involved in the medical response to a nuclear attack. The academies' committee plans to release a report in December that lays out how the United States could plug the gaps in its response capabilities.

The US government's spending on nuclear-weapons research and response has dropped drastically over the past few decades — as has the number of health workers with training in radiation medicine and management. According to a 2017 study by Dallas, more than half of emergency medical workers in the United States and Japan have no training in treating radiation victims (C. E. Dallas *et al. Front. Public Health* **5**, 202; 2017).

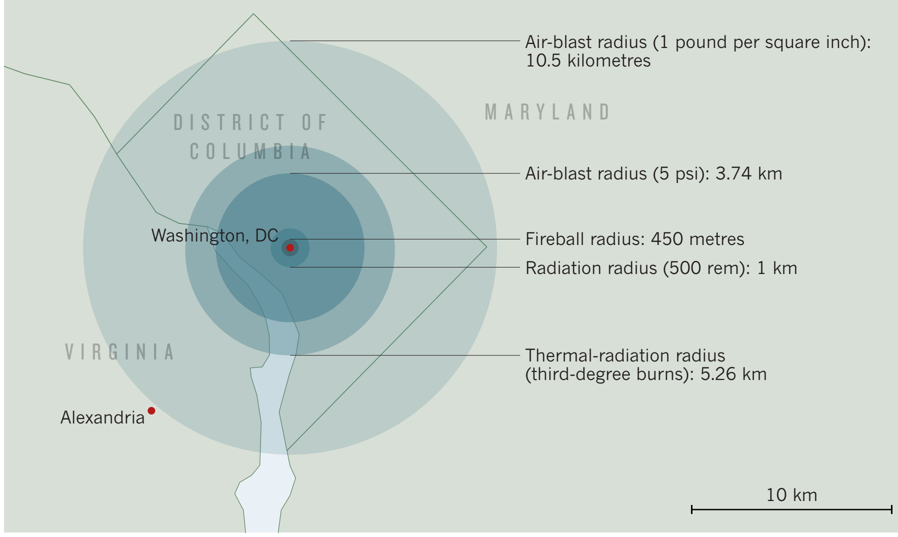
The same study suggests that even trained medical professionals might be too frightened to enter a nuclear-fallout zone or to treat radiation victims at the scene — Dallas's group found that 33% of medical professionals said they would not be willing to respond in such a scenario.

Compounding these concerns, treatments for radiation exposure and burns might not be available in sufficient quantities in the aftermath of a nuclear attack. James Jeng, a burns surgeon at Mount Sinai Health System in New York City, says that the detonation of a nuclear bomb can leave behind hundreds of thousands of burn victims. The best treatment for such injuries is skin grafting, he says, but there are only about 300 burn surgeons in the United States who know how to perform the procedure. It might also be difficult to quickly transport enough donor skin to treatment sites, Jeng adds.

North Korea's threat to Guam last year made clear to public-health officials there how limited their response capabilities are, says Patrick Lujan, emergency-preparedness manager for the Guam Department of Public Health and Social Services. Guam, an island of 163,000 people, has only three hospitals and no burns units. "We realized there's just so much you can do, being on an island," Lujan says. ■

DAMAGE ESTIMATE

This map shows the projected damage to Washington DC from the mid-air explosion of a 150-kilotonne nuclear bomb, such as the weapon that North Korea apparently tested in 2017.



SOURCE: NUCLEARSECRECY.COM/NUKEMAP

PHYSICS

Social-media storm dissects superconductivity claim

Thrill over potential high-temperature superconductor reached fever pitch, then died away.

BY DAVIDE CASTELVECCHI

It was an explosive claim: the discovery of a superconducting material that can carry electricity with almost no resistance in normal conditions. The purported finding — announced by two physicists[1] last month — sparked a rush of replication efforts. But independent researchers have grown sceptical as they have dissected the claim, in a process that played out mostly on social media.

"All these researchers who normally do not discuss on a single platform have come together and discussed this," says Pratap Raychaudhuri, who studies low-temperature physics at the Tata Institute of Fundamental Research in Mumbai, India. He led a discussion of the results on Facebook. "I think the self-correcting mechanism of science — the ruthless scrutiny of the community — has worked extremely well," he says.

Most superconducting materials identified so far work only at much lower temperatures, often close to absolute zero. The highest seen yet is −70 °C, reported[2] in 2015 — and that compound is superconducting only at extremely high pressures. (Just last week, the same laboratory posted[3] a preprint on the arXiv server describing a new record, −58 °C, for superconductivity at high pressure, but that result has not yet been confirmed.) In a preprint posted[1] on 23 July, Dev Kumar Thapa and Anshu Pandey of the Indian Institute of Science in Bangalore (IISc) described a material made from gold and silver that became superconducting at a balmy −37 °C, and at normal ambient pressure.

