



# Achieving Justice at Trial: Bloodstain Pattern Evidence and Expert Testimony

Patricia Powers, AEquitas

Jodi Corsi, Michigan State Police

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## Patricia D. Powers

Patti Powers joined AEquitas as the lead Attorney Advisor on the SAKI project after serving as a Senior Deputy Prosecuting Attorney in Washington State for 27 years. She supervised the Sexual Assault—Domestic Violence Unit, and prosecuted and tried a high volume of violent crimes—specializing in adult sexual assault, child sexual assault and abuse, sexual exploitation of minors, domestic violence, and related homicides (including complex litigation of high-profile, as well as cold and current cases). Patti served on the domestic violence and child fatality review committees and was a member of the Washington State Technical Assistance Committee for Child Death Review Guidelines. For five years, she was appointed as a Highly Qualified Expert for the United States Army, Criminal Investigation Division; in this role, she provided training for army criminal investigation agents and prosecutors at Fort Leonard Wood, Missouri, and in Germany.



## Jodi Corsi

Jodi Corsi is currently the manager of the Biology Unit at the Michigan State Police (MSP) Metropolitan Detroit Forensic Laboratory. She has been with MSP for over 15 years, most of that time as a forensic scientist in the Biology Unit. In addition to processing evidence for body fluid identification (BFI), Ms. Corsi also responds to crime scenes and is a trained bloodstain pattern analyst. She also teaches biology, bloodstain pattern analysis, and photography at evidence technician schools.



# Disclaimer:

This presentation contains images throughout that may be considered graphic in nature. Images of droplet testing are included, as well as actual crime scene photographs. **Viewer discretion is advised.**

# Objectives

Communicate with bloodstain pattern expert to determine presence and potential for analysis of evidence at crime scene

Recognize importance of documentation and analysis of bloodstain pattern evidence and significance of findings

Prepare with expert for trial testimony including anticipated cross examination and defense expert testimony

Offer effective expert testimony at trial to help recreate the reality of the crime

# First Steps: Homicide and Sexual Assault

Review reports, identify evidence and chain, submit for testing

**Crime scene documentation, video, photographs, measurements analysis**

**Consult with ballistics, bloodstain pattern, fingerprint experts, DNA analysts**

**Homicide witness interviews, possible res gestae statements by victim, statements/admissions of suspect**

**Consider impact of trauma and need for expert**

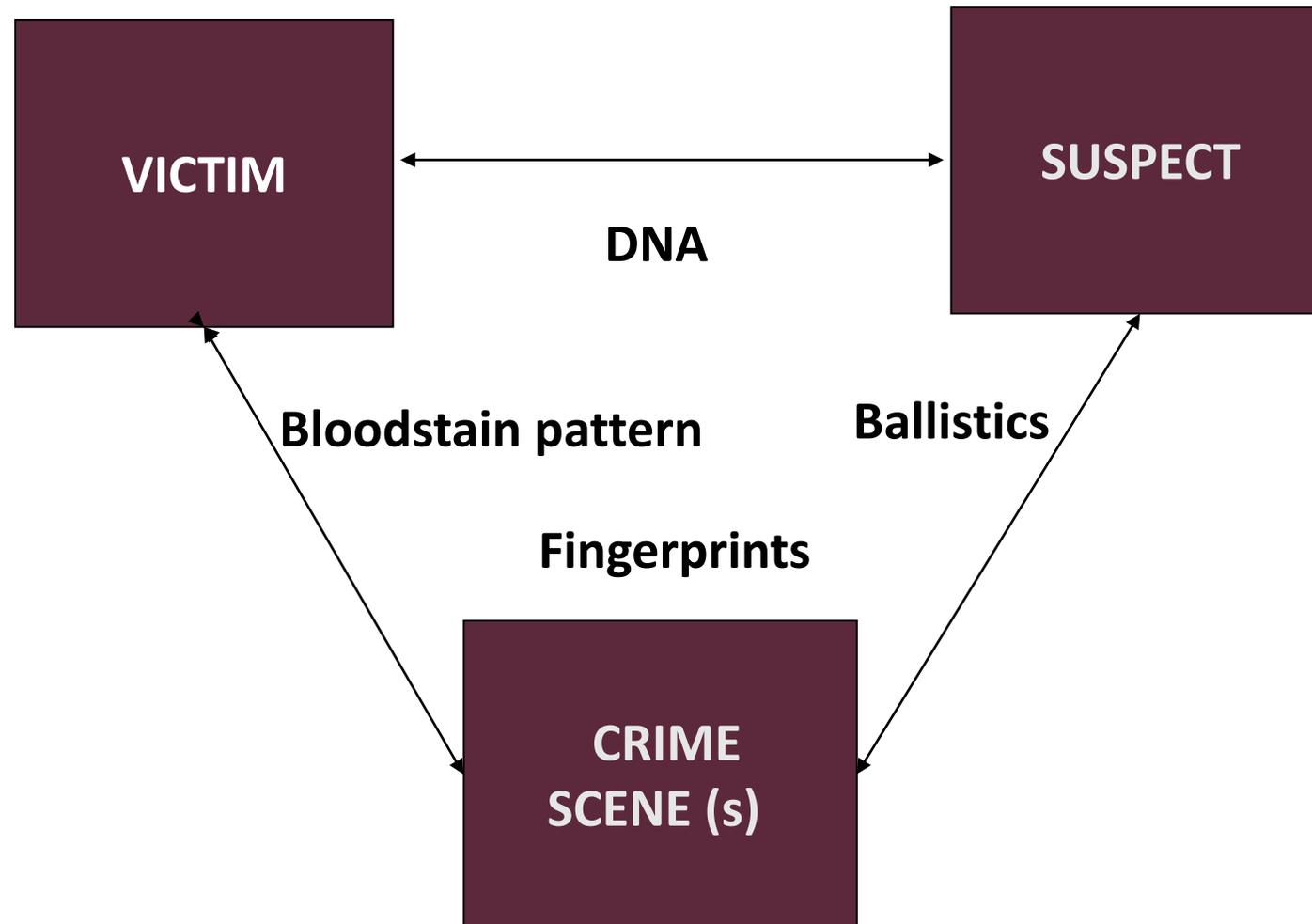
**Consult with forensic pathologist / SANE**

**Determining potential defenses**

**Denial, alibi, self defense (homicide), consent, denial (sexual assault)**

# Power of Linkage

Reality of the Crime



## Crime Scene(s): Prosecution Perspective

What/where is the crime scene(s) for this case?

What is the physical context of the crime scene? Are there multiple areas that must be considered?

In current cases, consider availability of digital photography/video, measurements.

In cold cases, consider availability of photography, documentation, measurements.

Is evidence documented in context of the scene?

Appropriate distance considerations.

# Evidence: The Remains of the Crime

What does the evidence tell us?

Who or what does it connect to?

What else should we be looking for?

Does it establish an element of the crime?

What does the absence of evidence suggest?

# Case Review: Identifying Probative Evidence

Review investigation and evidence.

Identify and discuss evidence associated with and linking victim, offender, crime scene.

Discuss theory of the case and insight from evidence: is serial perpetration or commission of other violent crimes a possibility?

Recognize physical and forensic evidence that may corroborate aspects of the victim's disclosure, witness testimony, presence/ involvement of offender.

Dive deeper—what old and new details are significant?

