

### **CARDIOTOXICITY ASSOCIATED WITH METHAMPHETAMINE USE AND SIGNS OF CARDIOVASCULAR PATHOLOGY AMONG METHAMPHETAMINE USERS.**

#### **National Drug and Alcohol Research Centre Technical Report No. 238**

**Kaye and McKetin (2005).**

Plain English summary and implications for police prepared by Roger Nicholas.

#### **Aims and Methodology**

The researchers undertook a literature search to better understand the ways in which short and long term methamphetamine use can impact on the cardiovascular system. The findings are highly relevant to police so far as the apprehension and custodial care of methamphetamine users is concerned.

#### **Key findings:**

- Low level or occasional use of methamphetamine does not appear to be associated with major acute cardiac complications unless the dose taken is very high or the user is particularly sensitive to the effects of the drug. Its use can, however, exacerbate pre-existing underlying heart problems in an otherwise healthy user. Long term methamphetamine users appear to be most at risk of an acute cardiac event such as cardiac arrest. That said, there is a considerable degree of individual variation to methamphetamine's effects and decisions about taking methamphetamine users to seek medical assistance need to be based on the symptoms that the person is displaying, rather than the amount they claim to have taken. Autopsy reports have shown that methamphetamine-related deaths are associated with a broad range of (very high and quite low) blood concentrations of methamphetamine.
- Methamphetamine is a stimulant which acts by increasing the release of chemicals that speed up the transmission of impulses between cells in the nervous system. These chemicals, which affect heart rate and blood pressure, are thought to be the main ways in which methamphetamine use affects the heart. They can cause narrowing of blood vessels, the sudden contraction of blood vessels (spasms), rapid heart rate and high blood pressure. Following methamphetamine use, an increase in heart rate and high blood pressure lead to an increased demand for oxygen to the heart muscle. As was noted above, this occurs at the same time as the narrowing and contraction of blood vessels which decreases the oxygen available to the heart. The poor supply of oxygen to the heart (myocardial ischaemia) can cause death of the heart muscle or (over the longer term) an increase in the size of the heart muscle (cardiomyopathy). As will be discussed later, longer term methamphetamine use is also associated with increased prevalence of coronary artery disease which can place users at further risk by reducing blood flow to the heart.
- Acute methamphetamine use can be associated with chest pain, rapid heart rate, shortness of breath and high blood pressure. Less common cardiac problems include myocardial ischaemia,

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myocardial infarction (heart attack), spasm of the coronary arteries, acute aortic dissection (a tear in the aorta as a result of high blood pressure) and sudden cardiac death. Sudden cardiac death (also known as arrhythmic death) results from sudden cardiac arrest. This is generally caused by the abnormal transmission of the electrical impulses which regulate the rhythm of the heart. The two most common forms of this problem are ventricular fibrillation (an extremely rapid, chaotic rhythm during which the heart quivers or fibrillates) and ventricular tachycardia (extremely rapid heartbeat).

- In one study 27% (8 out of 30) of patients presenting to emergency departments with chest pain following methamphetamine use were subsequently diagnosed with myocardial infarction. The major presenting symptom of myocardial infarction among methamphetamine users was chest pain.
- The most common cardiovascular problems experienced by regular methamphetamine users are premature and accelerated development of coronary artery disease and cardiomyopathy. In this way, there may be an 'incubation period' of methamphetamine use of several years prior to methamphetamine-related cardiac death, because cardiomyopathy and coronary artery disease take some time to develop.
- Methods of methamphetamine administration which are associated with more frequent use and taking higher doses (such as injecting or smoking crystalline methamphetamine) may place users at greater risk of cardiovascular problems, as may concurrent use of alcohol, cocaine or opiates. Of particular concern in this regard is concurrent use of cocaine.

## Implications for police

Police have long recognised the potential risks associated with the apprehension and custodial care of methamphetamine users<sup>1</sup>. These research findings bring those risks into sharper focus in relation to the specific risk of cardiac problems among this group. These problems may occur as a result of acute intoxication, as a result of chronic use, or as a result of acute intoxication, on top of chronic use. The findings of this research should act to lower the threshold for decisions by police about whether to take those affected by the use of methamphetamine to seek medical attention. In particular, given the relationship between chest pain and myocardial infarction among methamphetamine users, any complaints of chest pain should immediately prompt a decision to seek medical attention. Also important is the need to, wherever possible, use apprehension practices that minimise the risk of placing additional strain on the cardiovascular system of individuals under the influence of methamphetamine.

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<sup>1</sup> See, for example Nicholas, R. (2004). The apprehension and custodial care of offenders affected by the use of amphetamine type stimulants. Adelaide: Commissioners' Drugs Committee, Australasian Centre for Policing Research. Accessed on 18 December 2007 <http://www.acpr.gov.au/pdf/drugs/Apprehension%20and%20custodial%20care.pdf>

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