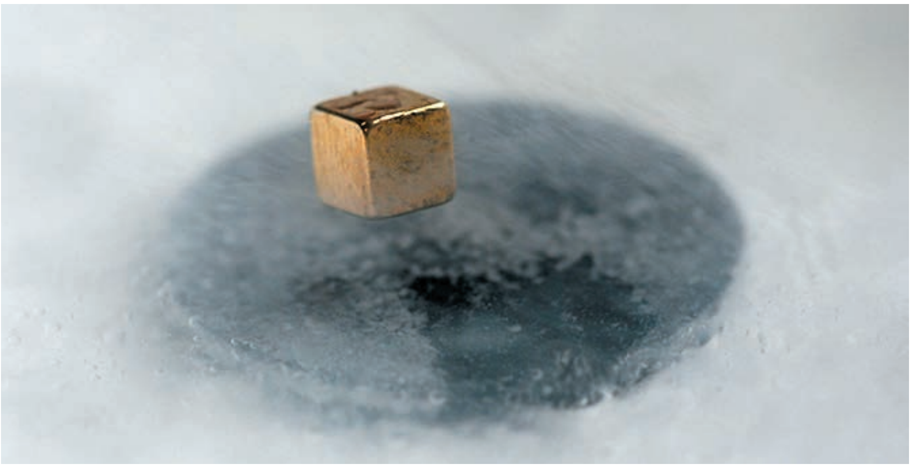
"It was a remarkable claim, so there was lots of interest," says Raychaudhuri. Several laboratories quickly leapt into action to try to replicate the results. But their efforts were frustrated, because the preprint did not provide the details needed to manufacture the gold–silver material, and because Thapa and Pandey declined requests to share their samples.

Thapa and Pandey told *Nature*'s news team that they would not comment on their research while their paper is under review at a journal. Pandey said that they are having their results validated by independent experts, and that they will announce the results of the validation in the appropriate forum as soon as possible.

TWITTER CHATTER

Brian Skinner, a theoretical physicist at the Massachusetts Institute of Technology (MIT) in Cambridge, began studying the preprint soon after it came out — and eventually chronicled his findings in a widely shared Twitter thread. Although superconductors are not ▶

CLAUDE WANGEN/ALAMY



Superconductors can levitate objects — but require very low temperatures.

his speciality, the excitement surrounding the paper piqued his curiosity. He noticed that one of the preprint's figures contained curves of data points that were surprisingly free of random background noise at relatively warm temperatures, but became noisier below the temperature at which the material transitioned to a superconducting state. "Usually, they look smooth on both sides, or dirty on both," Skinner says.

When he zoomed into the picture, Skinner was even more surprised: the graphic included several data sets in which the experiment was run in slightly different conditions, and the patterns of noise seemed very similar for each run. But noise is, by nature, random. He went to discuss his observation with an expert on superconductors at MIT, who agreed that the pattern was odd. And in the following days, Skinner had conversations with many other researchers.

Repeated patterns of noise alone do not necessarily mean that the data are faulty or intentionally fabricated, Skinner says, but he still wanted the broader community to know about his concerns. So on 8 August, Skinner submitted a two-page response[4] to the preprint on arXiv. The post, which he mentioned on Twitter, prompted a viral response, with more than 3,600 shares and countless online mentions.

A separate MIT group — led by experimentalist Mingda Li — that had also been attempting to replicate the results took note of Skinner's post, and Li became concerned. "Fluctuations really shouldn't be that identical," he says. His group decided to call off their replication attempts.

On Facebook, Raychaudhuri gave a possible explanation for the repeating data patterns, and said that to get to the bottom of the story, the authors need to share their data. But although Raychaudhuri is not convinced by the claims, the affair has provided an opportunity to show science in action.

As for the claims, says Li, "if the authors don't provide any new experimental measurements, this will gradually go away". ■

1. Thapa, D. K. & Pandey, A. Preprint at https://arxiv.org/abs/1807.08572 (2018).
2. Drozdov, A. P., Eremets, M. I., Troyan, I. A., Ksenofontov, V. & Shylin, S. I. *Nature* **525**, 73–76 (2015).
3. Drozdov, A. P. et al. Preprint at https://arxiv.org/abs/1808.07039 (2018).
4. Skinner, B. Preprint at https://arxiv.org/abs/1808.02929 (2018).