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The HeLa Bomb

In September 1966, a geneticist named Stanley Gartler walked up to the podium at a hotel in Bedford, Pennsylvania. There, in front of George Gey and the other giants of cell culture, Gartler announced that he'd found a "technical problem" in their field.

He was at the Second Decennial Review Conference on Cell Tissue and Organ Culture with more than seven hundred other scientists. They'd come from biotech companies and academia; they'd traveled from New York, England, the Netherlands, Alaska, Japan, and everywhere between to discuss the future of cell culture. The room buzzed with excitement as everyone talked about cell cloning and hybrids, mapping human genes, and using cultures to cure cancer.

Few there had heard of Stanley Gartler, but that was about to change. Gartler leaned into the microphone and told the audience that, in the process of looking for new genetic markers for his research, he'd found that eighteen of the most commonly used cell cultures had one thing in common: they all contained a rare genetic marker called glucose-6-phosphate dehydrogenase-A (G6PD-A), which was present almost exclusively in black Americans. And even among them it was fairly rare.

"I have not been able to ascertain the supposed racial origin of all eighteen lines," Gartler told the audience. "It is known, however, that at least some of these are from Caucasians, and that at least one, HeLa, is from a Negro." He knew this, because a few months earlier, he'd written George Gey:

> I am interested in the racial origin of the person from whom your HeLa cell line was initiated. I have checked a number of the early papers describing the development of the HeLa cell line but have not been able to find any information pertaining to the race of the donor.

When Gey responded that HeLa cells had come from "a colored woman," Gartler knew he'd found the source of the problem.

"It seems to me the simplest explanation," he told the audience, "is that they are all HeLa cell contaminants."

Scientists knew they had to keep their cultures free from bacterial and viral contamination, and they knew it was possible for cells to contaminate one another if they got mixed up in culture. But when it came to HeLa, they had no idea what they were up against. It turned out Henrietta's cells could float through the air on dust particles. They could travel from one culture to the next on unwashed hands or used pipettes; they could ride from lab to lab on researchers' coats and shoes, or through ventilation systems. And they were strong: if just *one* HeLa cell landed in a culture dish, it took over, consuming all the media and filling all the space.

Gartler's findings did not go over well. In the fifteen years since George Gey had first grown HeLa, the number of published articles involving cell culture had more than tripled each year. Scientists had spent millions of dollars conducting research on those cells to study the behavior of each tissue type, comparing one to another, testing the unique responses of different cell types to specific drugs, chemicals, or

environments. If all those cells were in fact HeLa, it would mean that millions of dollars had been wasted, and researchers who'd found that various cells behaved differently in culture could have some explaining to do.

Years later, Robert Stevenson, who became president of the American Type Culture Collection, described Gartler's talk to me this way: "He showed up at that meeting with no background or anything else in cell culture and proceeded to drop a turd in the punch bowl."

Stevenson and other members of the Cell Culture Collection Committee sat stunned in the audience as Gartler pointed to a chart on the wall listing the eighteen cell lines that had been contaminated by HeLa, along with the names of the people or places he'd gotten them from. At least six of the contaminated lines came from the ATCC. HeLa had penetrated Fort Knox.

At that point, the ATCC's collection had grown to dozens of different types of cells, all guaranteed to be free from viral and bacterial contamination, and tested to ensure that they hadn't been contaminated with cells from another species. But there was no test to see if one human cell had contaminated another. And, to the naked eye, most cells growing in culture look the same.

Now Gartler was essentially telling the audience that all those years researchers thought they were creating a library of human tissues, they'd probably just been growing and regrowing HeLa. He pointed out that a few years earlier, when scientists started taking protective measures against cross-species contamination—such as working under sterile hoods—it had suddenly become harder to grow new cell lines. And in fact, "very few [new human cell lines] have been reported since." Not only that, he said, but there had been no new examples of "so-called spontaneous transformed human cell cultures" since.