# Consulting with Bloodstain Pattern Expert

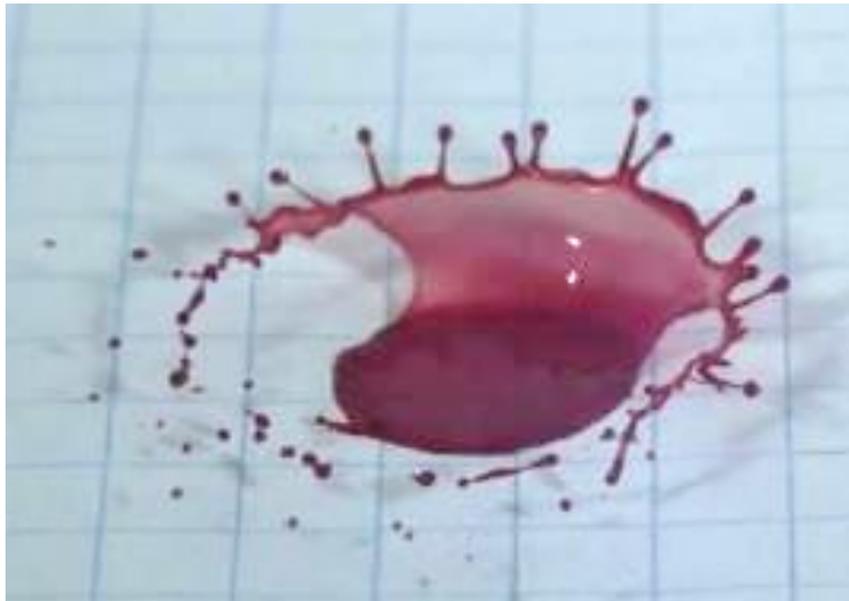


# Bloodstain Pattern Analysis

Overview

# What is Bloodstain Pattern Analysis (BPA)?

- A scientific study of the static consequences resulting from dynamic blood shedding events and the physical properties of blood in motion
- Examination of bloodstains to potentially identify the mechanism(s) responsible for creating the bloodstains



## How Can BPA benefit an investigation?

- When no witnesses are available, BPA can help determine the events that occurred
- It can refute or confirm statements made by witnesses, victims and suspects

# Bloodstain Pattern Documentation vs. Analysis

- Documentation of bloodstain patterns can be done by an evidence technician with minimal training
- The classification and interpretation of these patterns must be done by a bloodstain pattern analyst
  - 40-hour basic bloodstain pattern course
  - 32-40-hour advanced bloodstain pattern course
  - Fluid Dynamics of Bloodstain Pattern Formation
  - Bloodstain Pattern Analysis of Fabrics
  - Crime Scene Reconstruction
  - Proficiency Testing

# Bloodstain Pattern Hierarchy

Bloodstain

Spatter vs. Non-spatter

- Spatter = force applied to blood

Mechanism

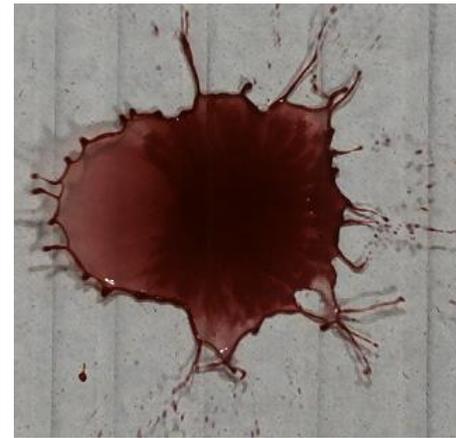
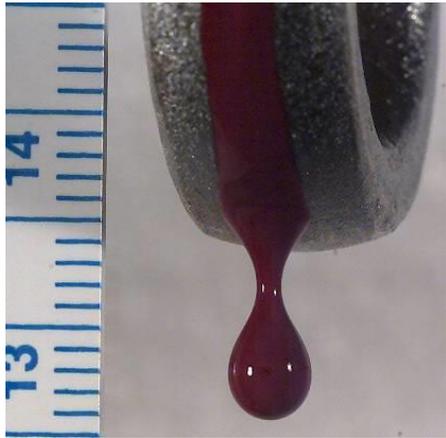
# Bloodstain Pattern Terminology

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- Academy Standards Board (ASB) Technical Report 033, First Edition 2017, Terms and Definitions in Bloodstain Pattern Analysis

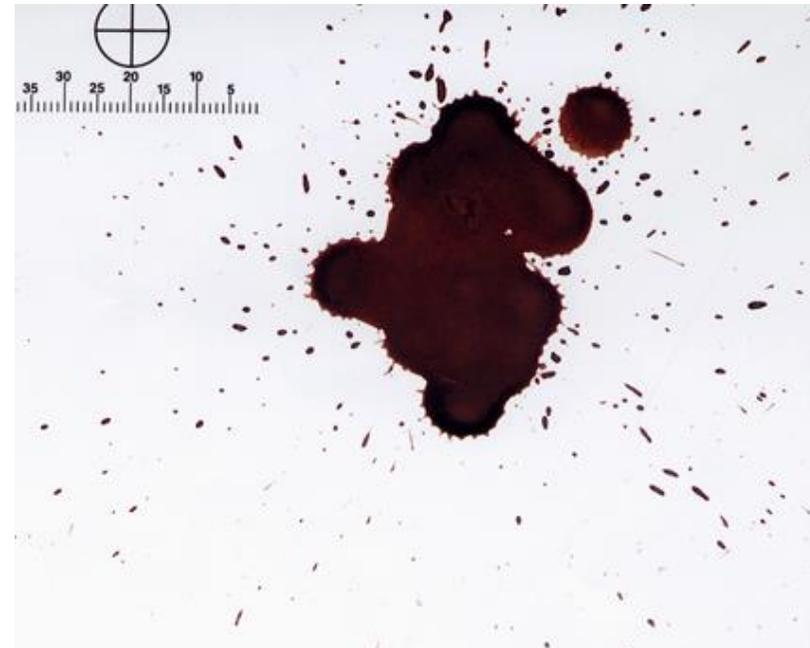
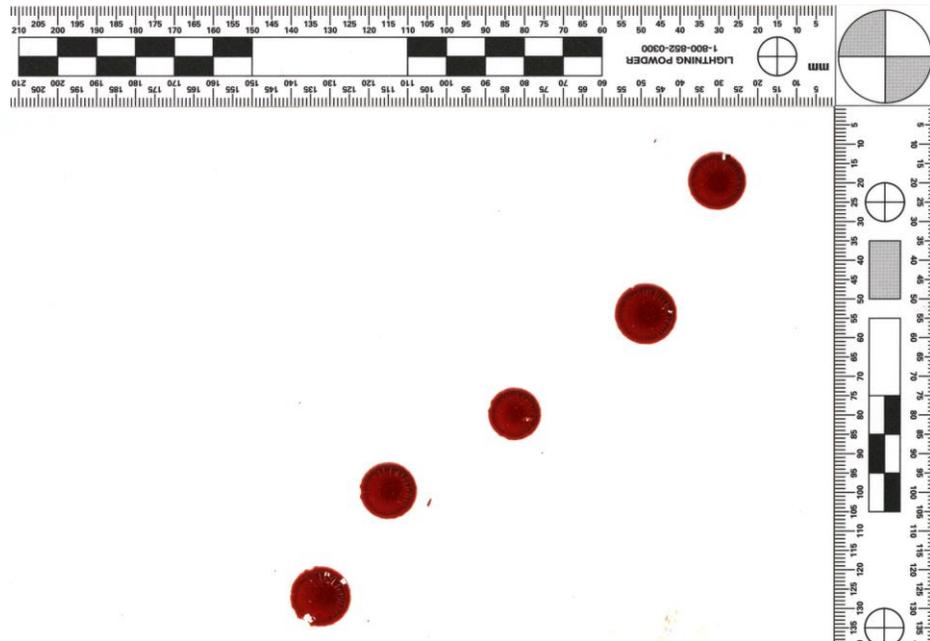
# Drip Stain

- A bloodstain resulting from a falling drop that formed due to gravity.



# Drip Trail & Drip Pattern

- Drip Trail - A bloodstain pattern resulting from the movement of a source of drip stains between two points.
- Drip Pattern - A bloodstain pattern resulting from a liquid that dripped into another liquid, at least one of which was blood.



# Transfer Stain

- A bloodstain resulting from contact between a blood-bearing surface and another surface.



