D44 From the Bed to the Bench: Defining the Vaginal and Cervical Environment for Post- Coital DNA Recovery

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After attending this presentation, attendees will understand the cyclic variability in the vaginal and cervical environment across the lifespan that may influence the recovery of seminal DNA following rape.

This presentation will impact the forensic science community by helping attendees understand that there may be reasons for absence/presence of DNA beyond the expected time-frame commonly accepted by the forensic community.

The forensic laboratory community has developed a number of advanced technical methods for DNA recovery. Recently, two important studies have: (1) evaluated recovery of DNA past the historical 72 hours promoted as the outside limits for a rape evaluation evidence recovery; and, (2) compared recovery of DNA evidence from the vaginal and cervical sample collected from rape victims. The impetus for both studies came from scholarly presentations and discussions with advanced practice forensic nurses, physicians, laboratory directors, and forensic nurses. The results from the pilot study with three couples looked at the timing of recovery in the post-coital couples. The results from the small sample was that DNA was found routinely at 3-4 days after coitus, but also at 5-6 days post-coitus, and also 7 days post-coitus using enhanced methods for DNA detection. These results question the prevailing practice of limiting evaluation post-rape to a 72 hour period. In the second study, vaginal and cervical samples were compared for the presence of DNA. The results of this study were that cervical samples produced the positive DNA samples when vaginal samples failed to produce recoverable DNA. Both studies challenge the prevailing wisdom, practice and protocols that direct investigation to limit evaluations to 72 hours and collections sites to the vagina for DNA recovery. Specifically, these studies challenge: (1) the limitation of rape evaluation and evidence collection to 72 hours for recovery of DNA; and,
(2) the optimum location for the recovery of DNA in the post-coital sample.

The literature review reveals that the medical literature reports a variety of physical and environmental changes in the genitourinary structures impact fertility. In addition, it is known that the normal appearance of genital and urinary structures change throughout the monthly cycle, are predictable, and documented over the lifespan of the female. Tools have been developed to help classify the changing appearance. However, the research has not quantified the changes in females that includes cyclic variances, e.g., the monthly cycle of a reproductive female, or the expected changes across the life span, e.g., infant, pre-pubertal, pubertal, reproductive aged, peri-menopausal, menopausal, to late menopausal changes.

To complicate the interpretation, the addition of ejaculate to the genitourinary environment, the nature of the semen, sperm and the influence of the cyclic vaginal environment on seminal properties in and out of the environment have not been considered by the forensic community. In addition, the vulvovaginal environment across the life span is not studied in the context of the forensic sciences or recovery of post-coital DNA.

This presentation will lay the foundation for understanding embryology and physiology of the vaginal and cervical environment, and the maturation of the vulvovaginal and cervical structures across the life span. The presentation covers the estrogenic changes and the impact of mixing ejaculate in the environment in the context of the post coital environment with the purpose of laying a foundation for future research questions and explanations for why a forensic sample produced (or did not produce) recoverable DNA.

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