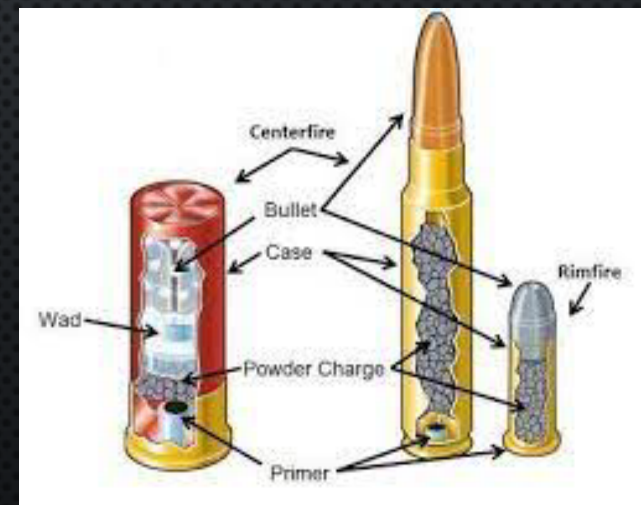


# FIREARM INJURIES

MALEK TAYEM

YOUNES MALKAWI

MOHAMMAD AL-BALWAH





# DEFINITIONS

- FIREARM: ANY INSTRUMENT OR DEVICE THAT DISCHARGES A MISSILE BY THE EXPANSIVE FORCE OF GASES PRODUCED BY BURNING OF AN EXPLOSIVE SUBSTANCE.
- BALLISTICS (GREEK BA'LLAIN: THROW): IT IS THE SCIENCE OF PROJECTILE MOTION, AND CONDITIONS AFFECTING THAT MOTION.
- FORENSIC BALLISTICS: SCIENCE WHICH DEALS WITH THE INVESTIGATION OF FIREARMS, AMMUNITION AND THE PROBLEMS ARISING FROM THEIR USE.



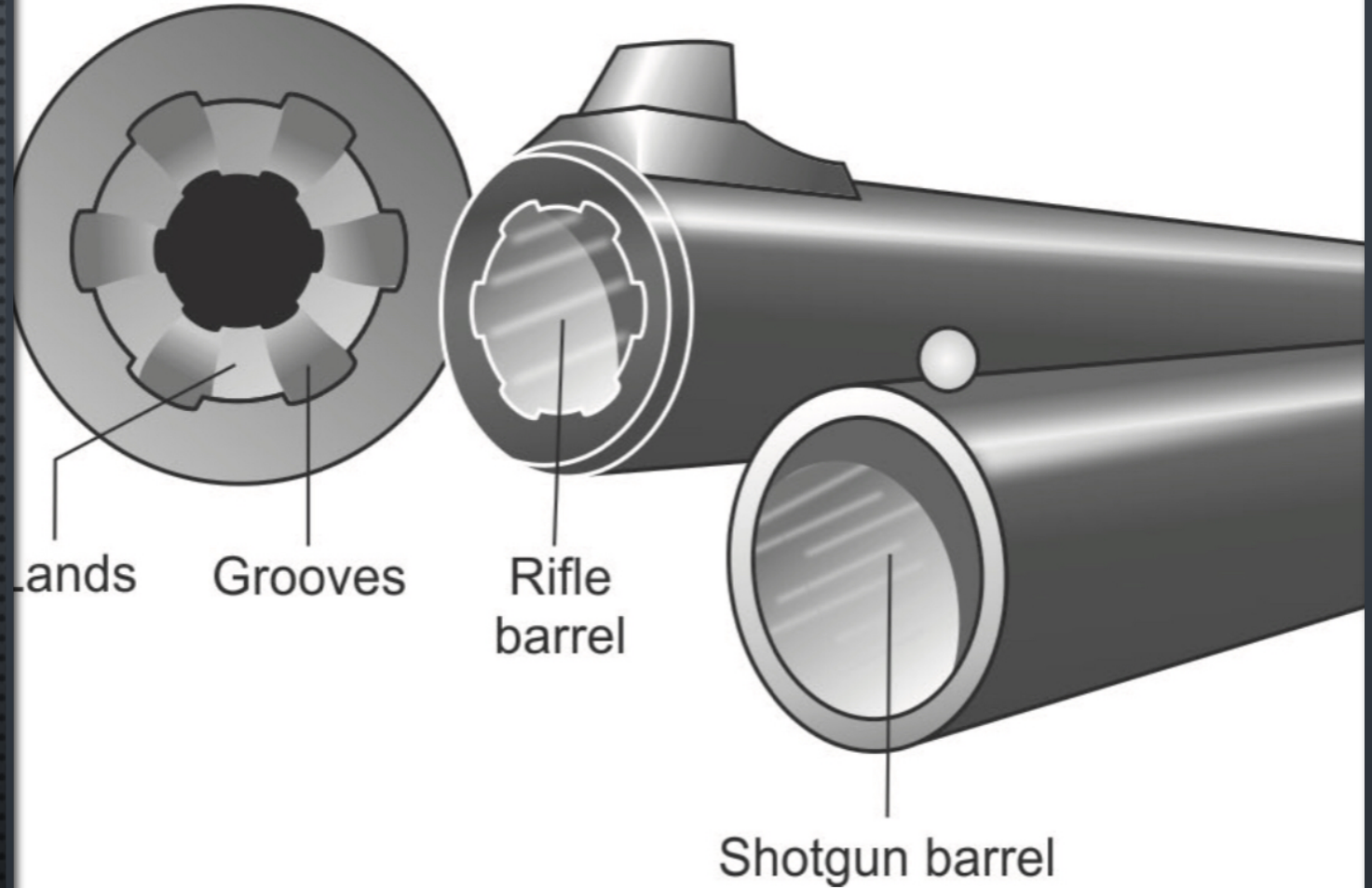
# FORENSIC BALLISTICS

- PROXIMAL (INTERNAL) BALLISTICS IS THE STUDY OF FIREARMS AND PROJECTILES.
- INTERMEDIATE (EXTERIOR) BALLISTICS IS THE STUDY OF THE MOTION OF PROJECTILE AFTER IT LEAVES THE GUN BARREL TILL THE TIME IT HITS THE TARGET.
- TERMINAL BALLISTICS INVOLVES THE STUDY OF BEHAVIOR OF MISSILES ONCE THEY PENETRATE THEIR TARGETS.
- WOUND BALLISTICS IS THE STUDY OF THE EFFECT OF MISSILES ON LIVING TISSUE

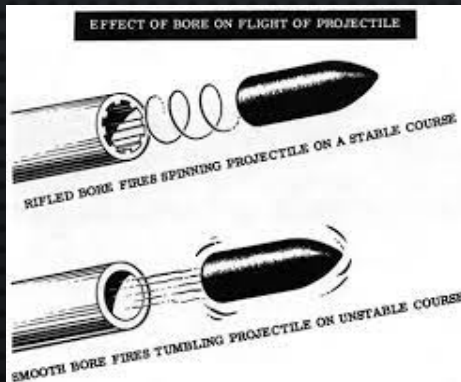


FIREARMS ARE BROADLY CLASSIFIED INTO TWO CATEGORIES DEPENDING ON THE TYPE OF BARREL:

- RIFLED WEAPONS
- SMOOTH BORE WEAPONS (SHOTGUNS)

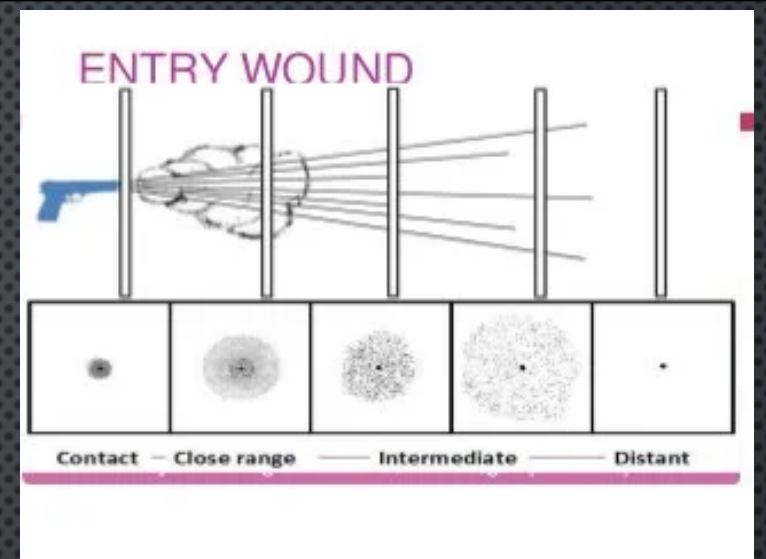


**Fig. 12.2:** Rifle and shotgun barrel





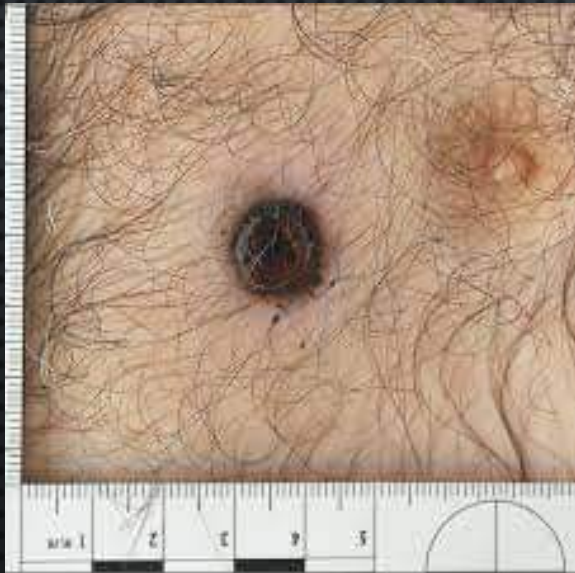
# RIFLED FIREARM INJURY



**ENTRY WOUND:** THE DISTANCE BETWEEN THE MUZZLE END OF THE FIRE ARM AND THE TARGET IS CALLED RANGE. THIS MAY BE:

- A) **CONTACT RANGE:** IF THE MUZZLE END IS IN CONTACT WITH THE BODY.
- B) **CLOSE RANGE:** IF THE RANGE IS WITHIN THE DISTANCE TRAVELLED BY FLAME (EXTENDS UPTO 8 CM).
- C) **NEAR RANGE:** IF IT IS WITHIN THE DISTANCE TRAVELLED BY UN BURNT OR PARTIALLY BURNT GUNPOWDER (EXTENDS 40 TO 50 CM WITH HANDGUNS AND 60 TO 100 CM IN RIFLES).
- D) **DISTANT RANGE:** IF IT IS BEYOND THE RANGE OF FLAMES, SMOKE AND GUNPOWDER PARTICLES.





