MAGAZINE

Lab Manager®

Where Science and Management Meet™

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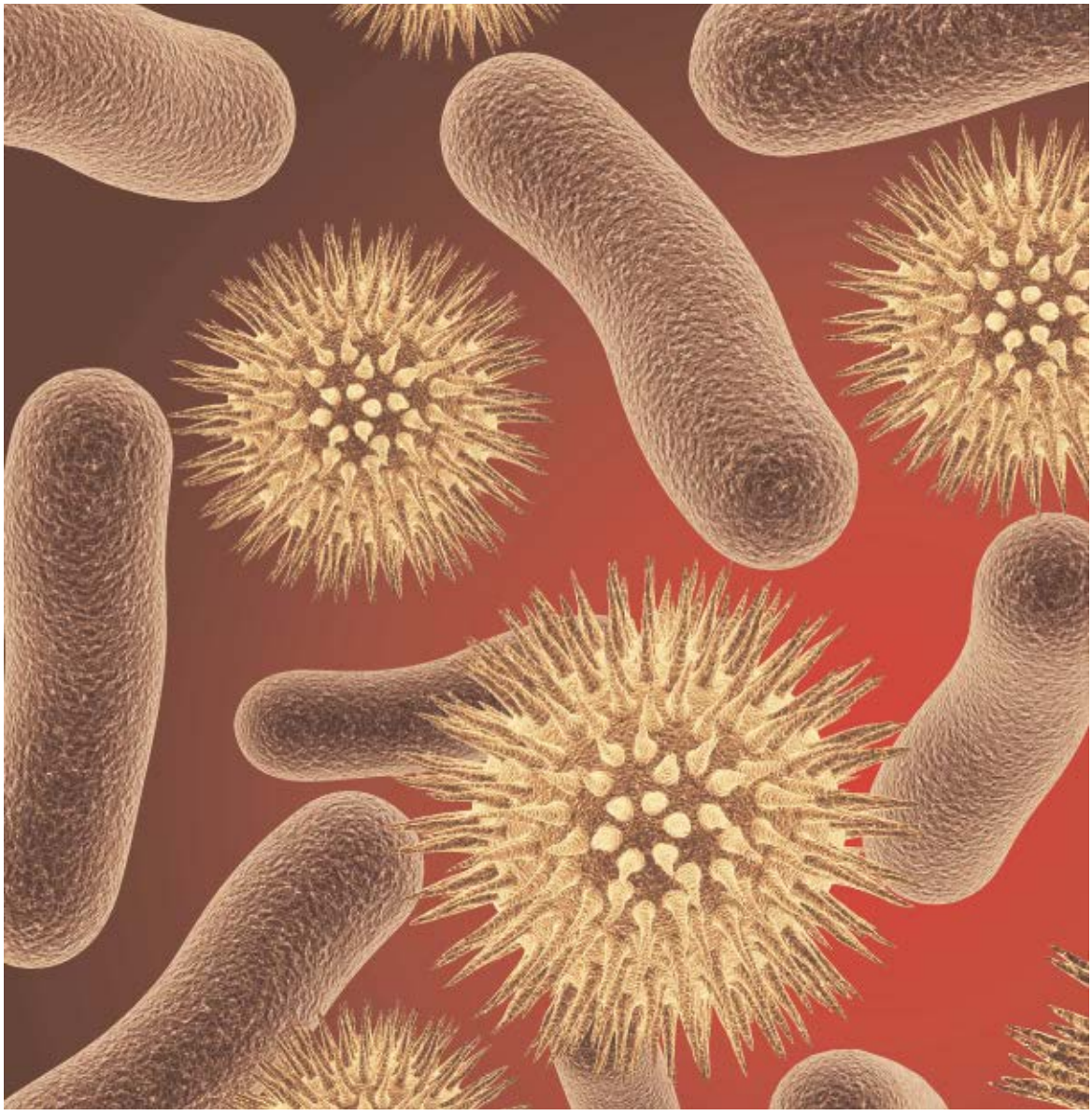

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Author Guidelines

Lab Manager Magazine® is a printed publication of resources, products, and information for today's laboratory manager. Articles should address some aspect of laboratory management from the perspective of a professional who is both a scientist and a manager. Topics areas would include: managing budgets, personnel, technology, information, funding, training, safety, risk, expansion, building or renovation, among others related to the role of a lab manager.

The article review process should begin with a query by e-mail or phone followed by a brief abstract or outline. Please state your topic and objective, and indicate your perspective as well as your professional relationship to the topic. Content must be unbiased and cannot promote a particular product or company. Article length may range from 1500-2500 words. All manuscripts must be submitted electronically by email or disk.

To submit an article query contact:

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Laugh, and the lab laughs with you

According to Motivational Humorist Jeff Justice, (now there's an interesting job title but that's a topic for another editorial), "The ability to take your job seriously and yourself lightly goes a long way in the battle against stress." Justice goes on to note, "A sense of humor can be used in stress reduction, problem solving, team-building, and improving communications without ever telling a joke."

There are days when keeping your sense of humor is the best management tool. Actually, there are very few days when a sense of humor isn't needed. A healthy dose of humor or an easily accessible sense of humor can create a positive atmosphere. Not every day is a full-tilt serious pursuit of science, nor should it be. People need outlets and if they can find a few during work hours, it generally results in happier employees. It's easy to extrapolate the benefits when staff members can have a good laugh together now and then.

In an online article titled, "Fun and the Bottom Line: Using Humor to Retain Employees" Susan M. Heathfield says, "In today's uncertain work environment, humor isn't an option, it's a necessary way to boost morale. When employees clown around, they're not wasting valuable time, they're making use of one of the few tools available to increase and maintain their esprit de corps. Laughter may not change the external reality, but it can certainly help people survive it."

Some of *Lab Manager* Science Editor, Barbara VanRenterghem's best stories are about lab antics and co-workers with intelligent and fun-loving senses of humor. She penned this "poem" about a not-so-good day in the lab. (To her disappointment, we decided not to publish her recipe for a dry ice bomb.)

If you've got a few stories or anecdotes to tell about the good, bad, and not-so-good days in lab, we'd love to hear from you.

Patrice Galvin, pgalvin@labmanager.com
Barbara VanRenteghem, bvanrenterghem@labmanager.com

The Lab Manager's Lament

I'd rather play with DNA
Than manage a lab everyday
I'd rather sniff some pyridine
Or clean the sequencing machine

When tempers flare I'd rather run
Than stay around, it's not much fun
Who made this mess? Who spilled the stain?
Who took the last of the xylocaine?

I'd rather not be the guy
To chase down others on the fly
To see that everyone plays nice
While looking after the lab mice

I'd rather run a protein gel
Than prod, remind, beg, nag, and yell
I'd rather radiolabel my thumb
Than tell you what you did was dumb

I'd rather autoclave my toe
Than hear another "I don't know"
I'd love a thank you now and then
Or at least some peaceful labmate zen

I do not like to run the show
Here in the lab, please let me go!
You don't want to hear me gripe and moan
I'm not your mother; leave me alone!

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Bio-Medical Light Microscopy Imaging Facility Management

A MICROSCOPY FACILITY CAN SERVE TO PROMOTE THE RESEARCH GOALS OF AN INSTITUTION. HOWEVER, SUCCESSFUL OPERATION INCLUDES PLANNING FOR AND ADDRESSING ISSUES SUCH AS FEES, ACCESS, DATA CONTROL, SAFETY, AND EVEN VIP TOURS.

Turning microscopic specimens into data involves using microscopes and often image analysis hardware and software. Such items may be beyond the reach of an individual laboratory. For example, a confocal/multiphoton laser scanning microscope can cost roughly $800,000 with an annual maintenance fee on the order of $60,000. An imaging facility may have additional fluorescence microscopes with digital cameras, along with specialized equipment, such as motorized fluorescence stereomicroscopes, automated stage tiling microscopes, slide scanners, slide makers, and high quality/poster printers. Ideally, the facility will be connected to the entire campus via centralized file servers through Gigabit Ethernet (at about $100,000 per building). Information about such facilities can be found on various web sites.[1–4] Many facility managers communicate through the confocal listserv <http://listserv.acsu.buffalo.edu/archives/confocal.html> where postings on many topics can be found. Besides listserv signatures, many facilities can be found by doing Internet searches, as can all items discussed below.

PLANNING

Before setting up a microscopy facility, an institution should think about the mission of the facility, its location relative to users, amount of space and infrastructure, and who will direct, staff, and use the equipment. Location is not a trivial consideration, and a poor choice can doom a facility. After the mission statement is agreed upon and published, policies on cost structure, access, and who does what is put into place. These should be posted on the facility website. Facilities, even with charge-back fees, rarely generate enough revenue from local users to fully recover operational costs. Administrators should not look upon facilities as potential profit centers, but rather should see the hardware and staff as technology infrastructure and resources that facilitate the research goals of the institution. Regarding hardware, systems usually have a computer with a Windows-based operating system. Macintosh users should be prepared to adapt.

Before setting up a microscopy facility, an institution should think about the mission of the facility, its location relative to users, amount of space and infrastructure, and who will direct, staff, and use the equipment.

ORGANIZATION

To start a facility, the available money, annual operating budget, and space will dictate the scope of the operation. The user community should be consulted through a needs-assessment survey and in meetings to determine what should go in the facility (or even if there should be one). The Director of an academic facility should be a faculty member who is knowledgeable about microscopy, but who will not monopolize the facility and staff for his/her own research. Typically, the institution pays 10% of the Director's salary to run the facility. The Director should have an advisory board that meets regularly during the year for review and planning. The board should not rubber stamp the Director and should have real input into how the facility is managed. A crucial role of the board is as an honest broker that can rationalize to institutional administrators the worth of subsidizing the facility with institutional funds. The facility staff will usually include one or more individuals who manage day-to-day operations, including educating faculty and users on which instruments will best answer their research questions, train (and retrain) users,

George McNamara and Carl A. Boswell

track usage, maintain equipment, interact with vendors for annual preventive maintenance, learn new applications, and potentially run experiments for users.

