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Integrating Rapid DNA Instruments into a Casework Environment and Beyond

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The Adventure Begins

- 2018 Rapid Rape Kit Pilot Project
- Partnered with ANDE
- Tested over 100 kits collected concurrently with a traditional rape kit with about 25 giving us a good male profile.
- We have an amazing Database section!

A Rapid kit is collected when collecting a traditional kit by taking two additional swabs from areas thought to contain semen. Usually this is limited to a max of two areas. Buccal swabs are also collected. These kits are mailed to the lab from the hospital while the traditional kit is picked up by the investigating agency. A minimal medical form is included to give some basic information about the event.

An Adventure To See Something Magical

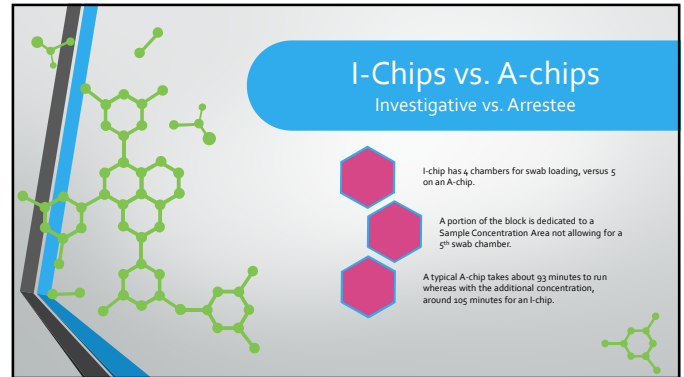
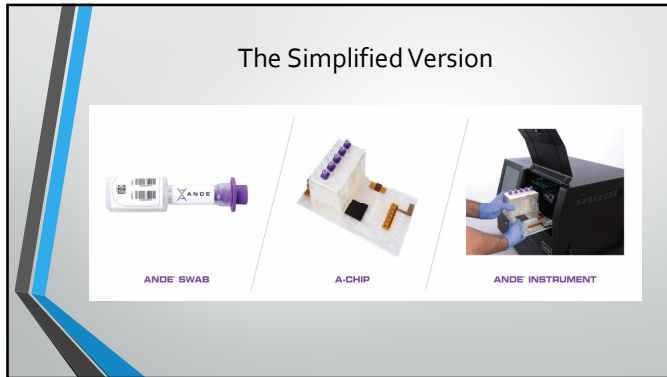


We want to see if we can effectively use a rapid instrument for casework.

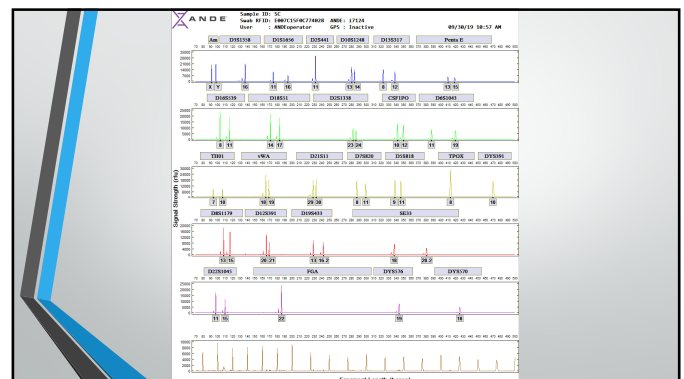
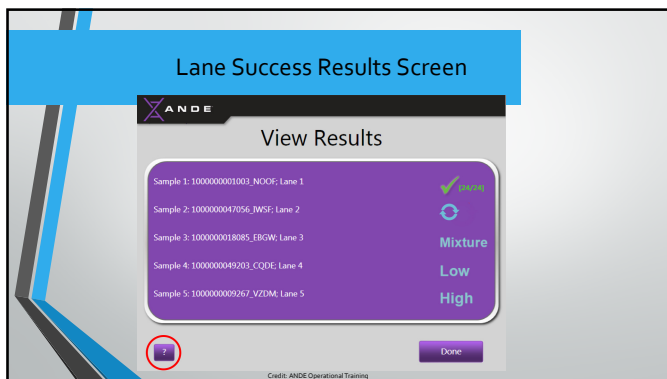
Our Vehicle



