Forensic Evidence in Civil & Criminal Trials

By

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Outline

• Let’s learn Forensic evidence in Civil Trials

• Let’s learn Forensic evidence in Criminal Trials
Forensic Evidence

CIVIL CASES
- Disputed paternity
- Disputed maternity
- Succession
- Inheritance

CRIMINAL CASES
- Sexual offence
- Murder
- Mental disease
- Child as an Adult
Forensic Evidence

- Trace evidence
- Injuries
- Sexually transmitted infections
- DNA profiling
- Lie detector
- Brain mapping
- Narcoanalysis

- Cyber forensics
- Ballistics
- Fingerprints
- Document analysis
- Handwriting expertise
- Toxicological analysis
- Hair & Fibre evidence
- Bite mark analysis
Forensic Evidence

• Scientific evidence V Eye witness
• Silent witness
• Objective Credible Chain of custody
• Trustworthy V Corroborative
• Convictions & longer sentences
• How and when was it obtained?
• Was there an opportunity for it to be contaminated or otherwise compromised?
• Does a particular piece evidence, in fact, actually point to guilt or innocence?
Forensic Evidence

• Establishes elements of crime / act
  suspected substances as contraband drugs
• Associates or Dissociates suspects / accused from the crime / act

  Associating – fingerprint, Firearm, blood, semen, hair, fibre

  Dissociating – Inconclusive forensic tests

• Helps reconstruct the crime / crime scene / act
Forensic Evidence

- Investigating Officer
- Forensic Scientist
- Doctor / Medical Officer
- Living / Dead person/s
- Scene of crime / Incident
Forensic Evidence - DNA

Indian scenario
• Section 45 to 51 IEA
• Expert opinion relevant

Daubert checklist
• Whether it can be tested;
• Whether the theory or technique has been subjected to peer review and publication;
• Known or potential error rate;
• General acceptance of the technique in the relevant scientific community.
Forensic science set up battles serious deficiencies

By T R Bagga

The dramatic twist, with the submission of ‘final’ report by the Special Investigation Team to the Delhi Police, in the mysterious case of Sunanda Pushkar’s death that once again brought to fore the serious deficiencies and lack of coordination between the departments of forensic medicine and toxicology, and forensic science laboratories. Being a sensational case with high socio-political connections, the case has attracted media attention and has been greatly publicised; otherwise, thousands of such cases pertaining to ordinary citizens go unnoticed in the routine.

Forensic science, which is an integral part of science, is facing a serious identity crisis in the country. The forensic science has never been given its right place in the science policy of the country. The scientific organizational or laboratory management principles have never been applied to FSL. They are either run like offices or police stations on shoestring budgets with skeletal staff that are paid peanuts. There is no awareness at all in the field of science and technology about forensic science. The allocation of funds for their growth of both in the universities and FSL are abysmally small and negligible.

While modern forensic science has to work in the frontier areas of science using the cutting-edge technologies if it has to deliver meaningful contribution to the criminal justice system, the forensic community in India is totally cut off from the mainstream of science and technology both academically and professionally. Forensic science is a multidisciplinary subject and it has to draw the knowledge, expertise and inspiration from all pure and applied sciences to effectively apply to crime prevention and crime investigation.

It cannot function effectively if it works in total isolation from the scientific culture and temper under the umbrella of police and other law enforcement agencies. Is it not a surprising paradox that while India has made giant strides in the field of agricultural, pharmaceutical, nuclear, medical, computer and space sciences, forensic science has remained totally static and technologically way behind by couple of decades when compared to other developed countries? Leave alone the advanced innovative research, the forensic laboratories are not even able to adapt routine analytical methodologies developed abroad decades ago for want of personnel, and infrastructure.

Due to serious limitations of staff, infrastructure and abnormally large number of cases, the forensic scientists are not able to show the optimal performance. It may not be out of place to point out that their performance has plummeted to a level much below the internationally accepted parameters. In the absence of where with al forensic laboratories are forced to perform manual as well as formal scrutiny of all analysis. Modern scientific activity be it routine work or research are highly fund resource intensive. As per the law of unintended, we cannot get accurate and fast results cheap.

