Science and Clinical Potpourri for Your Life and Your Practice

Color to an X-ray Image Coming Your Way?

The boring old black-and-white x-ray images may become a thing of the past. After 10 years spent in development, a company has unveiled the first-ever color x-ray scanner. The device offers physicians an unprecedented tool to peer into the bodies of patients, with potential applications ranging from research to diagnostics.

The three-dimensional image taken by the scanner is modified and colorized using Medipix technology to estimate the colors of the tissues seen in the image, a technology that originated at CERN, the European Organization for Nuclear Research. The very same technology (Medipix) used by the CERN scientists to detect subatomic particles now has been brought to the patient’s bedside. Traditional radiography devices record whether these waves pass through bone or soft tissue, whereas MARS Bioimaging’s device records the intensity of the outcoming radiation. With the use of sophisticated software, color coding is added that represents the internal structures, such as muscle and bone, as we know them to look.

Besides being just cool, if not amazing to look at, what is the benefit of this advancement? It appears that a much-improved resolution (more detailed image) is produced as well as the ability to identify tissues and the bones in the image. The extremely small pixels and accurate energy resolution mean that this new imaging tool is reportedly able to obtain images that no other imaging tool can achieve.

Testing the scanner in clinical trials in orthopedic and rheumatologic patients will begin in New Zealand. Given the success of earlier trials in patients with cancer, bone and joint diseases, and vascular disease, regulatory agencies may approve the device for more widespread use. Stay tuned!

The Passing of Koko

Prince, Madonna, Bono, Drake—to be known by just one name speaks of a certain degree of celebrity. To that list we can add Koko, arguably the most well-known ape in the world. Koko, a nearly 300-lb western lowland gorilla, mastered sign language. Her training began when she was about 1 year old, and she reached a “vocabulary” of about 1,000 different signs. Her ability to express emotions (such as indicating “sadness” when she was informed of the death of actor/comedian Robin Williams in 2014) was legendary.

Koko was a National Geographic cover subject in 1978. Her influence extended into many domains of life, changing in the minds of many the way we viewed our relationship with animals and the manner in which they should be respected.

Koko passed away June 19, 2018, at the seasoned age of 46 years. Her impact, well beyond her own species, will be greatly missed.

Acetaminophen: Oral or IV, Does It Matter?


The use of acetaminophen in our anesthetic care has assumed a greater role for many reasons: the opioid epidemic, Enhanced Recovery After Surgery (ERAS) protocols, avoiding the adverse effects of opioid painkillers, the upsurge in multimodal pain strategies, and so on. A recent randomized controlled trial examined the intervention of 1 g of acetaminophen given orally 80 minutes before surgery vs the same dose given intravenously (IV) 20 minutes after the start of surgery.

Nearly 500 patients were studied who underwent major hip or knee arthroplasty. The primary outcomes were morphine requirements and pain scores in the first 24 hours postoperatively. The researchers found no difference between the groups in these primary outcomes or in the secondary outcomes of time to first pain medication administered, time to ambulate, postoperative nausea and vomiting, or length of stay in either the postanesthesia care unit (PACU) or hospital.

Although likely not a popular finding for the manufacturers of IV acetaminophen, the study result strongly endorses a growing body of literature that a well-timed dose administration of oral acetaminophen can save money and reduce workload logistics that may be
associated with the use of IV acetaminophen in certain cases.

**Inefficiency in Accessing Clinical and Research Information**

Some 10 million academic researchers worldwide are working every day to expand what we know about the world we live in and beyond. Naturally, they have access to the best available tools to avail themselves of relevant research and information to aid in their quest. Well, actually, not really!

Consider the last time you engaged in a research journey. Perhaps you sought to learn more about a new drug; review the latest on managing a particular kind of surgical/anesthetic case; or search for the best evidence related to investments, nutrition, or whatever your interest. Generally, such a process begins with an online search of relevant literature, often by consulting many different articles or sources, and if you are one of those 10 million academicians, also analyzing the data and formulating a hypothesis to test. This can be extremely time-consuming and tedious. Recent research suggests that it takes 15 clicks on average, multiple logins into different data sources, encountering dead links, and waiting on endless rejections or redirects.

The reality is that the scale of this problem is enormous, with those 10 million researchers around the world accessing 2.5 billion journal sites every year. The time wasted trying to access the websites is an example of inefficiency at the highest level, and many who are knowledgeable about this problem are concerned that it thwarts progress on the development and dissemination of new knowledge.

The high cost and inconvenience associated with accessing research work has given rise to unauthorized alternatives, in the form of a “dark web” of crowdsourced journal articles. Sci-Hub is one example of such an alternative platform, as it is the world’s largest pirate website for scholarly literature; it has been accused of using phishing to attract researchers to share their work on the site.

Many academicians are developing new platforms for accessing and disseminating knowledge. Frustrated by the slow pace of the formal publishing process in biology, some scientists have created the bioRxiv service, which is a free archive and distribution platform created to make information relevant to biological research immediately available, even before peer review. This posting of preprints allows scientists to comment and provide feedback even before format publication.

It will be interesting to see how this pans out in other disciplines. The bottom line is getting the best information available to those in need of it without having to resort to outdated or illegal platforms. We are in a world dominated by digital technology, and access to the latest information is increasingly valued by consumers of all kinds.

**Typhoid Fever: A Dangerous, Drug-Resistant Resurgence**

*mBio*, February 20, 2018.

An antibiotic-resistant strain of bacteria responsible for typhoid fever is gaining traction in Pakistan, with experts predicting that it could move treatment back nearly a century, to a time when surviving typhoid was more a matter of luck than medical intervention. In a single, recent 6-month period, more than 2,000 Pakistanis have been infected with *Salmonella typhi*, according to the National Institute of Health in Islamabad, Pakistan. Only azithromycin works against the strain, and the other options—expensive IV drugs—are impractical for widespread use in Pakistan and other low-income nations. There are grave concerns that the disease will soon spill into other countries.

Typhoid is spread through water and food contaminated with *S. typhi*. Symptoms include greatly elevated fever, headaches, and stomach pain. Left untreated, typhoid fever may lead to intestinal hemorrhage and perforation of the bowel, and it kills up to 15% of infected people. More than 200,000 people die annually despite the availability of effective antibiotics against strains of the bacterium different from the drug-resistant form of *S. typhi*.

Pakistan is experiencing the world’s first outbreak of a drug-resistant *S. typhi* strain, reporting hundreds of cases that were mainly in the area east of Karachi. This strain is “really quite frightening,” according to a quotation from Myron Levine, MD, DTPH, a vaccine developer at the University of Maryland School of Medicine in Baltimore.

Pakistan began a vaccination campaign in February using a recently approved formulation that, for the first time, works in young children and triggers longer-lasting immunity than did older versions. The Bill & Melinda Gates Foundation in Seattle is funding the campaign, which aims to administer 200,000 doses of the new vaccine. Additionally, Gavi, the Vaccine Alliance, a nonprofit based in Geneva, Switzerland, agreed to purchase 10 million additional doses for Pakistan.

The inappropriate use of antibiotics is probably only a portion of the cause of *S. typhi*’s extensive drug resistance. Here it appears the resistant strain emerged because an existing *S. typhi* strain that was resistant to multiple drugs—probably because of antibiotic overuse—obtained a resistance gene from a plasmid (a circular piece of DNA) likely transferred from *Escherichia coli*, a bacterium common in human waste and polluted waterways.