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From: Rachel's Democracy & Health News #831, Dec. 1, 2005

THE EMPEROR OF RISK ASSESSMENT ISN'T WEARING ANY CLOTHES

By Peter Montague

Some of my best friends still put their faith in numerical risk assessments. For example, over in Jersey City, N.J., local people are now debating "how clean is clean enough" for thousands of tons of cancer-causing chromium wastes. My friends argue that 30 parts per million (ppm) of chromium-VI ("chromium six") is a "science-based" number that will protect residents from lung disease caused by chromium. On the other hand, N.J. state government wants to save the chromium polluters some money by declaring 240 ppm "safe," thus requiring less cleanup. The experts are duking it out, debating 30 ppm vs. 240 ppm.

Over in New York, major polluters have convinced state officials that toxic waste cleanup standards are unnecessarily strict, so the state has proposed to relax its toxic cleanup rules. Citizens are pressing to maintain the existing standards, which they hope are "fully protective" of human health, fish, and all other critters. Again, we have dueling experts defending their favorite numbers.

It's the same all over, really. After decades of industry-written government-delivered propaganda, many people have become convinced that there is some "safe" amount of PCBs plus mercury plus lead plus benzene plus trichloroethylene (TCE) plus [you name it] that can be released into the general environment. But let's think about this for a minute.

This whole approach is based on protecting a most-exposed individual located in the immediate vicinity of the pollution source. Once the pollution-source has been declared "safe" from the viewpoint of that most-exposed individual, the toxic discharge becomes legal, and a continuous stream of contamination enters the environment. As time passes, this "safe" discharge (plus thousands more like it) creates a buildup of pollution and the entire planet becomes contaminated with industrial poisons. As a result, everyone is endangered -- the asthma rate rises, diabetes increases, and cancers proliferate, not to mention male fish turning into females, oysters dying from bacterial infections because their immune systems are damaged, sea turtles developing deadly growths and lesions, ducks that cannot eat because they are born with crossed bills... and so on and so on.

Let's face it, a regulatory system based on risk assessments to protect the most-exposed individual ends up having one important effect: it legalizes the contamination of the biosphere upon which all life depends. It allows industrial poisons to pollute every living thing on earth. So it ends up not protecting anyone, despite its initial good intention.

Example: A factory is emitting cancer-causing benzene. A numerical risk assessment shows that only one-in-a-million individuals living near the factory will get leukemia from breathing benzene for a lifetime. Therefore the factory's benzene emission is declared "safe" and a permit is issued, making that factory's benzene discharge legal. But after 10 or 20 or 50 different benzene emitters have been licensed as "safe," the individual discharges have a cumulative effect: the entire area becomes contaminated with low levels of benzene. Eventually, you work your way up to our present situation -- benzene is measurable in the air everywhere, and thus poses a small but greater-than-zero cancer hazard to everyone who breathes the air (not to mention non-cancer harms that benzene may cause).

What is true for benzene is also true for mercury, PCBs, trichloroethylene (TCE), tetrachloroethylene (PCE), carbon tetrachloride, formaldehyde, xylenes, dioxins and furans, polybrominated diphenyl ethers (PBDEs), and on and on and on. There are 80,000 chemicals now in commercial use. Only a couple of thousand of these had undergone any testing for effects on human health and the environment. Only a few hundred are regulated in any way. For most chemicals, we are still living in the wild west: anything goes.

Even when a chemical is regulated, the regulatory system never asks, "What is the cumulative effect of all these small discharges of toxicants?"

To summarize: Our regulatory system was developed in the mid-1960s to protect the maximally-exposed individual. The idea was, if you protect that individual, then everyone else

will be safe. We now know that this is completely backward. Some 40 years later, scientific knowledge has increased greatly and we now know that...

** "If chemicals are produced, either intentionally or as by-products of industrial activities, and not destroyed naturally or by humans, they eventually reach the environment." [1, pg. 815]

** Once chemicals enter the environment, they start moving around and eventually end up in living things (the food chain);

** some contaminants are harmful at much lower levels than we ever knew (for example some chemicals are biologically active at concentrations measured as parts per billion or even, in some instances, parts per trillion);

** harm can occur in ways we never suspected (for example, disrupting our hormones, which control growth, development, brain function, behavior, and sexual orientation, among other things);

** multiple stresses on an individual can add up (or even multiply) to create harm greater than the harm caused by any of the individual stresses. For example, children who don't have enough iron in their diet can be harmed by toxic lead much more than kids who get enough iron. Iron deficiency and toxic lead add up to a bigger problem than either iron deficiency or toxic lead alone.