INCOME AND COSTS SCHEDULE

Methods of generating income include charging individual labs a set monthly or annual access fee for access to basic equipment, and an hourly fee for expensive equipment. Because the annual costs can be easily estimated, an initial fee schedule can be determined and then modified as income versus outflow becomes more apparent. Publicly funded resources are not allowed to generate a budget surplus, but arrangements (e.g., accumulated depreciation) can be made to set aside income to fund future needs, such as upgrades or new instruments. Some facilities charge less for off-hour operation and more when staff is required to setup or carry out experiments. "Bulk" pricing for labs that make heavy use of a system is not economically viable and may breed discontent among other users. A requirement associated with federally funded instruments is that the fee schedule applies to all users.

The fee structure should be explained to each new faculty member and user, and a cost-center number for billing should be obtained for each user. Exceptions can be made for faculty without current grant support so they can "prime the pump" with imaging data for grant and manuscript submissions. Evaluation of imaging goals for such users by the advisory board may be a good mechanism for waiving fees for well-planned experiments without incurring the ire of paying customers.

Once the equipment is in, the two biggest recurring direct budget items are salaries and maintenance contracts on hardware and software. A "consumables" budget should also be agreed upon within the institution. By totaling the annual estimated cost, then dividing by an estimate of the hours used, an hourly rate can be derived. Be ready to make adjustments as reality sets in, but give the facility a year to develop a user base and pass through lulls, such as summer vacation. At the facility one of us managed, with $760,000 worth of equipment, the maintenance contracts totaled about $25,000 per year and we had an additional $20,000 "consumables" budget for purchasing supplies, additional fluorescence filter sets, low - end scientific digital cameras, new software, new computers, new computer peripherals, and disks. Useful supplies might include QA/QC fluorescent microspheres, calibration microscope slides, and commonly used reagents, such as DNA counterstains and mounting media. If a large enough user base exists, negotiating with a supplier of commonly used reagents may get you an "in-house" freezer plan. This would provide an immediate source of commonly used materials, such as secondary antibodies, nuclear stains, mounting media, membrane and organelle labels, and other supplies.[5] Objective lenses are not intended to be consumables but are sometimes treated as such. Repairing a $6,000 plan apochromat 63x/1.4 NA oil immersion lens costs $3,000.

TRACKING USE

Access is best tracked by a combination of institutional scan card access to the facility, and computer login and/or sign in/out sheets at each station. Commercial or freeware[6] calendars can be used for tracking usage and billing. Even for equipment that is not billed, usage for each equipment and staff should be summarized for monthly reports to the Director and annual presentations to the advisory board and to the institution's senior research administrator. The annual usage/billing data can be used to justify budgeting for new equipment, upgrades, maintenance fees, and promotions. Access to the most expensive equipment is often limited to institutional business hours. If access is available on evenings and weekends, a policy defining how experienced the user needs to be to get access is needed. Facilities funded through shared instrumentation grants or other government funds usually have both usage/cost recovery and data archiving requirements. As a facility manager, you should operate on the assumption that you will be audited; you really do not want to get in trouble because you could not find a computer file.

SPECIFIC CONCERNS

Certain questions must be addressed when considering an imaging facility. Does (will) your space have the necessary room, power, HVAC, and Ethernet connections? Remember to consider future needs. The layout of your space needs to be thought out carefully to enable productive work with minimal disruptions from people walking through experiments, room lights going on and off, or distracting conversations. Exits need to be well marked and aisles kept clear of chairs, carts, gas tanks, and cables so that staff, users, and visitors can get out safely in the event of emergency. Does the electrical system provide clean power? Does it work 365/24/7? Even hospitals with mandated always-on power experience blackouts. Key equipment should be powered through an uninteruptable power source (UPS), available from several sources. Does the HVAC maintain constant temperature (few do)? A heavily instrumented room may exceed design range, especially with several people in the room. Are the air ducts organized correctly to avoid drafts and dust blowing on the equipment?

Vibration can affect your experiments. If you see a standing wave in your cup of coffee or petri dish, you have a vibration problem. Ideally, only the microscope and items directly bolted to it should be on the anti-vibration surface (tables that isolate are easy to find, those that do so and

leave the equipment ergonomic are not). It is best to place all ancillary equipment (i.e., filter wheels, beamsplitters, spinning disk confocal attachments, intensifiers, digital cameras) on an optical rail to enable easy component changes while maintaining alignment. Cables should be suspended off the table by elastic supports to dampen transmission of vibrations from a source to the scope.

Will your facility be used for intravital microscopy or pathogen research? If so, you need to plan for how to contain and clean up after such experiments. Some people are allergic to mouse or rat dander so clean up is critical. Are the animals going to be under anesthesia the entire time they are in the facility? If gas anesthesia is being used, how will it be vented? Will you require copies of all animal care committee paperwork before permitting a researcher to bring animals to the facility? Handling lab animals always requires gloves. If the facility equipment is normally used ungloved, it should continue to be used this way during experiments. This implies either a lot of ungloving/regloving or multiple researchers. Are the extra hands going to come from the researcher's lab or will the facility staff assist (and provide oversight to make sure the glove/biosafety policy is followed)? Do the facility staff need animal care training?

Finding staff for a facility can sometimes be done locally, but excellent resources for trained personnel include the Confocal listserv, International Society for Analytical Cytology (ISAC), and Microscopy Society of America (MSA). Ads in certain journals may be appropriate for certain positions.

A common way to find out what equipment to buy is to visit other facilities, either locally or during travel to meetings and speaking engagements. The confocal listserv again is a valuable resource for these types of questions. Visits and needs assessments go hand in hand. Visits also help build bridges for collaborations, mentorship, and access to complementary equipment. Most facilities managers are happy to show off their gizmos. Identifying the good, the bad, and the ugly is done by communicating with local vendors, querying other facilities, and attending meetings to kick the tires and get a sense of the organizations standing behind (or not) the local salespeople. After-purchase support can be a huge bone of contention in some venues, so be sure to ask people about their experiences with vendors. The big biomedical meetings are where new imaging equipment is introduced. These include American Society for Cell Biology, Neuroscience, Biophysics, and Federation of American Societies for Experimental Biology. Smaller meetings/tradeshows, such as The Histochemical Society, International Society for Analytical Cytometry, and Microscopy Society of America, may also be worthwhile. There are several excellent courses offered in advanced light microscopy that can help the Director or a staff member get up to speed on new equipment and techniques, plus network with course faculty and other users (a few of the courses are listed at <http://microscopy.uc.edu/lm/course/other%20courses/other-courses.htm> and others are posted on the confocal listserv).

SAFETY

Safety is everyone's business. In addition to having sharps and biosafety trash available (and not overflowing), you should train everyone on the hazards of arc lamps and lasers. In practice, the risks of eye damage from a 100+ Watt arc lamp or explosion of a high pressure bulb may be greater than from lasers. Institutions usually require non-ionizing radiation training for the manager and staff. If lasers are not enclosed, then laser safety training may be required for all users. Laser physics labs have signs posted; the classic is: "do not look at laser with remaining eye." Staff of microscopy and flow cytometry labs sometimes becomes cavalier with their 50-W laser or especially with their 1-W, 80-MHz, multi-photon laser. This energy source puts out 100-fs pulses, resulting in 125,000-W peak power that may be invisible (current multiphoton lasers are tunable from 700-950 nm, with invisible light above 800 nm). Insist on the use of fiber-coupled lasers or at least enclose all laser light paths in tubing. Explain to each user the dangers and oversee them (and watch yourself). "Off-the-shelf" confocal instruments come with this protection, but homemade or modified systems may need special attention. Fires from lasers, arc lamps, or any other malfunctioning equipment are a very real possibility. Users need to be educated not to place paper (or anything else) on such equipment. Any smoking equipment could potentially trigger an overhead sprinkler system, which could in turn cause water damage. Our closest call was allowing the unfiltered output of a 300-W arc lamp's light guide to touch a wooden desktop. Within a second, smoke started rising from the illuminated spot of wood.

Pathogen controls: are users permitted to bring live pathogens or live animals into part or all of the facility? What is the policy regarding lab coats and gloves? Users typically glove up to protect their specimen from themselves (i.e., RNase or bacterial contamination), but rarely think about protecting other users and staff from their specimens. At hospital new employee orientations, more time may be devoted to hand washing than to lab safety. It is hard enough to get MDs to wash hands,[7, 8] getting researchers to un-glove before touching door knobs and computer keyboards/mice is just as difficult. Clear policies and training on the use of gloves should be implemented with full support from the research administration.

Microsoft Outlook can be used for equipment and staff calendars/reservations, but email serves as a major entry point

to computer viruses. Backing up key files and periodically making a "disk image" of all facility computers can mitigate against computers failing or becoming infected. A general facility policy is for files to go out, not in. Image files from other acquisition devices can be placed on a virus-scanned file server for analysis. A file server and blank recordable CDs and DVDs can be used to export results.

WEBSITE

Any modern facility should have a website, either intranet or Internet. Intranet-only allows for informality, quicker posting, and avoids the need for organizational approval. Internet access enables the entire world to see what you have. One site, Molecular Expressions,[9] already has a huge amount of informational content. A simple "confocal facility" Internet search will find many sites, some with current, others with out of date, information. At the least, the site should contain information on what is available, who is allowed access, who to contact to get access, and what the basic charges and policies are. Be careful with verbiage. If you have too many policies, no one will remember (or even read) them, so keep it simple. The most contentious issues in running a facility are fee structure and recovery, access, data control, and safety, both hardware and biological.

TRAINING

Learning and Unlearning Curves: Most users are focused on the thing they study and want to spend the minimal time and thought to get the image they need. There are three ways to provide for use of advanced instruments, such as confocal/multiphoton: 1) spend the time to climb the long, shallow learning curve to understand what is happening when a good image is produced, 2) learn only those buttons and knobs that get the required image, or 3) ask the facility staff to setup (and run?) the instrument. Blank stares and yawns usually follow the first approach, and large fees and excessive staff time follow the last. A brief overview of the system and a few principles, followed by emphasis on doing what the investigator needs may be the most efficacious approach. Remember, however, that these are intelligent, educated people, so terms such as "spectra," "objective," and "resolution" should not be avoided. One of the most basic problems for new users is the confusion surrounding the green of fluorescence versus the green from a laser.

