

Gunshot residue patterns on skin in angled contact and near contact gunshot wounds

T. Plattnera, B. Kneubuehnb, M. Thalia, U. Zollingera,
Forensic Science International 138 (2003) 68–74



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รหัส 52312306



Gunshot residues

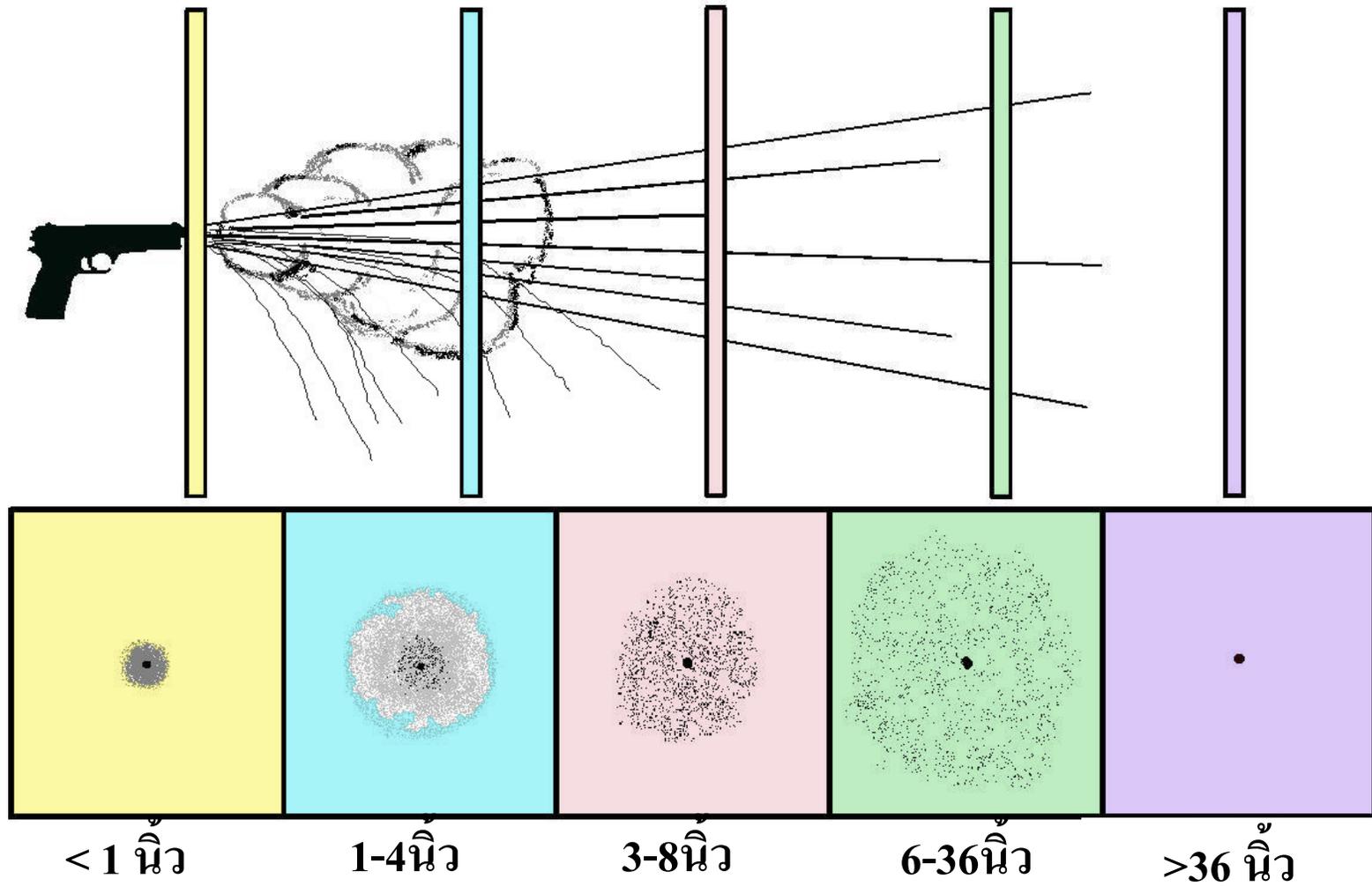
Gunshot residue (GSR) is principally composed of burnt and unburnt particles from the [explosive primer](#), the [propellant](#), as well as components from the [bullet](#), the [cartridge](#) case and the [firearm](#) used.



The pattern of gunshot residues

- **distance between muzzle and target**
- **the muzzle-target angle**
- **target**
- **weapon**
- **type of ammunition**

Distance Determination and Gunshot Residue



จำแนกออาวุธปืน

- ปืนพกสั้น (PISTOL)

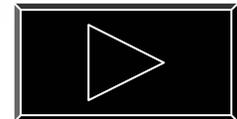
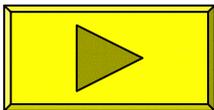
 ลูกโม่ (REVOLVER)

 กึ่งอัตโนมัติ (SEMI-AUTOMATIC)

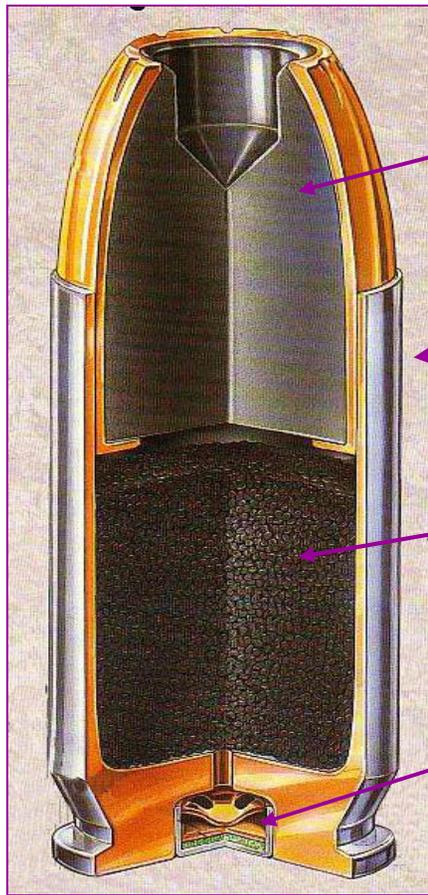


- ปืนยาว (RIFLE)

- ปืนที่ใช้ในการสงคราม



กระสุนปืน (Cartridge)

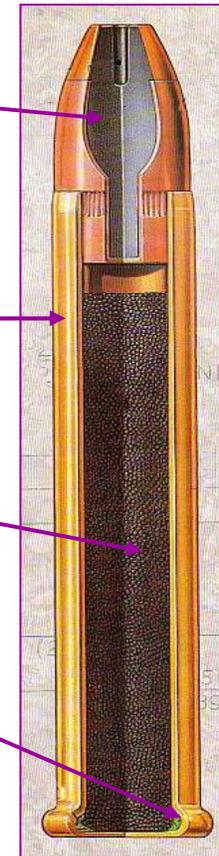


ลูกกระสุนปืน
(Bullet)

ปลอกกระสุนปืน
(Cartridge case)

ดินส่่งกระสุนปืน
(Powder)

