The Impact of Touch DNA on Criminal Investigation in Florida

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Abstract

This research looked at the use of Touch DNA by law enforcement agencies in Florida. One hundred law enforcement agencies in Florida were surveyed to determine if they used Touch DNA in their investigations. Information was collected on the types of crimes Florida law enforcement agencies routinely utilized Touch DNA as a part of their investigative efforts. The survey also sought comments on any barriers that had been encountered in the use of Touch DNA. The survey results suggests that 87% of the agencies did use Touch DNA to solve criminal investigations, but there were limitations on its' use due to the reluctance of government laboratories to process samples on routine cases and the cost of privately contracted laboratories.

Introduction

The science and technology involving the use of deoxyribonucleic acid (DNA) has evolved to the point where it is possible to develop a human identification profile from as little as a few skin cells left behind by a suspect handling objects at a crime scene (Minor, 2013). These profiles are able to be placed into searchable databases which allow for the linking of crimes and suspects to crime scenes. This science has been accepted by the judicial system in Florida as being reliable and has resulted in many suspects being identified that would have not been identified through other investigative means. Several studies have concluded that using "touch" DNA is particularly effective in solving property crimes as these crimes have low clearance rates when compared against more violent crimes. This paper seeks to look at what agencies in Florida are utilizing Touch DNA as a routine part of their investigation of crimes and to determine what reason or barriers agencies that are not using touch DNA have encountered which are preventing them from using this technology.

The use of deoxyribonucleic acid (DNA) has become common place in sexual battery and homicide cases, yet has only recently begun gaining acceptance for use by law enforcement agencies in solving other types of part one uniform crime reporting crimes such as thefts and burglaries (Rockne, 2013). As the sensitivity of the scientific processes used to develop DNA profiles has increased, the amount of material needed to produce a genetic profile has decreased (Huffine, 2008). With this increased efficiency in processing DNA, the ability to obtain useable and searchable DNA profiles has improved. Current technology allows DNA laboratories to process minute quantities of skin cells left behind at crime scenes by perpetrators from casual contact with items at the crime scene. This type of DNA is commonly known as touch or contact DNA. Since a perpetrator's mere contact with items at a crime scene may leave enough DNA behind to develop a comparable DNA profile, the potential impact on solving crimes has never been higher (Wickenheiser, 2002). The increased use of touch DNA may serve

to thwart perpetrators who wear gloves and masks while committing crimes since they still will be leaving tiny pieces of their identity behind in the form of skin cells (Garrett, 2006).

Several recent studies have concluded that utilizing DNA in property cases can enhance the likelihood of identifying an offender as much as five hundred percent (Roman, Reid, Reid, Chalfin, Adams & Knight, 2008; Ritter, 2008). The use of touch DNA is relatively new in criminal investigations, but it has the potential to identify even more suspects in property crimes cases than traditional DNA samples such as blood, semen, sweat and hair. This is due to the fact that not all scenes have biological samples left behind by the perpetrator, but most will have skin cells left behind from a suspect's interaction with the crime scene. This however will require a change in how property crime scenes are processed and how law enforcement is trained (Dale, Greenspan & Orokos, 2006).

Property crimes such as burglary directly affect many more people than crimes such as robbery and murder, and have a much greater financial impact than violent crimes (Garrison, 2008). In the "Burglary Project" conducted by the Denver Police Department from 2005 through 2007, it was estimated that using DNA evidence to solve property crimes saved the tax payers approximately $41.8 million in losses due to crime and money not spent on investigating crimes that had been prevented (Ashikhmin, Berdine, La Berge, Morrissey & Weber, 2008).

Literature Review

Background on Forensic DNA Use and Advancements

In 1980, two American genetic scientists pioneered a technique termed Restriction Fragment Length Polymorphism (RFLP) which allowed for the cleavage of deoxyribonucleic acid (DNA) through the use of enzymes (Wyman & White, 1980). This set the stage for the future of the human genome project being used to identify specific regions of DNA for human identification. This technology was first used forensically in 1985 by Professor Alec Jeffries to solve two murders in the United Kingdom and dramatically changed the way law enforcement would investigate and solve crimes (Seringhaus, 2009). Since that time, the standard methods used to investigate crimes have not been the same. Science has concluded that except for identical twins, the identity of humans can be distinguished through the analysis of their DNA and this DNA pattern is unique to the individual (Seringhaus, 2009). Whereas the science and admissibility of DNA in criminal cases quickly gained acceptance in the United Kingdom, it took longer to gain acceptance in the judicial system in the United States. It was not until 1988 that Florida had its first successful appellate DNA challenge upheld (*Andrews v. Florida*, 533 So. 2d 841 [Fla. App.]). During the next twenty-five years, both the technology on producing DNA profiles and the acceptability by the judicial system of this science would make rapid and noteworthy strides forward in establishing national standards for the collection and analysis of DNA.

The Federal Bureau of Investigation (FBI) Laboratory took the lead on a standard way of coding DNA for forensic use and formed the Technical Working Group on DNA

Analysis Methods (TWGDAM) ("History of dna,"). This group's recommendations became the framework for the Combined DNA Index System (CODIS) which became law under The DNA Identification Act of 1994.

