by an electric motor and controlled by a small computer. The device receives three-dimensional information about its anatomical location by means of a small speaker placed on the skin near the patient’s laryngeal prominence—Adam’s apple—emitting sound and magnetic waves detected by accelerometers and magnetic fields, respectively.

Ohio State University
http://tinyurl.com/jktdayp

Simple interventions significantly reduce CLABSI rates in NICU

Two simple interventions -- sterile tubing change in combination with hub scrub compliance -- can significantly reduce the rates of central line-associated bloodstream infection (CLABSI) in children’s hospital neonatal intensive care units (NICUs), according to a multi-centre improvement collaborative.

“The practices we identified that are associated with lower central line infections should be considered by clinicians in efforts to decrease central line infection rates,” said Dr. Anthony J. Piazza, from Emory School of Medicine, Atlanta, Georgia. “These central line care practices can be incorporated into daily patient care. Lowering central line infections can decrease health care costs and may be associated with fewer deaths, shorter hospital stays, and improved developmental outcomes.”

Dr. Piazza and colleagues from 17 centres participating in the Standardizing Line Care Under Guideline (SLUG Bug) collaborative used orchestrated testing to identify infection practices that contribute to reductions in infection rates.

The collaborative CLABSI rate decreased from a baseline rate of 1.333 to 1.076 per 1000 line-days, a 19.28% reduction, according to the study.

Among the 14 centres that had decreased CLABSI rates during the study period, sterile tubing changes decreased rates by an average of 0.51 and the addition of hub scrub compliance monitoring decreased rates by an average of 1.25 per 1000 line-days.

“We are excited to have identified specific infection prevention practices that helped achieve very low rates of infection,” Dr. Piazza said. “We are hopeful these findings can spread to other areas of the hospital that are still working on lowering infection rates.”

Medscape
http://tinyurl.com/hpbnysc
Understanding Global End-of-Life Care Practices: IHF 2014 Research Project

KATHLEEN VERMOCH
PROJECT MANAGER, QUALITY OPERATIONS
IMPACTFUL LEADER, PATIENT EXPERIENCE
UHE, USA

ABSTRACT: This first-of-its kind survey of global end-of-life (EOL) practices uncovered major differences in how EOL care is defined, delivered, and measured. According to respondents from university hospitals and cancer centers in 17 countries, the primary challenges to providing effective EOL care are communication between clinicians and patients/families, cultural beliefs about death, entrenched staff beliefs about prolonging life, and lack of funding. However, many organizations are implementing improvements in EOL services that support hospitalwide identification of patients for whom such services are appropriate, screening to avoid needless aggressive therapies, enhanced provider education, and ways to assess quality of life for terminally ill patients.

Comprendre les pratiques des soins de fin de vie dans le monde: Projet de recherche UHC 2014
La première enquête en son genre de pratiques mondiales de fin de vie a démontré les principales différences sur comment les soins de fin de vie sont définis, effectués et mesurés. Selon les personnes interrogées d'hôpitaux universitaires et de centres contre le cancer dans 17 pays, les principaux défis pour fournir des soins de fin de vie efficaces sont la communication entre les médecins et les patients et leurs familles, les croyances culturelles à propos de la mort, les croyances ancrées dans le personnel à propos du prolongement de la vie, et le manque de financement. Cependant, de nombreuses organisations sont en train de mettre en place des améliorations dans les services de fin de vie qui prennent en charge l'identification dans tout l'hôpital des patients pour lesquels de tels services sont appropriés, de dépister pour éviter des thérapies agressives inutiles, en améliorant la formation du personnel et des moyens pour évaluer la qualité de vie des patients en phase terminale.

