



Medical & Legal Briefs



A Referenced Compendium of Chemical Injury

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The Healthy Hospital Part Two: Pesticide Risks and Alternatives

By Cindy Duehring

A 42-year-old physician experienced a gradual onset of slowed thinking and impaired memory after commercial pesticide applications in the basement of her home. Neuropsychological testing 18 months after the exposure showed it had caused her intellectual functioning to drop well below the superior level she had before the exposure. She performed especially poorly on recent memory tests, indicating short-term memory problems. The testing also revealed a variety of persistent cognitive and perceptual deficits.(1-2)

On a daily basis, many healthcare professionals are faced with life-and-death decisions regarding their patients. Therefore, anything that might alter their perceptions or impair their ability to concentrate and perform mentally is of extreme concern. As an added pressure, mistakes regarding prescriptions, treatments, and pharmaceutical dosages are the substance of lawsuits. The routine use of pesticides in the majority of hospitals in the U.S. adds another dimension to the picture. The New York State Department of Law, Attorney General Dennis C. Vacco, recently published a report addressing the topic.(2) The lead author is the department's Chief Scientist, Michael H. Surgan, Ph.D. The Healthcare Association of New York State and the New York state Environmental Protection Bureau also participated in the report. In the case mentioned above, the 42-year-old physician was exposed to the organophosphate pesticide chlorpyrifos (Dursban). Commenting on her case, the report states, "The spectre of such effects arising from a hospital's use of chlorpyrifos — or other neurotoxic pesticides — is a sufficient basis to justify critical reevaluation of pest management practices."(2)

"The principle recommendation of this report is that all hospitals in New York should adopt the least toxic pest management policies and practices," the Chairman of the Department of Community Medicine of the Mount Sinai School of Medicine in New York City, Philip J. Landrigan, M.D., M.Sc., states in the preface. "This is an eminently sensible finding. It transcends partisan politics. It prescribes a highly reasonable course of action that every physician and hospital administrator across the state should follow. Indeed, the recommendation deserves to be heeded widely not only in New York but across

the United States. Adherence to this recommendation will reduce pesticide exposures to patients and to hospital staffers and thus protect health. Additionally, adoption of this recommendation will save money. Pesticides are not cheap. Any approaches that sensibly reduce their use will help to contain hospital costs."(2)

The report presents survey results covering the pest control practices for 302 hospitals in New York state. A wide cross-section of facilities was represented including both public and private institutes, large and small, suburban and rural, general care and psychiatric. Ninety-six had nursery facilities, 124 had pediatric facilities, and 147 had intensive care units. The use of over 30 pesticide formulations was reported, including numerous hazardous active ingredients such as acephate, avermectin, bendiocarb, carbaryl, chlorpyrifos, cyfluthrin, cypermethrin, dichlorvos (DDVP), diazinon, fenvalerate, permethrin, propetamphos, propoxur, and resmethrin.(2)

Three hospitals had already successfully implemented true integrated pest management (IPM) and used no pesticides at all. Unfortunately, the majority of hospitals in the survey used pesticide fogs, sprays, and powders in "virtually all areas of hospitals," including areas that contained patients, waiting rooms, halls, and offices, cafeterias, kitchens, and patient treatment areas. Eighty-five percent of the hospitals let the pest control companies conduct routine pest control on a schedule rather than limiting it to when specific pest problems were present, which constitutes "unnecessary and excessive pesticide use. Pesticide applications, if they are to be made at all, should be targeted at a specific pest which has reached a predetermined threshold problem level."(2)

A disturbing number of hospitals delegated the decision-making control over the pest control to independent contractors — the people who have the least reason to encourage non-chemical controls and the most to gain financially from setting up contracts for routine pest control. Smaller hospitals were more likely than larger hospitals to delegate this decision-making process to private contractors.(2)

The current practices involving pesticide use in hospitals signify an unawareness of the non-chemical and low risk con-

trols that are being successfully used in a number of office buildings, schools, and hospitals.(2) They also betray a dangerous ignorance of the adverse health effects associated with pesticide exposure, the legal responsibilities of hospital administrations according to federal law, and the liability risk for personal injury suits from hospital workers, patients, and visitors who could easily experience serious adverse effects from exposure. In the past, misdiagnosis and ignorance have inadvertently helped protect against lawsuits simply because people often didn't know enough about the health effects of pesticides to make connections. However, as research has gradually been catching up with reality and the general public has become more aware of the potential hazards, personal injury suits from pesticide exposure have been on the rise.(3) Also, a small but growing number of healthcare professionals have taken an interest in pursuing the subject themselves by reading the relevant medical literature on the topic, which is generally not covered in medical school.(4)

Pesticides (which include insecticides, herbicides, fungicides, and mildewcides) are especially dangerous products for a number of reasons: 1) They are designed to kill, are toxic to humans as well as the target pests, and should be respected as poisons. 2) The full formulations are not subject to health effect testing, so the synergistic health effects of all the hazardous ingredients are not taken into account. A recent study found that combining two pesticides made them up to 1600 times more potent [See "Pesticide Synergy: $1 + 1 = 1600$ " in this issue of *Medical & Legal Briefs*]. 3) Full pesticide formulations are still not tested for immunologic, neurologic, endocrine, respiratory, and metabolic effects from chronic exposure even though reports of such effects from pesticide exposure are on the rise. 4) Pesticide manufacturers are not required to reveal the identity and effects of all pesticide ingredients for registration, or to the public. Typically over 90% of pesticide formulations consist of toxic solvents and carriers misleadingly called "inert ingredients" on the label and protected as trade secrets. Inert ingredients are not biologically inactive and can be registered as active ingredients on other pesticide labels.(5-7)