AUTHORSHIP

Authorship for both academic publications and especially patentable inventions should be defined by the institution, and whoever has the final decision should be defined. At the least, the facility and/or staff must be acknowledged for every publication containing data from the facility. All documentation should be available online. Facility-specific tips should be produced for major applications and be available online and in binders by each instrument. Many graduate students, postdoctoral fellows, medical residents/fellows, faculty, and fellow staff are not native English speakers, thus understanding training or advice may be problematic. If you value your equipment, you will become attuned to who gets the message and who does not and act accordingly.

TOURS AND DEMONSTRATIONS

Presentations and Tours:[10] For a VIP tour, we recommend personalizing the title page. VIPs include past, present, and future financial donors/sponsors, Presidents, Deans, advisory committees, seminar speakers, faculty and staff recruitments, and just about everyone else. Tours are a type of outreach. If you are asked to participate in a VIP tour, find out who the tour is for, communicate to make sure that your facility is a useful stop, find out what the goal is, and what should and should not be presented. Provide best contact information for the liaison (and get their pager and cell phone in return). Make sure that the hallways are clear and make reservations to block out all instrument access for several hours before and for a few hours after the scheduled stop. Communicate with users and neighbors about the need to shut down access for a few hours and on the need to keep the hallways clean and quiet on the day of the tour. Clean up (or mark up!) whiteboards in the hall and conference room. Plan ahead for the number of visitors to be expected, but be prepared in case there are more. If possible, hallways with large professional prints of interesting (but non-controversial) images from your facility will impress VIPs on the way in and out, and give something for overflow crowds to check out while waiting their turn. Have something interesting on each microscope but do not expect anything from the visitors. Time is money; if you have a 10-minute slot, show a few slides, light up an instrument (multicolor sequential scanning on a confocal microscope is good), and be prepared to answer questions (keep noisy equipment off so you can hear the questions).

A set of application-specific PowerPoint presentations and/or web pages should be available for meeting potential clients (faculty and users). When you meet with clients, listen for their needs and communicate how your facility will help them. Get your (and sibling facilities) on campus seminar series or set up your own. Having so many users that you are too busy is a better problem to manage than an unused facility.

SUMMARY

We have tried to provide insight into setting up and running a light microscopy facility. Many of these issues — such as scheduling and data management — can be shared with flow

cytometry, electron microscopy, small animal imaging, microarray, and other facilities. Discuss your issues with the people in other campus facilities, as well as other microscopy facilities. The success of your facility ultimately rests with what your users take away from it: training, data, and insight into their experiments.

ACKNOWLEDGEMENTS

Our thanks to Tom Coates for discussions and confocal listserv contributors, vendors, and CHLA and City of Hope researchers and staff for opportunities to learn.

REFERENCES

1. http://www.cityofhope.org/SharedResources/LightMicroscopy/LightMicroHome.htm
2. http://www.itg.uiuc.edu/ms/equipment/
3. http://nic.med.harvard.edu/equipment/index.html
4. http://ncmir.ucsd.edu/Research/resources.htm
5. http://www.biotech.missouri.edu/mcc/MCC%20Invitrogen%20Inventory.html
6. http://demo.arl.arizona.edu/
7. Pittet, D., et al. "Hand hygiene among physicians: performance, beliefs, and perceptions." Ann. Int. Med. 141 (2004): 1–8.
8. Gawande, A. "On washing hands." N. Engl. J. Med. 350 (2004): 1283–6.
9. http://micro.magnet.fsu.edu/
10. http://www.itg.uiuc.edu/publications/forums/2003-02-04/index.htm

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Getting Employees Involved

EMPLOYEES OFTEN HAVE IDEAS TO HELP MAKE THEIR COMPANIES MORE PRODUCTIVE AND PROFITABLE. AN EMPLOYEE INVOLVEMENT PROGRAM IS NOT MERELY A VARIATION ON THE "SUGGESTION BOX" BUT AN OPPORTUNITY TO IMPROVE PROCESS AND OUTCOMES.

Getting employees involved is a good thing. The Employee Involvement Association, which has recognized companies such as General Motors and Lockheed for their outstanding employee involvement programs, describes it as "the keystone of organizational development, nurturing the empowerment of people."[1] The National Bureau of Economic Research concludes that employee involvement is "a net benefit to the U.S. labor market."[2] And it is a "minimum" requirement in developing a work stress prevention program.[3]

Employee involvement (EI) programs can boost morale and reduce cost. It makes sense. Most of us prefer some control over our work environment. Workers have a practical interest in creating leaner, less wasteful, and cheaper processes. They also seek job satisfaction. Done right, an EI program can have impact in all of these areas. According to one study, eight out of ten companies reported that EI results were positive or very positive. Only three percent reported a negative experience.[4]

Great as this sounds, your organization may lack a program or perhaps your EI program was a "flavor of the month" in the past and is now on the shelf. Revitalizing or starting your own program is a worthwhile undertaking but as a manager, there are some practical considerations and potential hurdles to overcome.

Asking people what they want comes with an inherent obligation to respond.

Organizational culture: Put simply, your top dogs need to walk the walk. Northwest Community Hospital, for example, listed in Fortune's 100 Best Companies to Work For in 2006, emphasizes employee involvement by increased communication, decision-making forums, "view teams," and recognition programs.[5] Upper management must recognize that an investment in employees can result in greater customer satisfaction and cost reduction.

Table 1: Outcome vs. Value Based Management

OUTCOME-BASED	VALUE-BASED
Customer impact	Cash flow impact
Measure quality	Measure profit
Staff-driven	Management-driven

Employee attitudes: According to the Gallup Organization, only 29% of employees are engaged, or feel a profound connection to their company. While 54% are going through the motions, the rest are actively disengaged, working to undermine the organization.[6] Chances are two thirds won't be enthusiastic participants no matter how obvious the benefits.

You: While you might be doing your best to up that 29% by talking about empowerment, involvement, and team building, these buzzwords can become shopworn and make you sound like the wa-wa of Charlie Brown's teacher no matter how sincere your efforts.

Indeed, a game called "Buzzword Bingo" is played everywhere from board meetings to college commencement addresses. The squares contain management buzzwords instead of numbers. You mark off words when you hear them, shouting "Bingo!" when you get five in a row.[7]

Scott Warner

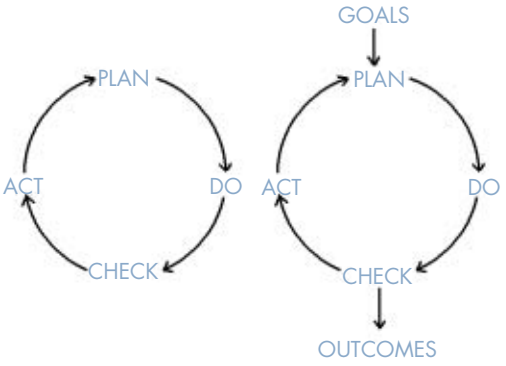

Figure 1. The Deming PDCA (Plan-Do-Check-Act)

Humor can be healthy. Not so funny is a possibility that employees perceive your "verbal tribute" to EI as manipulative, especially if their ideas are discounted, altered, or ignored.[8] Asking people what they want comes with an inherent obligation to respond.

So, how do you get your employees involved? Focusing on outcomes may be your answer.

Outcome-based management (OBM) is exactly what it sounds like — managing the outcome of a business. It measures satisfaction over sales. Quality, not the bottom line, is the driver. It is contrasted with value-based management (VBM) in Table 1. Whereas VBM looks at the impact on future cash flows,[9] OBM looks at the impact your product has on your customers.[10]

Traditionally, nonprofit organizations accountable to taxpayers have used OBM. Quality ethics also drive hospitals. For example, a lab test to measure cardiac function may cost less if done by an off-site reference laboratory, but the outcome might be fatal for a patient who suffers a heart attack.

If you're a hospital laboratory manager, patient welfare trumps cost. While medicine is clearly outcome based, the products of all laboratories have end users. And focusing on outcomes connects your employees to those users, your customers. It provides a rational motive for involvement in how products are created.

OBM also focuses on wants. As put by the Urban Institute, "Outcome management enables organizations to define and use specific indicators to continually measure how well services or programs are leading to the desired results."[11] Your customers' needs are almost perfunctory; their wants are a wellspring of pride for your employees. "Desired results" are integral to those wants.

To integrate your existing quality program with outcomes, you'll need to measure them. Quality, productivity, and customer satisfaction are a few examples. In a hospital setting you might also consider length of stay and readmission rate.

Your employees need this information, too. It gets

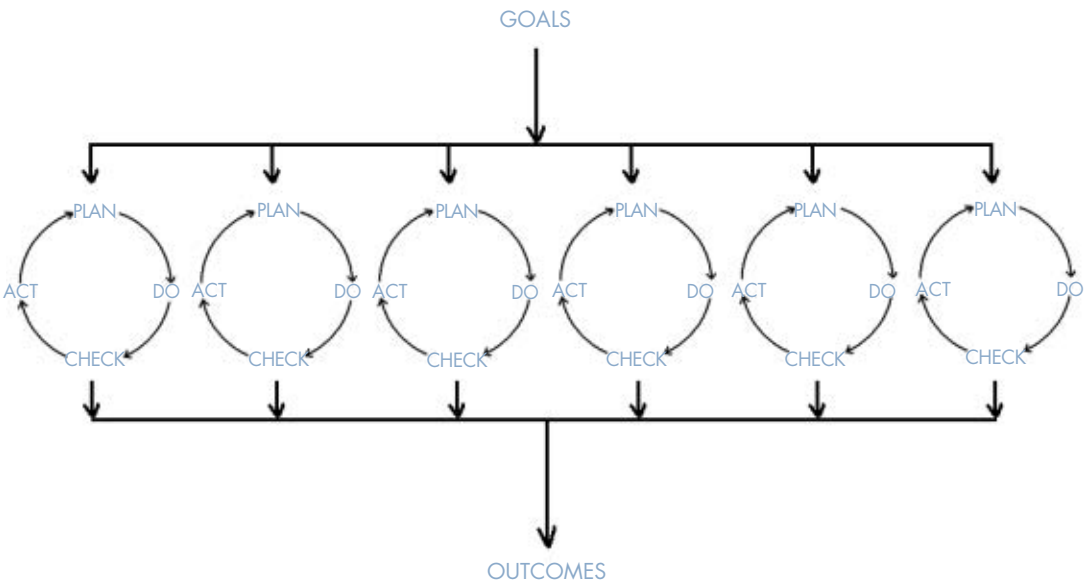

Figure 2. Multiple Cycles Aligned with Outcomes.

them interested, makes their input more relevant, and makes change easier to accept. This natural link between quality improvement and outcomes measurement has already been recognized by managed care companies.[12]

As an example, Figure 1 illustrates the Deming PDCA (Plan-Do-Check-Act) cycle[13] alone and aligned with your organization's goals and outcomes. In this model, change happens while measuring outcomes, linking process improvement to desired results. Figure 2 expands the model to include multiple quality cycles all linked to the same outcomes.