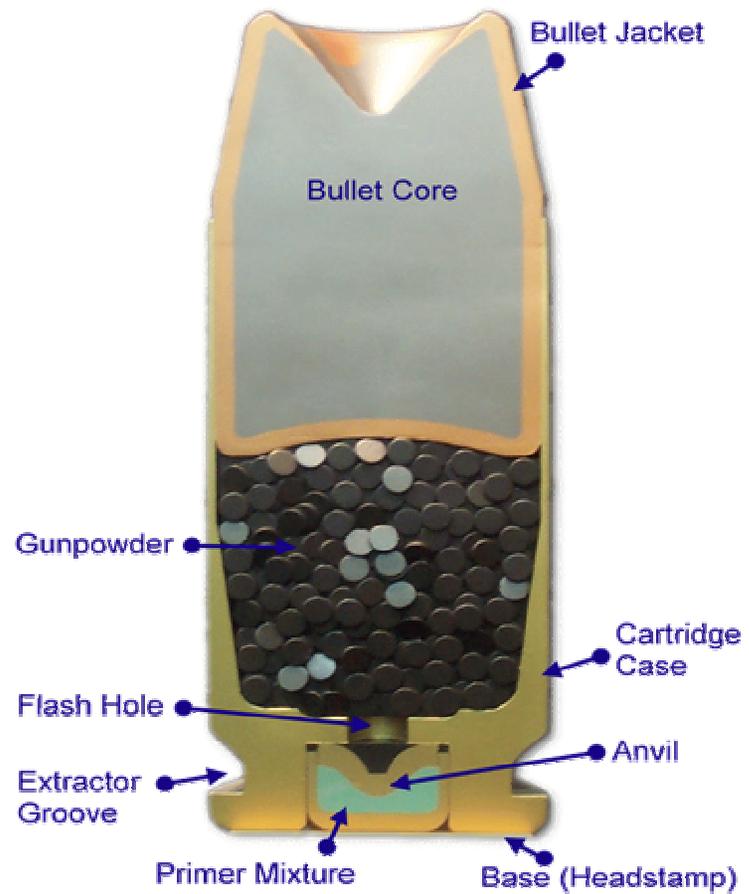
ชนวนทำยกระสุนปืน
(Primer Cap)



ขอบงานท้ายกระสุน

1.Center fire

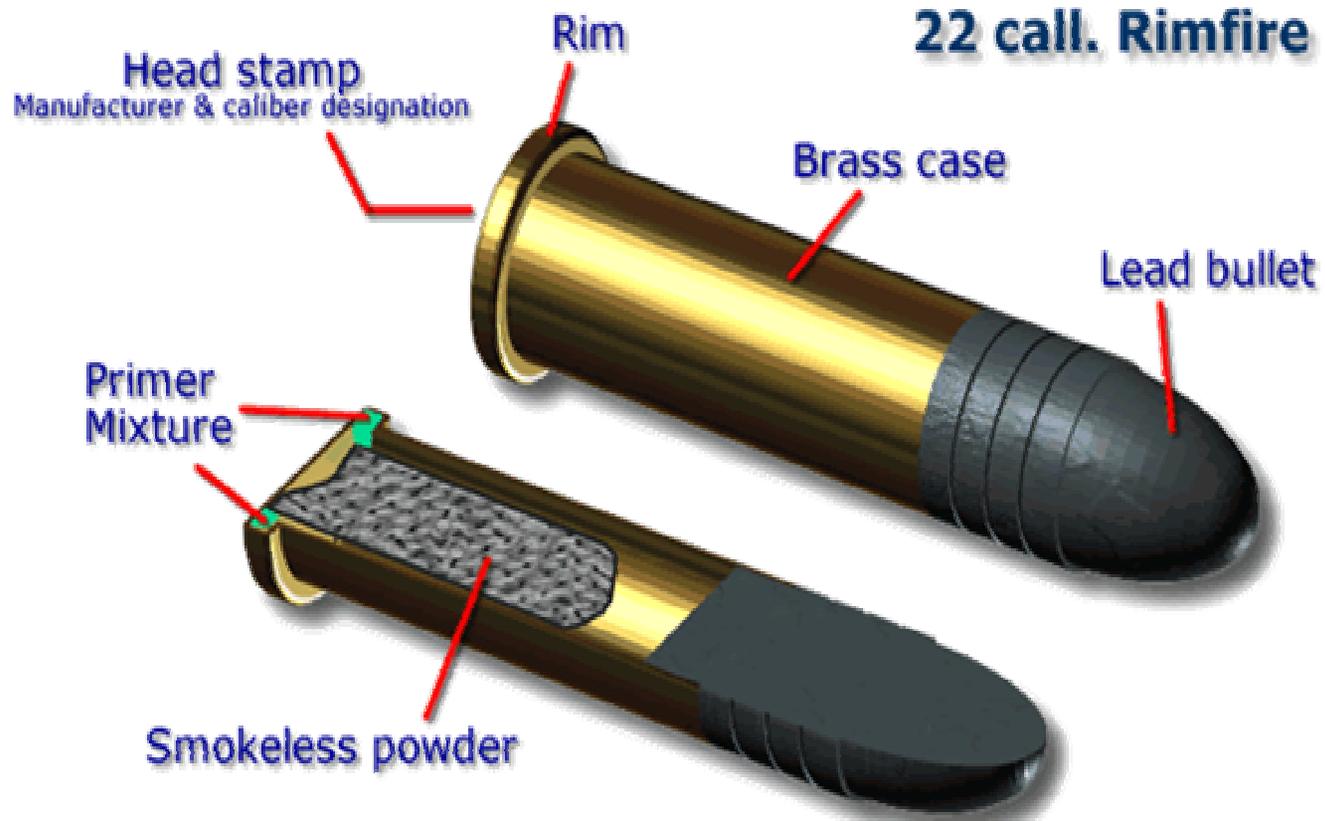
40 S&W Centerfire Cartridge



ส่วนประกอบชนวนท้ายกระสุนปืน

1. Initiator นิยมใช้ Lead Stypnate ($\text{PbO}_2\text{C}_6\text{H}(\text{NO}_2)_3$)
2. Oxidizer นิยมใช้ Barium nitrate ($\text{Ba}(\text{NO}_3)_2$)
3. Fuel นิยมใช้ Antimony Sulfide (Sb_2S_3)

