ORGANOPHOSPHATE POISONING

Examining the Evidence

CONFERENCE REPORT MAY 2002

OPUS
OrganoPhosphate User Support
Mid Wales & Marches

Institute of Rural Health

ORGANOPHOSPHATE POISONING - EXAMINING THE EVIDENCE

"As a physician you should always ask the patient what they do"
Bernadino Ramazzini, Italian physician, early 18th century.

FOREWORD:

Dr David Freed MD, MIBiol, Allergist. Formerly Lecturer in Immunology, Manchester University

Twenty years ago allergists were accustomed to working with a 'simple' list of allergic disorders, such as rhinitis, eczema and asthma. In the mid-70's a new set of symptoms began to appear. These included initially implausible syndromes such as the cycle of elation and euphoria followed by depression and fatigue, arising after exposure to certain foods or fumes. These syndromes seemed to depend more on toxicology than immunology, and more radical theorists began to query possible connections between the toxic triggers and certain forms of brain damage, or autism in children.

As it became apparent that the medical and political establishment were lacking both the relevant knowledge and the will to investigate these cases, confidence decreased in the official responses to these occurrences.

Even with the best will, expertise and effort, the 'truth' is likely to be far more complex than we can comprehend. There is already a huge amount of research literature on the subject, to the degree that no single person can comprehend it all. None of us knows everything that is already known, let alone what is not yet known.

This conference attempted to combine the different angles of several experts to give an overview of the latest information on the scientific, medical and legal complexities of organophosphate (OP) poisoning and to look at possible constructive ways of tackling the issue.

INTRODUCTION

The Conference was a joint initiative between the Institute of Rural Health and OPUS (Organophosphate Users Support Group), a charity covering the Marches and Mid-Wales, which supports people suffering through exposure to pesticides. This was the first national conference to combine the latest understanding in both the medical and legal complexities of OP poisoning, a condition which is notoriously difficult to diagnose and which has no easy remedy.

CONFERENCE SUMMARY

The diagnosis and treatment of organophosphate poisoning has never been a straightforward matter but has been bedevilled both by lack of knowledge and poor communication of that knowledge and by a lack of will, perhaps as a result of varying political and industrial agendas.

The appearance over the last three decades of a cluster of symptoms, overlapping those of other neurological illnesses but not identifiable as such (indeed sometimes not identifiable as anything 'real') has necessitated fresh thinking on the part of scientists, medical practitioners, environmental health specialists and, increasingly, lawyers.

Many sufferers have been exposed, over a long period, to substances about which there was until comparatively recently no public acknowledgement of toxicity, and have had to struggle to have their symptoms taken seriously. Recognition of the cause of their illness may be the first breakthrough for them.

The symptoms of OP poisoning may vary in intensity and duration, depending not only upon the degree of exposure but on factors such as individual pathology, age and genetic traits. There is the possibility that the chronic syndrome (1) may be the effect of an immunotoxic mechanism.

Research suggests that an individual may be pre-sensitised to toxins both by pre-exposure to other toxins and by single exposure to a complex of chemicals, such as occurs in many commercial preparations. The combination of these combinations may multiply toxicity exponentially.

Since many of these substances are relatively recent introductions the gradual evolution of human defence mechanisms is inadequate to cope, and the young and unborn are particularly vulnerable. It would be wise therefore to adopt the 'precautionary principle'(2) rather than confining safeguards to advice about end use.

An emphasis on the 'healthy and safe worker' risks transferring responsibility from the manufacturer and 'employer' (government) to the farmworker using the product. Laboratory analysis of risks is in any case inadequate to prescribe for actual use in the field with live and harassed animals.

Though medical professionals are still a long way from being able to predict, or even totally explain, the syndrome, the evidence for actual effects and the diagnostic criteria are now much more established. These include chronic fatigue, multiple chemical sensitivity, and personality changes, with their accompanying physical and psychological effects.

Such a complex syndrome requires a broad range of interventions, including of course the prevention of further exposure. It is also important to recognise that the resulting disabling effects may be social and financial as well as physical and psychological.

Because of the technical nature of the medical evidence, bringing a legal case will make extra demands on both witnesses and the court. Detailed and accurate medical records, and clarity about how they are to be used, are therefore crucial. This places a requirement on the doctor to conduct extensive and appropriate tests as early as possible.

Lack of knowledge is disempowering and destructive of confidence in the regulatory system. Poor communication of knowledge handicaps those attempting to find solutions and offer treatment. It is vital that full and understandable information is made accessible to all those involved manufacturers, scientists, medical and environmental health professionals and of course the end users.

