

# Mid-America 2012 Forensic DNA Conference

10:10 am - 10:30 am **Is It a Glow or a No-Glow: Evaluating Sperm Hy-Liter™ As a Predictor of Male DNA Yield**

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*The Kansas City Police Crime Laboratory began utilizing the Independent Forensics Sperm Hy-Liter™ kit on casework samples in October 2010. To date, approximately 50 samples have been screened with Sperm Hy-Liter™ and subsequently extracted for DNA analysis. These results as well as several variables affecting casework samples were tracked in order to gauge the utility of Sperm Hy-Liter within our workflow. This presentation will provide a brief overview of the processes used and explore the associations between Sperm Hy-Liter™ results and male DNA yield.*

10:30 am - 10:50 am **Break**

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# Is It a Glow or a No-Glow?

## Is It a Glow or a No-Glow?

Evaluating Sperm Hy-Liter™ as a Predictor of Male DNA Yield

Kansas City Police Crime Laboratory  
Shana Hawkins, Emily Brogdon, and Kelsey Grist

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## Sperm Hy-Liter

- › Independent Forensics product
- › Screening tool for sexual assault cases
- › Phase contrast microscope with fluorescence illumination capabilities
- › Identify Spermatozoa
  - DAPI dye stains nuclei of all cells BLUE
  - FITC dye stains human sperm heads GREEN

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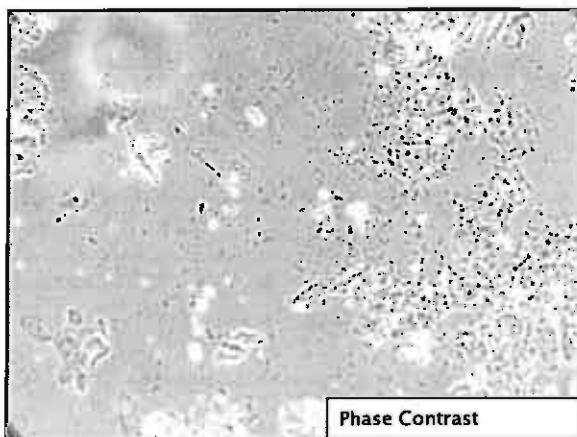
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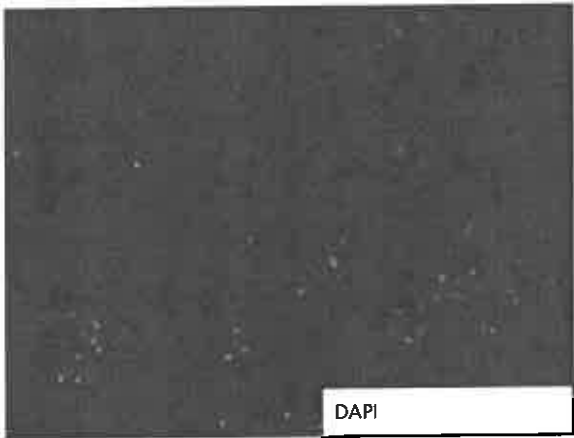
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Is It a Glow or a No-Glow?



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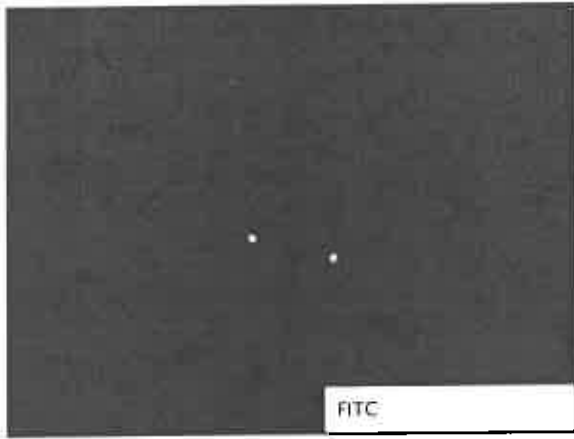
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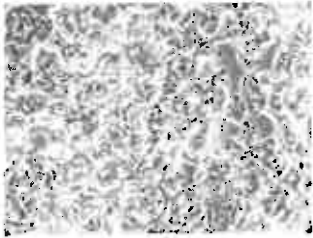
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**Advantages**

- › Thick, occluded smears
- › Partially degraded sperm



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# Is It a Glow or a No-Glow?

