



## DNA Database & DNA Profiling or DNA Typing Tools to Trace Missing Children

<sup>\*1</sup>Vijay D. Rughwani, <sup>2</sup>Sweta A Kahurke, <sup>3</sup>Yogesh Golhar

<sup>\*1,2</sup>Assistant Professor, Om College of Engineering, Wardha (M.S), India,

<sup>3</sup>Assistant Professor, YCCE, Nagpur (M.S), India

\*Email Id: vijay\_55478@rediffmail.com

Received date: 11<sup>th</sup> October 2012, Accepted date: 22<sup>nd</sup> November 2012, Published date: 1<sup>st</sup> March 2013

### Abstract:

Lakhs of children are kidnapped across the country each year and pushed into sex or organ trade or bonded labour but precious little is being done to find and restore them to their parents. For these children, it is living through the worst nightmare. Getting lost in markets and seeing strange faces all around may put a child in utter agony. But for a kidnapped child, this is just the beginning of a long ordeal. At the other end, for the parents it is an even bigger horror; not getting to see the child they were bringing up with so much affection and the constant fear of what he or she might be undergoing among strangers. The Supreme Court recently asked the Centre and all the State governments to state what they have been doing to trace the 55,000 children who, officially, have gone missing in the past three years. It issued notice on a petition, which alleged that these children were kidnapped for the purpose of prostitution, bonded labour, removal of vital organs such as kidneys and eyes, bootlegging and smuggling. Incidentally, on July 18, the National Human Rights Commission (NHRC) asked the Delhi government and police to submit a report on claims that at least 50 children went missing from the Capital in the first eight days of that month. It also asked them to inform whether the guidelines on missing children issued in August 2007 were strictly followed. The NHRC had, in the wake of the Nithari kidnappings and murders of children in Noida, constituted a five-member committee under member P.C. Sharma, which prepared an exhaustive report on missing children. This paper focus on recent technology of Bio-engineering like Dna Database & Dna Profiling that can be used to trace missing children.

**Keywords:** DNA databases, DNA profiling, National, Genetic genealogy, Medical DNA database

### Introduction:

India is being manipulated into losing her Sovereignty. The Future of Common Indians is very DARK, as the Indian Democratic Republic is being turned into an Unconstitutional Oligarchy, with "ruthless" CLASS WAR as the main Objective. PPP, Divestment, Privatization, DEREGULATION, National Manufacturing Policy, NMIZs, Destroying Agriculture and "Culture", by Industrialization and Real Estate on Fertile lands, subsidies to the rich oligarchs Indian and foreign in the form of stimuli, from 2008, Deliberately keeping Budget Deficit and Inflation High, SOCIAL ENGINEERING on the diktat of

"their" Western Masters, FDI in and Philanthropy for Education, Efforts to take over the CHILD by the STATE, Misusing the Minorities Against the Majority Hindus, Land Grabs, SEZs, GMO Foods/seeds, Misuse of Media by Predictive programming and other Mind Control techniques over the Masses, Misinformation using the so-called "Intellectuals, celebrities and other Public Figures and Bodies", UID, Bankrupting the Nation in collusion with the International Bankers, Dislocating Citizens of India from their places of birth, "REFORMS", GLOBALIZATION, DEPOPULATION (EUGENICS) and profit for the Pharma industry, misusing Vaccination, Bio-Terror like Bird-, Swine-, etc- Flu, Free Trade, NGOs, the Philanthropic Foundations, both Foreign and Indian, MNCs joining Indian Media Houses in campaigns, Technocracy (Scientific Dictatorship) to STEAL the Wealth of the Citizens by Electronic and other means, carbon Tax /Currency/ Trading, Stock, Commodities And Currency Markets, and above all the UN, with MDG or Agenda 21, False Flags, Awards to Pro-Globalists, allowing Foreign [US] troops to operate inside the nation on the pretext of "War On Terror", etc are being used to weaken the people and thus their WILL to resist, the formation of ONE WORLD TOTALITARIAN GOVERNMENT, also called, THE NEW WORLD ORDER (NWO) <sup>[1]</sup>