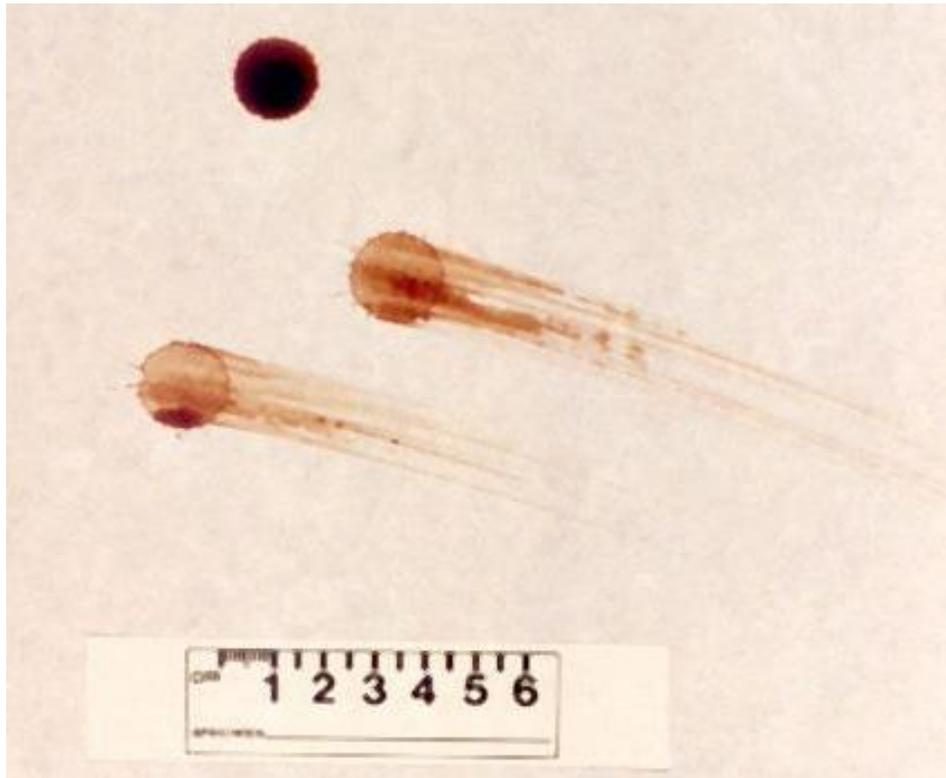
# Swipe Pattern

- A bloodstain resulting from the transfer of blood from a blood-bearing surface onto another surface, with characteristics that indicate relative motion between the two surfaces.



# Wipe Pattern

- An altered stain resulting from an object moving through a preexisting wet bloodstain.



# Pool & Saturation Stain

- Pool - A bloodstain resulting from an accumulation of liquid blood on a surface.
- Saturation Stain - A bloodstain resulting from the accumulation of liquid blood in an absorbent material.



# Spatter Stain

- A bloodstain resulting from an airborne blood drop created when external force is applied to liquid blood.



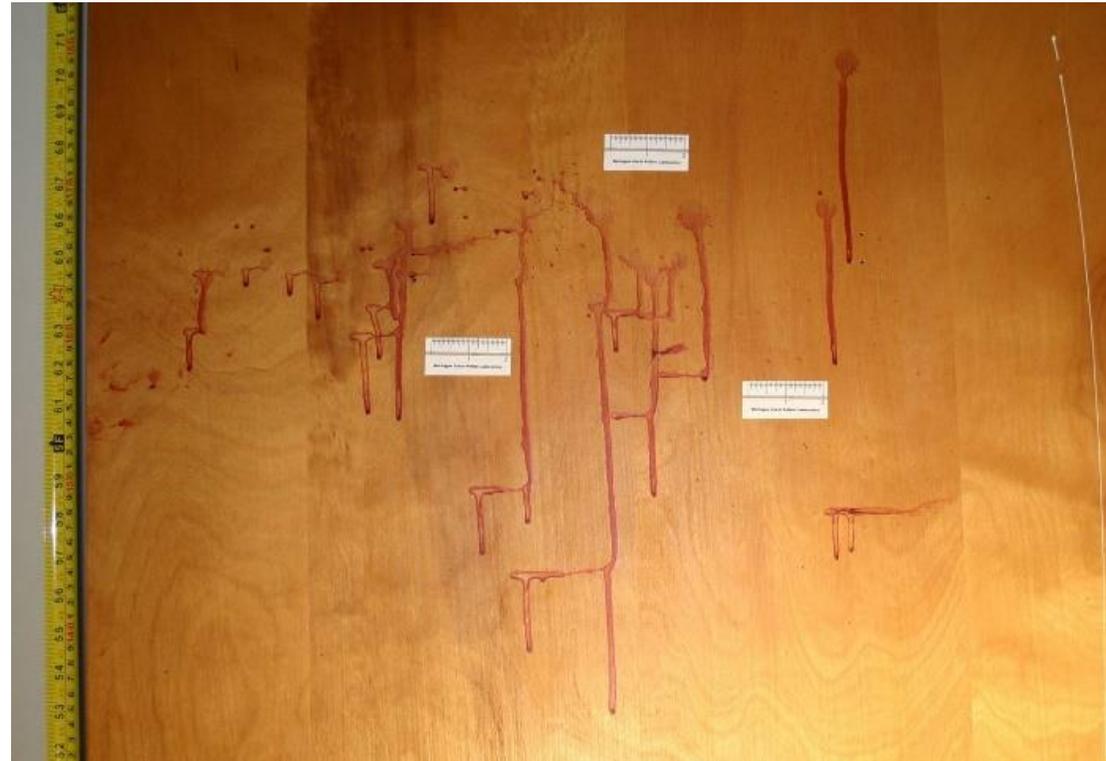
# Projected Pattern

- A bloodstain pattern resulting from the ejection of blood under hydraulic pressure, typically from a breach in the circulatory system.



# Flow Pattern

- A bloodstain resulting from the movement of a volume of blood on a surface due to gravity or movement of the target.



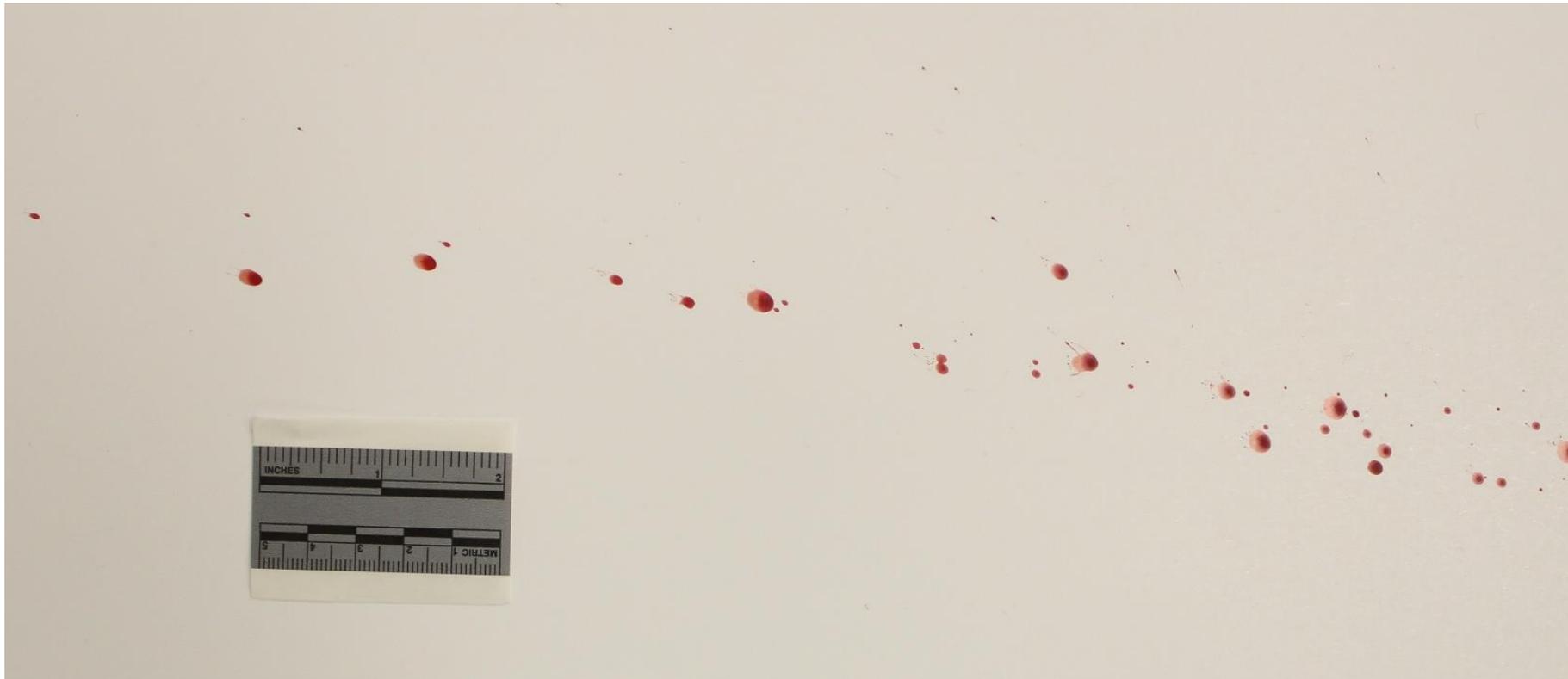
# Impact Pattern

- A bloodstain pattern resulting from an object striking liquid blood.



