



SEP 2007

A Fast Read on the Latest in Lab Automation

Enlightenment From The Lab Man

The Return of RFID?

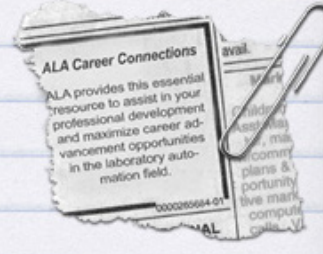
Radio Frequency ID made a brief appearance in the laboratory a decade ago. Will it make a lab comeback via improved technology and dramatically lowered cost as it is doing in the shipping and retail industry? The Lab Man talked to Rick Pestian of the RFID Solutions Center to find out.

[Podcast](#); [Blog](#).



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LabAutomation 2008

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ALA News

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[First ALA Spotlight Series Workshop Set for September 20 in San Diego](#)

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[LabAutomation2008 Early Bird Registration Deadline September 30](#)

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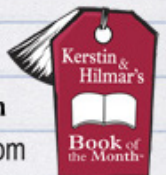
Not-So-Secret-for-Success Sweepstakes: Three Members Win the I-Robot

Congratulations to Tracy Erkkila, Prolexys Pharmaceuticals; Henry Couture, Proteodyne Corporation; and Layne Williams, University of Utah, winners of ALA's Not-So-Secret-for-Success Sweepstakes. All three will receive an iRobot Programmable Robot.



What's so funny? [Click here](#) for this month's *The New Yorker* cartoon.

Kerstin & Hilmar's Book of the Month



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? Query of the Month ?

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Do You Compute?

Drug Discovery & Development (09/07/07) Hovde, Mark ; Weiner, Dan ; Marier, Jean-Francois

Scientists who conduct pharmacokinetics (PK) and pharmacodynamics (PD) work are facing rising demand for their services, with drug companies conducting PK/PD evaluations at earlier stages of clinical development and the U.S. Food and Drug Administration (FDA) Critical Path Initiative urging greater use of PK/PD modeling. Companies are increasingly relying on technology to enhance productivity and maximize limited talent resources. After an analytic assay of a drug takes place, specific concentration values are consolidated with sample time collections, and the pharmacokineticist conducts PK/PD assessment and reporting. The creation of clinical study reports needs to be done in a "regulatory compliant" way that encompasses audit trails, electronic signatures, and other procedures to make sure the final assessment and reporting conform to FDA 21 CFR Part 11 rules. The complete protocol should ensure that a design is created that supercedes a wide range of assumptions about PK/PD factors and additional trial factors. The preferred model-building tool is currently NONMEM, which involves DOS and FORTRAN commands and requires additional software. Once a regulatory PK assessment is created, it needs to be pushed through another tool, such as a word processor or presentation software, and subsequently logged into a repository such as Documentum. Prior to submitting regulatory documents, it is essential to check them against time-concentration data sets, and connectors may be required to incorporate a data capture system for the case record form into the PK data repository.

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The Business Value of Virtual Lab Automation

IT Business Edge (09/05/07) Pisello, Tom

Alinean estimates that virtual lab automation can improve net usage of lab systems by more than half and deliver an average 60 percent to 95 percent reduction in the number of systems required, according to Alinean founder and CEO Tom Pisello. A virtualized infrastructure gives an organization the power to establish a centralized pool of resources shared across software development and test teams, supporting the reduction of the number of systems needed to satisfy testing and development lab requirements and lowering annual support and maintenance contracts, along with facilities and space costs, and administrative and support overhead. Intelligent virtual lab automation eases the activation or deactivation of virtual machines on an as-needed basis, shrinking the total amount that are "live" and taking up system space at any given time. Another advantage is the creation of a shared storage library in which users can check out fully provisioned systems "on demand," reducing provisioning task time by at least 90 percent and lowering the tasks and person hours needed for system reconfiguration. Pisello writes that that a virtual lab environment gives a team the ability to suspend and capture "live" multi-machine configurations to a shared library, facilitating the reliable capture, reproduction, and sharing of bugs across the team so that troubleshooting time can be significantly reduced. A 50 percent or more improvement in quality can be effected through virtual lab automation via its ability to enable automated provisioning and speedy replication of software defects, while development lifecycles could be lowered by 10 percent to 15 percent on average, with a reduction in provisioning/reproduction and support time through the improvement of the application development group's time to market responsiveness.