Another investigative report published by the New York

State Department of Law, called "The Secret Hazards of Pesticides," notes the irony that so-called "inert" ingredients, when identified in non-pesticide products, are carefully controlled and regulated by various laws and regulations (including the Toxic Substances Control Act, the Clean Water Act, the Clean Air Act, the Resource Conservation and Recovery Act, regulations by the Environmental Protection Agency and the Occupational Safety and Health Administration, and guidelines from the National Institute for Occupational Safety and Health) because of their toxicity. When identified, there are limits for many of these chemicals in air, water, and the workplace. Yet when used in pesticide formulations and sprayed in homes, offices, and hospitals, these same chemicals are allowed to go unidentified, unreported, and uncontrolled.(6)

The warning label limitations are only required to apply to the ingredients the manufacturers choose to name on the label. That means applying a pesticide indoors "according to label" does not protect against the health effects of the majority of the ingredients, nor does it protect against hazards from the full formulation. In recognition of the human hazards of pesticides, it is against federal law to claim they are "safe," or "nontoxic," or "safe when used as directed." In spite of this, a U.S. General Accounting Office report found "false and misleading" safety claims abound in the pesticide industry, in direct violation of the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).(8)

The lack of true ingredient identification on product labels poses a tremendous problem for medical diagnosis and treatment from exposure. It also makes it impossible for medical personnel to protect their patients from toxic solvents that can complicate or exacerbate their health problems.

Some common so-called "inert" ingredients are chemicals such as carbon tetrachloride, chlorobenzene, chloroform, chloroethane, cresols, dichlorobenzenes, epichlorohydrin, ethyl benzene, ethylene dichloride, isophorone, methyl bromide (also named as an "active" ingredient in many formulations), phthalates, phenol, propylene dichloride, trichloroethane, toluene,

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trichloroethylene, and xylene.(6,9) Target organs include the liver, kidney, nervous system, immune system, eyes, heart, respiratory system, and blood. Symptoms can include eye, nose, and throat irritation, central nervous system depression, cancer, kidney damage, liver damage, abdominal pain, diarrhea, dizziness, vomiting, chest pain, slowed heart rate, electrocardiogram (ECG) irregularities, lung congestion, lung damage, coma, gastrointestinal irritation, nausea, fatigue, respiratory distress, testicular damage, gonadal atrophy, fetal resorption, cardiac arrest, inflammation, eye damage, blindness, pneumonia, pancreatitis, kidney failure, respiratory failure, hypersensitivity to light, conjunctivitis, slowed respiratory rate, paralysis, chronic bronchitis, mutagenesis, fetal damage and birth defects, blisters and skin burns, headaches, sleepiness, liver enlargement, weight loss, blurred vision, brain damage, convulsions, anemia, cataracts, hyperactivity, blood disorders, lung congestion, fainting, immune function disorders, hallucinations, or death.(6)

One of the most tragic misconceptions that allows for misdiagnosis is the myth that the potential for harm is primarily the result of acute or immediate poisoning. Instead, delayed effects or effects that result from repeated or chronic low level exposure are some of the greatest problems.(5,10) The risk of toxic effects from repeated exposures at levels low enough not to make a person immediately sick is repeatedly affirmed in the New Jersey Department of Health individual Hazardous Substance Fact Sheets.(10)

The most frequently used pesticides in the hospital survey were organophosphates such as chlorpyrifos.(2) In a review article, Janette D. Sherman, M.D., notes that fat-soluble organophosphates may bioaccumulate and biomagnify, and "can be expected to exert prolonged effects." Multiple smaller doses may result in signs and symptoms comparable to a larger dose exposure. Organophosphate-induced enzyme changes that result in unreversed stimulation of various nerve endings in the smooth muscle, heart, endocrine glands, autonomic ganglia, and skeletal muscle nerves result in symptoms of wheezing, nausea, vomiting, abdominal cramps, frequent and/or involuntary defecation and urination, visual disturbances, weakness, fatigue, muscle cramps, involuntary muscle twitching, and dyspnea and loss of respiratory efforts from weakness of the muscles of respiration. Central nervous symptoms secondary to exposure include headaches, anxiety, confusion, slurred speech, tremors, incoordination, restlessness, sleep disturbance, nightmares, excessive dreaming, emotional instability, neurosis, apathy, and seizures. Organophosphate exposure can cause neurotoxic effects with sensory disturbance and motor weakness, in some cases leading to paralysis.(7)

Sherman warns, "Exposed persons may display any of the constellation of symptoms, thus presenting a problem of accurate diagnosis for a physician or health official. Failure to make the connection between a patient's illness and pesticide exposure has serious consequences....Marketing of similar products under different trade names, and the promotion of odorless and slow-release encapsulated formulations makes diagnosis difficult. Unrecognized migration and persistence of indoor pesticide products, even when used according to direction, has resulted in contamination."(7)

Even if patient rooms are not directly sprayed, they can be contaminated from pesticide movement through the ventilation

system or from volatilization and redistribution on other surfaces when temperatures fluctuate. Sherman states, "Heat, whether from sunlight or a heating system, volatilizes the chemicals, resulting in deposition on colder surfaces, not usually thought of as absorbent, such as the outside of appliances, mirrors, and windows, especially at night. As heat increases, a new cycle of recirculation takes place, with carpets, furniture, and bedding acting as absorbent reservoirs. Many of these pesticides have significant volatility and persistence, confounding the basic toxicity. A major source of exposure, especially for children, is skin contact with contaminated surfaces."(7)

The New York Department of Law Report notes that "exposure may occur at the site of pesticide application or elsewhere as the result of airborne movement, tracking, or routine cleaning activities. Pesticides may persist for days, weeks, months, or even years after indoor application."(2)

