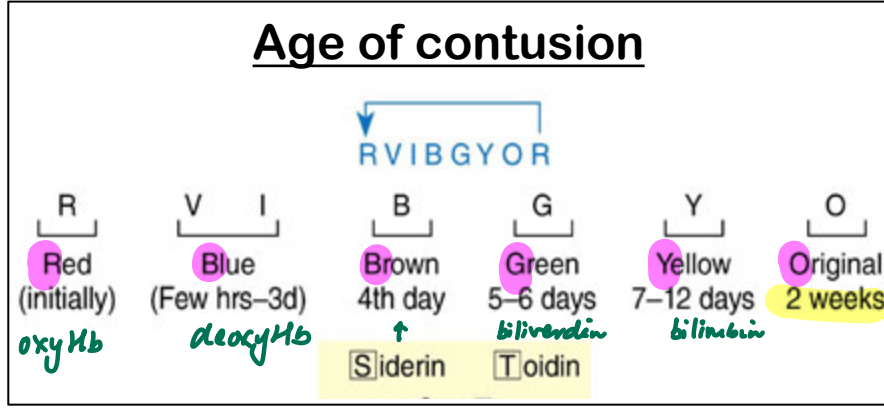
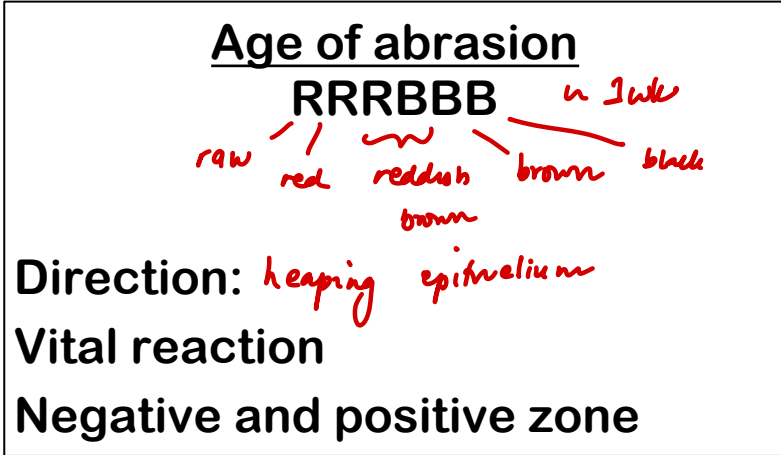


# Forensic Medicine

---

# Types of Injuries

ABRASIONS → epidermal



*heaping of epitelium*  
*direction*  
*Pressure abrasion / Imprint*  
*Graze / Gravel burn abrasion (mc)*  
*solid of abrasion skin*  
CONTUSION / BRUISE - subcut fat

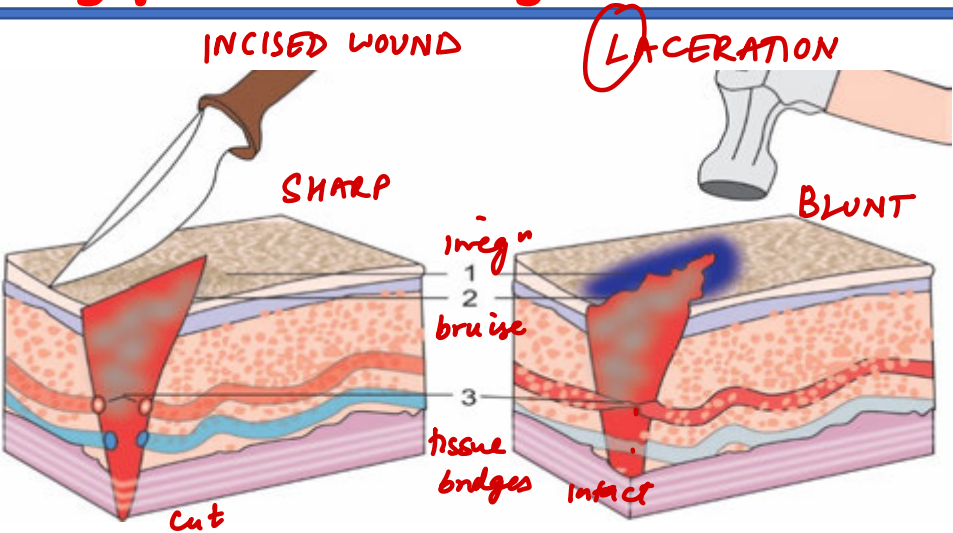
	Livor Mortis	Contusion
Dependent	✓	✗
Well defined	✓	✗
Blanch	✓	✗
Extravasation	✗	✓
Color change	✗	✓



*Battle sign*  
*tram track bruise*  
*Six penny bruise*  
*Bucket handle*  
 Contact admin  
 Join our group  
Ectopic bruise  
 ↓  
*latni*  
 NAI - # of diff ages  
 Retinal hge SDH  
 D10 : 01

- No colour change: *subconjunctival hge*
- Artificial Bruise: → *pruritus* ✓  
 → *blisters* ✓  
 Semicarpus → *colour change* ✗

# Types of Injuries



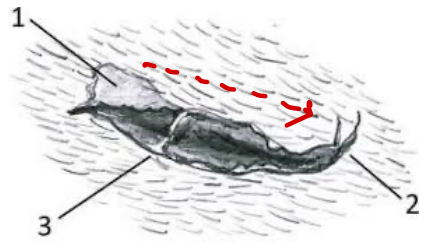
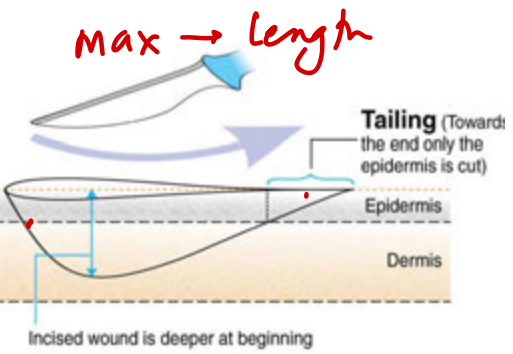
Stab: Max → depth      **FISH TAILING**

Chop wound: AXE

Avulsion laceration: Tangential force

Flaying → degloving inj

Closed degloving injury: Morelle-Lavade lesions



**SWALLOW TAIL**



Defence cuts  
↓  
Homicidal



Hesitation cuts  
↓  
Suicidal

bony prominences  
↓  
**Incised-looking lacerations**

Scrotum / axilla  
↓  
**Lacerated-looking incised wound**

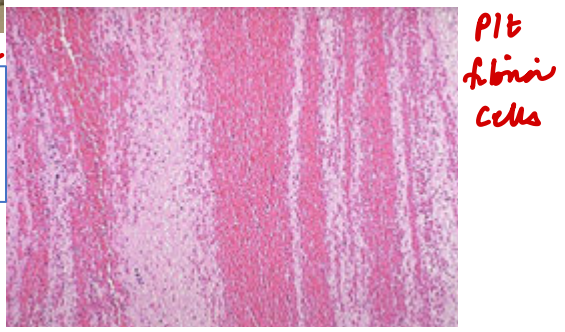
# Types of Injuries

Electrical



AM VS PM clot:  
 Firm, dark red- AM  
 Striae of Zahn - AM  
 Coralline platelet thrombus- AM  
 Chicken fat clot- PM  
 Takes shape of vessels- PM

→ varicagal syncope  
 Harakiri = Seppuku  
 Jigai - 15V cut



↓  
 Lightning  
 Lichtenburg flower /  
 Filigree burns /  
 Keratographic /  
 Arborescent flower



↓ voltage  
 JOULE BURN

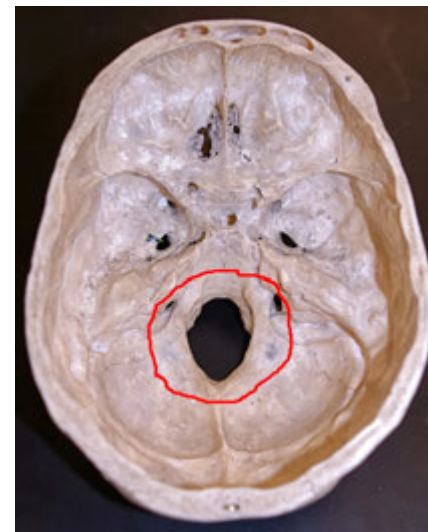
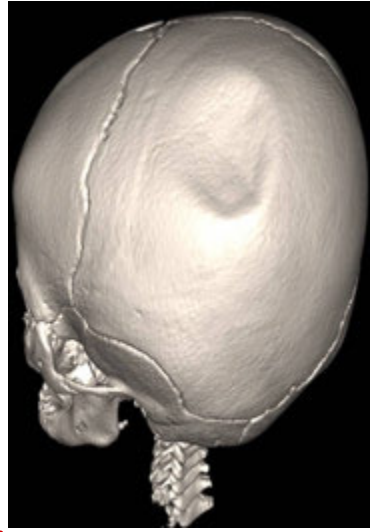
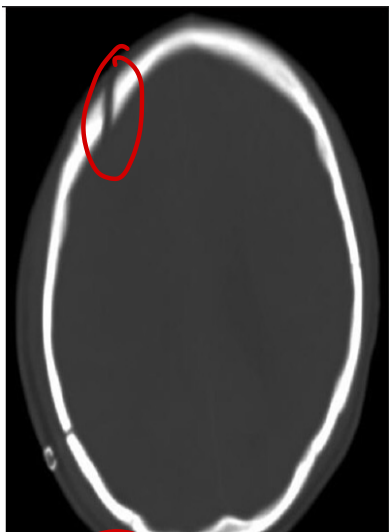


Flash burn  
 ↑ voltage  
 Electrode burn

More dangerous: AC > DC  
 Dry skin max resistant  
 MCC of death: Arrhythmias  
 Rigor mortis: early.  
 Bone pearls- molten CaPO<sub>4</sub>

amperage

# Skull Fractures



mc Linear /  
Fissured #

Depressed #/  
Signature #  
-Max injury

Ping pong #/  
Pond #

Sutural diastasis #

Ring #  
fall from a ht  
heavy object on head

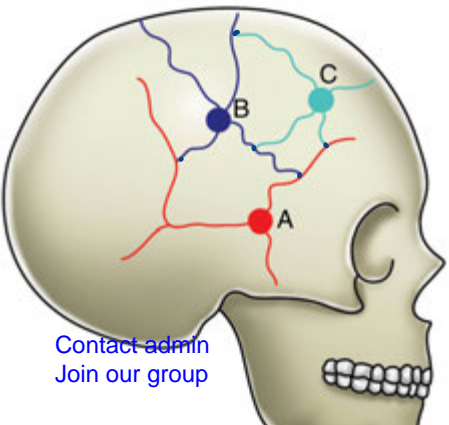
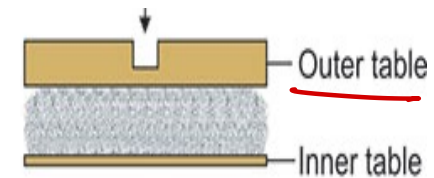
Hinge # /  
motorcyclist #

**Lucid Interval:** Valid evidence, Will & Criminally liable

EDH > SDH



- Keyhole: bullet - outer table → tangentially
- Gutter fracture: outer table - bullet
- Kronlein shot: # + evisceration of brain



PUPPE'S RULE

A > B > C

# RTA

# Blast Injuries

Face and head injury

Cervical spine injury

Steering wheel impact

Dashboard impact

Pelvic fracture

Braced leg fracture

post hip disloc

Sparrow's foot

**WHIPLASH**

RESTING    IMPACT    HYPEREXTENSION    HYPERFLEXION

**Aortic tears:**

- Intimal
- Ladder-rung tears

• Days within which death attributed to RTA: 30d.

