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How do you ID a dead Osama?

By [Christie Wilcox](#) | May 2, 2011 11:20 AM | [32](#)

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[Osama bin Laden is dead](#). At least, that's what we've been told, and I tend to believe such things.

But how do they *know* it's him? Well, they have the visual evidence and the body, for one. But to be certain it's not a look-alike, the U.S. government has taken a step above and beyond to make sure they've got who they think they have: DNA analysis.

Now, I'm not entirely sure what DNA analysis has been done, but I can say this for certain—whatever method they used could be completed in a matter of hours given a lab ready to go and focused solely on this. Using commonplace PCR methods—which, for the record, is what I use in my lab every day—Bin Laden could easily be ID'd faster than you'd think. Heck, I can get DNA from a fish and turn it into sequences or genotypes in 24 hours, so I think the US government can work faster than me when time is of the essence. Allow me to explain *how* they could do it so quickly.

Step 1. Extract DNA

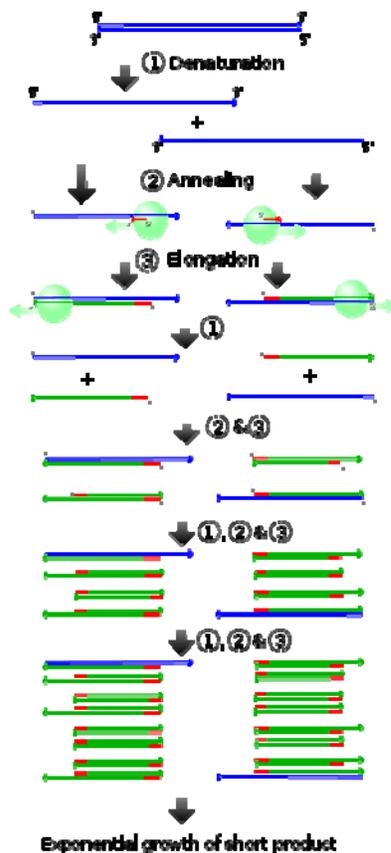
If they've got his body, then they've got enough DNA to run a billion or two genetic tests. It takes extremely little DNA to run genetic tests - on the order of single cells. So having even a 1 mm square piece of flesh would provide more DNA than they would even have use for. Extraction takes very little time. All you need to do is place the cells/tissue in some kind of solution that will break up the cell's membranes, thus liberating the DNA from the nucleus without damaging the DNA too much. There are hundreds of extraction kits and protocols. I don't know what the gov't extraction policy is, but the [Arkansas State Crime Lab](#) just uses sodium hydroxide and hydrochloric acid to extract DNA from their samples (which, btw, is how I get DNA from my fish samples, too). For example, this is their protocol for buccal punches (a.k.a. cheek tissue):

1. Place 52 μl of 0.01 M NaOH in each well with 2.0 mm of tissue.
2. Incubate samples at 65°C for 10 minutes.
3. Add 10 μl of 0.1 M Tris HCl (pH 7.3).
4. Mix.
5. Let stand for 5 minutes.
6. Samples are now ready for amplification

TOTAL TIME: 15 min

Step 2: Amplify Identifying DNA Sequences

Once you have DNA, you're ready to ID your suspect. While there have been a few methods used in the past, the onset of [Polymerase Chain Reaction, or PCR technology](#), has made looking at parts of a genome pretty darn quick and easy.



The namesake of PCR, polymerase, is a very special enzyme that cells use to duplicate DNA. Polymerases are found in all creatures because we all must, at some point, have cells divide to grow and reproduce. When our cells divide, we have to make two copies of our genome—one for each new cell. To do this, our cells unwind the DNA, spread apart the two matching strands, then use each as templates to make two new strands. Polymerases are the enzymes that actually do that—they attach to single strands of DNA and grab matching nucleotides to create the other half of the strand.

PCR was invented in the 1980s and takes advantage of how our DNA reacts to temperature. At lower temperatures, like in our bodies, DNA sticks to its complementary half and forms a tight helix. But as you turn up the heat, our DNA denatures—that is, it unwinds and each half of the helix separates. We can't use our own cell's polymerases for PCR because they can't stand that

kind of heat. Instead, we've borrowed an enzyme from a particularly heat-tolerant bacteria to do the job for us.

