

The forensic use of bioinformation

Resources for teachers

These activities aim to teach students to think about how bioinformation - fingerprints and DNA profiles - are used to investigate crime. Students will be encouraged to consider the ethical issues arising from the storage of bioinformation on national databases.

The activities have been designed to be flexible for different size groups and different classroom facilities. The activities have been developed for Key Stage 4 and above and can be used for a range of subjects.

Contents

Background information for teachers	04
--	-----------

Activity 1 – Introduction to the forensic use of bioinformation	10
--	-----------

Lesson plan

Materials:

- a. The forensic use of bioinformation introductory PowerPoint and quiz 11
- b. Fact file: DNA and fingerprints 12
- c. Quiz answers 14

Activity 2 – The forensic use of bioinformation: ethical issues	15
--	-----------

Lesson plan

Materials:

- d. Summary of European Court Judgment 18
- e. Summary of rights and freedoms from the European Convention on Human Rights 19
- f. Statement cards 21
- g. Suggested responses 22

Activity 3 – The forensic use of bioinformation case studies	26
---	-----------

Lesson plan

Materials:

- h. Case studies 28
- i. The forensic use of bioinformation law - summary sheet 33

Produced by the Nuffield Council on Bioethics 'Reaching Out to Young People' Advisory Group and Sarah Bougourd, Communications Officer, Nuffield Council on Bioethics.

Information correct at the time of writing in November 2009.



Curriculum Links

Subject	Activity 1	Activity 2	Activity 3
KS4			
Citizenship	May be useful as a preliminary exercise for activities 2 and 3	<input checked="" type="checkbox"/> Concepts: Rights and responsibilities; Democracy and Justice Processes: Critical thinking and enquiry	<input checked="" type="checkbox"/> Concepts: Democracy and justice Processes: Advocacy and representation
Law	May be useful as a preliminary exercise for activities 2 and 3	<input checked="" type="checkbox"/> Demonstrate knowledge and understanding of the balance between the rights and obligations of individuals and groups	<input checked="" type="checkbox"/> Apply critical understanding to examine issues, and construct and evaluate arguments and conclusions
Personal development	May be useful as a preliminary exercise for activities 2 and 3	<input checked="" type="checkbox"/> PLTS: Independent enquirers	<input checked="" type="checkbox"/> PLTS: Team workers; Effective participators
Religious studies	May be useful as a preliminary exercise for activities 2 and 3	<input checked="" type="checkbox"/> Concepts: Practises and ways of life; Identity, diversity and belonging	<input checked="" type="checkbox"/> Concepts: Practises and ways of life; Values and commitments
Science / Biology	<input checked="" type="checkbox"/> How Science Works Applications & implications of science	<input checked="" type="checkbox"/> How Science Works Applications & implications of science; Communication skills	<input checked="" type="checkbox"/> How Science Works Applications & implications of science; Communication skills
A Level			
Applied science	<input checked="" type="checkbox"/> Science and the community	<input checked="" type="checkbox"/> Science and the community	<input checked="" type="checkbox"/> Science and the community
Biology	<input checked="" type="checkbox"/> How science works	<input checked="" type="checkbox"/> How science works	<input checked="" type="checkbox"/> How science works
Law	May be useful as a preliminary exercise for activities 2 and 3	<input checked="" type="checkbox"/> Relationship between law and morals	<input checked="" type="checkbox"/> Relationship between law and morals
Philosophy	May be useful as a preliminary exercise for activities 2 and 3	<input checked="" type="checkbox"/> Philosophical problems	<input checked="" type="checkbox"/> Philosophical problems
Religious studies	May be useful as a preliminary exercise for activities 2 and 3	<input checked="" type="checkbox"/> Religion and ethics	<input checked="" type="checkbox"/> Religion and ethics
Science in society	<input checked="" type="checkbox"/> Evaluating a scientific or technological issue	<input checked="" type="checkbox"/> Evaluating a scientific or technological issue	<input checked="" type="checkbox"/> Evaluating a scientific or technological issue

Background information for teachers

Fingerprints and DNA profiles are routinely used by police in crime investigation. Whilst this is often a valuable tool for solving crime, the collection and storage of bioinformation, and access to the resulting forensic databases, raise a number of ethical issues.

What is a forensic DNA profile?

- Each person's DNA is unique (except identical twins)
- A DNA profile is created when a complete DNA sample, taken from a cheek swab of a criminal suspect or from blood or other biological material found at a crime scene, is analysed
- A forensic DNA profile is a sequence of 20 numbers, each of which represents a specific part of the genome, plus a sex indicator
- A DNA sample contains all the genetic information about a person; a DNA profile only contains information to help identify a person
- On average, the chance of two unrelated people sharing the same complete forensic DNA profile of 20 numbers is around one in a billion



Background information for teachers

Legal background

Taking fingerprints and DNA

In England, Wales and Northern Ireland, the police can take a DNA sample and fingerprints without consent from anyone arrested for a 'recordable' offence (mostly offences that could lead to a prison sentence). The DNA profile derived from the sample is stored on the National DNA Database (NDNAD) and the fingerprints are checked using the National Automated Fingerprint Identification System (NAFIS).