(1) syndrome - a concurrence of several symptoms in a disease or illness.

(2) precautionary principle - the principle that chemicals should not be used until they are shown to be safe beyond reasonable doubt

A PERSONAL PERSPECTIVE:

Teresa Layton, Chair of Organophosphate Users Support Group (OPUS)

Teresa recounted her own family's experience of OP poisoning, with her husband, herself and all three of her sons being affected in some degree.

Their sons were born between 1978 and 1981 and were involved in farm life from babyhood. Though never helping directly with dipping they helped move and handle sheep in the days following the dip. During the years of compulsory dipping there was no information about the toxicity of the compounds used.

Formerly in good health and very fit, her husband began to suffer from disabling joint and muscle problems, flu-like symptoms and night sweats. These began in 1989, immediately after dipping, but intensified over the next few years to such a state of unco-ordination and exhaustion that Multiple Sclerosis was diagnosed. The family knew of several other farmers with similar symptoms being given the same diagnosis. No questions were being asked about the chemicals used on farms.

In 1992 their eldest son became ill with flu-like symptoms, and their second son, a fit and active 13 year old, experienced such disabling muscle and co-ordination problems that he could barely walk. Finally the youngest boy began to limp increasingly badly each year after dipping. Blood tests on all three proved inconclusive and the family felt misunderstood and patronised as they attempted to find a cause.

Finding a doctor who took them seriously, looked at the symptoms as a whole and suggested a cause in organophosphate poisoning, proved to be the breakthrough. Looking back through her consistently kept diaries Teresa was able to see a clear connection between each bout of illness and the days of dipping. Researching further she was shocked to discover that there were known hazards associated with the use of OPs, made many years earlier but never passed on to families such as hers.

After extensive tests her husband and middle son were diagnosed as suffering from OP poisoning. They have permanent irreversible damage to their nervous systems and each member of the family has some degree of chemical sensitivity. Teresa also became aware of the isolation experienced by sufferers. OPUS was set up to provide information and support, to keep sufferers in touch with each other and to achieve recognition and compensation for their suffering.

THE SCIENTIFIC EVIDENCE:

Prof P J Nicholls, Professor of Pharmacology and Toxicology, Welsh School of Pharmacy

Organophosphate compounds have a range of uses, from medicines to chemical warfare agents, but have most commonly been used as insecticides, with the risk of routine occupational exposure to recommended 'safe' levels along with accidental exposure to 'high' levels. In fact there is no such thing as a safe substance. All chemicals are toxic at some level and life is a trade-off between risks.

The main mode of action of OP compounds has been known for a long time but the accumulated information has not been accessible to all those concerned in their use. The function of OPs in inhibiting acetylcholinesterase (AChe) results in the accumulation of acetylcholine (ACh), one of the body's chemical transmitters. Elevated levels of ACh produce a range of symptoms including muscle, stomach, breathing and visual problems,

increased secretions, slowed heart rate and damage to the central nervous system. The addition of more subtle emotional effects make it important to distinguish the syndrome from psychological disorders.

The resulting syndromes may be acute (with rapid onset and short duration), intermediate (following on from acute symptoms), or delayed (occurring 1-2 weeks after exposure and persisting for several further weeks or longer.) The chronic syndrome, which occurs after intermittent or continued exposure to low doses of OPs, produces the most difficulty (for both sufferer and professional), resulting in neurological damage to the central nervous system, with associated neuropsychological symptoms. The mechanism is still unknown and there has been much controversy about the link between OP exposure and the symptoms.

A complex of factors may influence the degree of toxicity. The specific agent or chemical may be accompanied by other components in a formulated product which may buffer, modify or exacerbate the effect, for example by multiplying the toxicity or increasing the rate of absorbtion. The intensity of the exposure and the access route - via skin, mouth or lungs - will also affect the level absorbed. These exposures are not taking place in a laboratory but in the real and unpredictable world of animal husbandry. In addition the exposed individual will have their own particular pathology, age and genetic traits all of which will modify their susceptibility to the toxin.

The effect of variations in enzyme levels between individuals is well established for the metabolisation of certain drugs, and it has been suggested that people with low levels of the enzyme paraoxonase (PON-1) may be at greater risk of poisoning when exposed to some OPs. Though animal studies seem to endorse this, human studies have been weakened by the use of subjects whose ill health is self-perceived.