ANDE 6C Rapid DNA Instrument



We are using Modified Rapid DNA analysis on the I-Chip. This means the analyst must review all data from the instrument to ensure the analyst agrees with the calls being made by the instrument. Currently, if the instrument fails a sample or allele, we do not interpret failed data. We will evaluate the passing data to make sure we agree with the accepted calls. Some issues like PHR and homozygous alleles at larger loci may cause the analyst to also reject an accepted call.



This is a passing male profile in the FlexPlex27 kit from the ANDE instrument.

Guide the Technology

- 'Rapid DNA' promises breakthroughs in solving crimes. So why does it face a backlash?
 - Los Angeles Times By Maura Dolan Sept. 25, 2019
- In Kentucky — where it is a felony to completely consume a DNA crime scene sample — ANDE and Thermo Fisher last year approached state law enforcement, misrepresenting their products' immediate potential, said Laura Sudkamp, director of the state police forensic laboratory.
- Jim Davis, chief federal officer for ANDE, said some laboratories feel imperiled by the new technology and underestimate the abilities of law enforcement.

Our Family

PARENTS
RAPID USERS

How can Rapid instruments help our customers, our backlog, and relieve some of the pressure on analysts?

CHILDREN
CASEWORK ANALYSTS

Why are we doing this? Now we have more work, and we are under more pressure.

Our goal is not keeping the instruments out of the hands of law enforcement. We want to have a complete understanding of the workings of the instrument so we can guide law enforcement in the proper use of the instruments. Once we inform the agencies of the current cost and limitations, they are willing to provide us with their samples and let us determine what can be run and absorb the cost.

There are genuine issues we are still working out that cause problems for the casework analysts. The FlexPlex27 kit is missing Penta D so the analyst may have to remove that locus from their stat. Most casework analysts have not been trained in Rapid so understanding the report structure and documentation can be frustrating.

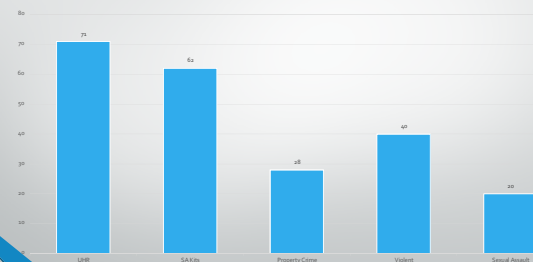
RAPID CASEWORK ONLINE JULY 15, 2021

- Body Identifications
- Unidentified remains
- Death Investigation
- Burglary
- Assaults
- Sexual Assaults

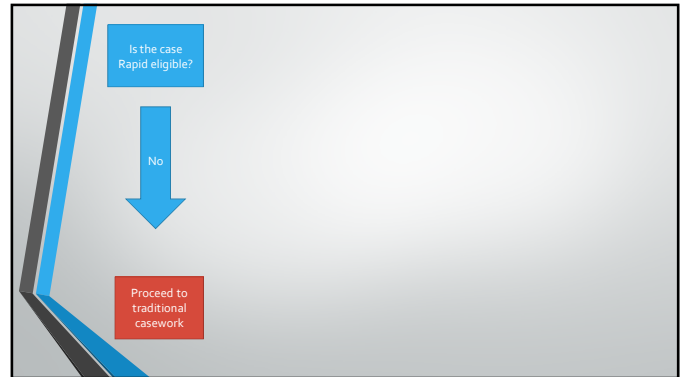
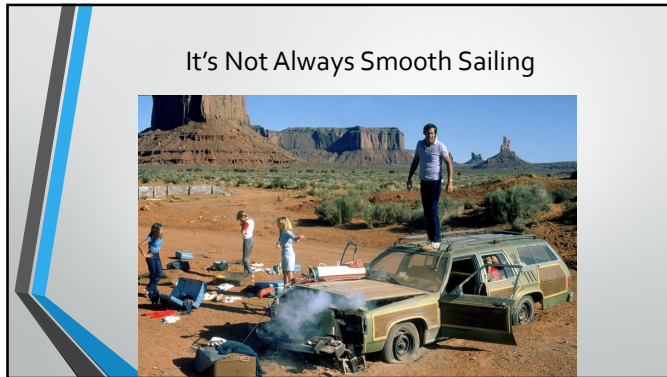
Total 221 cases

