COMMITTEE ON CARCINOGENICITY OF CHEMICALS IN FOOD CONSUMER PRODUCTS AND THE ENVIRONMENT (COC)

NON-TECHNICAL SUMMARY

BREAST CANCER RISK AND EXPOSURE TO ORGANOCHLORINE INSECTICIDES

STATEMENT OF REVIEW UNDERTAKEN DURING 2003/4

Introduction

1. Organochlorine insecticides (OCIs) are a group of synthetic chemicals that were widely used in agriculture (and for the control of malaria) during the 1940s up until the 1960s. They were commonly used because they were very effective and were also relatively cheap. However, following evidence that they persist in the environment and in humans, concern about their use increased and they were subsequently withdrawn from use.[1] Currently there are no approved pesticide formulations in the UK that contain OCIs.

2. People may be exposed to OCIs as environmental contaminants in their diet. In 1995, the Committee was asked to review studies where humans were exposed to OCIs to advise whether it was possible that environmental exposure to OCIs could be linked to the development of breast cancer in women.

3. Breast cancer is a very complex disease and the risk factors are well documented. They include the age at first birth, menarche and menopause, as well as obesity, parity and use of oral contraceptives and hormone replacement. Further information about the possible causes of breast cancer can be obtained at the Cancer Research UK internet site http://www.cancerresearchuk.org/aboutcancer/specificcancers/breastcancer

4. A common feature associated with these various risk factors is the fact that they result in increased amounts of the female sex hormone oestrogen in the body. In women, oestrogen is normally secreted by the ovary and is responsible for producing typical female sexual characteristics. Some synthetic chemicals, including OCIs, may have a very weak ability to act like oestrogens in the body i.e. have 'oestrogen-like effects'.

5. Therefore in 1995 (and again in 1999) the Committee was asked to consider evidence that suggested exposure to certain OCIs i.e. DDT, dieldrin, β-HCH and lindane, might be associated to breast cancer.

6. From the available studies in 1999, it was concluded that environmental exposure to DDT, dieldrin, β-HCH and lindane does not

increase the risk of developing breast cancer. However, since publication of the 1999 review, additional studies have been published and so the Committee suggested that a further review of the available data should be undertaken.

7. To help determine whether OCIs could possibly be involved in breast cancer the following areas must be considered:
   (a) Does the chemical have oestrogen-like effects in animals?
   (b) How does the oestrogen-like effects of OCIs compare to other chemicals with these effects?
   (c) Does the presence of more than one OCI in a mixture change the way each component behaves?
   (d) Do OCIs actually persist in breast tissue?

8. Obtaining evidence in humans of an association between breast cancer and exposure to OCIs is another important part of the review process. Since the first review, there were very few studies conducted in humans, but there are now many studies available for estimating the relative risks of developing breast cancer following exposure to OCIs (although the majority of these studies have focussed specifically on exposure to the chemical DDT).

9. The conclusions, which update those given in the 1999 review (http://www.doh.gov.uk/ocbreast.htm) are summarised below.

Overview and Conclusions of the 2003/4 review

10. The OCIs reviewed here had at most a very weak ability to act like oestrogen in the body, although the majority had no oestrogen-like effects. Even if added together these chemicals would still be very weak compared to the use of oral contraceptives, hormone replacement therapy (HRT) or flavenoids in food.

11. Furthermore, from the available studies the COC concluded that there is currently no evidence to support the view that OCIs can alter the behaviour of other OCIs at the levels humans are exposed to environmentally.

12. One way in which OCIs are thought to contribute to the development of breast cancer is by their capacity to accumulate in fatty (adipose) tissue. Under these circumstances the breast receives a continuous supply of oestrogen-like substances over a prolonged period. Various studies conducted across the UK, Europe and USA measured the concentrations of OCIs in human adipose tissue or breast milk. Upon reviewing data published by the UK Pesticides Residues Committee (PRC) collected over 37 years since the 1960s, the levels of OCIs in human tissue are decreasing.

13. Upon reviewing studies of humans exposed to OCIs, there is currently no convincing evidence that OCIs are associated with the development of breast cancer.

14. The Committee reached a number of specific conclusions regarding the individual chemicals under review, which are tabulated below for ease of reference.

15. A detailed statement is available (http://www.advisorybodies.doh.gov.uk/coc/)

Conclusions on the individual chemicals considered in the 2003/4 review

OCl	**Does the chemical have oestrogen-like effects in animals?**	**Are the levels detected in human tissue significant?**	**What is the relationship between human exposure to a particular OCl and breast cancer?**	**Are people who are exposed to environmental levels of a particular OCl at increased risk of developing breast cancer?**
DDT	Yes, although its effects are very weak.	Levels of DDT are known to be declining.	There is no evidence for a link.	No.
Dieldrin	No.	Levels of dieldrin are known to be declining.	Overall there is insufficient information to draw any conclusions.	No definite conclusions drawn. To be kept under review..
β-HCH	Yes, although its effects are very weak.	Levels of β-HCH are known to be declining.	Overall there is no evidence for a link.	No.
Lindane	No.	No.	Overall there is insufficient information to draw any conclusions.	No.

September 2004

Reference

1. Smith AG (1991). Chlorinated insecticides. Chapter 15 in Toxicology of Pesticides. Edited by Hayes WJ and Laws ER. Pages 731-915. Published by Academic Press, San Diego, California USA. ISBN 0-12-334162-0.