If we expect accurate, meaningful and fast results from the forensic laboratories, there are no cheap options. We have to invest lot of funds for highly qualified, experienced and competent human resources, infrastructural facilities like buildings, instrumentation, library etc. The accountability in forensic science has been minimal in the past and it must be brought in the ambit of mainstream science and technology. Rigorous accountability should be there through appraisals, assessment and expert reviews by multidisciplinary expert members from different institutions.

Toxicology issues

A committee was appointed for revising the forensic science in India by the Union Ministry of Home Affairs in 2010 and its job within seven limitations and submitted its report in July 2011. However, it will hardly shake the frozen outlook and liberate forensic science from its shackles. Even though the recommendations of this committee were said to have been accepted by the ministry in toto, they have not been implemented to date. Apart from forensic scientists, the committee should have had members from CSIR, ICMR, DRDO universities, judiciary and law enforcement agencies like the Department of Justice, USA (Strengthening Forensic Science in the United States: A Path Forward, National Academies Press, 2009) to have a meaningful outcome.

The plight of the Department of Forensic Medicine and Toxicology in the country is not different from FSL. The facilities of autopsy theatres as well as pathology toxicology laboratories attached to them are either not existing or inadequate. Strangely, there is absolutely no interaction between the forensic pathologists (autopsy surgeons) and the forensic analytical toxicologists who examine the same case. The above Committee has recommended that all toxicological analysis work has to be carried out in a sophisticated laboratory attached to the autopsy theatre under the supervision of the forensic pathologist, as is done in USA and under their Medical Examiners system.

The government and the scientific communities in general and forensic science laboratories and Department of Forensic Medicine and Toxicology in particular should synchronously work to foster the growth of forensic science in the country through an integrated approach towards forensic science education, routine forensic work, and research and development work. Whole forensic science set up needs to be overhauled and reorganised completely, as at all levels, however difficult or painful it is.

This can be done by liberal funding to all agencies concerned and at all levels for improving the availability of human resources, boosting the infrastructure to an excellent state, promoting good science and good research, integrating forensic science with mainstream science and technology and giving complete scientific autonomy free from red tape, bureaucracy and non interference from the police or administrators.

(The author is former Director, Central Forensic Science Laboratory and Head, Forensic Toxicology, Academic Coordinator, Forensic Science, Department of Chemistry, University College of Science, Osmania University, Hyderabad)
Limitations of Forensic evidence

• Much of Forensic Evidence is to be compared?
• Accused is not caught immediately
• Evidence not sent timely to the (FSL) Labs
• Due to poor infrastructure (staff / funding / equipment) no speedy testing
• No chain of custody maintained
• Not all sensitive / specific or confirmatory tests
• No accreditation – NABL / JCI? Of all labs??
• No Defense labs......... Bias
• No interaction between FSL and the Doctors??
Limitations of Forensic evidence

- Evidence only analysed by FSL if sent via Police
- Voluntary reporting to hospital – evidence does not get examined by FSL if not sent by police
SEXUAL OFFENCES
Evidence in Sexual Violence

• Oral testimony of Survivor but requires corroboration?!

• Linking the facts with Forensic Evidence
Forensic Evidence?

In the past ......

• If Forensic evidence was **negative**
  **Absence Of** semen, spermatozoa, hair, injuries

**very difficult** to prove a charge of RAPE

• Such importance given  - Forensic Evidence
Why Forensic Evidence?

Today......

• If Forensic evidence is negative Absence Of semen, spermatozoa, hair, injuries still it could be a case of RAPE ?!!!!

• Because the definition of RAPE / SEXUAL ASSAULT Changed

• Penetrative – Peno vaginal, Peno anal, Peno oral, Body parts- fingering, Objects
• Non penetrative – Kissing, Touching, Manipulating
• Hence- Not Much Demonstrable Forensic Evidence
What is Forensic Evidence in SO?