Storing fingerprints and DNA

The laws governing the amount of time for which a person's fingerprints and DNA can be stored on the databases are the same in England, Wales and Northern Ireland, but different in Scotland. There have been a number of developments in this area of law recently, as summarised in this table. Please note this information is correct as of November 2009 and legal changes may be ongoing. For more information please see http://bit.ly/DNA_database_homeoffice

Since 2003	<ul style="list-style-type: none">• In England, Wales and Northern Ireland, DNA profiles and fingerprint records are stored permanently on databases even if the person arrested is not later charged with or found guilty of a crime• DNA profiles of individuals who have volunteered their DNA as part of an investigation may be stored permanently if consent is given by the volunteer• The UK has the largest DNA database per head of population of any country in the world, with 5.5 million DNA profiles held• In Scotland, records are destroyed if the person is not charged or convicted, unless it is a serious crime and the police request to keep it
December 2008	<ul style="list-style-type: none">• In a case brought by UK residents, S. and Marper, to The European Court of Human Rights, the Court ruled that keeping an innocent individual's DNA and fingerprints on record indefinitely is a violation of a person's right to privacy• Legal changes were therefore necessary in England, Wales and Northern Ireland
May 2009	<ul style="list-style-type: none">• The Government announces new proposals to change the way DNA is used and retained in England, Wales and Northern Ireland• More than 500 people and organisations write to the Government setting out their views on the proposals
November 2009	<ul style="list-style-type: none">• The Government announces revised proposals, including:• All DNA samples should be destroyed as soon as they are converted into a profile• DNA profiles of people arrested but not later convicted of a crime should be retained on the National DNA Database for 6 years• The proposals will be debated in Parliament and introduced through an Act of Parliament 'as soon as Parliamentary time allows'

Background information for teachers

Ethical considerations

At the heart of this debate is the need to find an appropriate balance between protecting people from crime and protecting the right to privacy of innocent people. Different people will have different views on which is more important. Key questions include:

- Is it justified for the police to take DNA and fingerprint samples upon arrest?
- Is it justified for people's data to be stored permanently even if they are innocent?
- What are the implications for innocent people of having their details on a database?

Background information for teachers

Summary of key issues

Issue	Summary	For	Against
The ' <i>no reason to fear if you are innocent</i> ' argument	This argument says: innocent people have nothing to fear from being on the National DNA Database	<ul style="list-style-type: none"> Having as many people's DNA as possible helps the police to identify people who were at a crime scene and find the perpetrator People should not mind/care about having their DNA on a database if it is for the wider benefit of solving crime Nothing will happen to innocent people on the database as long as they don't commit a crime 	<ul style="list-style-type: none"> If your DNA is on the database, there is a chance you will be identified as a match or partial match to a crime scene sample even if you are innocent. You may not be charged, but being involved in a criminal investigation can be distressing People may feel that being on the database implies that they are a criminal Sensitive genetic information can be obtained from DNA samples, such as family relationships
Should there be a population-wide DNA database?	It has been suggested that there should be a population-wide forensic database e.g. by taking the DNA of everyone at birth	<ul style="list-style-type: none"> This would remove discrimination as all people would be treated in the same way It would assist police with their investigations People may be deterred from committing crime if they knew the police already held their DNA and they could be easily caught 	<ul style="list-style-type: none"> This would be very expensive Any impact on public safety would be minimal as the majority of people will not go on to commit crimes so having their DNA will not assist the police It would be very hard to maintain the records for people coming in and out of the country Having a DNA profile on the database is only useful if there is DNA collected from a crime scene, so this is where efforts and money should be concentrated

Background information for teachers

Summary of key issues continued

Issue	Summary	For	Against
Familial searching	If a crime scene sample does not find a match on the database, police can search for a genetic relative to help track down the person who left the sample	<ul style="list-style-type: none">This process could help to find possible relatives which may lead to finding a suspect	<ul style="list-style-type: none">The process could reveal previously unknown family relationshipsThis could be seen as an intrusion into family privacy

Further reading

Short guide to '*The forensic use of bioinformation: ethical issues*'

http://bit.ly/bioinformation_short_report

Please note that laws regarding the use of forensic bioinformation have been under review since this short guide was published. The Home Office outlined new proposals in November 2009 which may lead to a change in policy.

Glossary

arrest (for a criminal offence)	An action of the police, or person acting under the law, to take a person into police custody
bioinformation	Biological material or data that contains information about an individual which may assist in their identification (e.g. fingerprints, DNA sample, DNA profile)
charge (with a criminal offence)	A formal accusation preceding a criminal prosecution
crime scene sample	Biological sample obtained from examination of a crime scene and collected by a Scenes of Crime officer
DNA (deoxyribonucleic acid)	The chemical that carries a person's genetic information. Most cells of a person's body contain a complete copy of that information. A DNA molecule consists of a long chain of units called nucleotides or bases, designated A, G, C & T
DNA profile	An individual's profile stored on the National DNA Database. Consists of a series of 20 numbers, recording the size of particular marker sections of DNA, plus a sex indicator. The profile is derived from analysis of a DNA sample
DNA sample	A biological sample collected from a crime scene, or taken from an individual, usually a swab of saliva taken from the inner cheek
'familial searching'	The tracing of biological relatives through the location of 'close matches' between a crime scene sample and a profile on the National DNA Database
forensic	Related to courts of law or legal argument, commonly in relation to the detection of crime
forensic science	The application of scientific techniques to the investigation of legal disputes, commonly in relation to the detection of crime
genetic	Relating to a person's genes. A gene is a unit of heredity which is transmitted from parent to child, usually as part of a chromosome. Genes consist of DNA
IDENT1	The software 'platform' that hosts a number of police databases, including the national fingerprint database
NAFIS	The National Automated Fingerprint Identification System
NDNAD	The National DNA Database

