

**News / World****A young lab worker, a professor and a deadly accident**

The tragic story of a young lab assistant, whose death exposed lax safety at UCLA and other universities and has led to an unprecedented criminal trial.

---



Sheri Sangji with her brother, sister Naveen and parents at her graduation from Pomona College.

---

**By: Kate Allen** Science and Technology reporter, Published on Sun Mar 30 2014

LOS ANGELES—Until Sheri Sangji's screams split the calm, Dec. 29, 2008, was a subdued day in the UCLA Molecular Sciences Building. Campus was mostly deserted for Christmas break.

Sangji was working on a reaction involving tert-Butyllithium. She was 23 and had earned her bachelor's degree that spring. Two older postdoctoral fellows were engrossed in their own work nearby. Patrick Harran, the chemistry professor who had hired Sangji as a research associate two months earlier, was in his office one floor up.

Tert-Butyllithium, or t-BuLi for short, is what's known as pyrophoric: it ignites spontaneously in air. Sangji picked up a plastic syringe and began drawing up 54 millilitre quantities.

One of the postdocs heard Sangji scream. He looked up and saw her on fire. He tried wrapping his lab coat around her, but that caught fire too. The other postdoc called 911 and ran to find Harran. When Harran arrived, Sangji was sitting on the floor with her arms outstretched, shaking. Her synthetic sweatshirt had burned away, and large blisters were beginning to form on her abdomen. The skin was separating from her hands. She had not been wearing a lab coat.

At the specialized burn centre where she was treated for the next 18 days, Sangji was at first conscious and in great pain. She worried that she would lose use of her hands.

Then her organs began to fail, and on Jan. 16, she died. A doctor later testified she had suffered second- and third-degree burns to nearly half her body. Sangji was buried in Toronto, a short drive from her parents' house.

Nobody involved in Sangji's story claims her death was anything other than tragic. But lawyers for Harran, the professor, say that tragedy was rooted in Sangji's own actions: she was an experienced chemist who had botched a basic experiment she had completed successfully before. Her death was an accident, not a crime.

Prosecutors for the Los Angeles County District Attorney's Office disagree.

The systemic failures that led to Sangji's death began accumulating well before the day a young, inexperienced woman was permitted to undertake a dangerous experiment alone, California workplace safety investigators concluded in a 2009 report. She was never properly trained or even issued a lab coat. Harran's lab had been cited for safety problems but given an extension on the cleanup date. And in earlier incidents, two other students were seriously burned at UCLA labs, but nothing at the school changed.

The D.A. charged Harran with four felony labour code violations, and if convicted he could go to prison for four years. The case, currently on hold while Harran's lawyers seek to get it dismissed in appeals court, is the first criminal prosecution of an American academic for a lab accident.

The trial has startled the scientific community, prompting debate over whether Harran was grossly negligent or following standard protocol for academia, where free-ranging intellectual curiosity trumps bureaucratic strictures.

But nobody disputes that safety culture at universities is widely divergent from safety culture in private, industrial labs.

"What happened there is unacceptable, but what happened there could have happened to other professors too," says [Wayne Wood](#), associate director of university safety at McGill. In 2010, a graduate chemistry student in Texas lost three fingers and damaged an eye during a dangerous experiment. In 2011, a Yale undergraduate working late at night was asphyxiated when her hair caught in a chemistry lab lathe. There are no good statistics on the differences between academic and industrial safety, however, and oversight varies by state and province.

"I think a lot of people are running scared. But the problem is how to run," says [Bill Tolman](#), chair of the chemistry department at the University of Minnesota.

"The most difficult thing to do is change a culture."

### **From Karachi to L.A.**

[Sheharbano Sangji](#) — Sheri for short — was born in Karachi, Pakistan, to a comfortable middle-class family whose biggest conflict seems to have been who would get to read the newest issue of Time magazine first. Sangji and her siblings, an older sister and a younger brother, would fight to get in the door and monopolize it for the rest of the afternoon.

Naveen Sangji, the eldest, said her sister was shy as a child. That changed with adolescence.

“I will tell you, she was not shy anymore,” Naveen said. “She was very confident. She knew what she wanted out of life.”

The children were encouraged to strive academically. They were all accepted to Karachi Grammar School, an elite institute whose alumni include Benazir Bhutto, the former prime minister of Pakistan, and a long roster of international who’s who.

In her final year there, Sangji discovered that the school’s timetable was arranged so that she couldn’t enroll in history, her favourite subject, along with the full complement of sciences. She wrote a petition explaining why history and science were important to study together, gathered signatures from her classmates, and marched into the headmaster’s office.

