What follows is Dr. Jorge Mancillas's comments at
the Legislative Briefing on Malathion and Medfly Issues
held May 10, 1995 in Monterey Park, California

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Dr. Jorge Mancillas.is, a Neurobiologist at U.C.L.A. and Dr. Mancillas, in addition to being a professor with the U.C.L.A. School ff Medicine, Department of Anatomy and Cell Biology and Brain Research, was formerly on the staff of the Salk Institute. He is also affiliated with the Laboratory of Molecular Biology In Cambridge University, and he has also been called upon to give expert testimony before the LosAngeles County Board of Supervisors regarding the aerial use of malathion. When Dr. Mancillas was originally approached about aerial malathion they were going to spray in Los Angeles, he was approached to do a video to calm peoples's fears that malathion was not a danger to people. And the good scientist that he is, he looked into it, and he came up with an entirely different conclusion.

DOCTOR MANCILLAS

Malathion is a poison. The only reason malathion was developed, synthesized and is manufactured is for its ability to inflict damage to biological tissues. I know of no other reason malathion is synthesized anywhere in the world.

Obviously, its intended targets are those living organisms which we consider pests, but the main reason malathion has such widespread use is because, like other organophosphates, it has a broad spectrum of applicability; that is, that it affects many species.

And the explanation for that is that it affects, again like other organophosphates, those entire targets, those living organisms by a common mechanism, a mechanism that is applicable, that is found both in the simple organisms which we treat as agricultural pests as well as humans. That is through the, inhibition of an enzyme called cholinesterase. Inhibition of this enzyme, cholinesterase, causes buildup of a neurotransmitter called acetylcholine.

Many of our nerve cells, cells that communicate with one another to process information, nerve cells that are used to communicate information to the brain from the outside world, nerves that control muscles, glands and other organs, communicate with one another by releasing, by squirting a very minute amount of a chemical neurotransmitter,(acetylcholine) a chemical that activates those muscles, those other nerve cells, those glands.

But as a system of communication, that message has to be brief as in a telegraph key; that has a spring that makes it go back. The way these systems regulates the length of the message is that the cell response to acetylcholine released by nerve cells have, among other things, an enzyme called cholinesterase which degrades acetylcholine,thus, mopping it up, removing it. It is like this the enzyme cholinesterase works, if you wish as the spring that sends the telegraph key up again and makes the message be very well defined in time.

What malathion does is it inhibits cholinesterase. And the effect is as if the telegraph key got stuck, it's a continued message. And, therefore, the distribution -- the widespread distribution of acetylcholine throughout organs controlled by the brain explains the very ubiquitous effects, the well-documented effects of malathion in the clinical and scientific literature.

At low levels of exposure -- and most of the studies are based on accidental exposure either in agricultural fields or more likely in manufacturing plants. At low-dose exposures the symptoms include dizziness, headaches, loss of coordination, lack of balance, all of which have to do with inability of the brain or the cells in the brain to have a defined message because of the inhibition or cholinesterase by malathion. It also includes nausea, vomiting and diarrhea because the muscles controlled by nerve cells which reaches the colon continue to contract over a period of time. They hypercontract and cause a disturbance and excess in intestinal movements.

At higher doses it may impair respiration and affect the cardiac rhythm, again because instead of the contraction of muscles under the influence of nerve cells that contain acetylcholine is no longer rhythmic and patterned, but it is overextended because of the inhibition of cholinesterase.

At high-enough doses malathion can cause convulsions, respiratory failure, cardiac arrest, and there are documented cases of malathion-caused death.

In addition to the immediate acute effects of exposure to malathion, significant repeated exposure to low levels of malathion over a period of time can lead to delayed long-term neurotoxic effects, permanent irreversible damage to the nervous system. I will expound on that in a few minutes.

Malathion also, again, depending on the dose, causes damage to genetic material, to D.N.A. if the level of exposures are high enough, this could potentially lead to the development of cancer, and there's very suggestive evidence in experiments with animals.

If it occurs during pregnancy, damage to genetic material occurs in pregnancy and if the levels of exposure are high enough, this can lead to myocongenital abnormalities, birth defects or stillbirths.

The level of risk, the likelihood that any of these immediate or long-term negative effects will be observed, depends on the dose. That is the amount absorbed by the skin, through the skin, by inhalation from malathion in the air (after it dries out from the ground) because the sun does come out the next day even if the droplets are sticking to the ground, Malathion has been measured in the air by CDFA technicians.