Activity 1

Introduction to the forensic use of bioinformation

Lesson plan

Introduction

An introductory activity to explore the basic science of fingerprints and DNA and discuss how they are used in investigating crime

Learning Outcomes

Students develop an understanding of:

- the science behind the use of fingerprint and DNA evidence in criminal investigations
- the difference between a DNA sample and a DNA profile

Structure

Whole class and individual or group work

Materials

- Forensic bioinformation PowerPoint presentation and quiz
http://bit.ly/bioinformation_introduction
- Fact file: DNA and fingerprints (see page 12)
- Quiz answers (for teachers)

For making fingerprints:

- Dust (flour, chalk, talc, cocoa powder) or soft pencils or non-permanent ink
- Plain A4 paper (white paper for pencil, cocoa or ink prints; black paper for white powder prints)
- Sellotape
- Scissors
- Magnifying lenses
- Microscope (optional)
- Soap and water or hand wipes

Activity 1

Introduction to the forensic use of bioinformation

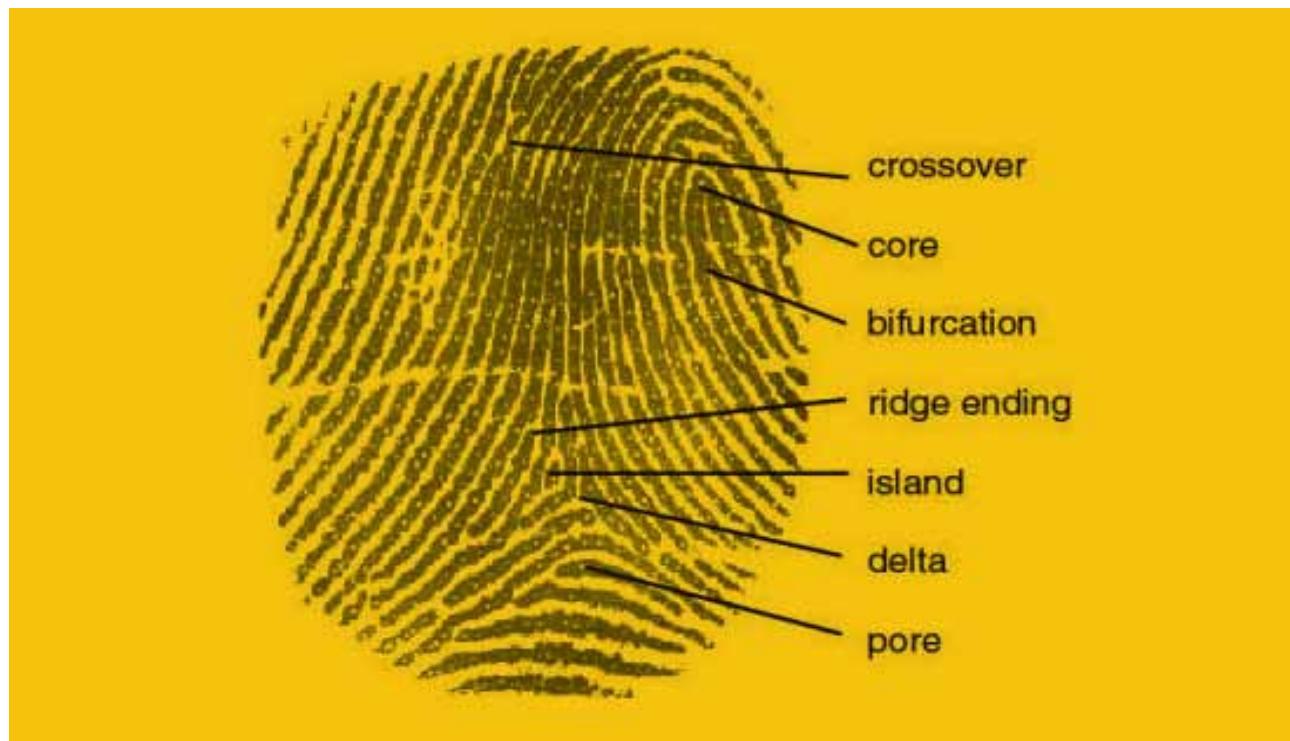
Activity

1. Use the PowerPoint presentation or handout 'Fact file: DNA and fingerprints' to conduct a general introduction to DNA and fingerprints. Explain the functions of forensic bioinformation and highlight the difference between a DNA sample and a DNA profile. Students are given the DNA and fingerprint fact file and can take extra notes from the PowerPoint presentation.
2. Students now use the powder or ink, sellotape and paper to take their own fingerprints:
 - Put your thumb or finger in the dust/pencil rubbing/ink pad, then place on the sticky side of a piece of sellotape
 - Stick the sellotape onto a piece of paper
 - N.B. to obtain a good quality fingerprint, wash hands between prints and tap fingernails so that excess powder comes off - a thin layer is best
 - Students can then examine their own fingerprints with the magnifying lenses or binocular microscopes looking for the characteristics that are labelled on the handout, and in small groups compare their prints with others
3. Fingerprints and DNA quiz (questions are on the PowerPoint presentation). Students can answer on paper/blackboard/interactive whiteboard and can either work alone or in pairs/small groups.

