





NFAMUSEUM.COM

# THE ILLUSTRATED HISTORY OF FIREARMS

IN ASSOCIATION WITH THE NATIONAL FIREARMS MUSEUM  
DETAILING OVER 1500 FIREARMS WITH COLOR PHOTOGRAPHS



JIM SUPICA © 2003 WOODLUM PHOTODISCRIEY  
Copyrighted Material



DISTANT SHOT GUN


# Learning objectives

- ▶ Describe terms, definitions used in firearm injuries.
- ▶ Describe Ballistics and its types.
- ▶ Identify types of gun powders and ammunition used.
- ▶ Explain Basic mechanism of firearm injury.

# Ballistics

It is the science of motion of a projectile.

- ▶ **Exterior Ballistics** is this study of motion of a projectile after it leaves the barrel of a firearm.

- 
- ▶ **Interior Ballistics** is this study of physicochemical phenomena within the firearm from the moment of detonation of primer to the time the projectile leaves the barrel.
  - ▶ **Terminal Ballistics** is this study of the effect of impact of projectile on the target (resulting in wound formation – wound ballistics)

# Firearm

- ▶ A firearm is a specialized device designed to propel a projectile (shot, bullet, missile) by the expansive force of gases generated as a result of combustion of the propellant, at its base in a closed space.
- ▶ In general, a firearm consists of:
  - (1) a barrel
  - (2) action and
  - (3) a grip butt stock.



BARREL

CARTRIDGE CASE

SLIDE

RIFLING

FIRING PIN

SEMI-AUTOMATIC  
HANDGUN

MAGAZINE

*Click on a term for the definition*





# Types of firearms

- ▶ Firearms are basically of two types :
- ▶ Guns and
- ▶ Shotguns.

Firearms

## Types of Guns



Pistols, Revolvers, Shotguns, Rifles, semi-automatic

# Guns (rifled firearms)

- ▶ Guns are firearm weapons which can fire missiles or bullets, capable of spinning on its own axis. Following are the basic concepts which can help and easy understanding about guns.
- ▶ Rifling of a gun
- ▶ rifling marks
- ▶ caliber of a gun
- ▶ classification of guns
- ▶ cartridge of a gun



Revolver



Pistol



Rifle

# Cartridge

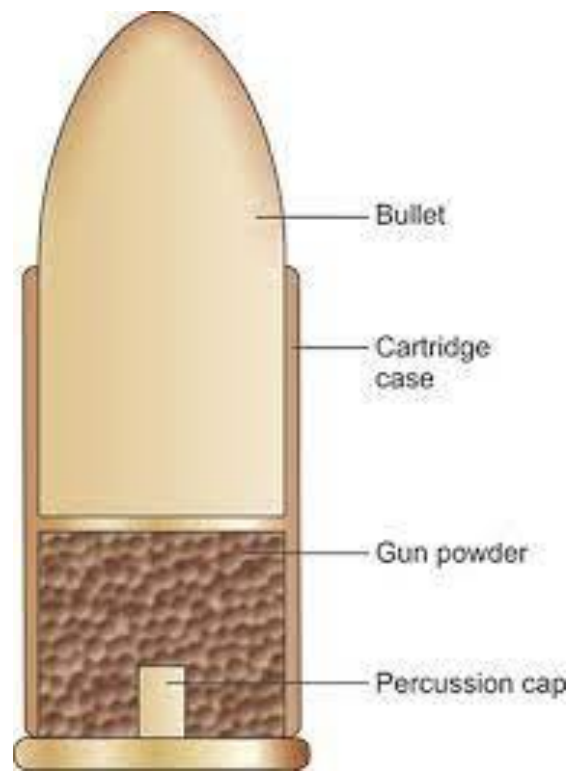
Means one unit of ammunition. It consists of:

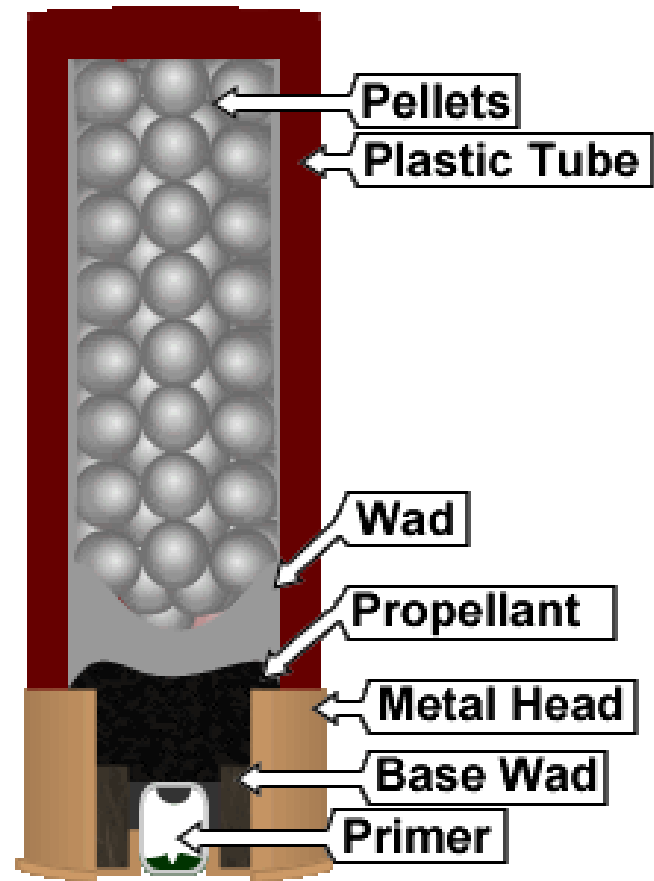
- (1) A cartridge case with a percussion cap containing the primer at the base,
- (2) The propellant charge,
- (3) The projectile,
- (4) The wads if any.



alamy

Image ID: 5AM9W  
www.alamy.com





## **Bore (Gauge, caliber)**

- ▶ Means the diameter of the interior of the barrel of a firearm and is expressed in inches or millimeters, or the number of lead balls of size, almost fitting the barrel of a shotgun, which can be made from one pound of lead.