PCR uses multiple cycles of heating and cooling to create thousands to millions of copies of a single piece of DNA. But how do we copy just what we want? Well, it turns out that polymerases need a little help getting started. They require a short sequence of RNA to tell them where to attach, called a *primer*. Because we can design this primer to match any unique sequence in the genome, we can target where the polymerase will attach, and

voila. You've just picked your little chunk of genome to amplify over and over and over again. The total process doesn't take all that long - you heat it up for a bit, run it through a set of temperature cycles, and then you're good to go. The Arkansas protocol, for example, takes just about two and a half hours.

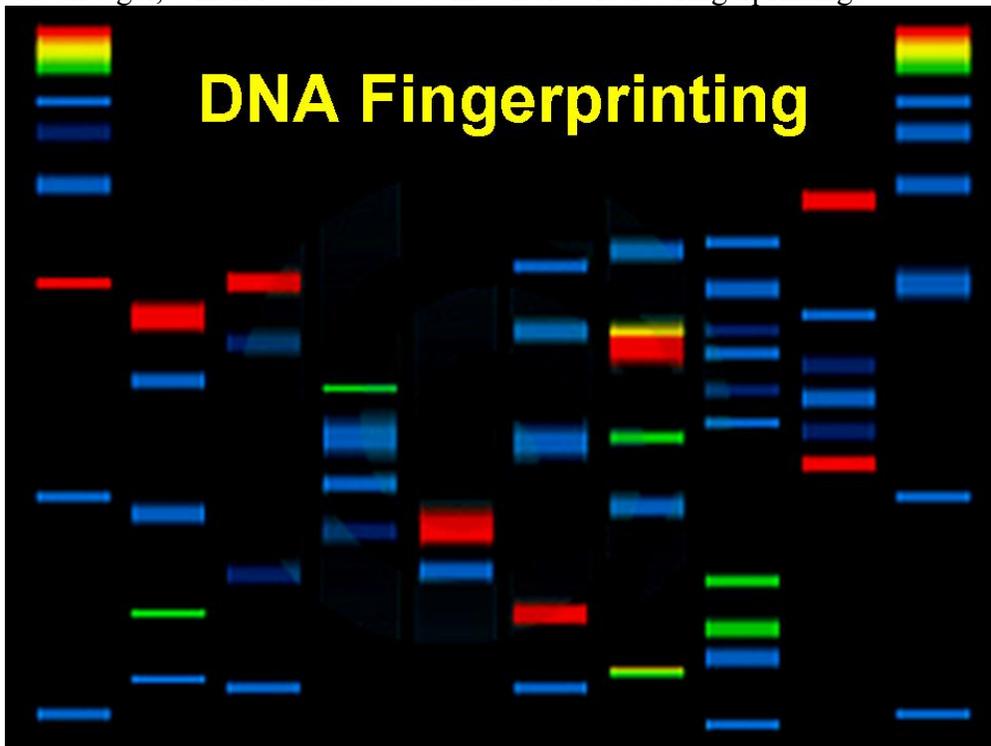
In the case of DNA fingerprinting, a set of very special genome regions called [Short Tandem Repeats \(or STRs\)](#) are used. These are non-coding sections that vary a lot between people. To be certain of ID, 13 separate regions, called loci, are compared between people. The chance that two people who are not twins would be the exact same across all 13 different loci is approximately 1 in 575 *trillion*.

The best part of PCR is that you can attach things to those primers to make the new DNA really easy to find. For example, the AmpF/STR® Identifiler™ PCR Amplification Kit used by Arkansas has the primers for 15 different STR loci all tagged with fluorescent dyes. That means once you're done with the PCR, you're just a hop skip and a jump away from a full genetic ID.