There is much scope for investigating other targets and mechanisms for the chronic syndrome, in particular a possible immunotoxic mechanism. There is the possibility that when an organophosphate binds with a protein in the body the resultant 'foreign body' may trigger off an immune reaction, manifesting in chronic adverse effects without significant acute toxic reactions. However these mechanisms, and in particular the way in which proteins might change as a result of the 'foreign body' reaction, are not yet understood.

Questions for the future should include:

• is the required new information already available? - much of this research (as at Porton Down) is classified and may not be available to manufacturers let alone others involved in the chain of use.

• should there be more basic and clinical investigation?

• should there be Government sponsorship for this work?

• and should there be more interaction between all those involved? - this would include manufacturers, pharmacists, pharmacologists, toxicologists, environmental health specialists and of course those at the 'receiving end'.

HEALTH & SAFETY:

Prof A Watterson, Occupational & Environmental Health Research Group, University of Stirling.

Thomas Legge (the first UK government occupational physician, working in the early 20th century) proposed a number of basic axioms to govern the use of hazardous chemicals, that included:

• Employees should always be informed about hazards. Hence the users of chemicals should always be informed about the hazards, with the information being not only accessible but understandable.

• Without the 'employer' (in this case the Government through statutory approval of sheep dips and the requirement to dip) doing all they can to protect the health and safety of the workers (in this case the farmers and farm workers), the workers themselves can do nothing.

In addition, tests for safety must extend beyond the laboratory to the actual use of products in the field.

Organophosphates have been in use in agriculture since the 1950s, and have been used as veterinary medicines for well over 40 years, replacing the arsenical and other dips which posed apparently more obvious and immediate hazards for livestock and the workers manufacturing them. The approach to occupational health and safety management for much of that time has been driven by an emphasis on the 'healthy and safe worker' rather than the 'healthy and safe workplace', inevitably shifting responsibility from the manufacturer/employer to the end-use worker. Thus the 'careless worker' can, theoretically, be transformed by proper instruction and training and the use of personal protective equipment into an entirely safe user of the product; removing the pressure to develop a substitute, safer product or indeed to replace the process altogether. This is not the reality.

The official response to concerns about OP poisoning comprises a series of defences over the decades of use. These have developed from the view that there is no problem with OPs; that we don't know what they are doing but it must be safe; through various degrees of acknowledgement of problems but denial of reality of effects (different dose, different illness, different product); to denial of foreknowledge of effects (and denigration of damaging studies); and most recently to a last ditch attempt to focus all attention on the containers (and the responsibility of workers to read the labels thereof.)

In fact studies in the 1950s were already flagging up concerns about organophosphates but these were not picked up by the Health & Safety Executive (HSE), the Ministry of Agriculture, Fisheries & Food (MAFF), or the veterinary establishment and certainly not emphasised sufficiently in their advisory publications. The regulatory system tends to be both delayed and reactive and until the Health & Safety at Work Act (1974) the agricultural sector was not in the mainstream health and safety structure. And even good legislation will not be able to permeate a system with no clear management of information or effective supervision.

An increasing emphasis on personal protective equipment fails to address the more fundamental issues about product safety and the realities of its use, and research has only recently begun into real alternatives. In the meantime the precautionary principle should be

adopted. If there are significant indications of problems, even in 'imperfect' studies, this should be reflected in a policy of caution, with the burden of proof being laid on the manufacturer rather than the burden of responsibility being laid on the user.

Thus guidelines of good practice would include:

Precaution
• placing the burden of proof on manufacturers to prove a substance is safe

• recognising the limits of scientific knowledge and the need to marry it with other forms of knowledge.

• moving away from restrictive and rigid risk assessment towards an initial and greater emphasis on hazard identification and removal of exposures to hazards if at all possible.

Prevention
• 'upstream' prevention is more effective and also cheaper than 'downstream' managing or curing of problems.

Democracy
• involving not only scientists, policy-makers and regulators but also the end users and their communities. This would govern not only the decision-making and regulatory process but also the investigative process.

• providing full and understandable information and recognising that uncertainty is disempowering and destructive of confidence in the regulatory process.

• giving effective teeth to this process by legislation on hazardous products.

An Integrated Approach
• recognising the importance of each stage of the process and the combined impacts of production, use and environmental effects.