Table 2: Process Endpoint vs. Outcome in a Hospital Laboratory

PROCESS ENDPOINT	OUTCOMES
• Instrument calibration •Rapid turnaround time • Reliable test results • Minimal error rate	• Doctor receives an accurate result to quickly treat the patient • Patient receives the correct treatment when it is needed

Focusing on outcomes makes change less arbitrary. To apply these concepts in getting employees involved, I'll use a hospital laboratory setting. Note how individual processes affect desired outcomes in Table 2. Proper calibration, shorter turnaround time, accurate results, and fewer errors separately affect the measured outcome of how a patient receives treatment.

Given hurdles of employee attitudes, complexity, and limited resources, where do you begin? Here are some guidelines:

- Choose group outcomes. If your perceptions differ from your employees, you'll want to create expectations in their minds that match your own.
- Choose measurable outcomes. "Higher customer satisfaction scores" suggests a way to measure performance.
- Choose outcomes across a range of service. For example, hospital laboratory testing affects Emergency Department and walk-in patients.
- Consider a customer forum. To meet customer expectations, you have to know what they are. Including them in your decision making is one approach.
- Plan to prioritize based on outcomes. At a strategic meeting, ask for staff input in how they believe changing a process will impact customers, and arrive at consensus on what change will have the greatest impact.
- Plan feedback sessions. Letting your employees know the impact of their work can be rewarding or it can be a wake-up call. Feedback ensures their continued input.
- Respect your staff's decisions. You'll have to lay sufficient ground rules (e.g., decisions cannot include new hires or budget increases) to frame their consensus, but it's important not to undermine their work to suit your notions.

Pilot programs are effective beginnings, making a relatively easy win possible. It can add credibility to what your staff may perceive as a gimmick or just "more of the same."

For example, as a hospital laboratory manager you might look at routine outpatient blood draws. In this common process, a patient arrives at hospital registration, sits in a

Table 3: Laboratory vs. Patient Outcomes in a Hospital Laboratory

LABORATORY	PATIENT
• Accurate order • Blood is drawn quickly • Specimen is correctly labeled • Patient leaves happy • Test is performed • Result is sent to doctor	• My doctor explains why I'm having the test • I am prepared for the test • My information in the hospital billing system is accurate • I don't wait too long in the waiting area • The lab person knows who I am • My procedure is explained to me • My procedure is safe, quick, and painless • My results go to my doctor only • My doctor calls promptly with the results, I receive the correct treatment • I receive a timely and accurate bill

waiting area until summoned by a phlebotomist, and then a blood sample is taken. Your staff may perceive this as a relatively narrow interaction. So narrow, in fact, that it may not involve your lab techs who may see value as test completion before reports are run.

But the patient's laboratory experience begins when the doctor orders a lab test and ends with a treatment decision. It includes how well the laboratory communicates its services, how easy it is for the doctor to order a test, the convenience of the laboratory hours, and all the wait time. What the patient wants is more than simply getting in and out of a phlebotomy chair quickly, as shown in Table 3.

The range of impact suggests processes to improve. In Table 3, for example, a current and accurate test menu doesn't only affect order accuracy. It affects what the patient is told. Patient preparation is a related process in which the doctor or the lab person instructs the patient in how to fast or collect a sample.

Therefore, the end point of an up-to-date test menu isn't that the patient gets in and out of your phlebotomy chair quickly, but that it happens once with accuracy. It affects everything down the line. Telephone calls to clarify orders and patient recalls are two possible indicators to measure. These measurements can ensure that employee performance is evidence based.

Bottom line, if you involve all employees in your outcome based strategy, measurement reflects group performance. Empowerment and team building are buy-products of this strategy and not prerequisites. Your employees won't need to play Buzzword Bingo.

How well your employees understand outcomes can get them involved, making the leap from good to great performance. You as a manager can lead them in the right direction.

REFERENCES

1. The Employee Involvement Association page. 2004, Employee Involvement Association. 13 October 2006. <www.eianet.org>.
2. Freeman R, & Kliener M. "Who benefits most from employee involvement: firms or workers?" December 2000, The National Bureau of Economic Research Page. 13 October 2006. <www.nber.org/sloan/freeman.html>.
3. Sauter S., Murphy L., et al. "Stress at Work." National Institute for Occupational Safety and Health. 7 September 2006. <www.cdc.gov/niosh/stresswk.html>.
4. Lawker, E. "Employee involvement makes a difference." The Journal for Quality and Participation. Sep/Oct 1999.
5. Weiss, J. "From great to best: culture as a competitive advantage in healthcare." 21 June 2006, The Great Place to Work Institute. 14 October 2006. <resources.greatplacetowork.com/article/pdf/culture_as_competitive_advantage_northwest_community_hospital_6.21.06.pdf>.
6. Crabtree S. "Getting personal in the workplace." 2004. The GovLeaders.org page. 01 October 2006, <www.govleaders.org/gallup_article_getting_personal.htm>.
7. Geiger, K. "Business Buzzword Bingo!" 01 March 2003. Business Buzzword Bingo! 12 October 2006 <isd.usc.edu/~karl/Bingo>.
8. McConnell CR. Employee involvement: motivation or manipulation? Health Care Superv1998 Mar;16(3):69-85.
9. Koller, T. "What is value-based management?" The McKinsley Quarterly (1994:3). <www.exinfm.com/pdffiles/whba94.pdf>.
10. McNamara C. Basic Guide to Outcomes-Based Evaluation for Nonprofit Organizations with very Limited Resources." 2006, Free Management Library. 12 October 2006. <www.managementhelp.org/evaluatn/outcomes.htm#anchor30249>.
11. "Key steps in outcome management". 2003, The Urban Institute. 12 October 2006. <www.urban.org/uploadedpdf/310776_keysteps.pdf>.
12. Brown G, Burlingame G, Lambert M, et al. "Pushing the quality envelope: a new outcomes management system". Psychiatric Services 2001:52; 925.
13. "Project Planning and Implementing Tools." 2006, The American Society for Quality. 14 October 2006. <www.asq.org/learn-about-quality/project-planning-tools/overview/pdca-cycle.html>.

Scott Warner *is director of laboratory services, Penobscot Valley Hospital, Lincoln ME.*

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Toxicological Testing

A MAJOR BOTTLENECK IN THE DRUG DEVELOPMENT PROCESS IS TOXICOLOGICAL TESTING. TRADITIONAL IN VIVO TESTS PERFORMED IN ANIMALS ARE DIFFICULT TO AUTOMATE; ONE CAN'T PUT A RAT INTO A 96-WELL PLATE! HOW DOES ONE MANAGE THIS LEG OF THE DEVELOPMENT PROCESS, WHERE NOT "FAILING EARLY" CAN MEAN MILLIONS OF DOLLARS IN WASTED CAPITAL?

Technical improvements in tissue culture and advances in molecular biology have increased the understanding of cellular and molecular processes and the differences in these processes between humans and animals. Tools from cellular and molecular biology are being used to develop research strategies for identifying primary target genes. Moreover, the costs of assessing potential health effects of newly identified or synthesized therapeutic compounds (new chemical entities, NCEs) necessitate alternatives to animal testing. In vitro testing provides the researcher with considerably more control of the variables than whole-animal testing; however, an advantage of whole-animal testing allows for any adverse effects of "uncontrolled" variables to demonstrate broader-scale problems. New tools for toxicity testing must be looked on as adjuncts to traditional testing methods. Any testing method has inherent difficulties: when using whole animals, data must be extrapolated from one species to another; when using cell or tissue culture assays, data must be extrapolated to the whole organism. In vitro toxicological methods have allowed an earlier assessment of an NCE's toxicity. Early determination of pharmaceutical properties can serve as predictors of a compound's possible developmental success — or lack thereof. Therefore, implementation of high-throughput ADME-Tox assays that address absorption, metabolism, and physical-chemical properties of potential therapeutics may serve to minimize discovery to market attrition.

Early drug discovery ADME cell-based assays, such as fast Caco-2 screens, can help rejection of test compounds that lack good efficacy and toxicity profiles.

Alternatives to whole-animal testing include endpoint assays, cell and tissue culture assays, the use of tissue slices, toxicokinetic modeling, and structure-activity relationships and databases. One of the difficulties with cell culture has to do with maintaining differentiated cells. Cells in culture tend to become unspecialized after a short time, losing the characteristics of the organ or tissue from which they were taken. Immortalized cells that have been genetically altered could prove useful for toxicity testing, although in in vitro testing, one looks for cells that respond closely to those of the intact human body. Continuous cell lines have undergone extensive selection for the ability to grow in culture, whereas normal cells have complex requirements for growth and differentiation in culture. The importance and great variety of growth factors, cell regulators, and mediators must also be taken into account.