## Our Sperm Hy-Liter Procedure

- ▶ Extract sample in PBS 1-2 hours
- ▶ Spin basket substrate and centrifuge
- ▶ Use supernatant for other screening tests
- ▶ Resuspend pellet in 100µl of supernatant
- ▶ Add resuspended extract to Sperm Hy-Liter slide in 10µl increments until adequate cellular material is deposited
- ▶ Heat fix slide using hot plate on low setting
- ▶ Store slide in freezer until stained (<1 month)
- ▶ Examine slide

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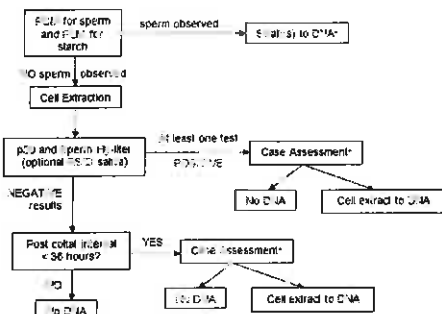
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## Work Flow for Swabs with Possible Penetration



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## DNA Analysis

- ▶ Differential Extraction
- ▶ Quantification - Quantifiler Duo
  - Stop if male DNA is below 0.25ng
  - Consider Y-STR analysis
- ▶ Amplification - Identifiler
  - Only F2 fraction typically\*
- ▶ Analysis - GeneMapper-IDX

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## The Evaluation

- › How do Sperm Hy-Liter results correlate to DNA results?
- › Can Sperm Hy-Liter results combined with other screening tests be used to predict the quality of the DNA results?
- › Can we make adjustments to improve our practices?

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## Tracking Casework Samples

- › Case Specific Variables
  - Consensual partner, condom use, DFSA, swab type, etc.
- › Screening Results
  - PCM pre-staining, p30, AP, Sperm Hy-Liter
- › DNA Results
  - How much sample used for extraction
  - How much male DNA detected
  - How much sample amplified
  - Quality of male DNA profile

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## Tracking Casework Samples

- › Sperm Hy-Liter Results
  - Negative
  - +1: hard to locate
  - +2: some in some fields of view
  - +3: some to many in most fields of view
  - Invalid
- › DNA Results
  - No male DNA detected
  - Minimal male DNA (no further testing)
  - Partial male profile (# of alleles)
  - Full male profile

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Is It a Glow or a No-Glow?

Samples

▶ 171 casework samples screened using Sperm Hy-Liter Staining

▶ 63 of these samples submitted for DNA testing

▶ DNA analysis complete for 51 of the submitted samples

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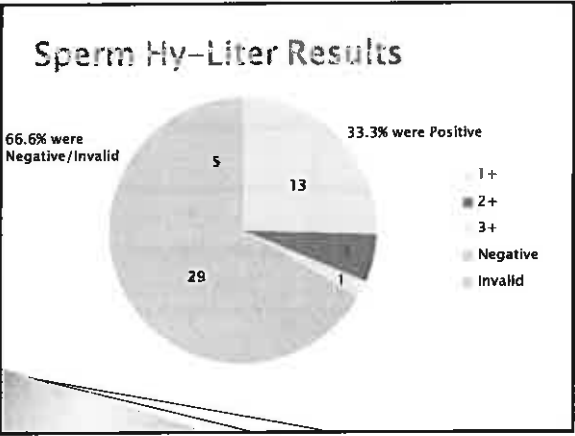
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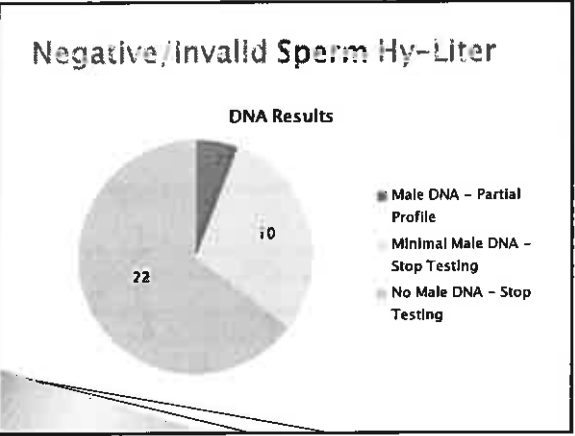
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## Is It a Glow or a No-Glow?