June 2023

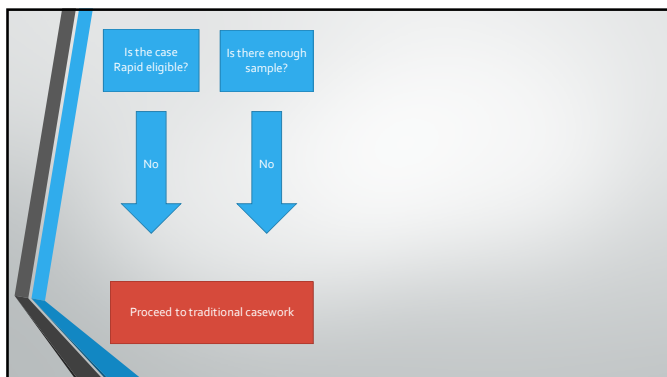
Cases Received



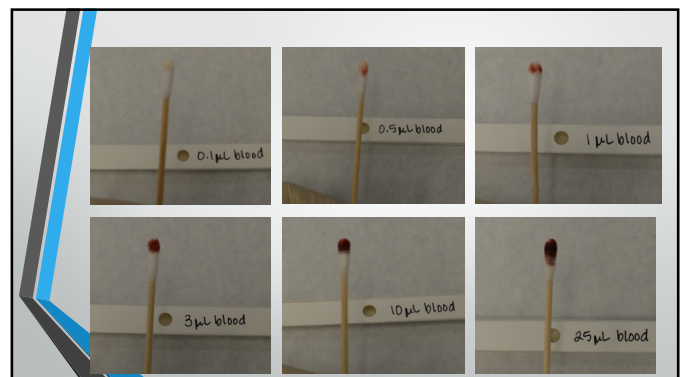
221 cases is low for a two year project but the instruments require high quantities of DNA and no mixtures. This naturally reduces the number of cases that can be run. Over 170 Rapid SA kits have been submitted and only 62 have made it to the Rapid instrument. Not all of the 62 provided a usable male profile.



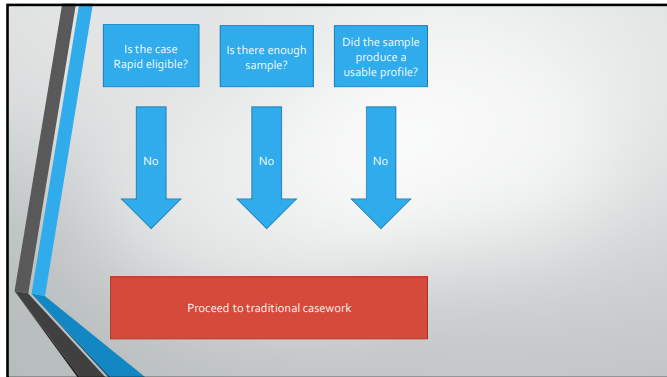
Any sample that could result in a mixture (body swabs, gun swabs, multiple assailants) will not be worked. Limited or trace DNA samples are not worked either because of the amount of DNA required for the instrument.