**Trace evidence**
- Locard’s principle of exchange
-Sem en, Spermatozoa, Blood, Hair, cells, Dust, Paint, Grass, Lubricant, Fecal matter, Body fluids, Saliva
- **Body fluids** – Drug / Alcohol - Blood, Urine, Breath, Sweat
- **Injuries** – Body / Genitals……. – Skin / Mucosa
- Abrasions, Contusions, Lacerations, Fractures
- Incised / Stab / Chop / Firearm injuries

**STIs** – HIV, Hepatitis, Gonorrhea

**Pregnancy & Complications**
- POC, Foetus – MTP, Delivery

**Evidence of treatment**
- pain, infection, depression...
Based on

Analysis of POCSO cases in Five States
Assam, Andhra Pradesh, Delhi, Maharashtra, Karnataka

On appreciation of Medical Evidence

National Law School of India University, Bangalore
SEMEN

• Penetrative assault by penis
• Ejaculation into orifices / surface of body/ at the scene of incident
• Use of condom – its recovery or NOT?
• Vasectomy – its impact on evidence!
• Azoospermia / Necroospermia
• Penetration by Objects / Body parts
• Nonpenetrative assault / No ejaculation / No condom recovered / ??? Vasectomised!
Biological characteristics of Semen

• Typical ejaculation
  – 2-5 ml of semen, 160 million sperm
    • 3 pg DNA/sperm = 480,000 ng DNA/ejaculate
    • Only 1 ng DNA needed for STR typing!

• Seminal fluid
  • Medium for ejaculation
  • Enzymes and other proteins
    – Choline, Spermine, Zinc, Acid Phosphatase (AP), Prostate Specific Antigen (PSA), and semenogelin

• Sperm cells or Spermatozoa
Presumptive vs Confirmatory Tests

• **Presumptive tests**
  – Fast, easy, inexpensive
  – Great for screening evidence to find possible stains
  – Usually detect enzymes specific to the body fluid
  – False positives (hence “presumptive”)
    • Open to attack in court

• **Confirmatory tests**
  – Not available for most body fluids
    • Main exceptions are semen and blood
Presumptive tests

• Florence test
  Choline of seminal vesicles

• Barberio’s test
  Spermine of prostate

• Zinc test
  Zinc from prostate
  140mg/ml in contrast to 1.2mg/ml for normal blood serum
  can be detected in older stains

• Semen Fluoresces under UV light
Wood’s Lamp Examination

3. Wood’s lamp utility in detection of semen. Pediatrics, 1999 Dec;104(6):1342-4

X - water-based lubricant, petroleum jelly, antibiotic ointment and lotion, saliva
Acid Phosphatase enzyme (Prostate)

— Advantages
  • High levels in fresh semen stains
  • Very fast, inexpensive

— Limitations
  • Activity may be weak or absent in older stains
  • Also present at low levels in vaginal fluid and bacteria, cauliflower, almonds, snake venom
  • Not species-specific
Prostate specific antigen

– Major protein in seminal fluid
– Also detected in urine*, fecal matter, sweat, milk but at much lower levels
– Half-life of dried stain: 3 years
– Hydrolyzes semenogelins (seminal vesicle specific antigens)
– Detected with immunochromatographic test strip assay

• Schmidt S et al, Prostate-specific antigen in female urine: A prospective study involving 217 women; UROLOGY 57 (4), 2001, 717-720
Semenogelin or Seminal vesicle specific antigen (SVSA)

- Higher concentration in seminal fluid than PSA
- Not found in urine, milk, sweat
- Greater specificity for semen than PSA
- Detected with immunochromatographic test strip assay – rapid and simple

Confirmatory test for Semen
Confirmatory test for Semen

- Motile Spermatozoa ?!

- Sperm morphology – complete

- Disintegrated sperm heads
BLOOD

• Blood or not
  – Phenophthalein test, Luminol test

• Human or not? – RBC, Antigens........

• Blood group?

• DNA identification
Confirmatory tests

Blood

Semen
Hair

• Hair or Not – fibre – synthetic /natural
• Human or not
• Age
• Sex
• Which part of body
• Natural fall or traumatic
• Whose – Victim / Accused
Innocent people convicted from flawed hair evidence

FBI ADMITS ERRORS IN 90 PERCENT OF HAIR AND FIBER CASES, INCLUDING 13 IN WISCONSIN.

