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What is touch DNA?

The technology that cleared JonBenet Ramsey's family of her murder can detect the slightest bit of genetic material. Husband and wife forensic experts Max and Lucy Houck explain:

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Last month various news outlets reported that police had used a technique called "touch DNA" to clear the family of JonBenet Ramsey of any wrongdoing in her gruesome 1996 death.

So what's touch DNA?

The touch DNA method—named for the fact that it analyzes skin cells left behind when assailants touch victims, weapons or surfaces elsewhere at a crime scene—has been around for the last five years. In fact, the prosecutor in the Ramsey case, Boulder County District Attorney Mary Lacy, learned about touch DNA when she attended a course here at the West Virginia University Forensic Science Initiative in the summer of 2007.

The technique has dramatically increased the number of items of evidence that can be used for DNA detection. In the 1980s, to perform DNA analysis on a crime scene or victim, forensic investigators needed a blood or semen stain about the size of a quart. By the 1990s, the sample size fell to the size of a dime and then became: "If you can see it, you can analyze it."

Touch DNA doesn't require you to see anything, or any blood or semen at all. It only requires seven or eight cells from the outer layer of our skin.

Here's how it works: Investigators recover cells from the scene, then use a process called polymerase chain reaction (PCR) to make billions of copies of the genes. Next, scientists mix in fluorescent compounds that attach themselves to 13 specific locations on the DNA, creating a highly specific genetic portrait of that person. The whole process takes a few days, and forensic labs are often backed up analyzing samples from other cases.

These 13 locations were carefully chosen because they are highly variable between people and do not give away any specific information, such as race, gender, personal health or genetic disease. The reason: authorities don't want personal health information being used for law-enforcement purposes, such as interrogations. The chance of DNA profiles from two different people having the same gene signature is vanishingly small.

The trick to finding these cells: context. If clothing is removed from the victim, as it was in the Ramsey case, a forensic specialist can try to guess where it might have been handled—perhaps the waistband of a pair of pants—and swab those areas with a Q-tip. But in cases like the JonBenet Ramsey murder, which has tripped up authorities for over a decade, it can provide information that points to a killer—or at least exonerates the innocent.

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