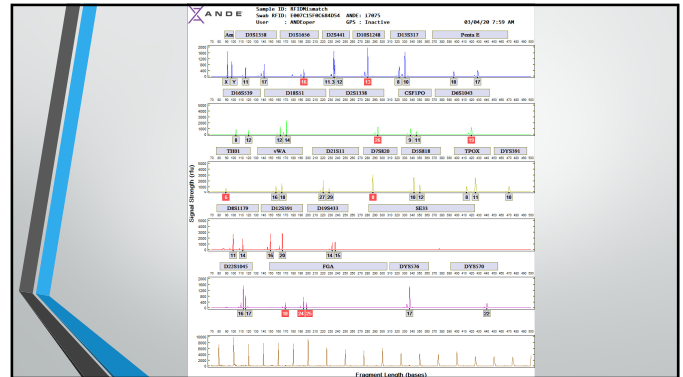
We Y-screen the Rapid kits. Any sample with less than 5ng of male DNA will not be run on the Rapid instrument. The instrument works best with 15ng of male DNA. Because of the need to Y-screen the kit, male on male cases are not worked on the Rapid instrument.



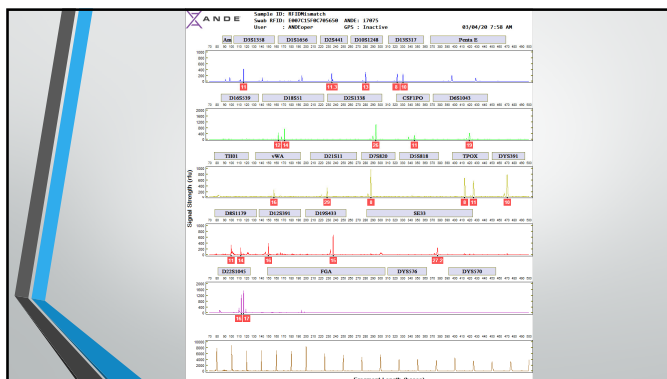
Limited blood samples like those on the top row will not be worked on the Rapid instrument. The bottom row has enough blood for consideration. The 25ul swab could be swabbed with an ANDE swab to try to transfer enough sample and preserve the original swab.



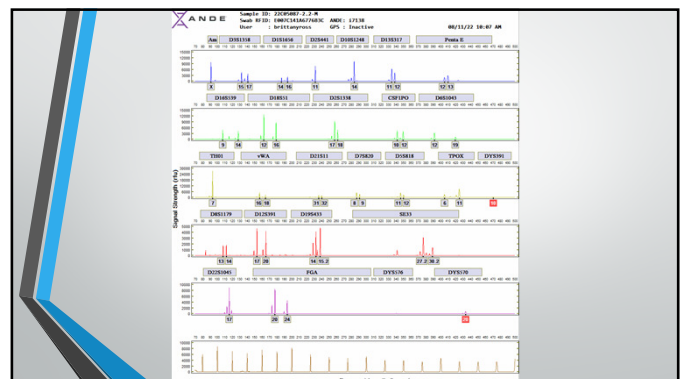
Not every sample run on the instrument will produce a usable profile. Sometime it is possible to rerun a sample but most samples are a one and done scenario and must be sent to traditional casework if they fail.



This sample has failed alleles/loci and must be evaluated to determine if enough information is available or if the sample should be reworked to provide a complete profile.



This sample did not have enough DNA to provide a usable profile and would need to be reworked with traditional methods.



This male fraction failed to call a Y in AMEL and flagged the DY peaks as failing. The female profile matched the victim but there was debate over saying no DNA foreign because we don't know if the DY peaks are real or not. This sample would need to be rework with traditional methods.

Double Homicide

- Two victims found beaten to death in a home
- Man shows up at a hospital in another jurisdiction covered in blood
- Swabs taken from his bloody clothing
- One victim's profile located on his shirt
- Report released in less than 3 days

The process does work and can provide information quickly.

Bone Sampling



ANDE has solutions and protocols for extracting DNA from bone samples. These are very effective, even with older samples.

HB BOARD MISSING PERSONS UNIDENTIFIED PERSONS UNCLAIMED PERSONS


Missing Person / NamUs #MP7099

Ruvil Hale, Male, White / Caucasian

MISSING	Date of Last Contact July 3, 1990	Missing From Paintsville, Kentucky	Missing Age 43 Years	Current Age 76 Years
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CASE IMAGES & DOCUMENTS CONTACTS

Image or Document



Facial/Case ID
Uploaded: May 1, 2010

2/22/22 Sent Post 9 an e-mail requesting help in locating Mr. Hale's son.