Dee J. Hall, Wisconsin Center for Investigative Journalism

Published 12:04 a.m. CT April 30, 2017 | Updated 6:12 a.m. CT April 30, 2017
Other evidences

- Lubricant
- Saliva – Amylase test
- Fecal matter
Is presence of injuries a must??

- WHO evidence – 30%

- CEHAT evidence (http://cehat.org/go/R83manual.pdf)
  19% body injuries, 38% genital injuries

- 23% cases only had injuries
  :Female Genital Injuries Resulting from Consensual and Non-consensual Vaginal Intercourse, Forensic Science International, 204(2011)27–33.

- Unconscious – drug, trauma, overpower, fear, lubricant

- Explanation 2 to Section 375 IPC
  no physical resistance does not mean consented

- WCD guidelines – in CSA

Guidelines for medico-legal care for victims of sexual violence
Court rulings on injuries
Lower Courts & High Courts

- Physical injuries
- Genital injuries
- Hymenal injuries

Colposcopy

- Magnification / Photo & or Video / Green & white filters
- Introitus, vaginal, cervical – abrasions, lacerations, contusions

David J. Templeton, Angela Williams, Current issues in the use of colposcopy for examination of sexual assault victims, *Sexual Health* 04/2006; 3(1):5-10

Child V Adult


------- colposcopy V visual exam
Toluidine blue dye test
Clothes

- Vaginal Fluid / Vaginal Cells / Anal cells / Feacal Matter / Blood / Lubricant / Saliva / Body fluid / Semen

- Clothes seized
  - When - Immediately / Delayed
  - Which - worn at time of incident / exam
  - What - outer clothes / inner clothes

- Chain of custody

- Clothes packed - contamination
  - Folding / Packing
  - destruction
  - air drying

- Effect of washing of clothes - Semen?
Limitations of Medical Evidence?

• When was the examination done? Documentation
• Mucosal injuries
  (http://pediatrics.aappublications.org/content/116/2/506.long)
• Healing of injuries
• Post assault activities – Urination/ Defecation ??, Washing, douching, bathing!!!!
• Use of Condom which is not recovered

No medical evidence **DOES NOT MEAN** No Offence
Documentation as evidence??!!

Past sexual practices

- Two finger test
- Old hymenal injuries
- Past Pregnancies / Abortions / Contraceptive practices / Last consensual sexual intercourse

When relevant

- Chronic sexual abuse
- If within one week - consensual sexual intercourse

Photographs – body injuries/ genital injuries???
All 5 accused convicted in BPO employee’s rape case

DNA Report & 57 Witnesses Nail Them

New Delhi: Four years after a 25-year-old call centre employee was abducted from South Delhi’s Dhaula Kuan and gang-raped by five men, a trial court on Tuesday convicted all five in the crime.

The court said the DNA report had established that all the accused had raped the woman, who hails from the northeastern region. Apart from forensic evidence, additional sessions judge Virender Kumar Bhat relied on the testimonies of 57 prosecution witnesses and said the evidence was credible and trustworthy.

The court will hear arguments on sentencing of the men on October 17. The minimum prison term they can get is 10 years and the maximum life imprisonment.

The court said the survivor identified the rapists, did not fail at any point and stood her ground throughout. “The deposition of witnesses is in sync with each other and corroborates each other’s version,” the judge said. The crime took place on the night of November 20-24, 2010. The survivor was abducted while walking home with a colleague after getting dropped in an office vehicle.

The accused — Usman alias Kale, Shamshad alias Khutkan, Shahid alias Chhota Billi, Iqbal alias Bada Billi and Kamruddin alias Mobile, all residents of Mewat region in Haryana — were also held guilty of criminal intimidation and sharing common intention.

After abducting the survivor, they had taken her to Mangolpuri in a three-wheeler cargo carrier, raping her in the vehicle and dumped her at an isolated spot.

Convicting the five, the court expressed disappointment over the functioning of forensic laboratories, saying they needed to be more organized and do away with their casual approach. “It has become a practice in the FSL to not mention receipt of sample seals along with exhibits in the acknowledgments and mention in every acknowledgment, the number of sample seals deposited along with the exhibits... A direction needs to be issued to FSl officials to discontinue the practice,” the court said.