Previous research and results of utilizing DNA in high-volume crimes:

For years, law enforcement organizations have been looking for ways to improve the solvability of high-volume crimes such as burglary, motor vehicle-theft and theft from motor vehicles which perennially have the lowest clearance rates of any uniform crime report part 1 crime. From 2007 to 2011, the burglary cases nationwide resulted in an estimated twenty-three billion dollars in losses. While technology has evolved and allowed deoxyribonucleic acid (DNA) to be used to solve crimes, it has primarily been used only in violent crime cases in the United States and not for high-volume property crimes. Research funded by the National Institute of Justice (NIJ) from 2004-2007 indicates that the solvability of property crimes can be significantly enhanced when physical evidence is used to link a subject to a crime scene. The study titled *The DNA Field Experiment: Cost-Effectiveness Analysis of the Use of DNA in the Investigation of High-Volume Crimes*, found that using DNA in conjunction with other types of evidence resulted in identifying twice as many suspects in property crimes, twice as many arrests and twice as many successful prosecutions of the offenders (Roman et al., 2008). Results from five major cities proved that in cases where both fingerprint and biological evidence were collected, more suspects were identified via DNA in the Combined DNA Index System (CODIS) than were identified via the Automated Fingerprint Identification System (AFIS) (Roman et al, 2008). While DNA substantially improved identification of suspects in property crime cases, it did not come without an increased cost to an agency. As of 2008, it was estimated that cases involving DNA cost an agency an additional $4,502 per case to identify a suspect and a total of $14,169 to identify, arrest and prosecute the offender who would have otherwise gone unidentified (Roman, Reid, Chalfin & Knight, 2009). This figure includes the laboratory costs to process the DNA as well as other administrative costs such as evidence handling and witness costs.

High Volume Crime Trends in the United States

Property crimes in the United States account for nearly 95% of all part I crimes as reported in the FBI's *Crime in the United States* publications for the time frame of 2007-2011. While nationally the overall five year trend for property crimes has decreased by approximately 8%, the rates of suspects being identified in these cases has remained consistent and poor. From 2007 through 2011, burglaries had a clearance rate of 12.4%, motor vehicle theft had a clearance rate of 12% and larceny had a clearance rate of 19%. This is in stark contrast to violent crimes which were solved at a much higher rate. For instance during the same timeframe, 64% of murders and 41% of rapes has suspects identified (US Department of Justice, 2007-2011).

While the technology surrounding the use of deoxyribonucleic acid (DNA) to solve violent crimes has become standard practice, it has not been used routinely for what can be termed "minor crimes." While property crime far outweigh violent crime in number and in economic loss, law enforcement agencies have only recently begun to see the benefits of utilizing DNA evidence to link suspects to crimes. At many state and federal laboratories, there is fierce competition for DNA processing resources. Because

property crimes are many times viewed as “minor crimes” when compared to homicides, rapes and robberies, their priority is low and so DNA recovered in property crimes cases often does not get processed or there is a great delay in being processed. This myth of “minor crimes” does not recognize that many of these same offenders commit more serious crimes as well and that property crime offenders have a high recidivism rate; it has been estimated that prolific burglars may commit as many as 230 crimes a piece annually (Crouse, Sikorsky, Jeanguenat, Vreeland & Looper, 2012). Property crimes offenders often progress to more violent crimes which means that if they are caught earlier in their criminal careers, the violence cycle may be interrupted and quite possibly prevented (Buntin, 2010).

Successes in Using DNA for Property Crimes

The National Institute of Justice (NIJ) supported test programs in Dade County Florida; Palm Beach California; and New York City where DNA collection, analysis and use was tracked for property crimes. These programs showed success in identifying suspects that would not have otherwise been identified and improved conviction rates. However, there were concerns raised about the ability of current government labs to keep up with the increased number of DNA submissions by law enforcement. Many samples remain unanalyzed and the backlog is steadily increasing due to the lack of qualified technicians, funding and laboratory space. Due to the success of the three NIJ pilot programs, recommendations were made to increase funding to laboratories, training programs for law enforcement and a push to eliminate the backlog of entry into the CODIS (Zedlewski & Murphy, 2006). Although some funding was added, it has not kept up with the demands for processing DNA for inclusion into CODIS.

While the use of DNA has been estimated to solve up to twice as many property cases than cases that have no DNA, that is just the beginning of its potential to make dramatic changes to the criminal justice system. The benefits of using DNA in property cases may also link suspects to crimes which were previously not known to be related. In New York City, agencies were able to link more than thirty previously unrelated crimes to convicted offenders in CODIS (Dale, Greenspan & Orokos, 2006).

Ritter suggests further that the other test city locations experienced similar results and were able to solve crimes that had previously had no leads or suspects associated. Four of five test sites funded to use DNA in property crimes cases by the National Institute of Justice (NIJ) discovered that the suspects identified through the use of DNA had twice as many previous felony convictions when compared to offenders identified solely by traditional investigative means (Ritter, 2008).

