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LAB SAFETY

10 years after Sheri Sangji's death, are academic labs any safer?

Chemists discuss their efforts

by ***Jyllian Kemsley***

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On Dec. 29, 2008, Sheharbano "Sheri" Sangji was **working on a chemical synthesis** in a lab at the University of California, Los Angeles. One of the reagents she was using was *tert*-butyllithium (*t*-BuLi), which ignites spontaneously in air. It was likely only the second time she had handled such a hazardous substance. She had graduated from college a few months earlier and was working in the lab as a staff scientist while applying to law schools.

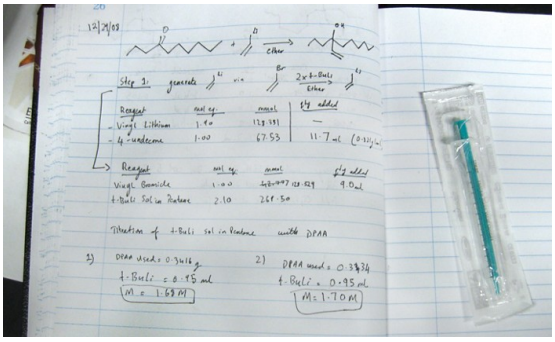
Credit: Courtesy of Naveen Sangji

Sheri Sangji

She was transferring a total of 160 mL of *t*-BuLi solution using a 60 mL plastic syringe, **according to her lab notebook**. For unknown reasons, the plunger came out of the syringe barrel and the *t*-BuLi was exposed to the atmosphere. The *t*-BuLi ignited, along with Sangji's clothes. She wore nitrile gloves, no lab coat, and possibly no eye protection. A lab mate attempted to use a lab coat to smother the fire, then started pouring water on Sangji from a nearby sink.

"Her clothing from the waist up was largely burned off, and large blisters were forming on her abdomen and hands—the skin seemed to be separating from her hands," the lab supervisor, chemistry professor Patrick Harran, later recalled for investigators. Sangji died from her injuries on Jan. 16, 2009. She was 23 years old.

The California Division of Occupational Safety and Health **fined UCLA $31,875** for workplace safety violations leading to Sangji's death. The Los Angeles County District Attorney charged the University of California system and Harran for **felony violations of California labor laws**. **Both** cases **settled**.



Credit: UCLA

Sheri Sangji's lab notebook page from the day of the fire.

Credit: UCLA

Sheri Sangji used a plastic 60 mL syringe to transfer *t*-BuLi.

Sangji's death and the felony charges rocked the chemistry community. Whether they inspired long-term changes in experimental planning and practices is unclear.

Her death pushed some chemists to try to improve academic lab safety culture to prevent similar accidents at their own institutions and beyond. C&EN asked scientists from all corners of the chemistry community to describe their efforts. Read on for their strategies, including incorporating safety into chemistry education, improving training, and developing resources to help people work in a safer manner.

Yet large-scale, systemic change remains elusive, as demonstrated by grievous incidents in the decade since Sangji's death. Postdoctoral researcher Meng Xiangjian died in a **hydrogen explosion** at Tsinghua University in 2015. Graduate student Preston Brown lost three fingers and damaged his eyes in a **nickel hydrazine perchlorate explosion** at Texas Tech University in 2010. And postdoc Thea Ekins-Coward lost one of her arms in a **hydrogen-oxygen gas mixture explosion** at the University of Hawaii at Manoa in 2016.

Meanwhile, Sangji's family continues to grieve. "She had so much spirit, energy, hope, and ambition. She hated injustice. She wanted to change the world," says Sangji's sister, Naveen Sangji. Sheri Sangji has missed family graduations, weddings, and births, Naveen notes. Their parents continue to visit the cemetery where she is interred at least weekly. "We will feel her absence in our lives forever."

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We're not there yet

Honor Sangji's memory by encouraging safer laboratory practices

by ***Chemjobber***

It is hard to believe that it has been 10 years since Sheri Sangji died. Since that time, thousands of words have been written about what happened, who was to blame, and how the chemistry community should respond.