A number of studies have documented the persistence of pesticides indoors where they are protected from the breakdown processes present outdoors. Carpet especially forms a "sink" or trap for chemicals sprayed or tracked on it. The pesticides work their way into the backing and the pad underneath, which act as long-term reservoirs that transfer the pesticide to housedust. Pesticides then reenter the indoor air during vacuuming and from volatilization.(11-12)

The list of people who are more susceptible to the hazardous effects of chemicals reads like a hospital roster. Research has repeatedly shown infants, children, pregnant women, the elderly, people taking medication (which may interact with pesticides in the body so the body's ability to detoxify the pesticides and/or metabolize the drugs is impaired), and people who are ill or have impaired kidney, liver, or other organ system functions are more vulnerable to toxic effects at lower levels.(2) Children and infants are more susceptible because of their low body weights and developing organs that are more readily damaged.(2,5) Researchers have further warned that exposures to cholinesterase inhibiting compounds (including organophosphate pesticides, carbamate pesticides, and many organic solvents) following properly conducted broadcast applications can result in exposure doses "at or above the threshold of toxicological response in infants, and should be minimized through appropriate regulatory policy and public education."(13)

In addition, the central nervous system effects of the so-called "inert" solvents and "active" ingredients in formulations (including confusion, nightmares, emotional stability, hallucinations, and neurosis) make it obvious that pesticides should not be used in psychiatric units.(6-7)

When all the potential adverse health effects and existing health condition complications that may result from pesticide use in hospitals are taken into account, the myriad personal injury liability possibilities are profound. For example, the Centers for Disease Control has warned that even indirect low level pesticide exposure can cause respiratory arrest in infants and mimic Sudden Infant Death Syndrome.(14) If an infant dies that same day or shortly after the hospital applies pesticides, the mother could initiate an investigation.

Or, a woman coming in for a pregnancy test could be at the most vulnerable stage in her pregnancy and risk exposure to a pesticide such as chlorpyrifos from a hospital application in the waiting room or in the examination room. Sherman recently

published a study reporting four birth defects cases associated with chlorpyrifos exposure. The statistical probability of the unique constellation of defects happening by chance was "staggeringly" small.⁽⁹⁾ If the woman sustains an exposure and her child is born with the reported pattern of birth defects, the projected medical expenses alone would prompt her to sue, not to mention the woman's sense of betrayal at the unnecessary exposure situation in a health-care setting.

Another example is brought to mind by the studies that have reported asthma deaths are on the rise, and that pesticides can trigger bronchial constriction and asthma attacks.⁽¹⁵⁻¹⁶⁾ One study reports on patients who developed severe asthma from small doses of organophosphate pesticides at levels not high enough to cause other systemic symptoms. The authors warn there is a "need for awareness that sensitivity to insecticides may precipitate asthma and that little exposure is necessary to elicit a response."⁽¹⁶⁾ What would happen if someone were rushed to the emergency room from a life-threatening asthma attack from pesticide exposure, only to find that the emergency room had recently been sprayed with pesticides?

Patients with disabling multiple chemical sensitivities tend to be highly educated about their legal recourses and are more likely to make use of their rights under the Americans with Disabilities Act (ADA), especially when their health is at stake. When it comes to pesticides, a growing number of hospitals have already proven they are unnecessary and that viable, practical alternatives work in healthcare settings. Therefore, a hospital doesn't have much in its defense if ADA complaints and suits are filed and may be at still greater financial risk if the hospital receives funding from federal programs that take ADA complaints into account.⁽¹⁷⁻¹⁸⁾

Other liability factors hospital administrations need to be aware of involve their legal responsibilities to keep records of hazardous chemicals stored and used on the premises, to conduct worker training for those who handle the chemicals (if not contracted out to an independent contractor), and to keep material safety data sheets available in a central file for the hospital community to access upon request.⁽¹⁹⁻²⁰⁾

The recommendations of the New York State Department of Law report state, "If pesticides are used, hospitals should notify all members of the hospital community in advance. Before and after pesticides are applied, warning signs should be posted around the treated area." In the survey, the amount of posting and prenotification varied from hospital to hospital. However, "while most hospitals notify some sector of the hospital community, patients are the least likely to receive prior notice of a pesticide application. Medical staff are notified at only 52% of the responding hospitals statewide. These two groups, most intimately affected and involved in the healthcare process, have a need to know. Written notice should be given to all members of the hospital community, including doctors, nurses, patients, administrators, kitchen staff, maintenance workers and custodians. All have a right to protect themselves, and many have responsibilities for the health and welfare of others. If individuals wish to take steps to avoid exposure, or if doctors deem it appropriate to take special precautions for their patients, adequate notice must be given. The written notice should identify the pesticides to be used, the target pests, the locations to be treated, and should identify a place where pesticide product labels are avail-

able for inspection....Advance notice is critical to allow for avoidance, while posting of treated areas helps to inform visitors, newly admitted patients, rotating staff and others who may not have received advance notice of a specific application."⁽²⁾

Pesticide warning labels state it is a violation of federal law to use the product in a manner inconsistent with its labeling. The hospital administration must be aware of the label directives and precautions on the material safety data sheets to make sure they catch any noncompliance on the part of the applicator. For instance, chlorpyrifos typically requires a several hour evacuation of the building that is sprayed.⁽¹³⁾ Yet how many hospitals evacuate the premises when it is applied? And if only a limited area in the building is evacuated, there is no way to ensure that other people in the building are not also being exposed indirectly through the ventilation system or through migration and volatilization of the pesticide within the building.^(2,7)

Yet, as noted above, even compliance with the label is still no guarantee of safety, and the application may still result in a personal injury suit. The safest approach health-wise and liability-wise is to not use pesticides at all, and to rely on time-proven alternative methods. Sherman observes, "Alternative and effective methods of pest control have been available for decades and should be promoted. Viewed in terms of personal and economic loss, increased medical burdens and costs, and loss of intellectual capacity, the benefits may be far less than the hazards."⁽⁷⁾