Everyone in the audience knew what that meant. On top of saying they'd possibly wasted more than a decade and millions of research dollars, Gartler was also suggesting that spontaneous transformation—one of the most celebrated prospects for finding a cure for cancer—

might not exist. Normal cells didn't spontaneously become cancerous, he said; they were simply taken over by HeLa.

Gartler concluded his talk by saying, "Where the investigator has assumed a specific tissue of origin of the cell line, i.e., liver . . . or bone marrow, the work is open to serious question, and in my opinion would be best discarded."

The room sat silent, dumbfounded, until T. C. Hsu, the chair of Gartler's conference session, spoke. Hsu was the University of Texas geneticist whose earlier work with HeLa and other cells had made it possible to discover the correct number of human chromosomes.

"A few years ago I voiced some suspicion about cell-line contamination," Hsu said. "So I am happy about the paper by Dr. Gartler and am also sure he has made many people unhappy."

He was right, and those people quickly began asking questions.

"How long did you keep them in your laboratory?" one scientist asked, suggesting that Gartler had contaminated the cells himself after they arrived in his lab.

"They were analyzed before being grown in my laboratory," Gartler responded.

"They didn't send them to you frozen?" the scientist asked, knowing that contamination could have occurred while they thawed.

Gartler said that didn't matter—the cells didn't have to be thawed to be tested.

Another scientist wanted to know if the similarity Gartler was seeing between cell lines was just the effect of spontaneous transformation making all cells act the same.

Eventually Robert Stevenson of the Cell Culture Collection Committee spoke up, saying, "It looks like more detective work is needed to see . . . whether we are going to have to start all over again to isolate some new human cell lines."

Hsu stepped in and said, "I would like to give particular priority to those who initiated the cell lines, whom Dr. Gartler has attacked. If there is any defense, we would like to hear it."

Harvard's Robert Chang—whose widely used Chang Liver Cell line was listed as a HeLa contaminant on Gartler's chart—glared from his seat. Chang had used those cells to discover enzymes and genes specific to liver cells. If Gartler was right and the cells were actually from Henrietta's cervix, Chang's liver research using them was worthless.

Leonard Hayflick had an especially personal connection with his cell line, WISH, which Gartler had listed as contaminated: he'd grown it using cells from the amniotic sac in which his unborn daughter had once floated. He asked Gartler whether it was possible to find G6PD-A in samples from white people.

"Caucasian subjects with G6PD-A have not been reported," Gartler told him.

Later that day—in a talk chaired by George Gey—Hayflick delivered a paper, on the "facts and theories" of spontaneous transformation of cells in culture. Before beginning his talk, Hayflick stood at the podium and announced that, since WISH cells supposedly tested positive for a genetic marker found only in black people, he'd called his wife during the break to ask if he was, in fact, his daughter's father. "She assured me that my worst fears were unfounded," Hayflick said. The room erupted in laughter, and no one said anything else publicly about Gartler's findings.

But a few people took Gartler seriously: before leaving the conference, Stevenson met several of the top cell culturists for lunch. He told them to go back to their labs after the conference and start testing cells for the G6PD-A genetic marker, to see how widespread this problem might be. Many of their cell lines tested positive, including the skin cells George Hyatt had transplanted onto a soldier's arm years earlier. Since Hyatt had no HeLa cells in his lab at the time, the cells in his experiment must have been contaminated before they arrived. And though few realized it, the same thing was happening in laboratories around the world.

Still, many scientists refused to believe HeLa contamination was real. After the conference where Gartler dropped what became known as "the HeLa bomb," most researchers kept right on working with the cells

he'd said were contaminated. But Stevenson and a few other scientists realized the potential scope of the HeLa contamination problem, so they began working to develop genetic tests that could specifically identify HeLa cells in culture instead of just testing for the presence of G6PD-A. And those genetic tests would eventually lead them to Henrietta's family.