Positions then and now
- **2008:** Postdoctoral fellow, industry
- **2018:** Employee, fine chemical manufacturing industry

I still find the story as horrifying as when I read about it the first time. I trained as an organic chemist and was a postdoctoral researcher at the time of the incident. Each time I learned a new detail, I turned it over in my head, asking myself questions such as, "Would this have been allowed in my graduate school group?" and "What would I have done in this situation?" I concluded that my lab group would have never allowed something similar to happen, although we surely had some near misses.

Nevertheless, the lab environment in which Sangji worked and the circumstances that led to her death were certainly not unique. I suspect that every chemist reading this essay can point to serious safety concerns in laboratories they have worked in or visited. Did someone ever work with an unusually dangerous reagent? Was that person well trained? Did well-trained senior personnel watch over junior scientists performing the procedure? Was all the available literature consulted and all the necessary equipment acquired before the procedure was performed? Were other experienced personnel aware of what was going on and available to help if something went wrong? I hazard a guess that few of us could answer yes to all those questions.

What has been accomplished in the past 10 years? The University of California system, following its legal agreement with the Los Angeles County District Attorney, has **reams of new standard operating procedures and documentation**. Other large research institutions have paid attention to the legal precedents set in California and revised their internal procedures. Whether these procedures are being followed is unclear, as is whether they are improving the safety of the scientists working in these organizations.

> "The lab environment in which Sangji worked and the circumstances that led to her death were certainly not unique.

What I think has not changed are incentives in academia that discourage scientists from pursuing safer work practices. The pressure on scientists young and old to produce data for publications and grant applications hasn't decreased. And young scientists in groups that may be ignorant of or

indifferent to best practices in chemical safety still face daunting challenges to inform themselves and their colleagues. The chemistry community can honor Sangji's memory by finding ways to encourage and ease safer laboratory practice.

One way to do this individually is to bring up safety issues whenever we can. It can be a burden to do this—you can be labeled as "the annoying one" when flagging unconsidered safety hazards in the laboratory. But to do better by Sangji and the many young and inexperienced people who will continue to enter laboratories, we must be willing to insist that before starting any experiment, we step back to ask if we can do it in a safer manner.

How we're making compliance beneficial

Developing a culture of safety is an ongoing process

by ***Debbie Decker***

In the days and weeks after Sheri Sangji was injured and then died, I think health and safety professionals across the US carried with them an icy ball of fear that something similar could happen at their own institutions. Another brilliant, beautiful life could be cut short because of a lack of oversight and a lack of will to insist on a robust culture of safety.

Credit: Tyler Mauritz

Positions then and now

- **2008:** Chemical hygiene officer, Environmental Health and Safety, University of California, Davis
- **2018:** Safety manager, Department of Chemistry, University of California, Davis

In the years since, the chemistry community has come a long way. Yet we haven't come as far as we can or should toward protecting those who do the heavy lifting of discovery research.

While California regulatory and legal agencies conducted their investigations at UCLA, I did my best to educate myself and provide as much information as I could to researchers who were using pyrophoric reagents on my campus, the University of California, Davis.

When the settlement agreement between the UC system and the Los Angeles County District Attorney was finalized in 2012, we had very little time to meet our first milepost toward meticulous adherence to the California Division of Occupational Safety and Health's requirements for laboratories. It felt like a tsunami of compliance. Excellent support from the Chemistry Department's chair and Safety Committee chair eased corralling of the grumpy and unwilling.

After the initial compliance obligations were behind us, we revisited how to better support our researchers. In particular, I worked with our Environmental Health and Safety office to develop a standard operating procedure task force composed of graduate students, safety personnel, and me. The task force developed templates to describe safe handling and storage of chemical groups according to the chemicals' hazards, and it continues to work on procedure- and task-based templates. This effort has proved to be incredibly valuable in moving our safety culture beyond compliance with regulations and toward a more risk-based approach to working more safely. This task-force model has spread beyond the Chemistry Department and now includes members from the College of Engineering.