ขอบจันท้ายกระสุน

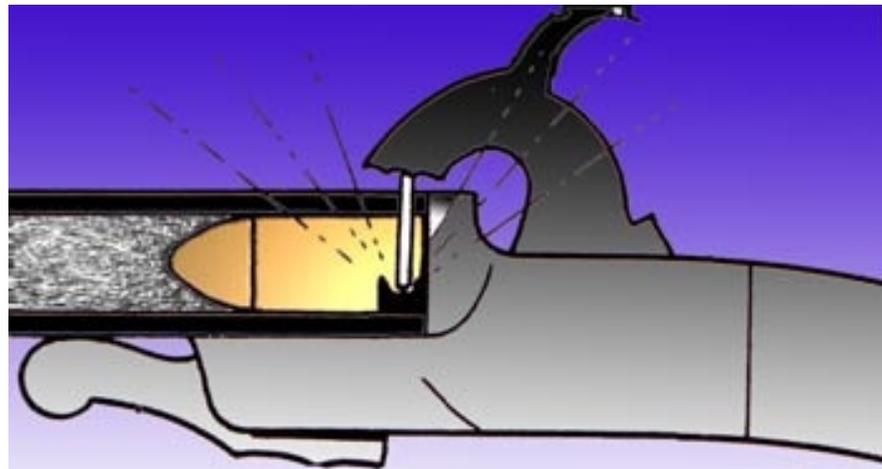


2. Rim fire

Illustrated by
firearmsID.com

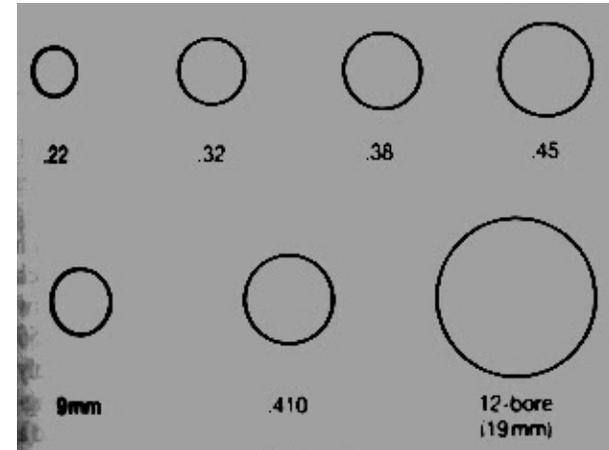
ขอบงานท้ายกระสุน

3. Pin fire



ขนาดของอาวุธปืนและกระสุนปืน

1. หน่วยนิ้ว เช่น .22 .25 .32 .38 .45
2. หน่วย มม. เช่น 9 มม. 11 มม.
3. หน่วย Gauge/Bore เช่น 12-Ga, 20-Ga



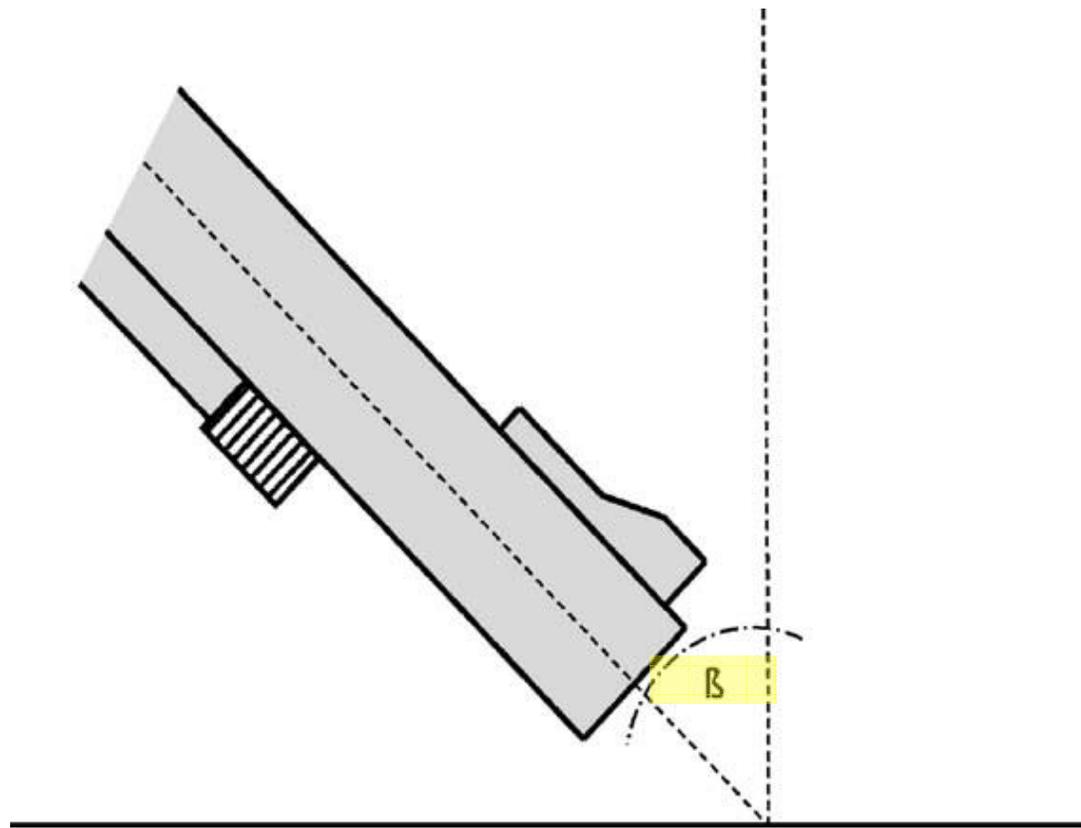
Objective

The goal of this study was the reproduction of shape and pattern of gunshot residues in near contact and contact gunshot wounds.

To investigate the shape and direction of soot deposits with regard to the muzzle according to

- different muzzle-target angles**
- firing distances**
- type of ammunition**
- weapon and barrel length**

Muzzle-target angle (β)



