The Microbiology of Prepared Heroin Injections

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Introduction

The spread of blood borne viruses through the injection of illicit drugs often overshadows the effects of infections caused by bacteria and fungi. These infections can cause severe morbidity and mortality, and unlike viral injections they do not require the presence of other injectors to occur. These infections can be transmitted from injection materials (drug, acidifier or water), dirty equipment, the environment, or the users themselves- for instance, from their skin.

The outbreak of *Clostridium novyi* infections in the UK and Ireland in 2000 was the result of drug material contaminated with this bacterium.

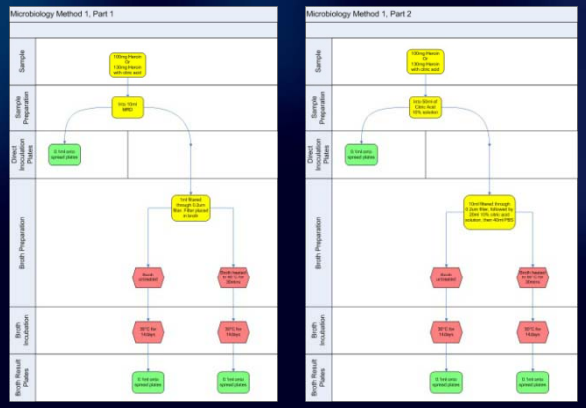
Methods

To assess the bacterial and fungal content of heroin samples, McLauchlin et al.[1] devised a microbiological culture project that would isolate a wide range of organisms. This method proved useful in identifying organisms present within samples, but did little to explain the actual risk they pose. This project repeated their work, but used prepared injections as the samples. Injections were prepared in the manner investigated through previous work[2].

Further work was conducted that involved the introduction of known potentially harmful organisms to samples and then assess their ability to survive the preparation process.

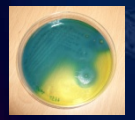
The culture method involved two main parts- the first studied aliquots of raw sample (including drug), the second involved a procedure to remove heroin from the samples on the basis that it inhibits microbial growth. To culture any organisms present, eight different agar plates were inoculated and incubated under different conditions to encourage growth.

The flow charts on the right show the steps used to prepare samples for culture.



Results

Examples of agar plate results:



The plate on the left shows the colour change produced by the growth of *Bacillus cereus*

The plate on the left shows the organisms produced on culture of the heroin sample

The culture of unprepared heroin samples demonstrated that they were unsterile. The samples contained at least three different organisms. Identification to species was not possible due to lack of microbiological facilities.

Cultures of heroin prepared for injection resulted in no growth.

Injections inoculated with *Staphylococcus aureus* and *Bacillus cereus* before the heating stage showed no growth of these organisms after preparation.

Control injections prepared with acid and heating, but without drug material, resulted in growth of the inoculated organisms.

Controls to ensure growth under the incubation conditions were conducted at all times.

Conclusions

The absence of growth from cultures of drug containing injections indicates that the presence of heroin during the preparation neutralises *S. Aureus* and *B. cereus*. This is of importance as McLauchlin found *B. cereus* to be the most prevalent organism within their samples, and both organisms are pathogenic.

Further Work

Investigation of the organisms present in illicit drug material and those that survive the preparation process is warranted. This would apply to all drugs, but particularly those that are likely to have been produced in an outside environment, where they are likely to have come into contact with soils and animals. Identification down to species level would be desirable.

References

1. J. Mclauchlin, V. Mithani, F.J. Bolton, G.L. Nichols, M.A. Bellis, Q. Syed, R.P. M. Thomson, J.R. Ashton. An investigation into the microflora of heroin. *J Med Microbiol.* (2002);**51**(11):1001-8.

2. R.Ponton, J Scott. Injection preparation processes used by heroin and crack cocaine injectors. *Journal of Substance Use*. (2004); 9(1): 7-19.

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