I have been able to work closely with safety representatives from department lab groups to support

> "It felt like a tsunami of compliance.

and cultivate their efforts to promote safer lab practices. The department also funds a half-time teaching assistant to support our safety program (two of my former assistants now work in academic health and safety jobs). We're now at the point where safety compliance in the Chemistry Department is almost routine, and we're able to take a higher-level view of laboratory activities. Many research groups regularly discuss safety items and share unexpected events. Undergraduate classes introduce the concepts of hazard recognition and risk assessment. But a comprehensive program of hazard assessment and risk mitigation remains elusive.

I still live with that icy ball of fear. But I'm encouraged by the efforts and support of the graduate students and faculty with whom I work. I'm also encouraged by the efforts of the chemistry community more broadly. The American Chemical Society, which publishes C&EN, has **made safety one of its core values**. I was also honored to work with the ACS Board of Directors to develop its **policy statement on safety**. There's always more work to do, but we have made significant progress from where we were in 2008.

I thought it would never happen to me

When it did, attention to safety mitigated the consequences

*by **Ian A. Tonks***

"Don't worry, that would never happen to me" was a common refrain I used with friends and family in the wake of Sheri Sangji's death.

Credit: Megan E. Davis

Positions then and now
- **2008:** Graduate student, Division of Chemistry and Chemical Engineering, California Institute of Technology
- **2018:** Assistant professor, Department of Chemistry, University of Minnesota Twin Cities

Although the Sangji case rightfully sparked much-needed discussion and action on academic laboratory safety at the national level, in many cases we were (are) much slower to embrace change as individuals. This was certainly the case for me. When she died, I was a third-year graduate student. I'd been working with pyrophorics for several years. I was young and felt invincible. It was difficult to comprehend the potential severe consequences of a lab accident. As a result, Sangji's death was for me not an instant paradigm shift but rather the start of a gradual awakening to the importance of laboratory safety.

In my graduate lab at the California Institute of Technology, one of the most noticeable and important changes after Sangji's death was that we, as a group, actually talked about safety on our own. These discussions began as a way to process and cope with what had happened and evolved into taking control of our own safety in lab.

To be honest, many of these initial discussions were met with serious eye rolling from me: Do we really need to be talking about this? Don't we all know how to be safe? Most of my previous experience with safety training had been out of touch with the modern lab experience, and as a result I was jaded and overconfident. I knew not to jam glass tubing into a rubber stopcock for risk of impaling my hand—but where were the modules on handling pyrophorics, high-vacuum line operation, or scale-up procedures? Because

these facets of safety training were overlooked, I assumed that I was an expert.

However, as lab safety discussions became normal, hearing my colleagues discuss safety concerns helped me realize how easy it is to miss various aspects of risk assessment and proper experimental planning. We talked about near misses and accidents and plotted out ways to run new, nonstandard reactions.

> "One of the most noticeable and important changes after Sangji's death was that we, as a group, actually talked about safety on our own.

It was jarring for me to hear how other researchers with similar or greater experience could still run into serious problems. This was a key factor for me to realize how seriously and carefully we need to operate in an academic chemistry setting. While some accidents are avoidable, in an academic lab where everyone is inexperienced, there is a built-in risk that we as students, postdocs, and faculty all need to acknowledge and strive to minimize. It was from these initial discussions that I teamed up with Alex Miller, a chemistry professor at the University of North Carolina at Chapel Hill, to create the Safety Net (**safetynet.web.unc.edu**) to share safety information and procedures among synthetic chemists.

Barely three years after Sangji's death, I had a serious and, frankly, terrifying lab accident of my own. I thought it could never happen to me, but I was wrong. The intervening years of safety emphasis served me well in that my reaction was scaled down, I wore personal protective equipment, and emergency plans were in place and followed. I hope Sangji's legacy is that academic departments identify safety as a critical component of research and that students actively participate in safety initiatives. As a junior faculty member now, I'm grateful to be part of a department where safety is valued.