Fact file: DNA and fingerprints

Fingerprints

- Fingerprints are the most commonly used method of identification
- Fingerprints develop before birth and remain unchanged throughout life
- No two people have the same fingerprints (including identical twins)
- Fingerprints may be taken from a person when they are arrested or found at a crime scene or taken from a weapon or item of interest to the police
- Fingerprints are hard to analyse and trained experts must check them. Partial fingerprints are even harder to analyse
- Identification relies on the matching of patterns and the detection of certain ridge characteristics (Galton details)
- When fingerprint evidence is used in court, juries must be aware that when a match is declared, it is never a matter of scientific certainty or conclusive fact, it is the opinion of the expert



Fact file: DNA and fingerprints

A DNA sample...

- Is a biological substance such as blood, skin, hair or semen
- May be taken from a person (e.g. a cheek swab) when they are arrested or found at a crime scene or taken from a weapon or item of interest to the police
- Contains all the genetic information about a person

A DNA profile...

- Is obtained by extracting some information from a DNA sample
- Is a sequence of 20 numbers that is stored on the National DNA Database
- Can be used to identify a person

How is a DNA profile created?

The technique currently used for DNA profiling in the United Kingdom is SGM Plus® (SGM+). It tests for ten 'markers', known as short tandem repeats (STRs), and a sex marker. STRs are short sequences of DNA that are repeated in tandem several times, and the number of repeats varies between individuals. The number of repeats is recorded to produce the DNA profile. It consists of 20 two-digit numbers (each person has two copies of each marker, one inherited from each parent), and a sex indicator.

The chance of two unrelated individuals sharing the same complete forensic DNA profile is around one in a billion. Chance matches are, however, more likely to arise:

- if the crime scene sample contains only tiny amounts of DNA, giving a partial profile
- between closely related individuals
- as the size of the National DNA Database expands
- between individuals within an isolated or inbred population

DNA profiling is generally a very reliable way of identifying a person

BUT:

- DNA evidence comes with lots of complicated statistics which can be difficult for legal professionals and members of the jury to understand
- contamination can occur e.g. at the crime scene, from police, or from laboratory staff due to poor storage protocols

Activity 1

The forensic use of bioinformation quiz answers

Question 1

No two people, even identical twins, have been found to have the same **fingerprints**

Question 2

A DNA profile is recorded on the National DNA Database as a sequence of **20** numbers

Question 3

Fingerprints are stored on a database called **NAFIS** (or the National Automated **Fingerprint** Identification System)

Question 4

On average the chances of two people sharing the same complete DNA profile is around one in a **billion**

Question 5

A DNA **sample** is a biological substance such as blood, skin, hair or semen



Activity 2

The forensic use of bioinformation: ethical issues

Lesson plan

Introduction

This activity provides students with background information about the storage of fingerprints and genetic information on national databases and asks them to consider different points of view about the associated ethical issues

Learning Outcomes

- Students understand the major ethical issues associated with the storage of forensic bioinformation on national databases
- Students use critical thinking and engage in debate to reflect on different ideas, opinions and assumptions
- Students develop the skill of arguing from more than one point of view

Structure

Individual and group work

Materials

- Summary of European Court Judgment
- Summary of rights and freedoms from the European Convention on Human Rights
- Internet access required to watch these news clips from the BBC
http://bit.ly/keeping_DNA
http://bit.ly/newsnight_DNA_clip
- Statement cards

Activity 2

The forensic use of bioinformation: ethical issues

Activity

1. Students read carefully through a simplified summary of the European Court of Human Rights ruling in the S. & Marper case from December 2008 and are provided with a summary of rights and freedoms according to the European Convention on Human Rights.
2. Students watch these video clips from the BBC website:
http://bit.ly/keeping_DNA
http://bit.ly/newsnight_DNA_clip
and are asked to make notes on the different viewpoints presented in the clips.
3. Split the class into small groups, and allocate each group a character from:
 - A police officer
 - A person who has been wrongfully arrested
 - A person who volunteered their DNA as part of a specific crime investigation
 - A relative or friend of a victim of violent crime
 - A leader of a civil rights campaigning group
4. Each group discusses the statements and must decide whether their character is most likely to agree or disagree with the view(s) presented and be willing to give a reason for their answer. Suggested responses are provided overleaf (please note: this is just a guide, students may be able to come up with other good reasons for agreeing or disagreeing with the suggested views).
5. Groups now swap over statement cards and repeat the process (optional).
6. The statements are then read out to the whole class in turn, a class debate is held as each group explains their argument.
7. At the end the students could be asked to vote on their personal opinion on each statement.

Summary of European Court Judgment

EUROPEAN COURT OF HUMAN RIGHTS

4.12.2008

GRAND CHAMBER JUDGMENT

S. AND MARPER v. THE UNITED KINGDOM

The European Court of Human Rights has today delivered its judgment at a public hearing in the case of *S. and Marper v. the United Kingdom*.

Principal facts

The applicants, S. and Michael Marper, are both British nationals, who were born in 1989 and 1963 respectively. They live in Sheffield, United Kingdom.

