

INSECTICIDES IN THE URBAN ENVIRONMENT

T. C. MARRS
Department of Health, London

INTRODUCTION

Insecticides are used in the urban environment for much the same reasons as they are in the rural environment. Major differences however are that use on food producing crops is only on a very small scale, while use in public hygiene is much more extensive. Public hygiene use of insecticides presents specific problems in that the opportunity for human exposure may occur when subjects cannot leave the affected area (eg hospital wards), during treatment. Exposure can frequently be minimized however, by advising a reentry period, often 48h, and this can conveniently be done by treating at the beginning of a weekend. The use of non-volatile insecticides as poisoned baits presents less of a problem, where subjects cannot leave the area, but such use is liable to present a hazard to children and pets unless care is taken.

The main groups of insecticides are:-

1. Organochlorines (OCs)
2. Anticholinesterases (AntiChEs)
 - A. Organophosphates (OPs)
 - B. Carbamates
3. Pyrethroids
4. Compounds of natural origin, including antibiotics, avermectins and derris (rotenone).
5. Specific inhibitors of aspects of insect metabolism such as chitin synthesis.

The first three groups all act as insecticides by interfering with nerve transmission in insects. Unfortunately they also do so in man and, potentially, all will show effects on the mammalian central and/or peripheral nervous system. By contrast the last group interferes with metabolic processes in insects that do not occur or are unimportant in mammals. For example mammals, including man do not synthesize chitin. Therefore such insecticides are intrinsically safer.

ORGANOCHLORINES

The OCs are becoming less and less important: their biopersistence and persistence in the environment have led, in many countries, to revocation of use (eg DDT) or severe restriction of use (lindane). Nevertheless OCs are still sufficiently widely used for a knowledge of their toxic effects to be useful and it is important to be clear that, purely from the point of view of human safety, many of them are not particularly toxic. It was primarily environmental concerns that led to their restriction although their persistence in humans, as shown by the continuing presence of OCs in human milk (WPPR, 1992) has also caused concern.

The OCs include DDT, HCH and lindane, the cyclodienes, dieldrin, endrin and heptachlor, and toxaphene. The most prominent effects of the OCs are those referable to the CNS. DDT produces tremor and incoordination in lower doses and convulsions in high doses, whereas HCH and the cyclodienes may produce convulsions as the first sign of intoxication, as well as fever, by a central effect. Chlorinated hydrocarbons produce microsomal enzyme induction and characteristic histopathological changes in the livers of experimental animals, and tumors are seen in rodents. These tumors do not appear to be indicative of genotoxic carcinogenicity. There has been some concern over a possible association between lindane and aplastic anaemia.

There is no specific antidote for OC poisoning and it is treated symptomatically. Diazepam is usually used to deal with the convulsions.