It also depends on the presence of other factors that also affect the cholinergic system, the group of nerve cells that use acetylcholine to communicate within the brain. Such factors are not very rare. They include alcohol, nicotine, cigarette smoke containing nicotine and a number of medications, some of which I already mentioned by Dr. Brautbar

It also depends, of course, on the state of health of the individual. What I mentioned so far is the potential risks based on analysis of the clinical and experimental data published in peer-reviewed literature. But spraying over urban areas, densely populated areas like Los Angeles, like those communities in Northern California that have been sprayed, like Corona, like Camarillo, present special risks.

First, in those areas there's the presence of pollutants which may lead to synergistic interactions or undesirable reactions. And these are not always those pollutants that we already identified as having adverse effects on our health. There's also factors which may have unexpected effects on the malathion - or on any substance that is already sprayed; for example, in 1975 there was an accident in Pakistan which led to five deaths and 2800 cases of severe poisoning which is believed to have been caused by an unexpected reaction with malathion turning it into isomalathion which is more toxic.

The second reason that spraying of urban areas poses special risk is because the larger the population, certainly in dense-populated areas as opposed to agricultural fields, there is a higher number of people that we categorize as being at special risk, susceptible populations. I want to emphasize that among those that are considered susceptible we have to include the aged or children because of their diminished ability of their livers to process malathion leading to malathion circulating in their bloodstream for a prolonged -- for a longer period of time.

When you spray a substance like malathion over an area like that which is sprayed 1989-1990 in Los Angeles with a population of 1.6 million people, even 1 % amounts to 16,000 people. Even if the especially susceptible population was just 1 %, you are talking about 16,000 people.

In addition, as Dr. Lappe pointed out, there are increased concerns because of the use of technical-grade malathion, 5 % of which consists of at least 16 impurities. This practice is inexplicable not only because some of them may be toxic, but because there's a well-documented series of reports on synergistic effects which are not just simply additive, but they potentiate exponentially the effect of one another.

But still the question remains: if the risk posed by a substance depends on the dosage to which you're exposed, what are the risks for the normal person?

Well, the E.P.A., Environmental Protection Agency, as it does with other substances, other poisons, has set an acceptable daily intake level for malathion extrapolated from animal studies of .02 milligrams per kilogram. This is based on a no observable effect level of 0.2 milligrams per kilogram;(the amount below which no effects will be observed) that is, if you are exposed to 0.2,(two-tenths of a milligram) per your body weight, you will display adverse health effects. This is a normal adult.

When residents of the area have been sprayed are informed of the levels sprayed -- of malathion spraying in the areas where they live, they are told that the amounts are very small. And it is true. In Los Angeles it amounted to 1.4 milligrams per square foot. In Corona and Norco it is claimed that it was 1 milligram per square foot;

If we take those figures and put them together with E.P.A.'s acceptable (PADI) and no Observable Effects level (NOEL), using those figures, a 50-pound child, a 22.7 kilogram child, would have to be exposed to the malathion in .45 square foot: one half a square foot, (the malathion deposited on the surface smaller than this page) to exceed the E.P.A.'s acceptable daily intake level. They would have to be exposed to the malathion deposited on the surface of four and a half square feet, about the surface of the front of this podium, in order to exceed the E.P.A.'s observable/no observable effect level.

The fact is that when the C.D.F.A. technicians measured the rate of deposition, not the predicted, but the actual rate of deposition of malathion in the spray areas in Los Angeles, they found that the average

concentration was 40 % higher. That is not 1.4, but 1.96 milligrams per square foot. And in some areas the concentrations were over 3 and a half times the predicted concentration; that is, 4.988 milligrams per square foot.

What does this mean?

This means that in those areas that 50-pound child would have to be exposed to the malathion on that surface equivalent to that of a dollar bill in order to exceed the E.P.A.'s acceptable daily intake level.

Was it surprising, then, that thousands of people reported adverse health effects during the period which malathion was sprayed over Los Angeles?

What we really need to know is the circumstances in which malathion was sprayed in the air in which it was sprayed, what was the amount that got into people's bloodstream?