**Blast Injuries**

1 Primary

Blast lung

Ruptured tympanic membrane

Bowel perforations

2 Secondary

Penetrating trauma and lacerations

3 Tertiary

Blunt trauma and fractures

Marshall

A C L

**TLC**

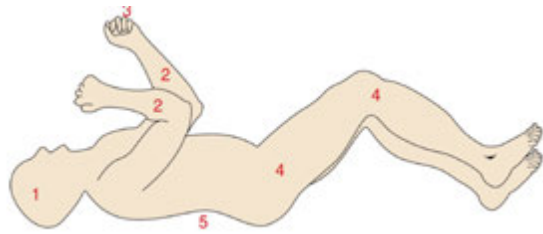
mc

(underwater: GI mc)

- Abrasion
- Contusion
- Laceration

# Thermal Injuries

- \* Heat cramps- water / electrolytes
  - \* Heat exhaustion-
  - \* Heat stroke- core temp  $>104^{\circ}\text{F}$  + heat stressor + neural dysfn
- Classical: sweating xx  
 Exertional sweating ✓✓  
 HR: ↑ BP: ↓ Pupil: miosis



Boxer's attitude / Pugilistic attitude  
 $>65^{\circ}\text{C}$  - prtn  
 Heat stiffening  
 AM / PM burns



Heat rupture  
 ↳ irregular a/  
 ↳ intact N/U underlying



ROW'S FOOT  
 AM burns

- ▶ Paradoxical undressing Hypothermia
- ▶ Hide and die
- ▶ Bright Pink hypostasis
- ▶ Fatty necrosis of pancreas
- ▶ Wishnewsy ulcer: Hypothermia
- ▶ Curling ulcer: Burns
- ▶ Cushing ulcer: ↑ Stress / Head trauma
- ▶ Cameron ulcer: Hiatal hernia

- EDH with honeycomb appearance
  - Bilateral, diffuse
  - Brain intact
- Heat hematoma



Molotov's cocktail  
 Incendiary weapon

<u>BURNS</u>	<u>AM</u>	<u>PM</u>
Cherry Red blood	✓	
Soot in airway	✓	
Line of Redness	✓	
Vital signs	✓	
Blister containing fluids	✓	
Blister containing gas		✓
Congested organ	✓	

Dry a burn

Wet / Moist a (scalds)  
 $>65^{\circ}\text{C}$

Chemical burns

Charring  
 Singeing  
 Blackening

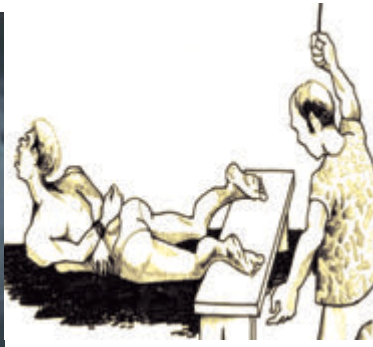
• Blisters+  
 • Splashing+  
 Line of redness+

Ulcers+  
 No blisters  
 Distinct colouration +

# Torture



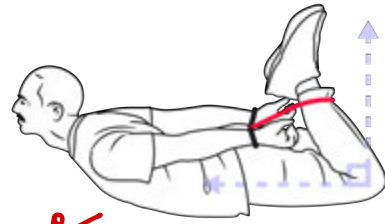
Telefono



Bastinado  
Telanga



wet submarine



Hog Fying



Parrot perch



Saw horse

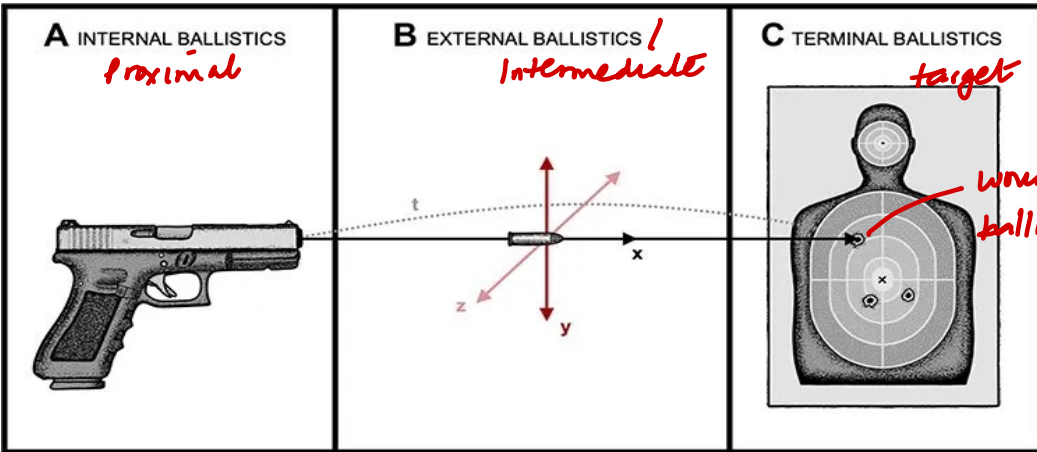


Calves : Chepuwa

Declarations	
Tokyo, Istanbul, Hamburg	TDR NRE
Hongkong	elderly abuse
Venice	terminal illness
Oslo	abortion
Helsinki & Nuremberg code	human experimentation
Ottawa	child abuse
Sydney	brain death
Geneva	Hippocratic oath
Malta	Hunger strike
Lisbon	patient rights
Washington	biological weapons
Hawaii	mentally ill

# Ballistics

Calvin Goddard: Father of ballistics

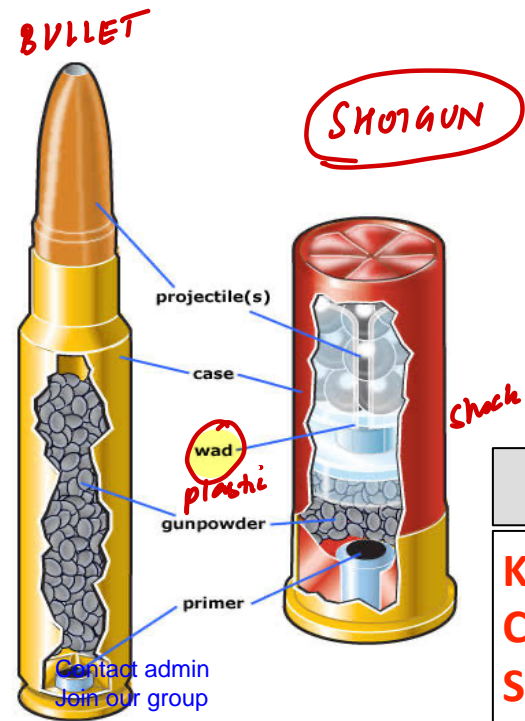


Rifling  
Calibre: LANDS  
BULLET

Choking Gauge

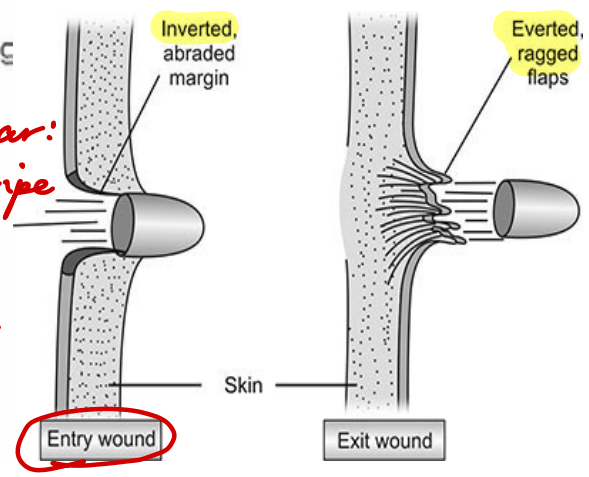
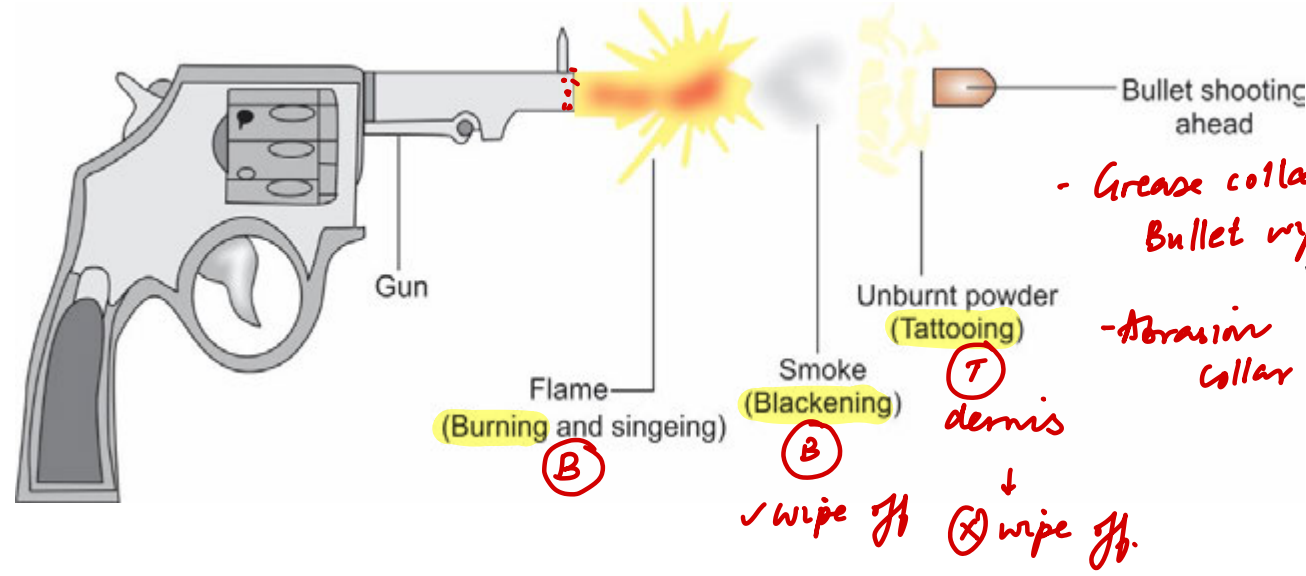
PELLET  
1 pound=454g

Paradoxical gun: smooth bore & terminal rifling

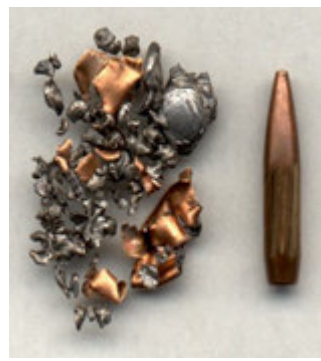


*Gunpowder*

Black	Smokeless	Semi-Smokeless	PRIMER
<p><b>K:</b> <math>\text{KNO}_3</math>  <b>C:</b> Charcoal  <b>S:</b> Sulfur</p>	<ul style="list-style-type: none"> <li>Single Base → Nitrocellulose</li> <li>Double Base → NC+ Nitro-Glycerine</li> <li>Triple Base → NC+NG + Nitro-Guanidine</li> </ul>	<p>80% : Black                  20% : Smokeless</p>	<p>Barium nitrate                  Lead peroxide                  Antimony Sulfide                  Styphnate                  Tetrazine</p>



Semi-jacket = Dum dum bullet



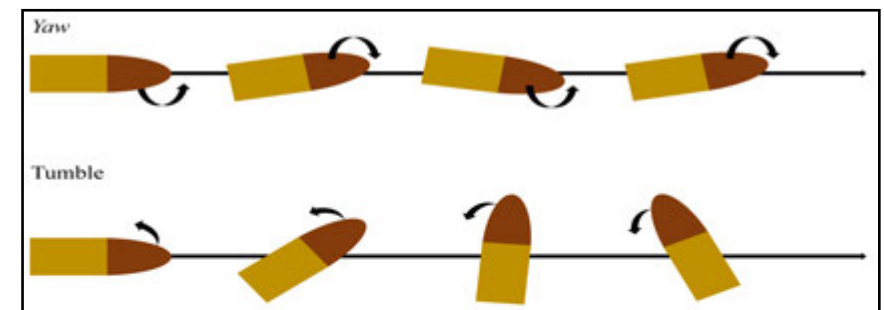
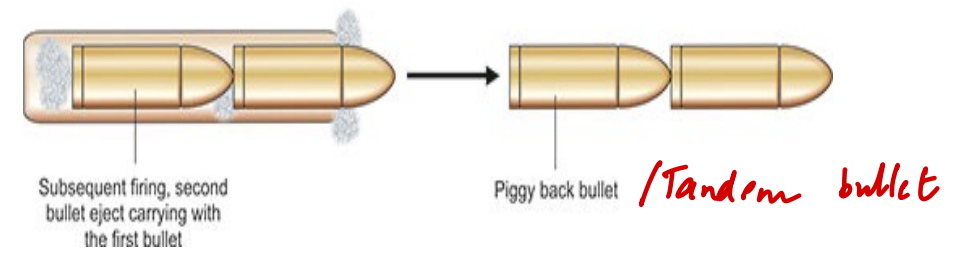
Frangible