## **Bullet**

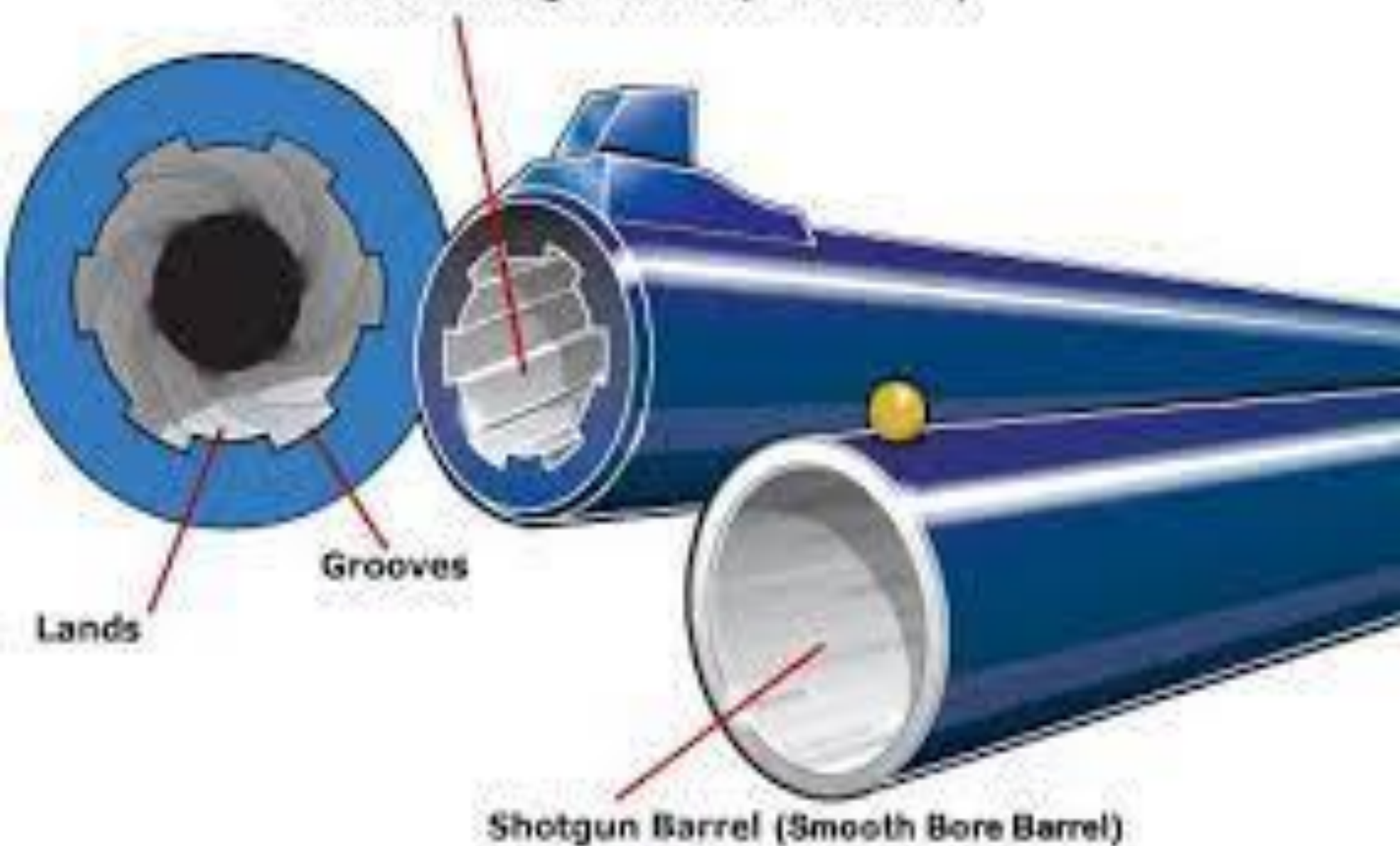
- ▶ Means the projectile of a rifled firearm.

# Rifling of a gun

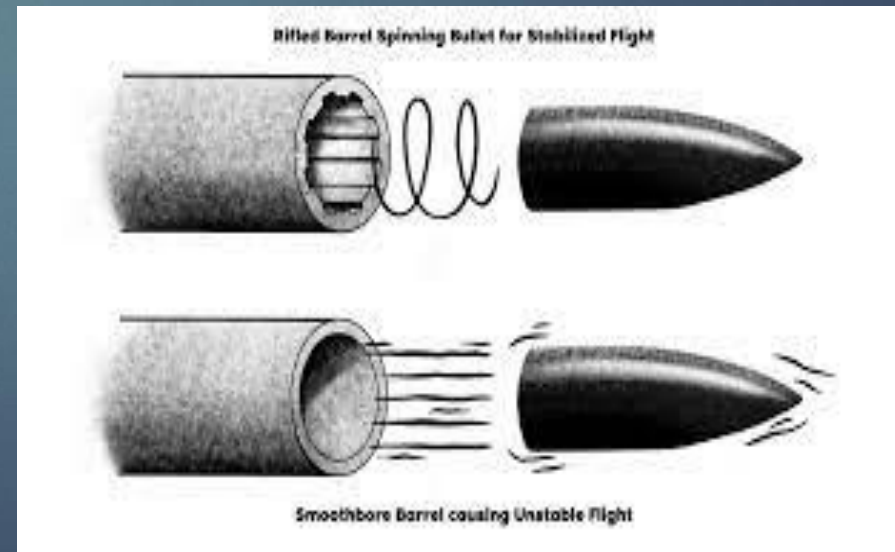
- ▶ The barrel in the gun of any type is cut into spiral grooves, longitudinally from the chamber to the major end or the inner aspect of its walls.
- ▶ These spiral grooves are called rifling of a gun.
- ▶ Thus in a cross section and longitudinal section of a gun barrel, this is seen as elevated areas, called lands and depressed areas called grooves.