The case concerned the holding of the applicants' fingerprints and DNA profiles by the police, after criminal proceedings against them broke down.

S.

- On 19 January 2001 S. was arrested and charged with attempted robbery.
- He was aged eleven at the time (which is why he cannot be named).
- His fingerprints and DNA samples were taken.
- He was found not guilty on 14 June 2001.

Michael Marper

- Mr Marper was arrested on 13 March 2001
- He was charged with harassment of his partner.
- His fingerprints and DNA samples were taken.
- On 14 June 2001 the case was formally discontinued as he and his partner had become reconciled.

Once they had been cleared, both applicants requested that their fingerprints, and DNA samples and profiles be destroyed. However,

their request was denied. The information had been stored on the basis of a UK law which states that police can permanently keep the details of anybody after their arrest.

The applicants took their case to the House of Lords, where it was rejected, and later to the European Court, claiming that the holding of their DNA and fingerprints was a breach of their privacy.

Decision of the Court

The Court decided unanimously that there had been a violation of Article 8 (the right to respect for private and family life) of the European Convention on Human Rights.

The Court noted that DNA samples contain much sensitive information about an individual, including information about his or her health. In addition, samples contain a unique genetic code of great relevance to both the individual concerned and his or her relatives. Given the nature and the amount of personal information contained in DNA samples, their indefinite retention was regarded as interfering with the right to respect for the private lives of the individuals concerned.

It was accepted that, because of the information they contain, the retention of DNA samples and profiles had a more important impact on private life than the retention of fingerprints.



Summary of European Court Judgment

Considerations

The Court considered whether keeping the fingerprint and DNA data of the applicants, as persons who had been suspected, but not found guilty of a criminal offence, was necessary in a democratic society.

The Court noted that England, Wales and Northern Ireland were the only countries within Europe to allow the permanent retention of fingerprint and DNA material of any person of any age arrested for a recordable (i.e. a more serious) offence. The majority of countries with functioning DNA databases are required by law to remove or destroy data either immediately or within a certain limited time after a person is cleared.

The Court was struck by the blanket and indiscriminate nature of the power of retention in England and Wales. In particular, that DNA data and fingerprints could be retained:

- irrespective of the nature or severity of the offence with which the individual was originally suspected
- irrespective of the age of the person arrested
- with no time limit

The Court expressed concern at the risk of stigmatisation, stemming from the fact that S. and Marper, who had not been found guilty of any offence and should therefore be entitled to be treated the same way as an innocent person, were in fact treated in the same way as convicted criminals.

Conclusion

The Court found that the blanket rule of keeping the fingerprints, DNA samples and DNA profiles of persons suspected but not found guilty of offences, failed to strike a fair balance between protecting people's privacy and protecting people from crime.

Accordingly, in this case keeping DNA and fingerprints constituted a disproportionate interference with the applicants' right to respect for private life and could not be regarded as necessary in a democratic society.

The Court concluded unanimously that there had been a violation of Article 8, the right to respect for private life.

Source: http://bit.ly/Marper_case_summary



Summary of rights and freedoms from the European Convention on Human Rights

Article 1: Respecting human rights

- All countries who have signed the convention must secure for everyone the human rights listed below

Article 2: Right to life

- Everyone's right to life shall be protected by law

Article 3: Prohibition of torture

- No one shall be subjected to torture or to inhuman or degrading treatment or punishment

Article 4: Prohibition of slavery and forced labour

- No one shall be held in slavery or servitude or be required to perform forced or compulsory labour

Article 5: Right to liberty and security

- Everyone has the right to liberty and security
- No one shall be deprived of their liberty except if they are under lawful arrest or detention

Article 6: Right to a fair trial

- Everyone is entitled to a fair and public hearing by an independent and impartial tribunal established by law
- Everyone charged with a criminal offence shall be presumed innocent until proved guilty

Article 7: No punishment without law

- No one shall be held guilty of a crime on account of any act if it did not break any national or international laws

Article 8: Right to respect for private and family life

- Everyone has the right to respect for a private and family life, home and correspondence
- There shall be no interference by a public authority on a person's privacy except in the interests of national security, for public safety or economic well-being of a country, for prevention of crime, for protection of health, or for protection of the rights and freedoms of others

Article 9: Freedom of thought, conscience and religion

- Everyone has the right to freedom of thought, conscience and religion

Article 10: Freedom of expression

- Everyone has the right to freedom of expression

Article 11: Freedom of assembly and association

- Everyone has the right to freedom of peaceful assembly and to freedom of association with others

Article 12: Right to marry

- Men and women of marriageable age have the right to marry and to found a family, according to national laws

Article 13: Right to an effective remedy

- Everyone whose rights and freedoms as set forth in this Convention are violated shall have an effective remedy before a national authority



Summary of rights and freedoms from the European Convention on Human Rights

Summary of Rights and Freedoms continued

Article 14: Prohibition of discrimination

- The rights and freedoms of everybody are secured without discrimination on any ground such as sex, race, colour, language, religion, political or other opinion, national or social origin, association with a national minority, property, birth or other status

Article 15: Derogation in time of emergency

- In time of war or other public emergency threatening the life of the nation, measures in breach of these conventions may be taken by appropriate authorities

Article 16: Restrictions on political activity of aliens

- Nothing in Articles 10, 11 and 14 shall be regarded as preventing authorities from imposing restrictions on the political activity of a resident born in or belonging to another country who has not acquired citizenship of the country they are living in

Article 17: Prohibition of abuse of rights

- Nothing in this Convention may be interpreted as to allow any State, person or group or any right to carry out any activity aimed at the destruction of any of the rights and freedoms listed above

Article 18: Limitation on use of restrictions on rights

- The restrictions permitted under this Convention to the said rights and freedoms shall not be applied for any purpose other than those for which they have been prescribed

Source: http://bit.ly/rights_and_freedoms



Statement cards



a.