“She got it done,” said Zahra Khan, one of Sangji’s closest friends. “Most people would have just been like, ‘Oh, I can’t take this, I’ll just take something else.’”

Sangji was keenly alert to inequality and disinclined to sit back and accept it, her friends say.

Sangji followed her older sister to Pomona College, a well-regarded liberal arts school in California; her parents moved to Toronto the same month. She majored in chemistry and by all accounts she excelled, earning outstanding grades and working in the lab of a professor.

But inequality was what tugged at her. “She had a big presence on campus, especially for social issues,” said Prashant Kotwani, who first met Sangji when Sangji volunteered to mentor incoming international students. Sangji chose social justice over science, and decided to apply to law school.

While working on her applications, she took a job at Norac Pharma in Azusa, just east of Los Angeles. But she wanted to be in the city, so when she saw an opening at UCLA, she applied and was hired. She started work in Harran’s lab on Oct. 13, 2008.

Harran was still a newcomer to Los Angeles too. In July, he left a tenured position in Texas to take up a newly minted endowed chair in organic chemistry.

Details of [Patrick Harran](#)’s personal life are hard to come by, thanks to the trial. His colleagues declined to comment or didn’t respond to inquiries.

His professional life followed a clear trajectory. After earning a PhD from Yale, Harran did a postdoctoral stint at Stanford, and then joined the faculty at the University of Texas Southwestern Medical Center in 1997.

For the next decade, Harran worked to create molecules that mimic those found in nature and that might be effective in fighting diseases, particularly cancer and obesity. One project involved synthesizing diazonamide A, a toxin discovered in sea squirts. Harran and colleagues demonstrated that one of the compounds kills cancer cells with few side effects when given to mice.

UCLA recruited him for the new chair. When Harran accepted, the professor leading the search committee said Harran's arrival "will immediately raise the profile of UCLA organic chemistry in the U.S."

The chair was endowed by the family of a chemistry Nobel laureate. Expectations for Harran were not middling. When UCLA fire marshals wrapped up their interview with him three weeks after Sangji's death, they asked if he had anything else to discuss.

"I uh, again just to say that this is not how I wanted to start at UCLA," a transcript of the interview quotes him as saying.

As a junior staffer with a bachelor's degree, Sangji's primary responsibility was setting up instruments; a third of her time was spent on chemistry.

The day after she began work, Harran watched her complete a reaction with a reagent called Grubbs' Catalyst, which is air-sensitive, but not pyrophoric, so not at risk of spontaneously igniting. Sangji completed the syringe transfer within a "glove bag," an enclosed area that prevents any part of the reaction from coming in contact with air. Harran later told workplace safety investigators that she executed the transfer without difficulty.

A few days later, Sangji completed her first reaction with t-BuLi. The plan was to combine t-BuLi with vinyl bromide to create vinylolithium, the first part of a multi-stage process. She emailed a postdoc for help, but the postdoc said he doesn't remember what he told her, if anything. In any case, Sangji managed to complete the reaction.

The morning of Dec. 29, Sangji told Harran she was going to scale up the reaction, according to evidence presented at a preliminary hearing for Harran.

During her short time at Norac Pharma, the company president later told investigators, Sangji was closely supervised because of her limited laboratory experience. She never performed experimental work without direct guidance from her superiors. She never worked with t-BuLi or any other pyrophorics.

The prosecution said that all Harran gave Sangji in the way of direction that morning was to "be careful." There is no evidence she was ever ordered a standard cotton lab coat, not to mention a fire-resistant one, which experts testified would be the minimum protection required at a private laboratory.

Harran's lawyers said Sangji had been issued five lab coats at Norac Pharma, and that her experience there, at school, and in her earlier t-BuLi reactions provided her with the necessary training to undertake the experiment alone. What's more, there is no guarantee that what happened next could have been prevented with a lab coat.

The company that manufactures the t-BuLi that Sangji was using, Sigma-Aldrich, provides a bulletin for the safe handling of pyrophoric and air-sensitive chemicals. The bulletin states that up to 50 millilitres may be transferred with a one- to two-foot needle. Sangji was transferring 54 millilitres with a two-inch needle. She would have had to hold the bottle by hand and tip it toward herself so the short needle could reach the top of the t-BuLi.

The bulletin indicated the syringe should be glass and should only be used for a single transfer, or else the syringe might freeze up or become plugged. Sangji was using the same syringe, a plastic one with plastic locks, for all three transfers she needed to make.