Introduction of an Advance Care Planning Clinic in a Regional Care Coordination Service

BELINDA JONES
ADVANCED TRAINEE IN PUBLIC HEALTH AT
AUSTRALIAN CAPITAL TERRITORY HEALTH

WENDY APPLETON
CLINICAL CARE COORDINATOR WITH THE
CHRONIC CARE PROGRAM THE CANBERRA
HOSPITAL, AUSTRALIA

TONI HEAZLEWOOD
CLINICAL CARE COORDINATOR WITH THE
CHRONIC CARE PROGRAM THE CANBERRA
HOSPITAL, AUSTRALIA

JAN IRONSIDE
FORMER CLINICAL MANAGER OF THE CHRONIC
CARE PROGRAM THE CANBERRA HOSPITAL,
AUSTRALIA

PAUL DUGDALE
DIRECTOR OF CHRONIC DISEASE
MANAGEMENT AT CANBERRA
HOSPITAL AND HEALTH SERVICES,
AUSTRALIA
Overcoming the Obstacles in Promoting Hospice Palliative Care- Sharing Experiences of the Taiwan Changhua Christian Hospital

PEI-YU TSAI
CHIEF OF DEPARTMENT OF PALLIATIVE CARE,
CHANGHUA CHRISTIAN HOSPITAL,
TAIWAN, ROC

ABSTRACT: Hospice palliative care for terminal patients is necessary, yet challenges are on the way worldwide. This study demonstrated that hospice palliative care has been quickly developed in Taiwan due to the support of the National Health Insurance system, the promotion by civic societies and religious groups, patient's legal right for DNR, easier access to pain killers through medical prescription, and well-planned hospice staff training programs. This paper introduces how hospice consultation is provided by a comprehensive hospice palliative team at Changhua Christian Hospital to establish trust and cooperation with the medical team, and to improve hospice-palliative care referral and utilization rates.

Palliative Care and legislation around dying

THE BARONESS FINLAY OF LLANDAFF
HON. PROFESSOR OF PALLIATIVE MEDICINE.
CARDIFF UNIVERSITY AND LEAD PALLIATIVE CARE CLINICIAN, WALES, UK

HARRIET LANCASTER
PARLIAMENTARY RESEARCHER
FOR BARONESS FINLAY IN THE HOUSE OF LORDS, LONDON, UK

ABSTRACT: Around the world, forty million people a year need palliative care yet more than four in five of these have no access to basic analgesia with morphine. 6% of those dying with no pain relief are children. Those left behind carry with them the memory of the death and it can colour their future lives, making good palliative care an urgent public health issue around the world. Everyone providing healthcare needs care training in palliative care, including the fundamentals of pain and symptom relief. Governments must urgently address barriers to morphine availability and educators of health care professionals must eliminate myths and phobias, and teach good end of life care.

Soins palliatifs et législation relatifs à la mort

Partout dans le monde, quarante millions de personnes a un ont besoin de soins palliatifs, pourtant plus de quatre sur cinq d'eux n'ont pas accès à l'analgésie de base avec la morphine. 6% des personnes qui meurent sans soulagement de la douleur sont des enfants. Ceux qui restent portent avec eux la mémoire de la mort en faussant leurs vies futures et en faisant des bous soins palliatifs un problème urgent de santé publique dans le monde. Toutes les personnes prodiguant des soins de santé ont besoin d'une formation de base en soins palliatifs, comprenant les principes fondamentaux de la douleur et le soulagement.
Establishing Palliative Care across the AKDN
Health Services: Opportunities and Challenges

SALIM HASHAM
VICE PRESIDENT HEALTH SERVICES FOR AGA KHAN UNIVERSITY (AKU), PAKISTAN

SAMEENA SHAH
ASSISTANT PROFESSOR IN THE DEPARTMENT OF FAMILY MEDICINE AGA KHAN UNIVERSITY HOSPITAL, KARACHI, PAKISTAN

LAILA KHYMANI
SENIOR ADMINISTRATOR, OUTREACH SERVICES AGA KHAN UNIVERSITY HOSPITAL, KARACHI, PAKISTAN

DAVID MAKUMI
REGIONAL MANAGER - CANCER PROGRAM FOR THE AGA KHAN UNIVERSITY HOSPITAL, NAIROBI, KENYA

ZEENAT SULAIMAN KHAN
AGA KHAN HEALTH SERVICES EAST AFRICA REGIONAL DIRECTOR QUALITY AND NURSING - INVOLVED IN STRENGTHENING THE PALLIATIVE CARE PROGRAM IN THE EAST AFRICA REGION