The New York State Department of Law hospital report notes that the New York State Office of General Services has banned pesticide spraying in its more than 40 office buildings and other facilities, and the United States General Services Administration has established a successful program for 30 million square feet of government office in Washington D.C. The report gives written suggestions for hospitals and hints to help them switch over to a successful IPM program. Regarding hospitals that already have successful low risk pest control, the report states: "For IPM to be successful, all members of the hospital community must participate in a coordinated effort. The hospital should be responsible for this coordination and should work closely with pest control personnel on these key decisions."⁽²⁾

The report continues: "In Boston, 10 teaching and research hospitals associated with Harvard University have been practicing Integrated Pest Management for about 10 years. These large, urban hospitals are subject to all of the same pest problems which afflict New York's hospitals. Controls used include boric acid and pyrethrum formulations, sticky traps, silica gel, vacuums, caulking and other typical IPM methods. No pesticide sprays, mists, or fogs are used. No rodenticides are used. And no 'preventative' pesticide applications are made. The contractor responsible for these programs has witnessed a tremendous reduction in pest problems over the years. In one hospital kitchen, thousands of roaches could be caught with sticky traps, each month, when traditional pest control methods were employed. Today, using IPM, the traps typically yield only dozens of roaches per month. The director of Environmental Services at Children's Hospital, a 329 bed unit of the Harvard Medical Institutions, endorses IPM wholeheartedly. He reports that pests have been better controlled by IPM than they were with pesticide treatments. Furthermore, the IPM program has proven to be no more costly for Children's Hospital than tradi-

tional pest control methods have been for comparable hospitals." (2)

While quantities last, single copies of the New York State Department of Law reports are available at no charge by writing: Ms. Angela Fiore, New York State Department of Law, Justice Building, Room D-10, Albany, NY 12224.

For more information on alternative pest control methods, contact: BioIntegral Resource Center, P.O. Box 7414, Berkeley, CA 94707, (510)524-2567; and Praxis, 2723 116th Avenue, Allegan, MI 49010, (616)673-2793. Praxis has successfully implemented nonpesticide pest control programs in a number of settings including hospitals and schools.

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Review Finds Psychogenic MCS Studies Seriously Flawed

A basic maxim of psychiatry is that physical causation for symptoms must be carefully investigated and ruled out before a psychological diagnosis is given. In spite of this, a number of published studies have concluded multiple chemical sensitivities (MCS) is psychogenic in origin even though the researchers failed to investigate and rule out physiological abnormalities. As noted in an ongoing series of articles in *Medical & Legal Briefs*, objective physiological abnormalities affecting a number

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of organ systems — especially the central nervous system — are present in disabled MCS patients when the appropriate in-depth medical tests are conducted. A review article found the research studies that are "considered widely supportive of a psychogenic origin for MCS syndrome, have serious methodologic flaws regarding sample selection, measurement, and study design."

The authors state supportive evidence for the MCS psychogenic theory is absent and list several interrelated factors that may have contributed to the mislabeling of the illness. Because chronic medical conditions are commonly accompanied by psychiatric symptoms such as depression, anxiety, fatigue, and distress, psychological tests and interviews are not able to differentiate between psychiatric patients and medical patients with well-documented biologic disorders. Some doctors may assume just because patients have psychiatric symptoms their problems must be psychological in origin. However, psychiatric symptoms such as depression, fatigue, and difficulty concentrating can be caused by physiological problems such as brain lesions, metabolic or endocrine dysfunction, or toxic exposure. The authors also note the medical community appears to have widespread misconceptions regarding the purpose, limitations, and applicability of psychometric data from psychiatric and psychologic tests. "Psychometric data are not comparable to findings from a medical laboratory," these Johns' Hopkins University researchers warn, "at most, psychometric data provide information about symptoms, traits, emotions, beliefs, attitudes, memories, judgments, and the like. They were not intended to, and cannot reveal, the origin of those characteristics and conditions."

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EARN Library Code: 0030-DAVI-94-010

Over 700 Chemicals May Cause Headaches

Headache is a common complaint from exposure to workplace chemicals and consumer products, and it's no wonder: a search of the U.S. Department of Health and Human Services' Hazardous Substance Data Bank revealed over 700 chemicals of diverse nature that may cause headaches. In addition to this, the authors of this study found the published literature on chemically induced headaches is limited primarily to cases associated with nitroglycerin exposure, sick building syndrome, and solvent-induced toxic encephalopathy. To add to the published literature, they reviewed 50 cases of people experiencing headaches from chemical exposure and found different patterns for different types of exposure irregardless of the chemical involved. While most cases involved mixed solvents, some cases involved pesticides or irritant chemicals such as formaldehyde and ammonia. Forty-three cases in this study involved low level exposure. People with chronic low level exposure generally experienced headaches within two minutes to four hours of exposure onset. The headaches recurred with low level reexposure and abated soon after cessation of exposure.

The people who experienced single accidental large exposures developed a previously unexperienced syndrome of severe

recurring headaches that persisted in intensity from several months to over three years. In the seven cases reported here, the onset of the initial severe headache was usually within minutes, although one person had a delayed onset four hours after exposure. The different chemicals involved in the seven acute exposures were multiple solvents, glycol ether, trichloroethane, naphtha, perchloroethylene, hydrogen sulfide, and the pesticide Lannate. Because so many chemicals can cause headaches, the authors caution that the risks for persistent headaches from high exposure are not limited to the chemicals involved in these cases. They discuss recent research that points to a neurogenic origin of headaches and the ability of high doses of neurotoxic chemicals to alter neural gene expression, which could possibly account for the lowered trigger point for headaches in the people with long-term problems.