Industrial poisons are now found everywhere on the planet, from the bottoms of the deepest oceans to the tops of the highest mountains. This has occurred because our regulatory system is set up to protect the most-exposed individual, but it is not set up to protect the world from the cumulative effects of releasing "safe" quantities of industrial poisons.

All of this was summarized clearly by researchers at Oak Ridge National Laboratory (ORNL) 14 years ago, in 1991:[1]

Writing in *Environmental Science & Technology*{1}, Curtis Travis and Sheri Hester said in 1991:

** "If chemicals are produced, either intentionally or as by-products of industrial activities, and not destroyed naturally or by humans, they eventually reach the environment." (pg. 815)

** "Chemicals, once they are released into the environment, seek out the environmental media (air, water, soil, or biota [living things], in which they are most soluble." (pg. 815)

** "Once in the environment, [chemicals] are transported globally, partition into biological media [some preferring to stay in the air, others preferring soil or water or living things], and result in essentially the entire world population being exposed to trace levels of chemical contamination." (pg. 815)

** "... a consensus is emerging that even trace levels of environmental contamination can have potentially devastating environmental consequences." (pg. 815)

** "With alarming regularity we find reports of chemical contamination in parts of the world previously thought to be pristine."

** "Aerial fluxes of these pollutants contribute a major portion of pollutant loadings to the Great Lakes, the Chesapeake Bay, and other lakes." (pg. 815)

** "Humans are exposed to hundreds of synthetic organic chemicals daily." (pg. 817)

** "...the true extent of human exposure to environmental pollution has never been quantified." [And this remains true today.]

Back in 1991, the Oak Ridge researchers pointed out another basic feature of the U.S. regulatory system: To protect the most-exposed individual, locally high concentrations of pollution are decreased not by destroying the chemicals or decreasing production, but by moving them to a different environmental medium (moving them from air to water, for example).

Here's how it works: stack emissions are reduced by installing stack scrubbers which use water to remove gases and soot from stack emissions. Scrubber water is typically then sent to a municipal sewage treatment plant. During water aeration at such plants, up to 99% of volatile chemicals are discharged into the air. A study of toxic exposures in Philadelphia found that more than half of the local exposures to cancer-causing chemicals came from the local sewage treatment plant. (pg. 817)

At the great majority of toxic Superfund{2} sites, contaminated groundwater is cleaned by "air stripping" volatile organic chemicals from the groundwater, releasing the toxicants into the air. Very few Superfund cleanups actually produce "permanent" remedies, in the sense of actually detoxifying any chemicals. Usually, toxic chemicals are just moved around in a "shell game" that passes the problem on to someone else. This is certainly the case in New Jersey where the preferred remedy for contaminated sites is to place a "cap" over them. A typical cap is a plastic tarp or a parking lot or a shopping mall or a school. As chemicals ooze out from under the cap (or through the cap) the entire environment of New Jersey and beyond has become contaminated with low levels of industrial poisons{3}.

As the Oak Ridge researchers pointed out in 1991

** "The only way to diminish global cycling of contaminants is to decrease production of pollutants or to destroy pollutants before they are released into the environment." (pg. 818) Think about that: there are only two ways to diminish global pollution. Are our regulatory agencies set up to diminish global pollution? Not even close.

** And: "EPA's regulatory focus is on controlling local exposure to large point sources of pollutants.... Thus EPA regulations, although protective of the maximum exposed individual, do little to reduce the overall U.S. rate of cancer resulting from exposure to toxic pollutants." (pg. 818)

** And: "The difficulty with regulating background risk is that it results from widespread global pollution from a multitude of widely dispersed sources. This pollution cannot be reduced significantly by controlling emissions associated with production and use. When these chemicals are produced and not destroyed naturally or by humans, they will eventually reach the environment." (pg. 818)

** And: "If we do not want to change our standard of living, the only way to reduce global chemical pollution is to make our production and consumption processes more efficient and to lower the levels of production of these toxic chemicals. Thus the only reasonable solution to global pollution is not increased regulation of isolated point sources, but rather an increased emphasis on waste reduction and materials recycling. Until we focus on these issues, we will continue to experience background cancer risk in the one-in-a-thousand range." (pg. 818)

In sum: The use of numerical risk assessment to determine a "safe" level of exposure for the most-exposed individual is a way of pretending to protect public health without actually protecting it.

