The Aerial Spraying of MALATHION: How Safe is it?

Interview with Jorge R. Mancillas, Ph.D.

Jorge R. Mancillas, Ph.D. Neurobiologist at the University of California, Los Angeles (formerly affiliated with MRC's Laboratory of Molecular Biology, Cambridge, England, and the Salt Institute) as interviewed by Betsy Russell-Manning, in her publication "Malathion: Toxic Time Bomb"

BRM: How does malathion affect the living organism?

DR. MANCILLAS: All cells in the body are in constant communication with one another. This allows all the tissues to act in a coordinated fashion (this is the key point). One of the chemicals most commonly used for cellular communication, especially in the nervous system, is acetylcholine. Some nerve cells release acetylcholine and this leads to excitation of the cells they contact. The cells that respond to acetylcholine, have an enzyme called cholinesterase, which destroys the acetylcholine (to limit the period of excitation). Malathion inhibits cholinesterase, and as a result, the cells that are exposed to acetylcholine, go into a frenzy of activity, (or a period of activity that does not end) leading to damage or leading to abnormal responses or abnormal activity in the nervous system. It affects humans, flies, insects, dogs, rats or any other animals the same way by binding and inactivation cholinesterase. A short way of saying all of this is to say, malathion interferes with cell communication by inhibiting cholinesterase.

BRM: In other words, malathion affects the entire nervous system.

DR. MANCILLAS: Exactly. Any part of the system where you find acetylcholine, and therefore cholinesterase, that communication will be disrupted by malathion.

In the nervous system of flies, it acts by disrupting the control of their muscles, and kills them. In our bodies, acetylcholine and cholinesterase are found most commonly in nerve cells that control muscles. They are found in the visual system in nerve cells and muscles that control pupil and lens contraction and eye movements; in the nerves and muscles that control respiration; in nerves and muscles that control the digestive system. They are also involved in the control of blood vessel contraction, release of tears and mucous secretion.

So, not surprisingly, when you examine the many well-documented cases in the clinical literature of people that have been accidentally exposed to malathion in the pesticide manufacturing industry or in agriculture, when it is clear that malathion was the causative agent, all of the symptoms documented involve those areas of the body I just mentioned.

The textbook description of the symptoms of malathion poisoning include increased lacrimation, irritated eyes, blurred vision, breathing difficulties, muscle paralysis, vomiting, diarrhea, increased mucous discharge and flu-like symptoms.

It can also affect the central nervous system, leading to headaches, dizziness, weakness, blurry vision, etc. Which of these symptoms will be displayed depend on the amounts of malathion and the mode of exposure. If the dose of malathion is really large, patients can display generalized convulsion, psychological disturbances, coma and death from respiratory or cardiac failure.

BRM: For example, if I am in El Monte one night (where they are spraying) and then Pasadena the next night (where they are spraying) will the malathion be cumulative — even if it is a low dose?

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DR. MANCILLAS: Yes... let me interject a point before I go into that ... if you are exposed to malathion, the question is how much of it do you get exposed to? Obviously a very small amount can kill a fly, but because our bodies are larger, the relative dose per kilogram of body weight, is much lower. Can malathion harm you? Well, if you are under a barrel and you don't touch it, you don't get exposed to it, and you don't breathe it, it won't harm you.

The critical question is how much malathion are you exposed to? State officials repeatedly bring out the importance of the concept of dosage and claim that the doses applied are very low, too low to cause any harm. The first flaw with their argument is that they are not monitoring what doses people are being exposed to, but at best what amounts are being applied to the ground. But let us examine this question using their own figures. The Environmental Protection Agency (EPA) has established that the No Observable Effect Level, that is, the amount below which no effects are observed, is 0.2 mg per Kg of body weight. Based on that they have established a Provisional Acceptable Daily Intake level of 0.02 mg per Kg of body weight, to account for some uncertainties in the data. Now, if you look at the California Department of Food and Agriculture claims that the amount of malathion sprayed would be at a rate of the position, **which means that it is not spread evenly.** The average coverage per square foot was 1.9 milligrams and the maximum found was 4.9 milligrams. Exposure to 1/3 sq. ft. exceeds the EPA's acceptable intake level and the amount of malathion in 3 1/2 square feet would have observable effects. If you have a child playing in the grass, a sand box, or on a slide, in a park or at his home, or drinking from a public fountain, he can easily be exposed to that amount.