Inner table beveling: entry wound

Outer table beveling: exit wound

No entry wound changes: Ricochet

Souvenir bullet: ⊗ exit wound - Pb ↑



- ▶ **Markings-**
  - Primary: class characteristics - manufacturer / gun make
  - Secondary: individual to the gun - metal fouling
- ▶ **Bullet fingerprinting:**  $d^2 > l$
- ▶ **Gun Shot Residue (GSR)-** accused
  - Dermal nitrate test
  - GSR collected by paraffin wax
  - SEM with EDXA Best
- ▶ **Kennedy phenomenon-** iatrogenic manip<sup>n</sup> of entry wound
- ▶ **Royalasima phenomenon-** stab ⊗ bullet

Rifle:

CONTACT

~~Q~~ CLOSE

~~Q~~ NEAR/ INTERMEDIATE

DISTANT



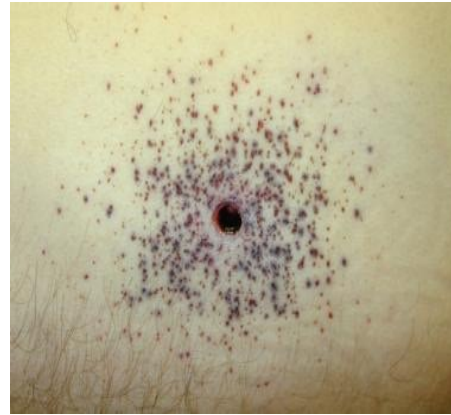
Cruciate



Cherry red -> COHB  
BBT - inside



BBT ✓  
GC-AC ✓✓



T ✓  
GC-AC ✓✓



GC-AC ✓✓

Shotgun:

CONTACT

CLOSE

NEAR

INTERMEDIATE

DISTANT

< 1m

1-2m

2-4m

> 4m



'Rat hole'



main ✓  
Dispersion ↑↑

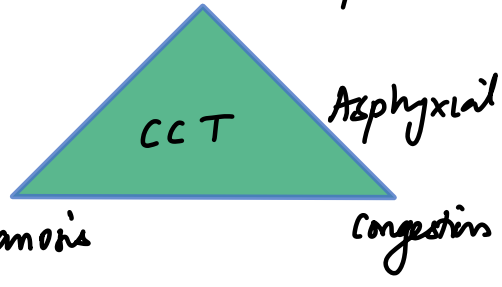


x 1° wound  
Complete  
dispersion

# Asphyxia



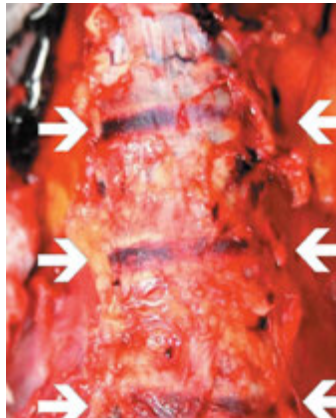
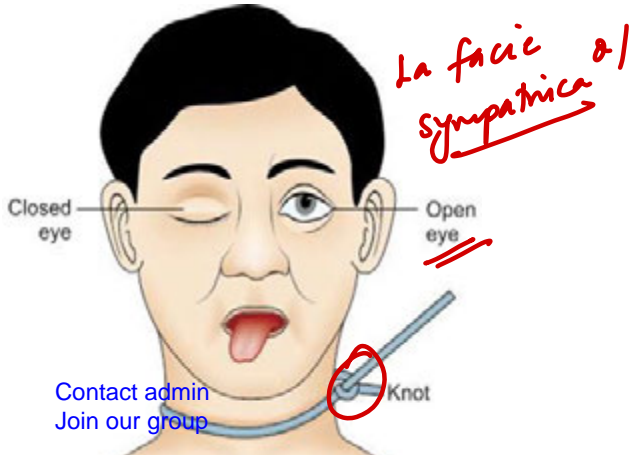
Tardieu spots



	Strangulation	Hanging
Direction	Transverse	Oblique Except: Partial H
Continuity	Continuous	Non-continuous
Level in neck	At / Below thyroid	Above thyroid
Base	Soft, Reddish	Pale, Hard, Parchment-like
Hyoid fracture MS > H > LS	Adduction # 'SAD'	Abduction #



Surest sign of Ante-Mortem Hanging: dribbling of saliva  
SIMON BLEEDS AMUSSAT SIGN



Prinsloo's Gordon artefact neck-hge - PM artefact  
Undertaker # (C6-C7 # -transplants) (∴ Neck-last)  
Lividity: Glove & stocking  
Weight to obstruct:  
IJC: 2kg CCA: 5kg Trachea: 15kg Vertebral A: 30kg  
Complete VS Partial hanging  
Typical VS Atypical hanging  
knot caput - head-constricting force

# Strangulation:



Throttling / MS



Mugging



Bansda  
↳ Bamboo.



Spanish windlass =  
Garotting.



Choke hold  
↳ trachea  
↓  
asphyxia



Carotid hold  
↳ carotid  
↳ loss consciousness

**Suffocation**



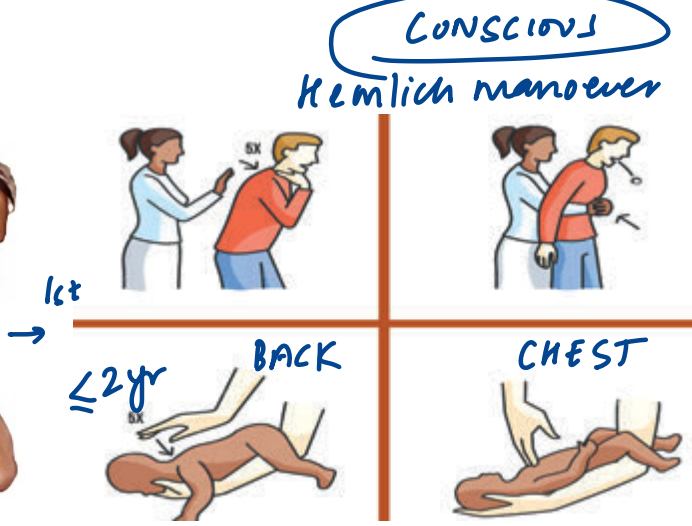
Smothering



Gagging



Choking



**CAFE CORONARY**  
Mishmer

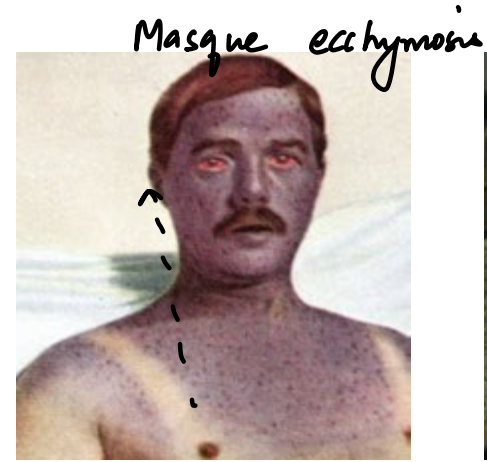


mode of death  
asphyxia  
Choking

**UNCONSCIOUS - BLS → CPR**



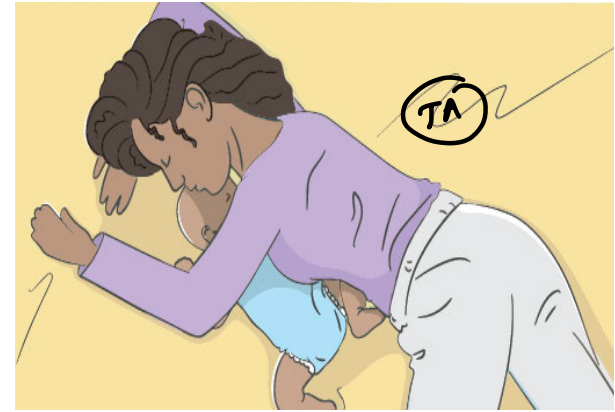
BURKING



traumatic asphyxia



positional asphyxia  
↳ Jacknife



overlaying

# Drowning <sup>QQ</sup>

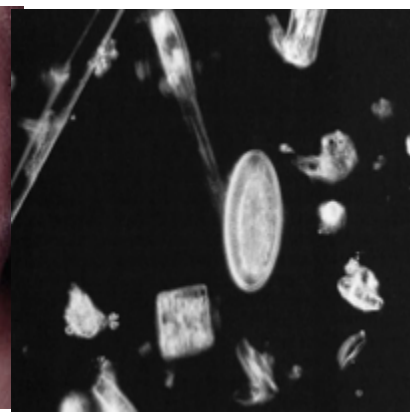
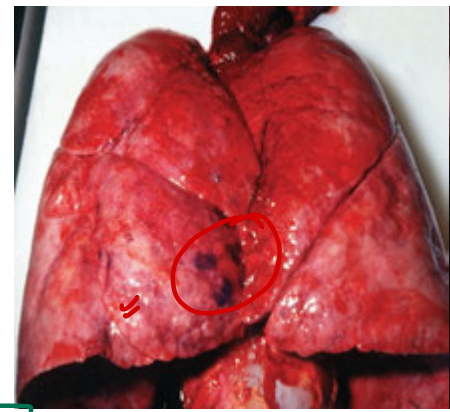
## Typical Drowning

Fresh Water	VS	Salt Water
<ul style="list-style-type: none"> <li>• Hemodilution</li> <li>• ↓ Na ↓ Cl</li> <li>• RBC lyses → ↑ K<sup>+</sup></li> <li>• V Fib → cause of death</li> </ul>	<p>Kettler test LV &gt; 25% RV-control</p>	<ul style="list-style-type: none"> <li>• Hemoconcentration</li> <li>• ↑ Na ↑ Cl</li> <li>• ↑ Mg ↑ Sr</li> <li>• Myocardial anoxia ↳ cause of death</li> </ul>

- ▶ Dry Drowning: laryngospasm
- ▶ Near Drowning: other changes → electrolyte / sepsis
- ▶ Immersion syndrome: COLD  
↳ vasovagal syncope "vagal inhibition"

## Signs of Ante-Mortem Drowning

← AM / PM drowning →



**Cadaveric spasm**  
 ↓  
 ✓ drowning  
 ✓ suicidal gunshot  
 ✓ electrocution  
 X Contact admin  
 Join our group  
 X ATP

**emphysema aquosum**  
**frothing ++**  
**Paltanof hge**  
 ↳ pleura

**Diatom test**  
 ↳ bone marrow  
 ↳ unicellular algae  
 ↳ silica shell → acid resistant

Cutis anserina / Gooseflesh

Washwoman hands  
 - time since death

# Autopsy

## Order in autopsy:

- 1) Poisoning *Cranial cavity 1st - smell*
- 2) Newborn *Cranium → abdo → thorax (SB vs LA) 3-4 hrs 5-6 hrs*
- 3) Asphyxia *Neck last.*

*Virchow- MC : H → T → A*

*Letulle- en masse*

*Ghon- en block ('BLOG')*

*Rokitansky- in situ → infectious ⚠ = COVID-19*

## Organs preserved

- **Blood** (preservative: *K oxalate / NaF*)
- **Urine** (preservative: *NaF / Thymol*)
- **Stomach** (Incise along GC)
- Proximal 30cm **SI**
- 500g **liver**
- Half of each **kidney**
- Preservative: *MC- saturated NaCl*
- Ideal- *Rectified spirit*
- DNA analysis: *Blood (EDTA vial)*