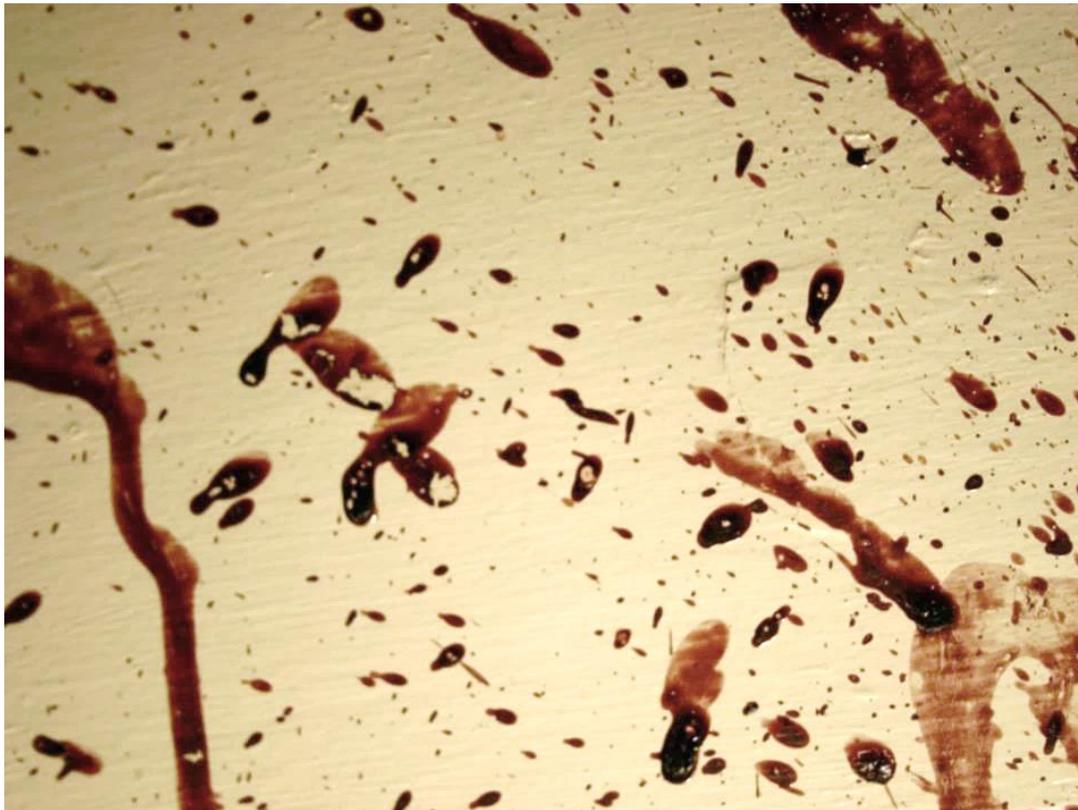
# Cast-Off Pattern

- A bloodstain pattern resulting from blood drops released from an object due to its motion.



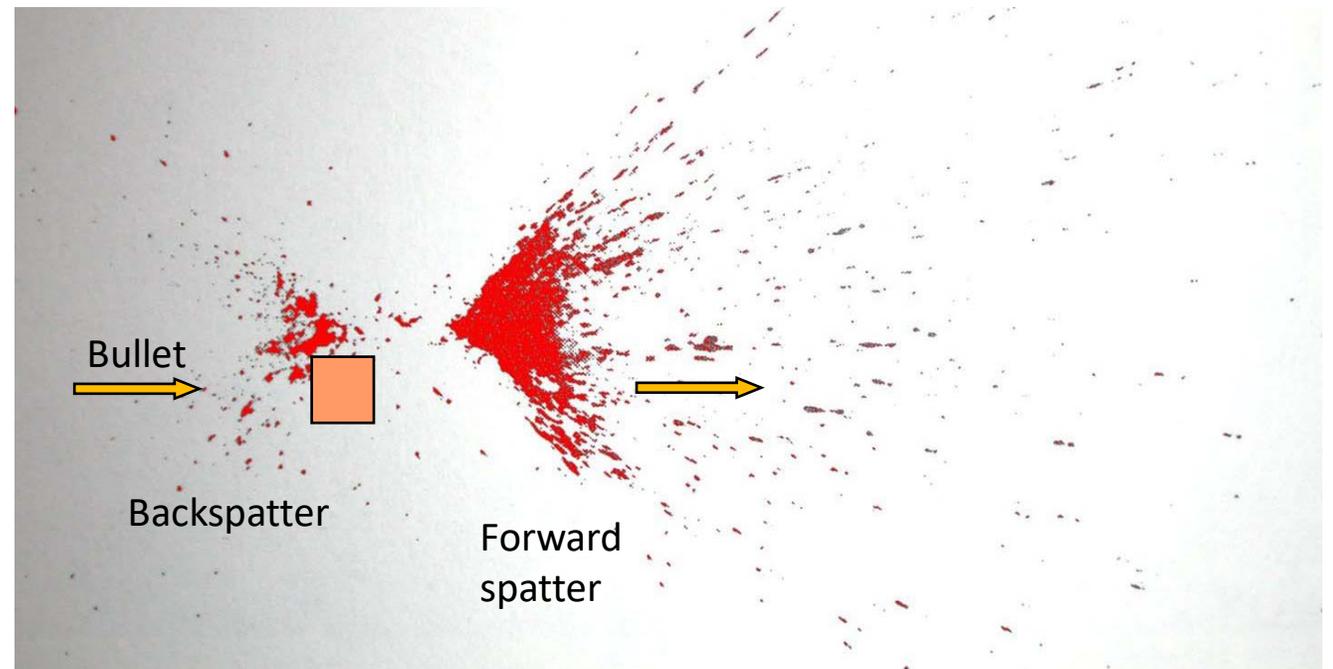
# Expiration Pattern

- A bloodstain pattern resulting from blood forced by airflow out of the nose, mouth, or a wound.



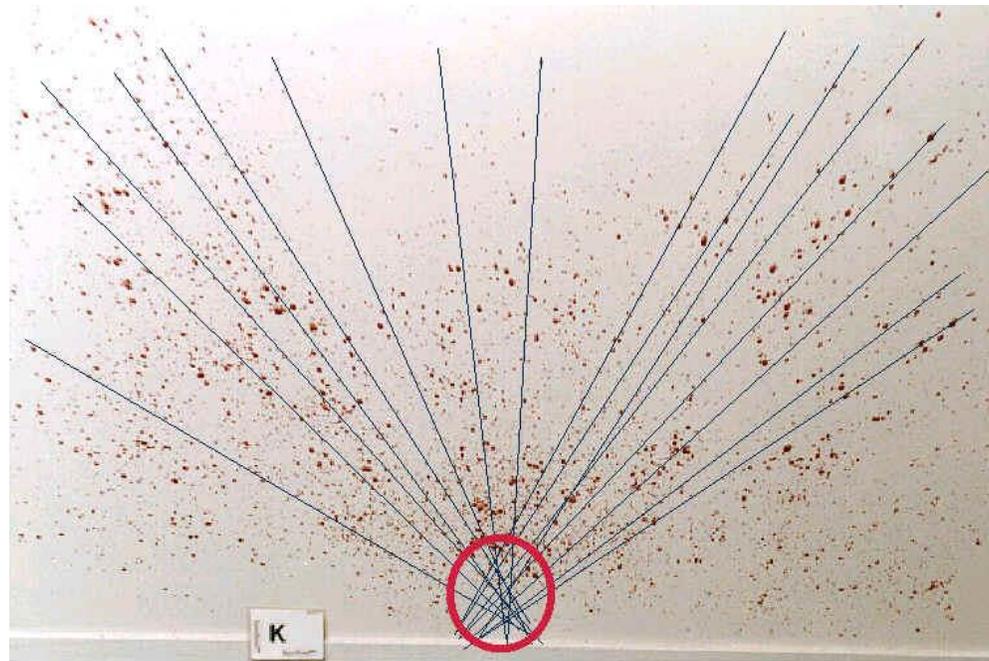
# Forward Spatter & Backspatter Patterns

- Forward Spatter Pattern - A bloodstain pattern resulting from blood drops which can be produced when a projectile creates an exit wound.
- Backspatter Pattern - A bloodstain pattern resulting from blood drops which can be produced when a projectile creates an entrance wound.