02/24/22 Sent Post 9 an e-mail stating Paintsville PD had located Mr. Hale's son but request a trooper make contact and collect DNA.

03/18/22 Skeletal remains found submerged in a car in Dewey Lake



The tooth on the right was processed for Rapid analysis.

Auto Thefts

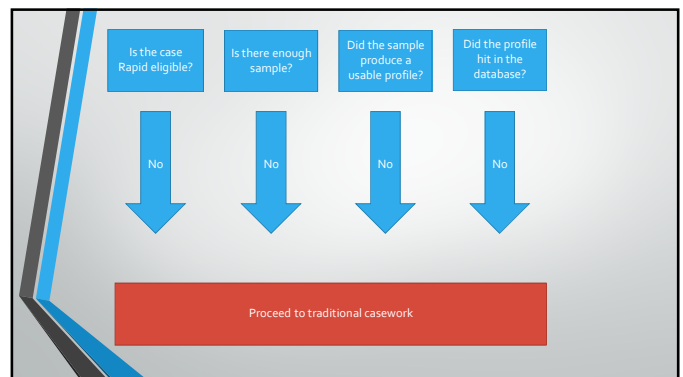
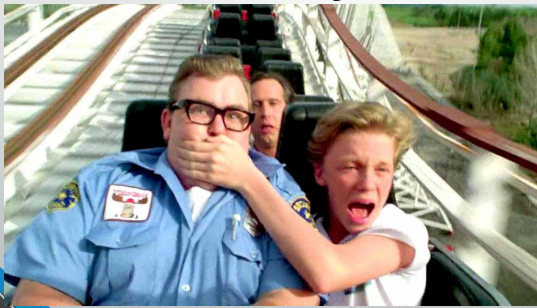
- Multiple cases where a vehicle is stolen and then found wrecked
- Blood swabs taken from areas such as the windshield, airbag, seats, and headliner
- At least one case resulted in a database hit identifying a suspect

Sexual Assault/Homicide

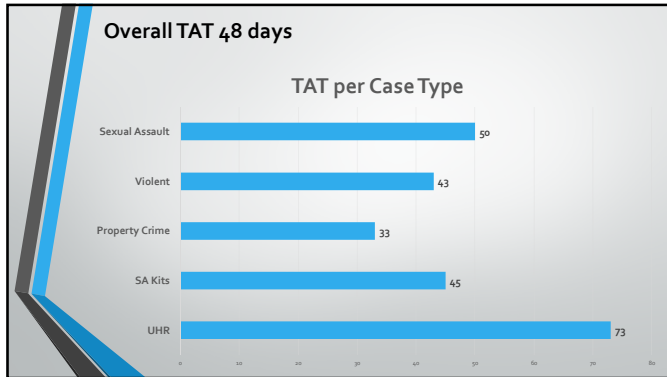
- Man found stabbed to death
- Suspect stated that she stabbed him because he had sexually assaulted her
- Sexual assault kit was collected from suspect
- Male DNA profile was obtained from kit but did not match the man she stabbed
- DNA profile from kit matched an offender in the database

We have had some success with samples hitting in the database and helping law enforcement get some quick answers.

Now We Are Having FUN!!!



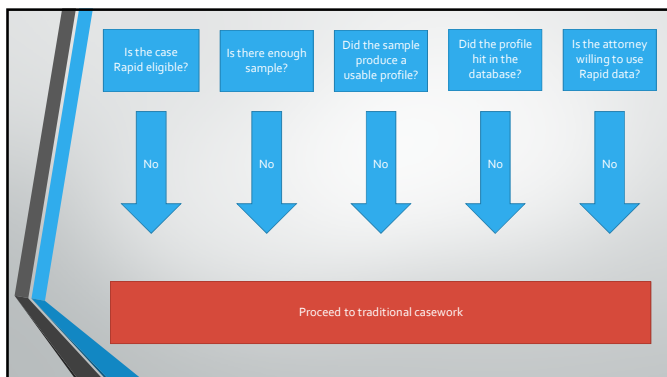
If the forensic unknown does not hit in the database, the sample will need to be processed using traditional methods so it can be uploaded into CODIS. Because our Rapid analysts and casework analysts are two different groups, each must write their own report which is sent through the peer and admin process. This ultimately results in a lot of time wasted when a sample did not hit in the database.