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Microrobots Made From Heart Muscles

ZDNet (09/02/07) Piquepaille, Roland

At Seoul National University's Nano/Micro System Laboratory, Sukho Park and his colleagues created microrobots from a rat's heart muscle tissue, which wraps around polydimethylsiloxane skeletons. The robots have three short legs, about 400 micrometers long, and three long legs in the back, about 1,200 micrometers long. Researchers indicate the use of a molding aligner to situate biocompatible and elastic material into three strips, resembling a backbone, coupled with cardiomyocytes along the backbone enables the microrobot to walk for up to 10 days without stopping, reaching a distance of 50 m in a week. Scientists expect the microrobot to be useful in reducing or eliminating blockage in ducts or vessels through the human body.

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Bursting With Possibilities

R&D (09/07) Livingstone, Paul

Scientists looking beyond the movement of fluids via microscopic pumps and actuators are researching laser-controlled microfluidic systems. However, State University of New York-Stony Brook associate professor Jon Longtin says the development of such systems could be complicated by the fact that high laser intensities alter saturable absorption and that classical models do not accurately predict how liquids actually behave. Longtin notes that "from a microscopic point of view, liquids are surprisingly not understood." However, European researchers have discovered how to speed up fluids in microchannels via photonic energy, and another research team was able to move liquids via radiation pressure. In the latter study, the liquid was a quaternary mixture comprising toluene, water, and a surfactant. Researchers often need to create specialized liquids rather than simply use water, as it is hard to control water using a laser due to such factors as high surface tension.

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An Early Example of Nanotechnology's Convergence with Other Technologies

Nanowerk.com (08/31/2007) Berger, Michael

University of Toronto researchers led by Dr. Warren Chan have developed a medical device that fuses nanotechnology, microtechnology, microfluidics, photonics, signal processing, and proteomics into a methodology that could lead to rapid, portable point-of-care diagnostics for infectious diseases such as SARS and HIV. Chan reports that "with this device we can detect HIV and hepatitis B and C with greater sensitivity than conventional FDA-approved methods." The detection system is comprised of quantum dots (QdotBs) conjugated to targeting molecules to deliver selectivity and multiplexing capabilities; electrokinetically propelled microfluidics that facilitate sequential, high-throughput readout of single barcodes with no moving parts and the potential for portability; photon counting detection systems that effect flowing barcode readout in real time; and signal processing to enable deconvolution of QdotB optical signals. The team says the detection results represented an improvement over those for enzyme-linked immunosorbent assay (ELISA) kits, and that the platform could be adapted to screen for biomarkers for cancer, heart disease, and other non-infectious ailments. The scientists intend to refine the fabrication and development of each device component with an eye toward commercialization. "A major challenge in the medical field lies in the ability to diagnose any kind of infection fast, locally and accurately," explains Chan. "This unmet need is what motivates our work."

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Nanotechnology Fights E. Coli

ScienceDaily (08/31/07)

Menachem Elimelech of Yale University has found that single-walled carbon nanotubes (SWCNTs) can kill the common pathogen E. coli and other bacteria by substantially injuring their cell walls. The study is the first to provide direct evidence that carbon nanotubes, which are microscopic carbon cylinders easily absorbed by human cells, have potent antimicrobial powers. This discovery may help wage the war against the growing number of antibiotic-resistant infections. After researchers incubated E. coli cultures for one hour in the presence of the nanotubes, the microbes in direct contact with the SWCNTs were killed outright. Elimelech posits that the nanotubes cause cellular damage by puncturing the cells; the study eliminated metal toxicity as a contributor to cell damage. Elimelech anticipates that SWCNTs could improve hygiene by being incorporated into surface coatings and antimicrobial materials. Embedding the SWCNTs would control their toxicity by preventing them from seeping into the environment, says Elimelech. The research is published in the American Chemical Society journal *Langmuir*.

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New Digital Image System Launched

Medical Laboratory World (08/07)

Image Solutions' Web-based digital system, called TissueMine, automates the workflow for pathology research and development. The system enables the reduction of analysis time from weeks to minutes by accelerating the workflow and minimizing bottlenecks in what is otherwise a manual process. The package includes iScan, a new high-speed tissue slide scanner that can obtain high quality images and auto-load up to 160 slides. Among the more than 30 morphological algorithms covered by TissueMine are IHC, H&E, CISH, and FISH, including user modifiable analysis parameters. TissueMine provides consistent results because the slide scoring process is standardized. The system also features customizable report templates and can assess a 100 core Tissue Micro Arrays in under 15 minutes instead of 3 to 4 days. In addition, archived images from iScan are automatically stored on 3i informatics platform, results can be exported to other program as PowerPoint, Excel, Microsoft Word, SAS, and Spotfire, and the system works with LIMS, EMR, and cheminformatics systems.