CHILD DEVELOPMENT TOXICOLOGY OF OPs IN MIXTURES

Dr C Vyvyan Howard, Developmental Toxico-Pathology Research Group,
Dept of Human Anatomy & Cell Biology, University of Liverpool

Human populations have now been exposed to complex mixtures of man made chemicals for several generations, such that the average person contains hundreds of synthetic chemicals. This is a relatively new assault on the body, the character of which is hard to quantify, and which often occurs at the highest doses early in life when the system is at its most sensitive and vulnerable. Some of these chemicals are persistent, like the organochlorines, of which DDT (dichlorodiphenyltrichloroethane) is an example, which accumulate in fat stores and have a very long half-life. Others, like organophosphates, are transient because they can be metabolised in the body and are usually excreted within 72 hours.

The developing foetus is reliant on the mother for removing any man made chemicals that get into its body across the placenta and also their metabolites. Sometimes the metabolites can be more toxic than the parent compound and these can build up in the foetus because of its very high metabolic rate. To a degree the body has evolved effective mechanisms to control access of 'foreign' substances to the body, but this has been a gradual evolution and can not necessarily cope with recently introduced substances. The means of exposure will also affect this process. Normally the liver will serve as at least a partial filter for ingested toxic substances but airborne spray drift, where the toxins enter the body by both inhalation and skin absorption, will bypass the filtering effect of the liver and can prove considerably more toxic.

Rapid changes in the pattern of disease over the last 50 years (such as the rise in cancer rates), or changes in fertility rates (which are falling), may be significant evidence of these new inputs. The genetic basis for susceptibility to cancer is actually very low compared to lifestyle factors and these include not only dietary factors (including the chemicals we ingest in food) but the whole range of environmental inputs we are exposed to, including radiation.

Some of the chemicals that have been released into the environment are confusing to the immune system and disruptive of the hormonal system. For example high levels of phthalates have been associated with a lowering of the age of puberty in females and a feminisation of males. PCBs (polychlorinated biphenols) and DDT are also implicated. A total of at least 49 registered pesticides are recognised as disruptive to the endocrine system.

However, even when a change in human disease pattern is identified, it is hard to pin down the precise cause. This is not only because there are so many chemicals to choose from but because of the way complex mixtures of chemicals interact. These interactions could well be particularly significant where those exposed to chronic low levels of pesticides are then challenged with an acute exposure to a further toxin or complex of toxins.

Thus in a series of *in vitro* tests of developing nerve cells (3) a significant increase in glyphosate toxicity occurred following chronic pre-exposure (at 'non-toxic' levels) to diazinon, a common component of sheep dip. Further, when the glyphosate was formulated in a more complex mixture, toxicity drastically increased (as Tough Weed by 13-fold and as Roundup by 165-fold, where no chronic pre-exposure to diazinon had occurred, and by 200-fold following such exposure.)

These effects, which were all demonstrated at cell level in laboratory research, may have implications for the unexplained high sensitivity of some individuals to environmental toxins. Further research has investigated the possible link between the OP pesticide Phosmet and neurological disorders such as BSE. In this case it appears that exposure to phosmet increases the sensitivity of cells to the neurotoxic prion protein fragment PrP106-126.

We do not yet know how these findings extrapolate to people. But the evidence is compelling enough to suggest that we should exercise the precautionary principle. Since the human population is increasingly exposed to not just one pair of formulations (each with their own cumulative interactions) but to many, we are likely to see an increase in the toxic effects of such interactions. Since the developing foetus or infant is even more vulnerable and sensitive to such toxicity we would be right to exercise the utmost caution.

(3) This work was part of Dr Janie Axelrad's PhD research.

THE ROLE OF THE VETERINARY MEDICAL DIRECTORATE THE HISTORY, THE LAW AND LEGISLATION OF OPs:

Phil Davies, Head of Licensing Policy, Veterinary Medical Directorate

The Veterinary Medical Directorate (VMD) was established in 1989, within MAFF, with the role of 'assuring safety, quality and efficacy of veterinary medicines'. There are three arms to its operation: the Licensing Business assesses, licences and monitors medicines; the Residues Business operates a residues surveillance programme e.g. looking at chemical residues in meat; and the Policy Business advises on the development of general policy on authorisation of veterinary medicines.

The VMD has therefore always been involved in the regulation of sheep dips. Ectoparasites in sheep have been with us since pre-history, giving rise to a variety of controls, but the first effective control was the plunge dipping introduced in the early 1800s. A number of substances were used including copper sulphate, boron compounds, tar acid derivatives and sulphur, with a common combination being arsenic and soft soap.

