Interim report

Investigation into the sensitivity of spermatozoa microscopy

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Introduction

Project Proposal #181 – Investigation into the sensitivity of spermatozoa microscopy stated that "…information will formulate decisions on the direction of any further experimentation." The experimental work has been completed and a decision point has been reached.

This interim report briefly describes the results obtained, the decision that needed to be made and the factors considered in making that decision.

The information within this interim report was presented to the Forensic DNA Analysis Management Team on …… All of the members of the Management Team that were present at this meeting have agreed with the decisions made.

Results

Mock samples were created as described in Section 5.1 of *Project Proposal #181 – Investigation into the sensitivity of spermatozoa microscopy* and the Evidence Recovery process completed. The results of the AP and p30 testing were not as expected in that the more concentrated samples gave poor results. The microscopy and differential lysis extraction of these samples was not pursued since it was noted that the semen sample used to create the swabs was compromised.

A second set of samples was created using a fresh semen sample and testing conducted as per *Project Proposal #181*. The results of this testing are detailed in Table 1.

I cannot get this table in for love nor money!!!

A number of conclusions can be drawn from this data:

1. The AP and p30 results are as expected
2. Given that epithelial cells were observed on all of the ER slides, material is not being lost during the slide making process
3. As expected, the number of sperm observed decreased as the concentration of the semen decreased in an approximately linear fashion

4. The number of sperm observed is consistent across replicates of the same semen concentration
5. As expected, less sperm are observed on the ER slide than on the diff slide
6. There were four instances where sperm were observed on the diff slide when no sperm were observed on the ER slide, however this occurred with the lower semen concentrations

Discussion

The aim of this project was to investigate the performance of the process of generating microscope slides at Evidence Recovery. This investigation was necessary since numerous examples were seen in casework where sperm were not observed on the ER slide but were observed on the diff slide. In some instances the difference in the number of sperm observed on these slides was large, e.g. <1+ from the ER slide and 4+ from the diff slide.

Section 1.1 ii) of *Project Proposal #181* questioned whether sperm could be being lost in the slide staining procedure. Epithelial cells were observed on all of the ER slides prepared from the experimental samples leading to the conclusion that the slide staining procedure is not the cause of the issue.

Section 1.1 i) of *Project Proposal #181* questioned whether the suspension method was causing overly diluted samples thereby affecting the ability to detect sperm on the ER slides. Experimental data showed the number of sperm observed on both the ER and diff slides decreased as the semen concentration decreased and that there were more sperm observed on the diff slides compared to the ER slides, however this difference was only small. These observations were as expected given the concentration step during the diff slide making process. There were four examples of sperm being observed on the diff slides when no sperm were observed on the ER slides, however these samples were from the 1 in 100, 200 and 500 dilutions and the number of sperm observed on the diff slides was small. The observations of large differences between the ER and diff slides from casework were not replicated in the experimental samples. This could be due to a number of reasons including, but not limited to:

- Small sample set;
- The conditions under which the issue was observed in casework not being replicated in the experimental set;
- The experiment was not performed as a blind trial;
- Experimental samples not accurately representing casework samples in their physical characteristics.

Following the review of the experimental data, a decision point was reached as follows:

1. Do we design further experiments to investigate whether there are possible issues with the current ER process and identify them?
2. Do we stop investigating the cause of the issue and instead design and test a different evidence recovery process?

In order to make this decision we considered the following:

- If we are able to identify an issue with the current process then a new ER process will need to be designed;
- If we were unable to identify the issue with the current process then the observations in casework are unexplainable and it is likely that a change in ER process will be required to prevent reoccurrence in the future.

Given that both options would likely result in the same outcome it was decided that further investigations would not be of any tangible benefit, therefore it was decided that the next step would be to design and test a new Evidence Recovery process.

A new Project Proposal detailing the testing of an alternative ER process will be produced and submitted to the Forensic DNA Analysis Management Team for approval.