ABSTRACT: AKDN has one of the most comprehensive private not-for-profit health care systems in the developing world. It has state-of-the-art urban academic tertiary care centers, service hospitals and community based primary care centers spread across the most remote areas of Central and South Asia and East Africa. In response to a global initiative to make palliative care widely available, the AKDN is spearheading the integration of palliative care across its international health network. The scope includes specialist palliative care services in urban tertiary care centers across secondary and outreach programs to home based palliative care services. The ultimate goal is to develop a comprehensive structure of palliative care services which, in addition to fulfilling the vision of quality, also fulfills the needs of the communities that it serves. This article describes the international undertaking: its challenges and the key contextual design principles of the implementation.

Établir des soins palliatifs à travers les services de santé de l'AKDN : Opportunités et défis
AKDN possède l'un des systèmes de soins de santé privée à but non lucratif le plus complet du monde en développement. Il définit la perfection des centres urbains de soins tertiaires universitaires, des services des hôpitaux et des centres de soins primaires communautaires répartis dans les zones les plus reculées des régions de l'Afrique centrale et orientale et de l'Asie du Sud. En réponse à une initiative mondiale visant à rendre les soins palliatifs largement disponibles, ce système de soins de santé est le fer de lance de l'intégration des soins palliatifs à travers son réseau de santé international. Le champ d'application comprend les services de soins palliatifs spécialisés dans les centres urbains de soins tertiaires ainsi que les programmes secondaires et de sensibilisation jusqu'aux services de soins palliatifs à domicile. Le but ultime est de développer une structure complète de services de soins palliatifs qui, en plus de la réalisation de la vision de la qualité, répond également aux besoins des collectivités qu'elle dessert. Cet article décrit cette entreprise internationale ; ses défis et ses clés contextuelles dessinent les principes de mise en œuvre.
Evolution of palliative care in the French Cancer Centers: Unicancer

Anne Fogliarini
Physician Pain and Palliative Care
Mobile Team DISSPO
Centre Antoine Lacassagne, Nice, France

Gérard Guesdon
Physician Responsible for the Palliative Care Mobile Team
Institut Bergonie, Bordeaux France

Gisèle Chvetzoff
Department of Support Care
Centre Léon Berard, Lyon, France

Ivan Krakowski
Medical Oncologist, Pain Physician
DISSPO Care Coordinator, Institut Bergonie, Bordeaux, France

ABSTRACT: The French Cancer Centers (FCC) have a threefold mission, care research and education. Their specificity is multidisciplinary and comprehensive patient support at all stages of cancer. Innovation and research are at the heart of FCC action, but the care of patients in the palliative phase is a major and long-term concern. In each center there is an autonomous or integrated structure of palliative care in a service or Interdisciplinary Department of Support Care for the Patient in Oncology. These include, besides the hospice activity, chronic pain, psychooncology, social support, nutrition, functional rehabilitation, etc. Furthermore, the FCC have, in accordance with a secondary regulatory text to National Plans for palliative care, identified beds of palliative care (IBPC) in oncology day hospitals and in palliative care. In 2006 a Unicancer-CC group was established. One of the group’s goals is to promote “early palliative care” together with other FCC teams. A common research dynamic has been implemented, ensuring the development of organizations and palliative culture. Evolution des soins palliatifs au sein des Centres de lutte contre le cancer (Unicancer)
Les Centres Régionaux de Lutte contre le Cancer (CRLCC) ont une triple mission de soins de recherche et d’enseignement. Leur spécificité est la multidisciplinarité et la prise en charge globale du patient, à tous les stades du cancer. L’innovation et la recherche sont au cœur de l’action des CRLCC, mais la prise en charge des patients en phase palliative est une préoccupation majeure et ancienne. Dans chaque Centre il existe une structure de soins palliatifs autonome ou intégrée dans un service ou un Département Interdisciplinaire de Soins de Support pour le Patient en Oncologie. Ces derniers regroupent, outre l’activité de soins palliatifs, celle de douleur chronique, psycho-oncologie, accompagnement social, nutrition, réadaptation fonctionnelle, etc. Les CRLCC ont aussi identifié, conformément aux Plans Nationaux de soins palliatifs, des lits identifiés de soins palliatifs (LISP) dans les services d’oncologie et des hôpitaux de jour en soins palliatifs. Il a été créé en 2006 un groupe Fédéral des CRLCC. Un des objectifs du groupe est de favoriser l’«early palliative care» en lien avec les autres équipes CRLCC. Une dynamique de recherche commune a été mise en place et veille à l’évolution des organisations et de la culture palliative.
Patient studies underway for CBCT