Stating that the prosecution’s case had been proven beyond reasonable doubt, the court said the evidence, including the DNA report, established that the woman was abducted and first in a moving vehicle and then at a secluded place. “It is evident that DNA of the accused was found in the vaginal slides... the court held.

18 K woman cop gets Con shoots
DNA analysis

- Personal genetic blue print
- Positive identification except identical / uniovular twins
- RFLP – Restriction fragment length polymorphism
- PCR – Polymerase chain reaction
Restriction Fragment Length Polymorphism (RFLP)

Bloodstain → DNA extracted from blood cells → Restriction enzyme cleavage of DNA

Radioactive DNA probe binds to specific DNA fragments → Transfer of DNA fragments to a membrane (Southern blott)

The fragments of DNA are separated by electrophoresis

Membrane is washed free of excess probe → X-ray film, sandwiched to the membrane to detect radioactive pattern

DNA pattern is compared with patterns from known subjects
Indian Case Laws

• Govind Singh v. state of Madhya Pradesh- SC- fundamental right must be subject to restriction on the basis of compelling public interest
• Khark Singh v. state of Uttar Pradesh 1961- SC- right to privacy is not a guaranteed right under our Constitution.
• N.D. Tiwari case – SC rejected claim of violation of right to privacy & would cause public humiliation. Given in sealed cover
Indian Case Laws

• Priyadarshini Mattoo case - DNA from seminal discharge of accused found on undergarments of victim and her private parts were compared with DNA of accused & they matched conclusively.

• Nirbhaya case - forensic and medical evidence including bloodstained clothes of accused DNA samples matched with that of Nirbhaya

• 2017 – SC – 9 judge bench – Right to privacy a fundamental right
DNA samples

- Sec 164 A CrPC & Sec 53 A CrPC
- Evidence to compare?!
- EDTA vaccutainers – dry gauge – FTA cards?
- Trace evidence on genitals / body / clothes / Scene / Nail clippings / Products of conception / Foetus
DNA

• Workload on FSL?
• Accreditation ...... NABL / JCI
• Private labs / Defense labs

• Pascal’s case / Baduan case????!!!!!!!!!!!!

DNA not matching to the Victim/survivor
DNA samples

• Non matching of DNA – ?????….. False case
• Improper sample
  Maternal / Fetal tissue, Spouse / accused semen
• Denatured sample
  Formalin fixed / Heated / Sunlight / Cold chain XX
• Contaminated sample
  Pre sterile swab / Touch DNA
DNA samples

• 16 loci V 24 loci match

• Reporting ? ..... Statistical probability?!

• DNA typing ..... DNA database???????????

• ? Human DNA Profiling Bill 2015 / DNA Technology (Use & Application) Regulation Bill 2018???
Fast forensic test can match suspects' DNA with crime samples in four hours

Date: August 5, 2010
Source: American Chemical Society
Summary: A newly developed test could make checking DNA from people arrested for crimes with DNA samples from crime scenes stored in forensic databases almost as easy as matching fingerprints. With the test, police could check on whether a person's DNA matches that found at past crime scenes while suspects are still being processed and before a decision on whether to release them on bail.

A newly developed test could make checking DNA from people arrested for crimes with DNA samples from crime scenes stored in forensic databases almost as easy as matching fingerprints. With the
Sexually Transmitted Infections

• Locard’s principle of exchange – if one of them is harbouring infection or disease

• **Incubation period** – Gonnorhoea / Chlamydia / HIV / Hepatitis / Syphilis / Herpes

• **Minimum two examinations**
  – first examination as early as possible
  – second after incubation period

• **Penile contact V Fomite transfer**

• **Penis / Objects / Body parts – Sexual offence**
Pregnancy & its Complications

• Issues with consent – MTP - Age / Person
• Issues with products of conception / foetus
• Authorisation- DNA - Rape / disputed paternity
• Cold storage
• Chain of custody
• Complications - Anaemia / Infection / Infertility / Psychological consequences
Evidence of treatment

• Pain, infection, depression...