### Negative Sperm Hy-Liter & Partial Male Profiles

- ▶ Sample 1 (F2)
  - Vaginal swab, p30+
  - Amplified 0.22ng of male DNA
  - Partial profile from at least one unknown male
  - 9 alleles plus X,Y
- ▶ Sample 2 (F2)
  - Male victim, Rectal swab, p30+
  - Amplified 0.74ng of DNA
  - Indiscernible mixture of profiles from at least 3 contributors

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### Negative Sperm Hy-Liter Samples

- ▶ Conclusions
  - No need for differential extractions on Sperm Hy-Liter negative samples
    - no sperm or sperm too degraded
  - If male DNA is present, it may be more likely in the F1 fraction
- ▶ Practice Adjustments
  - Only Non-differential extractions for Sperm Hy-Liter negative samples
    - Will track results

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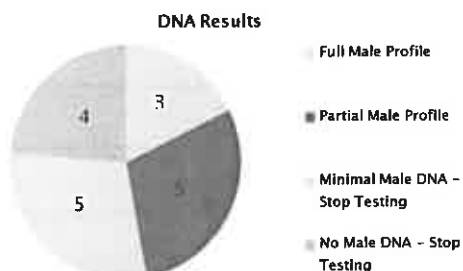
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### Positive Sperm Hy-Liter Samples



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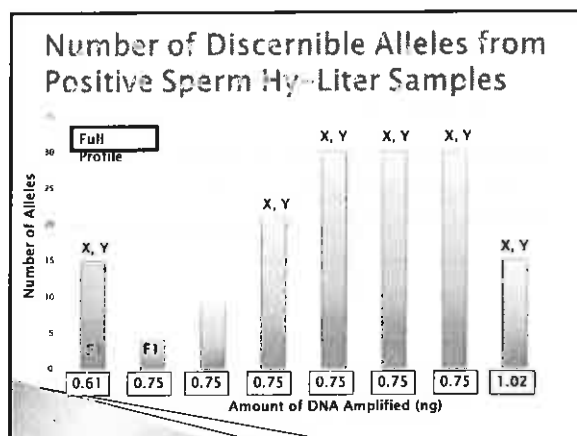
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## Is It a Glow or a No-Glow?




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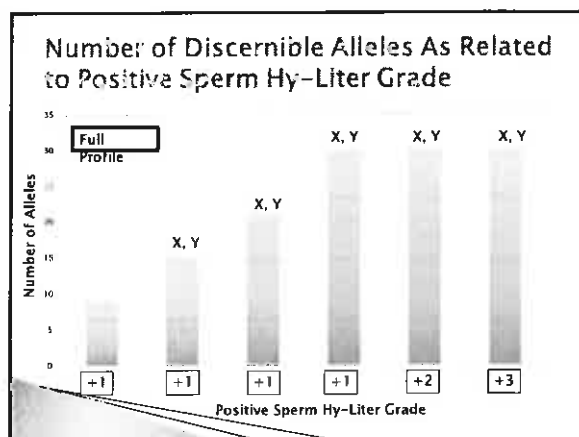
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**Positive Sperm Hy-Liter Samples**

- Observations
  - The positive Sperm Hy-Liter grading is subjective
  - Higher grades seem to produce higher quality DNA profiles
  - Sample size of positive SHL samples that yield full or partial male DNA profiles is still very low
- Conclusions
  - Cannot make a firm conclusion about a correlation between positive SHL grades and DNA results
  - Need to compile more data

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## Summary of Conclusions

- › Negative Sperm Hy-Liter samples submitted for DNA analysis should be extracted using non-differential methods
- › More data needs to be compiled about positive Sperm Hy-Liter samples in regards to their relation to DNA results

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## Acknowledgements & Thanks

- › Jennifer Old and Karl Reich – Independent Forensics DNA Testing & Technologies
- › DNA and Trace Criminalists – Kansas City Police Crime Laboratory
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- › Paternity Testing Corporation

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## Questions?

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