Carestream is expanding into new imaging modalities, including cone beam CT, and key advances were demonstrated at the recent British Orthopaedic Association (BOA) Annual Congress conference held in Liverpool, UK, where a conceptual scale model of cone beam CT was on display. Patient studies are helping to guide Carestream’s development of cone beam CT (CBCT) systems for orthopedic imaging at hospitals, clinics and sports medicine providers. Cone beam CT systems use less radiation than traditional CT; they are compact and affordable and can be used in a wide range of facilities. Carestream is exploring the benefits of CBCT technology for capturing images of patient extremities including weight-bearing images of knees, legs and feet, which are of particular interest to orthopedic and sports medicine specialists. (The CBCT system used in this study is investigational and not available for commercial sale).

“We are expanding our proven expertise in radiology with new systems and research aimed at addressing unmet needs in the orthopedic markets,” said Jianqing Bennett, President, Digital Medical Solutions, Carestream. “Our development staff is working with clinical experts and leading healthcare providers to develop new features and functionality that enhance patient imaging in these areas.”

Yeovil District Hospital, UK, adds ceiling suspended X-ray room to existing Agfa HealthCare DR solutions

Yeovil District Hospital has chosen to replace an existing third-party X-ray unit with Agfa HealthCare’s DR 600 X-ray room offering full automation, auto-positioning and auto-tracking. The hospital chose this top-performance solution based on its successful experience with Agfa HealthCare’s direct radiography (DR) Retrofit solutions, which include MUSICA image processing. The DR 600 offers faster patient turnaround and enhanced image quality, plus potential dose reduction. With its high-productivity, innovative features and ZeroForce Technology offering high speed, precision and comfort, the fully automated DR 600 streamlines workflow, increases throughput and enhances the experience of patients and operators alike, even in the busiest imaging environment. Robotization, in combination with the pre-programmed MUSICA workstation exam tree, the automated MUSICA image processing, and seamless integration with RIS and PACS offer a complete and integrated solution that maximizes productivity, versatility and ease of use.

The conhIT AppCircus goes in search of the best health app

This event, part of the internationally recognized AppCircus series, will be taking place for the second time, and is regarded as the world’s biggest competition for mHealth apps. Taking part gives companies and mHealth app developers an opportunity to present their products to an outstanding audience and to increase awareness of their companies in the Health IT sector. At conhIT 2016 more than 7,500 visitors and some 400 exhibitors are expected to attend. The competition will be looking for an app that assists the daily work of medical professionals, nurses and patients and can be used in Europe in hospitals, rehab centres, care homes and general patient care. The award ceremony will take place on 20 April 2016 in the mobile health zone at conhIT. This section of the exhibition focuses on innovations and trends in mobile health applications. The winner of the conhIT AppCircus competition will be nominated for the Mobile Premier Awards, the world’s biggest app exhibition at the Mobile World Congress in Barcelona.
O₂ BLENDER™ is mainly intended for pediatric and neonatology low flow applications.

TECHNOLOGIE MEDICALE

Advanced technology ultrasound imaging system

The Esaote MyLabSix CrystaLine ultrasound system offers exceptional image quality for confident diagnosis in a compact design. CrystaLine top level image technology is now embedded in a solid system with an exceptional attention to ergonomics and ease of use. CrystaLine superior technical capabilities enable high quality images to be captured at greater depth in the body for difficult-to-scan patients. High frequency imaging, advanced hemodynamic evaluation tools such as XFlow and HD CFM, as well as a complete large probe portfolio offer solutions ranging from abdomen to vascular, including musculoskeletal, cardiology, obstetrics and gynecology. Esaote’s attention to prevent work-related musculoskeletal disorders is exemplified by the design award-winning appleprobe transducers, as well as by the ergonomic design of the system and the adjustable positioning of the control panel. Touch screen-based operation is offered by the eTouch fully automated workflow which features customizable protocol user interfaces that are readily understandable and intuitive commands enabling comfortable and easy operation of the system in any scanning condition.