How to instill a robust safety ethic

Graduate programs could train for hazardous procedures as they train for NMR use

*by **P. J. Alaimo and Joseph Langenhan***

The death of Sheri Sangji prompted chemistry faculty nationwide to reflect on institutional safety practices and the culture we promote within our laboratories. The accident reaffirmed our important responsibility to inculcate from day 1 a robust safety ethic in students.

As organic chemistry faculty at a research-active, predominantly undergraduate institution (PUI), we have students who are quite inexperienced in our laboratories. Our approach has been to condition students to be mindful of safe practices through safety teams in our instructional labs (*J. Chem. Educ.* 2010, **DOI: 10.1021/ed100207d**).

For each lab session, a student team is assigned to research chemical hazards, procedural hazards, protective equipment, and waste disposal. The team then conducts the prelab safety discussion, monitors the lab periodically, and conducts a postlab inspection. This approach empowers students to view themselves as stewards of safety and seems to promote a sense of responsibility that manifests in attitude and behavior.

P. J. Alaimo

Credit: Courtesy of P. J. Alaimo

Joseph Langenhan

Credit: Courtesy of Joseph Langenhan

Positions then and now

- **2008:** Assistant professors, Chemistry Department, Seattle University
- **2018:** Professors, Chemistry Department, Seattle University

We are not alone in thinking carefully about safety in undergraduate chemistry education. Many organizations have developed resources to promote safety in teaching and research laboratories. The use of standard operating procedures (SOPs) has become more common at PUIs and graduate institutions.

But PUI faculty have a luxury that graduate faculty do not. Handling highly hazardous materials like pyrophorics is arguably not central to undergraduate research training, so we may eliminate use of them or handle them ourselves. Faculty mentoring graduate students, however, must turn out synthetic chemists competent in the use of such reagents.

Reflecting on this difference, and on our own experiences as organic chemistry PhD students at top 10 institutions, we see an opportunity that could help prevent future tragedies: centralizing at the departmental level hands-on training for the safe execution of particularly hazardous procedures.

Many synthetic PhD students complete organized training on the use of nuclear magnetic resonance instruments. That training is designed, in part, to ensure students do not damage expensive equipment. Yet, to our knowledge, most PhD programs do not provide centralized hands-on training for using substances that can cause grave injury or death.

A course taught by a trained advanced graduate student or postdoc could teach the use of dangerous materials. For synthetic chemists, this might look like reading an SOP; watching a trained person perform tasks; practicing on nonhazardous materials; maybe practicing on less-hazardous materials that give obvious indicators of leaks, like $TiCl_4$; and practicing on increasing scales.

No such course could possibly be comprehensive; however, by selecting examples from commonly used classes of dangerous materials, such a course could have a significant impact and hopefully prevent accidents.

TRAINING CANDIDATES

Chemicals that could be covered in a graduate-level course on handling hazardous chemicals include the following:

Air-sensitive solids and liquids—for example, potassium metal, silanes, and phosphines

Alkylating agents—for example, methyl triflate

Heavy metal–containing materials—for example, compounds of Hg, As, Tl, and Pb

Pyrophorics—for example, $(CH_3)_3CLi$, $NaNH_2$, and $LiAlH_4$

Toxic volatiles—for example, $COCl_2$, HCN, Cl_2, and F_2

Highly toxic materials—for example, NaCN, NaN_3, and $Ni(CO)_4$

We turned a horrific incident into a force for good

Safety Day fosters a culture of safety in the chemistry department

*by **Nicole S. Sampson and Jonathan Rudick***

At the time that one of us (Nicole) became chair of the Chemistry Department at Stony Brook University in 2012, the criminal legal proceedings over Sheri Sangji's death were covered frequently by **C&EN's *Safety Zone.*** Sangji's death and the events surrounding it were somber reminders that safety in all laboratories is a community responsibility.