We have also recently learned from scientists working for the California Department of Health Services that the amounts of malathion are closer to 1.9 mg per square foot and that the distribution is not homogeneous, having found areas where the concentration was around 5 mg per square foot. Is it therefore surprising that so many people in the sprayed areas are reporting adverse health effects?

There are a number of independent physicians in Los Angeles who have documented cases of people displaying classical symptoms of malathion poisoning. I am told by Dr. Thrasher that he has documented thousands of calls made to one of the non-governmental malathion hotlines and found that close to 15,000 people reported classical symptoms of malathion poisoning. That is not unreasonable if you consider that over a million people are being exposed, and 15,000 represents between 1-2% of that population.

BRM: Are there different symptoms for the different ways in which malathion gets into the body?

DR. MANCILLAS: Exactly. It depends on what part of the body it goes through, and what amounts the child/adult were exposed to. We get a lot of different symptoms reported. It just depends how much malathion they got on themselves, or if the pets were playing outside and went into the house and jumped up on the table and then you ate something or you got it on your hands because you played around with your pet. It is difficult to know where in the body people got it, but their most commonly reported symptoms have been allergic skin reactions, which is also one of the clinical symptoms, as well as vomiting and diarrhea, nausea, headaches, and blisters on their skin. All of these are clinically documented as a symptom of malathion exposure.

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Many people are reporting fever or high temperature. That in the clinical literature is considered less typical. But for some reason we are receiving many reports of these symptoms. I am not sure that this is due to malathion, but

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it could be because together with fever they are reporting some of the other symptoms of malathion poisoning.

BRM: In your opinion, Dr. Mancillas do you think it is safe to spray?

DR. MANCILLAS: As a scientist I have to make a decision based on the data. We have not yet touched on data that is much more worrisome than what has been talked about thus far. Based on the data ... a very carefully worded opinion would have to be... "We are running a risk." There is a very serious reason for concern. This is a very risky proposition. This is not traditional use of this pesticide, which is to use malathion in restricted areas, by people with protective gear, in confined areas; who know malathion is there, and therefore take precautions. You look at the instructions for people using it in the fields or anywhere else, and they always say workers should not go back into the fields for a week. All this precaution. So the Department of Health says there have not been many problems in the past with malathion. There have been problems. You might have heard of the case in Pakistan where 2,800 workers were severely affected, and 5 people died. There are other cases, in fact, in California every year there are dozens of people reported every year in the fields who are poisoned by malathion, and we don't know how many cases go unreported.

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It is a substance you have to be careful with. When you spray it over a populated area of close to 400 square miles, you have two things:

#1. You have no control over the environment or where the droplets are going to be deposited and what else malathion is going to react with? The reason there was an accident in Pakistan was that malathion reacted with something in the environment and became 'isomalathion' which is extremely toxic. We don't know what these droplets are going to react with in the atmosphere, because our atmosphere in L.A. is highly polluted. Also we don't know what the malathion will react with on the ground. We don't know what may happen. There is the potential for an accident under these conditions.

#2. More importantly, you are spraying it on a population that is approaching 2 million people. You don't know what different susceptibilities these people have. What do I mean by that? Their nervous systems vary, their bodies are different. For example, when any poison goes into your body the damage it causes depends on its toxicity and the amount of the drug that will go into your body, and how long it stays in your body. Eventually your body will destroy it and metabolize it, but if the toxicity or the dose is high it can cause extensive damage. If the toxicity or dose is low, but it stays in the body longer it can still cause damage.

Some people have less ability to metabolize malathion. Primarily young children, older people; people that are ill, people that have jaundice, liver disease, or other liver conditions. These people are less capable of metabolizing malathion, (even a low dose) so it will stay a longer time in their body, and it is more likely to cause damage. Also, there are many medications used to treat psychiatric disturbances, or to treat visual problems, which will also affect that chemical system (acetylcholine) called the cholinergic system. Therefore, if you are taking that kind of medication, in addition are exposed to malathion, you are going to get some very strange reactions. We have reports of people who have had very severe reactions. When you are dealing with more than a million people, the chances that you are going to get hundreds of people under these types of circumstances, are very high.