Reference:

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EARN Library Code: 0468-MART-93-005

Pesticide Synergy: 1 + 1 = 1600

For decades, activist groups and some concerned scientists have decried the U.S. government's policy of testing only individual chemicals for health effects rather than the combinations that exist in indoor and outdoor environments as well as in full product formulations. They have warned of the potential synergistic effects, whereby chemicals in combination are exponentially more toxic than the sum of their individual toxicities. Now there is compelling confirmation of synergistic effects the government can no longer ignore.

Spurred by concerns of endocrine effects of combinations of environmental chemicals leading to cancer and reproductive abnormalities including decreased sperm counts, a team of researchers found a combination of two polychlorinated biphenyls (PCBs) painted on the eggshells of male turtle embryos caused them to develop into female turtles. Estradiol, the body's main estrogen, caused the same effect, but the individual PCBs were too weakly estrogenic to bring about the change by themselves.(1-2)

The researchers then set up a yeast system containing a human estrogen receptor to screen for estrogenic effects of four very weakly estrogenic pesticides: dieldrin, endosulfan, toxaphene, and chlordane.(2) These chemicals persist in the environment even though dieldrin, toxaphene, and chlordane have been banned.(1) When tested alone, they yielded little or no response. However, when they were paired, the activity went up by a factor of 160 to 1600. In other words, depending on the combination, 1 + 1 could equal 1600 in terms of estrogenic toxicity.(1-2) The researchers found that overall, the "combination of two weak environmental estrogens, such as dieldrin, endosulfan, or toxaphene, were 1000 times as potent in human estrogen receptor-mediated transactivation as any chemical alone."(2)

The yeast test system also showed the PCBs that changed the sex of the turtle embryos had a five-fold synergistic effect. The researchers also showed their yeast test system translates to human effects by getting the same five-fold synergistic results with the PCBs in human endometrial cells.(1-3) The researchers worked with levels of environmental estrogen that actually can exist in real life systems, such as the PCB levels in the

serum of a group of women with breast cancer.(1) Still other research has shown that while dieldrin, endosulfan, and toxaphene are only marginally effective in stimulating human breast cancer cell proliferation in culture, when they are combined they exhibit "greater than additive effects." This means that when they are combined, the pesticides cause synergistic effects increasing the proliferation of the breast cancer cells.(2)

Pesticide products are typically used in combination, and pesticide formulations are complex chemical cocktails registered by the Environmental Protection Agency (EPA) without health effect testing of the actual product that is placed on the market. The combination effect "is a very, very new issue for us," Lynn Goldman, chief of the EPA's Office of Prevention, Pesticides and Toxic Substances, told the Associated Press. "The policy implications are enormous."(4)

References:

1. Kaiser, J. "Environmental Estrogens: New Yeast Study Finds Strength in Numbers." *Science* 272: 1418 (1996).
EARN Library Code: 0092-KAIS-96-001
2. Arnold, S.F.; Klotz, D.M.; et al. "Synergistic Activation of Estrogen Receptor with Combinations of Environmental Chemicals." *Science* 272: 1489-1492 (1996).
EARN Library Code: 0092-ARNO-96-004
3. Simons, S.S. "Environmental Estrogens: Can Two 'Alrights' Make a Wrong?" *Science* 272: 1451 (1996).
EARN Library Code: 0092-SIMO-96-001
4. Associated Press. "Pesticides Much More Toxic when Combined, Tests Show." *Bismarck Tribune* (Jun 7, 1996) p. 7A.
EARN Library Code: 0092-APSR-96-001

Low Antioxidants Increase Semen's Susceptibility to Trinitrotoluene

A study of men exposed to significant concentrations of trinitrotoluene in their workplace confirmed previous animal and human studies linking it to abnormal semen analysis and sexual dysfunction.(1) Trinitrotoluene is used in dyes, explosives, and photography.(2) The workers at the trinitrotoluene plant had elevated levels of skin contamination and blood concentrations of the chemical as compared to control subjects. The exposed workers showed increased impotence and loss of libido as well as increased incidents of sperm malformation and decreased viability of the sperm.(1)

The sperm of the exposed workers also had significant decreased concentrations of selenium, magnesium, copper, zinc, and sodium. The scientists referred to previous research that showed trinitrotoluene produces oxidative stress and that the antioxidants selenium and vitamin E play a major role in protecting the body against its toxic effects: "Its toxicity was synergistic if the animal's diet was deprived of selenium or vitamin E. It is not surprising to see that the selenium content in workers exposed to trinitrotoluene was far below that in control workers." Other research shows trinitrotoluene can interfere with zinc and copper metabolism. Trinitrotoluene's possible interaction with magnesium needs to be further studied. Magnesium plays an essential role in almost all fundamental cell reactions in the body and activates many enzyme systems and metabolism within the cell. Lowered magnesium in the exposed workers' semen, perhaps through diet or trinitrotoluene's actions on the body, may

also have affected the semen quality.(1)

References:

1. Liu, H.X.; Qin, W.H.; et al. "Some Altered Concentrations of Elements in Semen of Workers Exposed to Trinitrotoluene." *Occupational and Environmental Medicine* 52: 842-845 (1995).
EARN Library Code: 0268-LIUO-95-004
2. Wilson, C. *Chemical Exposure and Human Health*. Jefferson, NC: McFarland & Co., Inc. (1993) pp. 121, 247, 274, 280, 282, 286.
EARN Library Code: 7394-WILS-93-007

PCBs & Dioxins Have Synergistic Porphyrinogenic Effects

Some of the most common environmental pollutants are polychlorinated biphenyls (PCBs) and dioxins. Because of their presence in wildlife and human milk and fat, researchers have raised concerns about their estrogenic and other adverse effects on the body. Now there is yet another cause for concern. Researchers know PCBs and dioxins individually can create disorders of porphyrin metabolism by disrupting the heme biosynthetic pathway, which is a metabolic process essential to life. In addition to numerous other metabolic functions, heme is required for hemoglobin which carries oxygen to cells. The estrogenic effects on the wildlife in the PCB- and dioxin-contaminated Great Lakes has served as a warning bell, and Theo Colburn's recent book, *Our Stolen Future*, has sounded the alarm to society. The fact that estrogenic chemicals are also porphyrinogenic confirms and adds to the warning. Evidence of the porphyrinogenic effects of the chemical contaminants in the Great Lakes is provided by the presence of porphyria in Great Lakes gulls as compared to the gulls in less polluted coastal regions.