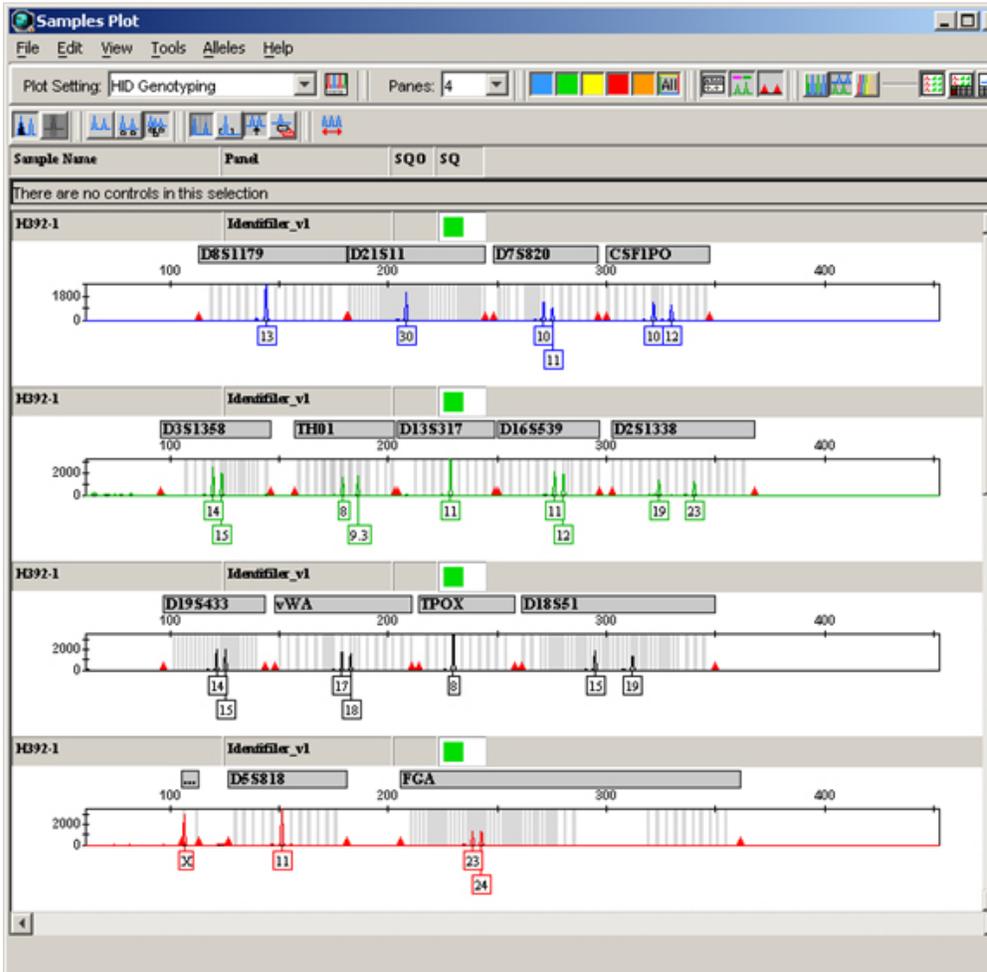
TOTAL TIME: 3 hours, tops.

Step 3: Genotyping

Once you have your DNA amplified, you need to find out what it looks like. In the case of STRs, you're looking for how many repeats are in each DNA chunk. In other words, you're looking to see how long they are. Because they're each flagged with a fluorescent dye, the sequence in and of itself doesn't matter, just the size. Some people just run this out on a gel, which is what we see in our classic TV fingerprinting:



But nowadays, more and more labs are shifting to genotyping analysis with the help of automated machines. Determining the size of fluorescent labeled DNA sequences is the job of specialized machines like the ABI 3130xl Genetic Analyzer. It can take a sample of DNA and tell you how much DNA you have at what sizes in what colors. The output looks something like this:



The pattern of peaks are the person's "DNA Fingerprint". All you gotta do then is line them up with the peaks of your target person, and it's either a match or it's not.

TOTAL TIME: 1 hour, maybe less.

So how long did it take to get Bin Laden's fingerprint? Well, with the three steps here, just **under 5 hours**. And for all I know, the FBI has a faster way of doing it—I wouldn't exactly be shocked. That, and some are reporting he [actually died last week sometime](#), and they've been waiting for the DNA confirmation—which also, frankly, wouldn't shock me.

Of course, to ID Bin Laden in this way, they would have to have some Bin Laden DNA lying around to compare it to. I don't know if they had some from some inside source, or not. [What they do have is brain tissue from Bin Laden's sister](#), who died in the US. They *can* compare his genetic signature to hers and determine if they are related — which is as close as you can get to guaranteeing it's Bin Laden without a sample of his actual DNA from prior to his death.



About the Author: Christie Wilcox is a science writer who moonlights as PhD student in Cell and Molecular Biology at the University of Hawaii at Manoa. Follow Christie on her blog, [Observations of a Nerd](#), or on [Facebook](#) or [Twitter](#).

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