MDMA research leaves ravers far from ecstatic

The recreational drug ecstasy (MDMA) can produce severe dopaminergic neuronal toxicity, in addition to less pronounced serotonergic toxicity, in non-human primates. "The most troubling implication of our findings is that if young adults using ecstasy develop dopamine neuronal toxicity, they may be increasing their risk for developing parkinsonism as they get older", says investigator George Ricaurte (Johns Hopkins University School of Medicine, Baltimore, MA, USA).

Patterns of ecstasy use have changed since the 1980s when individuals generally took no more than one or two 7–150 mg doses twice monthly. Nowadays, ecstasy, which is considered safe by many partygoers, is often taken several times during one night. To model this new dosing regimen, Ricaurte's team gave three sequential doses of MDMA at 3 h intervals to 11 squirrel monkeys and five baboons. One monkey and one baboon died after developing malignant hyperthermia immediately after the third and second dose, respectively. In addition, a further animal of each species developed an unstable gait and so was not given the third dose (*Science* 2002; **297:** 2260–63).

Post mortem analysis showed that 60–80% of the dopaminergic nerve endings were destroyed in the striatum. There was also less pronounced serotonergic neurotoxicity. "We do not yet know if our findings in non-human primates will generalise to human beings but, needless to say, this is a major concern", says Ricaurte. Andy Parrott, the head of the Recreational Drugs Research Group at the University of East London, UK, told *The Lancet Neurology* that he has seen human users with psychomotor problems. "In the paper, George Ricaurte suggests that this neural damage may become manifest in later life, but we have found a wide range of problems in current users in their teens and twenties, including some which may be best explained in dopaminergic terms", he says.

Parrot's research has found the most problems in heavy users. In his most recent study (*Hum Psychopharmacol Clin Exp* 2002; **17:** 309–12), 36 heavy users (>100 lifetime occasions) reported a wide range of problems which they attributed to their use of the drug. These symptoms included memory difficulties (73%), poor concentration (70%), depression (65%), anxiety (60%), poor sleep (52%), weight loss (48%), and tremors (38%). In addition, 14% of 109 novice users (1–9 lifetime occasions) reported experiencing tremors.

Jacqui Rodgers (Newcastle University, UK) has also found that some regular ecstasy users have muscular twitches and spontaneous hand flicks when drug free. "These psychomotor problems in abstinent recreational ecstasy/MDMA users may well reflect the dopaminergic problems being described in laboratory animals by Ricaurte and colleagues", says Parrot.

James Butcher

Ethical guidence given on genetics of normal human behaviour

On Oct 2, 2002, the Nuffield Council on Bioethics published a report on the issues surrounding the genetics of normal human behaviour (*Genetics and human behaviour: the ethical context*). The working party, led by the lawyer, Bob Hepple QC (Cambridge University, UK), considered four areas: intelligence, personality, antisocial behaviour, and sexual orientation. "We hope that this report—the first in the area—will stimulate debate and discussion between scientists, policy makers, and the public about the ethical and legal implications of behavioural genetics", said Hepple. "We call on policy makers to begin to consider how to monitor and regulate the applications of this research. If we put safeguards in place now we should be able to prevent potential abuses in the future."

The report starts by reviewing the history of behavioural genetics, including what many people equate it with—the eugenics movements of Europe and the USA. "The first question we asked was whether such research should be carried out at all", said Hepple. "We concluded that it can be justified because it has the potential to advance our understanding of human behaviour." However, the report urges responsible reporting of any research. Some of the participants at the launch meeting (University of London, UK) felt that if such research is to be done, then the public—who currently give funding research into normal behaviour a low priority —should be involved in setting the research agenda.

The report raises questions over what is "normal" for a population, and whether research will lead to the medicalisation of individuals at the extremes of normality. Alison Stewart of the Public Health Genetics Unit, Cambridge, UK, thinks this issue is particularly relevant; however, she commented that the report was "thoughtful, thorough, and balanced".

On reproductive issues the report concludes that there was no case where selective abortion would be appropriate, nor could pre-implantation genetic diagnosis be recommended on the basis of tests for the different ranges of normal behaviour, though it acknowledges the difficultly of balancing issues such as parents' right to procreative autonomy, and a child's opposing rights to be loved unconditionally .

With regards to the legal implications of testing, the report concludes that the presence of a particular trait should not absolve an individual of responsibility for their action, nor be considered to be predictive of criminal actions, but might be used in mitigation of their sentence. "Where a person has not yet committed a crime, we do not feel that it is justifiable to try to predict behaviour with a view to detaining that individual", said Hepple.

Virginia Barbour