The science and admissibility of DNA has progressed rapidly in the past thirty-three years and has now become accepted as one of the best forms of physical evidence for criminal investigations. As recently as June 2013, the United States Supreme Court ruled in favor of law enforcement use of DNA in a ground-breaking decision involving a sample obtained while booking a suspect on felony charges in Maryland that later linked him to a 2003 rape case. The court found that “When officers make an arrest supported by probable cause to hold for a serious offense and bring the suspect to the station to be detained in custody, taking and analyzing a cheek swab of the arrestee’s DNA is, like fingerprinting and photographing, a legitimate police booking

procedure that is reasonable under the Fourth Amendment. Pp. 3–28" ("Maryland v. King," 2013). While there will be much more debate as to how far this use of DNA as an identification means may be used, it has certainly solidified that it is an accepted science and that it is reliable.

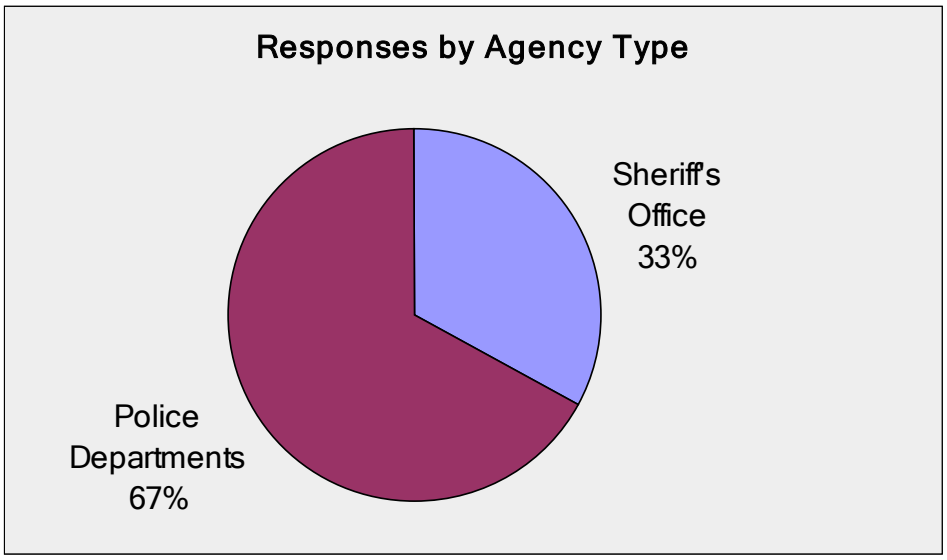
Methods

The purpose of this research was to determine if touch DNA has gained acceptance for identifying suspects in criminal investigations in sheriff's offices and police departments in Florida. An internet based survey was used to collect the data in order to reduce cost, limit the time burden for those completing the survey and to allow for easy compilation of the collected information. This research also gathered information as to why agencies might not be using touch DNA in their investigations as well as data on how many crimes agencies have solved from 2011 through 2012 as a result of touch DNA hits.

In order to obtain a fair representation of law enforcement agencies from all areas of Florida, the survey was sent to the sheriff in each of the sixty-seven (67) counties in Florida as well as to one hundred forty (140) chiefs of police of municipal and state police departments within Florida. A letter explaining the purpose of the survey was emailed to the head of each agency with a request that the survey be completed by an appropriate latent investigative area within the agency. The survey was treated as confidential in terms of identifying the respondents as opposed to anonymous due to the built in features of the electronic survey system utilized. Information identifying specific agency's responses was not utilized in the analysis of the data or released. (See appendix "A" for the entire survey)