When we create toxic chemicals that we do not destroy, and that nature cannot rapidly destroy, those chemicals come back to bite us. That is why it is so important that we press ahead with green chemistry{4} [and see this report{5}], green engineering{6}, clean production{7} and biomimicry{8} (learning how nature does things, to make our chemicals and processes compatible with nature). Most of our industrial system will have to be redesigned from the bottom up to be compatible with nature. Doing so will create tens of millions of good jobs.

In the meantime, government, industry, and my friends could stop pretending that numerical risk assessment of the most-exposed individual protects public health. It doesn't. Everyone knows it doesn't. Ending the pretense would go a long way to restore confidence in government. That in itself would be a huge benefit.

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[1] Curtis C. Travis and Sheri T. Hester, "Global Chemical Pollution," Environmental Science & Technology Vol. 25, No. 5 (May 1991), pgs. 815-818. Available here{9}.

{1} <http://www.rachel.org/library/getfile.cfm?ID=452>

{2} <http://en.wikipedia.org/wiki/Superfund>

{3} http://www.precaution.org/lib/05/stop_the_killing.050531.htm

{4} http://www.precaution.org/lib/05/green_chemistry.science.20020105.pdf

{5} http://www.precaution.org/lib/05/safer_substitutes_available_now.050425.pdf

{6} http://www.precaution.org/lib/05/green_engineering_design_principles.est.20030307.pdf

{7} <http://www.cleanproduction.org/AABase/default.htm>

{8} <http://www.biomimicry.net/>

{9} <http://www.rachel.org/library/getfile.cfm?ID=452>

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URL:

http://www.precaution.org/lib/05/farmers_use_methyl_bromide_despite_ban.051128.htm

From: Seattle Times, Nov. 28, 2005

U.S. DRAGS ITS FEET IN PHASING OUT BANNED PESTICIDE

By Rita Beamish

Watsonville, Calif. -- Shoppers browse store displays brimming with succulent tomatoes and plump strawberries, hoping to enjoy one last round of fresh fruit before the Western growing season ends. There is no hint of a dark side to the blaze of red.

But strawberries are a painful subject for Guillermo Ruiz. The farmworker believes his headaches, confusion and vision trouble stem from a decade of working in the fields with methyl bromide, a pesticide that protects the berries with stunning efficiency.

Cheri Alderman, a teacher whose classroom borders a farm, fears her students could inhale a dangerous whiff of the fumigant as it drifts from the adjacent strawberry field. "A little dribble of poison is still poison," she says.

Other nations watch as the United States keeps permitting wide use of methyl bromide for tomatoes, strawberries, peppers, Christmas trees and other crops, even though the U.S. signed an international treaty banning all but the most critical uses by 2005.

The chemical depletes the Earth's protective ozone layer and can harm the human neurological system.

Methyl bromide's survival demonstrates the difficulty of banishing a powerful pesticide that helps deliver what both farmers and consumers want: abundant, pest-free and affordable produce.

The Bush administration, at the urging of agriculture and manufacturing interests, is making plans to ensure methyl

bromide remains available at least through 2008 by seeking and winning treaty exemptions.

The administration's "fervent desire and goal" is to end the use of methyl bromide, said Claudia McMurray, deputy assistant secretary of state. However, she added, "I can't say to you that each year the numbers [of pounds used] would automatically go down."

The reason is that farmers around the country are struggling to find a suitable replacement for methyl bromide. Alternative organic techniques are too costly, and substitute chemicals are not as effective, growers say.

"We're not totally clueless. We've seen this train coming. We've tried every alternative and put every engine on the track, but none of them run," said Reggie Brown, manager of the Florida Tomato Committee.

Plastic slows release

Methyl bromide is a colorless, odorless gas that usually is injected by tractor into soil before planting, then covered with plastic sheeting to slow its release into the air. It wipes out plant parasites, disease and weeds. It results in a spectacular yield, reduced weeding costs and a longer growing season.

Workers who inhale enough of the chemical can suffer convulsions, coma and neuromuscular and cognitive problems. In rare cases, they can die.

