

## **FIREARMS**

### **HANDGUNS**

- single-shot pistols
- derringers
- revolvers
- auto-loading pistols (automatics)

### **RIFLES**

### **SHOTGUNS**

#### **HANDGUNS**

Single-shot pistols - with one firing chamber integral to the barrel and must be loaded manually each time the weapon is to be fired

Derringers - are small pocket firearms having multiple barrels and each is loaded and fired separately (variant of single-shot pistols)

Revolvers - have a revolving cylinder that contains several chambers, each of which contains one cartridge. The cylinder is rotated mechanically. The first revolver was produced by Samuel Colt in 1835-1836.

Auto-loading pistols (automatics) – the trigger must be pulled for every shot fired. The forces generated by the fired cartridge is used to operate the mechanism that extracts and ejects the empty cases, loads the fresh cartridge and returns the mechanism into position to fire the next round. The first commercial auto-loading pistol was produced in 1893 by Borchardt.

A RIFLE – has a rifled barrel, designed to be fired from the shoulder

A SHOTGUN – is fired from the shoulder, has a smooth bore, is designed to fire multiple pellets from the barrel.

Rifled barrels – in rifles, handguns, submachine guns and machine guns.

Spiral grooves along the length of interior surface of the barrel = grooves and lands.

Caliber = diameter of the bore measured from land to land.

BULLETS – roundnose, wadcutter, semi-wadcutter, hollow-point, metal jacketed...

The shape of a bullet dictates its aerodynamic and impact characteristics

The nose of hollow-point bullets

is turned over to form a mushroom shape.

Fragmentation of bullet in the body.

### **GUNSHOT WOUNDS**

Entrance wound

- contact wound
- near-contact wound - burning, smoke soiling, powder tattooing
- distant wound

Exit wound- usually stellate

Superficial perforating wounds

Ricochet bullets

#### ENTRANCE WOUNDS

- contact wounds – round entrance (hole) with blackened margins, contusion ring
- near-contact wounds - round entrance (hole) with blackened margins, contusion ring, ring of soot, powder tattooing
- distant wounds – hole, contusion ring, without ring of soot and powder tattooing

#### ENTRANCE WOUND

Firing a bullet is accompanied by:

- jet of flame, 1400F in temperature,
- cloud of gas,
- burning/unburnt gunpowder
- carbon or soot from burnt gunpowder
- vaporized metal from elements of cartridge (bullet, case, primer)

NEAR CONTACT WOUND – soot, powder tattooing.

Superficial perforating wounds – bullet parallels the surface of the skin,

Severity of injury depends on:

1. Disruption – mechanical interaction between the bullet and the tissue,
2. Effects of the temporary cavity, produced by the bullet

TEMPORARY CAVITY - model

Hydrodynamic result (explosion-like) of bullet

Temporary cavities

TEMPORARY CAVITY

Appears when the tissue is displaced away from the path of the bullet.

The greater the kinetic energy of the bullet the greater displacement of tissue is observed.

It is pulsate in nature.

## TEMPORARY CAVITY

Lasts only 5-10/1000 s. and disappears leaving detectable injuries.  
It is about 11 times greater than diameter of the bullet.

## EXIT WOUND

Usually stellate, bigger than entrance wounds.

Identification of the shooter

## GSR PARTICLES

- Gun fires-primer and powder explode within cartridge-forcing bullet down barrel
- Much of the explosive gas follow the bullet
- Some escape through openings in the weapon-especially revolvers
- Gunshot residue-GSR-chemical particles of these gases- on shooter's hand, arm, clothing, face
- dissipates after two hours and can be washed off
- chemical analyses-by products of combustion of primer and gunpowder - lead, barium, and antimony
- suspect's hands, arms, and clothing are swabbed and treated with diphenylamine - chemical that identifies metals
- some examination can locate GSR particles on clothing or hair

Chemical composition of GSR particles.

CRIMINALISTICS – ballistic examination of test and questioned bullets  
Microscopic comparing view of both bullets

Injuries due to explosion