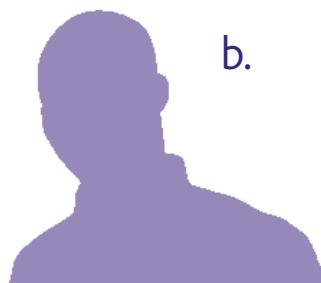


I am happy for my DNA to be on the national database. If you obey the law you have nothing to worry about.

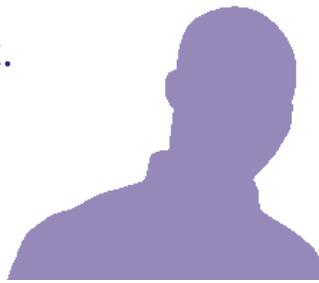


A compulsory DNA and fingerprint database for everybody in the UK would solve the problem of some people being on it and not others.

b.



c.



I am worried who might have access to my genetic information now it is stored on a national database.



When a crime scene sample doesn't match anyone's DNA on the database, the closest match on the database (likely to be a relative of the person) should be contacted.

d.



Suggested answers to statements

Suggested answers to statements

- A - I am happy for my DNA to be on the national database. If you obey the law you have nothing to worry about
- B - A compulsory DNA and fingerprint database for everybody in the UK would solve the problem of some people being on it and not others
- C - I am worried who might have access to my genetic information now it is stored on a national database
- D - When a crime scene sample doesn't match anyone's DNA on the database, the closest match on the database (likely to be a relative of the person) should be contacted

A police officer	AGREE (1) Having as many people's DNA as possible helps us to identify people who were at a crime scene and find the perpetrator (2) A suspect can be cleared from an investigation by volunteering to provide their DNA	AGREE (1) The more people there are on the database, the easier it will be to identify suspects and solve crime (2) It would be fairer to have everyone on the database so we are all treated the same	DISAGREE (1) Any person who has access to the data will only be using it in the process of trying to solve a crime	AGREE (1) This process could help to track down a suspect
A person who has been wrongfully arrested	DISAGREE (1) Being on the database implies that you are a criminal even if you are innocent (2) I have obeyed the law so it is not fair to keep my details after a mistaken arrest (3) I am worried that I might be involved in a criminal investigation in future if I happen to have been at a crime scene	EITHER AGREE (1) Everyone is treated the same so there is no stigma attached to having your details stored OR DISAGREE (2) Any impact on public safety would be minimal because the database will be flooded with millions of profiles from innocent people that will never be involved in a criminal investigation	AGREE - (1) When DNA from a crime scene doesn't match anyone on the database, the police can use it to find relatives of the person, this could reveal family secrets and is an intrusion of privacy (2) Sometimes people use the DNA database to do research, so they would have access to my DNA without my permission	DISAGREE (1) Being involved in a criminal investigation can be distressing and it is not fair to involve relatives

Suggested answers to statements

Suggested answers to statements continued

- A - I am happy for my DNA to be on the national database. If you obey the law you have nothing to worry about
- B - A compulsory DNA and fingerprint database for everybody in the UK would solve the problem of some people being on it and not others
- C - I am worried who might have access to my genetic information now it is stored on a national database
- D - When a crime scene sample doesn't match anyone's DNA on the database, the closest match on the database (likely to be a relative of the person) should be contacted

A person who volunteered their DNA as part of a specific crime investigation	EITHER AGREE (1) People should not mind or care about having their DNA on a database if it is for the wider benefit of solving crime OR DISAGREE (2) I have volunteered my DNA for a specific investigation - it was my free choice and it should be my free choice to remove it as well	EITHER AGREE (1) I don't see a problem with everybody having a sample taken if it helps the police OR DISAGREE (2) Impact on public safety would be minimal because the database will be flooded with millions of profiles from people that will never be involved in criminal investigations	AGREE (1) I volunteered my data for the purposes of helping to solve crime and the data should only be available to people involved in that process	EITHER AGREE (1) This process could help to track down a suspect OR DISAGREE (2) Being involved in a criminal investigation can be distressing and it is not fair to involve relatives
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Suggested answers to statements

Suggested answers to statements continued

- | | | | |
|---|---|--|---|
| A - I am happy for my DNA to be on the national database. If you obey the law you have nothing to worry about | B - A compulsory DNA and fingerprint database for everybody in the UK would solve the problem of some people being on it and not others | C - I am worried who might have access to my genetic information now it is stored on a national database | D - When a crime scene sample doesn't match anyone's DNA on the database, the closest match on the database (likely to be a relative of the person) should be contacted |
|---|---|--|---|