Results

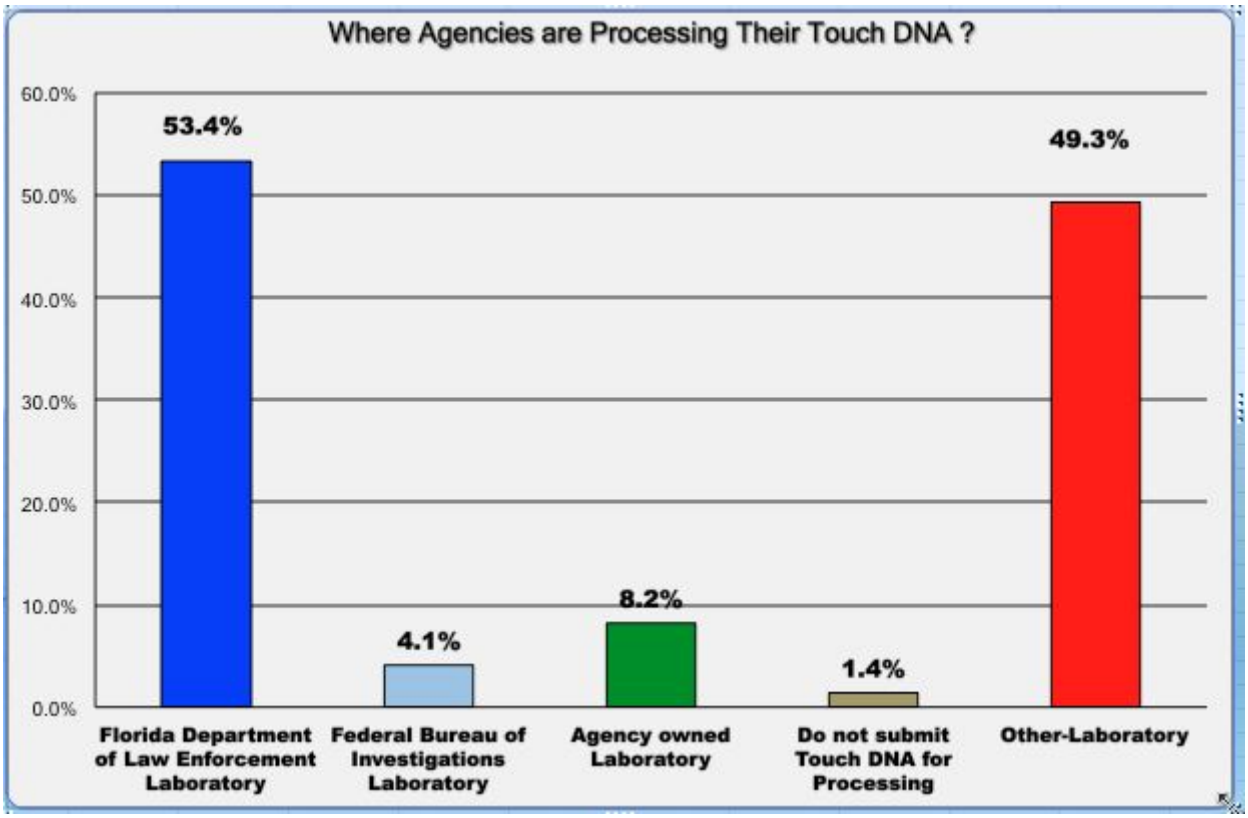
Of the two hundred-seven (207) agencies that were sent surveys, one hundred (100) completed at least a portion of the survey. This equated to a forty-eight percent (48%) return rate. Of the one hundred responses completed, there was a much higher return rate from police departments (67) compared with sheriff's offices (33).



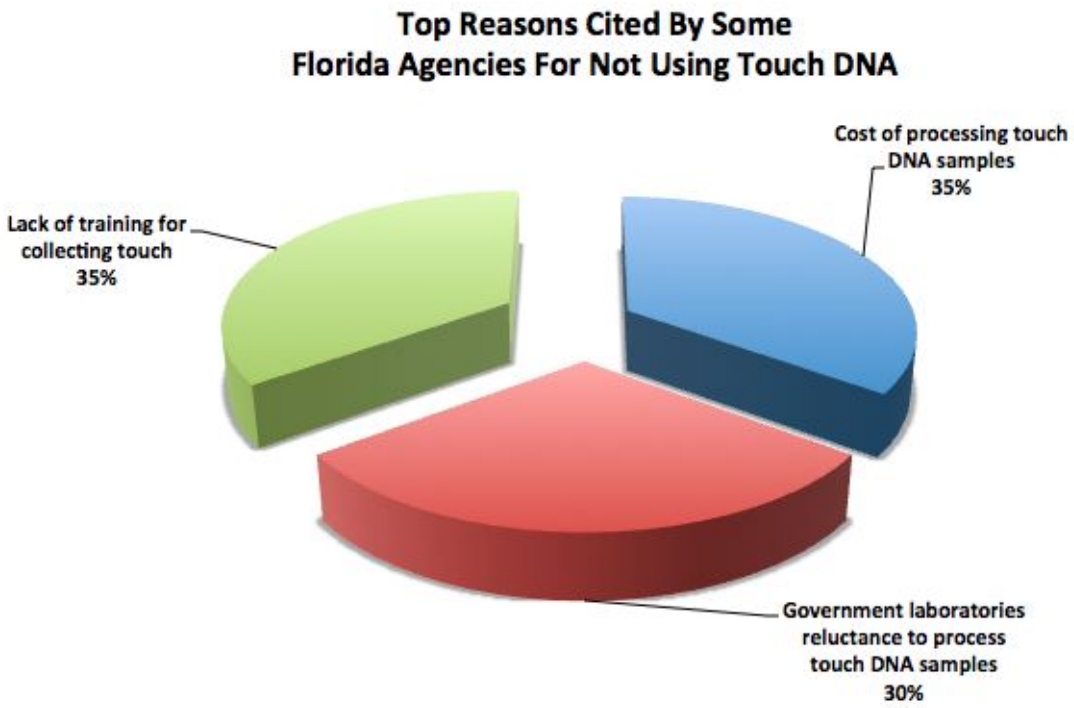
Eighty-seven of the one hundred agencies indicated that they collect Touch DNA for criminal investigations while only thirteen responded that they do not collect Touch DNA. Of the agencies that use Touch DNA as a part of their criminal investigations, seventy-three agencies completed the survey question dealing with the break down of crime types in which they collected Touch DNA as a part of their investigation. Fourteen agencies that indicated they collected Touch DNA, did not answer question number six which asked for details about the types of crimes for which they collected the DNA. The greatest crime that Touch DNA was collected on was for Homicides, with 91% of the 73 agencies reporting that they use it in these serious cases.