## Rifle or Handgun Barrel (Rifled Barrel)



- ▶ Rifling of a gun helps the bullet to achieve a gyroscopic movement which in turn gives a steadiness, during its flight.
- ▶ It gives the bullet greater power of penetration, enabling to cover longer ranges, improves accuracy of hitting the target aimed and also prevents wobbling of bullet due to wind.



- 
- ▶ Rifling marks are important markings developed on the surface of the bullet during its transport through the barrel when fired ,due to the friction or rubbing against the lands and grooves.
  - ▶ These marks are unique and typical for a particular gun, no two guns can induce rifling marks which are identical.
  - ▶ Rifling marks can help in identification of the crime gun.



 dreamstime.com

© ITTYNOBA U Polimoda

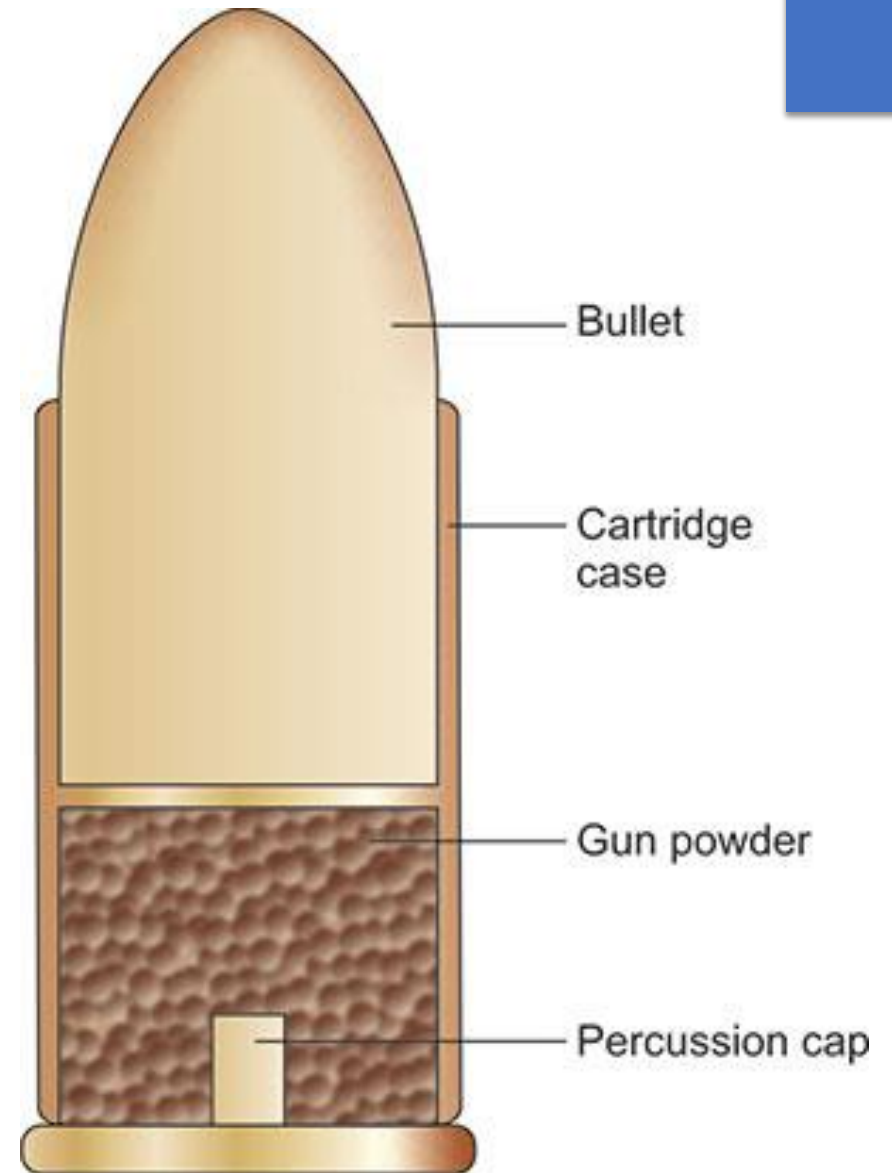


# Classification of guns

- ▶ Guns or rifled weapons could be classified into following six varieties;
  1. Air operated guns rifles
  2. 0.303 and 0.22, 0.25, 0.32 , 0.39, 0.45 rifles
  3. Pistols( Single shot target)
  4. Revolvers
  5. Automatic pistols and
  6. Machine guns (true automatic weapons)