A relative or friend of a victim of violent crime	AGREE (1) The DNA database helps to catch criminals who may otherwise get away with it (2) People should not mind or care about having their DNA on a database if it helps to solve crime and make the country safer	AGREE (1) The more people there are on the database, the easier it will be to solve crime (2) It may deter people from committing crime if their DNA is on a database	EITHER AGREE (1) The databases were introduced to help solve crime and people are right to be worried if their data is being used for any other purposes OR DISAGREE (2) Only the police have access to the database. People should be more worried about keeping safe and catching criminals, than who might have access to their data	AGREE (1) This process could help to track down a suspect
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Suggested answers to statements

Suggested answers to statements continued

A - I am happy for my DNA to be on the national database. If you obey the law you have nothing to worry about	B - A compulsory DNA and fingerprint database for everybody in the UK would solve the problem of some people being on it and not others	C - I am worried who might have access to my genetic information now it is stored on a national database	D - When a crime scene sample doesn't match anyone's DNA on the database, the closest match on the database (likely to be a relative of the person) should be contacted
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A leader of a civil rights campaigning group	DISAGREE (1) Being on the database implies that they are a criminal even though they are innocent (2) If your DNA is on the database, there is a chance you will be identified as a match or partial match to a crime scene sample even if you are innocent, because DNA matching can sometimes be inaccurate. You may not be charged, but being involved in a criminal investigation can be distressing	DISAGREE (1) This would be very expensive and impossible to maintain what with all the people coming in and out of the country all the time (2) This compromises the human right to a private life (3) Any impact on public safety would be minimal because the database will be flooded with millions of profiles from innocent people that will never be involved in a criminal investigation	AGREE - (1) DNA profiles contain highly sensitive genetic data such as family relationships. This could reveal family secrets and is an intrusion of privacy (2) We are worried that people's genetic data is being used without their permission by people other than the police, such as researchers	DISAGREE (1) The process could reveal previously unknown family relationships (2) This could be seen as an intrusion into family privacy
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Activity 3

The forensic use of bioinformation case studies

Lesson plan

Please note: students should complete activity 2 before starting this activity.

Introduction

Students participate in a group discussion to consider and make judgement on some example cases involving the use and storage of forensic bioinformation (DNA or fingerprints)

Learning Outcomes

- Students develop an understanding of the role of the law regarding the retention of bioinformation
- Students interpret and analyse evidence to participate in decision making

Structure

Group work or individual activity

Materials

- The forensic use of bioinformation and the law - summary sheet
- Case studies
- Internet access (optional)
- Summary of European Court Judgment
- Summary of rights and freedoms from the European Convention on Human Rights

Activity 3

The forensic use of bioinformation case studies

Activity

1. In groups, students are given a case study involving the use of forensic bioinformation.
2. Each case has a series of questions to consider. The groups must discuss the questions and come to a verdict on each of the questions, providing appropriate evidence or reasons for their decisions. The background materials from activity 2 can be used if required, and to provide further information, a fact sheet is provided on recent developments in UK law on forensic bioinformation.
3. Each group must then present the case to the class and explain their answers.
4. **Alternatively**, students could each choose one of the case studies and work individually. Students could research the case online and use the questions provided as a basis for a piece of written work.



Case Study

Jonathan

Twickenham, Middlesex

Jonathan intervened when he saw a drunken man trying to smash a woman's car windscreens and drag her out. The man turned on Jonathan, who laid him out with one punch. When the police came, they arrested Jonathan - despite there being dozens of witnesses, who said he had behaved like a hero.

For three months Jonathan's father battled to get the police to take his son's DNA sample off the database. But it was only after his local MP and a national newspaper supported his case that the police agreed to back down and erase the details.

Source: http://bit.ly/DNA_case_1

Questions to consider

1. If the drunken man in this case was arrested and charged with assault or criminal damage, do you think his DNA should be kept on the National DNA Database?
2. Do you think Jonathan's father had a reasonable complaint?
3. Why do you think the police made an exception to the law in Jonathan's case?
4. Do you think this story might put other people off trying to help if they see a crime being committed?



Case Study

Mark Dixie

Croydon, South London

Sally Anne Bowman's partly clothed body was found in a pool of blood in Croydon, South London in 2005. Police had taken DNA from 1,700 men who volunteered as part of the investigation into the murder, but the screening produced nothing.

Mark Dixie was arrested in 2006 after a fight at the pub in Surrey where he was a chef. His DNA was taken and checked on the National DNA Database. His DNA profile was found to match DNA taken from the **crime scene** of Sally Anne's murder nine months earlier.

Mark Dixie was convicted of the murder in 2008. The case led to calls for everyone's DNA to be put on the database in the hope that similar matches would be found.

Source: http://bit.ly/DNA_case_2

Questions to consider

1. If Mark Dixie had been arrested and released without charge for a separate offence BEFORE the murder, could the police still have caught him using the DNA database?
2. How would a compulsory national DNA database have helped to solve this crime?
3. Do you think the DNA profiles of the men who volunteered their DNA for this investigation should be kept by police and checked against other crimes?



Case Study

Angela

Heanor, Derbyshire

Angela was arrested and had a DNA sample taken after being accused of stealing a £60 football. She was reported to the police by her neighbour who claimed his sons had kicked the ball into her garden. Despite insisting she had never seen the ball, police officers took her into custody in August 2006. They also scoured her garden and rifled through drawers and cupboards.

The theft case was later dropped by the Crown Prosecution Service - but Angela is still waiting to learn if her genetic profile has been destroyed.