It's not known whether Sangji ever saw that bulletin, or whether anyone ever told her it was available. It's also not known where she came up with the flawed transfer method.

Whether her syringe became plugged or not can't be determined — it was found melted in her fume hood. The plunger was lying two metres away, where she had thrown it.

At the hospital, she told firefighters who took her statement that she had pulled the plunger of the syringe too far. She also said she spilled a flask of pentane, a flammable chemical that fed the fireball.

### **Systemic safety failures**

Naveen Sangji was getting ready to go out for dinner in Boston, where she was a medical student at Harvard, when her cellphone rang. Her little sister's name appeared on call display. Naveen assumed it was more news about law school.

“The last few times I had heard from her, in very quick succession it was, ‘Hey, I just got accepted at USC. Hey, I just got accepted at the University of Michigan.’”

Instead, it was a hospital social worker.

As the Sangji family's de facto spokesperson, Naveen speaks in practised messages. She never bothers to hide her anger at Harran and UCLA, but she rarely reveals the depth of her sorrow or that of her family; before all this, she said, she was a private person.

All she will say about that phone call is that friends came to help her. She waited until she and an uncle from Toronto had booked seats on the next flights to California before phoning her parents, who were on a trip to the United Arab Emirates. She doesn't want to say how her parents reacted, only that breaking the news to them was one of the hardest things she has ever done.

Naveen, now a surgical resident at Massachusetts General Hospital, knew without being told how devastating her sister's injuries were. Yet doctors thought Sheri Sangji would survive, and so did her family. Trying to stay positive, they didn't talk much about what had happened in Harran's lab.

But the burns deepened, and Sangji spiralled into multiple organ failure. During a third operation to scrape away dead tissue, her heart stopped. Doctors declared her brain-dead. Eighteen days after the fire, her family took her off life support.

California's Division of Occupational Safety and Health, better known as Cal/OSHA, began an investigation. Investigators interviewed Harran, Harran's staff, Sangji's employers at Norac Pharma, her college chemistry mentor and UCLA's health and safety unit, and subpoenaed numerous records.

A year after Sangji's death, Cal/OSHA completed its report, which painted a damning picture of systemic safety failures at UCLA.

Harran's endowed chair came with \$3.2 million to set up laboratories on the fifth floor of the molecular science building, the report said. But until those renovations were complete, his team occupied rooms on the fourth floor, which were a third the size and lacked storage space.

During a routine, pre-announced inspection of the labs in October, a UCLA chemical safety officer noted a long list of problems in the fourth-floor labs, from improper storage of flammable materials to numerous staffers working without lab coats or other protective equipment. Harran was given 30 days to comply, the standard timeframe, though there were no penalties for missing the deadline.

In early November, he asked for an extension since they were soon to be moving to the spacious fifth floor. He was given it. Harran appears to have received no safety training from UCLA either, investigators pointed out, or any help setting up his lab to comply with university policy or state law.

In addition, investigators discovered two other laboratory accidents that had occurred within 14 months before the one that killed Sangji. In November 2007, a chemistry graduate who wasn't wearing a lab coat spilled ethanol on himself near a Bunsen burner and caught fire; he was hospitalized for a week. Just seven days before Sangji died, another graduate student, also not wearing a lab coat, was burned and cut when a reaction pot exploded. Neither incident was reported to Cal/OSHA.

"It was kind of common knowledge that laboratory people don't use the proper (protective equipment) when they are in the lab ... it was hard to convince the professors that they needed to," UCLA's manager of laboratory safety told the Cal/OSHA interviewers.

The Los Angeles County District Attorney's Office, acting on Cal/OSHA's recommendations, charged Harran and the governing body of the University of California with four felony labour code violations. (The DA's office did not, however, pursue a recommended charge of involuntary manslaughter.)

The university and the DA reached a settlement. In return for admitting responsibility for the laboratory conditions when Sangji died, for promising to maintain a comprehensive lab safety program, and for setting up a \$500,000 environmental law scholarship at Berkeley in Sangji's name, prosecutors dropped the charges.

The case against Harran continued, and last August, a judge ruled there was sufficient evidence to send him to trial.

### **Case sets off debate**

The news that a chemistry professor was actually going to trial for a lab accident jolted the academic community to attention.

Writers for the Chemical & Engineering News used freedom of information laws to access many of the reports that form the basis of this story, and they have attended all of Harran's key court dates. Their [detailed accounts of the proceedings](#) are dissected by a secondary ecosystem of bloggers, where raging debates over the merits of the case take place.