Now a case-controlled study provides evidence that background levels of the dioxin TCDD and PCB 153 can act in concert and have a potent synergistic effect on porphyrin accumulation — about 800 times control levels. Normally chemicals are studied individually. However, in real life they are found in combinations, which in this study caused "exceptionally high hepatic porphyrin accumulation in rats. Significant synergistic effects were found with any combination of PCB 153 and TCDD. The researchers state the concentration ratios they used

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are comparable with levels of these chemicals found in human milk and fat samples. They conclude "the interactive effects on porphyrin accumulation after co-administration of dioxinlike and non-dioxinlike compounds may have significant implications for the risk assessment of these chemicals."

The porphyrins that accumulated in the porphyrinogenic livers were uroporphyrin III and heptacarboxylic porphyrin. Since over 90% of the patients with multiple chemical sensitivities (MCS) who have been thoroughly tested have disorders of porphyrin metabolism, it appears chemically sensitive individuals are now the warning bell to the rest of the people in society who are also being chronically exposed to countless combinations of numerous porphyrinogenic chemicals. [See "MCS Porphyrinopathy Teleconference Held" *Medical & Legal Briefs* 1(5): 4 (1996).]

Reference:

Van Birgelen, A.P.J.M.; Fase, K.M.; et al. "Synergistic Effect of 2,2',4,4',5,5'-Hexachlorobiphenyl and 2,3,7,8-Tetrachlorodibenzo-p-dioxin on Hepatic Porphyrin Levels in the Rat." *Environmental Health Perspectives* 104(5): 550-557 (1996).
EARN Library Code: 5504-VANB-96-008

Silicone Found in Sites of Connective-Tissue Disease

Silicone has been associated with a number of connective tissue diseases and researchers have documented its ability to "bleed" through the Silastic envelope in breast implants and spread to surrounding tissues, including lymph nodes. Silicone can also spread through ruptured implants. This study reports on three women who had silicone-containing material within their sites of connective-tissue disease associated with a chronic inflammatory cell infiltrate. They developed their connective tissue diseases two to six years after receiving silicone gel-filled implants.

One patient developed seronegative synovitis (inflammation of the membrane lining the capsul of a joint) with silicone within the sites of chronically inflamed joint capsule membrane tissue. The second patient developed a syndrome with features of systemic sclerosis and systemic lupus erythematosus. This patient had connective tissue disease with interstitial lung disease, and silicone was demonstrated within the alveolar macrophages of the lung. The third patient, who developed a scleroderma-like illness with Raynaud's phenomenon, had silicone in the sites where the skin was involved with the disease, but not in sites where the skin wasn't involved. The authors report they have seen three additional patients with connective-tissue disease in whom silicone presence in the involved tissues was detected by electron probe microanalysis.

The authors conclude: "All patients with fibrosing skin and visceral disease such as systemic sclerosis, as well as other connective-tissue diseases, should be questioned about potential exposure to silica, silicone, or Silastic (and other potential toxins). In the case of known silicon exposure, tissue specimens should be examined for the presence of silicon and, if such is found, we believe that potential sources of silicone should be removed. Surveillance of the more than two million women in the United States who have undergone augmentation mammoplasty is warranted." [parentheses in original]

Reference:

Silver, R.M.; Sahn, E.E.; et al. "Demonstration of Silicon in Sites of

Connective-Tissue Disease in Patients with Silicone-Gel Breast Implants." *Archives of Dermatology* 129: 63-68 (1993).
EARN Library Code: 0585-SILV-93-006

Gas Cooking Causes Respiratory Symptoms

Cooking on a gas stove was associated with significantly increased subjective and objective respiratory symptoms in women according to a study of 1,159 people (659 women and 500 men) randomly chosen from 1,864 people who responded to a questionnaire mailed to 15,000 young adults (aged between 20 and 44 years) living in three towns in England. Women who used mainly gas for cooking had a significant increase in asthma-like symptoms including wheezing, waking with shortness of breath, and asthma attacks. They were twice as likely to develop respiratory symptoms and impaired lung function than women who cooked with electric stoves. Lung function testing showed they also had reduced lung function and increased airways obstruction compared to women who did not use gas for cooking. Men in homes where gas cooking was used did not have increased symptoms. This led the authors to conclude, "Women may be more susceptible than men to the products of gas combustion or they may have greater exposure to high concentrations of these products because they cook more frequently than men."