Source: K.J. Kovac, L.B. Stack, A.D. Morrow, R.J. Flannery.  
The Atlas of Emergency Medicine, 4th Edition,  
[www.accessmedicine.com](http://www.accessmedicine.com)  
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- DURING THE BULLET'S ATTEMPT AT PERFORATING THE SKIN WHILE ENTERING, DUE TO THE SPIN, THE EDGE OF THE ENTRANCE WOUND MAY BE ABRADED IN THE FORM OF A COLLAR, CALLED **ABRASION COLLAR**
- IN SOME CASES THERE IS CONTUSION INSTEAD OF ABRASION, IN WHICH CASE IT IS MORE APPROPRIATELY CALLED **CONTUSION COLLAR**. THE DIAMETER OF THE ENTRY HOLE TOGETHER WITH THE ABRASION COLLAR MAY GIVE THE APPROXIMATE DIAMETER OF THE BULLET.
- THE SPIN OF THE BULLET CAUSES WIPING OF ITS SURFACE ON THE SKIN WHILE ENTERING. THIS IS CALLED GREASE OR **DIRT COLLAR**.
- **THE ABRASION AND GREASE COLLARS** NORMALLY MEASURE ONLY ABOUT 0.3 CM TO 0.7 CM RESPECTIVELY
- BURNING/SCORCHING/SINGEING OF THE SKIN AND HAIR RESULT FROM THE FLAME THAT EMERGES FROM THE MUZZLE, AT THE TIME OF FIRING. CLOTHING AROUND THE ENTRY WOUND MAY ALSO SHOW EVIDENCE OF BURNING.



- **TATTOOING OR PEPPERING** RESULTS FROM THE GRAINS OF GUNPOWDER BEING DRIVEN INTO THE SKIN, EACH GRAIN ACTING AS A MINUTE MISSILE. TATTOOING IS SEEN ON THE SKIN AS SMALL, DISCRETE, BLACK SPECKS WHICH CANNOT BE WIPED OFF. THE EXTENT OF TATTOOING WILL DEPEND ON THE CALIBER OF THE WEAPON, THE TYPE OF POWDER USED AND THE RANGE. THIS MAY BE ABSENT, IF THE FIRING HAS TAKEN PLACE THROUGH CLOTHING.
- **BLACKENING OR SMUDGING** RESULTS FROM A SUPERFICIAL DEPOSIT OF SMOKE ON THE SKIN. IN OTHER WORDS, IT IS ONLY CARBON PARTICLE DEPOSITION OVER THE SKIN AND HENCE CAN BE EASILY WIPED OFF WITH A WET SPONGE. THE INTENSITY OF THE SMUDGING WILL DEPEND ON THE CALIBER OF THE WEAPON, THE TYPE OF POWDER USED AND THE RANGE. THUS, THE GREATER THE CALIBER OF THE WEAPON, WIDER THE AREA OF BLACKENING AND VICE VERSA.
- **A LEAD RING OR METAL RING** AROUND THE ENTRY WOUND RESULTS FROM DEPOSITION OF VERY SMALL QUANTITIES OF LEAD OR OTHER METAL IN THE FORM OF A RING OR COLLAR, AS THE PROJECTILE ENTERS THE SKIN. THE LEAD RING CAN BE APPRECIATED RADIOLOGICALLY OR BY NEUTRON ACTIVATION ANALYSIS.



# CONTACT SHOT



- THE FIREARM IS PLACED IN CONTACT WITH THE SKIN OR CLOTHING.
- A CONTACT WOUND OVER A DENSE AREA, SUCH AS THE VAULT OF THE SKULL, IS GENERALLY LARGE AND CRUCIATE (CRUCIFORM, STELLATE OR STAR SHAPED), DUE TO EXPLOSIVE EFFECTS OF THE GASES LIBERATED. THE IMPRINT OF THE MUZZLE OF THE WEAPON MAY BE FOUND STAMPED ON THE SKIN.
- BURNING, BLACKENING (SMUDGING) AND TATTOOING ARE SLIGHT OR ABSENT IN THE ADJACENT SKIN, SINCE ALL THE COMPONENTS OF THE EXPLOSION ARE DRIVEN INTO THE WOUND.
- THE TISSUES ARE OFTEN SATURATED WITH CARBON MONO OXIDE AND THEREFORE CHERRY RED IN COLOR.
- CRANIAL CONTACT WOUNDS ARE GENERALLY SEEN ON THE FOREHEAD OR TEMPLE.
- CONTACT WOUNDS OVER THIN BONE, CHEST OR ABDOMEN ARE USUALLY CIRCULAR IN SHAPE AND ARE SURROUNDED BY ABRASION OR CONTUSION COLLAR.
- THE OVERALL DIAMETER OF THE HOLE PLUS THE COLLAR REPRESENTS THE APPROXIMATE DIAMETER OF THE BULLET.
- THE SURROUNDING HAIR IS ALSO SINGED.



# CLOSE SHOT

- :THE FIRE ARM WAS FIRED WITHIN THE RANGE OF FLAME AND POWDER BLAST BUT WAS NOT IN DIRECT CONTACT WITH SKIN OR CLOTHING.
- FLAME TRAVELS APPROXIMATELY UPTO 75 CM IN CASE OF REVOLVER OR PISTOL AND 15 CM IN CASE OF RIFLE.
- THE WOUND APPEARS AS A CIRCULAR HOLE SURROUNDED BY SCORCHING, SINGEING, BLACKENING AND TATTOOING.
- ABRASION COLLAR AND GREASE COLLAR ARE ALSO PRESENT.



# NEAR SHOT



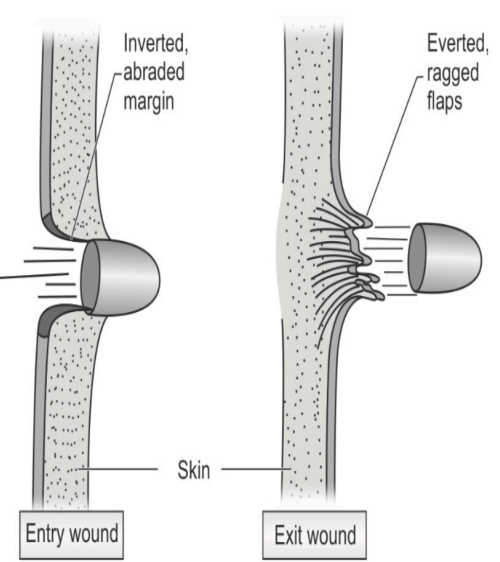
- :IT MEANS THAT THE FIREARM WAS FIRED OUTSIDE THE RANGE OF FLAME BUT WITHIN THE RANGE OF POWDER BLAST.
- THE ENTRY WOUND IS CIRCULAR OR OVAL IN SHAPE.
- BURNT POWDER GRAINS AND SMALL METALLIC PARTICLES TRAVEL APPROXIMATELY UP TO 60 CM IN THE CASE OF REVOLVER AND PISTOL AND 75 CM IN THE CASE OF RIFLE.
- IN PRACTICAL SITUATIONS, TATTOOING IS SEEN UP TO A MAXIMUM DISTANCE OF ABOUT 90 CM.
- SINGEING OF HAIR AND SCORCHING ARE ABSENT. SMUDGING CAN OCCUR UP TO A RANGE OF 30CM. GREASE COLLAR AND ABRASION COLLAR ARE PRESENT.



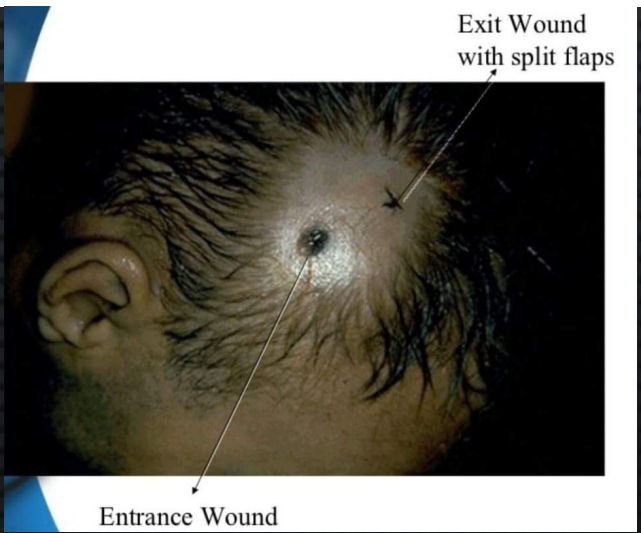
# DISTANT SHOT

- : IT MEANS THAT THE FIRE ARM WAS DISCHARGED OUTSIDE THE RANGE OF FLAME AND POWDER BLAST.
- THE ENTRY WOUND IS CIRCULAR WITH INVERTED MARGINS.
- SCORCHING, TATTOOING AND BLACKENING ARE ALL ABSENT.
- GREASE COLLAR AND ABRASION COLLAR ARE PRESENT.