Early drug discovery ADME cell-based assays, such as fast Caco-2 screens, can help rejection of test compounds that lack good efficacy and toxicity profiles. A cost-effective high-throughput method, PAMPA (parallel artificial membrane permeability analysis), which uses an artificial phospholipid membrane that models passive transport of epithelial cells, is becoming increasingly popular. In addition, drug-drug interactions occur when one drug alters the pharmacokinetics of a co-administered drug. This effect is often the result of drug-induced induction or inhibition of cytochrome P450 (CYP) enzymes. Induction of specific P450 enzymes may alter the metabolic profile of a drug by increasing metabolism or by creating an alternate pathway of metabolism. These changes can have profound effects on the pharmacology and toxicology of drugs. The effects of NCEs on the induction of CYP

Barbara VanRenterghem, Ph.D.

enzymes can be measured, assessed, evaluated, and performed in multiple species as numerous in vitro test systems are available. An understanding of species-specific changes in these important drug-metabolizing enzymes can provide important information for predicting how a drug is handled in animals versus humans. Moreover, these data may also provide an explanation for why a test compound that produces adverse effects in rodent studies may not have a similar effect in humans.

A high-throughput fluorescence assay using cDNA-expressed human CYP isozymes and fluorogenic substrates has been reported for the study of CYP inhibition. In the early stages of drug discovery, the fluorescence assay for CYP inhibition could be used in conjunction with a human liver microsomal assay to identify potential drug interactions between NCEs and established products. Such automated assays can be used for high-throughput ADME-Tox screening in early drug discovery although such screening this early in development is often cost-prohibitive for most companies.

Drug candidates may demonstrate cytotoxicity through apoptosis or necrosis. Different parameters for apoptosis can be measured compared with necrosis. Apoptosis is characterized by early events, such as expression of phosphatidylserine on the cell surface and fragmentation of DNA, followed by loss of membrane integrity and mitochondrial function. Parameters, such as drug concentration, time of exposure, and measurement of DNA fragmentation, can be customized for in vitro cytotoxicity assays. Necrosis occurs through the action of toxic factors that act within the cell, such as irreversible inhibitors of protein, RNA, or DNA synthesis, or mitotic poisons. Protein and nucleic acid synthesis rates are then measured to determine drug toxicity.

In vitro systems have provided information on metabolic pathways and mechanisms of action and have identified appropriate animal models for extrapolating to humans. When human cells are used, species extrapolation is less important and only a minimal amount of animal study is needed to confirm in vitro findings. From a scientific perspective, the FDA and most other regulatory agencies commonly require toxicology testing in two species, one of which is nearly always required to be a primate species.

The main questions concerning the use of in vitro assays are: 1) How do we extrapolate from an in vitro system to an in vivo system (i.e., how do we relate effects in single cells to complex interactions in whole animals); 2) How do we use available in vitro and in vivo data to design better experimental approaches; and 3) How do we predict potential biological effects from the chemical structure of a substance? It is important to note that research using cells, tissue cultures, or non-mammalian systems is conducted not only as an alternative to using mammals but because a given alternative system best answers the question under study. In vitro studies also allow researchers to understand the discrete steps in a specific sequence of events, which is difficult to do in whole animals. Using in vitro data, it is possible not only to extrapolate the human response but often to look at the pharmacokinetics of other species as well.

A wide array of tools is available for toxicity testing that has the capacity to greatly increase knowledge of the complex systems under investigation. Managing this step of the development process occurs simultaneously with pharmacokinetic analyses and, often, with early clinical trials. Toxicology testing development is often hampered by the requirement for validation and regulatory approval. Before non-animal toxicity tests may be officially accepted by regulatory agencies, it is generally agreed that the validity of the new methods must be demonstrated in an independent, scientifically sound validation program. The development of new, faster, more efficient in vitro tests, which are more prognostic and can be extrapolated to whole-animal testing, can result in a marked reduction in the use of in vivo testing, and the conjunction of the two can result in faster testing and lower development costs. It is not practical or realistic to assume that an in vitro test can fully predict a whole-body response, regardless of species used. The FDA requires extensive toxicology testing (both in terms of formal testing and in terms of safety assessments in human subjects) not only to identify "common" risks but also to identify those 1-in-10,000 or 1-in-100,000 events that are severely debilitating or deadly. The establishment of data-based performance benchmarks will better guide reviewers of a validation study in setting realistic performance expectations given the real-world technical limitations characteristic of the current state of the art. Progress has been and continues to be made at this level, critical for the management of the drug development process, and of toxicological testing specifically, to maintain not only a full spectrum of potential therapeutics in the pipeline but a semblance of control over rising R&D costs.

The author would like to thank Dr. Janice Badger for constructive comments and suggestions.

Barbara VanRenterghem, Ph.D. *is Science Editor for Lab Manager.*

How it Works

Advances in Microplate Washer Maintenance

Problem: Most common problems leading to ELISA assay failure, system downtime, and increased cost are a direct consequence of poor microplate washer maintenance. Washer manifold tubes can become restricted and/or obstructed due to protein or salt crystal buildup; manual cleaning methods are time-consuming, labor-intensive, and often incomplete.

Solution: A self-maintaining microplate washer with the cleaning power of ultrasonic technology.

The ELx405™ microplate washer with Ultrasonic Advantage™ technology by BioTek Instruments is the only self-maintaining microplate washer available today. The built-in ultrasonic cleaner aids in routine washer maintenance, eliminating assay failure resulting from poor microplate washer maintenance and guaranteeing reliable washer performance. At the touch of a button, the ELx405 with Ultrasonic Advantage can be programmed to dispense a custom cleaning fluid, cycle the ultrasonic cleaning process, and flush and prime the manifold with a rinse fluid or buffer in preparation for the customer's next microplate wash cycle.

Ultrasonic cleaning involves the introduction of high-frequency, high-intensity sound waves into liquid. This causes the rapid formation and violent collapse of countless small and intense vacuum bubbles that implode upon surface contact. This aggressive agitation creates a highly effective scrubbing action on both the inside and outside of washer manifold tubes. This process of cavitation is produced in a cleaning reservoir within the ELx405 — the washer's manifold tubes are fully submerged in liquid, and the Ultrasonic Advantage feature automatically pulses ultrasonic energy for optimal cleaning of common manifold tube buildup such as protein and salt crystals. The addition of a detergent containing protease enzyme into the supply bottle will enhance the cleaning process even further and help to break down proteinaceous residue such as bovine serum albumin (BSA).

Figure 1. ELx405 HT equipped with optional Ultrasonic Advantage™

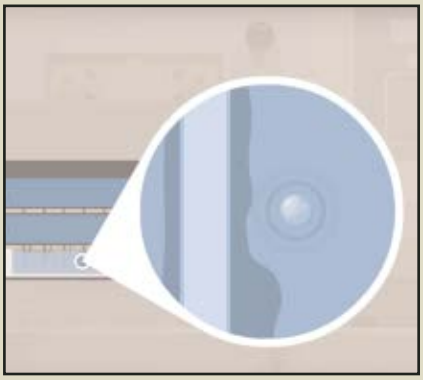

Figure 2. Ultrasonic waves effectively destroy protein and salt deposits inside and outside of manifold tube walls.

For years, ultrasonic technology has provided unmatched cleaning power in many applications and industries. Merging this proven technology with the a premier microplate washer, BioTek's ELx405 with Ultrasonic Advantage provides complete confidence in assay performance.

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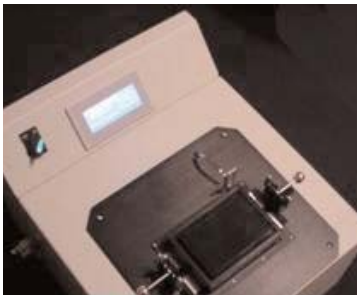

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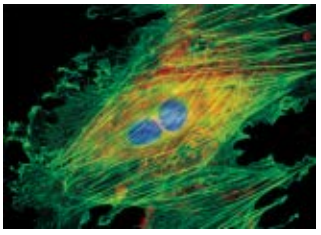

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product news continued

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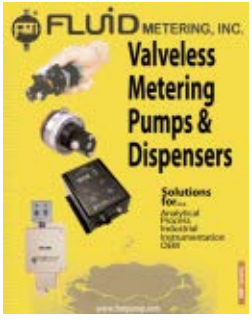

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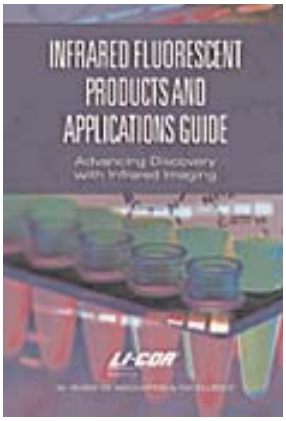
product focus: reagents



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LI-COR Biosciences
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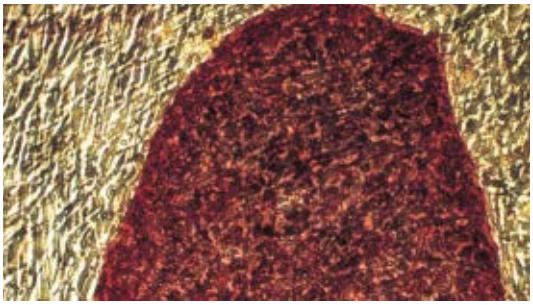


Animal Component-free Medium

The HEScGRO medium is the first commercially available animal component-free medium tested successfully for human embryonic stem cell culture and shown to maintain hES cells in their undifferentiated state. It is serum-free and offers a complete formulation. This medium has been extensively tested and proven to maintain the pluripotential nature of several hES cell lines.

Millipore
www.millipore.com

Cardiac Marker

Human and recombinant creatine kinase MB isoenzymes are available to the clinical research community. This cardiac marker is an enzyme produced primarily in the heart. Elevated levels in the bloodstream indicate heart damage, probably due to a heart attack. It has also been found effective in determining whether or not clot-dissolving drugs are working.

Lee Biosolutions
www.leebio.com

Cytochemistry Kits

These cytochemistry assays are designed for the cytochemical differentiation of leukemias and for cell identification. Most of the assays are available in either liquid or capsule options and the kit format facilitates assay standardization. Classic methods include specific and nonspecific esterases, tartrazine resistant acid phosphatase, alkaline phosphatase, myeloperoxidase, and periodic acid schiff assays.