Crimes Touch DNA Collected	Response Percent	Response Count
Auto-burglary	61.6%	45 out of 73
Motor vehicle-theft	64.4%	47 out of 73
Burglary	80.8%	59 out of 73
Homicide	91.8%	67 out of 73
Robbery	84.9%	62 out of 73
Sexual Battery	87.7%	64 out of 73
Other Crimes		10 out of 73
	answered question	73 out of 100
	skipped question	27 out of 100

The seventy-three respondents who completed question number eight indicated overwhelmingly that the Florida Department of Law Enforcement and private laboratories were used primarily to process Touch DNA specimens. The individual comments indicated that five different private laboratories were at times contracted by the seventy-three agencies and that six agencies submitted items to their own DNA laboratory. It should be noted that most agencies submitted DNA items to both the FDLE laboratory as well as to private laboratories.



The ten responses that indicated the agency did not collect Touch DNA for criminal cases were presented with a list of reasons for not collecting the Touch DNA and were asked to complete an “attitudinal” question concerning their reasons for not collecting Touch DNA. Reasons for not collecting or submitting Touch DNA mainly rested on two reasons; reluctance of government laboratories to process Touch DNA samples and the cost of contracting private laboratories to conduct the testing.

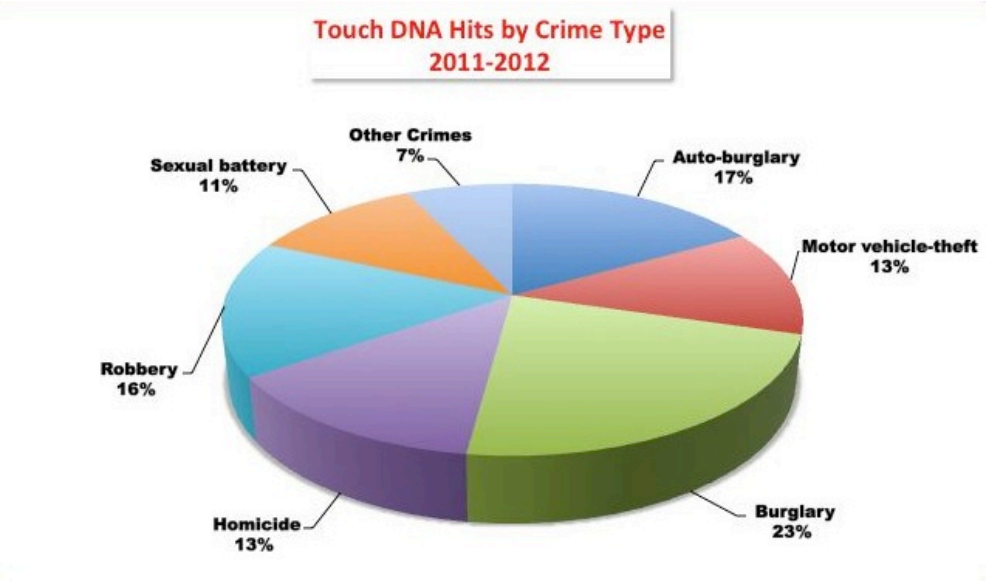


The final survey question sought the answer to the question of whether the agency would recommend to other agencies to collect Touch DNA samples for criminal investigations. Seventy-seven percent of the eighty-three respondents who answered this question recommended that agencies incorporate Touch DNA in their investigations. No agency recommended against using Touch DNA; however the comments related the following:

- "Due to its low success rate, only if no other evidence is available."
- "Only recommend touch DNA if analysis is needed for the obvious and may result in an ID. If it's obvious that most likely the DNA would not outcome in an ID, than no need to collect."
- "… would rather the patrol level focus on fingerprint and DNA (Blood, Fluids) evidence more than Touch DNA. Touch DNA has not been a proven asset to criminal investigations."
- "Touch DNA collection is useful depending on type of crime and evidence items available. Thorough training needs to be done."
- "Wish FDLE guidelines would allow touch DNA to be processed for crimes other then violent",
- "Limited to violent crimes only. Would like to submit on all cases, but FDLE will not process."
- "Strongly recommend incorporation to violent crime primarily. Our data demonstrates touch DNA has limited success (20%) on property crime and sometimes has police officers DNA rather than a perpetrator",

- “when necessary and/or feasible”,
- “Not limit touch DNA examination by FDLE to only violent crimes”,
- “Our crime lab supports DNA analysis.....not touch DNA analysis”,
- “Attempting funding source for Touch DNA program currently”

The results of the number of hits received from the responding agencies Touch DNA submissions for the period of January 2011 through December 2012 was low compared with the number of submissions. Burglary crimes received the most hits with thirty-two of the one hundred forty-two Touch DNA hits reported by the survey respondents.



