

DNA CASE STUDY

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Amanda Knox case Perugia, Italy

- Meredith Kercher was found Nov 1, 2007 partially nude and under a duvet cover in her locked bedroom, there were three slash wounds to her neck.

Amanda Knox case

- Meredith shared the house with three other female students; one was Amanda Knox.
- Meredith returned home around 9 pm after watching a movie with friends.
- None of the other girls claimed to be home the night of the murder.

Amanda Knox case

- Amanda said she returned home in the morning from spending the night with her Italian boyfriend, Raffaele Sollecito; she found a broken window and blood in a common bathroom.
- Police were summoned, and the locked bedroom door was broken down to reveal the murdered girl.

Amanda Knox case

- Investigators collected numerous items of evidence from the body and from the house.
- Police initially theorized that Amanda, Raffaele, and Amanda's boss were involved with the victim in a sex tryst gone awry.

Amanda Knox case

- Unlike in the US, prosecutors highly publicized their theory of the crime.
- Headlines across Europe and the US linked the three to Meredith's murder.

Thursday, November 8, 2007

The Murder of Meredith Kercher



IN DIRETTA
PENICIA

Left: Meredith Kercher.

Something is very kinky about the tabloid event of the season, the murder of Meredith Kercher. Meredith's roommate, Amanda Knox (now in custody), supposedly demanded "violent sex" —a guaranteed hot murder story. Add to that the alleged involvement of Amanda's boyfriend and another male friend from the Congo (that is to say, black) and you have all the ingredients for a 2-part CSI episode. From Sky News:

Murdered Meredith 'Refused Violent Sex'

Tuesday November 06, 2007

British exchange student Meredith Kercher was murdered because she refused to take part in violent sex, Italian police have claimed.

Amanda Knox case

- But Amanda's boss had an airtight alibi.
- Forensic evidence linked an Ivory Coast drifter, Rudy Guede, to the crime scene through a database hit.
- Prosecutors then substituted Guede for Amanda's boss in the sex tryst gone awry.

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Evidence linking Guede to the crime:

- An unflushed bowel movement in one toilet
- A bloody handprint under the victim
- Sperm in the victim's vagina
- Additional DNA on the victim's clothes

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- Guede had fled to Germany but was returned and arrested.
- He initially claimed to have had consensual sex with the victim.
- He said a stranger entered and attacked her while he was in the bathroom.

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- Weeks later he claimed that Raffaele was the stranger and Amanda was outside the room during the murder.
- Only Guede's DNA was found on the victim, and Guede was later convicted of murder.
- But police still believed that Amanda and Raffaele were complicit.

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- Police searched Raffaele's apartment for the murder weapon and chose one knife at random from the kitchen drawer.
- There were no apparent stains on this knife or any others in the kitchen drawer.

Amanda Knox case

- Tool comparisons showed this knife could not have made two of the three wounds on the victim's neck.
- This knife could not have made the bloody imprint left on the victim's bed.



Knife outline in blood.



Kitchen knife superimposed to show it is larger than blood outline of blade.

Amanda Knox case

The knife –evidence against Amanda:

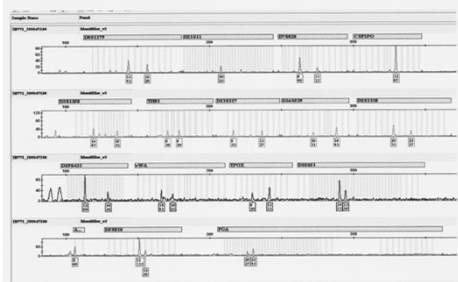
- Chemical testing (TMB) for blood on the handle and blade were negative.
- DNA testing was performed using STR methods.

Amanda Knox case

The knife –evidence against Amanda:

- DNA on the handle was Amanda's – Amanda had used the knife for cooking.
- DNA on the blade was very low level and partial - consistent with the victim.
- Most peaks on the blade were below 50 rfu – considered unreliable by US labs.

Figure 1. The low copy DNA electropherogram of the knife described above. Almost all peaks are below 75 RFUs, and most are below 50 RFUs. The peaks have not been confirmed by duplicate amplifications.



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The knife – evidence against Amanda:

- Victim's DNA on the blade cannot be from blood - chemical tests were negative.
- Chemical tests for blood can detect blood diluted to at least 1:10,000 and are more sensitive than tests for DNA.

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The knife – evidence against Amanda:

- It is extremely unlikely that the knife could be cleaned sufficiently to remove all chemical traces of blood while leaving enough cells to produce even a low level DNA profile.

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The knife – evidence against Amanda:

What is the source of victim's DNA on the blade??