Reference:

Jarvis, D.; Chinn, S.; et al. "Association of Respiratory Symptoms and Lung Function in Young Adults with Use of Domestic Gas Appliances." *The Lancet* 347: 426-431 (1996).
EARN Library Code: 0096-JARV-96-006

Reducing EMFs in Residential Water Main Grounding Systems

Rather than wait for the research world to finish its debate over the relative cancer risk for electromagnetic fields (EMFs), an increasing number of homeowners are opting to take simple preventive measures to reduce potential EMF hazards in their homes. This study takes a "wait and see" attitude toward the health risks but still analyzes the various available options for reducing EMFs produced by home grounding systems that connect to water mains through home water pipes. In their evaluation the researchers take into account risk reduction, cost, fire risk increase, worker risk, and electric shock risk. The options in this study are applicable for people who reside in states that legally required homes to be grounded to the main water pipe in addition to a metal grounding rod driven into the earth near the utility service panel. Physicist Duane Dahlberg, Ph.D., of Concordia College, Minnesota, notes that most legal codes have now been changed or are changing so they no longer require home grounding to the main water pipe. Because of the potential adverse health effects from conductive plumbing, he recommends that people not attach their grounding wires to their plumbing.

The authors explain how home water main grounding systems can increase EMF exposures in the home. The ins and outs of three mitigation strategies for systems that must be grounded to the water main are illustrated and discussed: 1) Reducing the magnetic fields produced by current in the water pipe by inserting an insulated coupling in the main water pipe (to meet Na-

tional Electric Code requirements, the couplings must be placed at least ten feet after the water pipe enters the ground). 2) Adding an optional ground connection to the above, with an automatic reclosure that senses voltage differences between the water pipe and the residence's standard grounding system. It then acts as a switch that allows excess current or fault current to flow into the main water pipe if it is needed. 3) Relocating the electrical main panel to the part of the house closest to the water main to reduce the opportunity for a long looping ground current through the water system in the house.

Reference:

Von Winterfeldt, D.; Trauger, T. "Managing Electromagnetic Fields from Residential Electrode Grounding Systems: A Predecision Analysis." *Bioelectromagnetics* 17: 71-84 (1996).
EARN Library Code: 0031-VONW-96-014

for people with EI and MCS. ADA Watch published the following recommendation: "Congress and the Administration should consider legislation to address the needs of people with 'emerging disabilities,' such as those with head injuries resulting from violence or other trauma and those with environmental illnesses who are severely adversely affected by secondary smoke or other pollutants in public places." [p. 61]

Reference:

National Council on Disability. "ADA Watch — Year One: A Report to the President and the Congress on Progress in Implementing the Americans with Disabilities Act" and its "Letter of Transmittal" (Apr 5, 1993) pp. cover page, Letter of Transmittal, 5, 7, 60, 61, 85.
EARN Library Code: 0028-NCOD-93-007

Legal Briefs

National Council on Disability Recognizes MCS Under ADA

The National Council on Disability established "ADA Watch" in 1991 to monitor the implementation of the landmark civil rights legislation, the Americans with Disabilities Act of 1990 (ADA). The National Council on Disability, an independent U.S. federal agency, notes, "Like the ADA itself, ADA Watch is comprehensive in nature: it covers all titles of the law, all regions of the country, and all sectors of the economy."

As reported in the May/June 1996 issue of *Medical & Legal Briefs* [1(4): 8], the ADA covers environmental illness (EI) including multiple chemical sensitivities (MCS) on a case-by-case basis if one or more of the individual's major life activities is substantially impaired. One of the findings in ADA Watch's April 1993 report, entitled "ADA Watch — Year One: A Report to the President and the Congress on Progress in Implementing the Americans with Disabilities Act," is that "people with certain kinds of disabilities, such as vision and hearing impairments, short stature, and environmental illness are becoming frustrated with the way ADA implementation efforts are being conducted. Despite the broad scope of ADA, there appear to be some gaps in coverage, such as full protection for people with environmental illness." [p.5]

The report also states: "Several previously unrecognized disabilities are emerging in the awareness of the American public. For example, there is increased awareness of people with severe head injury caused by violence or other trauma. Individuals with multiple chemical sensitivities and environmental illnesses have become increasingly vocal about the effects of tobacco smoke, chemicals, and perfumes in hotels, restaurants, bars, and other places of public accommodation. Regulations and guidelines they recommend include prohibiting smoking in public gathering places including hallways, forbidding department stores from spraying perfumes in the air, and removing perfumed deodorizing devices from restrooms and other common areas." [p. 61]

Therefore, to help insure the implementation of the ADA

Louisiana Courts the Chemical Industry

Louisiana governor Mike Foster sent a warm welcome to polluting industry by signing into law a bill (HR20, signed April 16, 1996) that bars punitive damages in legal cases involving hazardous chemicals. Supporters of the bill said the possibility of punitive damages hurts the state's efforts to recruit industry. Foster claimed punitive damages creates uninsurable risks for many businesses. Punitive damages also punish businesses for "bad luck," according to Jim Patterson, the lead lobbyist for the Louisiana Association of Business and Industry.

However, punitive damages aren't awarded for "bad luck," and insurance companies don't insure criminal behavior or fraud. Punitive damages are not awarded for accidents. They are awarded only in cases of malicious and willful misconduct and are a form of punishment to provide strict consequences for such behavior. Uninsurable risks are created over time by the removal of tough bottom-line incentives against seriously negligent business practices.

Reference:

Bureau of National Affairs. "Louisiana Governor Signs Tort Reform Law Barring Punitive Damages in Hazmat Cases." *Toxics Law Reporter* 10(48): 1411 (1996).
EARN Library Code: 1366-TXLR-96-001

British Columbia Allows Silicone Implant Class Action

Canada is moving ahead with class action suits against makers of silicone implants. Ontario and Quebec previously adopted class action legislation. Now the British Columbia Supreme Court has allowed a class action that is applicable to all manufacturers and models.