Types of ammunition and weapons



Revolver Cartridge
Lead round nose Bullet



**.38 SPECIAL (LRN) revolver cartridges fired
with a Smith and Wesson revolver**

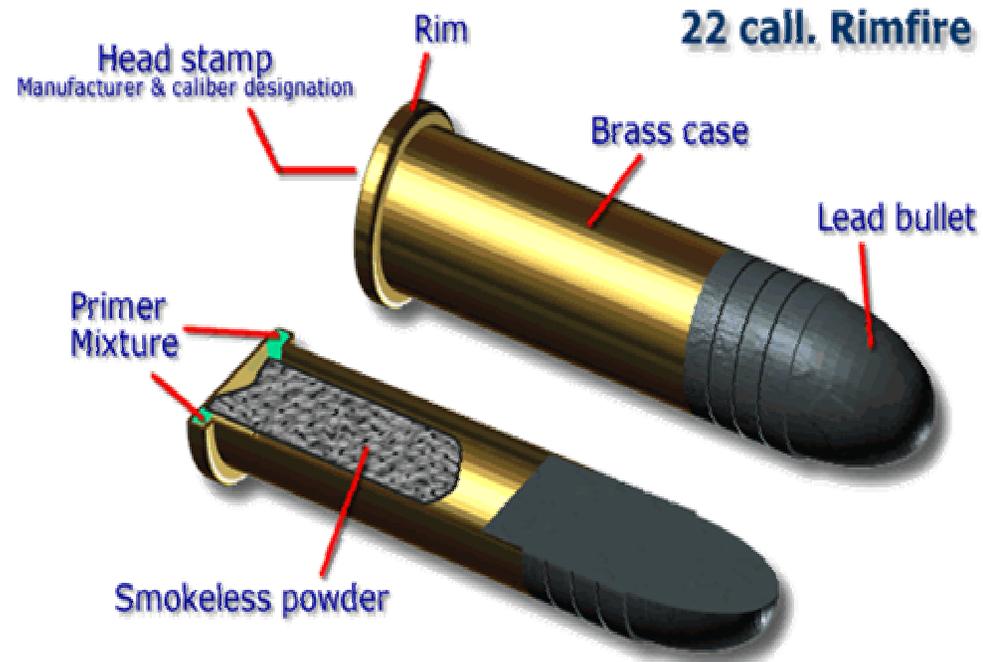
Types of ammunition and weapons



9 mm LUGER (FMJ) pistol cartridges with a SIG Pistol P 210

Types of ammunition and weapons

- 150 mm barrel
- 250 mm barrel
- 650 mm barrel



Illustrated by
firearmsID.com

.22 LONG RIFLE cartridges

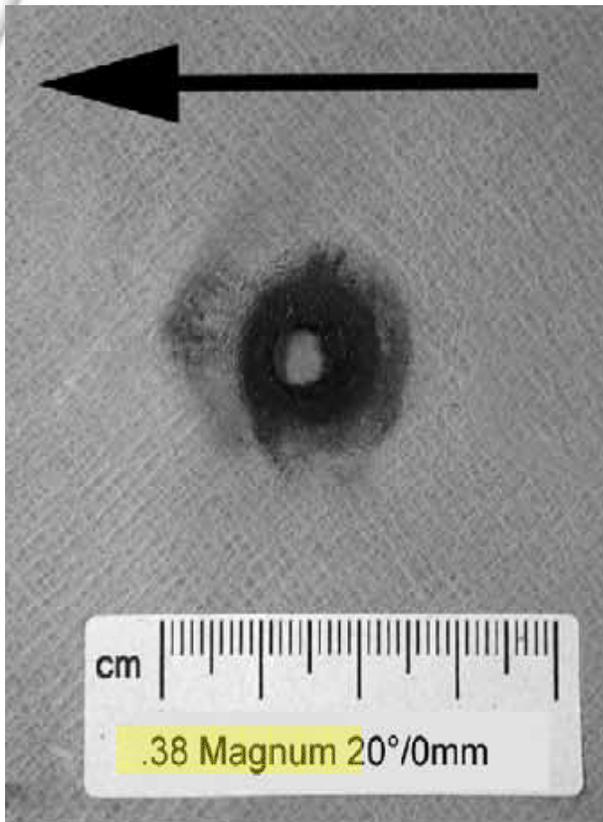
Targets

**calf skin leather fixed on soap and gelatine blocks
to simulate skin and underlying soft tissue**

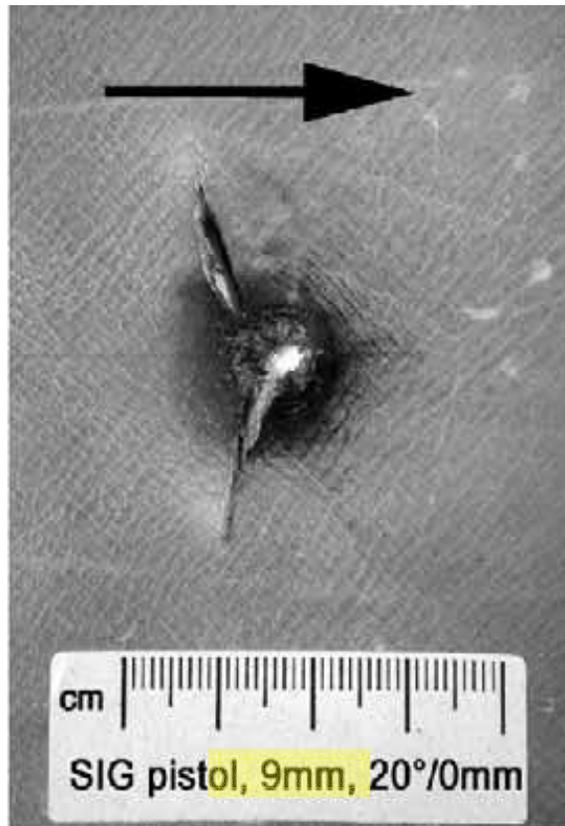


Results

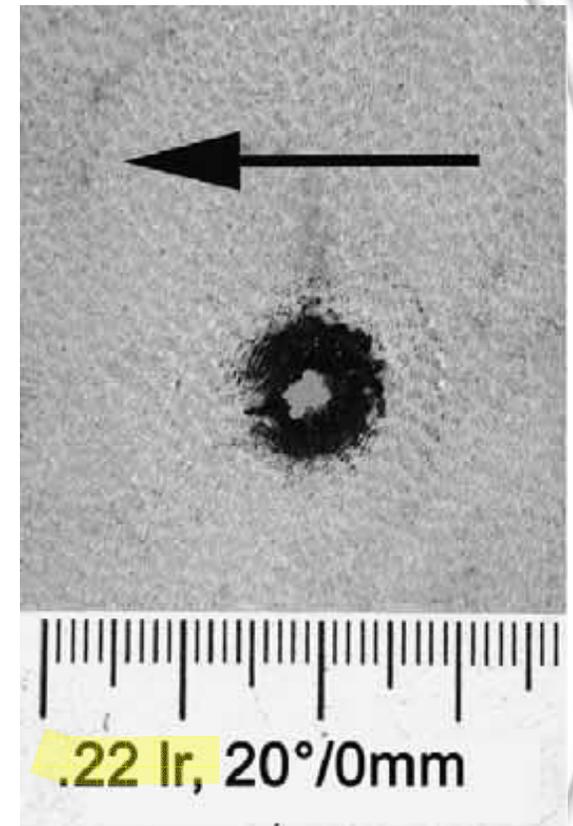
Gunshot residues on the target surface



**.38 Spl. LRN metal piercing revolver
with Smith and Wesson revolver**



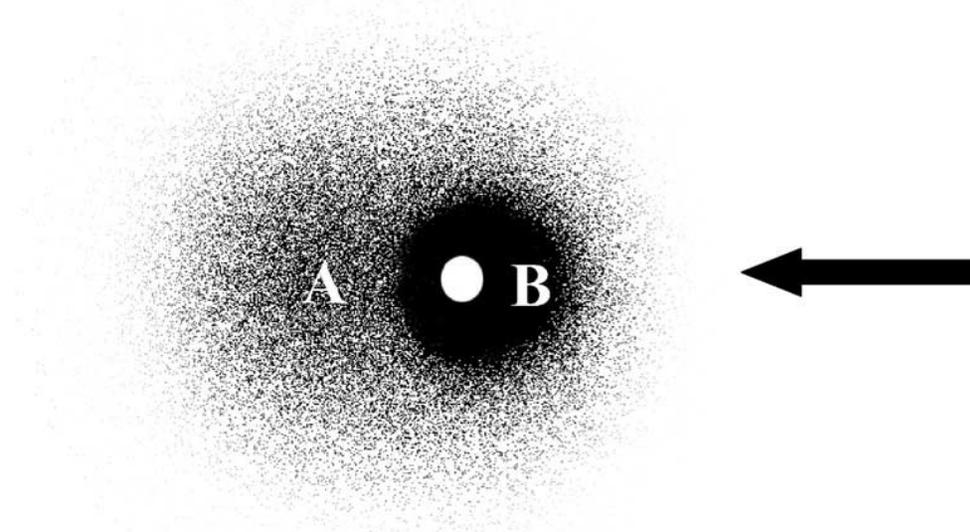
**9mm Luger pistol cartridges
fired with SIG Pistol P 210**