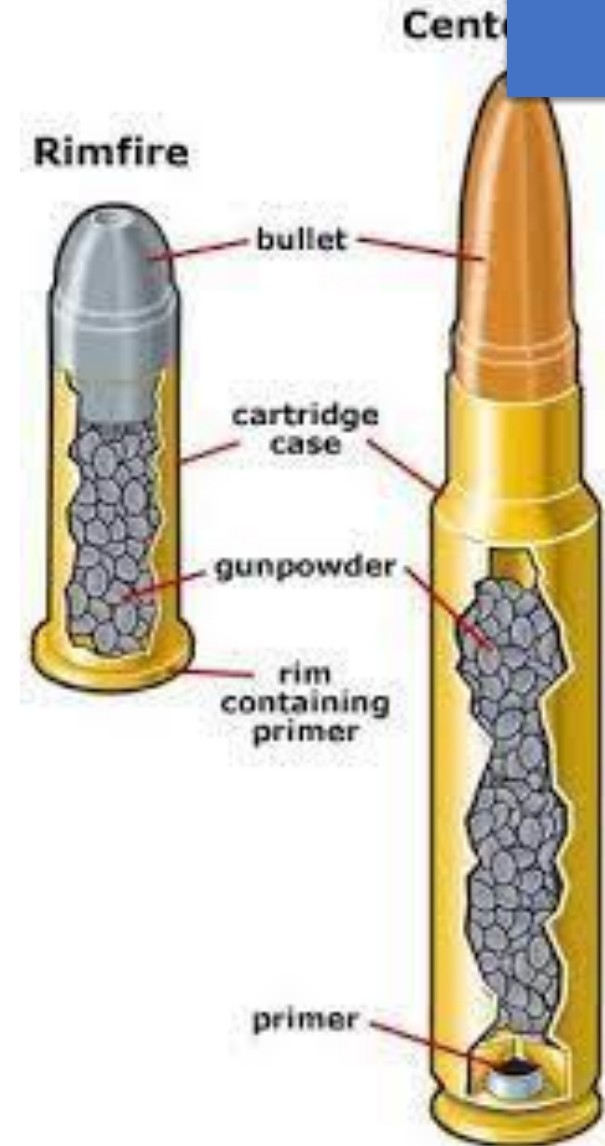
# Cartridge of a gun

- ▶ Gun cartridge is rifled firearm ammunition, which can be loaded into the Chamber of the gun and can discharge the bullet on being fired.
- ▶ It is made-up of two segments:
  - i. Cartridge case
  - ii. Bullet



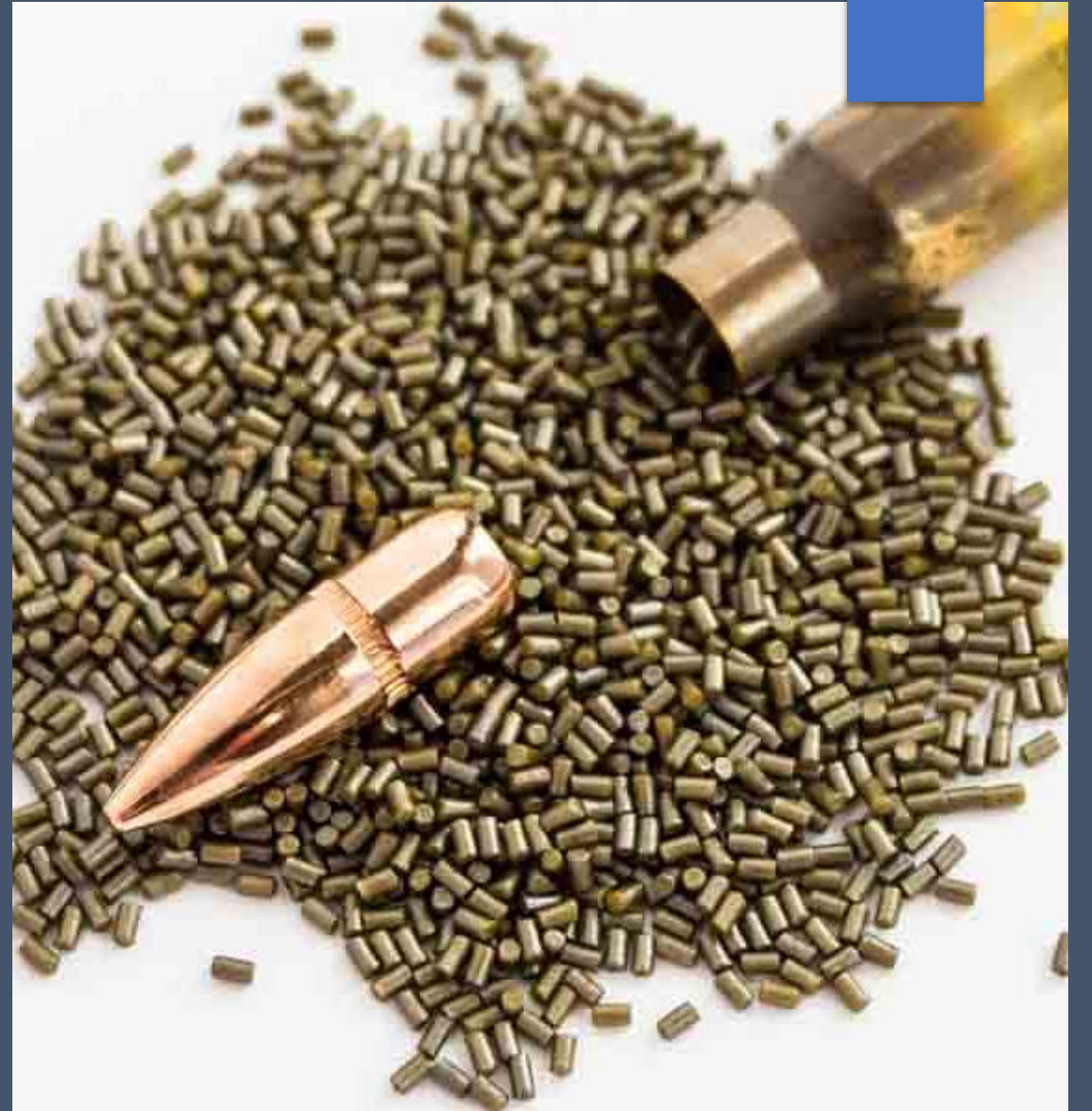
# Cartridge case

- ▶ It is an elongated metallic cylinder made up of cupronickel alloy, length of which varies with type of gun.
- ▶ This has two ends, a flat and closed end Base, with a depression in its center called percussion cap and this accommodates the primer mixture (detonator) next to it within the case.
- ▶ The priming composition may contain potassium chlorate, antimony sulfide, lead styphnate, barium nitrate etc.
- ▶ The terminal end of the gun cartridge which holds tightly the bullet in it.