A brief statement against malathion spraying would be, "It is a very risky proposition to spray a known toxic substance over a large population, in an uncontrolled environment." The last sentence is a short version of what I have just explained to you in the preceding paragraphs.

Personally, if I were your physician, and you were asking me is this the right prescription, I would say, "Don't do it. Don't do it. You don't take chances with people you are responsible for. You are taking a big chance when you are dealing with such a large population."

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Thus far, I've told you some of the risks of short-term immediate reactions. What worries me more are possible long-term effects. When we used thalidomide or DDT people didn't react immediately, but there was a negative effect in the body that only manifested itself months or years later. The same may be the case with malathion, because the data is not firm. There is limited amount of data, that shows long-term neurotoxic effects. The literature is just emerging, but I am not seeing anything which contradicts it.

That is what I have found very worrisome ... You may have heard of some data that was collected by Doctor Satoshi Ishikawa of Kitasato University, Japan. He found opticneuropathy damage to the visual system, which is from one to four years later. It is a long term affect. The state says, that data is inconclusive or is not valid. Their argument is that there were a number of substances these people were exposed to. That is a misleading statement. Dr. Ishikawa has been studying this problem for over 20 years. He has studied the effects of several substances on the visual and nervous system. In some of his reviews, where he summarizes all the data, he talks about all these substances, the organophosphates.

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If you are a serious, responsible scientist, like the people working for California Food and Agriculture Department or the California Department of Health Services should be, you would look at the individual papers, not the review, not the summaries. In fact, Dr. Ishikawa shows that from 1960 to 1967, the only substance sprayed on the region was malathion, and there was delayed neurotoxicity in patients that they examined after that period. No other substance was sprayed from 1960 to 1967. There were several substances sprayed on the area, but Dr. Ishikawa is a very careful scientist; he did two things. For the first seven years, he looked at the patients exposed to malathion, and found damage to the visual and nervous system. In later years, he did correlative studies with different substances showing how they affected animals and humans.

All of the substances, that Dr. Ishikawa has been studying, belong to the same class of chemical, organophosphates, all inhibit acetylcholinesterase. He did study patients who were affected exclusively by malathion. Was the government attempting to mislead the public by dismissing Dr. Ishikawa's studies, with a comment that there were many substances sprayed on the population?

Its hard to believe that state officials cannot understand the scientific literature. Not a very reassuring thought — when millions of people are being affected by their actions.

BRM: So, you think there might be a cover-up?

DR. MANCILLAS: Let me add one more point. Dr. Ishikawa is not the only one, there are scores of scientists, Dr. Duffy at Harvard, Dr. Johnson, Dr. Petty, Dr. Aldridge, Dr. Cavanagh, Dr. Jager, Dr. Babchina, Dr. Sakai, Dr. Chabra, Dr. Lowndes, Dr. Metcalf, Dr. Homes, Dr. Gershon, and Dr. Gary Hollingshaus, all of whom separately have studied neurotoxic effects of organophosphates, and they all found evidence that organophosphates can be neurotoxic. However, this shows up years later, and one must be acutely aware of the symptomology for a correct diagnosis.

A year after exposure blurry vision may develop, and obviously the doctor will just prescribe glasses. They won't make the link. Other symptomology may be headaches, or a diagnosis of chronic fatigue etc.

Is this a cover up? — I can't read minds and I am not privy to the discussions they have at the California Department of Health Services. So I really can't say what their intentions and motivations are. All I can say is this. It took me less then 10 hours to run a computer 'med-line' search (asking for any article with malathion in its text). The search gave me 1103 articles. It didn't take me 10 days to put all this data together and to become clear as to what the risks are. The same material is available to the State... are they really not aware of this? Is there this much incompetence? Drs. Sadun, Lawton, and Lappe have made data available to them, outlining the problems and the risks. ... Even if one were to allow for California Department of Health incompetence... they have been alerted and do know about the dangers... Their response was to dismiss us and

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call us ... "Scientists outside the mainstream" ... When asked, about Dr. Lappe's views, their answer, "That is just one scientist's opinion." When asked, "What about Dr. Ishikawa's work?" — again the reply was... "This is just one scientist's opinion."