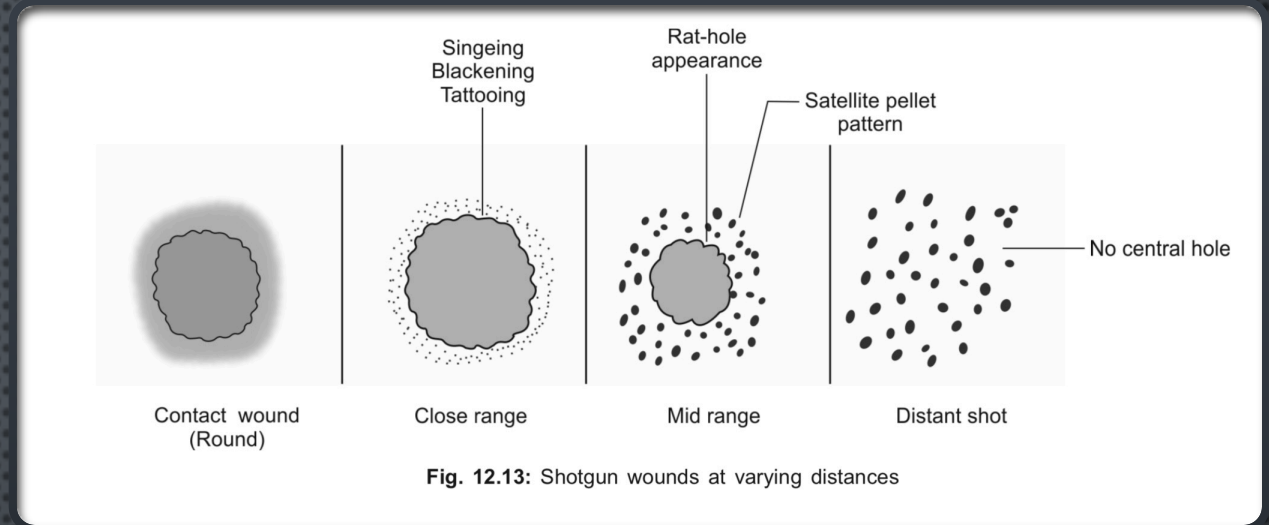
S.No.	Feature	Entry wound	Exit wound
1.	Size	Smaller than the diameter of the bullet (except contact shot)	Bigger than the bullet
2.	Edges	Inverted	Everted, puckered
3.	Skull	Clean cut on outer table and beveled in the inner table	Beveled in the outer table and clean cut on inner table
4.	Bruising, abrasion and grease collar	Present	Absent
5.	Burning, blackening, tattooing	May be seen	Absent
6.	Bleeding	Less	More
7.	Fat	No protrusion	May protrude
8.	Wound track	May be cherry-red due to carboxyhemoglobin and/or carboxymyoglobin	No color change
9.	Fibers of clothes	Turned in	Turned out
10.	Radiological/micro-chemical examination	Lead ring may be seen	Absent
11.	Spectrograph	More metal is found	Less metal



# EXIT WOUND



# SMOOTH BORE FIREARM INJURY



## • CONTACT SHOT-

- THE CONTACT SHOT WOUND IN THE CASE OF SHOT GUN IS USUALLY A LARGE, IRREGULAR HOLE, RESULTING FROM THE EXPLOSIVE BLAST EFFECT.
- THE EDGE OF THE DEFECT IS SCORCHED BY FLAME AND THE SKIN SURROUNDING IT IS BLACKENED BY SMOKE AND TATTOOED BY UN BURNT GUN POWDER.
- AN IMPRINT ABRASION PRODUCED BY THE MUZZLE END MAY BE SEEN.
- THE SHOT WHICH COMPRISES OF BUNCH OF PELLETS PASSES INTO THE BODY AS A SOLID MASS.
- THE INJURED TISSUE IS USUALLY CHERRY RED IN COLOR.
- SHOTGUN INJURY OF THE CRANIUM IS LARGE AND IRREGULAR, AND FISSURED FRACTURES OFTEN RADIATE OUTWARD FROM THE MARGINS. SOMETIMES A PART OF THE HEAD MAY BE BLOWN OFF.



# CLOSE SHOT (UPTO 1 METRE)

- -THIS PRODUCES A CIRCULAR DEFECT WITH IRREGULAR INVERTED BORDERS.
- THE EDGES ARE SCORCHED DUE TO FLAME AND BLACKENED BY SMOKE.
- A FAIRLY WIDE ZONE OF TATTOOING MAY SURROUND THE EDGES OF THE WOUND.
- TISSUES OFTEN APPEAR CHERRY RED IN COLOR.
- SOMETIMES A SHOTGUN MAY DISCHARGE PARTS OF THE CARTRIDGE CASE ITSELF, SUCH AS FRAGMENTED CARDBOARD , PLASTIC OR PRIMER PARTICLES. AT CONTACT AND CLOSE RANGES, THESE MAY CONTRIBUTE TO THE WOUND.



## NEAR SHOT (UPTO 2 METRE)

- THE WOUND IS CIRCULAR OR OVAL IN SHAPE.
- BLACKENING MAY BE EVIDENT AROUND THE WOUND UP TO A MAXIMUM DISTANCE OF 30CM.
- SOMETIMES THE WAD PRODUCES MILD ABRASIONS IF FIRED WITHIN A RANGE OF 30 CM.
- TATTOOING IS PRESENT OVER A WIDE AREA.
- THE PELLETS TRAVEL IN COMPACT MASS UPTO A DISTANCE OF ABOUT 45 CM, AFTER WHICH THEY BEGIN TO DISPERSE.
- THE ENTRY WOUND IS APPROXIMATELY 2.5CM IN DIAMETER.
- IF THE SHOT ENTERS AT AN ANGLE LESS THAN 90°, SHAPE OF THE WOUND MAY BECOME TRIANGULAR OR SEMI-CIRCULAR.



## DISTANT SHOT (BEYOND 2 METRE)

- BEYOND A RANGE OF 2 METRES, THERE WILL BE BURNING, BLACKENING.
- TATTOOING ALSO MAY BE RARE.
- WAD MAY BE PRESENT IN THE WOUND UPTO A RANGE OF 5 METRES.
- THE DISPERSION OF PELLETS BECOMES SIGNIFICANT AT RANGES OVER 2 METRES. □  
THEREAFTER, THE SPREAD INCREASES PROGRESSIVELY AND CENTRAL DEFECT DIMINISHES IN SIZE PROPORTIONATELY.
- AT DISTANT RANGES BEYOND 6 TO 10 METRES, THE CENTRAL HOLE MAY SHRINK TO NOTHING. AT SUCH RANGES , THE SHOTS MAY NOT BE LETHAL AND THE PELLETS, IF THEY DO PENETRATE THE SKIN AT ALL, MAY LIE JUST IN THE SUBCUTANEOUS TISSUE.



# MEDICO-LEGAL ASPECTS

- THE FOLLOWING QUESTIONS NEEDS TO BE ANSWERED:
- 1) THE NATURE OF THE FIRE ARM.
- 2) THE RANGE OF THE FIRE ARM.
- 3) THE DIRECTION OF THE FIRE ARM.
- 4) THE PLACE FROM WHERE THE FIRING TOOK PLACE.
- 5) THE CAUSE OF DEATH.
- 6) THE MANNER OF DEATH.



## FACTORS THAT CAN AFFECT THE AMOUNT AND DISTRIBUTION OF GUNSHOT ON SKIN INCLUDE:

1. FIRING DISTANCE
2. LENGTH AND DIAMETER OF THE FIREARM BARREL
3. CHARACTERISTICS OF THE GUNPOWDER
4. ANGLE BETWEEN THE FIREARM BARREL AND TARGET
5. THE ENVIRONMENT (WIND)
6. TYPE OF CLOTHING
7. CHARACTERISTICS OF THE TARGET (TISSUE TYPE)



# CHARACTERISTICS OF GUNSHOT WOUNDS

- 1. ENTRY & EXIT:
  - THE TWO ARE DISTINGUISHABLE FROM EACH OTHER
- 2. TISSUE DEFECT:
  - AS THE BULLET TRAVELS THROUGH THE BODY, IT LEADS TO TISSUE LOSS AND VARIOUS ORGAN DAMAGE ALONG ITS WAY
- 3. ASSOCIATED MARKINGS:
  - MUZZLE IMPRINT
  - SCORCHING/HAIR SINGEING
  - TATTOOING
  - SOOT
  - ABRASION COLLAR
  - OTHERS



# CHARACTERISTICS OF GUNSHOT WOUNDS

- 1. MUZZLE IMPRINT MARK:
  - INTRADERMAL CONTUSION CAUSED BY THE EXPANSIVE POWER OF THE GASES LIFTING THE SKIN FORCIBLY UP AGAINST THE MUZZLE.
  - PATHOGNOMONIC FOR A **CONTACT** SHOT.
  - CHARACTERISTIC IMPRINT MARKS CAN PROVIDE CLUES TO THE TYPE OF THE FIREARM AND ITS POSITION AT THE TIME OF DISCHARGE.





# CHARACTERISTICS OF GUNSHOT WOUNDS

- 2. SCORCHING / HAIR SINGEING:
  - BURNT SKIN & HAIR SURROUNDING THE WOUND CAUSED BY FLAME/HOT GASES EMITTED FROM THE GUN
  - SEEN MOSTLY IN CLOSE-RANGE FIRING (UP TO 15 CM)
  - DEPENDS ON THE LENGTH OF THE BARREL & NATURE OF THE POWDER CHARGE