- Possible contamination in the lab from other crime scene samples?
- All of the sample was consumed – the test could not be repeated and confirmed.

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The knife – Conclusion:

No credible scientific evidence was produced to link this knife to the murder of Meredith Kercher.

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The bra clasp- evidence against Raff:

- Victim's bra clasp had been cut away.
- CS video showed investigators picked it up and put it back down.
- The clasp was finally collected 46 days after the initial crime scene processing – found in a different location in the room.



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The bra clasp- evidence against Raff:

How did Raffaele's DNA get there?

- Raffaele had been at the house many times.
- Meredith, Amanda and their guests shared a bathroom – innocent transfer is possible.

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The bra clasp – Conclusions:

- Handling, movement, and delayed collection of this sample compromised its probative value.
- Lab results do not establish that the DNA was on the clasp at the time of the murder.
- Results do not establish how or when DNA was deposited or transferred.

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No DNA of Amanda or Raff was found:

- On the remainder of the bra that was on her
- On other items of the victim's clothing
- Other objects inside the room
- On the victim's body swabs

All of these items were collected the day the body was discovered.

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No DNA of Meredith was found:

- On the clothes of Amanda or Raffaele
- At Raffaele's apartment

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On November 19, 2009 Elizabeth Johnson and Gregory Hampikian co-authored an open petition outlining these concerns and conclusions.

Nine other members of the US forensic science community signed in agreement.

Amanda Knox case

In December, 2009 the Italian court found Amanda Knox and Raffaele Sollecito guilty of the murder of Meredith Kercher.

The appellate process began soon after.

Amanda Knox case

In October, 2011 an appellate jury overturned both convictions after court-appointed experts concluded that the DNA results were unreliable.

Experts cited the same concerns and conclusions noted in the US petition.

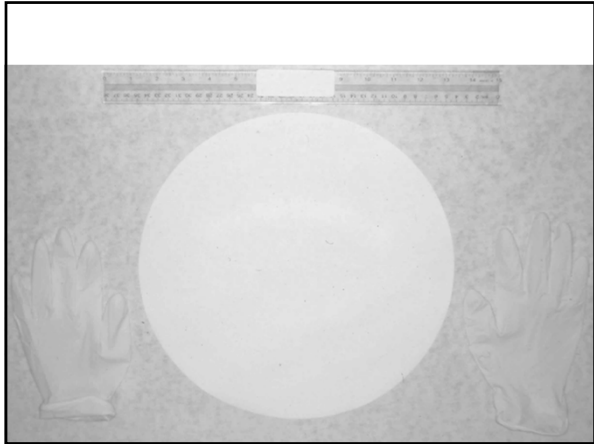
Amanda Knox case

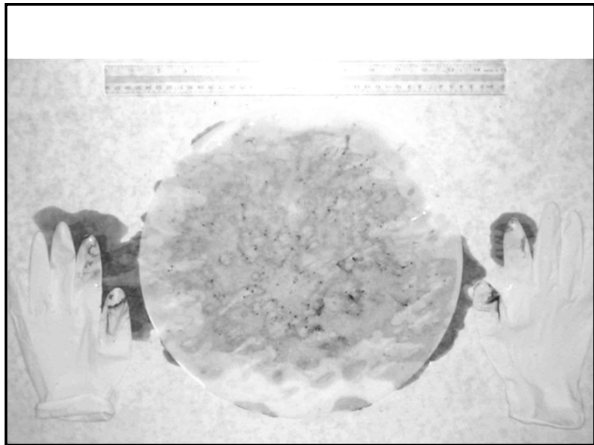
Amanda Knox and Raffaele Sollecito were freed after spending four years in an Italian prison.

Keep it in Perspective

STR testing is extremely sensitive....

- Approximately 30 diploid cells (200 pg) will be detected at reportable levels by most labs (150 RFU).
- How did the evidence get there?? Transfer?? Contamination?? Duration???





**Is there improper batching of
samples that could increase
contamination risk?**

Improper sample batching- contamination risk

A few examples:

- Reference and evidence samples extracted together.
- Samples taken from the victim extracted with samples taken from the defendant.
- Swabs from alleged murder weapon with blood from scene.

Documented Lab Contamination

Examples from US labs:

- Analyst's DNA in evidence sample
- Other staff's DNA in evidence sample
- Former staff's DNA in evidence sample
- DNA from unrelated samples carried over

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- The Italians refused to disclose laboratory notes that would verify which other samples were processed together with the knife.
- Requests for laboratory contamination and error logs were refused.

How to spot the problems?

- Get the notes, data, photos, and error logs!!
- Do your own exam or retest... sometimes the notes just don't reveal the problems.
- Have an expert monitor consumptive testing.