

Eurachem Scientific Workshop on Data – Quality, Analysis
and Integrity | *Janine Arvizu* | *May 14, 2018*

A process for assessment of forensic data integrity

Forensic integrity:

Audit of records:

1. *Representative* sample,
2. use of a *valid* method,
3. *reliably performed*

1. Representative Sample

- Unambiguous identity
- Protect from deleterious change from collection through testing
- Statistically significant samples of bulk evidence



Contamination Control

- Cross-contamination during DNA extraction
- FBI hair analyst

2. Valid Method

- Failure to validate qualitative methods
- Assumption that use of a valid analytical techniques is sufficient to ensure a valid forensic method

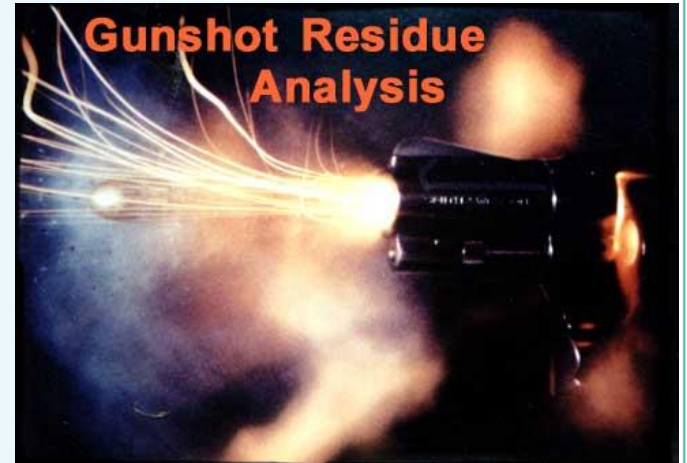
Gunshot residue

Identify GSR particles on a person that can be attributed with confidence to a specific instance of a firearm discharge.

“having fired a weapon”

“in the vicinity of a fired weapon”

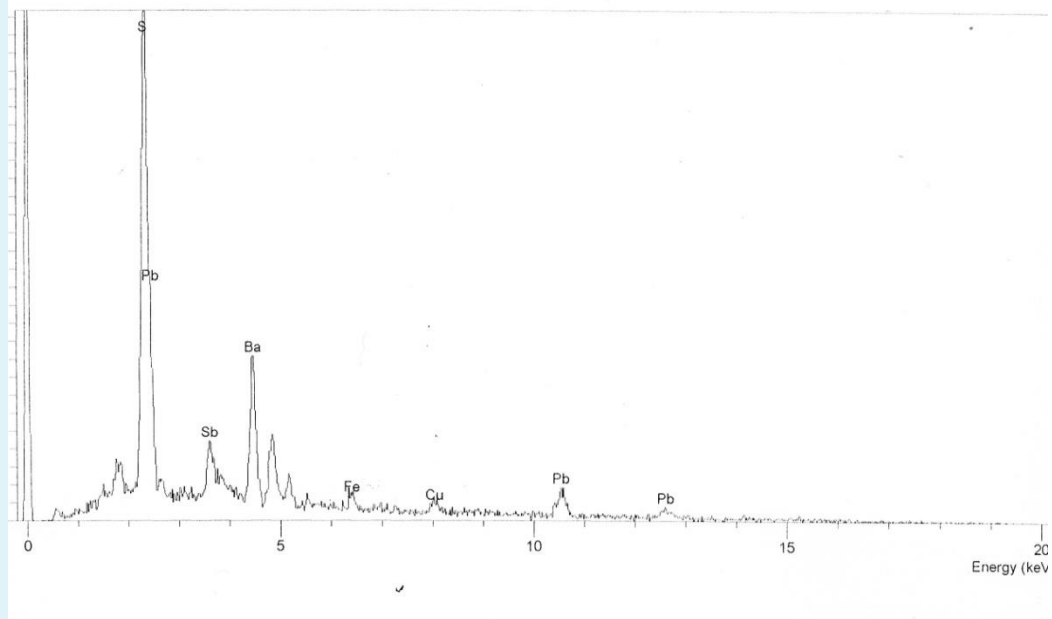
“touched an item with GSR”



Gunshot Residue



Operator : Claudio
Client : Rossi - Petrelli
Job : Scattona
VW Polo brake pad 1.2 (07/09/98 12:08)



Same Result – Different Conclusions

# Particles	Composition	Lab Report
1 particle	PbBaSb	GSR not identified Characteristic of GSR Unique for GSR
1 particle	PbBa	GSR not identified Characteristic of GSR Indicative of GSR
3 particles	PbBaSb	GSR not identified Characteristic of GSR Unique for GSR

Particle identification by SEM-EDX is straightforward. Valid use of the method is a challenge.

