

Does Cocaine Cause Thrombosis?

A systematic Review of Clinical and In-
vivo Studies

Dr Nat Wright

Clinical Director HMP Leeds

GP advisor UK Department of Health Prison
Health Unit

Background

- Lots of case reports of link between cocaine and myocardial infarction, stroke, and thrombosis in other major arteries
- Positive reporting bias in case reports
- In-vitro studies suggest cocaine *inhibits* thrombotic pathways

Clotting Mechanisms

Hypercoagulability increases the risk of large vessel thrombosis and can occur with any of the following:

- Low plasma tissue plasminogen activator activity
- High tissue plasminogen activator inhibitor activity
- Factor XII deficiency
- Abnormal platelet aggregation

Scope of the Review

- Clinical and invivo studies included
- Medline (1966 to June 2004), EMBASE (1980 to June 2004), psycINFO (1985 to June 2004), CINAHL (1982 to June 2004), Web of Science (1981 to June 2004) and Cochrane Database to June 2004. using umbrella terms of “cocaine dependence”, “thrombogenesis” and “clotting factors” were used.
- Hand trawled for the period January 1999 to June 2004: Addiction, Addition Abstracts, Lancet, British Medical Journal, New England Journal of Medicine, Journal of the American Medical Association, Annals of Internal Medicine, Annual Review of Medicine.
- Reference citations of retrieved papers were hand trawled

Inclusion/Exclusion Criteria

Studies Included

- observational or intervention studies of participants with diagnosed cocaine abuse or dependence
- Intervention studies conducted amongst human subjects administered pharmacological cocaine and evaluating any one of the following outcomes: clinical outcomes of thrombogenesis (e.g myocardial infarction, cerebrovascular accident, deep vein thrombosis), surrogate markers of raised clotting factors

Studies Excluded

- Studies which considered only the endpoint of vasospasm
- Editorials, discussion papers, opinion pieces
- Qualitative studies
- Quantitative in-vitro studies
- Animal studies
- Descriptive studies
- Observational studies that did not have a control group.

Results

- 2458 abstracts
- 186 papers retrieved
- 15 met criteria for inclusion in the review

Cocaine and Myocardial Infarction

- Case control cross-over study showed that within 1 hour of using cocaine there was a 23.7 times increased relative risk of MI. The elevated risk rapidly decreased after one hour. (*Mittleman et al*)
- People reporting regular cocaine use had a significantly higher likelihood of non-fatal MI than non-users (AOR 6.4) (*Qureshi et al*)
- At autopsy coronary artery pathology was greater in those who had toxic levels of cocaine in the blood compared to those who did not. Dressler et al
- Further autopsy studies showed higher levels of surrogate markers (mast cells, sudanophilia and mononuclear infiltrate in those with autopsy findings of cocaine use) (*Kolodgie et al* and *Virmani et al*)

Cocaine and Cerebrovascular Accident

- 10085 participants: no statistically significant increased risk of non-fatal stroke amongst frequent cocaine users. AOR (0.49, 95% CI 0.01-7.69) underpowered to detect a difference (Quereshi)
- Subarachnoid haemorrhage in those who used cocaine compared to a control group of non-cocaine users showed a younger age at presentation and a smaller aneurysm diameter in the cocaine using group, suggesting that cocaine accelerates pre-existing pathology. Fessler et al

Conclusions

- Cocaine increases the risk of coronary artery thrombosis
- It is possible that it has a small effect upon risk of thrombotic stroke
- It possible increases risk of haemorrhagic stroke in those with underlying pathology of intracerebral aneurysm
- Evidence for causing thrombosis in other large arterial vessels requires further research (possibly not limit to outcomes in specific vessels)
- Risk of cocaine inducing venous thrombosis is an area that warrants further research

Prison specific interventions

- Prison based therapeutic communities
- Better linking prison with community based residential aftercare^{1,2}

Wexler H, De Leon G, Thomas G, Kressel D and Peter J. The Amity Prison TC Evaluation: Reincarceration Outcomes. *Criminal Justice and Behaviour*. 1999; **26(2)**: 147-167

Sacks S, Sack J, McKendrick K, Banks S and Stommel J. Modified TC for MICA Offenders: Crime Outcomes. *Behavioural Sciences and the Law*. 2004; **22**: 477-501

Future Issues

- Better understanding and management of co-morbid conditions where there is potential for prisoner abuse of medication e.g. insomnia, benzodiazepine dependence, pain management
- Family based interventions that work with prisoner and family together
- Limiting the potential for prisons to reduce ill-health

Towards Healthy Prisons

- Provide prison officers with responsibilities that transcend custodial functions
- Encourage officers to take an interest in individual inmates
- Promote group activities that link prisoners with staff (caution regarding competitive activities)
- Prisoner representative groups to address prisoner concerns
- Involvement of “outsiders” or “civilians” in officer/prisoner activities
- Encourage prisoner informed decision making about their own prison involvements
- “*Institutionalise* the use of *compassionate discretion* in defining behaviours that justify formal sanctioning
- Operate the prison on the assumption that with the benefit of the doubt and appropriate support “bad” people can become “good”
- Avoid collective punishment when one does not know who is responsible for the problem
- Instruct officers not to have power contests with prisoners over trivial issues
- Employ disciplinary sanctions in strict moderation, always as a means to an end
- Remain mindful that prisoner mental health and non-mental health are a continuum rather than easily defined categories
- Take contextual information into account in response to prisoner infractions
- In taking significant action share one’s thinking with the prisoner

Toch H. Reinventing Prisons. In Liebling H and Shadd M. The Effects of Imprisonment. Cullompton: Willan Publishing, 2006.