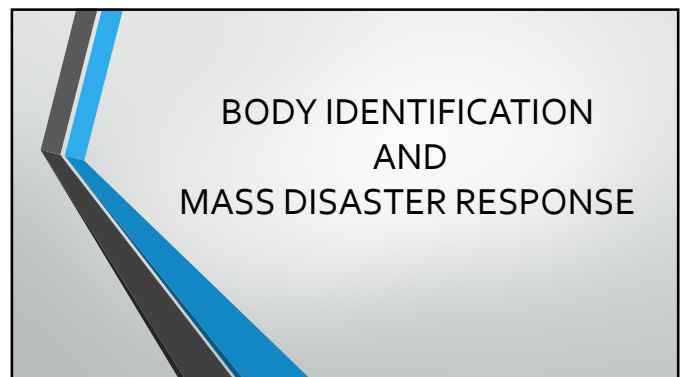
The overall TAT for Rapid cases is drastically lower than traditional casework. When a SA kit hits or matches a suspect standard, the results are reported a year earlier than traditional casework.



Some attorneys are stopping us in our tracks. While some attorneys are on board with Rapid and excited to see how this can improve the system, others do not wish to be bothered with the new technology and do not wish to use Rapid data. If they do not wish to use Rapid data we will rework the case using traditional methods.



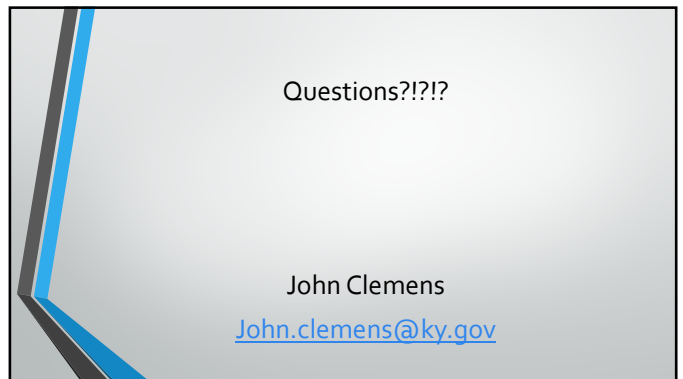
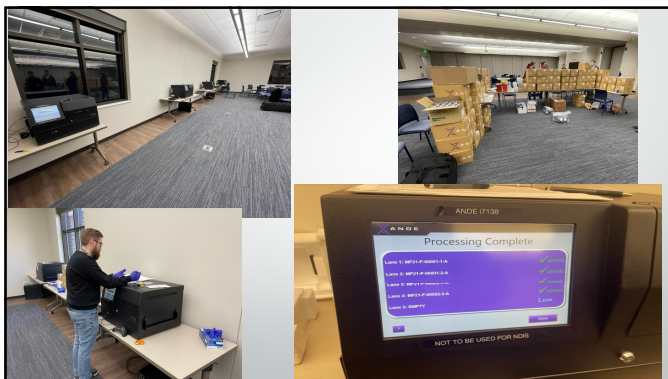
Unfortunately, there are several issues that cause us to have to send a case to traditional casework. While these cases ultimately cause more work for the casework analyst, the end goal is to understand the technology and help guide law enforcement agencies in the proper adoption of Rapid technologies.



Our understanding of the Rapid system has allowed us to help with body identification and mass disaster response in our state.



After tornados struck several cities in Kentucky, we were able to load up the instruments and respond to the areas hit and help with processing remains and family reference samples.



The ability to set up the instruments anywhere we can get power and process samples, help collect family reference standards, and process samples on scene leads to quicker identification of individuals and closure for families.