I am a member of several professional societies and neurobiologist at UCLA. It is not a third rate institution and my entrance was not through the back door. As a bonafide scientist, I am in contact with other reputable scientists. I know of no other person who when asked to review the literature on malathion has reached the same conclusion as the government. When they form an informed opinion, they come to the same conclusion. I have asked my colleagues to review the literature and we are in agreement on our conclusions.

... the California Health Department, made some unsubstantiated statements saying that "There are hundreds of studies showing the safety of malathion." Yet he did not produce one.

Therefore, when the government tells us that "Scientists think it is safe," I know it's not true: It's not true because it's not in the scientific literature. Literature to support their claims is not available. The state advises that "Hundreds of studies show malathion to be safe." However, they cannot be found. I've asked for one example from the literature and have never received any. I have debated the government personnel in public forums, and on television asking the same question. I have never received an answer and for the obvious reason, it does not exist.

In testifying before the L.A. County Board of Supervisors, I mentioned some of the studies. Dr. Stratton, from the California Health Department, made some unsubstantiated statements saying that "There are hundreds of studies showing the safety of malathion." Yet he did not produce one. He dismissed my work along with Drs. Nicolini, Sadum, Lawton of the University of Southern California, as well as the work of Dr. Lappe at the University of Illinois, Chicago. He also dismissed Dr. Ishikawa, chairman of the Department of Ophthalmology, Kitasato University with a blanket statement that "these scientists are outside the mainstream".

Dr. Stratton and Dr. Kizer are highly paid bureaucrats. It is questionable whether they have been affiliated with independent, scientific research institutes. When someone is represented as the Director of the California Department of Health Services, without presenting the amount of independent study and research done by that person, it is very misleading to the public at large, which assumes that those persons have done at least as much research as the leading scientists in universities. It is a great pity that bureaucrats are only interested in protecting their jobs, to the exclusion of accepting good provable information from credible scientists — it is also a great danger to society at large.

BRM: An informed public will eventually hear your message and demand changes.

DR. MANCILLAS: I would like to complete answering your question about how long malathion stays in the body. It stays in the body only a few days. The reason why good documentation is very important. Urine sampling would be a easy way to look for metabolites of malathion in the urine. Without immediate documentation for malathion, it is certain that blame will be laid on another substance in common use. Conclusive provability requires documentation in the first few days.

BRM: What do you think the state's motive is if there is indeed a cover-up?

DR. MANCILLAS: I can only speculate. They have been fighting the med-fly for 10 years. Off and on since 1980. Claims have been made that the med-fly has been eradicated. However each time the claim is made, it comes back. They claim people re-introduce it. If that is the case, why haven't they enforced better quarantines? Dr. Carey's evidence shows that it has not been possible to eradicate it with this method. The med-fly coincidentally re-appears in the same neighborhoods. It is just much too improbable that people are bringing it back from Hawaii or other locations. That it's always the same people and the same neighborhoods. Whatever the case, they have not been able to deal with it effectively for over ten years.

They are getting desperate. They want to stop it. So they are just pushing this eradication method through.

In 1980, the state asked Marc Lappe, now professor with University of Illinois, to head a commission with the intent to look into the risks of malathion. Dr. Lappe stated publicly that the state told him that their intent was to spray. Dr. Lappe was expected to bring in the "correct" information from his investigation, that "malathion" was "safe". Dr. Marc Lappe's research proved that malathion was "risky". His figures were changed by government personnel. Therefore, this does indicate a cover up according to Dr. Lappe.

BRM: What is in it for the Agricultural Industry?

DR. MANCILLAS: They don't want to have the problem of the med-fly. They don't want the med-fly to establish itself in California. It is much better for agribusiness if the spraying is done in the urban areas at taxpayers expense. If it is done in the fields, it would have to be paid by agribusiness.

BRM: International journals recommend spraying in agricultural not populated areas.

DR. MANCILLAS: That is a safer place. It is still not ideal, because of the migration of residues into the food chain.

BRM: Thank you Dr. Mancillas for allowing me to interview you, for your research, for the time and effort that you've put into this very serious matter. It not only affects all Californians but the entire nation.

Founder's Message

"Someone must teach new things, someone must take the abuse, someone must be ostracized, someone must be called a fraud and a quack. Then out of all of it comes new truth to become a part of us... Thus we receive new facts to make up our proud possession of knowledge." — *Fred Hart, 1888-1975*