Compulsory dipping was introduced in 1906 and in 1948 HCH (hexachloro-cyclohexane) was approved, providing 12 weeks protection from a single dip. Its subsequent combination with DDT had eradicated sheep scab in Britain by 1952. A further addition in the mid-50s, Dieldrin, was effective against blowfly, lice and keds, providing residual protection by penetrating the fatty tissue of the animal. However with scab making a comeback and organochlorine residues being found in meat (leading to the banning of Dieldrin in 1965), the OP based dips became increasingly popular. By 1970 there were 67 approved formulations, being sold under 297 different names.

The 1968 Medicines Act, introduced in the wake of the thalidomide tragedy, introduced a much more structured framework of regulation and monitoring. All products on the market before 1971 were granted Product Licences of Right, though a 1981 EC Directive required all these to be reviewed.

A UK review of OP sheep dips began in 1988 and a significant number of manufacturers chose not to renew their licences since they could not provide sufficient data. As a result of the review Phenols were removed from all OP dips by 1993 and just 12 authorised dips remained, of which 9 were OP dips. It was apparent that much more research was needed into the issue and a Medical and Scientific Panel was set up in 1994 to analyse the existing research and identify any shortfalls.

A number of studies into the effects of OPs on human health resulted in the Government producing a Four Point Plan on OPs in 1999, with the immediate suspension of all OP dips pending improvements to the containers. The temporary return of 3 OP sheep dips in new containers with vented taps, together with new requirements for manufacturers to supply gloves and a safety sheet, was replaced by the provision of two OP dips in closed transfer systems.

The Suspected Adverse Reaction Surveillance Scheme encourages the reporting of harmful side-effects and the VMD can take follow-up action. This can range from closer monitoring and the stipulation of clearer warnings on products, to suspending the sale of particular batches of the product or revoking its marketing authorisation altogether.

Subsequent discussion concerned - possible links between BSE and OPs ("possibly a contributory factor"),

- the means of extracting information from Porton Down (Porton Down are represented in a group of those involved with the issue and contribute information via this forum)

- and the possible risk of bias arising from the funding from industry for the inspection process.

THE LEGAL CASE:

The Hon John Melville Williams, QC, Old Square Chambers, London & Bristol.

Claims from those who have suffered from OP poisoning, whether brought against manufacturer or employer, must in every case be founded on proof that the ill health was caused by the exposure to and ingestion of the OP toxin. Because of the technical and specialised nature of the evidence there will be a greater role for expert witnesses and it is important for those involved to be aware of the differences in terminology between different professions.

'The balance of probabilities' for example holds different weights for lawyers (where 'probable' means more likely than not, i.e. as little as 51%) and scientists (where 'probable' implies 95% certainty.) Scientific and medical terms may pose further problems for lawyers.

The Court holds the responsibility and power to determine the way in which experts will contribute to the case and requires that they be independent witnesses, able to give objective and unbiased opinion, including both the research basis of that opinion and the limits of their expertise. Recent rules of court require supporting medical reports to provide not just confirmation of illness but a verification of its cause. Since the appraisal of scientific evidence is very different from that of lay or factual evidence there should perhaps be judicial training in the former or at least the equivalent of the US Reference Manual on Scientific Evidence.

OPs are toxic by design and evidence of their toxicity to man is increasing, with a range of effects from immediate and short term to long term, chronic and possibly permanent. However most cases will be those concerning chronic effects and these are the most difficult and controversial, particularly where there has been no obvious initial acute reaction. Even such terms as 'acute' or 'low dose' are liable to differences of interpretation and in any case there is rarely precise evidence of the actual dose to which the client has been exposed. 'Low dose' may even be used to imply a level of response rather than a level of exposure.

Many factors affect the amount ingested, from the nature and type of the pesticide and the cumulative effects of the formulation to the actual circumstances of use - the job being done and the route of ingestion. Therefore detailed and accurate medical records are essential, in particular the relationship of effects and time of occurrence to each event of exposure. Since the claimant's medical condition is often not investigated until the biological markers are no longer available, it can only be proved by assessment of the effects. Thus it is critical for the doctor to carry out tests at the earliest possible opportunity and to eliminate alternatives in order to establish a specific syndrome and pathology that cannot be ascribed to any other cause.

ORGANOPHOSPHATES & THE BRAIN

Dr Bob Davies, Consultant Psychiatrist, Rydon House, Taunton.