# Area of Convergence & Area of Origin

- Area of Convergence - The space in two dimensions to which the directionalities of spatter stains can be retraced to determine the location of the spatter producing event.
- Area of Origin - The space in three dimensions to which the trajectories of spatter can be utilized to determine the location of the spatter producing event.



# Bloodstain Pattern Analysis

## The Analysis

## Requesting a BPA

Significance of bloodstains and the potential for a BPA should be recognized at the crime scene to enable proper documentation

- Suspect's clothing should always be collected, if possible

Consideration should be given to the investigative questions because the questions may or may not be able to be answered by an analysis

# BPA Limitations

- Not all bloodstains and bloodstain patterns can be explained.
- Not all events will be able to be determined based on BPA alone.
- The nature of the bloodstains and presence or lack of patterns informs, and thereby can limit, the BPA conclusions.
- A BPA is typically performed using documentation from a crime scene and therefore the quality of the documentation directly affects the scope of the BPA.

# Documentation Used in a BPA

Police reports

Witness statements

Autopsy/medical records/reports

Crime scene documentation

- Digital images/videos
- Sketches
- Notes

Examination of physical evidence

Other experts' reports and case files

- DNA testing results

# BPA Methodology

Sequential unmasking  
to reduce the effects of  
potentially biasing  
information

Control the order the  
examiner accesses the  
information

# BPA Methodology

- Examine crime scene documentation to classify bloodstains and/or bloodstain patterns
- Attribute potential mechanisms
- Reference external reports
  - May be able to eliminate a mechanism(s)
- Address investigative questions
  - Support for and support against each hypothesis
- Generate report (and accompanying PowerPoint)
- Technical review of analysis

# BPA on Clothing

## Significance of spatter stains vs transfer stains

- Spatter stains on clothing indicate the clothing was in close proximity to the blood spatter at the time of bloodshed
- Transfer stains indicate the clothing came in contact with a blood-bearing surface
- Must also consider transfer of spatter (David Camm case)

## Consult with Bloodstain Pattern Analyst

- Discuss testimony expectations and limitations
- Should not expect testimony beyond what is in the BPA report
  - The opinions rendered have been peer reviewed
  - Do not expect new/additional interpretations during testimony

## Suggested Qualifying Questions

How long have you been employed as a bloodstain pattern analyst?

What training do you have in this area?

What are your responsibilities as a bloodstain pattern analysis?

Have you been qualified to testify as a bloodstain pattern analyst?

What is bloodstain pattern analysis?

# Pre-Trial Litigation

# Pre-Trial Hearing

Address anticipated issues with the Court:

- Expert qualifications: expert may testify or consider offer of proof
- Challenges to the science that have been addressed by *Frye/Daubert* cases or new issues that require a hearing
- Objections to admission of evidence based upon chain of custody
- Anticipated defense expert testimony

# Consider *Daubert* or *Frye* Issues

**General  
Acceptance**

Frye v. United States, 293 F. 1013 (D.C. Cir. 1923)

**Scientific  
Knowledge**

Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993)

**Technical and  
Other Specialized  
Knowledge**

Kumho Tire Co. v. Carmichael, 526 U.S. 137 (1999)

## Practice Tips

- Ensure a complete direct examination absorbing questions/ issues that you anticipate after any necessary pre-trial
- Offer expert an opportunity to explain issues on direct rather than respond to leading questions on cross-examination
- Remember re-direct may be limited based upon cross-examination
- Expert should have CV and reports available at witness stand

# Preparing for Cross-Examination of State's Expert

Review defense expert's report or interview: When there is not a defense expert, focus on defense theory of the case and evidence

Review CV, consult with other prosecutors and organizations

Determine information that expert is relying upon/ defense theory

Review report/ interview with State's experts

Determine viability of issues raised

Incorporate into direct exam of State's expert

# Presenting Expert Testimony

# Testimony by Expert Witnesses

FRE 702

A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:

- (a)** the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
- (b)** the testimony is based on sufficient facts or data;
- (c)** the testimony is the product of reliable principles and methods; and
- (d)** the expert has reliably applied the principles and methods to the facts of the case.

# Bases of an Expert

FRE 703

An expert may base an opinion on facts or data in the case that the expert has been made aware of or personally observed. If experts in the particular field would reasonably rely on those kinds of facts or data in forming an opinion on the subject, they need not be admissible for the opinion to be admitted. But if the facts or data would otherwise be inadmissible, the proponent of the opinion may disclose them to the jury only if their probative value in helping the jury evaluate the opinion substantially outweighs their prejudicial effect.

# Presenting Expert Testimony

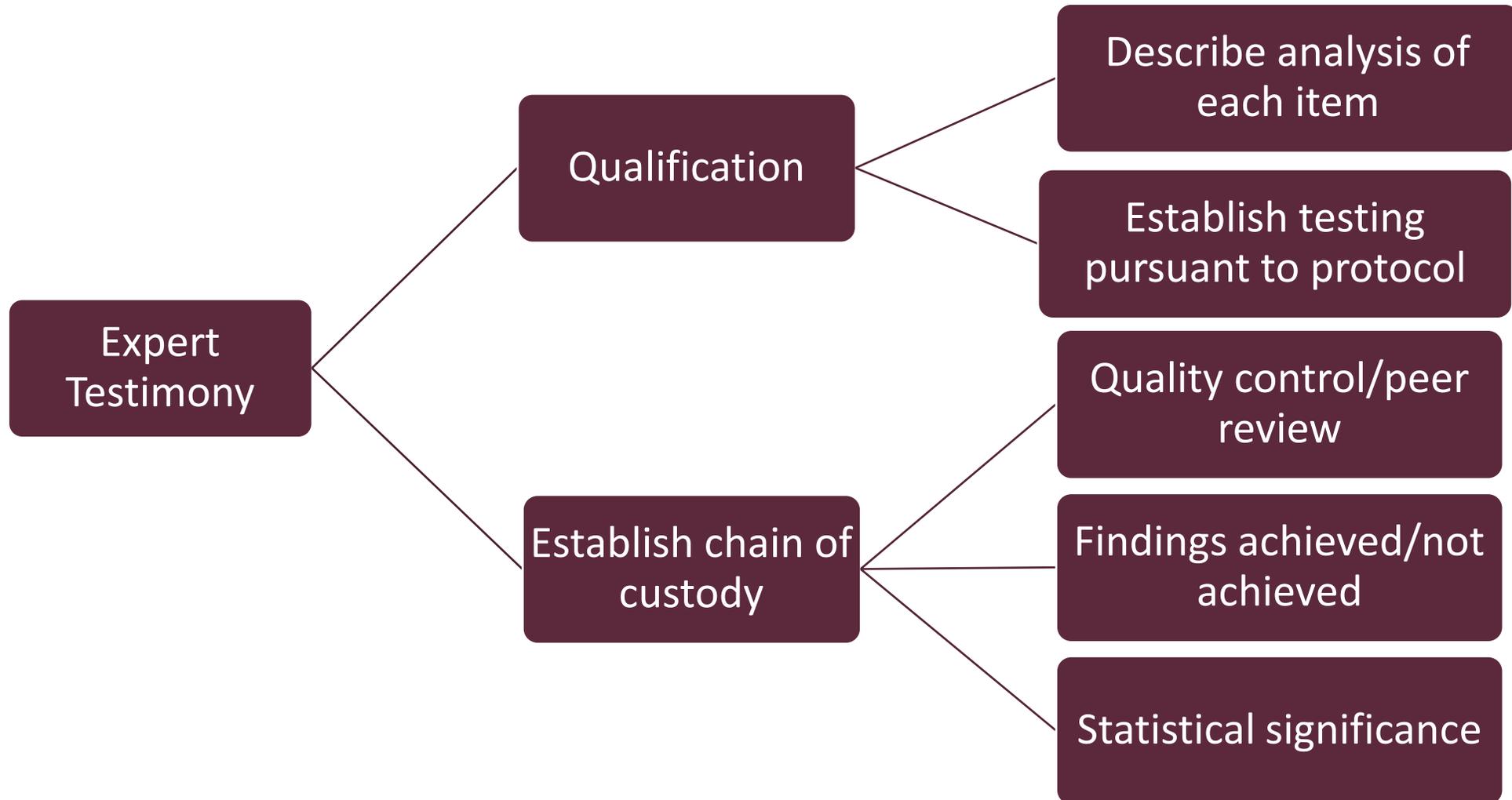
Prepare and present effective expert testimony on direct and cross-examination.