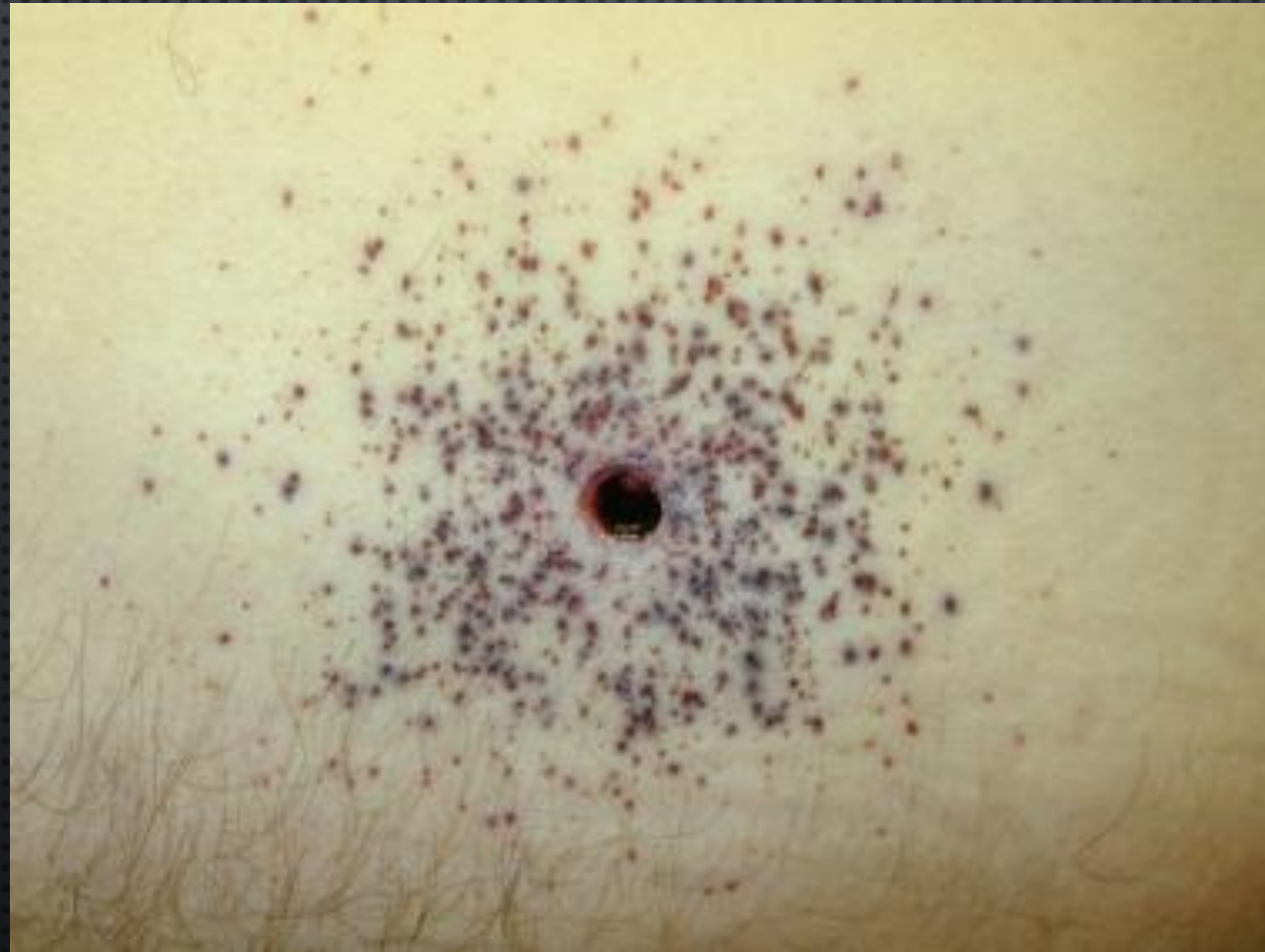
# CHARACTERISTICS OF GUNSHOT WOUNDS

- 3. TATTOOING (STIPPLING):
  - *UNBURNT OR PARTIALLY BURNT* POWDER PARTICLES THAT ARE EMBEDDED IN AND UNDER THE SKIN THROUGH THE FORCE OF THEIR IMPACT.
  - CANNOT BE WIPED AWAY WITH A WET-COTTON.
  - SEEN IN **INTERMEDIATE RANGE** WOUNDS – CAN TRAVEL UP TO 60 CM
  - A SUPERFICIAL INJURY LIMITED TO THE EPIDERMIS – HEALS IF THE VICTIM SURVIVES





# CHARACTERISTICS OF GUNSHOT WOUNDS



Intermediate range  
Wound



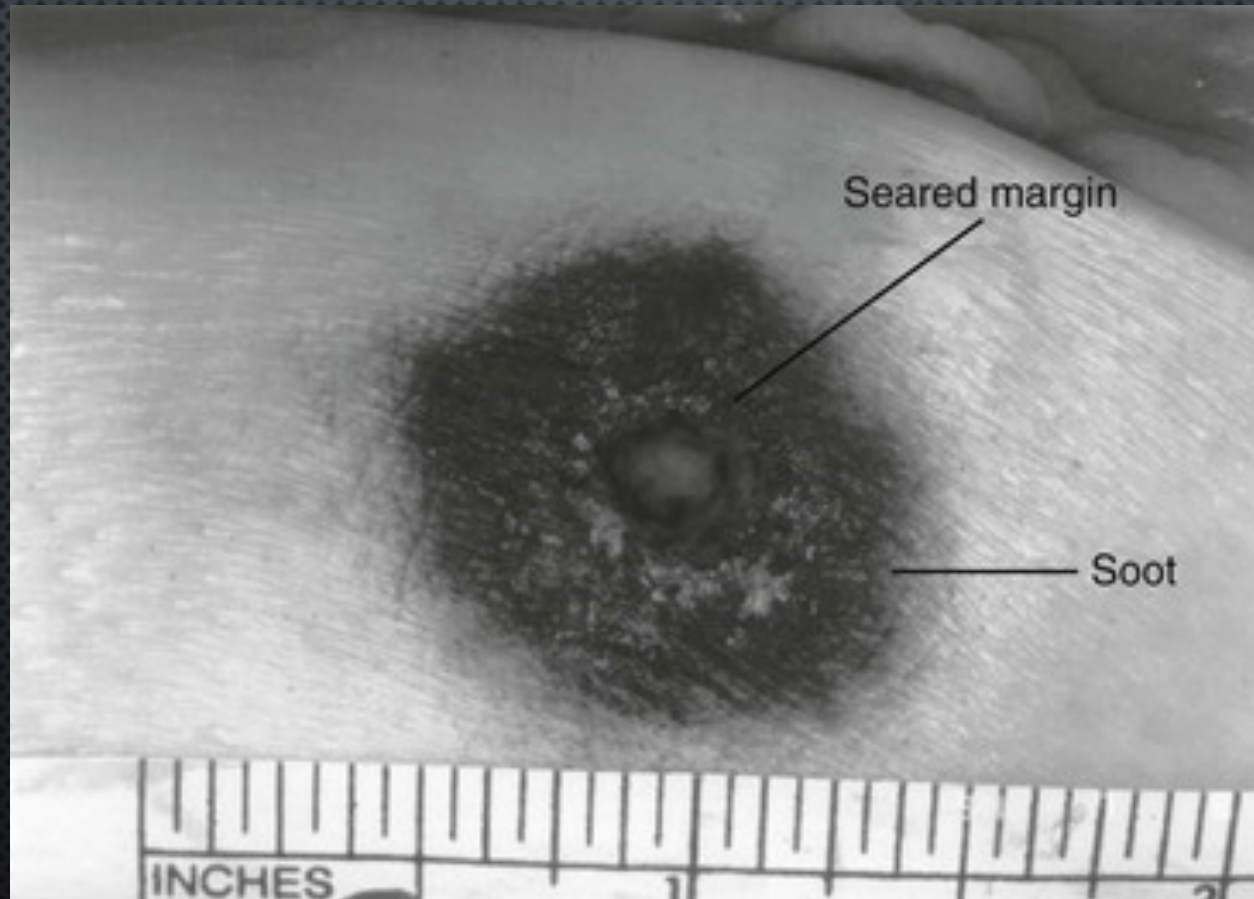
# CHARACTERISTICS OF GUNSHOT WOUNDS

- 4. SOOT:
  - DEPOSITION OF POWDER SOOT (CARBON) PRODUCED BY COMBUSTION OF GUNPOWDER.
  - AS THE RANGE INCREASES, THE SIZE OF THE ZONE OF BLACKENING WILL INCREASE, WHEREAS THE DENSITY WILL DECREASE.
  - IT CAN BE EASILY REMOVED WITH A WET COTTON.
  - SPREAD OVER THE SKIN – NO INJURY
  - SEEN UP TO 30 CM (**SHORTER** DISTANCE THAN TATTOOING)





# CHARACTERISTICS OF GUNSHOT WOUNDS

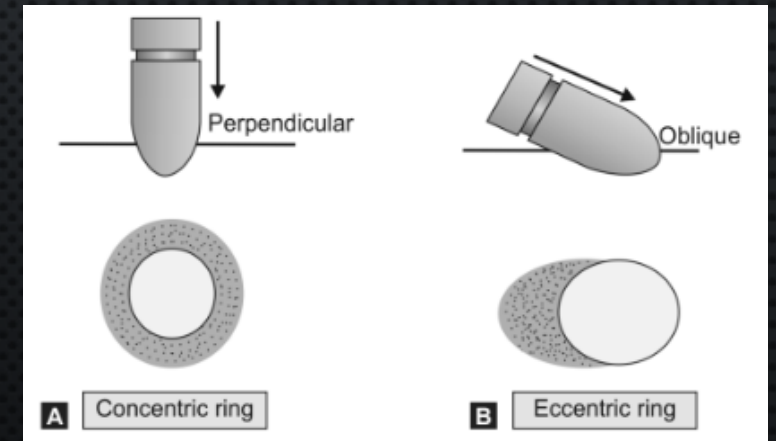
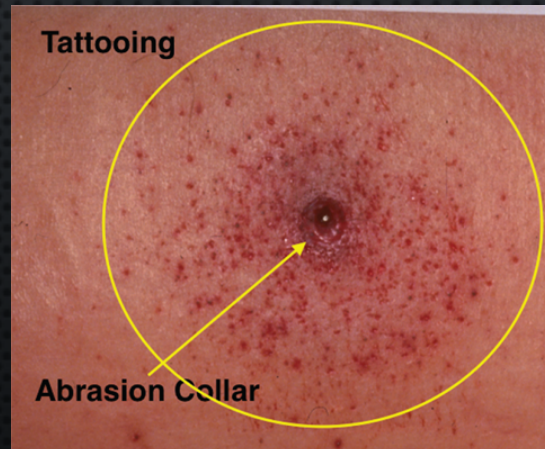