Sigma-Aldrich
www.sigma-aldrich.com/handh

news notes

BRUKER DALTONICS ANNOUNCES NEW FTMS APPLICATION NOTE

Bruker Daltonics announced the release of a new Application Note, its FTMS-35 "apex®-Qe: A Powerful Platform for Molecular Formula Determination." The ability of mass spectrometry to determine molecular composition is widely applicable to various disciplines including pharmaceutical discovery, metabolomics, petroleum analysis, geochemistry, and environmental chemistry, among others. Performing compositional analysis without fragmentation spectra is advantageous when measuring complex mixtures, and is intrinsically faster, allowing higher throughput in many cases.

To facilitate molecular formula analysis without the need for both MS and MS/MS fragmentation, Bruker Daltonics has developed a Generate Molecular Formula tool within its DataAnalysis software package. When used with high performance mass spectrometers, additional information fortifies the mass measurement to provide an extremely confident determination of the elemental makeup of a given peak. By creating robust statistical models using the masses, intensities, and spacing of each isotope in the measured distribution, the investigator is equipped with all the information required to determine the correct elemental formula for completely unknown organic molecules. Scientists may obtain copies of the FTMS-35 Application Note by sending a request to ms-sales@bdal.com, sales@bdal.de, or Bruker.AsiaPacific@bdal.com.

AGILENT TECHNOLOGIES JOINS UNIVERSITY OF CINCINNATI TO STUDY IMPACT OF METALS

Agilent Technologies and The University of Cincinnati announced the opening of a center at which research teams throughout the Americas will study the impact of metals on biological systems. The University of Cincinnati/Agilent Technologies Metallomics Center of the Americas will research such applications as the role of metal compounds as predictors of stroke damage and new detection methods for chemical warfare agents. The center's charter is to support research in all fields related to the analysis of metals and metal species and their interactions within biological and ecological systems. Applications include neurological research, metalloproteomics, metal tags for ultra-trace-level organic compound determination, and environmental monitoring, among many others, by using liquid chromatography (LC) paired with inductively coupled plasma mass spectrometry (LC-ICP-MS) and mass spectrometry (LC-MS).

The roster of partners, expected to expand globally in the future, currently includes: Argentina Atomic Energy Commission; Indiana University (U.S.); Laboratory of Environmental Research and Services (Argentina); National Council for Scientific and Technical Research of Argentina; National Research Council (Canada); Research and Development Center for Industrial Fermentation (Argentina); University of Guanajuato (Mexico); University of San Luis (Argentina); and University of Sao Paolo Nuclear Energy Center (Brazil).

Are You a Workaholic?

Eugene Raudsepp
From CareerJournal.com

Are you obsessed with your work? Is work dominating your life, replacing family, friends and outside interests? If you hesitate to say "no," think again. Your habits — whether those of a workaholic or "Type A" personality — may be jeopardizing your health and career.

First identified in 1959 by San Francisco cardiologists Meyer Friedman and Ray Rosenman, Type A describes common behavior patterns found among patients being treated for heart disease. Type A people share a chronic sense of urgency and have a tendency to be in constant overdrive. Because they suffer from "hurry sickness," they worry about every wasted moment. They display hostility in a traffic jam, anxiety when they miss the bus, and impatience when they have to wait in line. They clench fists, bang tables, twist and fidget, often acting as if there is an emergency or a life-threatening situation.

At the office, Type-A personalities work hard and fast to achieve. They set backbreaking deadlines and frequently bring work home. They are highly competitive, impatient, and prone to anger if someone gets in the way of their success. Rarely, if ever, are they able to leave the job at the office.

All of this fast-forward pace can exact a high price. Medical and psychological problems attributable to workaholism and stress have emerged as major health hazards. Reportedly, 50% to 80% of all diseases have their origins in stress, and eight of the top 10 causes of death are stress-related. Type A behavior has been accepted as the prime risk factor for heart disease by the American Heart Association and the National Heart, Lung and Blood Institute. Workaholics steeped in Type A habits are prime candidates for stress-related illnesses including ulcers, high blood pressure, and heart attacks.

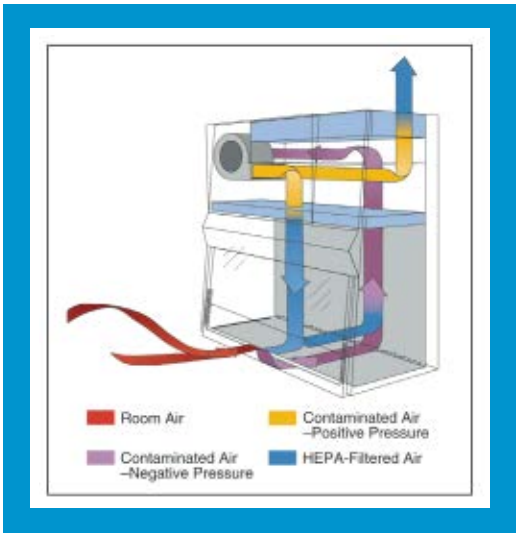
Clearly, the possible risk of work obsession is high. There is a line to be drawn, however, between healthy, ambitious work habits and workaholism. You may be thinking, "I bring work home. Am I headed for disaster?" or, "I hate to wait in line at the movies. Does that mean I'm Type A?" The following questions are designed to help you assess your work habits.

1. Do you take work home and work late into the night?
2. Do you work on weekends and holidays?
3. Do you get to work early to get a jump on things?
4. On Monday mornings are you anxious to get back to work?
5. Would you say that you could undertake many more projects?
6. Do you have to skip or shorten your lunch breaks?
7. Do you ever work while you eat lunch?
8. Do you find that you are harassed by constant, unexpected emergencies?
9. Do you move, walk and eat rapidly because you don't want to waste time?
10. Would you say that you feel harassed and not in control most of the time?
11. Do you find that you can't miss a day of work because you would fall too far behind?
12. Do you find it difficult to say "no" to requests?
13. Is it important for you to do things better than others?
14. Do you feel you always have to be "on" at work?

15. Do you find yourself fretting when others do not "move at your command" or work as fast as you do?
16. Would you rate yourself as exceedingly ambitious?
17. Do you strive for perfection and excellence?
18. At the end of a working day, do you feel exhausted and fit for nothing?
19. Do you find it difficult to relax and do nothing?
20. Do you feel vaguely guilty whenever you relax, especially when you're facing a deadline?
21. Do you find it difficult to enjoy leisure because you can't stop thinking about problems at work?
22. Do you find that leisure time bores you and that you would rather be at the office?
23. Do you find that you don't particularly like taking vacations?
24. Are you able to maintain a good balance between your work and private life?
25. Do you talk about your work on your free time with friends or family?

Is your dedication to work healthy or harmful? If you discover you are walking a thin line between workaholism and healthy motivation, you may want to slow down and take a look at what your obsession is costing you.

Selecting the Right Biological Safety Cabinet for Microbiological Studies Involving Gases or Volatile Solvents

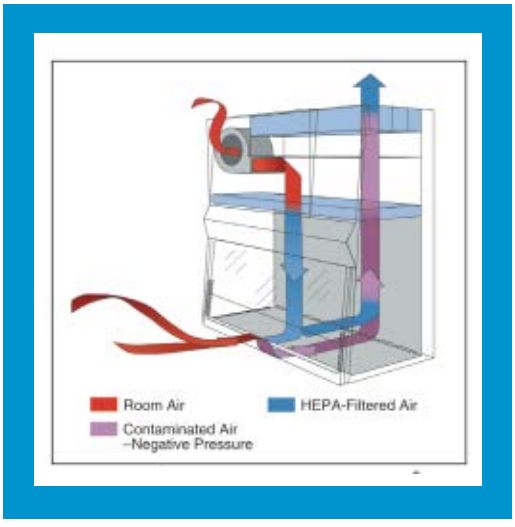


Class II, Type A2 Cabinet Design

When biological research calls for the use of gases or volatile solvents that are hazardous, malodorous, flammable, or irritating, the choice of a Class II Biological Safety Cabinet (BSC) can be critical for your health, comfort, and safety. The risks of using volatile solvents (which generate gases) include personnel exposure to hazardous chemical compounds with associated health issues, fire, and explosion. These gases or vapors need to be vented directly to the outside. The amount of these substances you need to use in your BSC as an adjunct for your biological research will dictate which type of Class II BSC you need.

Class II BSCs are equipped with HEPA filters and engineered air flows to keep laboratorians safe from the harmful biological agents with which investigators work. There are four types of Class II BSCs (A1, A2, B1, B2) that provide personnel, product, and environmental protection from particulates. So, you may ask, "Why are there four types of Class II BSCs?"

The answer has to do with HEPA filters, engineered air flows, and how the design relates to non-biological substances (chemical particulates or vapors). HEPA filters, by definition, have a minimum 99.97% efficiency on particulates. However, HEPA filters do not filter out gases or vapors. Although all types of Class II BSCs provide personnel, product, and environmental protection from particulates, they differ in their ability to handle increasing concentrations of gases or solvents.



Class II, Type B2 Cabinet Design

THE CHOICE OF CLASS II BSC TYPE CAN BE CRITICAL FOR YOUR HEALTH, COMFORT, AND SAFETY

A few safety tips:

- A proper risk assessment must be performed by a qualified biological safety officer or other qualified safety professional before starting a new procedure in any biological safety cabinet. Make sure your new procedure is safe to perform.
- Only bring the minimum amount of solvent or gas into the BSC to perform your work. Addition of more increases your risk.

Cliff Colby

Table 1: NSF #49 Guidelines

Class II Cabinet Type	Amount Recirculation (%)	Amount of gases or solvents
A1	70	Not Suitable
A2	70	Minute Quantities
B1	30–40	Minute Quantities – use in direct exhaust section
B2	0	May be used

- Never use the BSC as a storage space. Excessive items within a BSC can disrupt air flow and compromise your protection.
- Avoid using flammable gases such as natural gas, propane, and butane. There are safe alternatives to Bunsen burners. Not only is there an explosion and fire risk but the heat generated by open flames disrupts air flow and may compromise your protection.
- Some chemical vapors may damage HEPA filter media or its binder materials. This is another good reason to have a thorough risk assessment performed by a qualified individual.