Not nail

*Liver / spleen ✓*

*Bone (decomp) ✓*

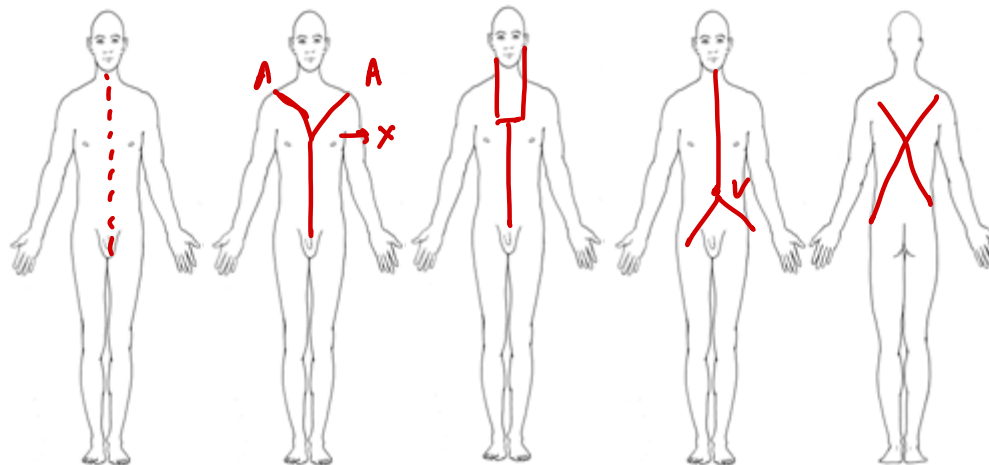
## Embalming fluid

- Preservative: *Formalin*
- Germicide: *Phenol*
- Buffer: *Na borate*
- Anticoagulant: *Na citrate*

**NOT ETHANOL**

## Incisions

- **I**: *MC*
- **Y**: *♀ - breast*
- **Modified Y**: *asphyxial - neck*
- **Inverted Y**: *children*
- **X**: *Custodial → deeper tissue*



## Types of autopsy

**Pathological:** *academic reasons → consent relative ✓*

**Medico-legal:** *10 orders → consent relative xx*

**Virtopsy:** *virtual → CT / 3D Xrays*

**Psychological:** *suicide*

**Obscure:** *clinical exam\* (K) - microscopy dx ✓*

**Negative:** *despite microscopy xx (n.s.)*

- ▶ Diaphanous test, Magnus's test, Icard's test *Clostrid<sup>n</sup>*
- ▶ Winslow's test *respirin*
- ▶ Body unclaimed after 48hr for Organ transplantation
- ▶ For RTA/ Police manual: 72hrs.
- ▶ Suspended animation : A      B      C      D      E      F  
*"transient dead"*  
*Anesthesia      Babes      Cholera      Drown      Electroc*  
*Barbiturates      Concussion      Frozen*

*ICH → brain mets → CA lung*  
*DM*

*Hypotensive*

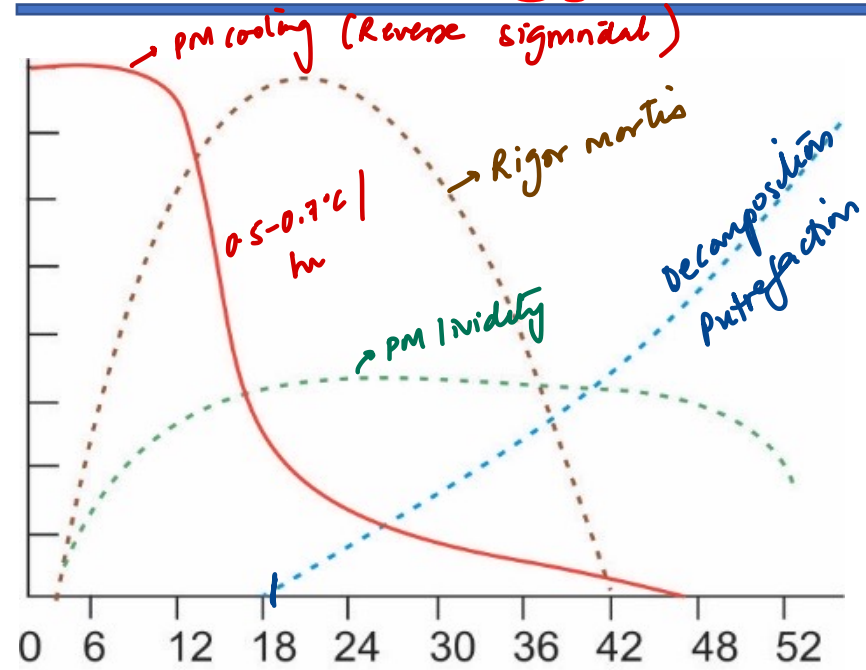
**FORM NO.4**  
**(See Rule 7)**  
**MEDICAL CERTIFICATE OF CAUSE OF DEATH**  
 (Hospital in patients. Not to be used for stillbirths)  
 To be sent to Registrar along with Form No.2 (Death Report)

Name of the Hospital: .....

I hereby certify that the person whose particulars are given below died in the hospital in ward No..... on ..... at ..... A.M./P.M

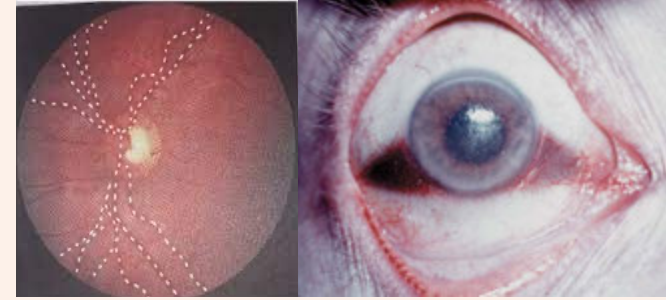
NAME OF DECEASED				For use of Statistical Office
Sex	Age at Death			
	If 1 year or more, age in years	If less than 1 year, age in Months	If less than one month, age in days	If less than one day, age in Hours
1. Male 2. Female				
<b>CAUSE OF DEATH</b>				Interval between onset & death Approx
<b>I. Immediate cause</b> State the disease, injury or complication which Caused death, not the mode of dying such as Hear failure, asthenia, etc.		(a) <i>ICH</i> ..... due to (or as consequences of)	.....	.....
Antecedent cause Morbid conditions, if any, giving rise to the above Cause, stating underlying conditions last		(b) <i>brain mets</i> ..... due to (or as consequences of)	.....	.....
<b>II.</b> Other Significant conditions contributing to the Death but not related to the diseases or conditions causing it.		(c) <i>CA lung</i> ..... <i>DM</i>	.....	.....
<b>Manner of Death</b>				
1. Natural 2. Accident 3. Suicide 4. Homicide 5. Pending Investigation				How did they injury occur?
If deceased was a female, was pregnancy the death associated with?				1. Yes    2. No
If yes, was there a delivery? 1. Yes    2. No				

# Thanatology



## Eye changes

- Minutes: Kerwokian sign → tracking
- 3-6 hrs: tache noir
- 6 hrs: corneal opacities
- Best indicator TSD- Linear → VH K<sup>+</sup> (↑)



## PM lividity (Livor Mortis)

Onset: Fixed → 8hrs  
 Not in **flowing water / shock**

- Cherry red- CO
- Brick red- cyanide
- Brown- (P) / aniline dyes / nitrites
- Bluish green- H<sub>2</sub>S

→ Dependent  
 drowning

## Algor mortis

Measure: Subhepatic space > rectu

## PM caloricity:

- Heat Stroke
- Pontine hemorrhage
- Sepsis
- Tetanus/ Strychnine
- Cholera

Contact admin  
 Not our group  
**NOT BURNS !!**

## Rigor mortis

- ▶ First: ♡
- ▶ First external: eyelids
- ▶ Nysten's rule: craniocaudal; P → D → eyelids → neck → jaw → face → Thorax → UL → Abdo → LL
- ▶ Rule of 12
- ▶ Not in fetus < 7 mo
- ▶ Late rigor mortis: Asphyxia, Hemorrhage, Pneumonia



Putrefaction

↓

Liquefaction (*C. welchii*)

- Hot & humid / waterbody
- fat saponific<sup>n</sup> - fruish odour
- facial preserv<sup>n</sup> (relatively)
- 3wks - 3mon

Mummification

- hot & dry - 3mon - 1yr
- organ preserv<sup>n</sup> best
- No odour

## Putrefaction

1st external change: RIF - greenish

Marbling

D/t:  $\text{sulfmethHb} < \text{sulfHb}$

Starts at: 24hs

Peaks at: 36-72hs

MARBLING



## Sequence of putrefaction :

Earliest: Larynx/ Trachea

Last: Prostate, Non-gravid uterus, Skin, Bone, Teeth

Casper's dictum:

Air > Water > Earth  
1 : 2 : 8

• Delay: Strychnine / Metallic poisons/ Carbolic acid

• Relaxation of sphincters: 2-3d

• Larva maggots: 24-72hs → Entomology

# Medical Jurisprudence

## Evidence

• **Direct** - eye witness / CCTV ✓ best.

• Indirect-

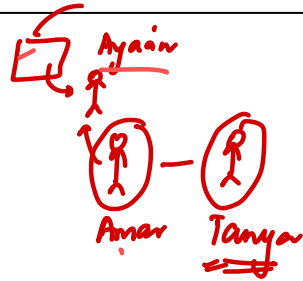
▶ **Circumstantial**: Amar ✓ valid

▶ **Hearsay**: Tanya → ✗ invalid

- Subpoena / summons / Duces tecum <sup>Higher Criminal</sup>

- **Leading questions**: Cross-exam, Hostile witness <sup>1st</sup>

- **First hand knowledge rule** <sup>Common witness</sup>



HIERARCHY OF COURTS	Max punishment/fine
SC	LI / Death -
HC	LI / Death -
Sessions court Additional sessions Fast track court	LI / <u>Death</u> <sup>confirmed</sup> -
Assistant sessions	10yr -
Chief JM	7y -
1 <sup>st</sup> class magistrate	3yr 50k
2 <sup>nd</sup> class magistrate	1yr 10k

## Consent

▶ Min age for consent:

- **Physical Exam/ sexual assault victim exam** -  $\geq 12$ yr

- PV/ PR/ Surgery/ Transplant/ MTP-  $\geq 18$ yr

▶ **BEST**: *Written informed consent*

• **Therapeutic privilege**: dr withhold info → harm

• **Extended consent**: Lap(dx) → R,  $\bar{c}$  prior consent

• **Therapeutic waiver**: ptnt themselves → info xx

✓ document  
✓ family

## PCPNDT (2002)

• Prohibit sex selection & prenatal diagnostic tests

• **Neither detect not reveal gender: Form F**

• Medical board: *OBg / Ped / Radiologist (Lawyer x)*

## POCSO Act

- Penetrative sexual assault, Sexual assault, Sexual harassment, Pornography

- Aggravated. *authority / weapons / custodial*

- Loco parentis *teacher / principal*

- Kidnapping (BNS 137)  $< 18$ yr

## Criminal negligence:

Dr drunk on duty <sup>Sy</sup> dies

• **Duty - Dereliction - Direct causation - Damage**

• **Res ipsa loquitur:** "facts speak for themselves" (Wrong part of Sx  
FB left inside)

▶ **Medical maloccurrence:** known complication

▶ **Contributory negligence:** ptnt also at fault

▶ **Novus actus intervenes:** intervening act  (X) liable

▶ **Double jeopardy = Res judicata** same case - (X) apply - appeal  
2 diff courts

**Res indicata** - 2yr - civil N

▶ **Good Samaritan doctrine:**

▶ **Respondent superior/ Vicarious liability**



• **Professional misconduct:** SMC - erase license

• **Dichotomy:** fee splitting → ↑ advertising

## Burden of proof

▶ **Criminal negligence:** Prosecution (state)

▶ **Res ipsa loquitur:** Dr (Defendant)

▶ **Civil negligence:** Ptnt (Plaintiff)

▶ **Contributory negligence:** Dr. (Defendant)

## Records

• **OPD/ IPD records kept for:** 3yr

• **MLC records** 10yr

• **MTP records:** 5yr

• **Time to provide records:** 3d

An orthopedic surgeon applied a very tight plaster on a patient's leg and asks the patient to inform if he develops any numbness. The patient does develop numbness and tingling sensation in his toes but does not inform the doctor. The patient informs the doctor about the numbness the next day, but the doctor is on call and forgets to take his cast off. Within the next 12 hours, the patient's leg starts to show discolouration and permanent damage occurs. Under which law will the doctor be held responsible?