Develop legally sufficient and persuasive foundation questions for the admission of testing results.

Offer expert testimony pursuant to ER 702 and 703 with evidence-based hypotheticals, when appropriate.

Employ strategies to educate juries and explain the importance of forensic analysis and the significance of findings in the context of the case.

# Overview of Testimony



## Initial Steps in Preparation With Expert for Testimony

Obtain CV from  
expert

Review laboratory  
report

Ask questions to  
inform direct  
examination at  
trial

Focus on case  
specific challenges

Provide context as  
to how the  
expert's testimony  
fits in

# Establish Expert Qualifications

## **ACADEMIC**

- Degrees achieved, institution, dates.
- Additional courses/ seminars/ additional training/ practicum or clinical.

## **PROFESSIONAL**

- How long have you served as a laboratory analyst?
- What are your responsibilities? Supervisory authority? Provide training? Peer review? Authored publications? Provide training?
- Ongoing professional training? Professional training in familial DNA testing, forensic genetic genealogy?
- Previous testimony as an expert?

## Foundation for Expert Testimony

Foundation is necessary for the court  
and the jury

Qualifications are critical to foundation

Present legally sufficient foundation in a  
persuasive manner

Assume most jurors do not have  
expertise in subject matter of expert

Develop questions to educate jurors on  
the science: " Can you explain to us....."

# Planning Testimony with Expert

Review and discuss report; inquire about any testing notes; ensure complete discovery

Preview expert qualification questions

Review foundation questions

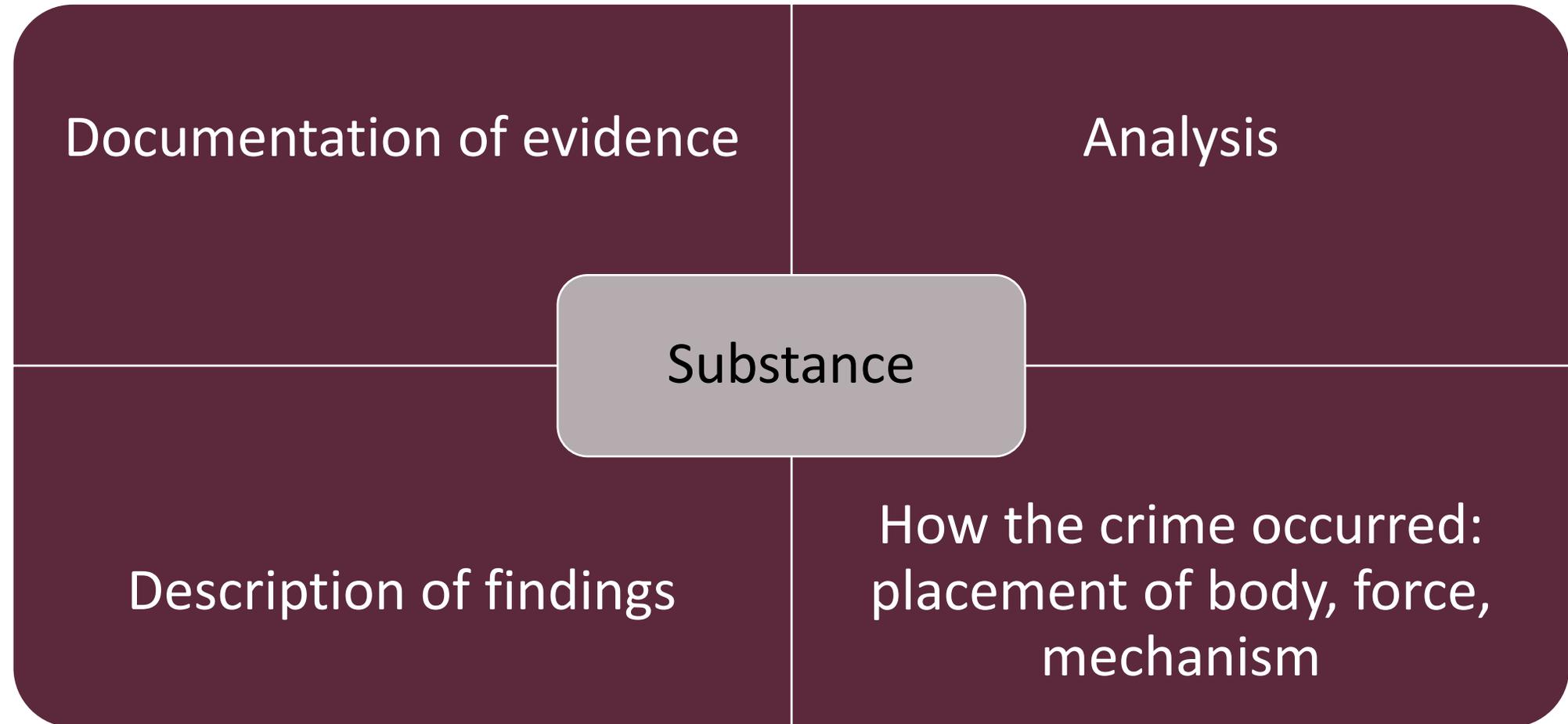
Employ strategic reference to jury: Can you explain to us?

Plan to offer evidence as exhibit during testimony

Anticipate issues that may be raised in cross examination

Discuss defense expert testimony

# Direct Examination



# Direct Examination

- Present expert qualifications rather than agreeing to defense stipulation of qualifications
- When referring to item of evidence, present the exhibit (physical evidence or documentary evidence) in the view of the expert
- Establish the expert's role in the chain of custody of the evidence
- Establish submission of items of evidence for analysis
- Refer to evidence along with assigned laboratory number
- Discuss nature and purpose of testing given the item of evidence

# Evidence-Based Hypotheticals

- Help make the **connection** to critical points
- Assist in translating science to practical examples
- May be based upon the evidence in the case: may/may not be admissible
- Must be reasonably be relied upon by experts in the field

# Bloodstain Pattern Analysis: Testimony

# Homicide on a Ship

- Decedent's body found in a freezer by a work crew
- Subject and decedent had been allowed to live on the ship
- Visible and latent bloodstains present in one room, hallway, and bathroom of the ship
- Majority of visible bloodstains on bottom bunk bed area of bedroom – believed to be bedroom where victim stayed