USE A CHEMICAL FUME HOOD FOR CHEMICAL WORK AND THE RIGHT BSC FOR BIOLOGICAL WORK

The National Sanitary Foundation (NSF International), in their standard #49, issued guidelines for the amount of solvents that can be appropriately used within a given type of BSC (See Table 1). However, NSF uses qualitative terms, not quantitative. For instance, for an A2 cabinet, NSF states it is acceptable to use "minute quantities" as an adjunct to microbiological studies. "Minute" may mean different things to different people and this is the essential reason to have a proper risk assessment conducted before starting a new procedure in a BSC. And by stating "as an adjunct to microbiological studies," NSF implies that a BSC should not be used as a chemical fume hood. Use a chemical fume hood for chemical work and the right BSC for biological work.

The amount of solvents or gases acceptable to use in a BSC increases from A2 (with canopy or hard exhaust connection) to B1 and to B2. This is because of the differing engineered air flows in these different types of Class II BSCs. The A2 cabinet recirculates approximately 70% of the air flow, meaning that gases or vapors will also recirculate within the cabinet (remember HEPA filters do not capture gases). These recirculated gases may interfere with your microbiological work and/or gas concentrations could build up to the Lower Explosive Limit (LEL) and result in explosion and fire. The B1 cabinet recirculates about 30–40% (depending upon the manufacturer) and is equipped with a direct exhaust section at the rear of the cabinet where any generated gases are directly exhausted to the outside. The B1 has less recirculation that lessens the chance for interference with biological work and also lowers the risk of concentration buildup to the LEL. Finally, the B2 cabinet does not recirculate any air flow. Sometimes called a "total exhaust" cabinet, the B2 cabinet eliminates any interference with microbiological work and any chance for gas concentration build up.

Whether you are using minute, small, moderate, or large amounts of gases or solvents associated with your biological work, have a qualified safety professional perform a risk assessment and use the proper type of Class II BSC for your health and safety as well as those around you. Be safe.

Cliff Colby *is the Manager for Sales Administration and International Sales at The Baker Company, Sanford, ME 04073. He can be reached at (800)-992-2537; ccolby@bakerco.com; www.bakerco.com.*

Glenn Ketcham, CIH and Vince McLeod, CIH

Get In The Flow!

Recently a thoughtful reader had a question for the Safety Guys. The email read:

TR: Your article points out that hood function can be compromised by "misuse." You specifically cite a condition that we constantly face here in my laboratory — that is the blockage of the back bottom slot by reagent bottles and overloading of the hood. The face velocity (at appropriate sash height) meets the required flow in spite of these conditions. That being the case, is it necessary to remove these items? We operate under the belief that as long as the face velocity meets specifications that we can use the hood without rearranging or removing the contents. Is there an OSHA standard that addresses this situation?

In research laboratories the hood is probably the single most used piece of equipment. It is often shared by lab personnel and, if located in a common area, shared with many labs. Exhaust hoods are available in many different designs. There are chemical fume hoods for working with acid fumes and chemical vapors. For working with biological material, there are clean air benches and biosafety cabinets that serve entirely different purposes. What we want to discuss here — basic design principals and proper operation — deals with one specific type of hood, the chemical fume hood. One problem with hoods that we see a lot is that they are frequently used for storage and become a repository for long-completed experiments as well as wastes. Since the reader's question deals with chemical fume hood operation let's take a look at their design features and proper operation.

Chemical fume hoods are designed to capture and exhaust contaminates resulting from working with chemicals. They are sometimes referred to as wet benches since the chemicals used (solvents, corrosives, etc.) are usually liquid. Their design attempts to create a capture zone in front of the hood, keep generated vapors and fumes within the hood, and draw contaminates away from the worker and into the hood where they are exhausted.

FUME HOOD DESIGN BASICS — FLOW IS KEY

One of the most important design features of a chemical fume hood is the entry. Basic principles of aerodynamics are used to promote a smooth flow of air into the hood. The sides and the sill (the lower lip across the front) are shaped similar to the leading edge of an airplane wing, a foil, to guide the airstreams into the hood with a minimum of turbulence. The idea is to maintain a laminar, non-turbulent flow. The sill is also raised slightly off the bottom or floor of the hood to create an air stream across this surface.

Since a smooth entry is vital, placement of the hood in the laboratory merits careful consideration. They should not be located near doors, busy walkways, or near room air supply or return ducts. All of these can cause turbulence and disrupt laminar flow.

Another important design parameter is the velocity of the air flow entering the hood. The speed of the air needs to be just right. Too slow and it will not capture contaminates or push

them out the exhaust duct. Too fast and turbulence and eddies can lead to slipstreaming and dumping contaminates into the laboratory. The speed of the air across the hood opening is referred to as "face velocity" and is a function of the total exhausted volume and the area of the opening. The basic relationship is velocity is equal to the volume divided by the area. So as the area increases the velocity drops and vice versa. Also, if the volume is reduced the velocity goes down. The hood sash, the sliding door, or window on the front of the hood controls the area open for flow and thus controls the face velocity. Different hood designs use this principle differently with the main types being standard hoods, bypass hoods, auxiliary air hoods, and VAV (variable air volume) hoods.

The third major design feature is the baffling or guiding of the flow in the hood. Chemical fume hoods are designed to handle a wide variety of operations and contaminates. Typically, this is done with a series of baffles on the back wall and/or top of the hood. These are slots with adjustable sliding covers, usually located near the bottom, center, and top of the hood's back panel. By opening and closing the appropriate baffles, more flow can be guided across the bottom, in the center or towards the top of the hood.

FINAL ANSWER — PROPER OPERATION USING THE BASICS

The OSHA standard for Occupational Exposure to Hazardous Chemicals in Laboratories,[1] 29CFR1910.1450, commonly referred to as the OSHA Lab Standard, does not specify safe hood operation, flows, or face velocities. It mandates a chemical hygiene plan be prepared for every covered laboratory and lists the requirements of the CHP. One of those states "that fume hoods and other protective equipment must be functioning properly and specific measures shall be taken to ensure proper and adequate performance of such equipment." The nonmandatory Appendix A contains this statement: "airflow into and within the hood should not be excessively turbulent; hood face velocity should be adequate (typically 60–100 lfm)."[2]

It is up to the operator to know how to adjust flows for their particular need. Some storage in the hood may not affect your use and could be left in place while performing other operations. Things to check and keep in mind are: 1) Are there dead spots in the face velocity or inside the hood and are they located where capture is needed? We recommend face velocity be checked using a grid pattern with a minimum of six readings and that readings not differ by more than 10%. Alternately, air current or smoke tubes could be used to detect dead or low flow zones. 2) Where is capture needed? Are you working with vapors that are lighter than air or heavier? If they are heavier than air, the dampers should be adjusted to capture at the bottom of the hood (e.g., open the bottom slot and close down the upper one) and storage blocking the lower slot may hinder flow and thus hinder proper capture. One quick fix is to install a shelf above the lower baffle so reagents and chemicals stored on the shelf do not block the lower slot. If the vapors are lighter than air you may be okay with some storage in the hood. Use smoke tests to confirm this.

These chemical fume hood basics should get you going in a safe direction. Pay attention to proper flow and remember to adjust the baffles according to the work being done. Finally, routinely check the hood for adequate flow and velocity and recheck if you suspect a problem.

REFERENCES

1. http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10106
2. http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10107

Glenn Ketcham *is a Certified Industrial Hygienist with 22 years experience in the health and safety field. He is currently the Risk Manager for the University of Florida with responsibility for the loss prevention, ergonomics, disaster preparedness, and the occupational medicine surveillance programs. He has managed the laboratory safety programs for both the University of California, San Diego (UCSD) and the University of Florida. In addition, he served as an industrial hygienist with federal OSHA compliance and has a masters degree in environmental engineering sciences with a health physics concentration.*

Vince McLeod *is a Certified Industrial Hygienist and the senior IH with the University of Florida's Environmental Health and Safety Division. He has 17 years of occupational health and safety experience in academic research with focus in the research laboratory. His specialties are in hazard evaluation and exposure assessments.*

The Safety Guys welcome your comments and questions. You can email them at thesafetyguys@labmgr.com.

The High Performance Workplace

The high performance workplace is a work environment that people look forward to entering every workday. It is a world characterized by high energy, excitement, and discovery. Properly channeled and directed, these qualities result in company growth and higher profits shared fairly among employees, managers, stockholders, and the company's community

How can you recognize a high performance workplace? More importantly, how can you help make your work environment a high performance workplace?

WORKING ENVIRONMENT

Two types of employees populate the high performance workplace, the high performers or "A" employees and "B" performers who have the basic tools to become A performers with proper motivation and guidance from management. "C" performers do not have the potential to become "A" performers in their current job assignment. E. Michael Murray, Jr., a Kinsey consultant and co-author of "Leading from the Front" (The McKinsey Quarterly, 1995, No. 3, pp. 18-31), observes that the best companies "get people who are in jobs they can't do out of them very quickly." Consequently, there are very few C performers in the high performance workplace. Co-author Guillermo G. Marmol qualifies this noting, "It's not about firing people. The majority of these companies do not fire people — not systematically anyway." Instead, the C performers are transferred to assignments for which they do have potential to become A performers. Should they not do so despite management encouragement and assistance, then their employment is terminated.

Some firms have programs in which the lowest performing group of employees, often 10%, is periodically fired. This can create a de-motivating work environment as there will always be a lowest performing group even when one has all A performers. For example, assignment to a very difficult project or termination of a project can result in an outstanding scientist contributing little to company performance in a given year. Yet some companies cling to this approach performing such "house-cleaning" as frequently as every year.

The A performers need a workplace that rewards both high performance and risk taking. A high performance workplace can be attractive to high performance applicants or it can be a very stressful place to be. Which it is depends on both corporate culture and the individual unit manager. In a high performance workplace, everyone knows what they are doing and why. Marmol and Murray note, "This creates enormous power and alignment and commitment to getting things done."

RISK TAKING

Many companies pay lip service to risk taking and encourage their employees to take risks to accomplish goals. However, employees soon recognize this as insincere when they see co-workers punished when their risk taking fails. In contrast, high performance workplaces truly encourage risk taking provided that the risks are carefully analyzed and appropriate measures taken to minimize these risks. When the risk taking pays off, employees are awarded commensurate with the results achieved. Should the risk taking fail, there are no negative consequences provided that the risk taking was well managed and executed.