# CHARACTERISTICS OF GUNSHOT WOUNDS

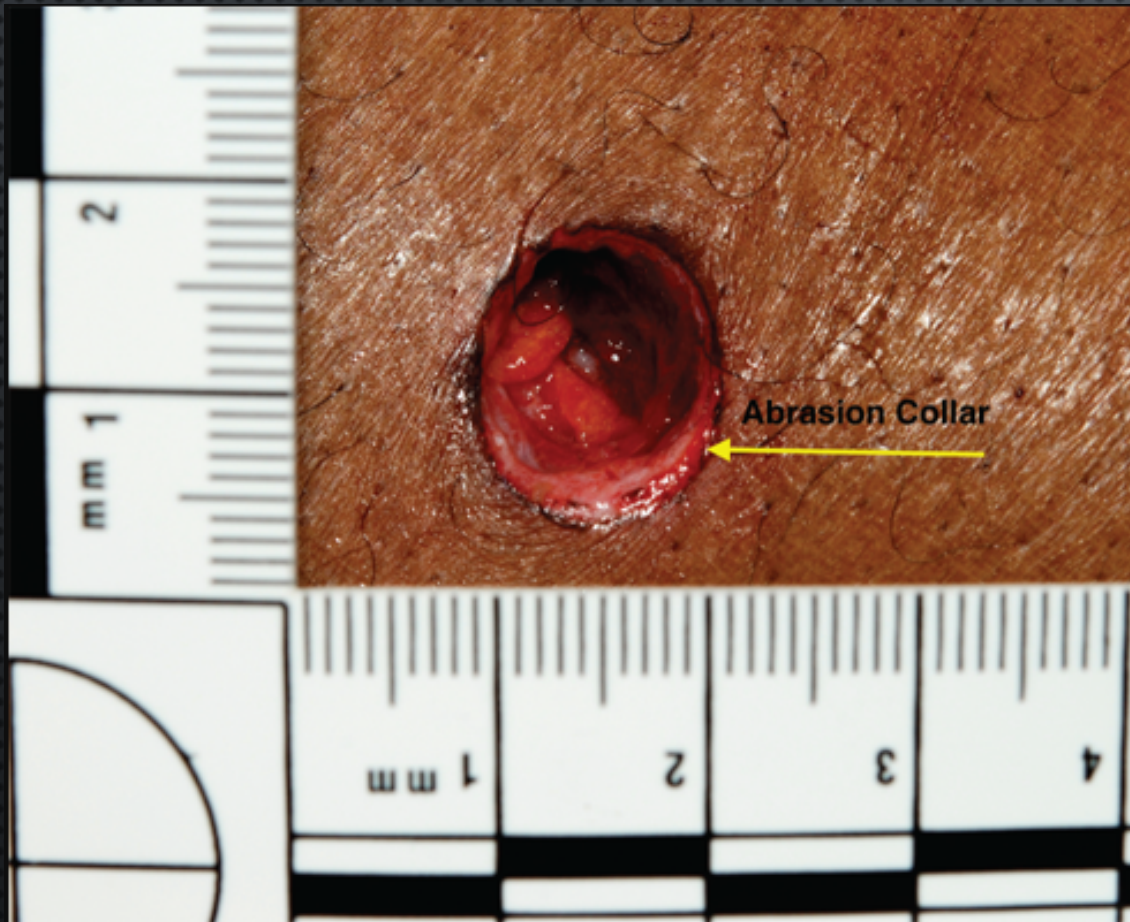
- 5. ABRASION COLLAR:

- AS THE BULLET STRIKES THE SKIN, IT FIRST INDENTS AND THEN STRETCHES THE SKIN SURFACE SO THAT PERFORATION TAKES PLACE THROUGH A TENSE AREA WHICH PRODUCES A RIM OF FLATTENED REDDISH-BROWN ZONE OF ABRADED EPIDERMIS, SURROUNDING THE ENTRANCE WOUND.
- A BULLET STRIKING **PERPENDICULARLY** WILL PRODUCE A **CONCENTRIC RING**, AND IF THE BULLET PENETRATES AT AN **OBLIQUE ANGLE**, THE ZONE WILL BE **ECCENTRIC** WITH THE WIDER ZONE ON THE SIDE FROM WHICH THE BULLET CAME.





# CHARACTERISTICS OF GUNSHOT WOUNDS



VS.





# CHARACTERISTICS OF GUNSHOT WOUNDS

- 6. OTHER MARKINGS INCLUDE:
  - GREASE COLLAR → FRESHLY LUBRICATED WEAPONS
  - BACKSPATTER → BLOOD, CLOTH OR HAIR IN A GUN BARREL FOLLOWING A CONTACT SHOT
  - BLOWBACK PHENOMENON → CRUCIATE LACERATION IF A THICK BONE IS PRESENT UNDER THE SKIN (E.G. SKULL) IN CONTACT WOUNDS



# CLASSIFICATION OF GUNSHOT WOUNDS

- 1. PENETRATING WOUNDS:
  - THE BULLET ENTERS THE BODY BUT DOES NOT EXIT
  - ENTRANCE WOUND PRESENT
  - EXIT WOUND ABSENT
- 2. PERFORATING WOUNDS:
  - THE BULLET PASSES COMPLETELY THROUGH AN OBJECT
  - ENTRANCE WOUND PRESENT
  - EXIT WOUND PRESENT



# CLASSIFICATION OF GUNSHOT WOUNDS

- 1. ENTRANCE WOUNDS:

- SEVERAL FACTORS AFFECT THE MORPHOLOGY OF ENTRANCE WOUNDS:

- NATURE OF THE FIREARM → SHOTGUNS VS. RIFLES
- SHAPE & COMPOSITION OF THE BULLETS & CALIBER → HIGHER CALIBER = BIGGER WOUNDS
- WOUND SITE & DENSITY → CORRUGATED SKIN SUCH AS IN AXILLA WILL HAVE AN IRREGULAR INLET
- DIRECTION OF FIRING →
  - PERPENDICULAR → WOUND INLET IS ROUND WITH A CIRCULAR ABRASION COLLAR
  - OBLIQUE → WOUND INLET IS OVAL WITH AN ABRASION COLLAR PRESENT ON ONE SIDE

- **FIRING DISTANCE**





# CLASSIFICATION OF GUNSHOT WOUNDS

- 1. ENTRANCE WOUNDS CAUSED BY RIFLED-FIREARMS:
  - CAN BE CLASSIFIED ACCORDING TO THE DISTANCE BETWEEN THE MUZZLE AND THE TARGET UPON FIRING:
    - CONTACT SHOT → MUZZLE FIRMLY PRESSED AGAINST SKIN (0 CM)
    - CLOSE SHOT (FLAME RANGE) → MUZZLE HELD AT A SHORT DISTANCE AWAY FROM THE SKIN (0-8 CM)
    - NEAR SHOT (MEDIUM & INTERMEDIATE RANGE) (8-60 CM)
    - DISTANT SHOT (LONG RANGE) (>60 CM)
    - INDETERMINATE RANGE



# CLASSIFICATION OF GUNSHOT WOUNDS

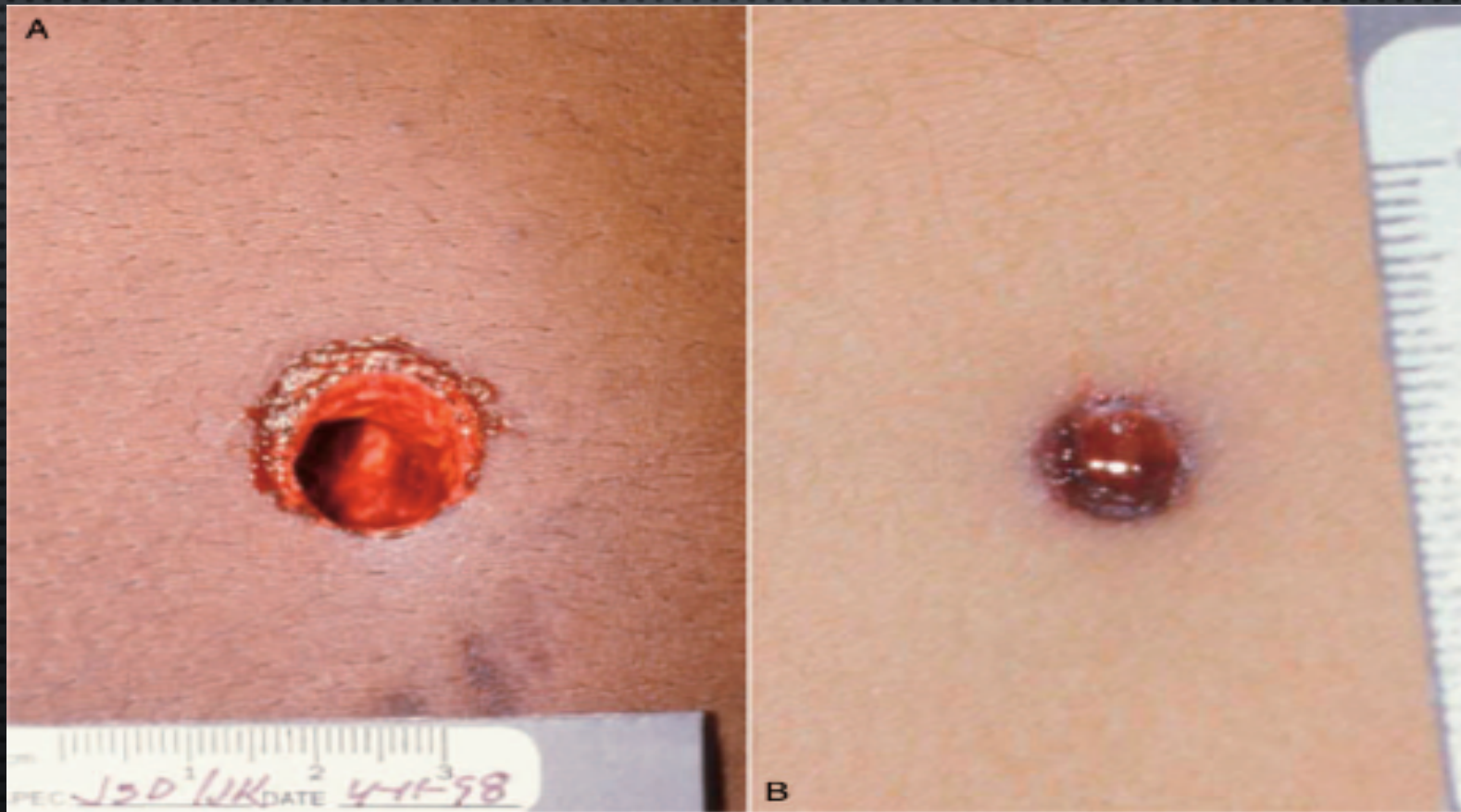
- 1. HARD CONTACT SHOT: (0 CM)

- MUZZLE IMPRINT MARK
- THIN & FAINT ABRASION COLLAR WITH BLACK DISCOLORATION ON EDGES
- CHERRY-RED DISCOLORATION → CO RELEASE → FORMATION OF CARBOXYHEMOGLOBIN THAT CHANGES TISSUE APPEARANCE TO PINK
- **No** SEARED MARGINS/HAIR SINGEING
- **No** SOOT → May be seen in loose contact shots
- **No** TATTOOING