The mechanism of the action of OP poisoning upon the central nervous system is not yet clear. These substances are very biochemically reactive, binding with proteins in the brain. There is a likelihood that OPs have the capacity to disorder cell regulation at the most fundamental level. However there is little research funding available for investigating this and the onus, which should be on manufacturers and promoters to prove that they don't present this risk, remains with the users and concerned professionals to prove that they do.

Evidence for the actual effects is now much more than anecdotal. Diagnostic criteria have been established for COPIND (Chronic organophosphate-induced neuropsychological disorder) which include:

* repeated exposure to organophosphates,
* at least four of the following:
    - personality change with mood destabilisation
    - impairment of memory and concentration
    - impaired exercise tolerance
    - reduced tolerance to alcohol
    - heightened sensitivity to organophosphates
* at least three of the following:
    - exacerbation of dippers flu
    - impulsive suicidal thinking
    - language disorder
    - heightened sense of smell
    - deterioration of handwriting

Approximately 10% of patients exposed to OPs will develop this syndrome but we are still a long way from understanding the factors which will determine this, though considerable progress has recently been made.

Questionnaire based research clearly demonstrates that this syndrome is consistent across occupational groups, and a comparison of exposed and non-exposed farmers reveals very compelling evidence of this being a distinct disorder, strongly refuting the suggestion that victims suffer from "non-specific" symptoms.

Treatment of those suffering the effects of OPs is less than satisfactory, and without official recognition that this is a real problem, development of treatments is inhibited. Antidepressant drugs (SSRIs selective serotonin reuptake inhibitors) may be helpful in low dose, and general supportive and problem-solving psychotherapy can often ease suffering. Cognitive therapy, advocated by some, generally seems unhelpful and can occasionally make matters worse by challenging the reality and causation of the disorder.

GROUPWORK
A: SIGNS, SYMPTOMS AND GETTING WELL:

Dr Sarah Myhill, GP

In clinical practice OP poisoning presents in many different ways, depending on level and frequency of dose, combination with other chemicals, and individual sensitivity.

All OPs are genotoxic, causing birth defects and cancer, but there are links also with osteoporosis and heart disease, disruption of the immune system, and neurological conditions such as Parkinson's disease and dementia.

Symptoms, which may occur immediately, after several weeks, or chronically, may include:

• Chronic fatigue, both physical and mental,

• Multiple chemical sensitivity a "spreading phenomenon" where patients not only become more sensitive to OPs but to many other chemicals as well and may develop extensive food allergies.

• Personality changes, particularly destabilisation of mood and severe depression.

The combination of the above can cause a variety of physical and psychological effects and there may be a great deal of overlap with conditions such as ME. Low exposure may produce no observable symptoms and even high doses, while inflicting observable damage, are quickly excreted from the body and are often undetectable by the time the patient gets to see the doctor.

Because damage to the body is widespread and subtle, 'standard' tests such as full blood count, liver function tests, X-rays and ECGs often fail to show abnormalities. It is therefore vital that the full range of symptoms that the patient is experiencing is assembled and viewed as a whole and that the appropriate tests are done. These could include immune function tests, sensitive tests of liver function, hormonal and psychometric investigations, tests of trace element levels and bone scans.

The priority is to recognise the illness and stop further exposure, then to treat with a broad range of subtle and low interventions. These might include B12 injections to counter brain function fatigue, magnesium injections to correct muscle symptoms, multivitamin supplementation, low dose hormone treatment, and a scrupulous avoidance of exposure to chemicals in the daily environment of the patient.

That this approach does not have a higher profile may be due to :

• the low status given to nutritional therapies (as too simple, too cheap and generally non-patentable),

• the reluctance of the Poison's Units (themselves funded by the pharmaceutical industry) to diagnose chronic organophosphate poisoning,

• the lack of training for doctors in toxicology.

• the involvement in the Committee on Toxicology of representatives from both the pharmaceutical industry and Porton Down.

Meanwhile lack of recognition of the existence and effects of this illness mean that its victims suffer not only physiological and psychological damage but often social and financial disaster as well.

B: LEGAL ASPECTS THE IMPORTANCE OF MEDICAL RECORDS:

Lis Charles, Gabb & Co.

If a case of OP poisoning is to be brought to law the clarity and accessibility of the medical records is crucial.

A solicitor needs first to identify a limitation date the date on which a client was injured or knew of the cause of his injuries as the three year period within which proceedings should be issued would start to run from this. Therefore the solicitor needs to have the full medical record rather than just those sections which the medical officer considers appropriate.