In 2005, the NHRC Action Research on Trafficking stated that in any given year, on an average of 44,000 children are reported missing; and of them, as many as 11,000 remain untraced <sup>[2]</sup> It was noted that as per the directions of the Delhi High Court, a cell relating to missing persons/children was set up in the Central Bureau of Investigation but lamented that due to lack of adequate resources, it was not able to achieve the desired results. "Since the CBI is a central investigating agency, having powers and jurisdiction to take up cases of inter-state and international ramifications, it would be desirable to strengthen this cell to enhance its capacity to coordinate and investigate criminal cases relating to missing children and persons," it said. Need for a central repository has long been felt by those working towards recovery and rehabilitation of missing children. Anuj Bhargava, a trustee of missingindiankids.com, which has been operating for over a decade from Bhopal and has helped in the recovery of six children by putting up on its website information and photographs on missing children from across the country, said: "The need of the hour is a

central repository to collect, collate and analyse the data pertaining to missing children.”<sup>[2]</sup>

#### Role of NGOs’:

While acknowledging the role of various non-governmental organisations such as Childline, India’s first 24×7 toll-free tele-helpline which operates in over 73 cities and towns; Bal Sakha in Patna; and the National Centre for Missing Children in Madhya Pradesh that runs website [missingindiankids.com](http://missingindiankids.com), the committee observed that funding was a serious issue with these organisations.

The committee recommended that the issue of “missing children” be made a “priority issue” by all stakeholders, especially the law enforcement agencies; that there be missing persons squad/desk in police stations and as per Supreme Court guidelines there be “prompt and effective steps for tracing missing children.”

The NGOs think that the government is slow to move, they say, because so many children go missing every year. If the figures are put up for public display, the numbers will add up so fast, there will be a furore. What will the government do then? Meantime, small disparate efforts are being made to try and stop this flood of missing children. Rishi Kant of the NGO Shakti Vahini talks about starting an emergency number on which worried parents would report the loss of a child. His NGO then will watch out for those children in the railway stations of Delhi and Mumbai, the major distribution points for trafficked children. Kant, who talks about a 16-year-old girl being rescued from the Delhi home of a doctor couple on Friday — she’d been abducted as a four-year-old and for the last year the doctor had been sexually abusing her while his wife had been feeding her anti-pregnancy pills, says his team harangues the police every day to raid another home. Getting the girl to her parents, though, is a different story.

#### DNA Databases:

Deoxyribonucleic acid (DNA), found in virtually every cell in the body, contains genetic information that helps determine physical characteristics. A person’s DNA is unique with the exception of identical twins. An individual inherits half their DNA from their father and half from their mother. Closely related individuals such as siblings have more similarities in their DNA than unrelated individuals. A DNA database or DNA databank is a database of DNA data. A DNA database can be used in the analysis of genetic diseases, genetic fingerprinting for criminology, or genetic genealogy.



**Figure 1. Current Scenerio of DNA Database**

A massive DNA database has generated a map of the genetic switches which impact everything from hair loss to cancer and opened the door to revolutionary treatments for a host of deadly diseases. The Encyclopedia of DNA Elements has enabled scientists to assign specific biological functions for 80 percent of the human genome and has helped explain how genetic variants affect a person’s susceptibility to disease. DNA databases are important tools in criminal investigations, in the exclusion of individuals who are the subject of criminal investigations or prosecutions and in detecting recidivist acts. This paper shows how DNA data base can be used in analysis of genetic disease.

#### Types of DNA database

DNA database is of following types.

- (i) National DNA database
- (ii) Genetic genealogy DNA database
- (iii) Medical DNA database

#### (i) National DNA database:

The National DNA Database is the largest DNA database in the world and contains the details of a substantial number of vulnerable people. The concerning issues encompass the criminalization of innocent people, erosion of trust in professionals and the transgression of fundamental civil liberties. We are particularly concerned about the implications resulting from the overrepresentation of minority groups, including mental health patients. We believe it is unacceptable for anyone’s profile to be on the National DNA Database, beyond that time necessary to exclude them from an investigation, if they have not been convicted of a crime.

This is an important issue with which doctors need to be informed and actively engaged. For over a decade, there has been a controversial issue dealing with building a national DNA database.

This issue has been brought up over the discussion of the actual database and what kinds of effects will come out of it, if it actually happens to go through. Some people think the database will be a force in crime fighting. Others think it is a violation of civil liberties. In the early 1900s, “fingerprinting,” a new crime-fighting

database, was developed. With the exception of identical twins, no two people have the same fingerprints. Every person who was arrested was fingerprinted, and those fingerprints were inserted into the FBI computer database. This database holds over 40 million fingerprints and this system is still used today. In 1984, a different forensic system developed that compared actual DNA profiles instead of fingerprints. In this day and age, all 50 states maintain a DNA database. Technology has become so advanced, that the slightest trace of any human individual can be used to create a DNA profile (DNA). All of this has been the start to the controversial issue of building up a national DNA database, with a DNA profile of literally every single American born into the United States. As more bills are passed to build the databases, this problem keeps developing. The Genetic Information Nondiscrimination Act (GINA) has been under great discussion since about 1995. Basically, this is a bill that prohibits insurance companies and employers to actually take action against an individual through their DNA, using the power of the government (Alston). The Newborn Screening Saves Lives Act, which grants money to healthcare providers to collect genetic DNA to the state, is also a policy that has been proposed in the past to help this issue along.

