

DANGEROUS DIPS
The Truth About Organophosphates

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1. Introduction

Organophosphates (OPs) include phosphates, phosphites, phosphonates, phosphoramides, and pyrophosphates. They usually come in liquid or powder form, and are either diluted with water and sprayed or directly applied as granules. They are widely used as pesticides in commercial farming, and are also present in some products sold over the counter for domestic garden use. In the UK, farmers also use organophosphate sheep dips as a routine preventative measure against sheep scab and fly-strike. Sheep dipping is not compulsory, but farmers whose flocks suffer from sheep scab outbreaks could face prosecution. It has been estimated that 40 million sheep are dipped each year at a cost of at least 50p per sheep (1992 prices).

2. Health Effects

OPs can be absorbed via skin, lungs and eyes, with absorption through skin probably the most common route in practice. Until recently it was thought that the toxic effects produced by OP compounds were exclusively due to inhibition of acetyl cholinesterases in the nervous system, with poisoning requiring repeated exposure within the cholinesterase recovery time. Clinical effects generally appear when plasma cholinesterase activity falls below 30% of normal pre-exposure values.

Symptoms can include:

- * weakness, headache, giddiness, loss of appetite, nausea and diarrhoea
- * muscle tremors and impaired co-ordination
- * miosis, blurred vision, excess salivation and sweating, decreased cardiac output and hypotension
- * urinary incontinence, abdominal pain, vomiting, broncho-constriction
- * depression of the respiratory centre,
- * depression, insomnia, lack of concentration, memory impairment.

However, it is now established that chronic nervous system damage can be caused by the action of OPs on a number of other enzymes. Reliance on blood and plasma tests, which monitor cholinesterase levels only, can therefore be misleading in all but acute poisoning cases. Recent evidence of further health risks from OPs includes studies on damage to the peripheral, central and autonomic nervous systems (Dr Jamal and others, Glasgow University Department of Neurology), damage to bone cell function (Dr Hodges and others,

Sheffield University Department of Metabolism and Clinical Biochemistry, and research on OPs, Affective Disorders and Suicide by Dr Davies, Avalon NHS Trust). OP use during the Gulf War has also been identified with "Gulf War" syndrome, which has affected returning service personnel.

OP poisoning is a reportable disease under the Reporting of Injuries, Disease and Occurrences Regulations 1985 and a prescribed disease under the Industrial Injuries Provisions of the Social Security Act 1975. While farm employees and others can claim industrial injuries benefit, no form of compensation is available to self-employed farmers who face loss of earnings as a result of OP poisoning.

In the two years from April 1994 to March 1996 there were 210 incidents of pesticide poisoning reported to the HSE, involving 353 people. Of these

- * one quarter of the people involved were employees, and three quarters were members of the public
- * three fifths of the incidents involved crop spraying.

It is likely that these figures significantly under-estimate the true extent of OP poisoning, because of continuing widespread ignorance about causes, symptoms and precautions.

Present methods of sheep dip disposal may also pose a threat to human and animal health. A 1989 study by the Tweed River Protection Board showed that dips contaminated 17 out of 20 river catchment areas surveyed. It now appears that OPs may persist in the water table and soil for much longer than originally thought.

The current Government has been notably complacent about the effects of OPs on human health. In 1993 Nicholas Soames MP, then food minister, denied that serious health damage could have been caused to farmers by sheep dip. In 1995, the same MP, then army minister, denied that OPs had caused health damage to Gulf veterans.

3. Licensing

Sheep dips are licensed jointly by MAFF and the Department of Health, on the basis of assessments made within MAFF. The evidence on which these assessments are based, which is largely data supplied by chemical companies, is not disclosed to the public. In addition, monitoring of the possible Suspected Adverse Reactions to OP exposure (SARS) has been undertaken by the same

- MA/DoH bodies (i.e. the Veterinary Products Committee and the Veterinary Medicines Directorate).

There is scientific doubt about the adequacy of the standard test used to determine the neurotoxicity of OPs for licensing purposes: the so-called "hen test". This is based on a model not related to acetylcholinesterase inhibition, but on neurotoxic target esterase inhibition (NTE). It is assumed that OPs which inhibit this enzyme are liable to produce neurotoxicity, those which do not are neurologically safe. Expert evidence, from Dr T Marrs - senior adviser to the Department of Health on OPs; Dr Jamal of Glasgow; and others; now suggests that this hypothesis is not reliable. Products licensed for use following the "hen test" may therefore be causing long-term nerve damage to users as a result of prolonged low or medium level exposure.

4. Future Action

The Government recently decided to give £500,000 to research into OP poisoning. However, the results of this epidemiological survey will not be made available until 1999. The Government has so far refused to fund any clinical investigation of the 500 sick farmers whose details are held by the OP Information Network, despite pressure to do so from the British Medical Association and National Farmers Union.

5. Safety Measures

In 1951 A Government Working Party chaired by Lord Zuckerman recommended a series of essential safety measures for all workers involved with OPs. They included:

- * protective clothing, including rubber gloves, rubber boots, an eye-shield and white cotton overalls with a hood, with respirators to be worn in all cases where OPs were handled in confined spaces
- * instruction in dangers and precautions - including a programme of work with doctors and hospitals on the dangers, mode of action and methods of treatment for OP poisoning
- * regular medical examinations
- * limited working hours, and no work with OPs where any individual is suffering from colds, bronchitis or stomach upsets.

It has been suggested that there has been a failure by Government over several decades to implement the Zuckerman report, particularly by educating farmers and other workers with OPs about its findings and recommendations.

In 1981, Guidance Note number MS 17 from the Health and Safety Executive (HSE) suggested "regular monitoring for anything more than occasional exposure to OP compounds", including:

- * pre-exposure measurement of both plasma and erythrocyte enzymes
- * regular (minimum four weekly) monitoring of plasma cholinesterase levels in repeatedly exposed subjects
- * measurement of both enzymes in cases of acute heavy exposure and investigations of possible incidents.

However, MS 17 was not fully circulated to doctors, farmers or even HSE field officers, and was not even mentioned in the latest advisory leaflet from the Chief Medical Officer ("Pesticide Poisoning ... Guidance Notes for Medical Practitioners", 1996).

6. Conclusions

The Government is open to criticism for failing

- * to provide adequate and accurate advice on the potential dangers of exposure to OP users
 - * to provide adequate and accurate advice on protective equipment
 - * to provide adequate education for doctors on the known chronic effects of OP poisoning
 - * commission a proper study of known cases where farmers and others have suffered from OP use, using *inter alia* the database compiled by the OP Information Network.
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