# CLASSIFICATION OF GUNSHOT WOUNDS

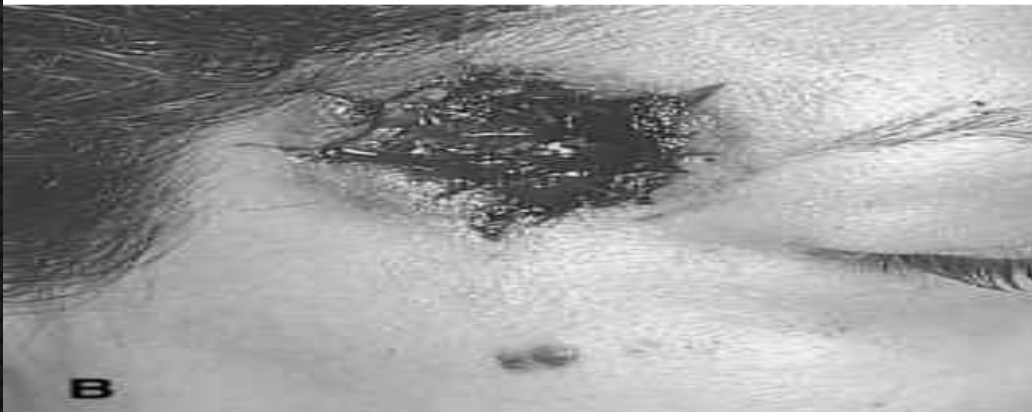




# CLASSIFICATION OF GUNSHOT WOUNDS



Contact shot to the head  
Producing a stellate/cruciform  
appearance



Occurs in contact shots involving the  
*forehead* or *mastoid* region – can be  
seen in distant shots as well



# CLASSIFICATION OF GUNSHOT WOUNDS

- 2. CLOSE SHOT (FLAME RANGE): (0-8 CM)
  - MILDLY IRREGULAR INVERTED INLET WITH CONTUSED MARGINS
  - **No** MUZZLE IMPRINT MARK
  - SOOT & HOMOGENOUS STIPPLING PRESENT (NO DISPARITY)
  - FLAME BURNS/SINGEING OF HAIR





# CLASSIFICATION OF GUNSHOT WOUNDS





# CLASSIFICATION OF GUNSHOT WOUNDS

- 3. NEAR SHOT (MEDIUM & INTERMEDIATE RANGE): (8-60 CM)
  - **DISCRETE** POWDER TATTOOING (DISPERSED) → **HALLMARK**
  - SOOT IS SEEN IF THE DISTANCE IS BETWEEN **8-30 CM**
  - SCORCHING/HAIR SINGEING IS SEEN BETWEEN **8-15 CM**





# CLASSIFICATION OF GUNSHOT WOUNDS

- 4. DISTANT SHOT: (>60 CM)
  - **No** POWDER TATTOOING
  - **No** SOOT
  - **No** MUZZLE IMPRINT MARK
  - GUNSHOT WOUND PROPERTIES ARE SOLELY ATTRIBUTED TO THE CALIBER AND QUALITIES OF THE BULLET
  - SOMETIMES DIFFICULT TO DISTINGUISH BETWEEN IT AND CONTACT WOUNDS IF MUZZLE IMPRINT CANNOT BE VISUALIZED → DISSECTING MICROSCOPE WILL SHOW NO POWDER GRAINS OR SOOT IN CONTRAST TO CONTACT SHOTS





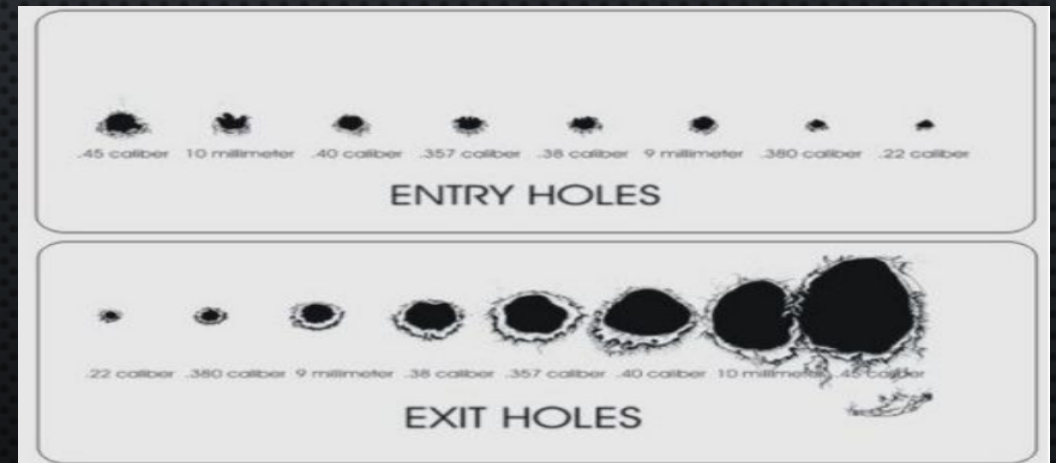
# CLASSIFICATION OF GUNSHOT WOUNDS

- 5. INDETERMINATE RANGE:
  - SOMETIMES, THE TERM 'INDETERMINATE' IS USED SINCE CLOSER RANGE SHOTS WHERE THE SOOT AND GUNPOWDER IS TOTALLY BLOCKED BY AN INTERPOSED TARGET MAY PRODUCE IDENTICAL APPEARING WOUNDS.



# CLASSIFICATION OF GUNSHOT WOUNDS

- 2. EXIT WOUNDS:
  - PRESENT ONLY IN PERFORATING WOUNDS
  - LARGER IN DIAMETER THAN ENTRANCE WOUNDS → SKIN RETRACTS INWARD IN ENTRANCE WOUNDS DUE TO ELASTICITY, WHILE THE OPPOSITE IN EXIT WOUNDS
  - IRREGULAR OUTLINE WITH EVERTED EDGES
  - **No** POWDER TATTOOING
  - **No** ABRASION COLLAR
  - **No** SOOT





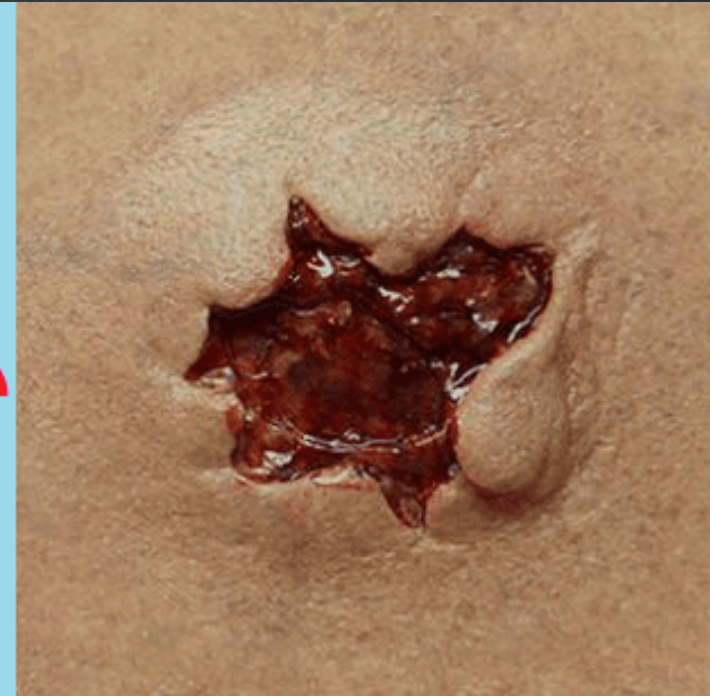
# CLASSIFICATION OF GUNSHOT WOUNDS

- 2. EXIT WOUNDS:



*Bullet Entrance Wound*

**VS**



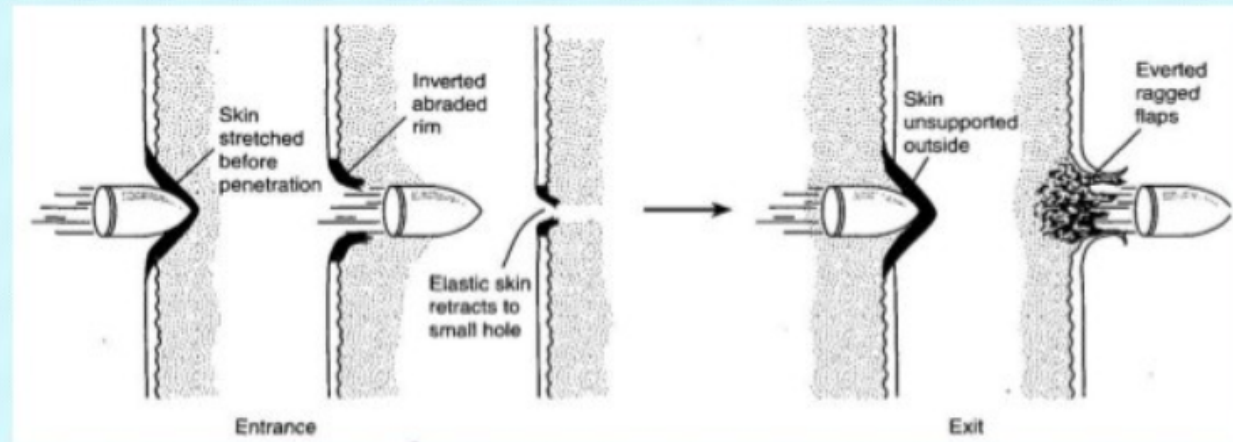
*Bullet Exit Wound*



# CLASSIFICATION OF GUNSHOT WOUNDS

## Differences between Inlet & Exit :

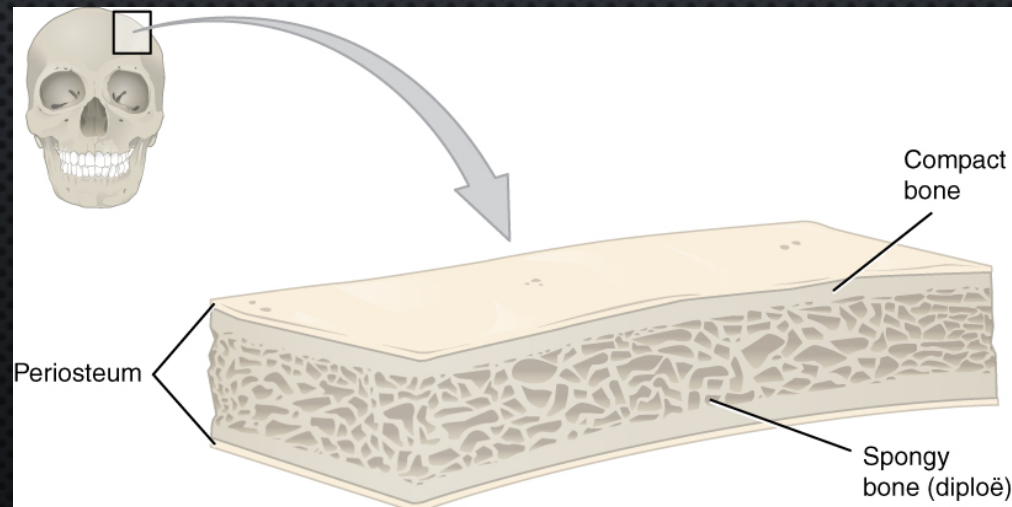
	INLET	EXIT
SIZE	SMALL	LARGE
EDGES	INVERTED	EVERTED
REGULARITY	MORE REGULAR	LESS REGULAR
POWDER MARKS	PRESENT	ABSENT
BEVELING	INTERNAL	EXTERNAL





