ETHICS WATCH

‘DNA theft’: new crime in the UK

The recent United Kingdom White Paper on genetics proposes the creation of a new offence of testing an individual’s DNA without their knowledge or consent[1]. The proposal follows the advice of the Human Genetics Commission[2], which highlighted public concerns about potential abuses that have been exacerbated by the ease with which genetic material can be obtained.

The justification lies partly in the desire of the government to respond to adverse public perceptions and to address lacunae in the law. Although it would be an assault to remove material from the body of an individual, it is not illegal, at present, to make use of genetic material left behind at a scene. Also, de-encrypting anonymized genetic information might have implications under the Data Protection Act, but only if the data make an individual identifiable. Moreover, paternity testing raises the issue of balancing the interests of the man and the child; legal responses have been uneven so far, and the possibility of abuse has been heightened by internet access to paternity-test kits.

Each of these scenarios has serious implications for individual privacy, which has received suprisingly little protection in British law. The harm from illegally generated genetic information could be compounded if it fell into the wrong hands, such as insurers or employers who might use it for discriminatory purposes. Concerns about genetic privacy have dominated legislation on genetics worldwide, often leading to tough action[3]. For example, the Australian Law Reform Commission also recently recommended a new offence for testing DNA without consent[4].

Both proposals relate offences to the ‘testing’ of DNA, not its collection or use. This is sensible, as the abundance of easily accessible genetic material might lead to innocent collection and some illegal uses might be hard to define. But should the person who requests the test and/or the person who carries it out be liable? The United Kingdom proposal is silent, but the Australian reforms envisage liability for laboratories if they knowingly test without consent or are reckless to this fact.

Both proposals are unclear about the meaning of genetic ‘information’ and ‘testing’. So, a significant challenge lies ahead of legislators to draft equitable provisions that are not so narrow as to exclude protection-worthy information or so broad as to render a ‘genetic’ law meaningless.

The Australian reforms contain exceptions for testing with ‘lawful authority’. These include testing for crime detection and prevention, medical care, ethically validated research and parentage testing with parental consent or by court order. These exclusions are broadly reflected in the British proposal. For example, testing by law-enforcement agencies would be permitted in exceptional cases. Legitimate medical and research uses are also included, but how is ‘legitimacy’ to be defined? Lawful access to private paternity testing is not to be affected, but what is ‘lawful’ in this context? The White Paper indicates elsewhere that it is limited to fathers with legal parental authority, potentially condemning the others to criminal sanction.

As a final point, we should avoid the attention-grabbing misnomer that heads this article. It is wrong to talk of these new offences as ‘DNA theft’, as theft is the misappropriation of the property of another. No country, so far as I am aware, recognizes property interests for individuals in their own DNA. This, however, is a subject for another article altogether.

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NEUROGENETICS

Big fat sleep

A combination of mapping and microarray analysis has just led to an exciting result — it has identified a gene that influences a specific pattern of brain activity that is associated with sleep.

For more than 70 years, electroencephalograms (EEGs) have been used to record brain activity as the voltage between electrodes placed on the scalp. Although controversial at times, there is no denying that distinct EEG patterns are associated with different behaviours.

A low-amplitude oscillation observed during sleep in humans and mice, called a theta rhythm, has also been seen in mice during exploratory behaviour. In this study, Tafti and colleagues crossed inbred mouse strains with either a high or low maximum theta-peak frequency (TPF) to map genes associated with differences in the TPF patterns. In one inbred line that had a reduced TPF during sleep they identified a mutation in the gene *Acads*. The enzyme encoded by this gene — acyl-coenzyme A dehydrogenase — catalyses the first step in β-oxidation of short-chain fatty acids: a pathway never previously associated with EEG patterns.

This curious finding led the group to perform whole-brain microarray analysis on mutant mice compared to wild type. They found that expression of one gene, *Glo1*, was consistently upregulated in the mutants. *Glo1* encodes an enzyme that is involved in metabolic detoxification in the glyoxalase pathway. Although none of the other inbred lines with slow theta rhythms carried mutations in *Acads*, *Glo1* expression was significantly increased in all of them. The authors confirmed the link between *Glo1* expression and low TPF in the inbred line by treating the animals with acetyl-L-carnitine, which removes excess short- and medium-chain fatty acids; this partially rescued the TPF and restored normal *Glo1* expression.

The authors speculate that the link between *Glo1* expression and TPF indicates that the glyoxalase pathway ultimately underlies the differences in theta frequency between the mouse strains tested. As the theta frequency in these mice is only affected during sleep, the results indicate not only that theta regulation is fundamentally different between waking and sleeping hours but also that β-oxidation might be required for normal sleep.

Mike Stebbins, Associate Editor,
Nature Genetics

References and links

ORIGINAL RESEARCH PAPER Tafti, M. *et al*. Deficiency in short-chain fatty acid β-oxidation affects theta oscillations during sleep. *Nature Genet*. **34**, 320–325 (2003)