In addition the pattern of attendance at the doctor's is significant. Sufferers of OP poisoning may not visit the doctor during the acute phase but only when the symptoms have become chronic enough to disable them from working.

Thirdly it is important to exclude all possible alternative causes for the illness, to pre-empt the defendants from using this defence.

Providing 'pruned' selections of records is self-defeating as this may prejudice the claim. Where records have been retained this should be made clear to all concerned.

The Legal Services Commission is currently funding personal injury claims based on product liability, but may review this. To make such a claim, the claimant must have been exposed to a product which has been on the market for less than ten years immediately preceding the issue of proceedings (though the ten year period relates to the particular batch of the product). Where a defendant has caused or made a material contribution to the claimant's injuries, their liability for the damages is joint and several. (4)

Subsequent discussion focussed on
- the role of insurers in gathering evidence about a client's state of health for example the inadequacy of video evidence of client activity as a means of assessing an illness the effects of which vary widely during the course of a day.
- the potential for pursuing a private prosecution against a manufacturer for a criminal offence. In fact a criminal case requires a standard of proof beyond reasonable doubt (difficult to prove after an interval of years), wheareas in civil proceedings that standard of proof is the balance of probabilities.

(4) Since the Conference of 2nd May the Fairchild case has been decided in the House of Lords and this will have a significant impact on the personal injury claims which are based on negligence. This was an asbestosis case in which the House of Lords was asked to decide upon the defendants' contention that if Mr Fairchild had been exposed to asbestos in two employments and could not therefore identify in which employment he had absorbed the asbestos which actually caused his death, then he could not recover damages from either defendant. The House of Lords decided that where the defendants had increased the risk of injury they they would be liable in damages to the claimant. The judgement brought the law in personal injury cases more in line with consumer protection legislation, under which the defendants are liable when they cause the injury or materially contribute to it.

C: PRACTICAL ASPECTS OF HEALTH & SAFETY

Carys Osborne, IMAS Inspector, Health & Safety Executive

Dipping is used to control lice, maggots and the mite that causes scab, all of which if untreated would eventually kill the sheep. The main problem with using dipping as a control is the risk of contamination of the workers at the time of dipping and through subsequent contact with the fleece as sheep are moved and handled.

Ingestion may be through the skin, via the mouth (from eating or smoking while working, not washing hands afterwards), or by inhalation from the mist vapour in the air. Tests using fluorescent dip show that a large part of the worker's body area is contaminated. Most cases of acute exposure have resulted from ingestion through the skin.

Dip baths with no guard rails offer no protection from splashes, or from leg contact with wet sheep. If there is no clean water facility then contamination can not be washed off as it occurs. The use of catch-all chemicals rather than selective preparations can compound the effects of contamination.

The Health & Safety approach includes:

• considering whether dipping is essential pour-on controls may be cheaper and quicker as well as avoiding the risk of splashing

• keeping chemicals under control do not buy more than is needed and keep locked up when not in use

• worker awareness advise workers of safe practices and provide training and protective clothing

• using safe handling systems designed to avoid having to handle sheep or physically submerge them

• safe disposal of used dip run-off should be into an adjacent bath not onto the land
Scab is no longer a notifiable disease though it is endemic in the UK. Dipping is no longer compulsory though if visible symptoms are present then action must be taken. Because of the amount of labour involved in dipping (at least three main operators are needed) more farmers now use contractors.

The sale and use of OPs declined during the last decade but they are now returning to popularity as some of the alternative methods have problems of their own:
Malathiones (pyrethrum based) have environmental risks and therefore greater disposal costs.

Injectables involve much more manual handling with increased risk of repetitive strain injuries.

However comprehensive the prescribed Health & Safety system there will always be those who abuse the safety recommendations, or who fail to report symptoms. The solution to this may be a combination of better initial training via the agricultural colleges and a system of health surveillance. The efficient completion and monitoring of medical records (particularly for contracted workers with greater regular exposure) would highlight those whose level of pre-exposure makes further exposure unacceptable.

PLENARY SESSION

Discussion in the final session focused on issues of knowledge and communication.

• Who controls the information?

• How are services accessed?

• How do we assess and monitor developments?

The route to treatment may be complicated by lack of knowledge, lack of communication and lack of will. GPs are the gatekeepers to other services but must apply to the Primary Care Trusts to authorise specialist treatment for sufferers. Since the scale (and sometimes even the existence) of the problem is not recognised, not enough attention is being given to its treatment. Progress may be further hampered by lack of cooperation between health professionals, itself possibly arising from lack of awareness.