IMG\_5582



IMG\_5905



IMG\_5312



IMG\_5674



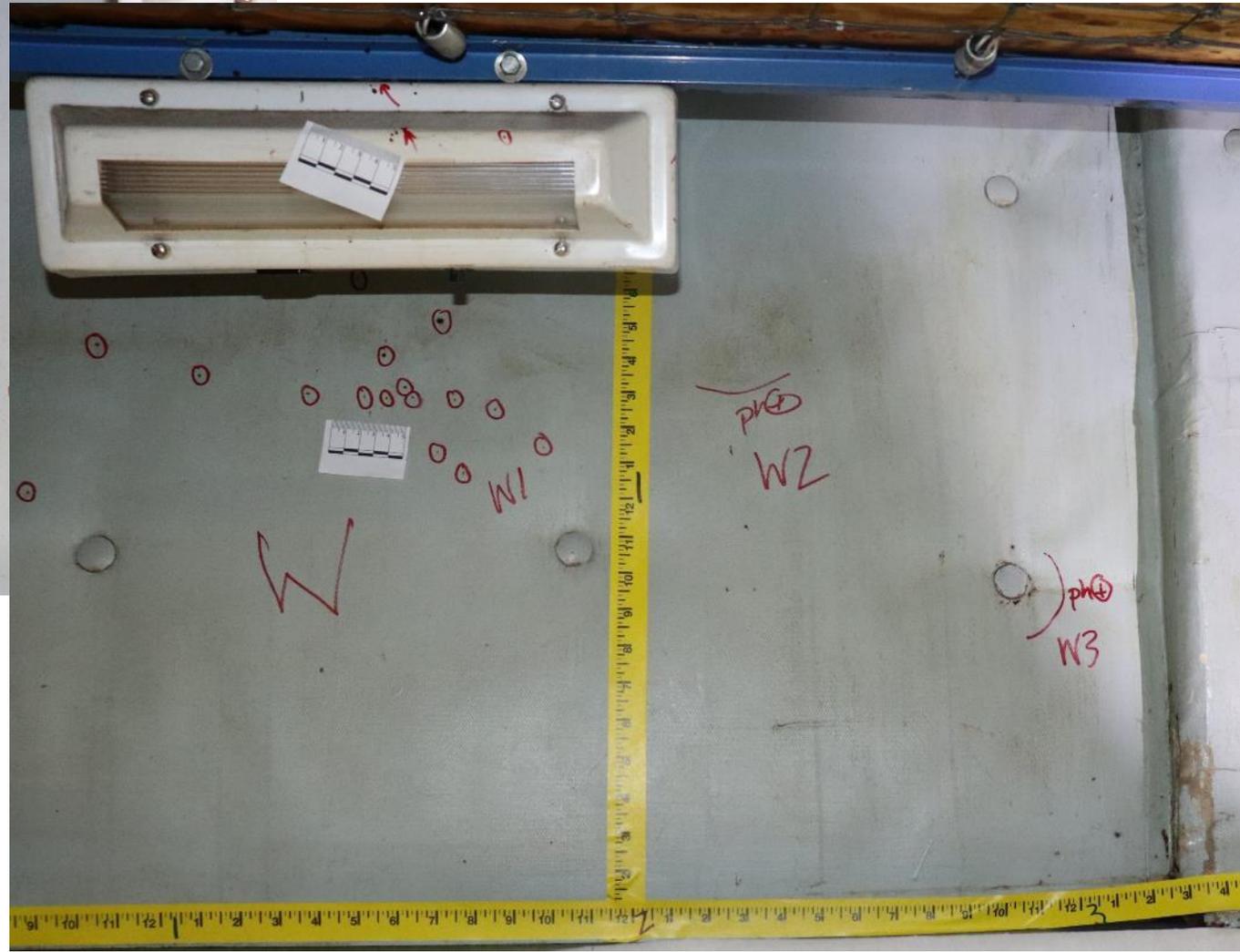
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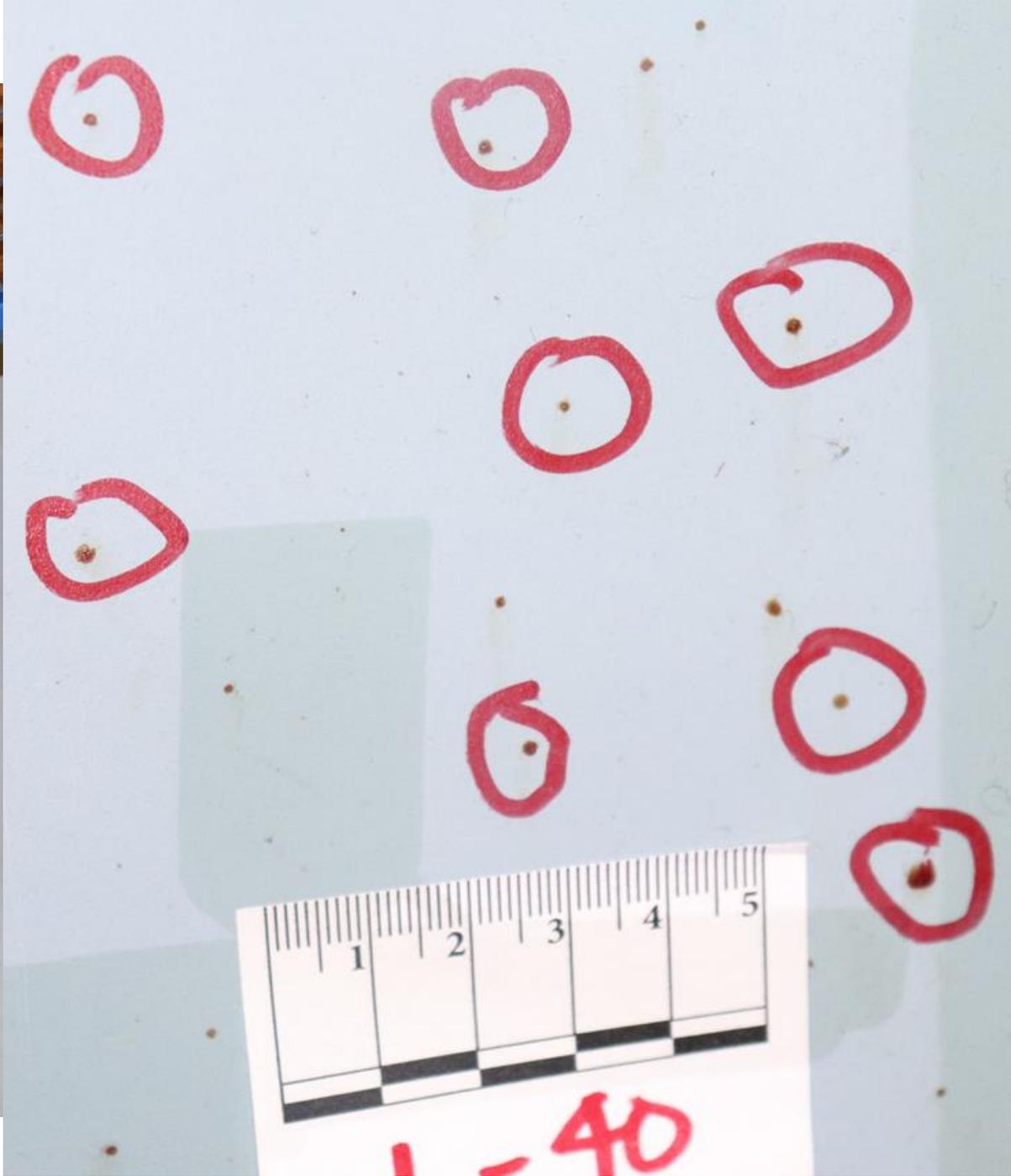