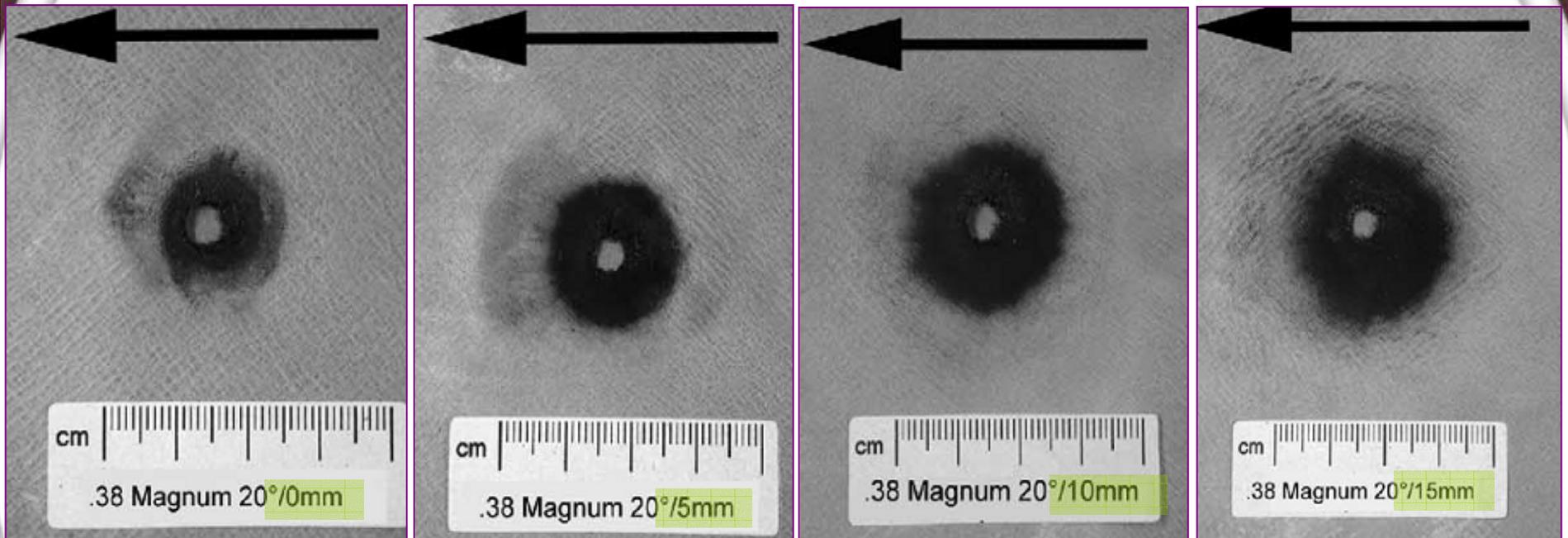
**.22 L.R. cartridges fired
with 150mm barrel**

Conclusion

1. **Gunshot residues on the target surface can be differentiated in a inner and outer powder soot zone**
2. **The outer powder soot zone is much less visible than the inner powder soot zone and may lack on human skin**

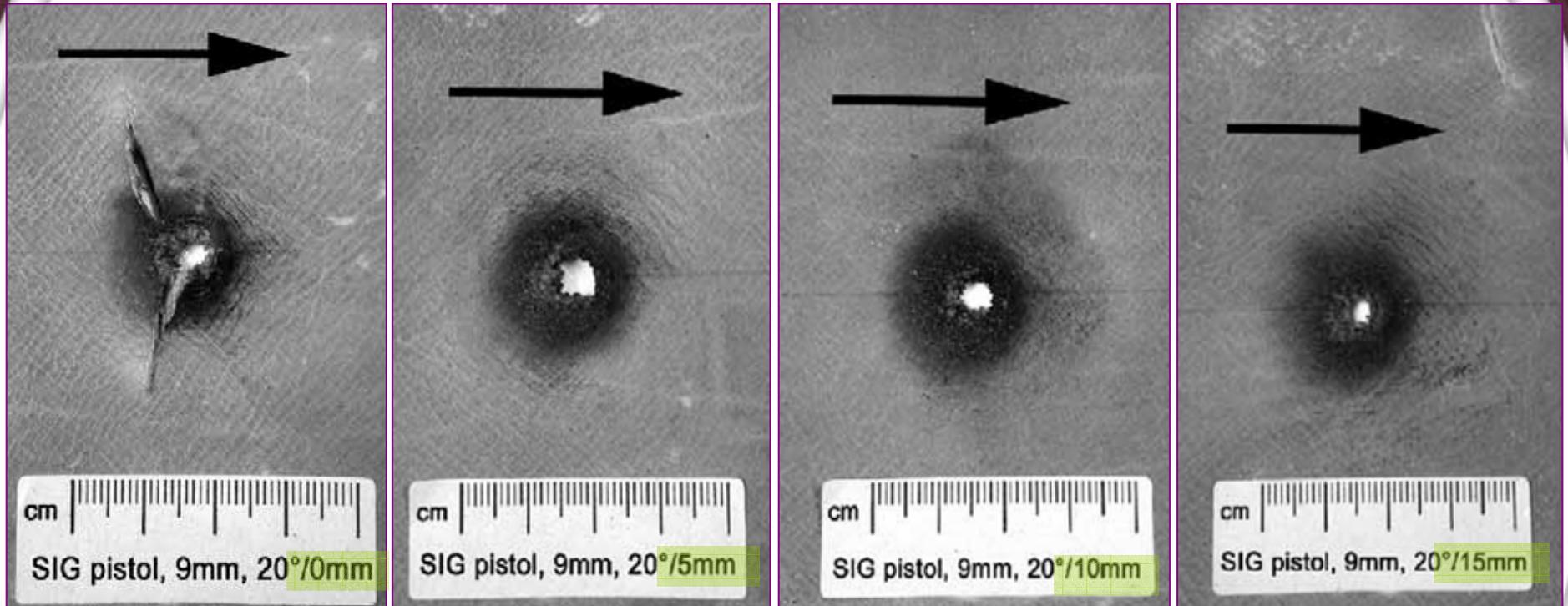


Effect of muzzle-target distance



.38 SPECIAL (LRN) revolver cartridges fired with Smith and Wesson revolver. Arrow indicates direction of bullet: muzzle-target angle = 20°