• documentation in case sheets / discharge summaries / prescription sheets / pharmacy bills, etc.
Lie detectors

• Badaun gang-rape
  Accused clear lie-detection test: CBI
  Wednesday, 6 August 2014 - 6:28pm IST | Agency: PTI

• Badaun Rape Case:
  Key Witness Fails Lie-detector Test
  By Express News Service Published: 18th September 2014 06:05 AM

• Judge Orders Rape Survivors to Take Lie-Detection Test
  March 19, 2010  Cleveland, Ohio Juvenile Court Judge Alison Floyd
Polygraph Instrument (Lie Detector)
Lie Detector

- BP – Blood pressure
- Pulse
- RR- Respiratory rate
- GSR /skin conduction

- Irrelevant / Relevant / Control questions

- X – psychotic personality, over reactive personality, Drug addicts, restless, Noncooperative people
Computerized Polygraph Lab
Normal (Non Deceptive) Blood Pressure Pulse Patterns

Each individual stroke in this tracing represents a heartbeat within a range of normal acts 80 beats per minute. A stroke of this amplitude (3/4 inch) with the dicrotic notch near the center is an ideal for deception testing purpose.
Blood pressure deception criteria

A typical deceptive response as indicated by a rise in the base level of the tracing. It reflects an increase in blood pressure after a question is heard.
What if polygraph instrument was wrong!

- Yes in USA polygraph machine was wrong
- The manufacturer came forward
- The convicts were released.

- Can it occur in India???
Asaram Bapu Rape Case: Self-Styled Godman to Undergo Narco Test?

By Debasree Purkayastha  September 12, 2013 13:10 IST

Asaram Bapu, the self-proclaimed godman who was recently arrested on rape charges, sparked another controversy after the victim's father sought for a narco analysis test to be conducted on the accused.

Asaram, who is currently in jail, was taken to MDM Hospital, Jodhpur on 9 September, for several tests which includes Magnetic Resonance Imaging (MRI) and Electrocardiogram (ECG).
Narcoanalysis

• At a point very close to unconsciousness
• Subject will be mentally incapable of resistance to questioning &
• Incapable of inventing falsehoods that they used to conceal their guilt

• Sodium pentothal IV
Selvi V State of Karnataka
(2010 (7) SCC 263)

- Lie detection test
- Brain mapping (BEAP)
- Narcoanalysis

- NHRC Guidelines.... Informed Consent
- Not allowed on Legal grounds.....?? Medical!
Selvi V State of Karnataka

- No Lie Detector Tests should be administered except on the basis of consent of the accused. An option should be given to accused whether he wishes to avail such test.
- If accused volunteers for a Lie Detector Test, he should be given access to a lawyer and the physical, emotional and legal implication of such a test should be explained to him by the police and his lawyer.
- Consent should be recorded before Judicial Magistrate.
- During hearing before the Magistrate, the person alleged to have agreed should be duly represented by a lawyer.
Selvi V State of Karnataka

• At the hearing, the person in question should also be told in clear terms that the statement that is made shall not be a `confessional' statement to the Magistrate but will have the status of a statement made to the police.

• Magistrate shall consider all factors relating to the detention including the length of detention and the nature of the interrogation.

• Actual recording of the Lie Detector Test shall be done by an independent agency (such as a hospital) and conducted in the presence of a lawyer.

• Full medical and factual narration of the manner of the information received must be taken on record.
Video goes Viral – Media trial / Public trial before adjudication by Courts
MUMBAI: In the last few years, the city police have used narco-analysis and brainmapping tests as a "secret weapon" against suspects in high-profile cases. However, often the results have been less than satisfactory and in some cases have led to major setbacks.

The Mumbai police's application to conduct narco-analysis on Suraj Pancholi, son of Bollywood actor Aditya Pancholi, who was arrested for allegedly abetting actor Jiah Khan's suicide, has once again brought attention on the much-abused test.

"At times, the police do resort to means, like the narco-analysis tests, as a shortcut to investigation or as a convenient tool to get their way. This should not be encouraged," said criminal lawyer Majeed Memon. "The facts of this case [Jiah's suicide] do not justify subjecting the accused [Suraj] to narco-analysis test and is undesirable."
DISPUTED PATERNITY
DISPUTED MATERNITY
How to solve **Disputed paternity**?