Nicole S. Sampson

Credit: Conor Harrigan/Conor Harrigan Photography

Positions then and now

- **2008:** Professor, Department of Chemistry, Stony Brook University
- **2018:** Distinguished professor and interim dean of the College of Arts and Sciences, Stony Brook University

Watching from afar, we grappled with the prospect that equally severe accidents could happen in our own laboratories. Then Superstorm Sandy brought extraordinarily high winds and massive flooding to Stony Brook University and its surrounding areas.

Labs were shuttered. People sheltered in place. Power, communication systems, and classes were disrupted for more than a week. Even as the campus regained utility services, the areas where researchers lived remained incapacitated, and transportation was limited.

Five days after the storm, the Chemistry Department was scheduled to hold its 13th Annual Chemistry Research Day, a campus-wide research symposium. With no way to determine the status of department members, leadership decided to do a meet-up that would serve as a roll call for our students, postdocs, staff, and faculty.

Jonathan Rudick

Credit: John Griffin/Stony Brook University

Positions then and now

- **2008:** Postdoctoral researcher, University of Pennsylvania
- **2018:** Associate professor, Department of Chemistry, Stony Brook University

The extent of the storm's devastation rapidly became apparent from the stories told at that meeting. Amazingly, the Stony Brook chemistry community had emerged with no casualties. We realized how lucky we were—and that next time, luck might not hold out. This natural-world crisis presented an opportunity to act on concerns that Sangji's death had surfaced about our department's safety management.

So when it came time to reschedule our research event, we turned Chemistry Research Day into Chemistry Research and Lab Safety Day. We aimed to address shortcomings in our processes and to improve our safety culture across the department.

We engaged students to develop live demonstrations to highlight best safety practices from their laboratories. We worked with our Environmental Health and Safety group to allow event participation to substitute for safety training modules. We turned the day into a friendly competition, with rewards for the most compelling demonstrations and the labs that did the best in safety inspections.

From this improvised beginning, a culture of safety has taken root. Chemistry Safety Day is now a **stand-alone annual event** whose format continues to evolve. Every student seminar includes a safety moment, and PhD candidacy exams incorporate a safety component. Nicole extended these efforts to highlight safety and responsible conduct across disciplines when she stepped into leadership of the College of Arts and Sciences.

We, the chemistry community, cannot bring back Sangji's life. At Stony Brook, we have tried to turn her death into a force for positive culture change to minimize risk in the laboratory and to place academic value on safe laboratory behavior.

> "We realized how lucky we were—and that next time, luck might not hold out.

What we can learn from safety experts in other fields

Adopting best practices may preserve rather than hinder researchers' freedom

by ***Holden Thorp***

Nearly every chemist has some connection to a major safety incident. For me, I started graduate school at the California Institute of Technology a year after graduate student **Ramsay Bittar was severely injured** when a flask overpressurized and exploded during a synthesis procedure and a shard of glass severed an artery in his neck.

Credit: Steve Exum

Positions then and now

- **2008:** Chancellor, University of North Carolina at Chapel Hill
- **2018:** Provost and executive vice chancellor for academic affairs, Washington University in St. Louis

Years later, a colleague in the field of bioinorganic chemistry, Dartmouth College professor Karen Wetterhahn, **died of mercury poisoning** after exposure to dimethylmercury in her lab. Her group was working on science close to mine, and I talked with her students about how to finish their research after her death.

My connection to Sheri Sangji came when the National Academies of Sciences, Engineering, and Medicine asked me to chair a committee that would prepare a new report on chemical safety. The study was commissioned partly in response to Sangji's death, and the academies had a novel idea to pair leading chemists from many career stages with experts in safety practices used by multiple industries, including the airlines and manufacturing. I enthusiastically agreed to this assignment and was pleased to be joined by cochair David DeJoy, a **behavioral science expert on safety** from the University of Georgia.