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Device May Offer Instant Diagnosis

Tallahassee Democrat (FL) (08/25/07) Jefferson, Jennifer

Florida State University researchers have developed technology that could allow instant diagnoses in the future. FSU's Thomas Fischer and Pietro Tierno, along with University of Oslo professor Tom Johansen, have created "lab on a chip," that uses low magnetic fields to track molecular markers that indicate diseases. Fischer says the device has potential for providing a "quick, inexpensive and --most important-- accurate diagnosis." By taking a drop of a patient's blood and placing it on the chip, specific biological markers, indicating the presence or absence of a disease, would be attracted to the magnetic fields. The researchers intend on continuing their work with Siemens Medical Solutions in an endeavor to further research and develop the technology before clinical testing occurs.

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New Kind of Chip Makes History in Silicon Valley

ABC7 Chicago (08/12/07) Hart, Richard

A bioprocessor chip in which fluid is directed through a series of microscopic pipes and valves is described by Stanford University's Stephen Quake as "a universal tool for chemical and biological automation." Quake pioneered microfluidics through his refinement of soft lithography, in which silicone is used in place of silicon. By striking the chip with a laser light, the generation of crystals can be maximized to study protein. The reaction is more effective when there is less volume, because the concentration of the molecules is higher. "I'm really excited about using [the device] to study microbes," notes Quake.

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Lab on a Chip for Oral Cancer Shows Promise

NIH News Release (08/08/2007)

Scientists at the University of Texas at Austin have created a lab on a chip that can diagnose oral cancer in a matter of minutes, eliminating the need for patients to obtain referrals and see specialists and increasing their chances of survival through early detection. Published in the August issue of *Lab on a Chip*, the study shows that the all-in-one test is effective in looking at three types of oral cancer cells and gauging their levels of epidermal growth factor receptor (EGFR) proteins. A drop of fluid that contains cells brushed from the lesion are inserted into the device and pushed into a porous, microfluidic chamber. According to researcher Shannon Weigum, "The cells stick to the membrane floor like starfish in a net. The floor has little exit holes that drain the fluid out of the chamber and allow us to pump in a cocktail of, in this case, antibodies that are tagged with a fluorescent dye and that are programmed to seek out and attach to the EGFR displayed on the cells." The level of EGFR is measured by the level of fluorescence.

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Simple, Convenient Tool for Synthetic Chemists

A to Z of Materials (08/07/07)

Radleys' Carousel 6 reaction station provides chemists with an affordable and convenient workstation. Flasks ranging from 5 ml to 250 ml can be simultaneously stirred for up to six reactions at a time; flasks are visible and reagents can be added at any time. The added capabilities of the integral reflux head and gas-tight PTFE caps allow for an inert atmosphere. The workstation's simplicity also enables chemists to master the tool in very little time, requiring minimal set-up and maintenance. The Carousel 6's Tornado overhead stirring system allow for stirring viscous liquids up to 10,000 cps at 500 rpm with a PTFE stirring blade.

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Robofin Could Help Naval Ships Find Mines

InformationWeek (08/06/07) K.C., Jones

Researchers at the Massachusetts Institute of Technology (MIT) have cited the common bluegill sunfish as the inspiration for a mechanized fin that could be used to propel robotic submarines and other types of autonomous underwater vehicles (AUVs). AUVs equipped with a mechanical fin would not need propellers, and the fin would enhance AUVs' ability to maneuver, making it easier for the craft to perform tasks like sweeping for landmines. The researchers explain that the mechanized fin, which is constructed with a new electricity-conducting polymer, would not create a backward drag. "If we could produce AUVs that can hover and turn and store energy and do all the things a fish does, they'll be much better than the remotely operated vehicles we have now," said MIT researcher James Tangorra. The researchers are constructing multiple prototypes of the fin. They explained that bluegill sunfish move forward constantly, and their fins are capable of changing shape.

