The occurrence of diltiazem in illicit cocaine

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Large-scale production of illicit cocaine

- Erythroxylon coca plant leaves contain 0.5–2.0% cocaine, plus other alkaloids. These alkaloids occur in different proportions in different ‘commercial’ varieties.
- Cocaine is extracted from the leaves and is refined to a purity of almost 100% as the hydrochloride.
- At the trafficking stage, a number of adulterants are added to increase profits, for example, phenacetin, caffeine, lignocaine, paracetamol and procaine. Adulterants may also be added once the drug has arrived in the UK.
- Further dilution is made within the UK. Cutting agents such as mannitol, lactose and glucose are commonly used.
- Crack cocaine (alkaloidal base) is formed from cocaine hydrochloride, usually in small batches in the UK (around 200 deals in one batch).

Forensic Alliance findings

Since July 2004, 14 separate cases of seized cocaine (both crack and hydrochloride) have been found to contain diltiazem. This has not been encountered previously.

The cocaine samples were seized from forces spread across southern England for both possession and supply charges (Table 1). A total of 26 items was found to contain both cocaine and diltiazem; 14 of these were crack cocaine, 4 cocaine hydrochloride, and 4 were not characterised.

<table>
<thead>
<tr>
<th>Origin</th>
<th>Supply</th>
<th>Abuse Type</th>
<th>Amount</th>
<th>Purity</th>
</tr>
</thead>
<tbody>
<tr>
<td>South America</td>
<td>Crack</td>
<td>Cocaine (unspecified)</td>
<td>827 mg</td>
<td>35%</td>
</tr>
<tr>
<td>South Africa</td>
<td>Crack</td>
<td>Cocaine HCl</td>
<td>264 mg</td>
<td>84%</td>
</tr>
<tr>
<td>South Africa</td>
<td>Crack</td>
<td>Cocaine HCl</td>
<td>192 mg</td>
<td>84%</td>
</tr>
<tr>
<td>Colombia</td>
<td>Crack</td>
<td>Cocaine (unspecified)</td>
<td>891 mg</td>
<td>95%</td>
</tr>
</tbody>
</table>
| Colombia | Crack | 12.5 g | 82%
| Colombia | Crack | 17.3 g | 81%
| Colombia | Crack | 2.68 g | 63%
| Colombia | Crack | 657 mg | 64%
| Colombia | Crack | 658 mg | 45%
| Colombia | Crack | 103 mg | 51%
| Colombia | Possession | Cocaine (unspecified) | 111 mg | 41%
| Colombia | Possession | Cocaine HCl | 30 mg | 20%
| Colombia | Possession | Cocaine HCl | 26 mg | 17%
| Colombia | Possession | Cocaine HCl | 12 mg | 8%
| Colombia | Possession | Cocaine HCl | 8 mg | 5%
| Colombia | Possession | Cocaine HCl | 4 mg | 3%
| Colombia | Possession | Cocaine HCl | 2 mg | 1%
| Colombia | Possession | Cocaine HCl | 1 mg | 0.5%

The complications most commonly encountered following cocaine abuse are

- Hypertension
- Global myocardial ischaemia
- Myocardial infarction
- Myocarditis
- Aortic rupture
- Diffuse microaneurysms (Ellenhorn, 1997).

Potential interactions of cocaine and diltiazem

- Animal studies show that calcium channel blockers can prevent arrhythmia, blunt negative inotropic effects, decrease vascular resistance and protect against myocardial infarction (Billman, 1993).
- Diltiazem given to six healthy human subjects 120 minutes prior to cocaine administration did not alter their physiological response to cocaine (Rowbotham, 1987).
- Diltiazem may give a degree of cardiac protection. However, in those cases where hypertension and/or left ventricular failure occurs, it may, in fact, potentiate the overall cardiotoxic effect of cocaine.
- Additionally, any treatment with beta blockers may lead to an unexpected interaction, with resulting complications such as bradycardia.

Origin of adulteration?

- Illicit production of cocaine often utilises inexpensive ‘recycled’ solvents (owing to legal restrictions) that may be contaminated with pharmaceuticals such as diltiazem. However, this source seems unlikely, given the relatively high levels of diltiazem detected.
- Adulteration is presumably performed to provide the user with a degree of protection against the cardiotoxic effects of cocaine. Diltiazem is, however, expensive.
- Forensic Alliance is monitoring the occurrence of diltiazem in cocaine and, as yet, there is no available intelligence to trace the potential source of the adulteration. The toxicology department has not yet had any cases involving cocaine and diltiazem together.

Conclusions

Overall, the literature on the beneficial effects of diltiazem on cocaine-induced cardiotoxicity in humans is limited. Diltiazem is used in the treatment of cocaine-induced hypertension and, therefore, it may be useful to bear this drug in mind when analysing, treating and interpreting cocaine-related cases.

References

Rowbotham, M. C., Hooker, W. D., Mendelson, J. and Jones, R. T., Cocaine–calcium antagonist interactions, Psychopharmacology (Berlin), 1987, 99(2) p152–154.