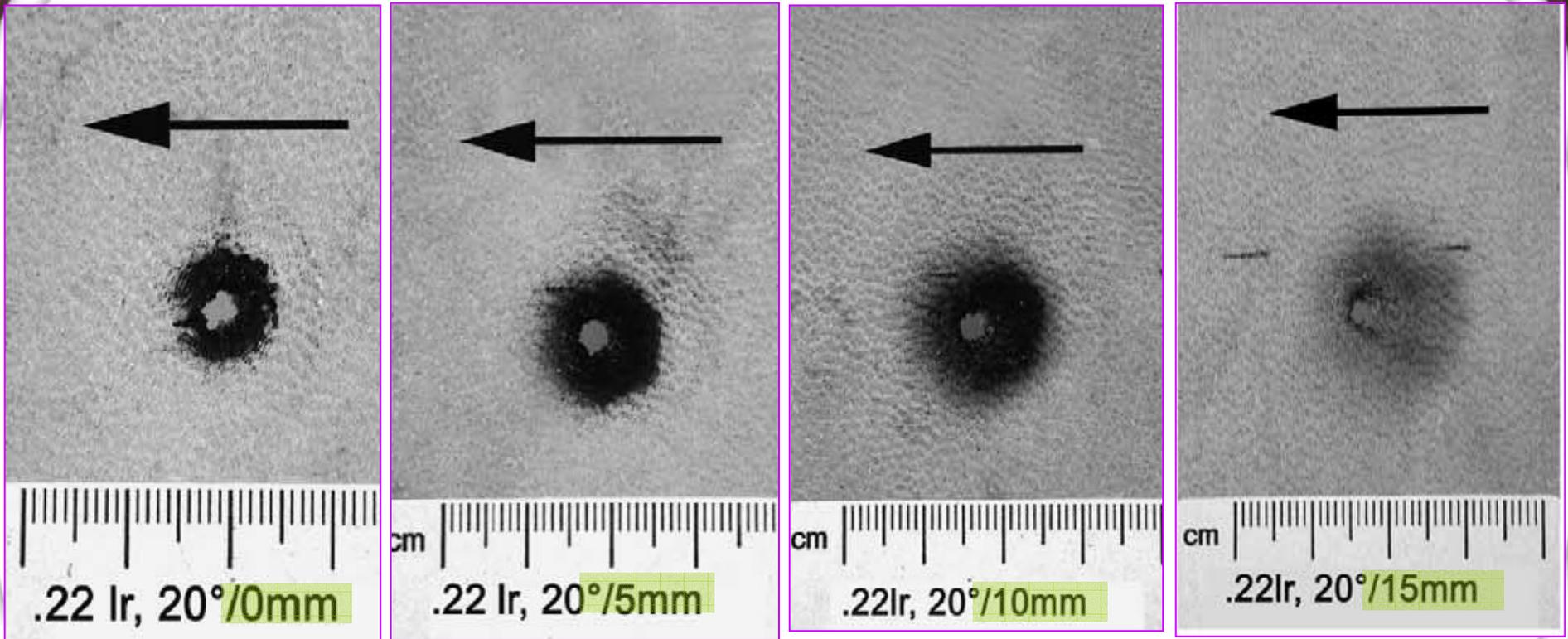
Effect of muzzle-target distance



9 mm LUGER (FMJ) pistol cartridges fired with SIG Pistol P 210

Arrow indicates direction of bullet: muzzle-target angle = 20°

Effect of muzzle-target distance



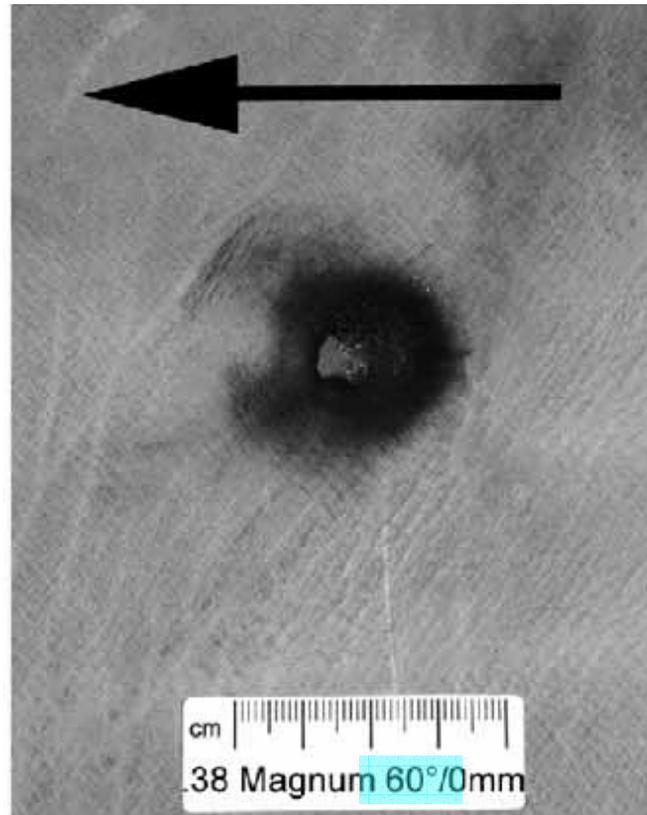
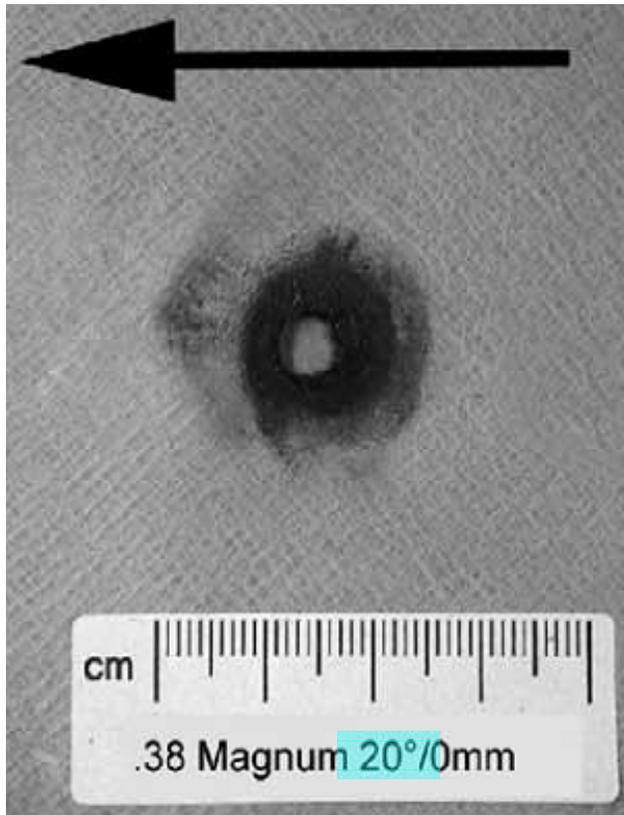
.22 LONG RIFLE cartridges fired with 150 mm barrel

Arrow indicates direction of bullet: muzzle-target angle = 20°

Conclusion (cont.)

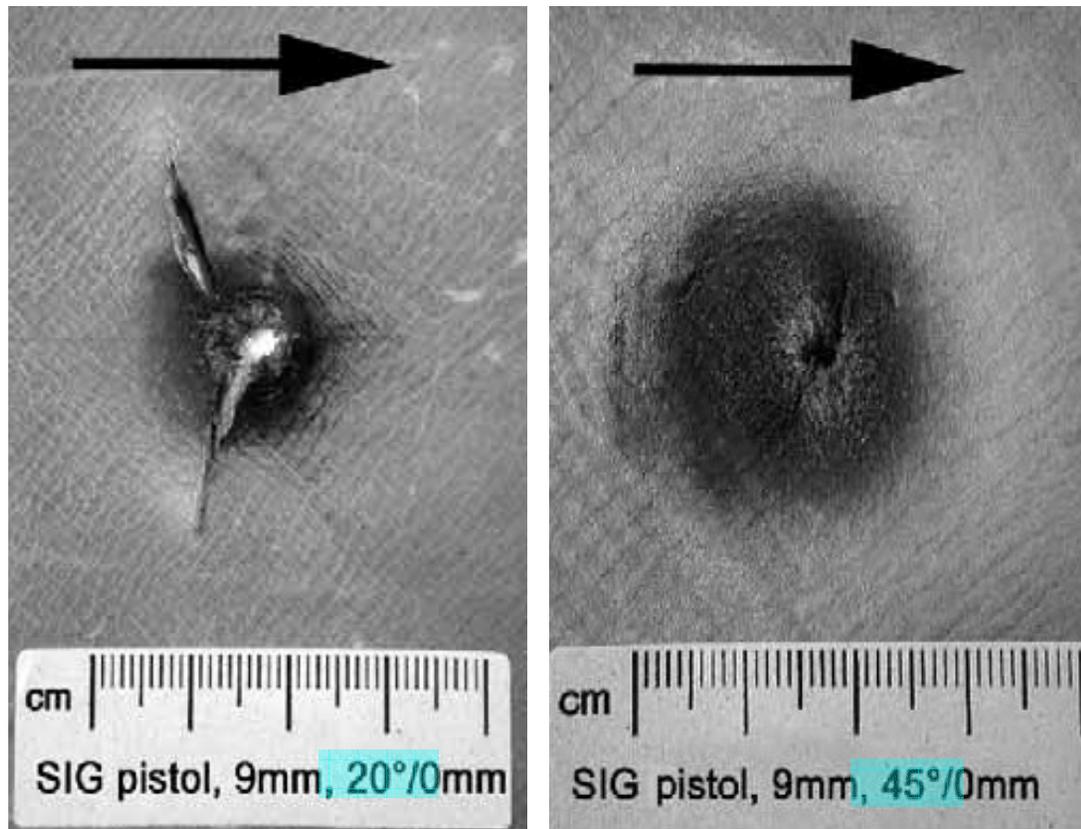
3. With increasing muzzle target distance both inner and outer powder soot halo increase in size and decrease in density.

