HEALTH AND SAFETY COMMISSION

ADVISORY COMMITTEE ON TOXIC SUBSTANCES

WATCH SUB-COMMITTEE

CHEMICAL SUBSTITUTES FOR GLUTARALDEHYDE IN

STERILISATION OF MEDICAL EQUIPMENT

Issue

1. Toxicological hazard assessment of two potential alternatives to glutaraldehyde in the sterilisation of medical equipment.

Timing

2. A position from WATCH is required at the September 2002 meeting.

Recommendation

3. WATCH is invited to respond to the actions in paragraph 15.

Background

4. Glutaraldehyde was examined by WATCH in the mid-1990s. As a consequence, glutaraldehyde has MELs of 0.05 ppm (8-hour TWA and STEL) and is also assigned a Sen notation in recognition of its classification as a respiratory sensitiser in the EU. The MELs for glutaraldehyde were first implemented in EH40 in 1999. According to the ODIN scheme (SWORD and OPRA) there were 40 cases per year of occupational asthma attributed to glutaraldehyde reported by participating chest and occupational physicians in the period 1999-2001. This accounts for 4.6% of all new cases, the fifth highest percentage for a specified agent (isocyanates, flour/grain, latex and wood dust being the top 4). The vast majority of glutaraldehyde cases were nurses and other health care workers. In May this year, the main glutaraldehyde-containing product (CIDEX®), an aqueous solution containing 2.4% glutaraldehyde, was withdrawn from the market. In view of this, hospitals and veterinary practices will be looking to use alternative sterilant systems.
5. As with other substitution decisions, there is an issue about the extent of knowledge of the toxicological properties of the potential alternatives. Some of the principal alternative active ingredients to glutaraldehyde do not have established UK or EU regulatory positions with respect to hazard classification or occupational risk management (OELs etc). Given the concerns about asthma with glutaraldehyde, a key issue is the asthmagenic potential of such alternatives, particularly as occupational asthma is a priority area for HSE’s work on chemicals.

6. In view of this situation, HSE’s Field Operations Division (FOD) recently requested advice on the likely occupational health hazards of the main chemical sterilants available as alternatives to glutaraldehyde. It is intended that FOD’s Health Services Unit will provide this advice to the Health Services Advisory Committee (HSAC) as a contribution to a broader debate on sterilant systems for use in health care. The HSAC discussion will also need to take account of factors such as efficacy and costs, as well as ease of use, health hazards and appropriate control strategies. This WATCH project is not intended to cover all such issues, but is focused on providing an essential foundation stone in developing a view on the health hazards of the alternative active ingredients. The work will also make an important contribution to the asthma strategy. The asthma plan of actions outlines a programme of work to reduce the incidence of occupational asthma due to glutaraldehyde to zero by 2005, by substitution with suitable alternatives.

7. In developing this project, staff in HSE’s Industrial Chemicals Unit took advice from HSE inspectors in the health services sector and searched information sources in this medical field to identify the main chemical alternatives to glutaraldehyde. Manufacturers and suppliers were contacted in an attempt to obtain all possible toxicological data on the active ingredients and their formulations; independent literature searches were also undertaken. The main alternative active ingredients identified were succinic dialdehyde (SDA), ortho-phthalaldehyde (OPA), and peracetic acid. Different commercial formulations based on these active ingredients, and also a very dilute hypochlorous acid-based formulation (Sterilox®), are marketed for sterilising endoscopy equipment. As there are no problematic issues concerning the toxicology assessment for the Sterilox® product it has not been included in this WATCH package. A number of enzyme-based sterilant products were also identified but it is not known yet whether they have gained any use in UK hospitals, and these products have also not been included in this project.

8. The technical package accompanying this Cover Paper covers the toxicology of SDA and OPA. A separate HSE package on peracetic acid (WATCH/19/2002) is also available for discussion at this September 2002 WATCH meeting.

9. There are no UK OELs listed for SDA or OPA and HSE does not propose to develop OELs for them at this stage. Furthermore, neither SDA nor OPA are listed in the Approved Supply List with an agreed EU classification. In such situations, it is the suppliers'/manufacturers' responsibility to self-classify. At this stage, HSE does not intend to
develop a formal classification proposal for SDA or OPA. Rather, the intention is to develop a view on the known and (where data are lacking) potential occupational health hazards of these substances; in particular, to give a view on whether they might be capable of causing occupational asthma.

10. The documentation provided with this cover paper is as follows: Annex 1: HSE Health hazard assessments of SDA (Section 1) and OPA (Section 2).

Argument

Health hazards

11. Very few toxicological studies have been conducted on SDA and OPA. In relation to occupational asthma, SDA is a dialdehyde that is structurally very similar to glutaraldehyde, being only one carbon atom less in chain length. There are no data concerning the ability of SDA to cause asthma. On structure-activity grounds one might predict that it might have the potential to cause asthma in a manner similar to that of glutaraldehyde. Currently, there are no documented case-reports of occupational asthma in workers exposed to SDA. However, it is uncertain how long SDA-containing formulations have been used for endoscopy sterilisation or how widespread the use of these formulations has become. SDA is present as an active ingredient in two commercial formulations used in the UK (Gigasept® containing 6.8% SDA, and Gigasept® FF containing 11% SDA).

12. OPA is also a dialdehyde; it is the active ingredient in the commercial formulation Cidex-opa® (containing 0.56% OPA). As with SDA, there are no data concerning the ability of OPA to cause asthma. The chemical structure of OPA consists of two aldehyde groups adjacent to each other on a benzene ring. The influence that the benzene ring might have on the ability of OPA to cross-link with proteins to form an immunologically active conjugate is uncertain. However, Cidex-opa® appears to be a relatively fast-acting sterilant, effective even at such a low concentration of the active ingredient (OPA). This suggests a high degree of chemical reactivity for OPA as a cross-linking agent to proteins. In support of this, marketing information indicates that Cidex-opa® kills most microorganisms within 5-12 minutes of contact. This observation, together with the fact that another dialdehyde (glutaraldehyde) is a known asthmagen, might raise some concern about its potential to cause asthma.

Consultation

13. No consultation beyond HSE has been undertaken at this stage. HSE have informed the Department of Health and the Scottish and Welsh offices that this review is being undertaken.

European Implications

14. There are no European implications for this work.
Action

15. WATCH is asked to consider the attached documentation and:

i. Give a view on the known and, in the absence of data, what might be positively indicated as possible health hazards of the active ingredients SDA and OPA.

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