- A. Doctrine of comparative negligence ~~xx~~
- B. Last clear chance doctrine → de liable
- C. Avoidable consequence law → ptnt
- D. Good Samaritan doctrine ~~xx~~

# BNS (Bhartiya Nyaya Sanhita)

- 20 - < 7yr xx liable
- 21 - 7-12yr - mental status - assign responsibility
- 22 - McNaughten's rule - Insane / Intoxicated - (x) LIABLE
- 23 - Forceful intoxication - x liable
- 24 - Self intoxication - ✓ liable

- 25 - Consent > 18yr =
- 27 - < 12yr (x) Consent
- 28 - INVALID CONSENT - < 12yr / Insane / Intoxicated / Threat
- 30 - CONSENT - Life threatening emergency

- 227: Perjury
- 228: Fabricating false evidence
- 229: Punishment for both
- 72: Revealing identity rape victims

Contact admin  
Join our group



- **McNaughten's rule.**
- Durham's rule.
- Curren's rule.
- Irresistible impulse test.
- American law institutes.
- Compos mentis: having control of mind



100 - Culpable homicide  
 101 - C.H. amounting to murder (Intent to kill)  
 103 - Punishment for 101  
 105 - Punishment for 100  
 106 → Medical negligence  $\left\{ \begin{array}{l} \text{l/t death} \rightarrow 5\text{yr} \\ \text{x} \rightarrow 2\text{yr} \end{array} \right.$

80 → Dowry death - 5 yrs of marriage  
 88 → Criminal abortion & consent  
 89 → " " " " " "  
 90 → l/t death of ♀

114 - HURT  
 116 - Grievous HURT  
 124 - Acid attack / vitriolage  
 63 - Rape  
 64 - Punishment of rape  
 Contact admin  
 Min punishment: 10yr      Min for rape of <16yr: 20yr



## GREVIOUS HURT

- i. Emasculation
- ii. Permanent privation of the sight of either eye
- iii. Permanent privation of the sight of either ear
- iv. Privation of any member or joint
- v. Destruction or permanent impairing of any member or joint
- vi. Permanent disfiguration of the head or face
- vii. Fracture or dislocation of a bone or tooth
- viii. Any hurt which endangers life or which causes the sufferer to be during the space of **15 DAYS** in severe bodily pain or unable to follow his ordinary pursuits

# BNSS/ BSA

## Bharatiya Nagarik Suraksha Sanhita (BNSS) CrPC

- 194 : Police inquest
- 196 : Magistrate inquest
- 52: rape accused - ⊗ consent - exam<sup>n</sup>
- 184: rape victim - exam<sup>n</sup>
- 366: In camera trial - sexual assault / PDSO

## Bharatiya Sakshya Adhinyam (BSA) IEA

- 26 - dying declarations
- 39 - expert witness
- 157 - Hostile witness (leading as)

### Exceptions to oral evidence:

1. Dying declaration
2. Deposition of medical witness from a lower court
3. Evidence by a witness in previous judicial proceeding
4. Reports of certain government scientific experts:

- Chemical Examiner, Chief Controller of Explosives,  
Director of Fingerprint Bureau, Director of a Central  
Forensic Science Laboratory

[Contact Admin](#)  
[Join our group](#)

### Police inquest:

- Minimum rank
  - ▶ Sexual offences- **Sub-inspector**
  - ▶ Others- **Head constable**

### Magistrate inquest:

- **Custodial death/ Rape/ Disappearance:** JM
- **Dowry death:** } JM / EM
- **Exhumation:** }

<u>Dying deposition</u>	<u>Dying Declaration</u>
Magistrate	<b>Anyone</b>
Oath	<b>No</b>
Cross-examination+	<b>No</b>
Valid if patient survives	<b>No</b>
Not in India	<b>India</b>

# Miscellaneous

- Lochia-  $\begin{matrix} \text{Rubra} \rightarrow \text{Sensa} \rightarrow \text{Alba} \\ \sim 24d & \sim 4d & \sim 8d & \sim 12d \end{matrix}$
- Vagitus uterinus/vaginalis- cry in utero / vagina
- Ewing postulate  $\text{Crime / event} \xrightarrow{\text{LINK}} \text{trauma}$
- Prior knowledge of the events/activity will influence the suspect's reaction - Brain mapping
- In 18th century British EIC used to transport opium to China

	Live born	Still born
Foder's test	60g	30g
Plocquet's test (Best) L: body	1: 35	1: 70
Wredin test	⊖	gel memb ear
Breslau's second life test $\begin{matrix} \text{ii} \\ \text{ii} \\ \text{ii} \\ \text{ii} \end{matrix}$	⊕⊕	⊖
Hydrostatic test=Raygat test $\begin{matrix} \text{ii} \\ \text{ii} \\ \text{ii} \\ \text{ii} \end{matrix}$	FLOAT	SINK
<ul style="list-style-type: none"> <li>- <u>False Positive</u>: Putrefaction / PPV</li> <li>- <u>False Negative</u>: Collapse / consolidation</li> </ul>		

## Intrauterine death signs:

- Earliest- Loss of FHR /  $\heartsuit$  activity
- Robert sign- air in aorta lbr
- Spalding sign- skull bones wanting
- Ball sign-  $\uparrow$  flex spine



## During the first five months of pregnancy:

Square root of length = age of fetus in months  $\sqrt{25cm}$

After first five months of pregnancy: Manniin

Length divided by 5 = age of fetus in months

$\frac{20}{5}$

# Sexual Assault case

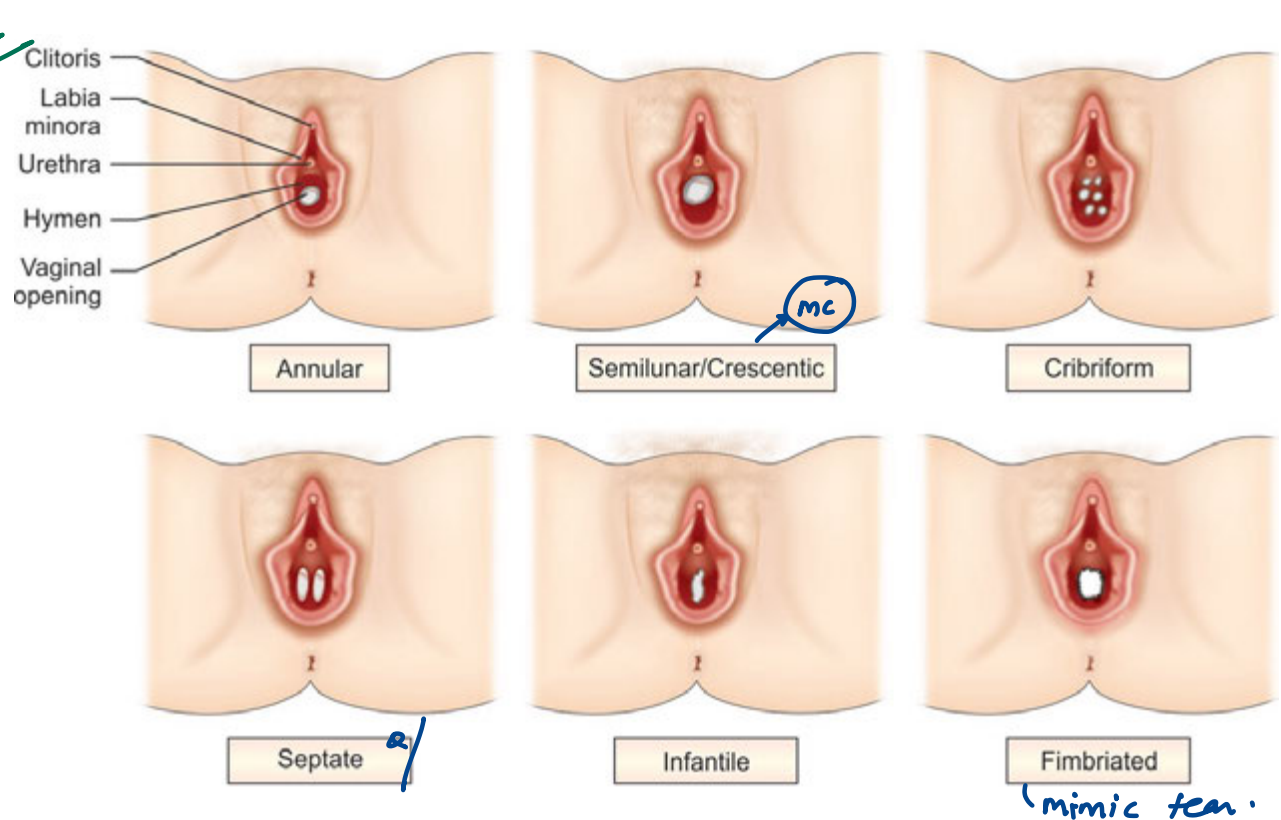
## Duties of doctor:

- 1) Inform police
- 2) Consent for examination- Age:  $\geq 12$ yr
- 3) Psychological counselling
- 4) Written refusal
- 5) Provide diagnosis and treatment, STDs, UPT

## Sexual Assault Forensic Evidence (SAFE) kit

- Time limit for vaginal swab: 96hr
- Sperm motility: 6-12hrs
- Smegma: - ACCUSED - LUGOL'S I  
 ↳ r/o - 24hrs. ↳ vag epim cells

VICTIM:  
 Tol blue  
 ↳ injuries



- Hymen tears Glaister Keen rods
- Posterolateral (4-7) penile penetr<sup>n</sup> Anterior: digit / FB
- Intact despite intercourse: CHILD - deep scated
- False virgin: Hymen intact - Telastic - FOURCHETTE TEAR
- Superfetation: } + <sup>0-ov</sup> <sup>ovul<sup>n</sup></sup> in next cycle → TWINS - 1mm age
- Superfecundation: Same cycle } + } - TWINS
- Post humous child- born after death of o (father)
- Supposititious child- Fictional child

# Paraphilias

Exhibitionism (296 BNS)	Exposing ones's genitals to an unsuspecting person or performing sexual acts that can be watched by others
Frotteurism (75 BNS)	Touch or rubbing against a non-consenting person
Voyeuristic disorder (77 BNS) 78 BNS - Stalking	Observe an unsuspecting person who is naked, undressing or engaging in sexual activities
Sexual masochism	Wanting to be humiliated, beaten, bound or otherwise made to suffer for sexual pleasure <u>Kotzwarism/ Autoerotic/sexual asphyxia</u>
Sexual sadism	In which pain or humiliation of a person is sexually pleasing
Transvestic fetishism/ Eonism &	Arousal from clothing associated with members of opposite sex (vs) Gender
Lesbianism=Tribadism=Sapphism	Active: Dyke      Passive: Femme <u>dysphoria</u>
Sodomy/Greek love/Buggery	Elderly: <u>Gerontophilia</u> Child ( <u>Catamite</u> ): <u>Pedarasty</u>

Incest: family M  
 Oedipus complex: mother - son  
 Electra complex: father - daughter  
 Pharoan complex: brother - sister

Contact admin  
 Join our group

# Evidence collection

## BLOOD

Luminol stain- UV light  
Precipitin test- *Species*

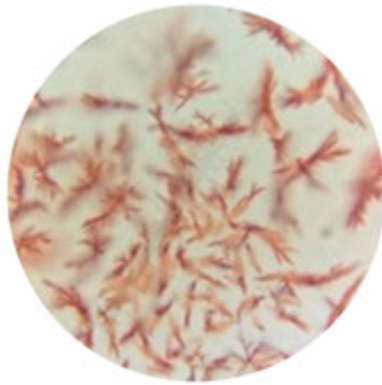


## CONFIRMATORY TEST

1) Microcrystal Test *qa*

- **TEICHMANN**: - *Hemin* → *brown rhomboid*
- **TAKAYAMA**: - *Hemochromogen* → *pink feathery*