- **Accessibility** of mother with alleged father during the probable time of conception
- **Morphological akinness** of the child with alleged father – complexion, features, etc.
- **Atavism** – X parents - v grand parents, great grand parents of paternal side
- Matching of **blood group and type factors**
- **DNA analysis**
## Use of ABO blood groups

<table>
<thead>
<tr>
<th>ABO blood group</th>
<th>Genotype</th>
<th>Possible outcomes</th>
<th>Children</th>
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<tr>
<td>A</td>
<td>AA or AO</td>
<td>AA &amp; BB</td>
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Use of **Rh system, MNS, Duffy, Kid, ……**
DNA Fingerprinting

- Extracting DNA from cells
- Cutting up the DNA using an enzyme
- Separating the DNA fragments on a gel
- Transferring the DNA onto paper
- Adding radioactive probe
- Setting up the X-ray film
DNA Fingerprinting

mother  Accused 1  Accused 2
Disputed maternity

• Accidental exchange of newborns in the hospitals

• Alleged supposititious child

• Exchange of male babies to female ones due to craving for male baby
How to solve **Disputed maternity**?

- Morphological akinness of the child with alleged mother – complexion, features, etc
- Matching of blood group and type factors
- DNA analysis
- Age of the child matching to the signs on the claiming mother in relation to the time of delivery.
Is it necessary to do age estimation?

- Borderline cases

- Sec 15 (5A) ITPA (Immoral Traffic Prevention Act) 1956

Sec 164A CrPC

- SC judgment in 2013............Ashwani Kumar Saxena V State of M.P. 2013(I) OLR(SC)-214

Documentary proof of age V Medical age
Is it necessary to do age estimation?

• Only in cases where those documents or certificates are found to be fabricated or manipulated, the court, the J.J. Board or the Committee need to go for medical report for age determination.

SC judgment in 2013..........Ashwani Kumar Saxena V State of M.P. 2013(I) OLR(SC)-214
Is it necessary to do age estimation?

- **Sec 94 of JJ Act 2015**
  - Presumption and determination of Age
- Committee, Board to decide on child’s age – decision final
- Reasonable doubt....
- School records to prove birth – marks cards
- birth certificate given by a corporation / municipal authority / panchayat
- only in absence of above, age shall be determined by an ossification test or any other latest medical age determination test ... on orders of Committee / Board
Model Rules???

• Medical Board – Radiologist, Dentist, Physician
• 15 days report

• CWC / JJ Board – lower limit of the range, margin of one year to the child

• Order – Conclusive proof of age
Bone test not enough to fix age: SC

Amit Anand Choudhary
@timesgroup.com

New Delhi: Holding that a medical test does not give an accurate finding regarding the age of a person, the Supreme Court has held that an accused cannot be declared a juvenile solely on the basis of ossification test result and allowed to evade a jail term.

A bench of Justices AK Sikri and R Banumathi said that a blind and mechanical view regarding the age of a person could not be adopted solely on the basis of medical opinion, and it refused to give credence to a report of AIIMS medical board according to which two murder convicts were minors at the time of committing a crime in 1994.

"Cours have always held that the evidence afforded by radiological examination is no doubt a useful guiding factor, in determining the age of a person, but the evidence is not of a conclusive and incontrovertible nature, and it is subject to a margin of error. Medical evidence as to the age of a person, though a very useful guiding factor, is not conclusive and has to be considered along with other circumstances," the court said.

"It is a well accepted fact that age determination using ossification test does not yield accurate and precise conclusions after the examinee crosses the age of 30 years, which is true in the present case," the court said.

The court was hearing a plea of two convicts who, along with four others, were convicted and sentenced to life imprisonment in a murder case. The two convicts never raised the defence of their juvenility during the hearing in trial court and high court. When the matter reached the Supreme Court in 2014, the two convicts told the court that they were minors at the time of committing the crime and could not be sent to jail.

Although the apex court agreed to examine the plea of the two convicts, it rejected the appeal of four other convicts and upheld their life imprisonment. As there was no documentary proof of their age, the court had asked AIIMS Delhi to conduct a medical test to ascertain their age.

The report said that their age was between 35-40 years in May 2015. As per the procedure to calculate the age at the time of incident, their age would have been around 55 years. But the bench refused to rely on the findings saying "Court should not take a hyper-technical approach while appreciating evidence for determination of age of the accused."