ESAO T E

Ultrasound for regional anesthesia

Developed specifically for anesthesiologists, the completely new EXAPAD scanner brings on an innovative way to adjust the parameters of the scanner when using it for nerve blocks. The special features EchoTouch, EchoVoice and EchoPad are all developed by ECM’s R&D team in close collaboration with well-known anesthesia specialists in order to make the EXAPAD the ideal working tool for regional anesthesia. The scanner provides unequaled precision of image quality, free hands for the needle placement and control of the scanner even in a sterile environment. Together with easy disinfection and cleaning, EXAPAD answers all the needs of the most demanding anesthesiologist for a scanner dedicated to ultrasound-guided regional anesthesia.

E C M

The BLENDER™ is a medical device used to provide a mix of O₂ and medical air to the patient (FiO₂). It is intended to adjust the concentration of oxygen (from 21 to 100 %) in medical air. It is provided with two outlets to connect a 15 or 30 l/min flowmeter and a 1.5,5 or 15 l/min flowmeter. It is connected to source of pressurized gas on the wall or to pressure regulators’ quick-release connectors using two hosepipes medical air and medical oxygen, respectively. It is connected to source of pressurized gas on the wall or to pressure regulators’ quick-release connectors using two hosepipes medical air and medical oxygen, respectively. It is intended to provide a mix of O₂ and medical air to the patient (FiO₂) in the range of 21 to 100 %. It is intended to be connected to source of pressurized gas on the wall or to pressure regulators’ quick-release connectors using two hosepipes medical air and medical oxygen, respectively. It is intended to provide a mix of O₂ and medical air to the patient (FiO₂) in the range of 21 to 100 %.

NewLife Eco-Pro is a new line of premium, eco-friendly and ergonomic commercial anti-fatigue floor mats designed specifically to benefit a workforce that stands. NewLife Eco-Pro is the industry’s first integral skin polyurethane mat made with Bio-Foam, a plant-based renewable resource. According to new research, the use of NewLife Eco-Pro mats can positively impact the health of people who stand for long periods. Texas A&M University’s System Health Science Center, conducted an independent research study that evaluated the ergonomics of industrial anti-fatigue floor mats. The study concluded that NewLife Eco-Pro is superior at reducing spinal compression and maintaining flexibility in workers who spend time standing as compared to traditional anti-fatigue mats. NewLife Eco-Pro mats not only provide much needed relief to employees who stand, but their use can reduce injury and time away from work while minimizing employer’s exposure to health-related claims. NewLife Eco-Pro mats maintain their quality and appearance, and won’t become a tripping hazard, disintegrate or develop an undesirable smell, all of which are typical issues with traditional commercial anti-fatigue mats. The mats also have anti-microbial properties and will not absorb water. At three quarters of an inch thick, New Life Eco-Pro mats are puncture- and stain-resistant, and maintain resilience and optimal comfort over time. Certified by the National Floor Safety Institute (NFSI) for its high-traction bottom surface, NewLife ensures the highest level of slip resistance compared to other mats currently on the market.

GELPRO

Medical gas blender

The Affirm prone biopsy system is the first dedicated prone biopsy system capable of both stereotactic and tomosynthesis-guided breast biopsies. It is CE marked and pending 510k clearance in the U.S. The new system complements Hologic’s Selenia Dimensions mammography system and Affirm upright biopsy system to ensure that facilities have all the options necessary to provide minimally invasive breast biopsy to their patients. The Affirm prone system provides enhanced biopsy performance over existing prone systems with exceptional biopsy imaging capabilities using the same detector technology as the Hologic tomosynthesis mammography system; a streamlined workflow designed to make the system fast and easy to use; access to challenging lesion locations with a fully integrated C-arm. The C-arm allows a full 360° access to the breast with both standard and lateral needle approaches—without requiring additional accessory attachments.