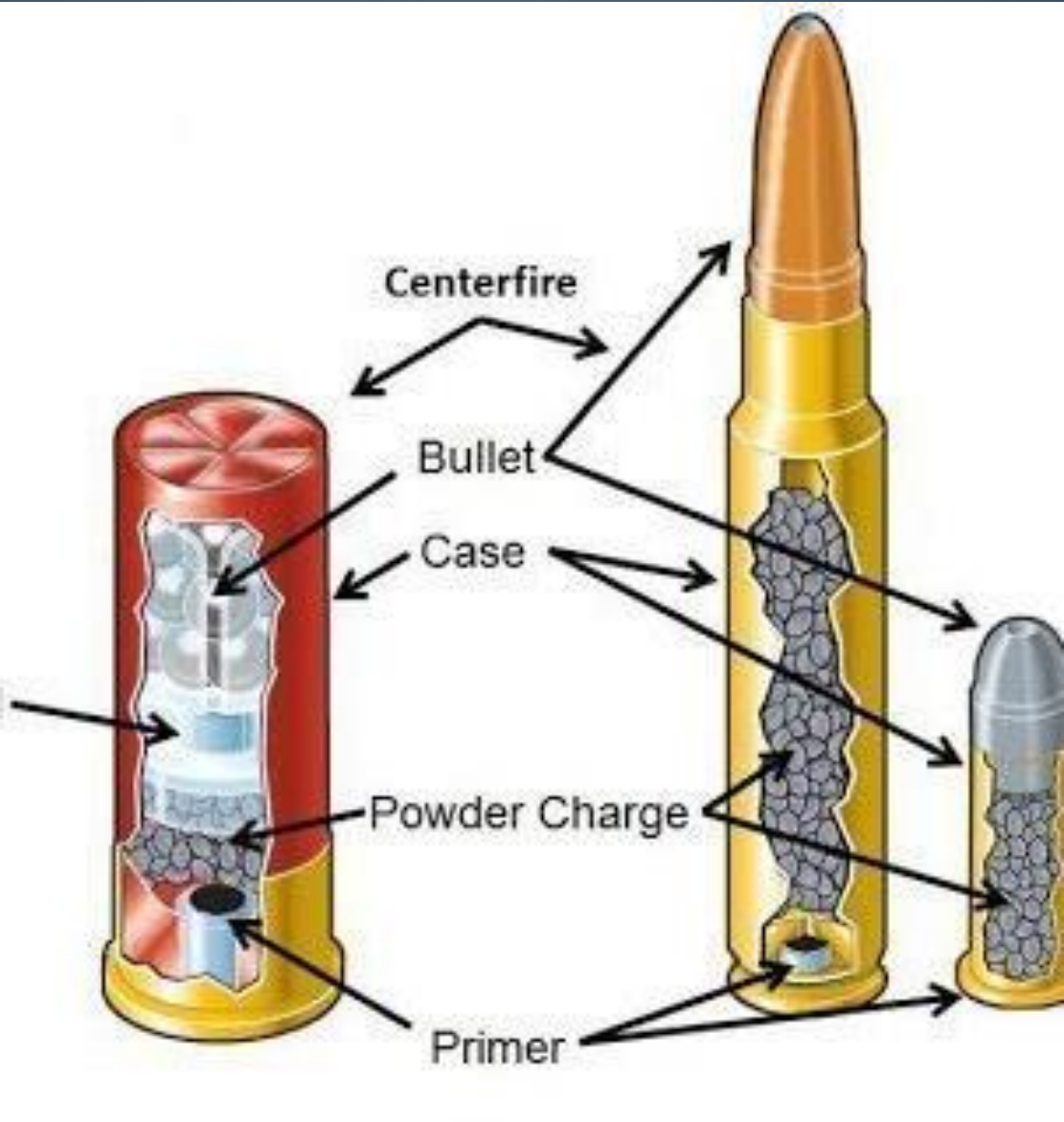
- ▶ Gunpowder or propellant charge is placed in between the detonator and the bullet within the cartridge case.
- ▶ It is composed of black powder or smokeless powder.
- ▶ **The black powder** consists of charcoal(15%), Sulphur 10%, Potassium nitrate 75%.
- ▶ When ignited it produces a lot of smoke and some of the powder is partly burnt or not burnt at all.
- ▶ Consequently, a good amount of blackening and tattooing is observed around the injury when the weapon using black powder is fired from a close range.



- ▶ **Smokeless powder** contains Nitrocellulose(single base )or sometimes nitroglycerine in addition(double base).
- ▶ It is more effective than black powder as it burns more efficiently and produces much less smoke.
- ▶ Consequently, less blackening and tattooing are observed around the injury when the weapon using smokeless powder is fired from a close range.

# Bullet

- ▶ It has got a conical shape and four components, namely
- ▶ A body made of cupronickel alloy.
- ▶ A flat base which is held in the terminal end of the cartridge case
- ▶ A pointed tip called nose, and
- ▶ A lead core within--- Which provides the weight and steadiness for the bullet and its flight from muzzle to the target.