Discussion

This research has shown that Florida agencies are in fact embracing the use of Touch DNA in their criminal investigations as 87% of the respondents indicated that they collect and submit samples for some of their criminal investigations. However, it is unclear as to what percentage of their criminal cases have Touch DNA collected compared to being submitted for processing. Several agencies commented that they would like to submit more evidence for analysis, but are restricted by the limitations imposed by government laboratories for submission of these samples as well as the cost of processing these samples at private laboratories. Despite this, offenders are being identified through the use of Touch DNA in Florida and the greatest number of successes is from the high volume crime of burglary. This would support the findings of the NIJ study “*The DNA field experiment: Cost-effectiveness analysis of the use of DNA*

in the investigation of high-volume crimes", where the greatest benefit was seen in solving high volume but normally low clearance rate crimes such as Burglary (Roman et al., 2008).It is clear that using DNA to link suspects to crimes is an effective means to solve crimes, especially ones with low solvability rates such as high volume property type crimes. The benefit of Touch DNA collection and processing in these cases is that many times there is no discernable suspect known before the submission of the DNA evidence collected at the scene. Because many property crimes are committed by offenders who are responsible for numerous crimes, the benefit of identifying them through the use of Touch DNA has wide ranging positive consequences. In terms of losses by the public and sheer numbers of victims, property crimes dwarf the more serious offenses such as homicide and sexual battery and deserve the same dedication of financial and laboratory resources to solve them. Clearly based upon the responses of the surveyed agencies concerning recommendations on using Touch DNA, they believe that Touch DNA should be incorporated into the investigative tool box of all agencies. This is not to say that traditional investigative techniques should be abandoned but does indicate that by augmenting these techniques, more crimes can be solved.

The challenge faced not only by Florida law enforcement agencies, but by all United States agencies is to find a way to leverage funds and procedures towards processing more Touch DNA for more cases. The collection of DNA at crime scenes should be as routine as dusting for latent fingerprints and interviewing witnesses. Training aimed at the first responding and investigating officer will need to identify what locations are ideal for collecting Touch DNA, proper swabbing techniques and triaging collection sites for the areas most likely to yield results. Government laboratories must increase the volume of Touch DNA cases processed even if a fraction of the cases return no discernable profile. From the survey results, almost a quarter of the reported hits from Touch DNA submissions came from burglary cases. This is disproportionate since more agencies reported collecting samples from other crime types especially in homicide and sexual battery. If the perception that violent crime is more important to expend funds on than property crimes can be changed, then Touch DNA success stories should increase and more suspects identified and arrested.

Recommendations

In order for Touch DNA to reach its success potential, several things should occur:

- A shared DNA identification database of arrested persons similar to the fingerprint database in Florida should be available for all Florida law enforcement agencies. This should be different than the Combined DNA Index System run by the FBI and should focus on all arrests made in Florida.
    - The premise should be predicated on identifying the booked suspect and not on conducting investigative operations.
    - "DNA is another metric of identification used to connect the arrestee with his or her public persona, as reflected in records of his or her actions that

are available to the police." Hiibel v. Sixth Judicial Dist. Court of Nev., Humboldt Cty., 542 U. S. 177, 191.

- Regulations on submitting Touch DNA to government laboratories for only violent crime must be modified to include high volume cases.
    - Selective screening of samples is necessary to ensure that the highest yield locations are processed for DNA and submitted.
    - CODIS standards must not be used for the Florida only identification database. Its limitations on discernable offender only DNA is too restrictive for many investigative needs.
    - Identifying a potential suspect based upon their DNA being at a crime scene provides investigative leads that are many times not present in high volume property cases.
- Touch DNA collection training should be available for all Florida law enforcement officers and should be standardized.

Captain David Fleet began his law enforcement career with the Hillsborough County Sheriff's Office in 1986. He is the former investigations and operations commander in District I and is currently the Deputy Distract Commander for District II which covers the northern and eastern sections of Hillsborough County. He has served in numerous areas within the agency including extensive experience with criminal investigations having served as a detective and detective supervisor in the criminal investigations division for over 10 years. He is a current hostage negotiator with the crisis negotiations team and is a former SWAT team member with 20 years of service within the tactical community. He was instrumental in establishing a local DNA index system with the Hillsborough Sheriff's Office and serves as the law enforcement project manager for an innovative crime reduction program that utilizes closed circuit cameras in the highest crime areas of the county. In 2012, he was the recipient of a scholarship to attend the National Institute of Justice Technical Institute and graduated from that program. He is a regular instructor within the Sheriff's Office and teaches a variety of technical topics. David has a Bachelor of Arts in Psychology from the University of Tampa.