Though rural GPs in particular are increasingly ready to acknowledge the cause of the symptoms patients present with, they are inexperienced in what treatment is effective. The evidence base can only come from monitoring the results.

Legal action, which is subject to time limitation, is complicated by the difficulty of defining a date of onset of a condition that is gradual and progressive

In today's environment the average household is subject to a constant low-level exposure. To identify additional risk we need

• maximum information e.g. from manufacturers. This is made more difficult by manufacturers retaining a product name while changing the formulation, or by similar products being managed in different years by different manufacturers.

• an efficient dipstick measure of contamination. With current levels of technology the lack of this implies a lack of will.

• detailed record keeping. Users need to keep farm diaries, dipping records, invoices of products purchased. Medical advisors need thorough and detailed records of even apparently unrelated symptoms.

Sufferers currently face a lottery. To counter this the profile of the problem must be raised, the level of knowledge improved and communicated to all parties.

EVALUATION

Participants found the day stimulating, challenging and useful. The majority rated most of the presentations highly, though poor accoustics and the highly technical level of some of the information made some of it difficult to assimilate. Certain speakers, (perhaps the most stimulating) aroused criticism and commendation in equal measure.

Frustration was expressed at the lack of time to take the discussion further, and the fact that more people did not attend. This was felt to be such an important subject, and still so

much bedevilled by conflict of opinion and political considerations. There was strong support for follow-up and further contact.

The support role of OPUS should be highlighted. "Clearly sufferers enter a minefield of competing interests and they need support and the knowledge that someone understands."

DEFINITION OF TERMS

COT	Committee on Toxicology
DDT	Dichlorodiphenyltrichloroethane
DEFRA	Department for Environment, Food & Rural Affairs
ECG	Electrocardiagram
HCH	Hexachlorocyclohexane
HSE	Health & Safety Executive
MAFF	Ministry of Agriculture, Fisheries & Food
ME	Myalgic encephalomyelitis
OP	Organophosphate
OPUS	Organophosphate Users Support
PCB	Polychlorinatedbiphenol
SSRI	Selective serotonin reuptake inhibitors
VMD	Veterinary Medical Directorate

Conference report compiled by Helen Porter
Each speaker's section is an edited summary of the information presented on the day.

The Institute of Rural Health is a registered charity. It was established in 1997 to identify and raise awareness of issues relating to health and well-being in rural communities, and offers a resource for individuals and organisations working in rural areas.

The OrganoPhosphate Users Support Group (Mid Wales & Marches) is a registered charity. The group offers support to people suffering through exposure to pesticides including access to medical and legal advice.

Institute of Rural Health
Gregynog Hall
Newtown
Powys SY16 3PW
Tel: 01686 650800

Organophosphate Users Support Group
The Vicarage
Lydbury North
Shrops SY7 8AU
01588 680609

APPENDIX I

OP'S A CLINICAL CASE

2nd May 2002

Programme

09.45 Registration & Coffee Blayney Room

10.00 Welcome & Introduction Dr David Freed The Music Room
Allergist, Manchester Royal Infirmary

10.15 Personal Perspectives
Teresa Layton, Chair of OPUS (family affected by OP poisoning)

10.30 The Scientific Evidence
Prof P J Nichols, Professor of Pharmacology & Toxicology
Welsh School of Pharmacy

11.00 Health & Safety
Prof A Watterson, Occupational & Environmental Health Research Group
University of Stirling

11.30 Coffee Blayney Room

11.45 The Legal Case
Hon John Melville Williams, QC
Old Square Chambers, London & Bristol

12.15 The Role of the Veterinary Medical Directorate The history, the law and legislation of OP's
Phil Davies, Head of Licensing Policy, Veterinary Medical Directorate

12.45 Lunch - Refectory

1.45 Child Development Toxicology of OP's in Mixtures
Dr C Vyvyan Howard, Dept of Human Biology, University of Liverpool

2.15 Organophosphates & The Brain
Dr Bob Davies, Consultant Psychiatrist, Rydon House, Taunton

2.45 Groupwork

A - Signs, Symptoms & Getting Well - Dr Sarah Myhill, GP
Music Room
B - Legal Aspects The Importance of Medical Records, Lis Charles, Gabb & Co.
Joicey Room
C - Practical Aspects of Health & Safety - speaker to be advised
Weaver Room

3.30 Plenary Music Room
"I think my patient\client has OP poisoning. Now what do I do?"

4.00 Tea and close Blayney Room