How many GSR particles are needed to reliably distinguish from background, and to associate with proximity to a specific firearm discharge?

NETFLIX

MAKING
A
MURDERER



EDTA and
EDTA-Fe
DETECTED

EDTA and
EDTA-Fe
NOT
DETECTED

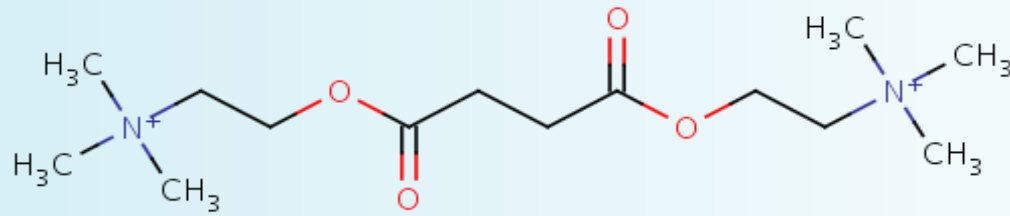


Lab method identified EDTA in blood specimens from lavender-top tube (1.8 mg/ml)

Lab method DID NOT detect EDTA in a 1 mm dried sample of EDTA-preserved blood.

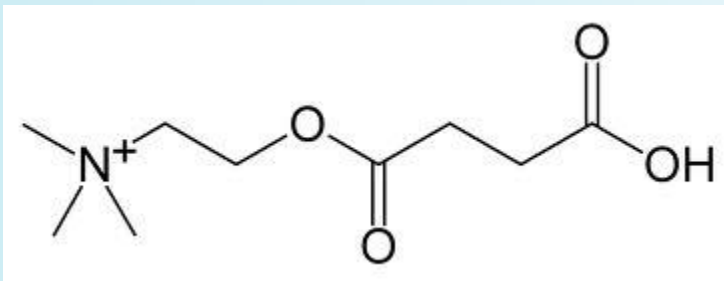
Testimony: EDTA was not detected, therefore the blood stain could not have come from an EDTA-tube.

NOT VALID for its intended use.

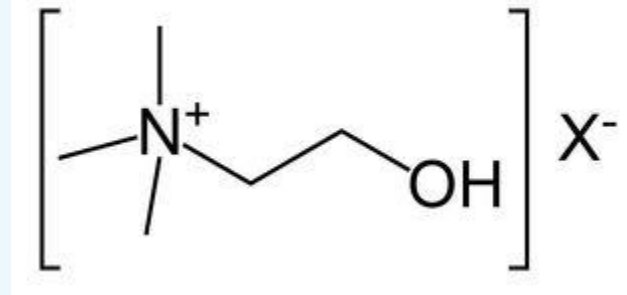


succinylcholine

pseudocholinesterase



**Succinylmonochole
in autopsy tissue**



choline

Succinyl Monochole

Tissue homogenization

Liquid-liquid extraction

Solid phase extraction with ion pairing

LC-MS/MS analysis

SMC detected in multiple autopsy samples

Findings verified by a second laboratory

Untested Assumptions

1. Detection of SMC in autopsy tissue establishes the prior presence of its parent, SC.
2. SMC can remain present at detectable levels in embalmed tissue samples years after death.