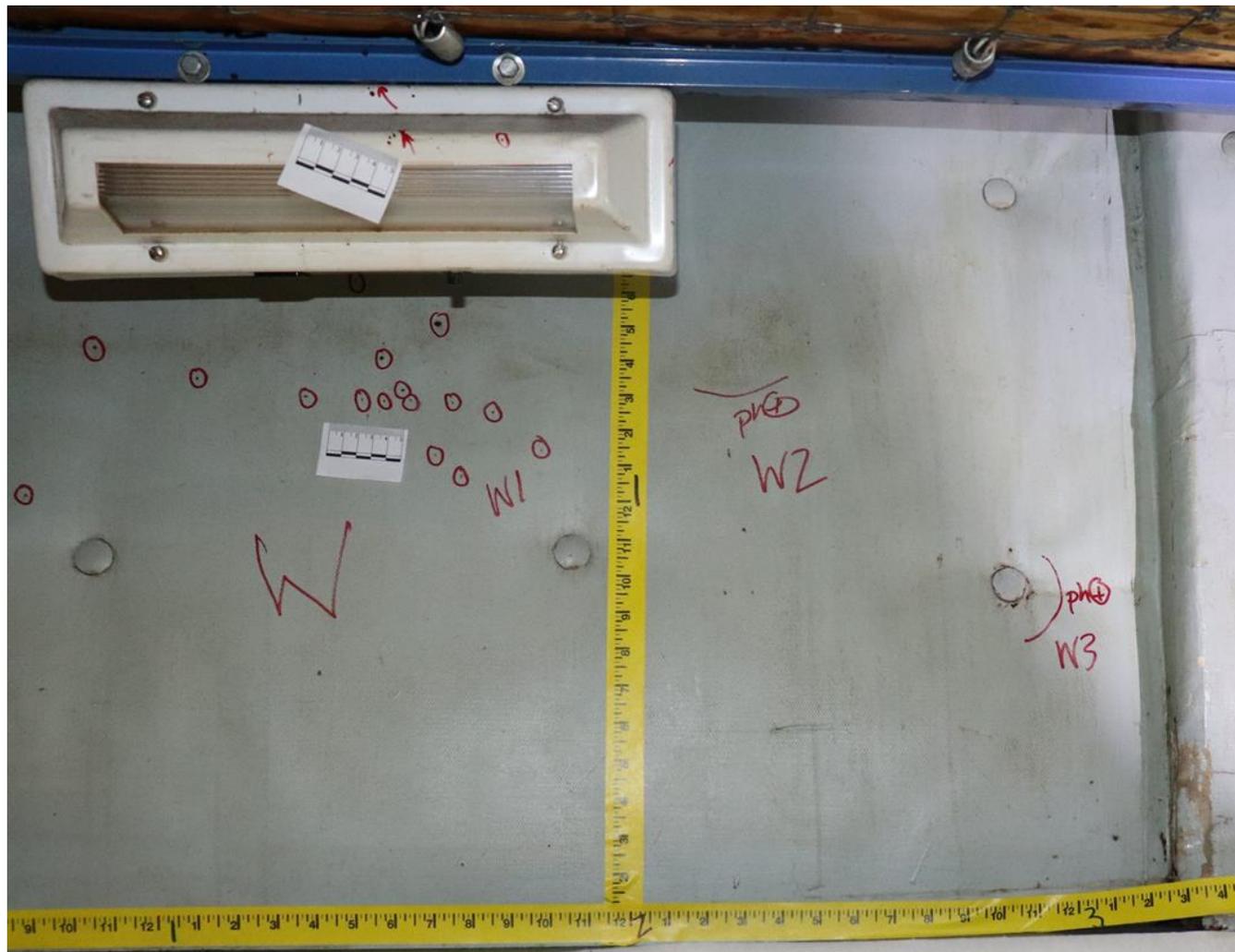
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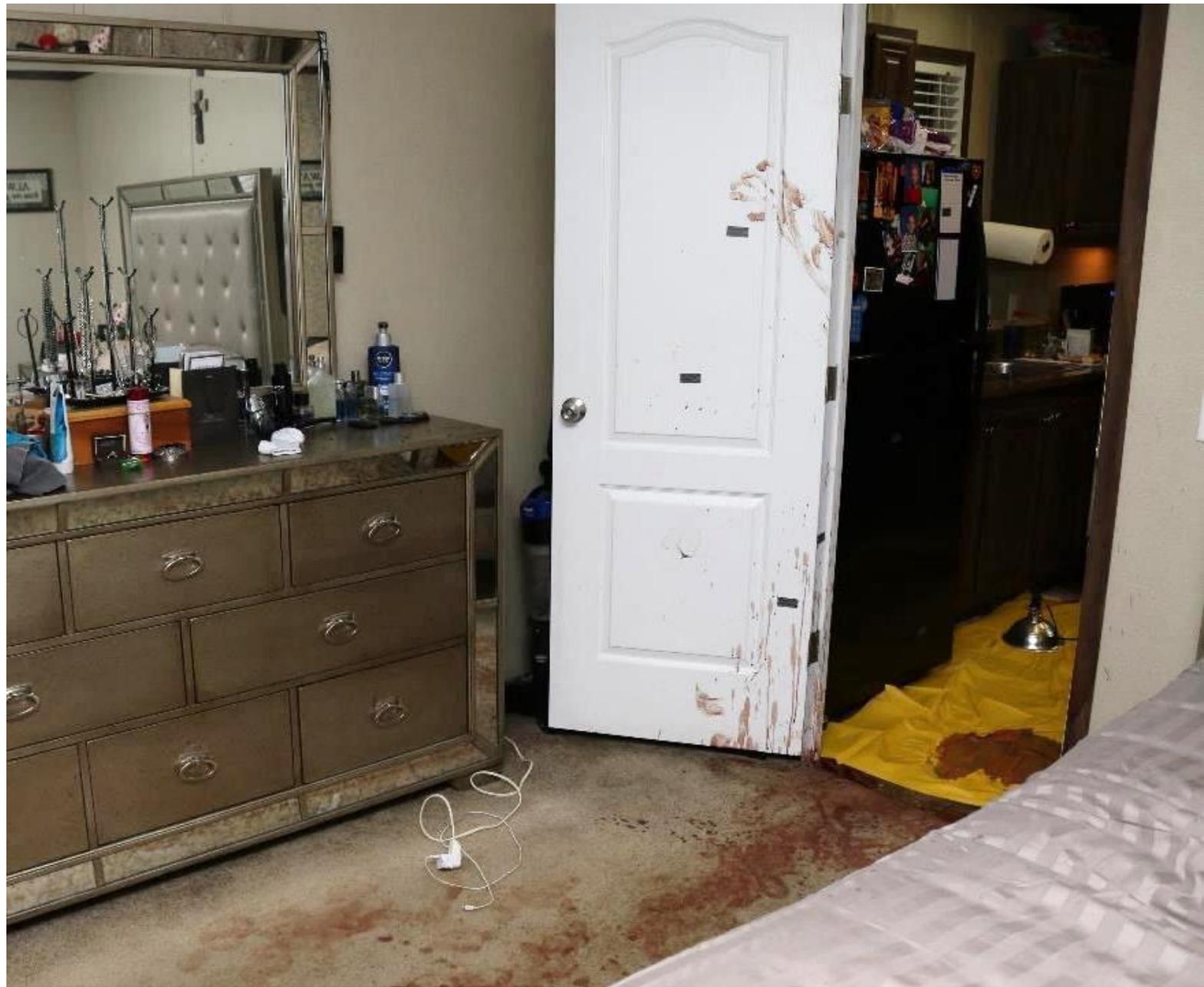
# Domestic Violence Homicide

- Decedent found by coworker(s) after not showing up for work
- Subject (decedent's fiancé) had fled and was arrested later that evening













# Where does bloodstain pattern evidence fit in?

Forensic evidence: crime scene, victim: video, measurements, analysis: ballistics, bloodstain pattern fingerprint experts, DNA analysts

Answering potential defenses: Denial, alibi, self defense (homicide), consent, denial (sexual assault)

**Elements of Crime/  
Context and Linkage**

Testimonial evidence: Victim/Witness statements; possible res gestae statements by victim, statements/admissions of suspect

Behavioral evidence: impact of psychological trauma, FRE 404(b) "other acts" evidence, behavioral patterns

# Closing Argument

1

Discuss expert testimony and explanation or testing results

2

Explain how evidence is probative of crime elements, defendant's ID, intent, motive

3

Argue that the evidence remains to convey the reality of the crime

4

***Remember that in the end-- the evidence speaks for itself***



## Going Forward

Communicate with bloodstain pattern expert to determine presence of evidence at crime scene

Recognize importance of documentation and analysis of bloodstain pattern evidence and significance of findings

Prepare with expert for trial testimony including anticipated cross examination and defense expert testimony

Offer effective expert testimony at trial to help recreate the reality of the crime

## Contact Information



### **Patricia D. Powers**

Attorney Advisor

AEquitas

(202) 596-4230

[ppowers@aequitasresource.org](mailto:ppowers@aequitasresource.org)

### **Jodi Corsi**

Manager, Biology Unit

Metropolitan Detroit Forensic Laboratory

Michigan State Police

[jodicorsi@gmail.com](mailto:jodicorsi@gmail.com)