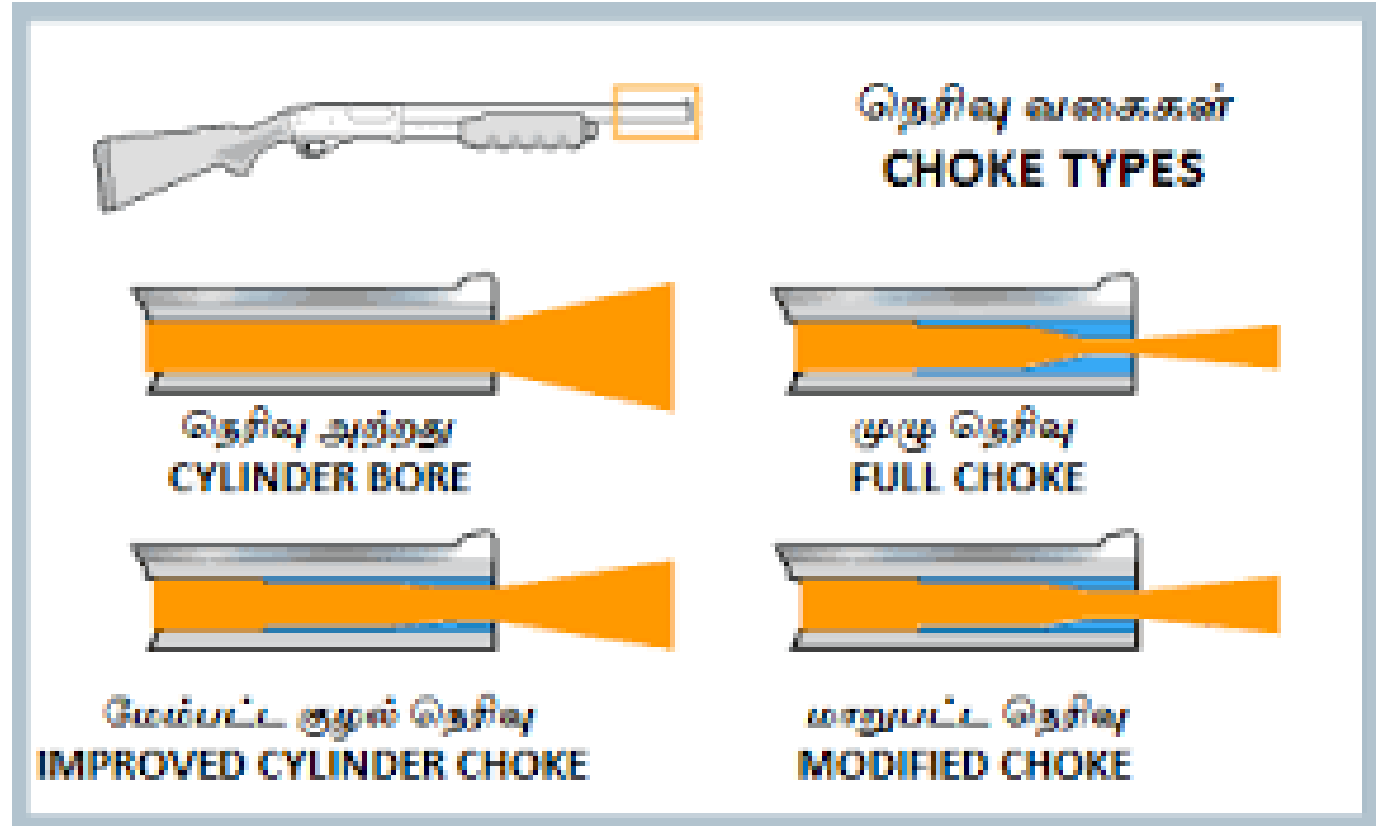


# Shotguns (smooth bore firearms)

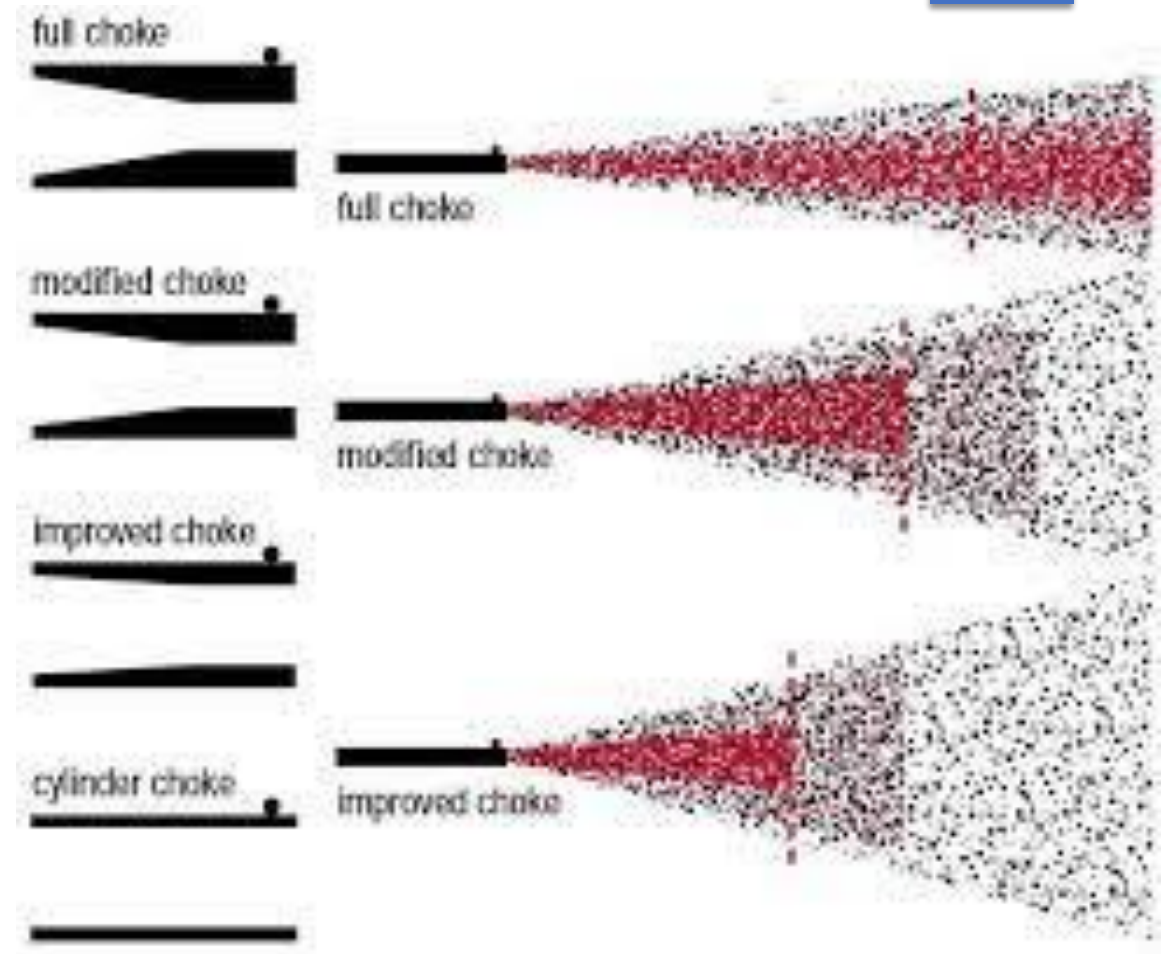
- ▶ Shotguns are smooth bore firearm weapons, which can fire missiles in the form of multiple pellets at a time.
- ▶ The barrel in a shotgun of any type is perfectly smooth on the inner aspect of the wall, and constitutes the term smooth bore firearm for a shot gun.