The court pointed out that the accused were involved in about two dozen criminal cases before they committed the murder and that they were produced in lower courts in many cases. It said that had they been minors then the lower court would have treated them accordingly and not as majors.

"Had it been so, the appellant would have been considered as children by their appearance. They would have been dealt with accordingly by juvenile court and the matters would not have been kept pending till this date. This in our view is yet another reason that opinion of medical board cannot be relied upon," the bench said.
Age estimation

- Ossification tests / Sutures
- Dental eruption / calcifications / translucency
- Xrays ...................... CT scans / USG / MRI
- Clavicle / 1st rib / cervical vertebrae / iliac crest / Knee
Age estimation


Age estimation

• Telomere shortening with Age
• Age = Relative telomere length $-1.5/-0.005$
• Effect on Cloning

• Investigation of telomere lengths measurement by quantitative real-time PCR to predict age, Sudinna Hewakapuge et al, Legal Medicine Volume 10, Issue 5, September 2008, Pages 236–242,
Age estimation by face images

- Crowds, Pubs, cigarettes, adult websites

Identity: ABC
Age: 42
Gender: Male
Race: White
Hair: Short, brown
Moustache: Yes
Beard: Yes
Mole: Yes
Scar: Yes
Sex verification

- Pinki Parmar case
- Duttee chand case/ Shanti Soundarajan case

- **Isolated test** to **Combination of tests**
- **10nmol/litre less than male levels of testosterone**

The International Olympic Committee (IOC), in charge of making the rules for the 2018 Winter Olympic Games in South Korea, said that there will be no sex or gender testing required for the upcoming games.

"With regard to Hyperandrogenism in female athletes, there were no regulations in place at the Olympic Games Rio 2016 and there will be no regulations in place at the Olympic Winter Games PyeongChang 2018 as we are still awaiting the resolution of the Dutee Chand case," the IOC wrote in a June email in response to an inquiry into how it would regulate the upcoming Olympics.
Child as Adult

Section 15 JJ Act 2015

- **15. (1)** In case of a heinous offence alleged to have been committed by a child, who has completed or is above the age of sixteen years, the Board shall conduct a preliminary assessment with regard to his mental and physical capacity to commit such offence, ability to understand the consequences of the offence and the circumstances in which he allegedly committed the offence, and may pass an order in accordance with the provisions of subsection (3) of section 18:

- Provided that for such an assessment, the Board may take the assistance of experienced psychologists or psycho-social workers or other experts.
Can you force a medical examination on the **Accused** of a Sexual Assault?

- Requisition from minimum of -Sub Inspector of Police
- Reasonable force as per Sec. 53A CrPC

.......................INFORMED REFUSAL

- Medical examination **includes** collection of blood, semen, saliva, hair, body fluids, etc
Is it relevant to document the POTENCY of the Accused?

• Earlier Law – only penetrative assault - Penovaginal
• Now – Fingering / Objects / Non penetrative also

• Sec 53 A CrPC – doesnot ask for Potency exam

• Sec 375 IPC – penetrates his penis to any extent

• SHOULD WE STOP DOING THIS EXAMINATION!!??
  Law doesnot mandate / not 100% medical opinion
Mental disease

• Section 84 IPC

• Insane & not Guilty

• At the time of committing offence

• McNaughten rule

• Guilty but Insane
Artificial Intelligence

• Cyanide Mallika case / Serial rapist Umesh Reddy

• Communication between forensic statisticians, crime investigators, lawyers, Judiciary

• Probabilistic reasoning

• Meta analysis

To Conclude.....

- Forensic evidence in Civil & Criminal Trials
- DNA Profiling
Acknowledgments/ References

• Dr.S.L.Vaya, Additional Director, Directorate of Forensic Science, Gujarat

• Richard Li, Ruth Ballard, Forensic Biology, Lecture 4: Identification of Semen, Available online
THANK YOU

- Recent advances of Forensic Medicine- 2, Book- Jaypee publishers, 2018 chapter – Controversies in Forensic Tests, Investigations and expertise

Bringing together Science & Victimology