While some argue that these policies and the national database are violations on human rights, others like the idea of a national DNA database, claiming that the United States would be safer.

### (ii) Genetic genealogy DNA database

In a first step toward the creation of a worldwide genetic family tree, a free interactive genetic genealogy database was launched. This database allows members to input their own DNA information into the database, built from collected genealogies and DNA samples from people all over the world, and search for possible matches. Participation requires entering the values from your DNA profile -- somewhat pricey genetic test now offered to the public by many laboratories using a cheek swab or mouth rinse -- into the database's drop-down menus. A graph then appears which displays information such as surnames, dates and places of birth for likely related individuals. Only names of people who lived prior to 1900 are available in order to protect the identity of living people and the privacy of participants who donated their DNA and pedigree charts. A potential match means people are related "with a high degree of probability (high 90 percentile). The molecular genealogy database is just the beginning of a project that will be expanded in scope over time. To date, DNA data from more than 5,500 participants has been catalogued, including over 40,000 surnames, and the

foundation plans to update the database every three months with new information. That data will eventually used to create extensive family trees that will allow curious genealogists to find links with others whose genetic information matches their own<sup>[3]</sup>

### (iii) Medical DNA database

Its main goal is to tease apart the genetic and environmental components of conditions such as cardiovascular disease and cancer and, eventually, to come up with new drugs to treat--or even prevent--these conditions. An expert panel is currently hammering out a strategy for setting up the database and is due to report its recommendations next month. Following the examples of Iceland, Sweden, and Estonia, the United Kingdom is drawing up plans to create a national database linking the DNA of 500,000 of its citizens to their medical records and lifestyle details<sup>[4]</sup>

### DNA Profiling or DNA typing:

The analysis of the DNA is known as **DNA Profiling** or **DNA typing**. DNA fingerprinting is not the appropriate term. DNA profiling is typically carried out when human biological fluid or tissue is found at a crime scene and used as evidence to link to, or exclude from, that scene, a possible suspect. Some examples are:

- A murder where it appeared that a struggle took place and blood from the murderer was left at the scene. This would be compared to a sample of blood from the suspect.
- A murder where a blunt instrument was used and a suspect was found with a club on which there were dried blood stains. The blood on the club would be compared to the victim's blood.
- A rape case where seminal fluid from the offender can be taken from the victim. This would be compared to a sample of blood from a suspect.

DNA profiling can only be used if there is enough DNA in the samples, and is only useful in comparing samples. Crime samples can be compared to a sample from a known suspect or compared to a database of DNA profiling results from other scenes or from convicted offenders. If there is a 'match', the two samples may have originated from the same person.

### DNA Profiling Techniques

There are two DNA profiling techniques used in forensic science laboratories throughout the world.

1. **Restriction Fragment Length Polymorphism (RFLP)**
2. **Polymerase Chain Reaction (PCR)**

The RFLP method was the first DNA profiling technique used in casework in Victoria in 1989. It involves cutting up the DNA into small fragments with molecular scissors known as restriction enzymes and determining their length. This is done by electrophoresis ie placing the fragments on a gel that acts as a molecular sieve. When a voltage is applied the larger fragments travel a lesser distance than the smaller ones because the gel molecules hinder the movement of the fragments.

The DNA fragments on the gel are then transferred to a special membrane to which is applied a 'probe', a radioactive piece of DNA that specifically attaches to certain fragments depending on their typ. The position of the probe is found by placing the membrane next to a sheet of radioactive film, resulting in the DNA fragments appearing as 'bands'.

The discovery of the PCR technique in 1984 has had a huge impact on the field of molecular biology (the study of DNA). Its applications have revolutionized the methodology in all fields of genetics. The method involves repeatedly copying a small area of the DNA molecule.

PCR method has many advantages over the RFLP method. The main advantage being that it is more sensitive; i.e. it is able to be used with smaller amounts of DNA or damaged DNA. It is also less time consuming than RFLP analysis. For these reasons PCR was introduced for casework and is the technique currently in use. The PCR reaction involves repeatedly amplifying (copying) a small region of the DNA molecule, so that at the end of the reaction that particular piece of DNA is present in greater (more detectable) amounts. To carry out the reaction a machine called a thermal cycler is used, which subjects the DNA to repeated cycles of heating and cooling. The double-stranded DNA is heated and the separated strands are allowed to bind to 'primers'. These primers are pieces of DNA made so that they attach to the DNA at each end of the region to be copied.