The plaintiffs contend that 1) the implants have a high rupture rate, 2) the released silicone is linked with connective tissue disease and localized complications, 3) the implants are generally defective because they will not maintain their structural integrity for the life of the implant and therefore are not fit for their intended purpose, and 4) the implants were not properly tested before marketing. The judge found common ground for these issues and stated, "The question which troubles thousands of women who have silicone gel breast implants is — are my implants safe? That question extends to the whole range of models of silicone gel breast implants distributed by the various

manufacturers." The judge also determined that cases addressing issues that involve specific manufacturers and implant models, failure-to-warn, and whether silicone implants are likely to cause specific medical conditions will need to be tried separately. (*Harrington v. Dow Corning Corp.*, SupCt BrCol, No. C95-4330, 4/11/96.)

Reference:

Bureau of National Affairs. "Canadian Court Allows Class Action on Allegations that Devices Were Unfit." *Toxics Law Reporter* 10(47): 1372-1373 (1996).
EARN Library Code: 0585-TXLR-96-002E

DuPont Loses First Benlate Birth Defect Jury Trial

The first Benlate birth defect case to reach a jury resulted in a \$4 million award to the family of a child born without eyes. The manufacturer, DuPont Co., still claims its pesticide product Benlate and its active ingredient benomyl don't cause human health effects.

Donna Castillo was walking in her neighborhood near the fruit and vegetable field of Pine Island Farm where she was "drenched" with Benlate. She was only six weeks' pregnant, an extremely vulnerable stage of pregnancy. DuPont bore the brunt of the liability for negligence and strict liability claims, and Pine Island Farm was held 0.5 negligent. The plaintiff's attorney James L. Ferraro of Ferraro & Associates in Miami, Florida, also represents 30 other potential plaintiffs whose children were born without eyes or with grossly underdeveloped eyes. (*Castillo v. E.I. du Pont de Nemours & Co.* FlaCirCt DadeCnty, No. 93-14-199-CA-23, 6/7/96.)

Reference:

Bureau of National Affairs. "Florida Jury Awards \$4 Million to Family of Child with Defects Blamed on Benlate." *Toxics Law Reporter* 11(2): 53 (1996).
EARN Library Code: 3068-TXLR-96-001

Nationwide Tobacco Class Action Suit Decertified

The tobacco industry was pleased with a recent federal appeals court decision that unanimously overturned a previous ruling and decertified the Castano class action suit, a nationwide proceeding alleging the tobacco industry conspired to keep generations of smokers addicted to their products. The class action had been open to the tens of millions of present and former smokers who became addicted to the nicotine-based products at any point since 1943.

The judge who initially certified the class action believed it made sense for a single trial to address the core liability issues. The U.S. Court of Appeals for the Fifth Circuit decertified and dismissed the suit, saying it would require a single federal court judge to apply the varying tort laws of all 50 states as well as the District of Columbia and Puerto Rico. Now the Plaintiffs' Legal Committee for the tobacco suit will file 52 individual class action suits modeled after the Castano complaint. Three state class actions have already been filed now for Louisiana, Maryland, and New Mexico.

References:

Bureau of National Affairs. "Fifth Circuit Decertifies 'Castano' Suit; Plaintiffs Vow to File State Class Actions." *Toxics Law Reporter* 11(1): 5-6 (1996).

EARN Library Code: 0133-TXLR-96-002E

Bureau of National Affairs. "Three State Class Actions Filed in Wake of 'Castano' Decertification." *Toxics Law Reporter* 11(1): 4-5 (1996).

EARN Library Code: 0133-TXLR-96-002D

Dow Chemical Loses Herbicide Case

Dow Chemical Co. was able to prevent the words "Agent Orange" from being used in a trial addressing bone marrow cancer from an herbicide containing one of Agent Orange's components, 2,4,5-T, but Dow was unable to convince the jury the product did not cause Terry DiPetrillo's multiple myeloma. The jury awarded \$1 million in compensatory damages for DiPetrillo's cancer, and \$200,000 to his wife for loss of consortium.

DiPetrillo used the herbicide, sold under the name Esteron 2,4,5, to clear electrical wires during summer jobs between 1968 and 1972. Dow denied that the plaintiff's description of the herbicide's packaging referred to a Dow product, but a Dow salesman and three other witnesses testified to the contrary. Dow also tried to get the case dismissed under the 1972 amendment to the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) that pre-empts failure-to-warn claims. However, the judge ruled the pre-1972 version of FIFRA applied because the exposure occurred between 1968 and 1972. DiPetrillo's condition is being compensated by the Veteran's Administration under the Agent Orange compensation program. Agent Orange was comprised of the dioxin-containing 2,4,5-T and 2,4-D. Plaintiff's attorney Philip Weinstein of Providence, Rhode Island, stated this trial was the first time a jury heard the evidence about 2,4,5-T, and he suspects there are "a ton" of people who have also been exposed to the same chemical without being aware of the problems. (*DiPetrillo v. Dow Chemical Co.*, RI SuprCt ProvidenceCnty No. PC93-6617, 5/24/96.)

Reference:

Bureau of National Affairs. "Rhode Island Jury Awards \$1.2 Million for Bone Marrow Cancer Tied to 2,4,5-T." *Toxics Law Reporter* 11(1): 15-16 (1996).

EARN Library Code: 0042-TXLR-96-002

Asbestos Award Upheld

The family of James Barry, a journeyman insulator who died in April 1993 from asbestos-induced mesothelioma, received a \$12.3 million verdict for survival and wrongful death claims. Because of pre-trial settlements with other companies initially named in the suit, the final award against Owens-Corning Fiberglas Corp. was reduced to \$11 million. The jury award was upheld by an Illinois appeals court as being within the limits of reasonable compensation. (*Barry v. Owens-Corning Fiberglas Corp.*, Ill AppCt 1stDist, No. 1-94-2193, 6/3/96.)

Reference:

Bureau of National Affairs. "Illinois Appeals Court Affirms Jury Verdict; Upholds \$12.3 Million Award for Mesothelioma." *Toxics Law Reporter* 11(2): 52-53 (1996).

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