And it's not terribly difficult. It is very difficult for individuals such as ourselves, but it's not terribly difficult for Department of Health Services to conduct a monitoring program. Eexamine the presence of metabolites; malathion metabolites in the urine or malathion in the bloodstream of persons and residents of the sprayed areas as well as the levels of cholinesterase, the levels of that particular enzyme in the blood of people in the sprayed areas.

No such programs have systematically been carried out.

At best -- at best, over the last few years an experiment has been carried out in California with the residents of California and no one is collecting the data. But such studies have been performed even if they have been maligned by the propagandas of CDFA.

In the 1960s and seventies a team headed by Dr. Satoshi Ishikawa of Kitasato University in Japan carried very thorough systematic studies in the Saku region of Japan, an agricultural region, with a population which was exposed to aerial spraying of malathion. They took blood samples of the residents, they took urine samples, they used control groups. They compared them with control groups in areas that had not been sprayed and found very alarmingly and documented in peer review journals that malathion exposure was associated with optic neuropathy, a number of disturbances of the visual system. And these studies only add to a literature that existed before. The article by Parker published in 1955 that document after exposure to malathion long-term toxic effects, weakness of muscle, sensory disturbances. Goldman in 1958 published after exposure to malathion, specifically weakness of muscle, sensory disturbances. Healey's group in 1959, "Ascending Paralysis Following Malathion Intoxication" chronic exposure leading to ascending paralysis.

This is referring to the existing literature, documented adverse effects to the nervous system, long-term delayed neurotoxicity, symptoms that begin to manifest themself a long time after exposure to malathion. And as far as we know, those effects are irreversible because examination of animals -- after animal experiments carried on by a number of researchers trying to replicate the doses that people in Saku region of Japan were exposed to -- this is now known as the Saku Syndrome -- examination of their tissue showed degeneration of the optic nerve and other peripheral nerves.

Now, this is no secret for neurotoxicologists. In April 1990 the Office of Technology Assessment of the U.S. Congress issued this report. It's a very timely report prepared by twelve of the most authoritative neuroscientists in the country and six of the foremost neurotoxicologists.

Under the heading of "Neurotoxic Pesticide" this report states that carbonates and organophosphates, the class of pesticide to which malathion belongs, are, quote, "The most neurotoxic classes of pesticides used in the United States and are the most common causes of agricultural poisoning." Again, I'm quoting from that report. "A number of researchers have observed persistent alteration of brain function after exposure to organophosphates which can produce delayed and persistent neuropathy by damaging certain nerves of the spinal cord and peripherial nervous system, end of quote.

The report also discusses reports that after poisoning with parathion and mevinphos and malathion which, quote, "Indicate that 4 to 9 % of the acutely poisoned individuals experience delayed or persistent neurological and psychiatric effects such as agitation, insomnia, weakness, nervousness, irritability, forgetfulness and confusion and depression." Persistent mental disturbance is reported as delirium, combativeness, hallucinations and psychosis.

Now, this is why the aerial spraying of neurotoxics -- neurotoxic substances over urban areas is so insiduous. It's that individuals who are affected and experienced insomnia, psychiatric effects, or subtle loss of coordination in their movements do not associate them with exposure to malathion. Their doctors may not make a connection unless there is a record of what amounts of substances like malathion they were exposed to during the aerial spraying.

The C.D.F.A. and D.H.S. in 1990 tried to discredit doctor Ishikawa and the other scientists (whose results were published in peer-reviewed journals) by carrying out a pr campaign; assembling a committeeof designated, quote, unquote, experts to discredit the studies. The way the scientists resolve differences of opinion is by replicating those studies. If they're going to spray, at least they could have conducted those studies, but they didn't, for obvious reasons.

Let me add one thing which Dr. Brautbar referred to. As I mentioned, at best, an experiment has been carried out on the population of California, and I hope it will not be continued to be performed. Whenever a substance or a particular medical procedure is offered to a patient for his or her own benefit, as long as there's any uncertainty or any type of experimental edge to the treatment or medication -- I'm talking about medication, let alone substances that are known to be toxic -- a doctor, physician must -- must obtain from them their informed consent.

In the case of the aerial spraying of malathion, not only have residents of those communities sprayed -- and as far as I know, every single city council or elected body has expressed their lack of consent -- their opposition repeatedly overruled by declaration of "state of emergency" by the govenor of the State of California.

Informed consent is not an issue in a totalitarian society. I would like to believe that I live in a democracy.

Thank you.