HOLOGIC

ECR 2016 Expo X5, 9

Anti-fatigue floor mat

NewLife Eco-Pro is a new line of premium, eco-friendly and ergonomic commercial anti-fatigue floor mats designed specifically to benefit a workforce that stands. NewLife Eco-Pro is the industry’s first integral skin polyurethane mat made with Bio-Foam, a plant-based renewable resource. According to new research, the use of NewLife Eco-Pro mats can positively impact the health of people who stand for long periods. Texas A&M University’s System Health Science Center, conducted an independent research study that evaluated the ergonomics of industrial anti-fatigue floor mats. The study concluded that NewLife Eco-Pro is superior at reducing spinal compression and maintaining flexibility in workers who spend time standing as compared to traditional anti-fatigue mats. NewLife Eco-Pro mats not only provide much needed relief to employees who stand, but their use can reduce injury and time away from work while minimizing employer’s exposure to health-related claims. NewLife Eco-Pro mats maintain their quality and appearance, and won’t become a tripping hazard, disintegrate or develop an undesirable smell, all of which are typical issues with traditional commercial anti-fatigue mats. The mats also have anti-microbial properties and will not absorb water. At three quarters of an inch thick, New Life Eco-Pro mats are puncture- and stain-resistant, and maintain resilience and optimal comfort over time. Certified by the National Floor Safety Institute (NFSI) for its high-traction bottom surface, NewLife ensures the highest level of slip resistance compared to other mats currently on the market.

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GELPRO
Electrosurgical testing device

The QA-ES III Electrosurgical Analyzer helps ensure the functionality and safety of today's modern, high-power electrosurgical units (ESU). Its user-friendly interface guides the user through test sequences, making it quick to collect all measurements, including vessel sealing, contact quality monitor (CQM), high frequency (HF) leakage, and output power distribution (single or continuous mode). Along with providing output power accuracy as low as +/-5% and built-in automation for easily performing power distribution tests, the QA-ES III offers intuitive, intelligent connectivity. Up to 5,000 records can be stored on-board, and then conveniently transferred to a PC wirelessly or via USB. Its Ansur test automation software makes it possible to create and automatically run tests, capture data, and produce reports. The QA-ES III complies with all global standards, including ANSI/AAMI and IEC.

MINDRAY
ECR 2016 Expo X3, 203
i www.ihe-online.com & search 47014

Ultrasound systems feature advanced capabilities

The Carestream Touch Prime and Touch Prime XE ultrasound systems are intended for general diagnostic ultrasound imaging within radiology. They incorporate a powerful, integrated GPU processor that provides exceptional image quality and fast response times, whilst also improving usability and productivity. Carestream Touch Prime XE is the company’s flagship ultrasound product, using the groundbreaking Touch Prime Syntek architecture to provide enhanced resolution and increase the number of images to better show moving structures whilst optimizing image output with less noise and fewer artifacts. Carestream Touch Prime XE also has the capacity to achieve frame rates of over 100Hz whilst maintaining image quality and functionality, as DICOM, wireless connectivity, barcode and card readers and elastography can all be selected within the system. Both ultrasound systems have a sealed all-touch control panel that combines the speed and flexibility of a touch screen with the tactile feel of a traditional keyboard. Etched markings for the main keys allow the user to easily find them without looking away from the monitor.