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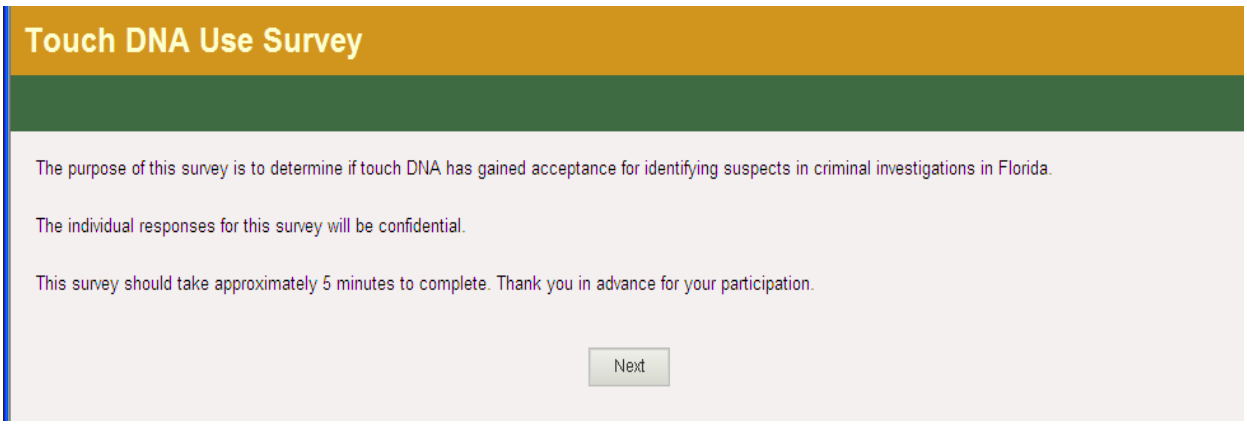
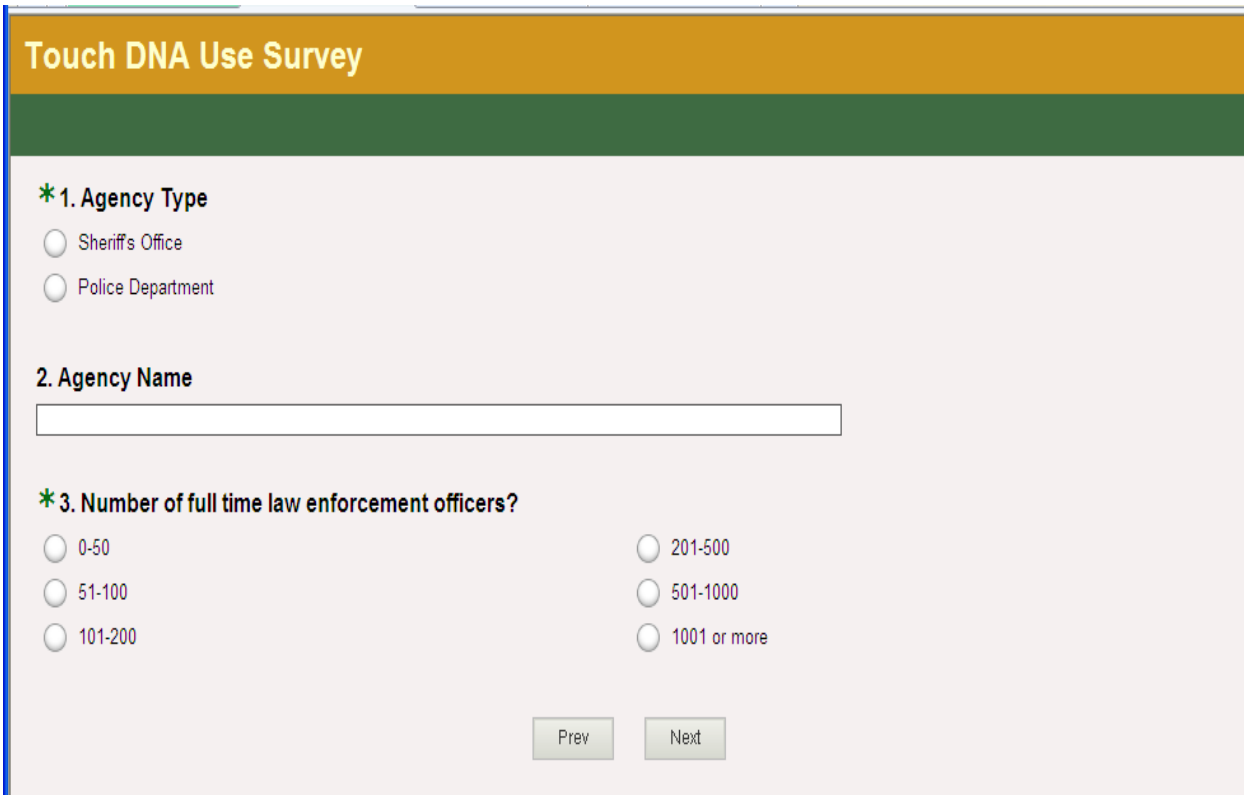
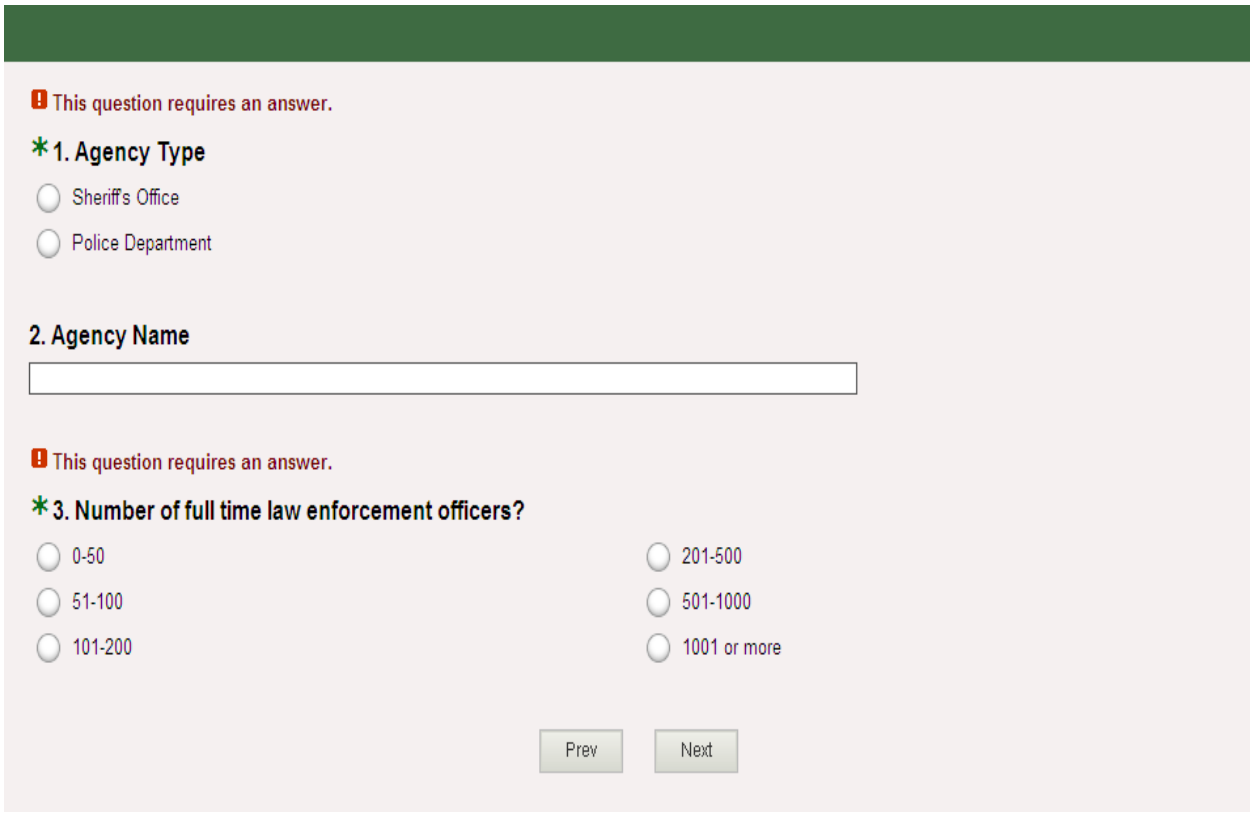
Appendix A