2) Absorption Spectroscopy- Best



## SEMEN

- 1) Florence stain - *brown rhomboid - choline*
- 2) Barberio test (*BSP*) - *spermine - picric acid - yellow*
- 3) Brentamine / Walker test
- 4) MUP test
- 5) ICT-Semenogenelin, LDH

CONFIRMATORY TEST: Microscopy

*Christmas-tree staining*

*Acid Phosphatase*



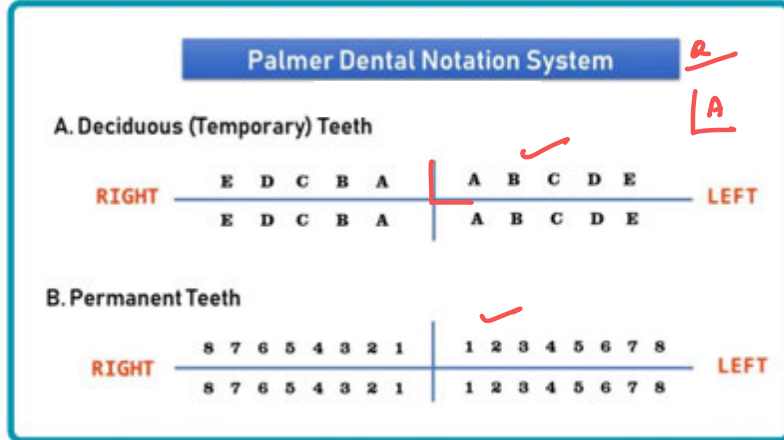
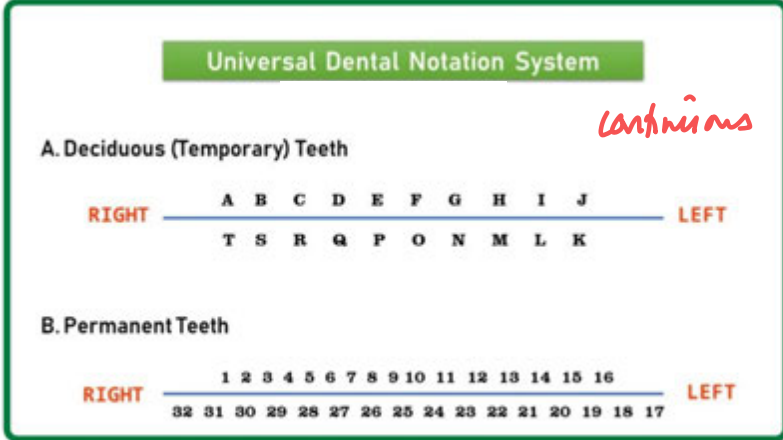
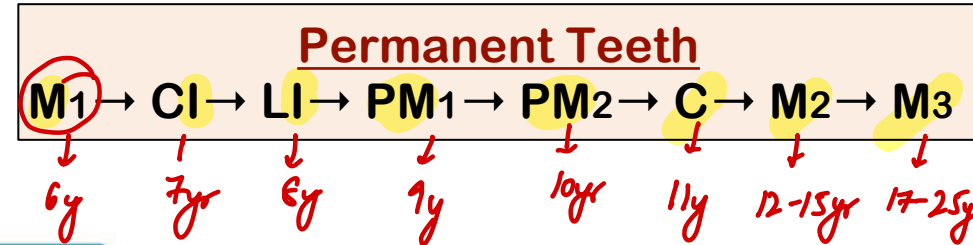
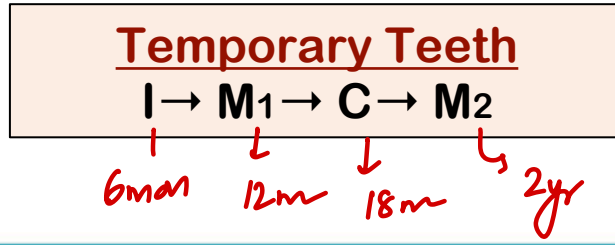
Crystal violet: *Sweat*

Edelman's agent: *fecal*

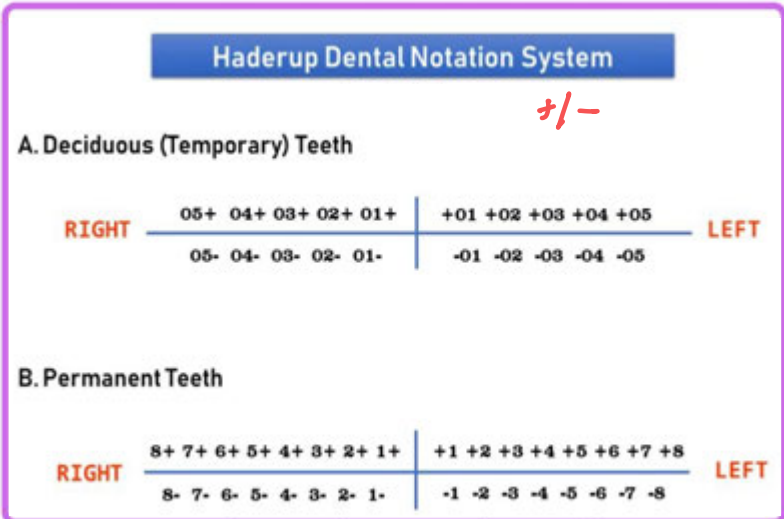
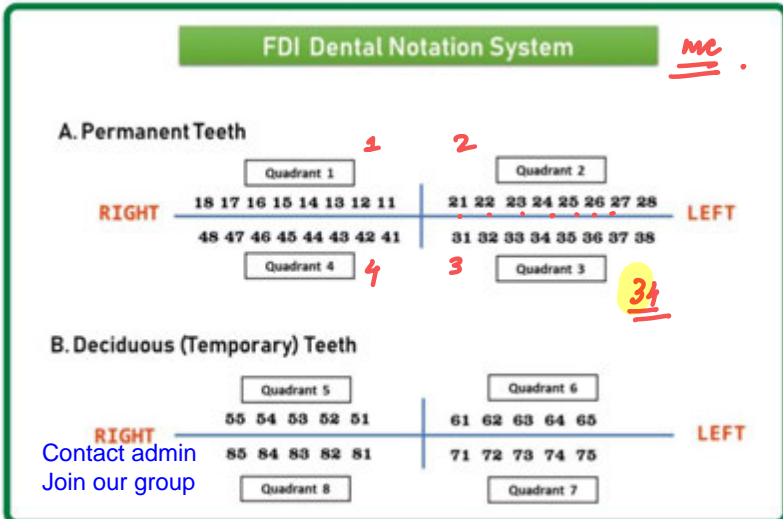


# Human Identification-Teeth

- Gustafson criteria
- Most reliable- *Root transparency*
- Carabelli's cusp- *Caucasians*
- Enamel pearls/ Taurodontism- *"bull" mongoloids*



- Mixed Dentition: *6 - 11yr*
  - Total: *24*
  - Formula *P: (age - 5) x 4*
- 10yr: P=20 T=4*



## Human Hair

- Medulla: **Fragmented, thin**
- Medullary index **< 0.33**
- **Pigment uniform**

## Animal Hair

- Medulla: **Continuous, thick**
- Medullary index **> 0.5**
- **Pigment in medulla only**



	Male Skull	Female Skull
Architecture	Rugged	Smooth
Plate	Large, broader, U-shaped	Smaller, Parabola
Occipital condyle	Large	Small
Supra orbital ridges	Prominent	Less prominent
Digastric groove	More deep	Less deep
Mastoid process	Large, Blunt	Small, Pointed
Zygomatic arch	More prominent	Less prominent
Occipital protuberance	Well marked	Less marked
Frontal eminence	Small	Large
Parietal eminence	Small	Large
Orbits, Margin	Square & Smooth	Rounded & Sharp

All large and wide in males' skull except:

- F/P eminence
- Nasal aperture
- Female forehead, Orbit, Round chin
- Angle of mandible  $> 120^\circ$

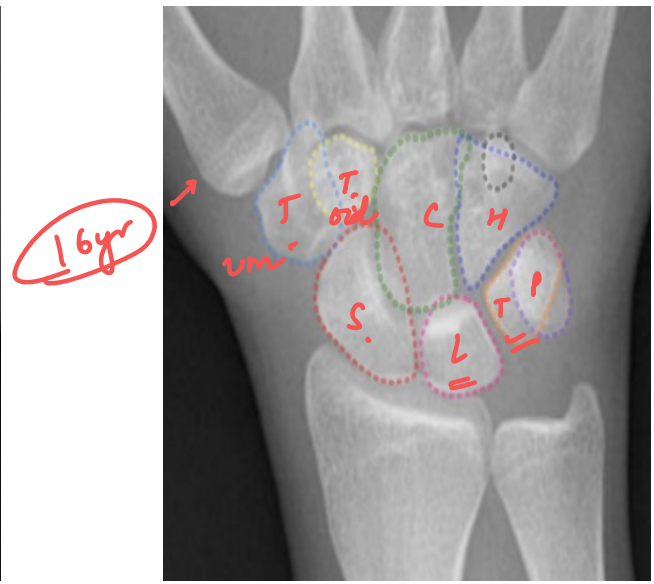
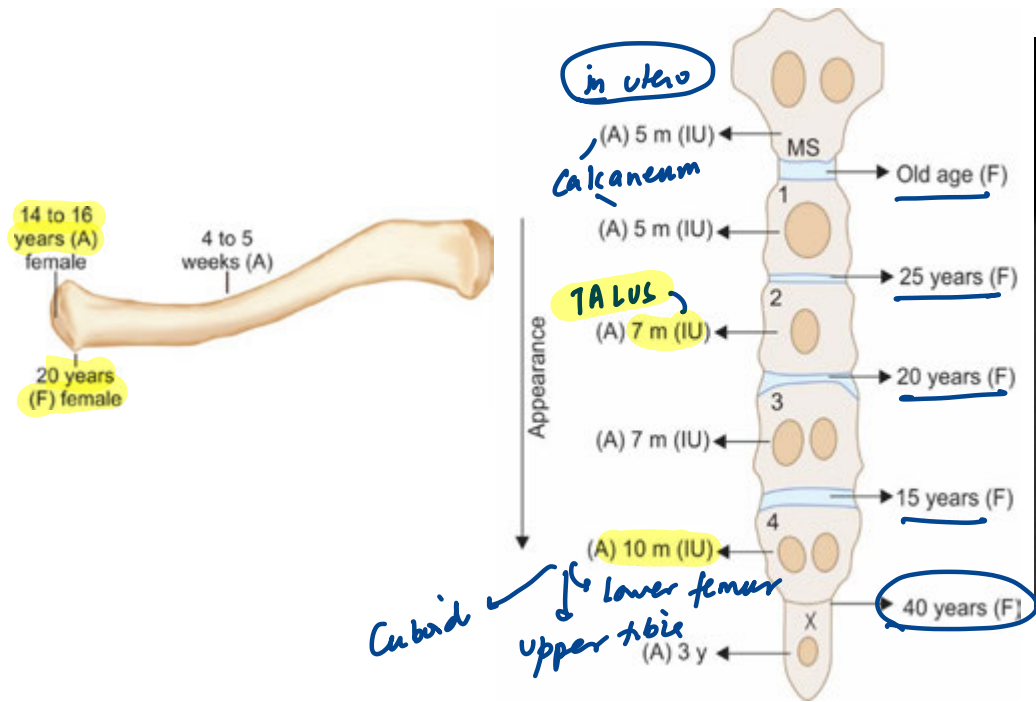
Dr. H. H. H.  
Join our group