THE MOTIVATION OF MISSION STATEMENTS

Mission statements have fallen into bad repute at many firms because so many are vague, lengthy statements designed to satisfy a number of constituencies. However, a concise mission statement that truly connects with a company's goals truly can motivate people and stimulate development of a high performance workplace as employees strive to accomplish their company's mission.

This motivation just doesn't happen; managers must use the mission statement in a sincere way to inspire employees. Smart managers enable employees to make the connection between mission and profit by emphasizing the importance of their work, their team, their market, their customer, according to Brayton Bowen, author of "Recognizing and Rewarding Employees" (McGraw-Hill, New York). He comments that "organizations that emphasize mission over money outperform the competition every time."

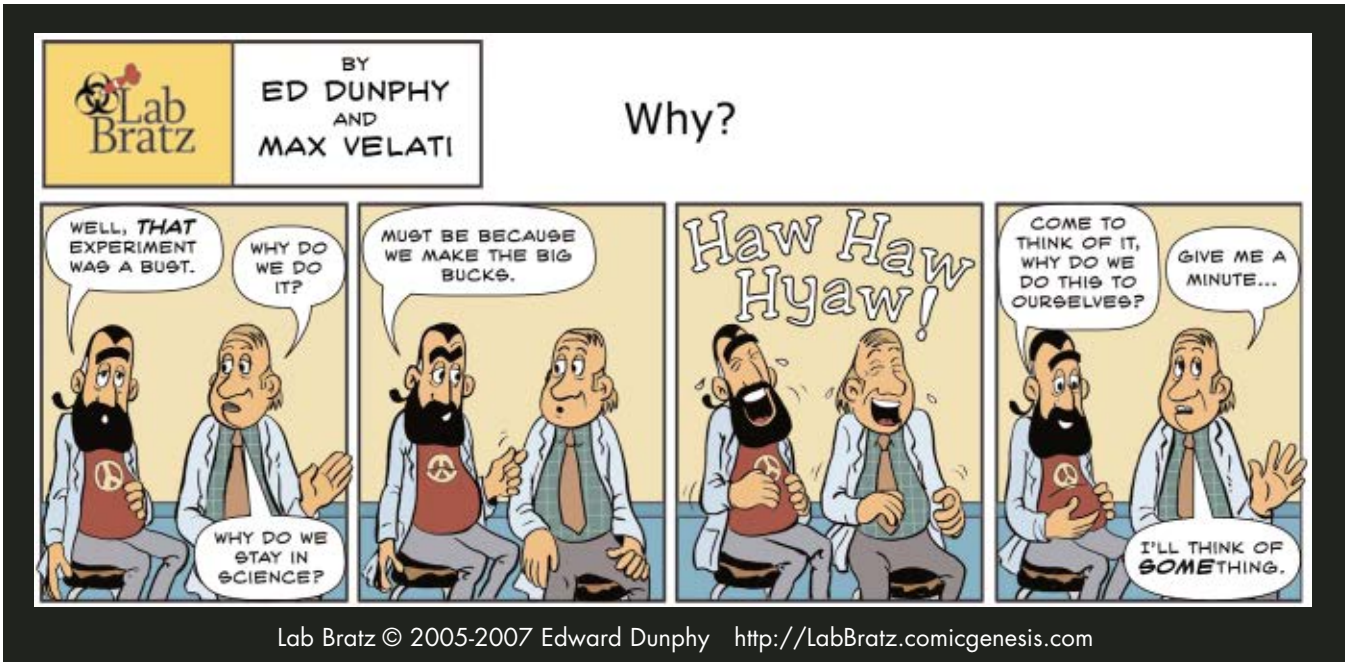
This statement may sound overly idealistic. However, a powerful mission statement, used effectively and sincerely by managers, can align the efforts of all parts of the company in achieving business goals consistent with the mission statement. This alignment increases team effectiveness by focusing effort.

John K. Borchardt

AVOID FALSE STEPS

While it is difficult to create a motivating work place, it is unfortunately very easy for a manager to create a strongly demotivating situation in an instant. For example, at one of my former workplaces a manager announced to a room full of chemists that he couldn't recommend an outstanding technician for promotion because she had taken a three-month maternity leave (in accordance with corporate policy) during the year. With twenty chemists and engineers in the room, this comment soon got back to the technicians. In the short-term, productivity was lost as the remark became the subject of many extended discussions. Longer-term, it affected everyone's motivation as technicians, chemists, and engineers became concerned that their own career advancement could depend on such arbitrary decisions.

Dr. Borchardt *is a consultant and technical writer. The author of the book "Career Management for Scientists and Engineers," he writes often on career-related subjects. He can be reached at jkborchardt@hotmail.com.*



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David H. Persing, M.D., Ph.D.
Executive Vice President, Chief Medical and Technology Officer
Cepheid

When it's time to chill, nothing works for David Persing like tooling about his estate in the bay area of San Francisco on his John Deere tractor, grooming his acreage to prepare for the planting of a vineyard or olive trees. Besides the immediate therapeutic value, he envisions future harvests of liquid gold — juice well worth the squeeze.

As chief medical and technology officer at Cepheid, Persing is wont to "introduce simple, catchy phrases…sort of a corporate mantra." And as he drives the Sunnyvale-based firm toward becoming a world-class manufacturer of molecular diagnostics, he time and again poses a catchall question to keep processes in the right perspective for product stakeholders: "Is the juice worth the squeeze?"

Will the extra effort required to extract a few more drops of juice, and enhance product performance, work to improve market uptake, patient care or medical utility? Does ROI justify a greater investment in detection technology? Can Persing motivate his teams of scientists and specialists tasked to develop diagnostic breakthroughs on "seemingly impossible" deadlines he routinely sets?

"Scientists tend to be perfectionists" who "sometimes get caught in the weedy details," said Persing, who dispenses timely reminders of the global impact of scientific R&D — the squeeze — to get the juices flowing and increase productivity.

The bench is history for Persing, now 51. "I used to be very 'good with my hands,' and have fantasized many times over the years about going back to the bench. One of my thesis advisers spent a year sabbatical doing bench work, and it was a hugely productive time for him."

After a lab medicine residency at Yale, he was recruited to head up a new lab at the Mayo Clinic focused on infectious disease, where he developed diagnostic methods based on nucleic acid detection. After 10 years at Mayo and feeling "increasingly pigeon-holed, as is the case for many academicians," Persing exited in 1999, exchanging Mayo's safety and security for an opening at a small biotech firm in Seattle which he combined with work as medical director of the nonprofit Infectious Disease Research Institute. In 2005, he joined Cepheid.

"My return to working in high-impact medical diagnostics was return to 'home-court advantage.' About 95% of my 250 or so publications are in diagnostics."

Persing advises "not to lose sight of a career goal when life delivers a temporary excursion. Take in the sightseeing…and use what you learn to further your career. My years in pharmaceutical development made me a better judge of opportunities to link diagnostics and therapeutics.

"Diagnostics is on a fast track compared to the therapeutic side. It's much more predictable, and product introductions can be placed onto a five-year plan. Advances in Dx will outpace Rx in he next few years, and we'll hopefully see more intersection between the two, like pharmacogenetics testing having an impact in predicting drug toxicity or guiding drug loading doses, and likely making drugs safer and more effective."

Persing likes the urgency of the industrial research model. "You can get a lot done. You put 30-40 people on a problem, and in six months you get an answer, a target, a product. In some cases it's more superficial than the academic model; you don't drill down as deeply. There are more test wells. But when you do hit, it's a gusher.

Persing reports directly to Cepheid CEO John Bishop, who uses behavioral assessment tests to create personality charts of key employees and identify their hot buttons. Persing relies on his powers of observation, "always in a kind of alert mode." He sits in randomly on team meetings to monitor the dynamics. He hires "the best" managers to "allow me to do less micromanagement."

His "essential toolbox for building good scientific judgment," learned at the knee of his thesis advisors, is fourfold: 1) Don't take science, presented as fact, at face value. Ask questions. 2) Assume that scientists doing basic research are still basically sales people, selling their ideas to get grants, promotions and respect. 3) Since we're immersed in a scientific sales environment, maintain a healthy dose of skepticism. 4) But don't let skepticism create cynicism. Always ask if the juice is worth the squeeze.

Francis Key Kidder *started out as a journalist before moving on to politics and government relations, where he still keeps his hand in writing. He may be reached at 410-828-6529; info@labmgr.com.*

F. Key Kidder

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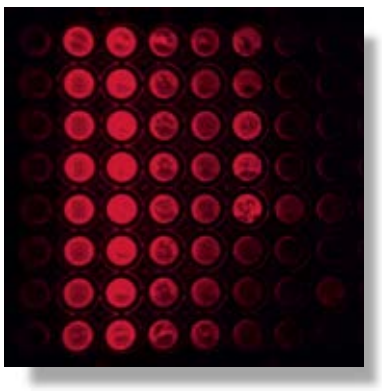
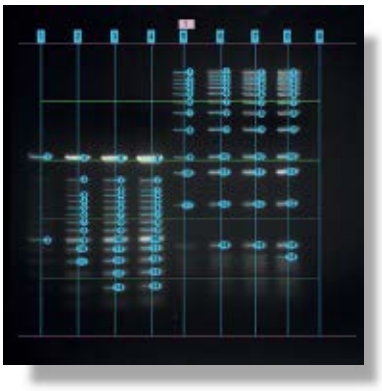
THE KEYS TO HIGH PERFORMANCE





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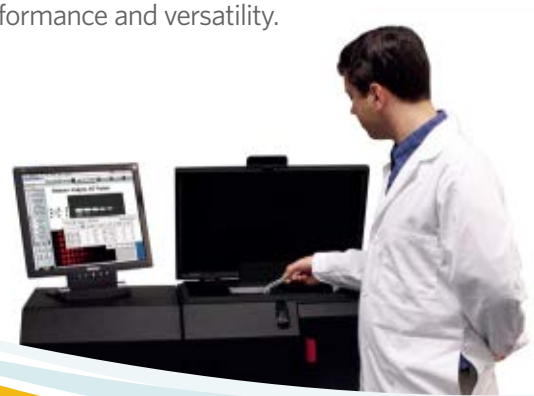

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