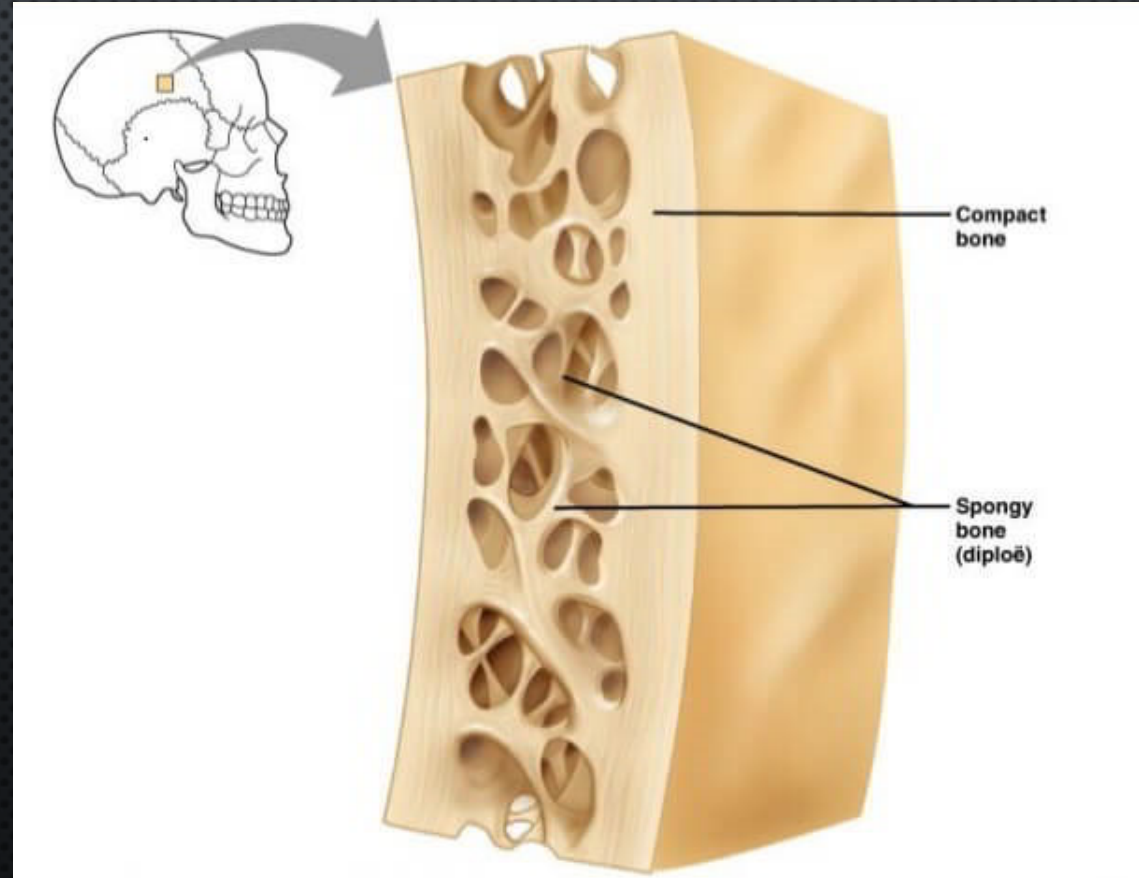
# GUNSHOT WOUNDS IN FLAT BONES

- FLAT BONES INCLUDE THE SKULL (OCCIPITAL & PARIETAL), STERNUM, RIBS & PELVIS
- THEY ARE MADE UP OF A LAYER OF **SPONGY BONE** BETWEEN TWO THIN LAYERS OF **COMPACT BONE**
- UNIQUE FEATURES OF GUNSHOT WOUNDS CAN BE SEEN IN THE SKULL ATTRIBUTED TO ITS FLATNESS





# GUNSHOT WOUNDS IN FLAT BONES





# GUNSHOT WOUNDS IN FLAT BONES

- ENTRANCE WOUNDS ARE ROUND WITH SHARP MARGINS AND SHOW **INTERNAL BEVELING**:
  - INNER TABLE OF THE SKULL IS MORE ERODED THAN THE OUTER TABLE, PRODUCING A CONE SHAPE IN THE DIRECTION OF THE BULLET PATH.
- EXIT WOUNDS MAY BE MORE IRREGULAR AND SHOW **EXTERNAL BEVELING**:
  - OUTER TABLE OF THE SKULL IS MORE ERODED THAN THE INNER TABLE, PRODUCING A CONE SHAPE FACING OUTWARD
- IN THE SKULL, GUNSHOT WOUNDS OFTEN PRODUCE NUMEROUS FRACTURES DUE TO RAPIDLY INCREASING PRESSURE AS THE BULLET TRAVELS THROUGH THE SKULL .



# GUNSHOT WOUNDS IN FLAT BONES

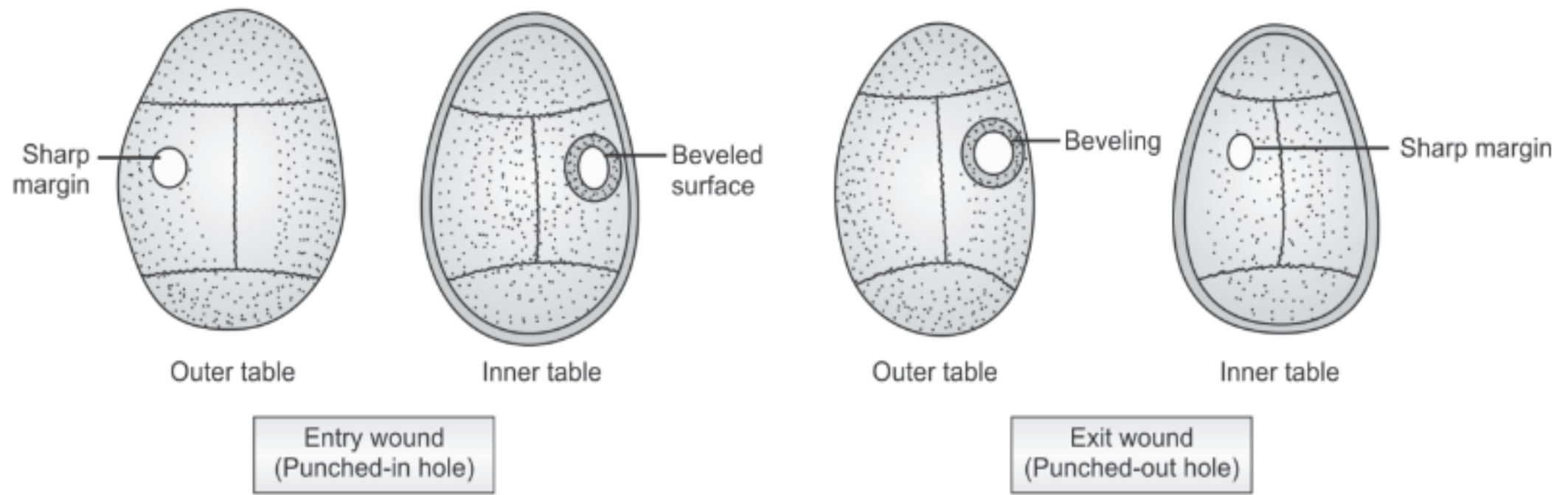
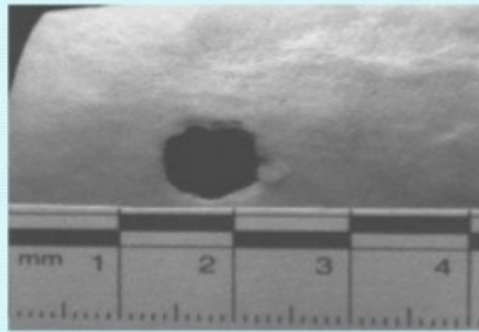


Fig. 12.17: Bullet wounds in skull

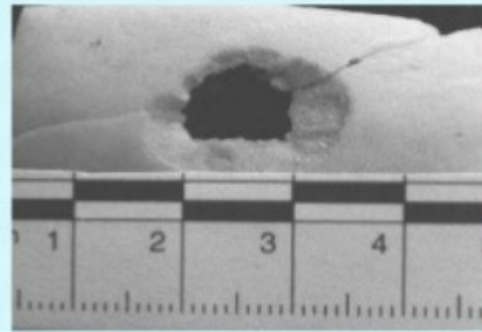


# GUNSHOT WOUNDS IN FLAT BONES

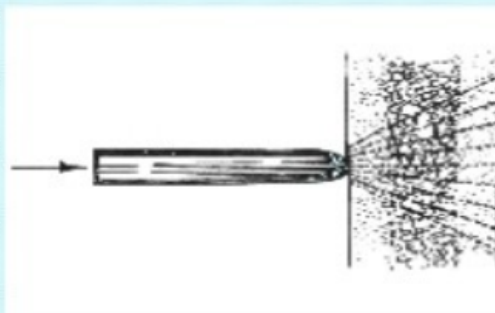
## Beveling of Flat Bones :