	Female Pelvis	Male Pelvis
Shape	Wider	Narrower
Pelvic inlet, outlet	Larger	Smaller
Coccyx	Moveable, More curved anteriorly	Immovable & Less curved anteriorly
Public arch	Wider	V shaped
Subpubic angle	$> 90^\circ$	$< 90^\circ$
Pelvic brim	Large, round	Small, heart-shaped
Sciatic notch	Wider	Narrower
Obturator foramen	Small, triangular	Large, oval
Sacroiliac joint surface	Short, wide, curved	Long, narrow, straight
Pelvic acetabulum	Small, faced anteriorly	Large, faced laterally

All large and wide in females' pelvis except:

- O: Obturator foramen
- S: SI jt surface / Chondritic line
- A: Acetabular notch

# Bone Age Estimation



CRITOE  
2 4 6 8 10 12y

L M O  
14y 15y 16yr

13yr

ESHA ki WnsZ  
Elbow 16yr  
17-18yr  
19yr

- 2 mon: Capitate
- 3 mon: hamate
- 3yr: triquetrum
- 4yr: lunate
- 5-6yr: S-T-T
- 9-12yr: Pisiform
- Radius: 2yr
- Ulna: 5yr
- Fuse: 19yr

Structure	Age of Fusion
Anterior Fontanelle	1.5 - 2 yrs
Posterior Fontanelle	2-6 mo
Antero-lateral Fontanelle	2-3 mo
Postero-lateral Fontanelle	12 mo
Lambdoid suture	45 yrs

# TOXICOLOGY

## Duties of doctor:

- 1) Medical duty (1<sup>st</sup>)
- 2) Inform police
- 3) Preserve evidence

## Universal antidote:

A T M  
Activated charcoal + Tannic acid + MgO

## C/I of A. charcoal: adsorb

- ▶ Heavy metal
- ▶ Corrosive
- ▶ Alcohol
- ▶ Kerosene, OP

## Gastric lavage:

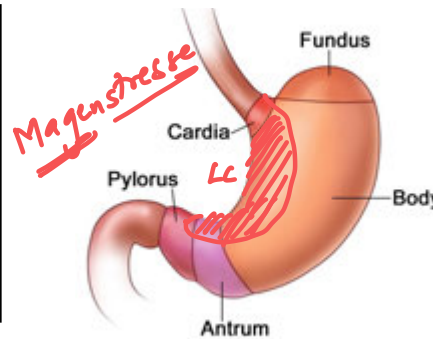
Time: < 1 hr  
Position: Lt lat decubitus



Ewald's tube

## C/I:

- ▶ Convulsants / Corrosives/ Comatose/ Kerosene
- ↳ except Phenol



## Stomach Mucosa:

- Black/ Blotting paper-  $H_2SO_4$
- Yellow-  $HNO_3$  (aqua fortis)
- **Leather / Grey**- Carboic acid (Lavage ✓)
- Red velvet-  $As$
- Yellowish brown- (P)
- Slate gray-  $Hg$
- Blue-  $CuSO_4$  /  $Na$  amylal

Carboic acid = phenol

Carbouluria + ochronosis

-Coagulative Necrosis: Acids except HF

-Liquefactive Necrosis: Alkali (↑ perfor)

\* Hypocalcemia: HF / Ethylene glycol (antifreeze) / Oxalic acid (whitener)

Hypokalemia:  $Ba$  carbonate

HypoMg: HF, celphas (ALP)

$R_2 \rightarrow iv$  ca gluconate.

\* UGIE: < 24hrs

↳ Zargar Classification



black

$H_2SO_4$  = oil of vitriol



Boiled lobster  
Boric acid



Pyrocatechol  
Hydroquinone

miosis

# Asphyxiants

## CYANIDE:

Flax / peach

- Bitter almond smell
- Anoxia- ETC IV Histotoxic
- Lee Jones test

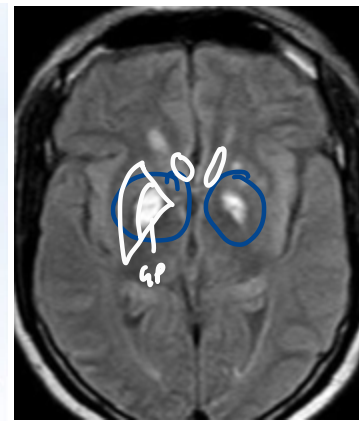
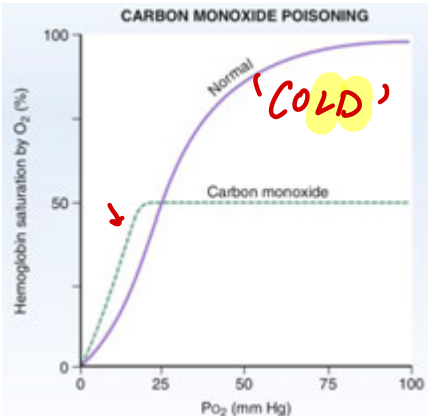
## Carbon monoxide:

250x ↑↑ Hb

- Anoxia- Anemic >> Histotoxic
- Pulse oximetry: abN (↑) - Hb-satn
- Cutaneous blisters

closed > 5% COHb → C/F

CO-oximeter



# Cardiac Poisons

♥ - DONA



Digitalis purpurea  
= Foxglove

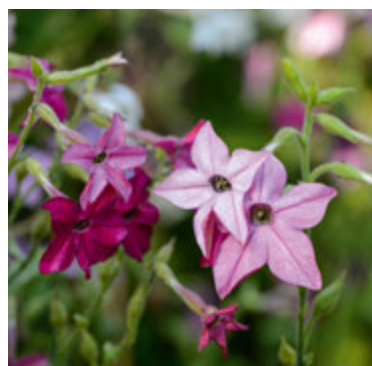
Na<sup>+</sup> K<sup>+</sup> ATPase ⊖  
Join our group



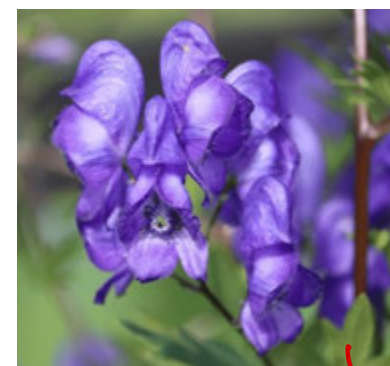
Pink oleander =  
Nerium



Yellow oleander =  
Cerebra Thunbergii



Nicotine  
Ach<sub>N</sub>



Aconite  
• Na<sup>+</sup>  
• paresthesia ⊕  
• ↓ BP • Hippus

Root =  
Mandrill's hood  
meetha  
zeher



Calotropis

# Deliriant



Datura = Atropa belladonna = Nightshade

Cannabis

E. coca  
↓  
Cocaine

Poppy = opium



# Agricultural Poisons

## Organophosphates: Dyflos/Malathion

- Kerosene odour / garlic
- Acute:
- Delayed neuropathy

Irreversible  
AChE ⊖



OXIMES

Contact admin  
Join our group

## Carbamates: Carbaryl/ Propoxur

- Reversible inhibition AChE ⊖

Ro: atropine

(X) OXIMES

## Organochlorines: DDT/ Lindane /

Endrin = plant penicillin  
- Na+ open: CNS stimulation

# Toxic seeds

toxaalbumen

protein synthesis ⊖

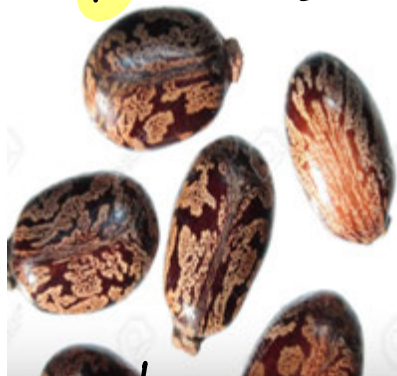
Abrus = gunti / mulethi



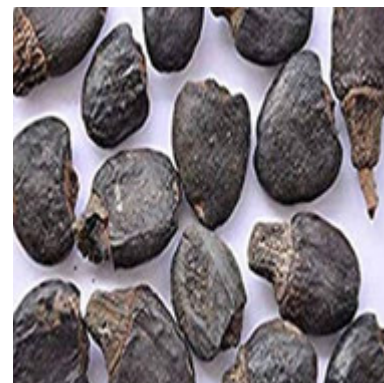
Croton = Thamalgotla



Ricinus = Castor



↓  
toxic except  
Castor oil ≡



• Marking nut ≡  
Semicarpus /  
Bhilwanol

**STRYCHNINE**



1 crushed ✓



Nigella  
arvensis

- ▶ Wenzel test
- ▶ Sonnenschein test

- postsynaptic ⊖ glycine
- locusts in b/w ≡

SPINAL

- ▶ Nux vomica = Strychnine
- ▶ Gelsemium

PERIPHERAL N

- ▶ Curare
- ▶ Conium = Hemlock

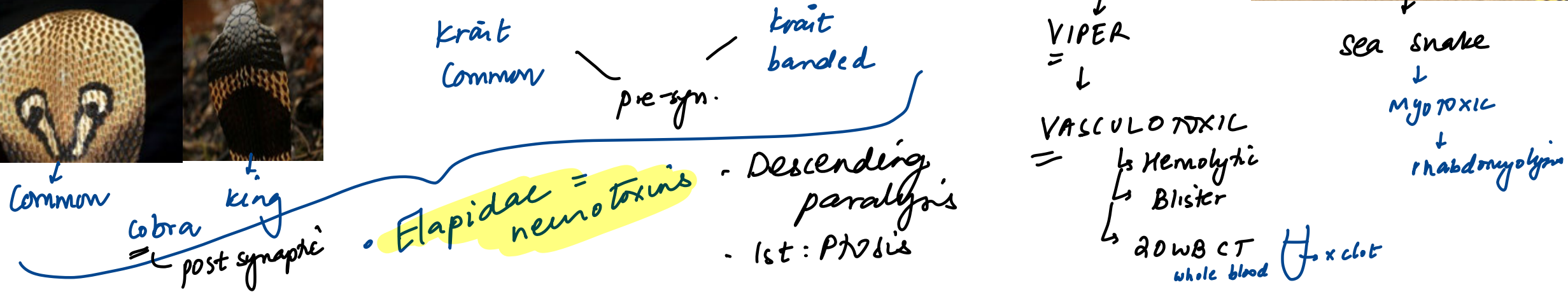
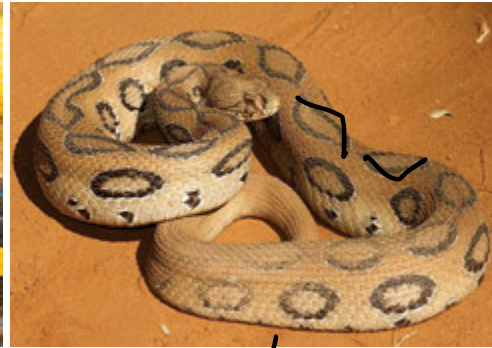


Capsicum seeds  
↓  
small yellow round



Datum seed  
↓  
larger dark

# Ophiology



## Carry No RIGHT:

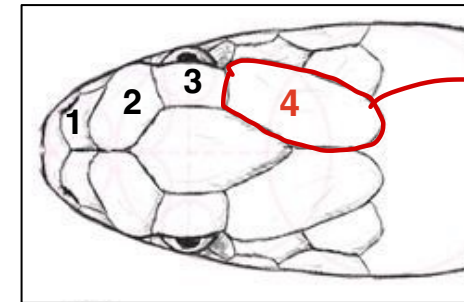
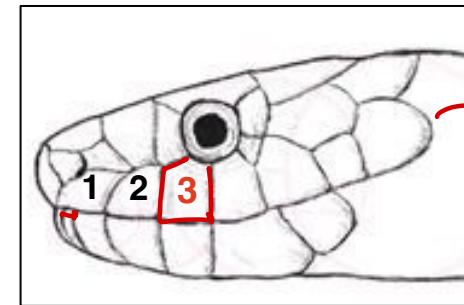
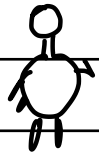
- Carry patient to hospital
- No tourniquet/ incision/ cautery/ sucking/ coffee/ alcohol/ debride/ kill snake
- Reassure
- Immobilize Sutherland wrap
- Go to Hospital & Tell symptoms