CARESTREAM
ECR 2016 Expo X3, 210
i www.ihe-online.com & search 47012

Emergency monitor/defibrillator

Thanks to the new software environment Touch’n Save, this compact device offers un matched functionality and intuitive, intelligent connectivity. The DEFIGARD Touch7 has been developed so that it can also be used in extreme conditions. It is suitable for all land and water interventions. Thanks to its lightweight structure, it also offers new possibilities for air rescue operations. Its low weight – three to four times less than that of competing products – ensures significant fuel saving when used on an airplane or helicopter. With its mounting bracket that also serves as battery charger, the DEFIGARD Touch7 is resistant to shocks and vibrations, thus complying with land and air rescue operation standards. The device can perform high-speed data transmissions whenever needed. Depending on the location, transmission can be performed using Wi-Fi or 3G. The safety standard WPA2 Enterprise guarantees comprehensive data protection. The DEFIGARD Touch7 is ready to be used at any time, thanks to regularly performed self-tests and to a RFID transponder that monitors the defibrillation electrodes’ expiry date. Most frequently demanded functions include ECG monitoring and 12-lead ECG diagnostics; SpO$_2$, SpCO, SpMet; non invasive blood pressure measurements and temperature.

SCHILLER
ECR 2016 Expo X2, 318
i www.ihe-online.com & search 47009

Mobile X-ray system

The fully motorized MobiEye 700 is suitable for any complex diagnostic environment. Mindray’s innovative dual-mode power management technology, mega-capacitors circuit and superior-capacity battery enable the MobiEye 700 to overcome the power limitations of conventional mobile radiology devices. The dual-mode power management utilizes power extraction from the long-life battery and wall current for all functions. The rapid-charging function delivers up to 80% battery capacity after 2hr charging while enabling 20 times exposure after only 5 minute charging. Mega-capacitors technology regulates the strength of the current and reduces the burden on the battery while extending the battery lifespan. Attention to details is one of the most significant aspects to ensure a highly efficient workflow and comfortable operation for technicians. A number of innovative and humanized features have been incorporated into the MobiEye 700. The anti-collision design combines 270° implanted sensors for emergency stop and double ultrasound sensors for motion buffering. Detector security is ensured by a detector lock on the control panel. A LED indicator displays the exposure and operational status. Both auto and manual motion modes are available, with the manual mode ensuring the device is fully usable in emergency situations. To help mobility, a specially designed bionic manipulator and multiple control mode bring definite advantages in terms of motion and positioning. The enhanced mobility includes 12° slope-climbing, 360° rotation with one-hand operation and intelligent speed regulation. The bionic manipulator offers an optimized bionic design while the multiple control mode features an ergonomically designed handle and a RF remote control for advanced movement. The unit measures only 47cm in width and weighs 370 kg. Mindray’s lightweight (3.3 kg) MPX wireless detector is liquid and dust resistant and is available with optional gird for maximum flexibility. The Mind-Home concept ensures automatic detector charging as well as detector security and protection. 5G wireless detector conjugation is possible by means of innovative antenna technology for 5G WIFI connection and allows ultra-high speed data acquisition and transmission.
Mid-range ultrasound systems with intuitive interface

The Acuson NX3 and Acuson NX3 Elite offer a simple, intuitive interface combined with innovative imaging solutions for examinations primarily in general medicine, obstetrics/gynecology, pediatrics and neurology. The customizable control panel and touch screen combined with Siemens innovative workflow innovations make it possible to perform certain routine anatomical measurements up to 76 percent faster than traditional solutions. The Acuson NX3 systems are equipped with a LED monitor (21.5") and a touch screen (10.4") which are among the largest in their class. To make daily routine examinations easier, the Acuson NX3 systems feature advanced ultrasound innovations, including Clarify vascular enhancement technology which provides multiple levels of clarification to optimize tissue contrast resolution and definition of both tissue and vessel walls. Higher image resolution is enabled with the 16 MHz transducer, which is especially suitable for breast and musculoskeletal imaging.

SIEMENS HEALTHCARE

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www.ihe-online.com & search 46981
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You, at the heart of transition

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Weight-bearing 3D exams can get your patients back OnTrack.

A world leader in diagnostic imaging is planning a revolution in Cone Beam CT.

The CARESTREAM OnSight 3D Extremity System is being designed to be OnTarget with your needs – planned capabilities include weight-bearing extremity exams, easy patient access and superb 2D and 3D images. And, OnSight is projected to keep you OnBudget, with a price that’s truly affordable. So get ready – we’re designing OnSight to set a new pace for CBCT imaging.

OnTrack. OnTarget. OnBudget.