Effect of muzzle-target angles



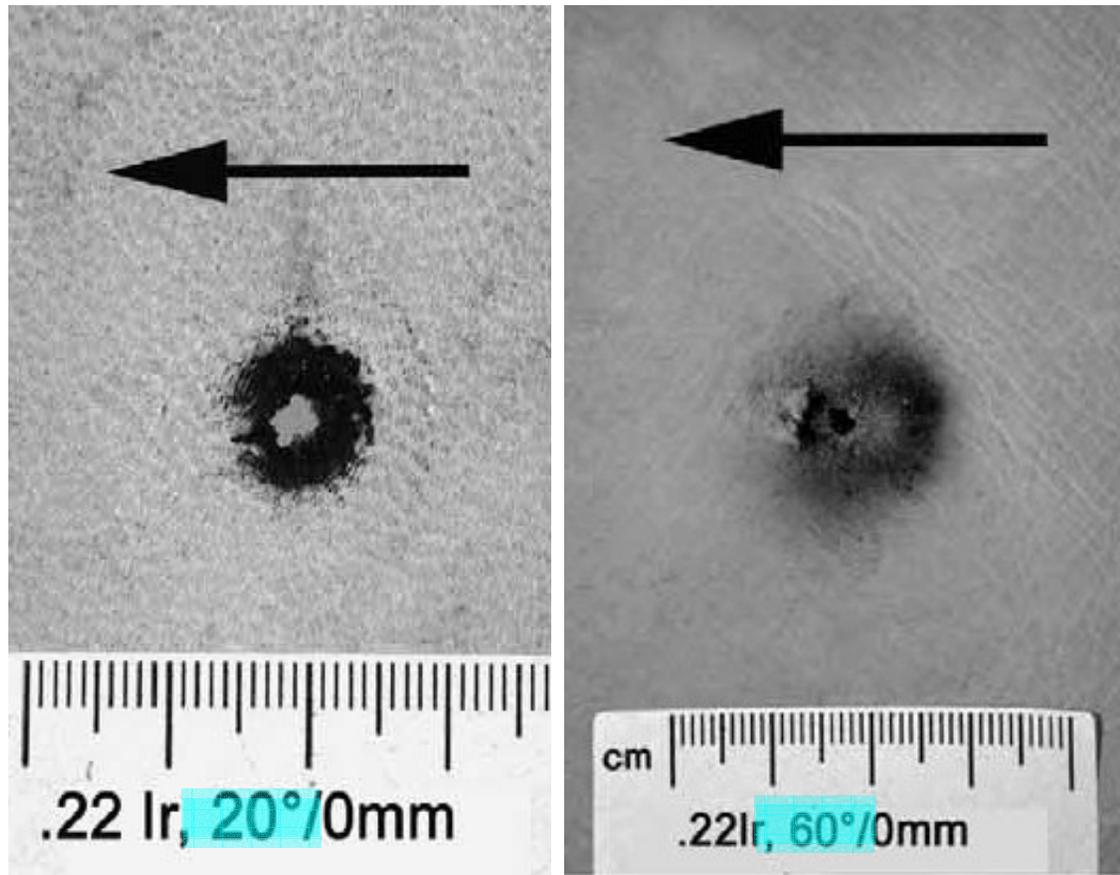
.38 SPECIAL (LRN) revolver cartridges fired with Smith and Wesson revolver. Arrow indicates direction of bullet

Effect of muzzle-target angles



9mm LUGER (FMJ) pistol cartridges fired with SIG Pistol P 210

Effect of muzzle-target angles

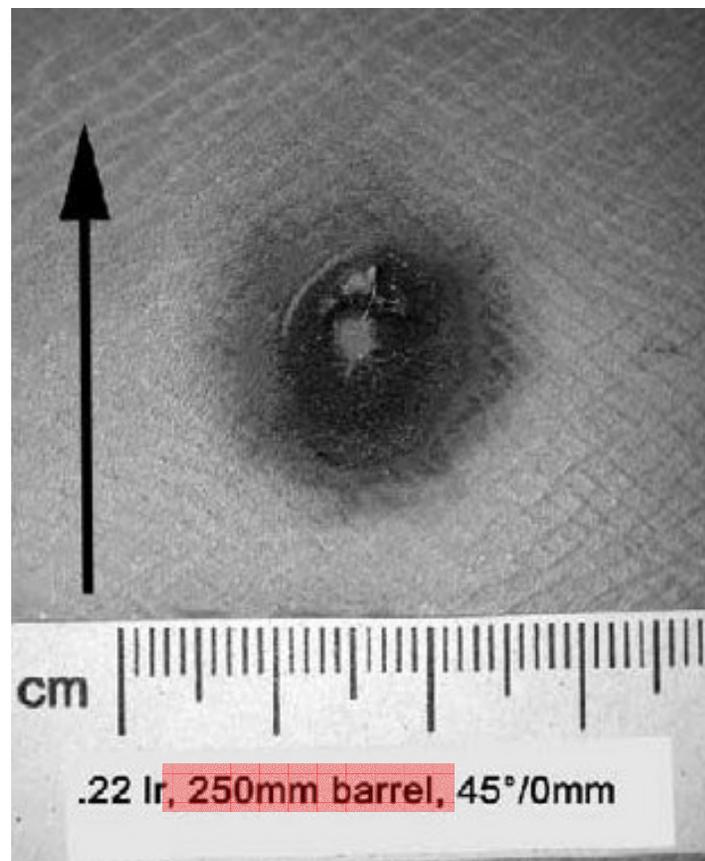
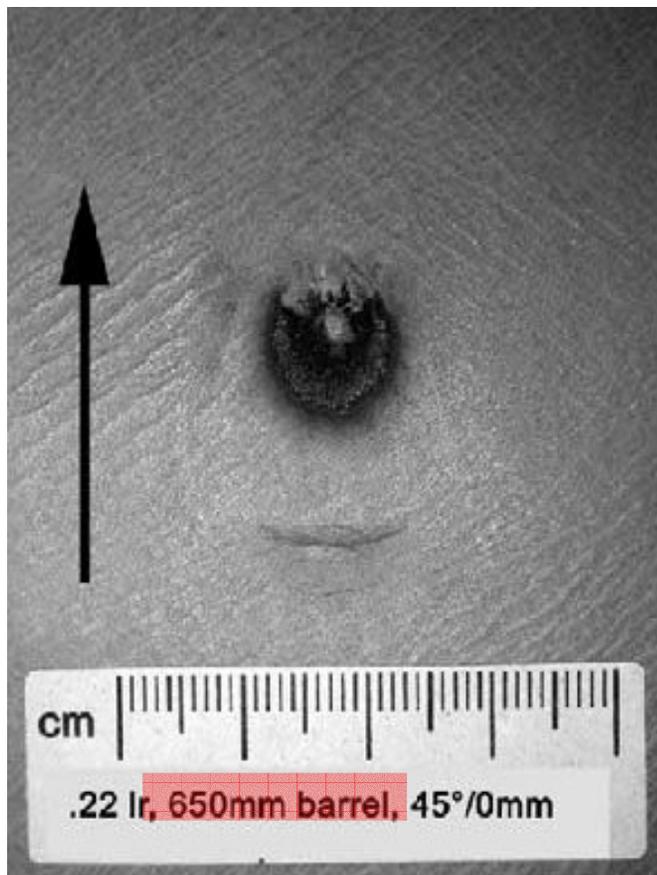


.22 LONG RIFLE cartridges fired with 150mm barrel

Conclusion (cont.)