## Specific Antidote – Only if ophitoxemia

- Poly-Valent ASV: Cobra, Krait, Russel's & Saw scaled viper
- Given within 4 hrs ← 10vials

Neostigmine + Atropine: Cobra > Krait  
 N ⊕ M ⊖

	<u>Poisonous</u>	<u>Non-Poisonous</u>
Belly scales	Large, cover entire belly	Small, Don't cover belly
Head scales	Small	Large
Fangs	Long, Canalised	Short, Solid
Tail	Compressed	Not compressed
Habits	Nocturnal	Diurnal
Bite	Two Fang marks	Small teeth in row



Spanish Fly:  
- Canthardin  
- Priapism



Indian red scorpion :

- ▶ Mesobuthus
- ▶ Autonomic storm
- ▶ Very painful



DOC- Prazosin

Monday morning :

1) Fever + Chills: *Zv -mimic malaria*

2) Chest tightness *byssinosis (cotton)*

3) Sickness (Headache): *Nitrates intolerance (vd)*

Japanese detergent suicide / Sewer gas / Bluish green lividity: *Rotten egg*  
*H<sub>2</sub>S*

Contact admin  
Join our group

# Inorganic Irritant Poisons

## ARSENIC



Rain-drop / Bowen's

Mees' lines

THALLIUM

Alopecia

PHOSSY JAW ↑ Inhal<sup>n</sup>

↑  
CuSO<sub>4</sub>

- Urine / Bone excreted
- Gastroenteritis (acute) - blood - mimics cholera
- Tests : Marsh, Reinsch, Gutziet

neuropathy  
BLACK FOOT

- ▶ Types: → Non toxic : Red  
White / yellow ⇐ Toxic
- ▶ Protoplasmic poison
- ▶ Smoking stool "diwali" poison
- ▶ Yellow liver
- ▶ Antidote: CuSO<sub>4</sub>

- Cu: Inhalation  
Vineyard sprays  
(ILD)

### Tactile Hallucination :

- C COCAINE = Magman bugs
- E ERGOT
- A As

} gangrene



Garlic Odour: A L P = Celphos.

OP  
✓ keratose

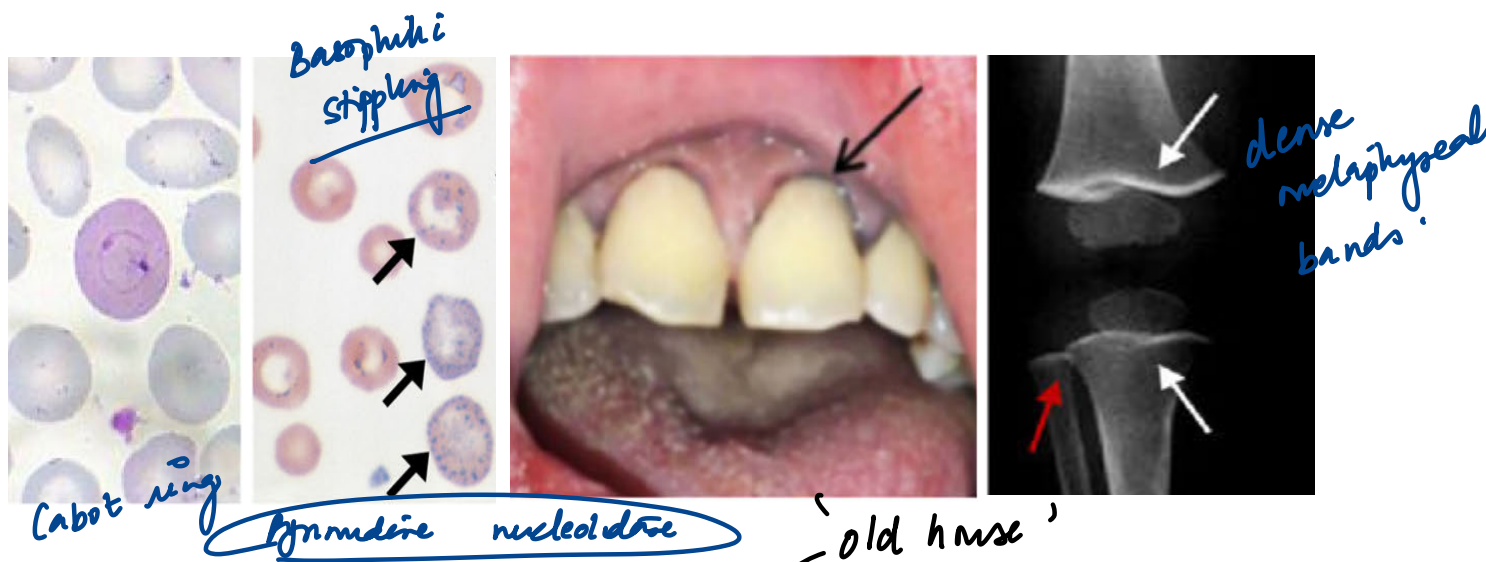
As

P

Contact admin  
Join our group.

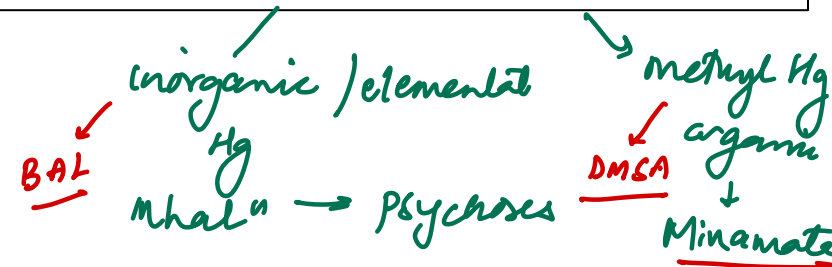
Itai itai disease: (Cd)

# Inorganic Irritant Poisons



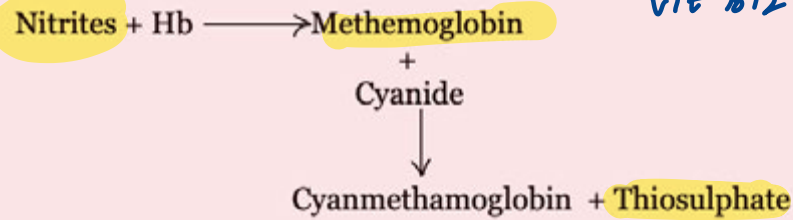
- Plumbism/ Saturnism**
- A - Anemia - facial pallor (mc) → Sideroblastic
  - B Burtonian lines (L I M C A)  
Pb Fe Hg Cu
  - C - Colic
  - D - Droop (Neuropathy)
  - E - Encephalopathy
  - F - Facial pallor
  - G - Gout
- Clinical symptoms: Pb > 70 mcg/dl
- ALA dehy  
Ferrochel  
Copro oxidase

- **Minamata disease**
- Mad Hatter's = Glass blower shakes = **Danbury tremors**
- Erethism (psychosis)
- Gingivostomatitis
- Mercuria lentis (Brown malt reflex)
- Membranous nephropathy
- Excess salivation



# Antidotes

- PCM: N-acetyl cysteine (↑ glutathione)
- BZD: Flumazenil
- B-blocker: Glucagon
- Meth Hb: methylene blue
- Cyanide: Lille's kit / PAPP-A / vit B12



Specific antidote: 3 step antidote  
 Amyl nitrite = Inhalational  
 sodium nitrite = IV  
 thiosulphate = IV

## Chelators

- CI: Cd / Fe
- ▶ BAL/ Dimercaprol: HAL Hg / As / Pb
  - ▶ DMSA/Succimer: HAL
  - ▶ D-Penicillamine: Cu
  - ▶ EDTA (CI in renal F): Pb<sup>2+</sup> (unconscious)
  - ▶ Desferrioxamine: Fe  
- Level >500ug/dl in children
  - ▶ Prussian blue: Thallium

## Hemodialysis:

(X) TCA

- Barbiturate
- Lithium ✓
- Alcohol
- Salicylates
- Theophylline

## Fe toxicity:

GI bleed → Asymptomatic → Liver failure → Pyloric Stenosis

## HEROIN

- Toxicity DOC: Naloxone
- Withdrawal DOC: Methadone

## Forced alkaline diuresis

weakly acidic "ate"

- Salicylate · Mx - Barbiturate

- TCA

NaHCO<sub>3</sub> DOC

## Forced acidic diuresis

weakly basic "ine"

Morphine Atropine  
Strychnine

NH<sub>4</sub>Cl

# Alcohol

## Alcohol Withdrawal

- Earliest: tremors
- Alcoholic hallucinosis: < 48 hrs - intact sensorium
- Delirium tremens: altered consciousness > 48 hrs
- **TOC**: BZD<sup>or</sup> - chlordiazepoxide
- BZD safe in liver failure: LOT - Lorazepam / oxa / tema
- Anti-craving: Naltrexone > Acamprosate

McEwen sign - alt miosis - mydriasis - ↑T - > 250 mg/dl

Morbid jealousy - Othello Sx

Munich-Beer heart - DCM

Mellanby effect - ↑↑

Alc hepatitis: AST > ALT

**Markers: Carbohydrate deficit transferrin > GGT**

## Chronic Neurologic Complications of Alcoholism

**Marchiafava Bignami**: demyel<sup>n</sup> CC

**Wernicke's Encephalopathy**: G O A

Contact admin

Join our group

**Korsakoff Psychosis**: AGA / RGA + Confabulations

**a = pcr for blood** *Widmark formula*  
a = Weight of alcohol in gms  
p = **Weight of body** in kgs  
c = **concentration** of alcohol in blood  
r = constant = 0.68 for male & 0.55 for female

**Legal Limit**: 30 mg %

**Critical Level**: 150 mg % → incoordination

**Coma cocktail**  
→ IV dextrose  
↳ Thiamine (B1)  
↳ Naloxone

# Acute Drug Intoxication

Drugs	Class	Clinical features
<p>Phencyclidine (Ketanamine) "angel dust"</p>	<p>Hallucinogen</p>	<ul style="list-style-type: none"> <li>• Dissociative Anesthesia <span style="color: red;">NMDA ⊖</span></li> <li>• Nystagmus (horizontal or vertical)</li> </ul>
<p>LSD "acid / paper"</p>	<p>Hallucinogen</p>	<ul style="list-style-type: none"> <li>❖ Euphoria</li> <li>❖ Tachycardia/ Hypertension</li> <li>❖ Bad trip, Flashback</li> </ul>
<p>Cocaine - Coke, Snow - Blow, White lady</p>	<p>Stimulant</p>	<p>Tachycardia/ Hypertension/ Mydriasis Magnan bugs <span style="color: red;">VC</span> Black teeth</p>
<p>MDMA "ecstasy / crystal meth"</p>	<p>Stimulant</p>	<ul style="list-style-type: none"> <li>▶ Violent behavior</li> <li>▶ Paranoid Hallucinatory Syndrome</li> <li>▶ Choreiform movements</li> </ul>
<p>Cannabis - Bhang / Majoon dried leaves - Ganja - flower top (♀) <span style="color: blue;">_most potent</span> - Charas/Hashish / Hash oil → stem resin</p>	<p>Psychoactive</p>	<ul style="list-style-type: none"> <li>▶ Increased appetite</li> <li>▶ Amotivational Syndrome</li> <li>▶ RUN AMOK <span style="color: red;">stick figure → stick figure with X → stick figure with X</span></li> <li>▶ Smell of burnt rope</li> <li>▶ Conjunctival injection</li> </ul>
<p>Opium = Heroin - Speedball = Cocaine + Heroin - Hot Shot = Heroin + Strychnine - Micky Finn = Chloral hydrate "knock out"</p>	<p>Opioid</p>	<ul style="list-style-type: none"> <li>❖ Depressed mental status, Miosis</li> <li>❖ Respiratory depression, Constipation</li> <li>❖ Marquis test, Gold chloride test</li> <li>❖ COLD TURKEY <sup>aa</sup> - opioid withdrawal <span style="color: red;">mydriasis, lacr, diarrhea, yawning</span></li> </ul>



# Toxicology Master Chart !!!