Internal beveling

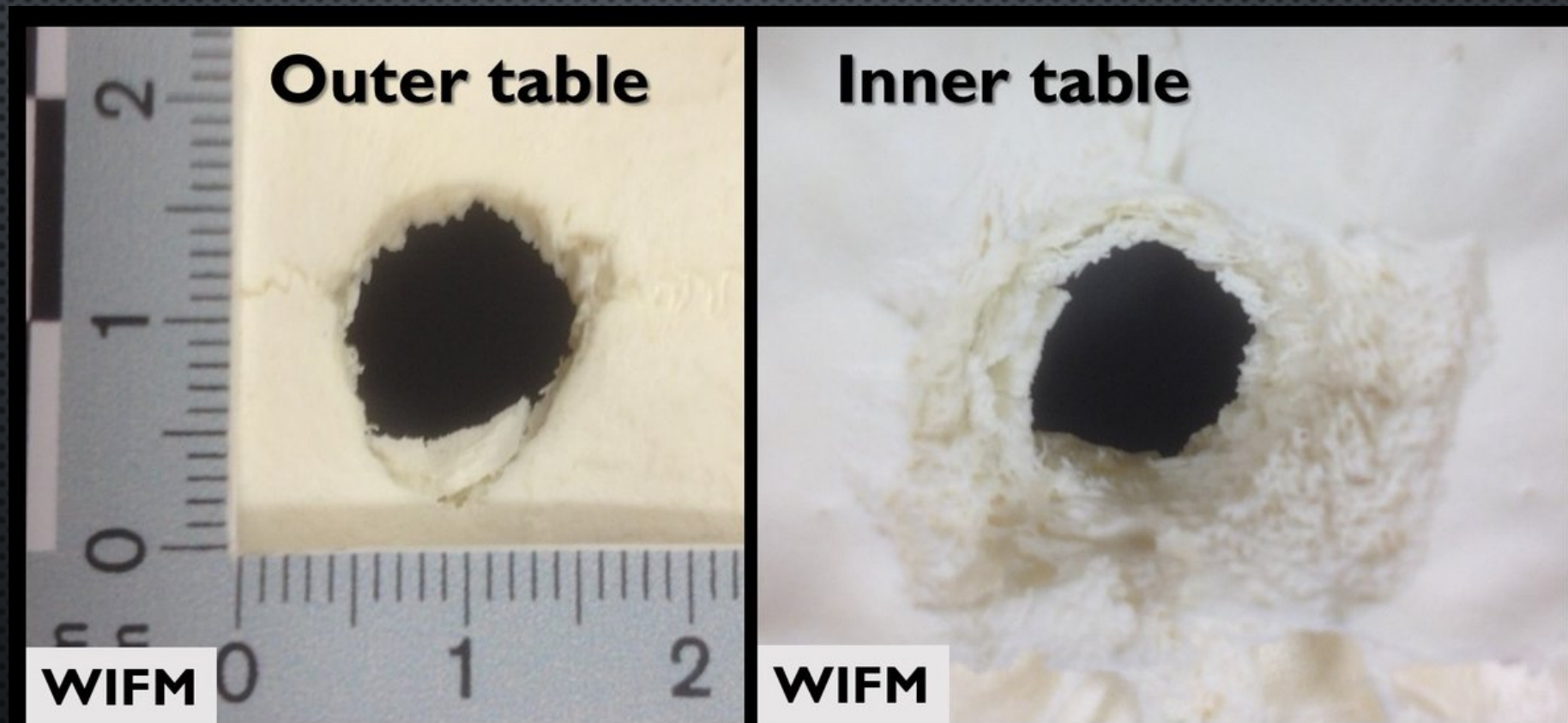


External beveling





# GUNSHOT WOUNDS IN FLAT BONES





SUICIDAL, ACCIDENTAL AND  
HOMICIDAL AND GUNSHOT WOUNDS



- THE SITES OF PREFERENCE FOR SUICIDES, ARE (IN DECREASING ORDER OF OCCURRENCE) : TEMPLE (60% OF CASES) CENTER OF FOREHEAD ROOF OF MOUTH MIDLINE BEHIND THE CHIN LEFT SIDE OR FRONT OF CHEST (PRECORDIUM) A SUICIDER USING A REVOLVER OR PISTOL USUALLY SHOOTS HIMSELF IN THE RIGHT TEMPLE REGION, THE BULLET PASSING ALMOST HORIZONTALLY OR UPWARDS AND BACKWARDS THROUGH THE HEAD, AND MAKING ITS EXIT IN THE LEFT PARIETAL REGION. IF THE INDIVIDUAL IS LEFT HANDED, LEFT TEMPORAL REGION IS SELECTED.

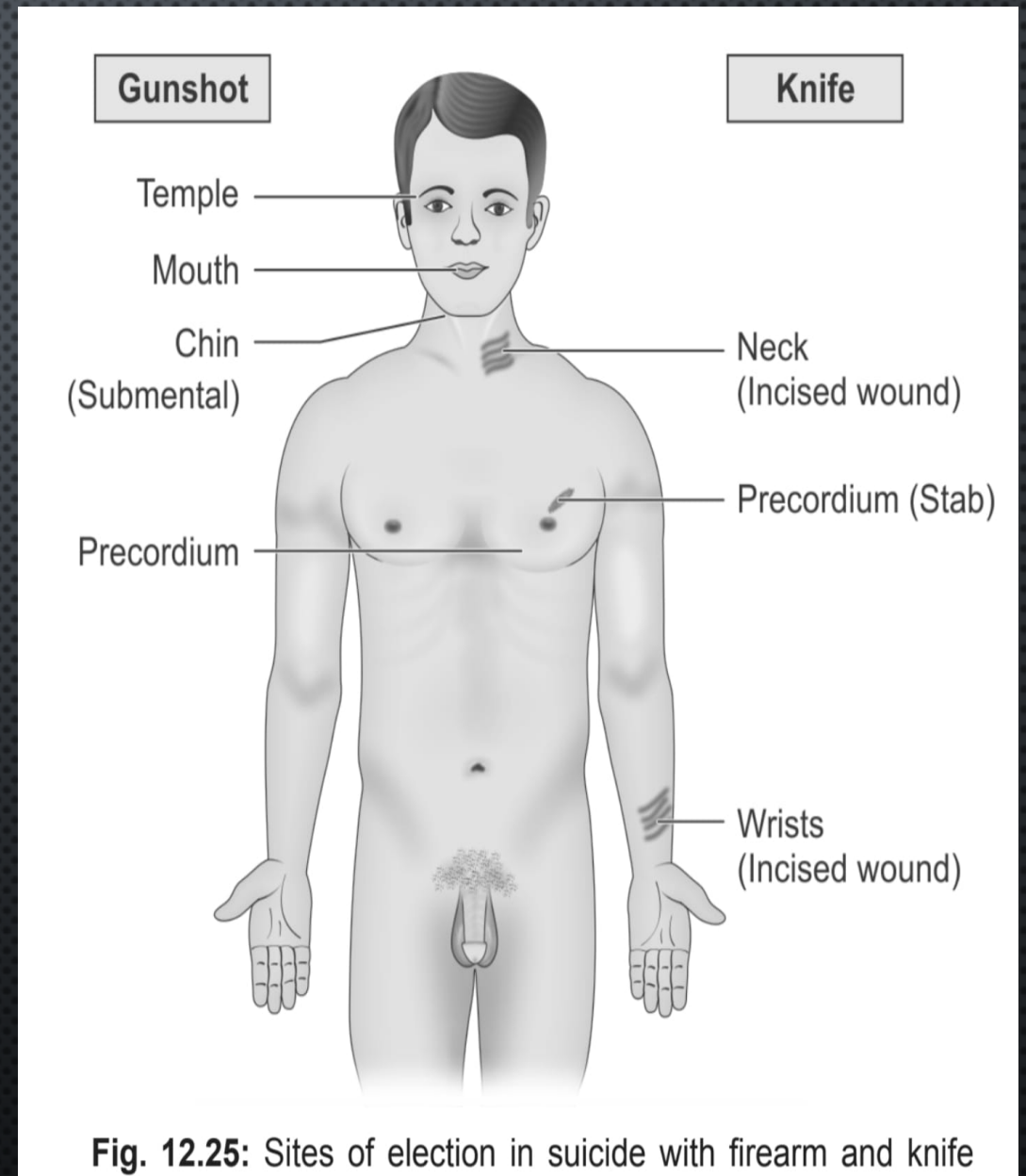


Fig. 12.25: Sites of election in suicide with firearm and knife



- MOST CONTACT SHOTGUN WOUNDS OF THE HEAD ARE SUICIDAL IN ORIGIN. THE INDIVIDUAL TENDS TO USE HIS DOMINANT HAND TO PRESS THE TRIGGER, STEADYING THE MUZZLE AGAINST THE HEAD WITH THE NON-DOMINANT HAND. SO, POWDER SOOT MAY BE VISIBLE ON THE NONDOMINANT HAND.
- SUICIDAL/ACCIDENTAL DEATHS IN ADOLESCENTS/YOUNG ADULTS MAY SOMETIMES OCCUR FROM PLAYING RUSSIAN ROULETTE. IT IS A LETHAL GAME OF CHANCE IN WHICH A PLAYER PLACES A SINGLE ROUND IN A REVOLVER, SPINS THE CYLINDER, PLACES THE MUZZLE AGAINST HIS HEAD, AND PULLS THE TRIGGER. SINCE ONLY ONE CHAMBER IS LOADED, THE PLAYER HAS ONLY ONE IN 'N' CHANCE OF HITTING THE LOADED CHAMBER, WHERE N IS THE TOTAL NUMBER OF CHAMBERS IN THE CYLINDER



### Differentiation 12.2: Suicidal, accidental and homicidal firearm injury

<i>S.No.</i>	<i>Feature</i>	<i>Suicide</i>	<i>Accident</i>	<i>Homicide</i>
1.	Site of entry wound	Head or heart	Any area	Any area
2.	Shot distance	Contact or very close range	Close or very close	Any range, usually distant
3.	Direction	Upward or backward	Any direction	Usually upward/back-front
4.	Number of wounds	Usually one	One	Any number
5.	Powder residue on hand pressing trigger	Present	Present	Absent
6.	Cadaveric spasm	May be seen with the weapon firmly grasped	Not so	Not so
7.	Weapon at scene	Found	Found	Not found
8.	Scene	Usually his house, suicide note, previous psychiatric illness	In his house or while hunting/handling	Any place, evidence of struggle
9.	Sex	Usually males	Usually males	Any sex
10.	Motive	Insanity, illness, financial loss	Nil	Gang feuds, robbery, revenge