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Scanning for Success

Nature Reviews Drug Discovery (08/07) Vol. 6, No. 8, P. 590; Jones, Dan

Genome-wide association studies (GWAS) are opening up a number of new insights for pharmaceutical research and development. GWAS uses advanced data mining technology to search up to 500,000 known genetic variants for possible connections to a particular disease. By using genetic data garnered from thousands of subjects, GWAS has been able to find genetic connections to major killers such as diabetes, heart disease and cancer. Many of these variations are only single-letter changes in the genetic code. On their own, each of these changes may only have a tiny influence on the chances of developing a disease, but when combined with other variations, the impact can be significant. GWAS is really only still in its infancy, and many more studies will be needed to confirm and understand the variations that have already been found. However, once the effect of a variant is understood, it can become a possible target for treating a disease. GWAS also opens up the possibility of developing better animal models for testing by disseminating genetic similarities between humans and a model species.

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One-Up, One-Back ERM in the Food Supply Chain

Information Systems Management (Quarter 3, 2007) Vol. 24, No. 3, P. 213; Gessner, Guy H.; Volonino, Linda; Fish, Lynn A

Recurring eruptions of E. coli and other food poisonings highlight the need for swift, precise tracking capabilities to pinpoint contamination sources and trace contaminated foods to their destinations. The 2002 U.S. Bioterrorism Act was prompted by fears of food or beverages contaminated by biological agents and the legislation, which requires a large volume of data, intensifies the need for effective electronic records management (ERM). The legislation requires all involved in the food supply chain to document the "one-back," the immediate previous supplier of all food received, and the "one-up," the immediate subsequent receiver of all food released. However, such documentation remains severely insufficient. Radio frequency identification (RFID) may be able to play a valuable role in ERM. Ideally, monitoring would begin at the livestock or farm and would continue to track the item from the processor to the distribution centers and wholesalers to the retailer and final customer. Dole Food, for example, recently launched an RFID system enabling the company to trace contaminated produce to a precise field location. A U.S. program for tracking livestock with RFID tags has been temporarily halted, however, due to tag costs. High costs and complexity have also hindered RFID implementation in the manufacturing industry. Most U.S. distributors and retailers are using a "slap-and-ship" RFID tag application technique, which does not yield the full benefits of RFID-tagging. Clearly, RFID implementation is a challenging process, and there is a crucial need for investment and research in food supply chain ERM. Doing so could help save lives, fulfill regulatory mandates, mitigate damage to profits and brands, and decrease risks connected to product recalls.

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Finding the Bugs in Pathogen Detectors

Drug Discovery & Development (05/01/07) Dove, Alan

Bioterrorism and disease pandemics are real threats to governments, companies, and the general public, but methods used to track pathogens are sometimes not effective. Generally, researchers pull air through a fine filter to detect and collect weaponized anthrax and other microorganisms, but Ohio State University researchers recently discovered that two of the commonly used filtration systems dilute the ability to create cultures from test samples. As a result, Ohio State University Associate Professor of Environmental Health Sciences Dr. Timothy Buckley and Johns Hopkins University Bloomberg School of Public Health postdoctoral researcher Ana Rule began studying the effectiveness of BioSampler, which uses a liquid gel substance to capture aerosol particles rather than a fine mesh filter; the studies yielded viable results for culturing bacterial cells. However, while the liquid gel filter is useful in environmental health research, its application in pathogen sensors poses serious concerns because its orientation and fluid content are important to its effectiveness, making it difficult to use in the field and maintain. Meanwhile, scientists at Los Alamos National Laboratory are testing the Hands-Off Sampler Gun, which will later be tested by the U.S. Federal Bureau of Investigation; researchers hope the sample pad, digital camera, voice recorder, and GPS system will create an ironclad chain of evidence and ensure quality sampling. Critics, on the other hand, indicate the assay process is the most integral part of tracking biological agents and weapons, but none of the current systems are foolproof, with many issuing large numbers of false-positives. In Los Alamos, researchers are using nanowired barcodes connected to antibodies to track biomolecules through optical or electronic means, and the metal wires attached to the antibodies only attract certain pathogens, which are then highlighted by the presence of fluorescent secondary antibodies. Other researchers are relying on nanotechnology to identify infectious diseases through protein biomarkers, but the biodetection device also must provide readable reports, be easy to use, and be accurate for emergency responders, postal workers, and others to use the devices efficiently.

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