Each group—the chemists and the safety experts—was in for some surprises. The chemists arrived skeptical of the heuristics and rubrics of safety culture, such as how to encourage people to stay mindful and engaged in routine tasks rather than become complacent, or the common characteristics of organizations that have a high level of safer work practices. But over time, the chemists came to agree that the ideas from safety culture specialists could make big differences in improving the culture of laboratory chemical safety. Some examples include university leaders establishing policies and deploying resources to maximize a strong safety culture, department chairs promoting collaboration among lab groups and safety professionals, and scientists incorporating hazard analysis into research processes.

The safety culture experts were most surprised by the level of autonomy afforded to bench

> **"We all agreed that laboratory scientists needed to make greater strides toward a culture of safety so that researchers' freedom could be maintained.**

researchers in the laboratory. In most of the other industries they had studied, a more elaborate apprenticeship occurred before workers could take on hazardous tasks, and more constraints were put on the types of operations that workers could pursue. The chemists impressed on the safety experts that undermining this freedom would severely curtail creativity and accomplishment.

We all agreed that laboratory scientists needed to make greater strides toward a culture of safety so that researchers' freedom could be maintained.

Less than two years after our report, **Safe Science,** came out, there was another tragic accident when a mixture of hydrogen, oxygen, and carbon dioxide exploded in a microbiology lab at the University of Hawaii. Postdoctoral researcher Thea Ekins-Coward lost one of her arms in the explosion.

Clearly, we still have work to do to promote safer laboratory practices. If we don't progress on this front, I fear stricter safety controls will curtail the autonomy that enables adventurous, curiosity-driven research.

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A decade after a needless lab death, how to strengthen safety

By Beryl Lieff Benderly | Jan. 9, 2019 , 3:10 PM

Reprinted from Science Magazine

Ten years ago this month, on 16 January 2009, 23-year-old lab technician Sheharbano "Sheri" Sangji died of the burns she sustained when an ill-prepared and risky experiment **went calamitously wrong**. This totally preventable waste of a young life is the most significant and revealing thing I've witnessed in more than 15 years covering early-career science issues, with the catastrophe's dispiriting aftermath a close second. That's because no responsibility that universities and faculty members shoulder—not making discoveries, not publishing articles, not winning funding, and certainly not advancing their own careers—matches the moral weight of safeguarding the students, postdocs, technicians, and others whose labor makes all those other things possible.

Working safely in the face of potential danger demands unrelenting, systematic attention to the reality of risk—thinking in advance about the specific hazards inherent in particular tasks—and determination to find ways to both lessen the chance that something will go wrong and protect oneself when it does. This approach explains the **strikingly positive safety record** of U.S. commercial aviation. University science, however, has generally failed to internalize this way of thinking and convey it to students, observes Harry Elston, editor of the *Journal of Chemical Health and Safety*. "The reason always revolves around two excuses: 'We don't have time in the curriculum' and 'We're not safety experts.'" This month, to honor Sheri's life, we consider steps that institutions, organizations, and individuals can take to counter this mindset.

Follow the money

Sheri was working on a project funded by the National Institutes of Health (NIH). The agency could have made a powerful impact on labs across the nation, changing incentives in favor of better safety standards, had it taken action after the fire. Instead, NIH did nothing except continue to fund her lab chief, professor Patrick Harran of the University of California, Los Angeles, even though he faced felony charges and served probation in connection with the conditions that caused the death.

In fiscal years 2010 and 2011, according to **NIH's RePORTER grants database**, the agency renewed an existing R01 grant, awarding Harran more than $300,000 annually. Felony charges were brought against Harran in December 2011. Then, in fiscal year 2014—the same year that Harran **accepted responsibility for the conditions leading to Sheri's death** as part of the settlement of the legal case against him—he was awarded two new R01 grants totaling more than $900,000 a year. Those grants have been renewed every year since.

Last month's Taken for Granted

Taken for Granted is a monthly column about training and career issues from scientific workforce expert Beryl Lieff Benderly.

A decade after a fatal lab safety disaster, what have we learned?