# Choking of shotguns

- ▶ Normally when a shotgun is fired, the lead pellets disperse soon after their exit from the muzzle end and the rate of dispersion increases with the range of firing.
- ▶ Choking is a constriction device at the muzzle end of the shotgun, which can control the area of dispersion of the pellets.



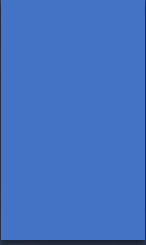
- ▶ Choking maintains the shots to remain together for a long distance during their flight from the muzzle end to the target .
- ▶ It can reduce spread area of pellets on the target aimed.
- ▶ It makes the weapon more lethal.





# Classification of shotguns


- ▶ Shotguns are classified depending on their length and number of the barrel and also depending on route of loading and choking.
- ▶ Depending on length of barrel there are two types---- a short barreled shotgun and a long barreled shotgun.

- 
- ▶ Depending on number of barrels there are again two types-----a single barreled and a double barreled shotgun.
  - ▶ Depending on loading route we have again two varieties-----A muzzle loading shotgun and a breech loading shotgun.
  - ▶ Depending on choking there are several types of shotguns and they are-----full choked, modified choked, non choked.

# Cartridge of a shotgun

- ▶ Shotgun cartridge is smooth bore firearm ammunition, which can be loaded into the Chamber of the shotgun and can discharge the pellets on being fired.
- ▶ Shotgun cartridge is made-up of:
  1. cartridge case,
  2. gunpowder,
  3. wad and
  4. pellets.



- 
- ▶ Cartridge case is an elongated cylinder, made-up of cardboard or special paper, length of which varies with type of shotgun.
  - ▶ It has two ends. flat closed end known as the base, which is metallic and with central depressed area called percussion cap (primer cap) and accommodates the primer mixture next to it within the case.
  - ▶ The second flat end which is closed terminal end is comprised of a cardboard disk and holds the pellets behind it.



- ▶ Gunpowder is placed in the compartment immediately next to the determinator towards the base of the cartridge case at one end and the pellets at the other end.
- ▶ Wad is a rounded disc of some thickness and made-up of compressed paper or felt material and is placed between the gunpowder and the pellets.
- ▶ Pellets comprise multiple uniform spherical balls of lead. the cardboard disk and the wad helps to keep these pellets as a core in one mass within the cartridge case.

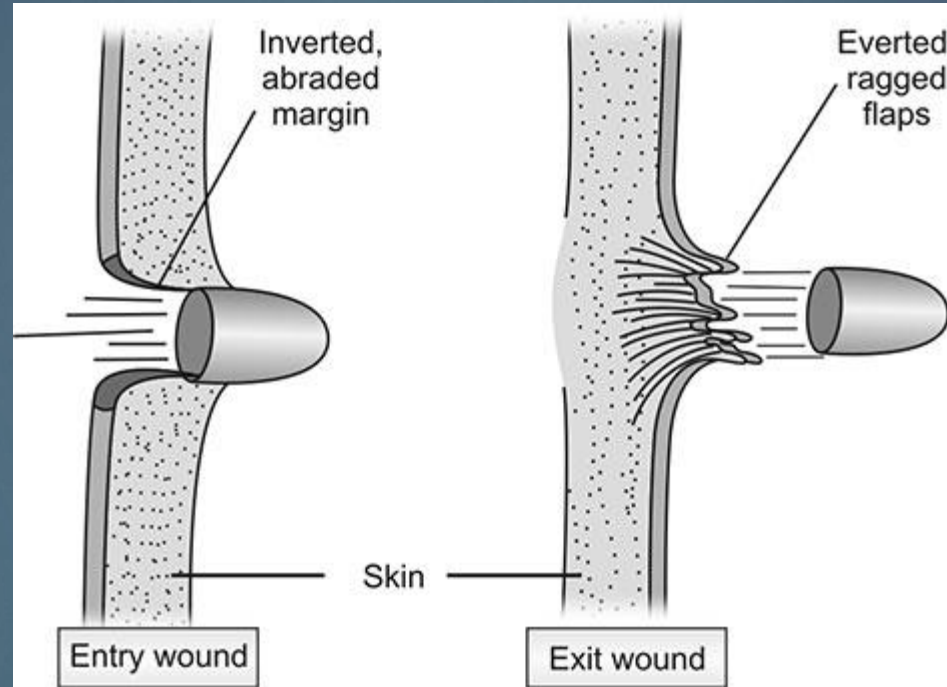
# Mechanism of wounding

- ▶ It depends upon the study of the interaction between the fire blast and the part struck.
- ▶ Factors in the fire blast are projectile, its diameter, Shape, weight, rigidity and terminal velocity.
- ▶ Factors in the part struck are: resistance of tissue dependent upon its nature, density and architectural design.
- ▶ The most important factor is the velocity of the bullet.

# Low velocity bullet

- ▶ When it strikes a part composed of soft and elastic tissue, it pushes and stretches the skin and underlying tissues to produce an indentation and also rotates upon its axis.
- ▶ It finally perforates the coverings and other tissues, which allow passage to the bullet through it.
- ▶ While passing, the energy of the bullet radiates laterally causing damage, proportionate to the diameter of the bullet and is represented on the body as the path or the track of the bullet.