"I'm an industrial chemist, and if I did what he did, I'd be in as much trouble as him, and my company sure as heck wouldn't have gotten off with a wrist-slap like UCLA did!" one anonymous commenter on the [Chemjobber](#) blog commented. "I agree ... if someone under my supervision were killed on the job, I would at a *minimum* be unemployed," another added.

Others bristled that Harran was being "railroaded."

"Did she have the proper training for t-BuLi. Nope. Do 90 per cent of grad students get any better training from their advisor? Nope. So I guess the plan is to martyr Professor Harran in the name of saving accidents in the future?"

The people paying closest attention have been those directly responsible for laboratory safety on campus: university safety professionals like McGill's Wayne Wood.

"It has sent shockwaves through the university campuses really right across the continent," he said. "For us, we're acutely aware of it, because Sangji is one of ours" — Sangji's younger brother studies biophysics at McGill.

Before Sangji's death, Wood said, safety managers like him were viewed as an unwelcome layer of bureaucracy.

Academics "are so focused on their research. They're really intense individuals who really devote all their time and attention to trying to unravel the mysteries of science," he said. "They don't necessarily have the personality profile of managers. Many are extremely intellectual, but maybe not the personality type who like to supervise people."

Since Sangji's death, Wood said he has been given more leeway to enforce sanctions when labs don't pass muster. His administration, once hesitant, now fully supports him, he says.

Another problem is the decentralized structure of universities. Industrial labs have one front door for new hires, and commands can be issued by executives. Professors are dispersed across departments and see huge turnover in students and staff — a "constant influx of rookies," says University of Minnesota's Tolman.

Tolman, the chair of the chemistry department, was "spurred into action" by a video about Sangji's death. With help from Dow, the multinational chemical company, the chemistry and chemical engineering department created a new system that saw students running a parallel safety board to the university's professional one.

"It's been an amazing story," said Tolman. "They've been changing the culture." The system helps enforce safety by empowering students rather than dictating it from on high.

When the Star visited UCLA in October, the university declined requests for a tour of safety improvements on campus, saying no one was available.

A spokesperson also said the director of Environmental Health and Safety was too busy to meet for an interview, and instead sent an email with statistics about UCLA's beefed-up enforcement — achieving 95-per-cent compliance with the personal protective equipment policy, for example, through a steep increase in unannounced safety inspections — and a list of links to press releases about safety improvements.

A voicemail left for chemistry department faculty and staff instructed them not to speak to the Star. But employees on the ground, who agreed to be interviewed anyway, said the problem is not yet fixed.

UCLA is “playing catch-up at a fierce pace,” said Rita Kern, who sat on the safety committee struck after Sangji's death and belongs to the union that represents research associates and lab technicians. But while there have been improvements, a pervasive safety culture has not taken hold. “The message hasn't gotten through.”

Judy Sweeney, a long-time administrative assistant for the department, told the Star during that October visit that she was still seeing kids wearing flip-flops and shorts working in labs on Saturdays.

Kern was shocked to learn that a graduate student had been injured in a lab fire the year before the one that killed Sangji, and no one heard anything about it. There was no wide-scale retraining in light of that accident.

“If they had done their job, Sheri might be alive.”

Harran's defence team petitioned the California Court of Appeal to dismiss the case, on the grounds that UCLA, not Harran, was Sangji's ultimate employer.

“The felony prosecution spells ruin for the promising academic career of Professor Harran in a profession that depends on government research grants,” the defence team argues. The case is on hold while the matter is argued.

“We maintain that the laboratory fire which resulted in Ms. Sangji's passing was a terrible accident, but not a crime,” Harran's lawyer, Thomas O'Brien, said in emailed comments to the Star. “Professor Harran mourns Ms. Sangji's loss and has the deepest sympathies for her family and friends. This tragic accident has led to a revolutionary change in laboratory safety practices, and now academic laboratories throughout the United States have a new focus on safety that simply did not exist in the normal course of business during and before 2008.”

For Sangji's family, the judicial process has been excruciating. They chose not to sue UCLA or Harran in civil court, saying they don't want money, only justice.

But they also care deeply about developments beyond the courthouse.

“The only thing my mom wants to see — which the rest of us want to see too, but for her, it’s the only thing — is that this shouldn’t happen again to anyone else,” says Naveen.

Sangji “was going to have an impact on the world. That was just something that if you knew Sheri, it was obvious to see,” said Kotwani, her friend from Pomona.

“That person and that impact is not going to come back. It’s hard to say what justice will look like.”

On the day of Sangji’s funeral in Los Angeles, a fat envelope arrived at her apartment. She had been accepted to Berkeley law school, her top choice.