Touch DNA Use Survey
*1. Agency Type
Sheriff's Office
Police Department
2. Agency Name
*3. Number of full time law enforcement officers?
0-50
51-100
101-200
201-500
501-1000
1001 or more
Prev
Next


This question requires an answer.
*1. Agency Type
Sheriff's Office
Police Department
2. Agency Name
This question requires an answer.
*3. Number of full time law enforcement officers?
0-50
51-100
101-200
201-500
501-1000
1001 or more
Prev
Next

*4. Does your agency collect Touch DNA samples for use in criminal investigations ?

(Touch DNA refers to the DNA that is left behind from skin cells when a person touches or comes into contact with an item and does not include DNA that is found in blood, semen, bodily fluids or hair.)

- ○ Yes
- ○ No

Prev Next

*5. In what year did you begin collecting touch DNA samples for criminal investigations ?

*6. What types of investigations does your agency regularly collect touch DNA on ? (Select all that apply)

(Touch DNA refers to the DNA that is left behind from skin cells when a person touches or comes into contact with an item and does not include DNA that is found in blood, semen, bodily fluids or hair.)

- ☐ Auto-burglary
- ☐ Motor vehicle-theft
- ☐ Burglary
- ☐ Homicide
- ☐ Robbery
- ☐ Sexual battery

Other (please specify)

*7. During the period of January 1, 2011 through December 31 2012, how many cases has your agency solved through the use of Touch DNA ?

	0	1-5	6-10	11-20	21-30	31-40	41-50	51-75	76-100	101 or greater
Auto-burglary	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Motor vehicle-theft	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Burglary	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Homicide	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Robbery	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Sexual battery	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Prev Next

***8. For crimes you collect Touch DNA on, where do you submit them for processing ? Please select all that apply.**

(Touch DNA refers to the DNA that is left behind from skin cells when a person touches or comes into contact with an item. It does not include hair or biological DNA samples)

- [ ] Florida Department of Law Enforcement laboratory
- [ ] Federal Bureau of Investigations laboratory
- [ ] Agency owned laboratory
- [ ] Do not submit Touch DNA for processing
- [ ] Other- please specify below.

Name of private laboratory used (if applicable)

Prev Next

***9. Our agency would**

(choose all that apply)

- [ ] recommend that other agencies incorporate touch DNA analysis into its' investigations.
- [ ] recommend that other agencies not incorporate touch DNA into its' investigations.
- [ ] like to incorporate touch DNA into its' investigations.
- [ ] not like to incorporate touch DNA into our investigations.
- [ ] other-specify below

Other (please specify)

Prev Next

Thank you for participating in this survey. Your answers will greatly assist in this research project.

Prev Done