Read more Taken for Granted

"A lot of very talented researchers go unfunded every year," says Sheri's sister Naveen Sangji, who is now completing her training as a trauma surgeon specializing in burns. "If you don't fund him, there will be a hundred others who will not be endangering their workers and their researchers, their students and their lab technicians."

The U.S. Department of Homeland Security (DHS), on the other hand, offers an example of how a funding agency can create pressure for positive change. After a preventable explosion that occurred during a DHS-funded project **maimed a graduate student** at Texas Tech University in Lubbock in 2010, the DHS Centers of Excellence began requiring funding recipients to submit and maintain **research safety plans**. In DHS's **Scientific Leadership Award** program, the research safety plan counts for 10% of proposed projects' scores in the internal review phase of the selection process. The plans must, among other things, identify "possible research hazards" and assure that all procedures "conform to generally accepted safety principles," with "independent review by subject matter experts of the safety protocols and practices." They also need to guarantee "faculty oversight of student researchers" and "education and training to develop a culture of safety."

DHS provides only a small portion of the funding that supports academic research, however, so its policy's influence is necessarily limited. The example set by NIH—which **accounts for more than half of U.S. academic research funds**—unfortunately speaks much louder.

Taking action

The "onus is on the scientific community to … demand change and work for it within their own professional associations and their societies and their universities," Naveen says. For one example, Harran's selection as a AAAS Fellow in 2015 **sparked controversy** and **was later rescinded** following protests. (AAAS publishes *Science* Careers.) In September of last year, AAAS **announced a new policy** for revoking a "AAAS Fellow's lifetime honor" for "proven scientific misconduct or serious breaches of professional ethics." This "would apply to any case of serious scientific misconduct, such as, for example, the Harran case," AAAS CEO Rush Holt told *Science* Careers by email.

The American Chemical Society goes even further. Having declared safety **a core professional** value, it includes a question about the person's safety record in all nominations for its national honors.

Efforts and policies like these are a step in the right direction. As Naveen and many other safety advocates believe, serious safety incidents should permanently stain and, if appropriate, even end responsible scientists' careers.

Universities across the country have also taken a variety of other steps to strengthen their safety cultures and heighten awareness and knowledge. A small sample of replicable ideas that I have heard of lately includes a **computerized registration system** that connects both students and faculty members to mandatory safety training about the particular risks presented in their laboratory courses. **"Soft skills" training** for environmental health and safety staffers improves their ability to work collaboratively with researchers. **"Safe + Sound Week" observances** focus attention on institutions' commitment to safety with activities such as awarding prizes to people "caught in the act" of working safely. **Posters** and **safety fairs** with attractive themes offer the chance for informal learning.

Student safety initiatives provide leadership opportunities while fostering engagement with safety. A group of Northwestern University students, for example, were inspired to start the **Research Safety Student Initiative** after visiting the **Dow Lab Safety Academy**. The volunteer organization carries out projects that range from voluntary lab walk-throughs that identify the safest research groups to ice cream socials where students can discuss safety topics with experts.

We can't know how many disasters haven't happened because people improved their safety practices—though, as Naveen says, "if we have managed to prevent even one additional incident," the years of advocacy and effort will have been worthwhile. There have never been reliable statistics on academic lab safety incidents to track progress.

But there is anecdotal evidence that limbs—and maybe even lives—have indeed been saved. To take one example, in 2012, chemistry professor Ian Tonks of the University of Minnesota in Minneapolis experienced a "serious and, frankly, terrifying" **mishap**, he recalled recently in ***Chemical & Engineering News***. But thanks to "years of safety emphasis" that followed Sheri's death, he continues, it ended noncatastrophically. "[M]y reaction was scaled down, I wore personal protective equipment, and emergency plans were in place and followed."

Tonks admits that, given his training and experience, he had "thought it could never happen to me." But so, of course, does everyone, and thus the urgent need for all academic scientists to follow Tonks's example. Had Harran's lab taken such precautions, we would not be observing this mournful anniversary.

Read more Taken for Granted stories

Posted in: **Taken for Granted**, **Column**, **Non-disciplinary**
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