This single-stranded DNA is then copied to produce two new double stranded pieces of DNA. This heating/binding of primers and copying is repeated approximately 30 times, each time doubling the amount of DNA in the region of interest.

**Working of DNA Profiling:**

*Steps in DNA Profiling are as follows*

**1. Collect a sample and extract its DNA.** Scientists only need a tiny amount of DNA—around 100 micrograms—to construct a DNA profile from a crime scene sample. That’s so little, a few cells from saliva on a straw will do.

**2. Amplify the telltale regions.** Scientists use a powerful technique called Polymerase Chain Reaction (PCR) to make millions of copies of the sample’s telltale DNA regions. In particular, they home on regions known as Short Tandem Repeats, or STRs, which are composed of short units of DNA—just four or five bases long—that are repeated numerous times in a row. What makes these regions telltale is that the number of repeats they contain varies widely from person to person. In criminal investigations, 13 such STR regions, all located in the non-coding DNA between our genes, are analyzed for the number of repeated units they contain.

**3. Count the repeats.** During PCR, fluorescent dyes are attached to all the STR copies that get made—one type of dye for each STR region—so that all of the DNA copies from a given region can be distinguished from the others in the mix. Scientists run the mixture through a capillary electrophoresis machine, which separates the various DNA fragments by size. From there, it’s a fairly easy thing to calculate the length of each STR region, and, therefore, the number of repetitive units at each site.

**4. Look for a match.** To convict a suspect, his or her STR repeats must match those in the crime scene sample—at all 13 STR regions. According to the FBI, when all 13 STR sites match perfectly, it’s virtually guaranteed you’ve got your culprit; the odds of fingering the wrong person are about one in 1 billion. A single STR mismatch, however, is enough to exonerate a suspect and spur investigators to search CODIS, the nation’s database of DNA profiles, in hopes of solving the crime [5].

DNA profiling is also commonly in use for paternity testing, usually to determine fatherhood of a child when this is disputed.

Type of Cases Examined	% of Cases
Homicide	20
Sexual Offences	60
Assaults	7
Burglary/Robbery	7
Criminal Damage	1
Other	5

**Table 1: Victoria city chart**

**Case Study:**

It was a strange phone call, says Anuj Bhargava. A man called Arun was calling from Belgium. Sometime in the '80s, said Arun, he'd been sold for \$8,000 to a Belgian couple by an orphanage in Chennai. He had an old photograph with him. Of him and a man — the man who had abducted Arun from his family. Could Anuj help find

his family? Anuj, a trustee of the NGO National Centre for Missing Children, called his local newspaper in Indore asking whether they had a correspondent in Chennai and if he could track down Arun's family. Soon, a woman who claimed to be Arun's mother was found. But only a few weeks later, Arun called back to say the search should be called off. Apparently, the police had begun to harass the woman.

Anuj wonders how much longer this will carry on. His website [missingindiankids.com](http://missingindiankids.com) puts up pictures of missing children from around the country, asking viewers to take printouts and put them up. So far, in 10 years, the website has been able to reunite just six children with their parents. That's a tiny drop in the ocean, considering the government recently put the figure at 12 to 13 lakh missing children in India every year. Yet, this is not a lost cause. People like Arun, can be reunited with their parents, no matter how many years later the children reappear, often as adults. And a solution is being offered to us from Spain, by Professor Jose A Lorente, a forensic geneticist with the University of Granada most famous for identifying the remains of Christopher Columbus and South American liberator Simon Bolivar. It started in Lima (Peru) a decade ago, while Lorente was there to identify the bodies of some terrorists. When he saw the street kids, he wondered what the police were doing to send them back to their parents. "Nothing," the police said. That spurred him to go to 15 countries — including Guatemala, Peru, Brazil, Indonesia, Malaysia, Thailand and Nepal — to build databanks which store the DNA of parents who have lost children. That way, when the children are found, a search of the DNA databank will allow the child to be reunited with their parents. Lorente, however, has had little luck in India. India has been talking about a national DNA databank — which would encompass the parents of missing children, DNA from the 30,000-50,000 dead bodies that are found each year, and from convicted criminals — since 1998, when the idea was first mooted at the Centre for DNA Fingerprinting and Diagnostics in Hyderabad, but nothing much has happened. In July 2007, after the abduction and murders of children in Nithari (Noida), the NHRC had in a report recommended that a national database of missing children be compiled on a priority basis. The database would be made up of text and pictures, no DNA was to be collected. But PC Sharma, the former NHRC member who presented the report, says the database was never built. While officials within the NHRC hinted that the responsibility was passed on to the then newly constituted National Commission for the Protection of Child Rights (NCPCR), Professor Shantha Sinha,

chairperson of NCPCR, says she was never made aware of it being passed on to her. But yes, she says, the database is needed.