Source: http://bit.ly/DNA_case_3

Questions to consider

1. Do you think Angela's DNA should be kept on the National DNA Database?
2. How do you think Angela and her family might feel if her genetic profile was kept by the police?
3. Do you think the police should take and store DNA and fingerprints from other people living in the street?



Case Study

Craig Harman

Frimley, Surrey

Michael Little, 53, died when a brick smashed into the cab of his lorry as he drove on the M3 in Surrey in March 2003.

DNA taken from the brick thrown through Mr Little's cab was checked against the national database but no matches were found.

Police then tried a technique known as familial searching, which is based on the fact that individuals who are related are more likely to have similar DNA. 25 individuals with similar (but not matching) DNA to the sample found on the brick were identified, and a relative of Craig Harman was the closest match.

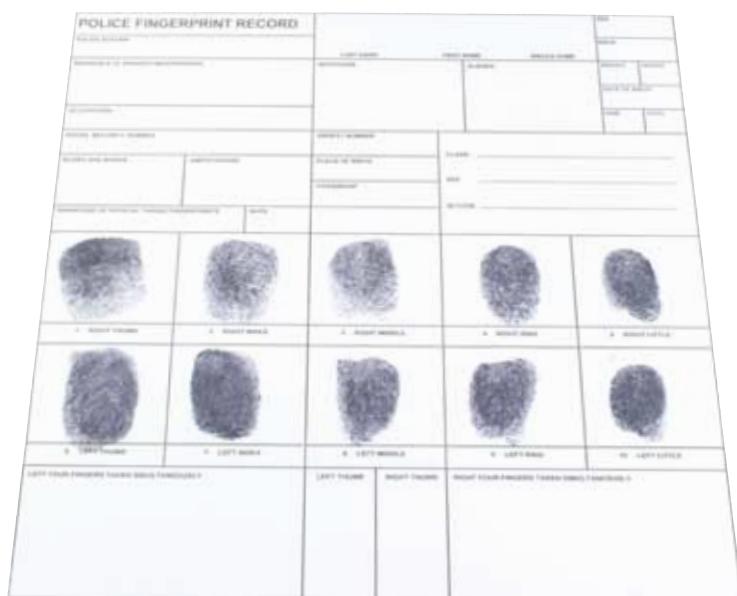
The police used this knowledge to identify Craig Harman as a suspect and asked him to give a DNA sample (his DNA did not show up in the original search as he did not have a criminal record). His DNA matched exactly to the sample on the brick. In April 2004 he pleaded guilty to manslaughter, becoming the first person in the world to be successfully prosecuted using familial searching.

Source: http://bit.ly/DNA_case_4

(see final example).

Questions to consider

1. Why could the police find the relative's DNA on the National DNA Database but not Craig Harman's?
2. Do you think detectives should be allowed to find suspects using familial searching? Why do you think people might object?
3. Do you think there is an argument for a compulsory national DNA database for everyone based on this case?
4. In your view, should Craig Harman's DNA profile be kept on the National DNA Database forever?



Case Study

Mr X

Student backpacker Inga Maria Hauser was found dead in a forest in 1988. Forensic scientists found a DNA sample from a **male** at the crime scene. However, the man who left the sample has never been identified as his DNA is not on the database.

Mr X and several other members of the local community have already helped police by giving a DNA sample for a voluntary DNA screening process to eliminate themselves from the murder enquiry (no matches have been found).

Police have since discovered other samples on the database that share similar characteristics with the profile, but are from **females** across the UK. Detectives now want to find the women to test their male relatives against the crime scene sample.

Source: http://bit.ly/DNA_case_5

Questions to consider

1. Do you think that Mr X's DNA profile should be kept on the National DNA Database forever?
2. Do you think detectives should contact the women on the DNA database to try to find their male relatives?
3. Is there an argument for a compulsory DNA database for everybody based on this case?



The forensic use of bioinformation law – summary sheet

Since 2003	<ul style="list-style-type: none">• In England, Wales and Northern Ireland, DNA profiles and fingerprint records are stored permanently on databases even if the person arrested is not later charged with or found guilty of a crime• DNA profiles of individuals who have volunteered their DNA as part of an investigation may be stored permanently if consent is given by the volunteer• The UK has the largest DNA database per head of population of any country in the world, with 5.5 million DNA profiles held• In Scotland, records are destroyed if the person is not charged or convicted, unless it is a serious crime and the police request to keep it
December 2008	<ul style="list-style-type: none">• In a case brought by UK residents, S. and Marper, to The European Court of Human Rights, the Court ruled that keeping an innocent individual's DNA and fingerprints on record indefinitely is a violation of a person's right to privacy• Legal changes were therefore necessary in England, Wales and Northern Ireland
May 2009	<ul style="list-style-type: none">• The Government announces new proposals to change the way DNA is used and retained in England, Wales and Northern Ireland• More than 500 people and organisations write to the Government setting out their views on the proposals
November 2009	<ul style="list-style-type: none">• The Government announces revised proposals, including:• All DNA samples should be destroyed as soon as they are converted into a profile• DNA profiles of people arrested but not later convicted of a crime should be retained on the National DNA Database for 6 years• The proposals will be debated in Parliament and introduced through an Act of Parliament 'as soon as Parliamentary time allows'