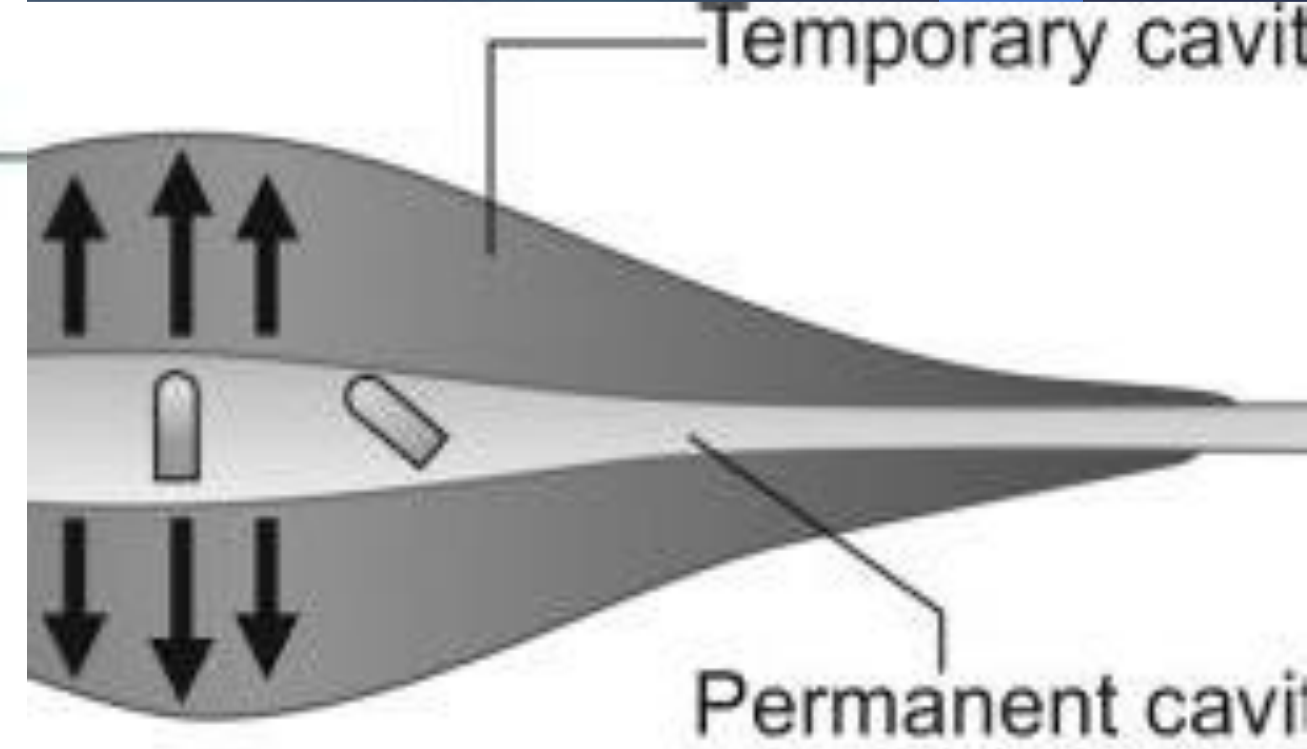
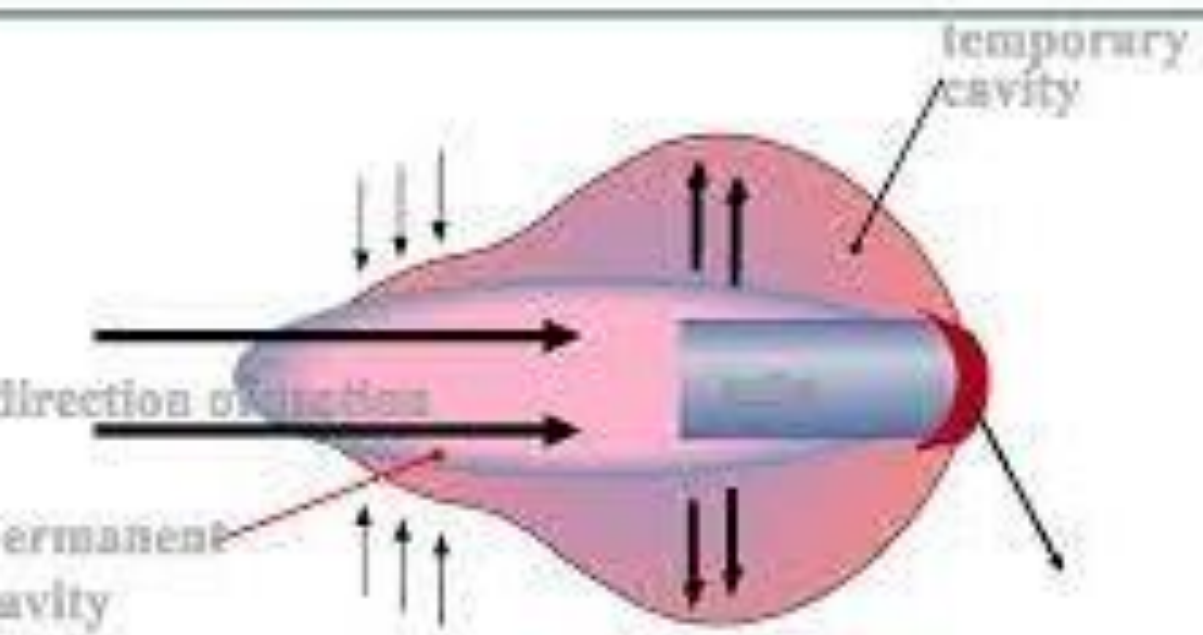




# High velocity bullet


- ▶ It additionally produces a temporary cavitation in the soft tissues pushing them literally over and above the damage caused by the low velocity bullet.
- ▶ Energy in the bullet is very high and it tends to dissipate in the surrounding tissues more effectively in radial fashion creating instant cavitation.
- ▶ Period of cavitation is extremely short, and soon after the passage of the bullet, tissues require and collapse back leaving a permanent cavity or damage, which is larger than the diameter of low velocity bullet.

# Cavitation



by  
e

- ▶ When the high velocity bullet strikes a bone, depending upon its strength, the bullet shatters its target more effectively.
- ▶ Greater the density of the tissue, greater is the amount of energy discharged.
- ▶ When Bone fractures into pieces, these bony specula act as secondary projectiles and spread in various directions causing many secondary tracks.

- 
- ▶ When a hollow viscus containing fluid is hit by a high velocity bullet, its contents get separated into small particles, which get displaced explosively in all directions away from the bullet path and behave as secondary projectiles.
  - ▶ In conclusion, it may be stated that characteristic of the damaged by high velocity bullet is disintegration and disorganization of large areas of the tissue immediately adjacent to the track as well as surrounding it.



**QuranMualim**

جزء الكافي