- 4. In angled shots the inner powder soot halo shows an eccentric, elliptic shape which points towards the muzzle, regardless of ammunition, calibre and barrel length**
- 5. The outer powder soot points away from the muzzle in angled contact and close contact shots**

Effect of barrel



.22 LONG RIFLE cartridges fired

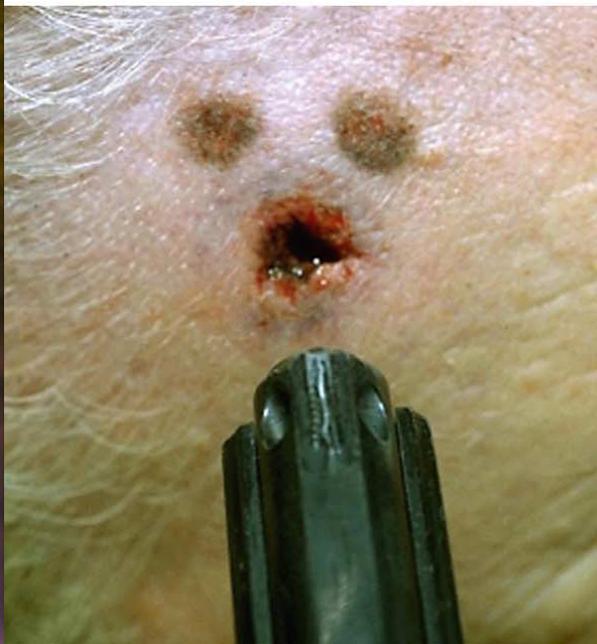


Contact shot with unusual soot pattern

M. G. Perdekamp et.al; *Forensic Sci. Int.*, 2002, 125,190–194



(a)



(b)

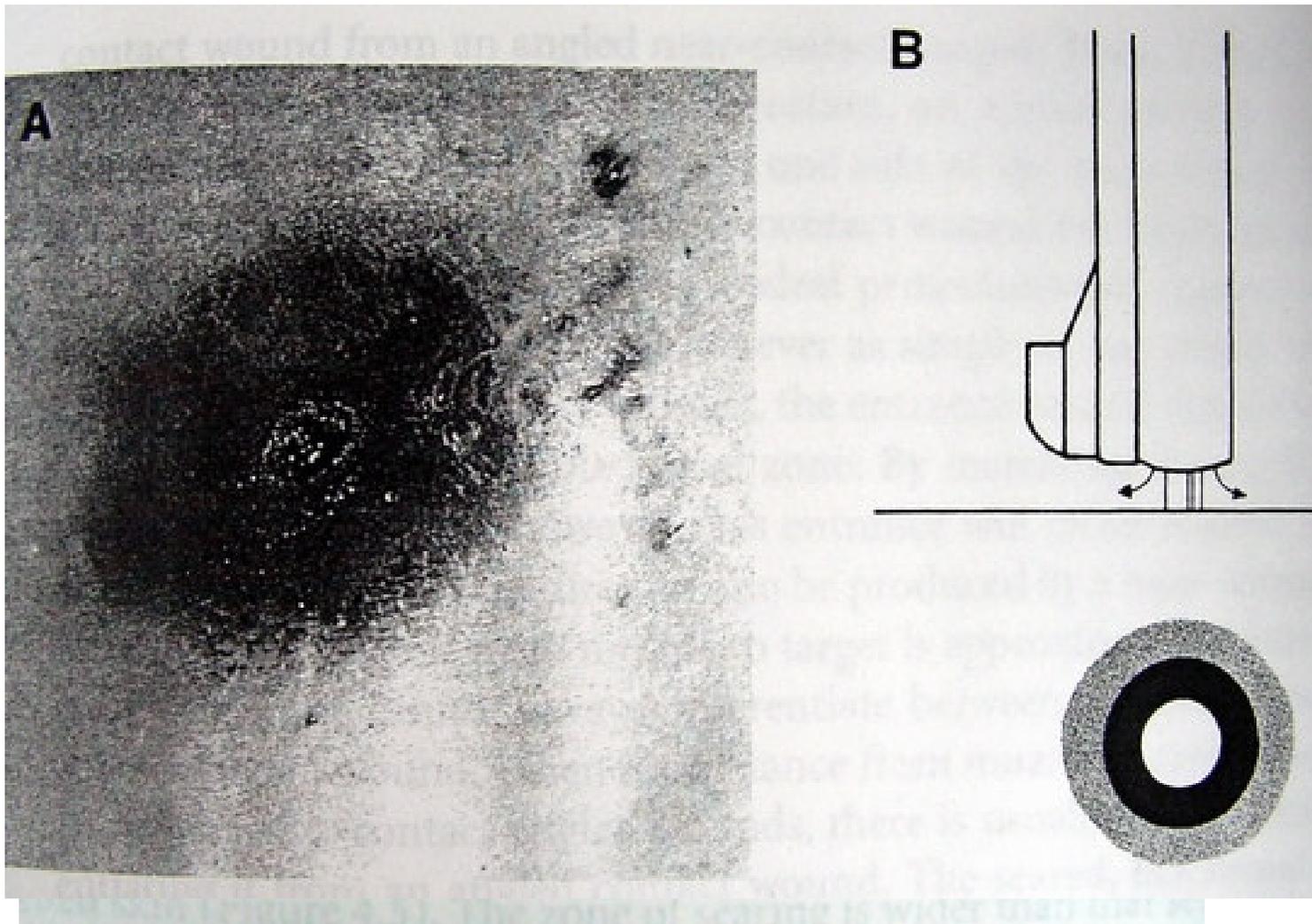


**converted Rhoner blank cartridge
pistol, Model SM 12, cal. 6.35 mm**

Conclusion

- 1. As the shape of gunshot residues depending on the type of weapon and ammunition.**
- 2. Gunshot residues on the target surface can be differentiated in a inner and outer powder soot zone**
- 3. The outer powder soot zone is much less visible than the inner powder soot zone and may lack on human skin**
- 4. With increasing muzzle target distance both inner and outer powder soot halo increase in size and decrease in density**
- 5. In angled shots the inner powder soot halo shows an eccentric, elliptic shape which points towards the muzzle**
- 6. The outer powder soot points away from the muzzle in angled contact and close contact shots**

ประชิดติดผิวแห้งแบบไม่แน่น Near Contact





Thank you

อาจารย์ ผศ.ดร.นรงค์ นิมพาลี

อาจารย์ที่ปรึกษาชั้นมมณฯ



Thank you

พ.ต.อ.พฤตมิเกษ ศรีชัย

ตำแหน่ง นวท.(สบ4) กชช. สพฐ 3

ที่ปรึกษาสัมมนา



Thank you