3. Reliable Performance

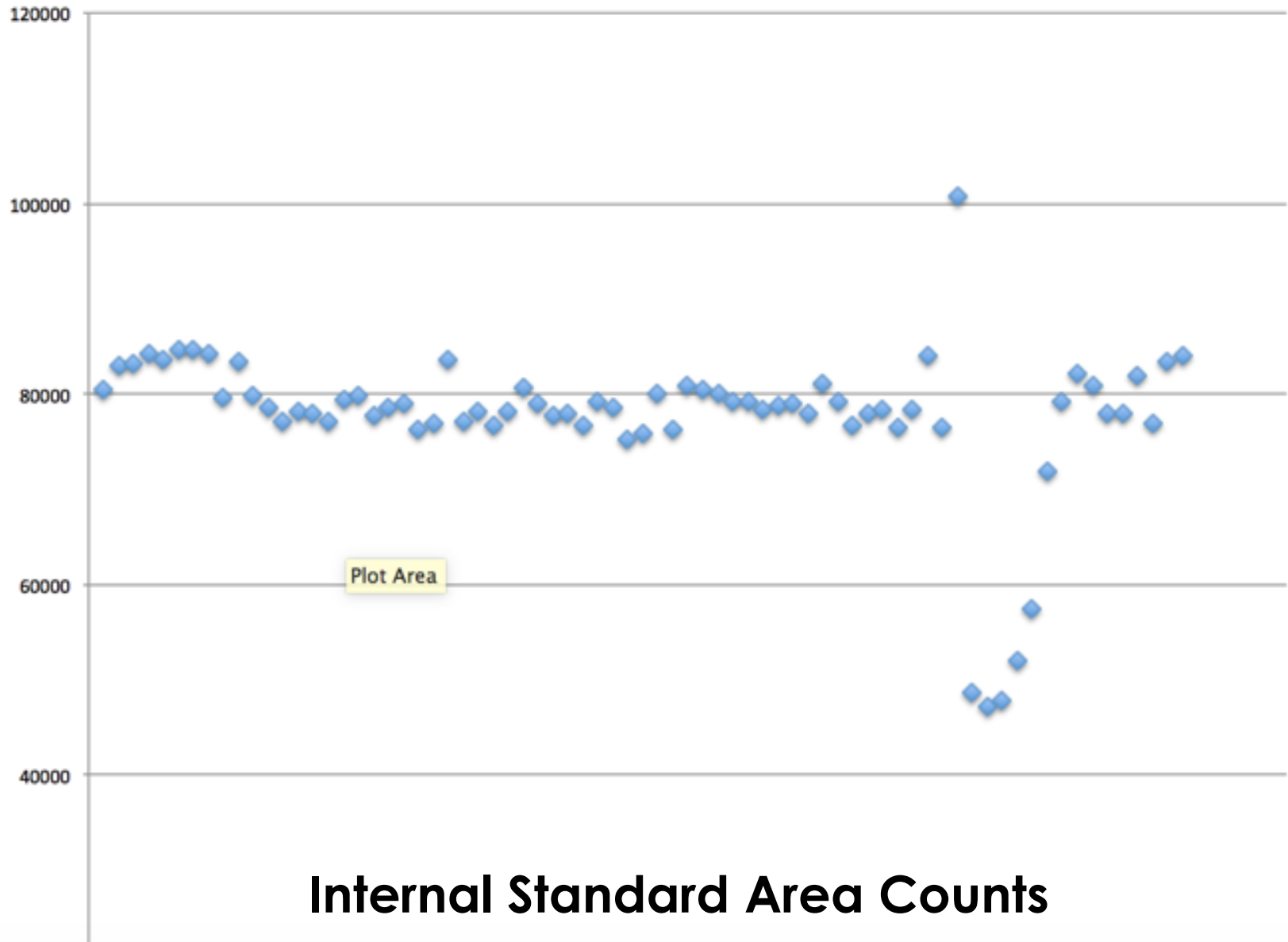
- Single source calibrators and controls
- ISTD batch variability >50%
- Weak QC (type, frequency, placement)
- Measurements not traceable

Batch Assessment

Known controls and unknown evidence samples **prepared and tested together under the same conditions**

- Same analyst and same time
- Same equipment, properly calibrated (pipettes, balance, instrument)
- Same reagents
- Same consumables

Interrupted Batch



Representative sample,
use of a *valid* method,
reliably performed

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