More optimistically, Prem Narain, secretary of the ministry of women and child development — which will have to take final responsibility for a database or DNA databank of missing children — had said last month that they will soon be inaugurating an online database of such children. To be called Track Child, Narain said he hoped the database would finally help return as many as 40% of kids to their parents. He added Track Child will "definitely be inaugurated by the end of this year or early next year". But that is not enough. A simple database does not stop illegal adoptions. Today, how do we know that a man or woman giving up a child for adoption is actually that child's parent? "A DNA test would ascertain that," says Lorente. "It would also push down the number of children who are trafficked and forced into prostitution." Lorente's databanks have so far reunited about 550 children with their families, and have stopped 200 illegal adoptions.

Dr VK Kashyap, former chief of the directorate of forensic science services (DFSS), which will finally be responsible for the national DNA databank, says Rs 20 crore had in principle been approved for a pilot project. "The databank would be built on the public-private partnership model. There would, finally, be 30 to 40 collection centres around the country where DNA would be collected. The collection centers would be run by private companies but the central databank would be managed by the government." He is hard-pressed to answer why it hasn't been done as yet. So is Dr CN Bhattacharya, the current chief of the DFSS. On the phone from Guwahati, where he is touring, he says he has just taken over the DFSS, so it is difficult to say why it's taken so long to build the databank. But he says the pilot project will take off soon. Narain adds that a DNA databank of missing children, while wanted, is difficult to imagine right now. That maybe the numbers are too big here for us to be able to afford it. According to Kashyap, each DNA test should cost about Rs 1,000<sup>[6]</sup>

#### **Conclusion:**

It is to be noted that new technology like DNA Databases & DNA Profiling can be used as tools to solve core issues like missing children. Statistics shows how rate of finding missing child has been increased by using this technology. Most developing nation like US, U.K & France rely heavily on these technique. In India still lot of improvement & adaptability is required in this technique. DNA Profiling Bill requires lot of changes so as to make it feasible to have good result. Presently 60 countries operate DNA Data bases & 34 new countries are planning to set up DNA Databases. This

paper showed how few cases were solved using above indicated technology. In India there was need to look at technology in detail to ensure speedy recovery of missing children. DNA profiling could prove to be a handy tool in this field.

Incidentally, as per Interpol, “with the exception of identical twins, each person’s deoxyribonucleic acid (DNA) is unique, which makes DNA sampling useful for solving crimes, identifying victims of disasters and locating missing persons.” The United States realized this about a decade-and-half ago. In 1998, it established a national DNA database known as the National DNA Index System. This system now has over 11 million searchable profiles and has aided close to 1,70,000 investigations. As per the Federal Bureau of Investigation, DNA databases have been particularly helpful to investigations that have been on for a long time and were no longer providing new leads. The FBI has also been sharing its Combined DNA Index System (CODIS) technology with law enforcement agencies in other countries. This system, as per the agency, blends forensic science and computer technology into an effective tool for solving violent crimes by allowing laboratories to store, compare, and match DNA records from offenders, crime scene evidence, unidentified human remains, and relatives of missing persons.

**Acknowledgement:**

We thanks to our college management, teammates, family & friends & critics for their constant encouragement & support.

**References:**

- [1]<http://ramadeva2.wordpress.com/dna-database-info-archive/>
- [2]<http://traffickingnews.wordpress.com/tag/national-dna-database/>
- [3]<http://genealogy.about.com/b/2004/03/01/new-dna-genealogy-database.htm>
- [4]<http://www.sciencemag.org/content/287/5456/1184.2.summary>
- [5] <http://grow.cals.wisc.edu/health/how-dna-profiling-works>
- [6][http://articles.timesofindia.indiatimes.com/2012-10-special-report/34306149\\_1\\_dna-databank-missing-children-nhrc-member](http://articles.timesofindia.indiatimes.com/2012-10-special-report/34306149_1_dna-databank-missing-children-nhrc-member).

\*\*\*\*\*