Less is known about the long-term effects of low levels of contact, said Dr. Robert Harrison, an occupational and environmental-health physician at the University of California, San Francisco.

The U.S. signed the Montreal Protocol treaty, committing to phase out methyl bromide by 2005 as part of the effort to protect the Earth's ozone layer. A provision allows for exemptions to prevent "market disruption."

The U.S. has used it to persuade treaty signers to allow U.S. farmers to continue using the chemical.

That exemption process leaves the U.S. 37 percent shy of the phaseout required by 2005, with at least 10,450 tons of methyl bromide exempted this year. While that compares with about 28,080 tons used in 1991, this year's total is higher than it was two years ago.

U.S. officials are heading to a Montreal Protocol meeting in Senegal on Dec. 7 to begin negotiations on exemptions for 2007 and are preparing requests for 2008.

That is not what the treaty envisioned, said David Doniger, senior attorney with the Natural Resources Defense Council. In the 1990s, he worked on the protocol as director of climate change for the Environmental Protection Agency.

"Nobody expected you would use the exemptions to cancel the final step of the phaseout or even go backward," Doniger said.

Among those pushing for continued exemptions are financial heavy hitters such as the family of Floyd Gottwald, vice chairman of methyl- bromide producer Albemarle Corp. of Richmond, Va. The family gave more than \$420,000 to President Bush's campaigns and to national Republican Party organizations over the past six years.

With methyl bromide probably sticking around for several years, the EPA is re-examining its health and safety standards.

The American Association of Pesticide Control Centers logged 395 reports of methyl-bromide poisonings from 1999 to 2004.

A national total remains elusive, because farmworkers often do not seek medical care.

Guillermo Ruiz and Jorge Fernandez, two California farmworkers, say they saw plenty wrong in the strawberry fields where they worked, starting with the dogs, birds and deer that lay lifeless when the workers arrived to remove plastic sheeting from fumigated fields.

"That's how we knew this was a dangerous chemical," Ruiz said.

Symptoms surface

His own symptoms added concern. "My eyes watered. I threw up. It gave me headaches," he said.

Ruiz and Fernandez say they developed nervousness and depression by the time they stopped work in 2003. They saw the plastic come loose in high winds or leak when animals punctured it.

Other workers had symptoms, they said, but kept silent because they feared for their jobs.

The two are in a disability dispute with their former employer, who denies allegations that workers were forced to remove plastic sooner than required.

Growers feel hamstrung. Despite millions of dollars spent on research, no alternative addresses all soils and pests as well as methyl bromide, they say.

"It just works so good and just does so many things so well," said Mike Miller, a strawberry grower in Salinas, Calif.

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URL:
http://www.precaution.org/lib/05/hot_on_parkinsons_trail.051127.htm

From: Los Angeles Times, Nov. 27, 2005

HOT ON PARKINSON'S TRAIL

Scientists have amassed evidence that long-term exposure to toxic compounds, especially pesticides, can trigger the neurological disease.

By Marla Cone

MERCED, Calif. -- A thousand acres stretched before him as Gary Rieke walked briskly behind a harvester, the parched, yellow stalks of rice sweeping against his knees. Stopping to adjust a bolt on the machine, Rieke struggled to maneuver a wrench with his trembling fingers.

It was 1988, and Rieke was in his mid-40s, too young and too fit to feel his body betraying him. For two decades, he had farmed in the heart of the San Joaquin Valley, and he knew what he wanted his hand to do. But for some frustrating reason, it refused to obey.

Unbeknownst to Rieke, by the time he noticed the slightest tremor, some 400,000 of his brain cells had been wiped out. Like an estimated other 1 million Americans, most over 55, he had Parkinson's disease, and his thoughts could no longer control his movements. In time, he would struggle to walk and talk.

Rieke, who was exposed to weedkillers and other toxic compounds all his life, has long suspected that they were somehow responsible for his disease.

Now many experts are increasingly confident that Rieke's hunch is correct. Scientists have amassed a growing body of evidence that long-term exposure to toxic compounds, particularly pesticides, can destroy neurons and trigger Parkinson's in some people.

So far, they have implicated several pesticides that cause Parkinson's symptoms in animals. But hundreds of agricultural and industrial chemicals probably play a role, they believe.

Researchers don't use the word "cause" when linking environmental exposures to a disease. Instead, epidemiologists look for clusters and patterns in people, and neurobiologists test theories in animals. If their findings are repeatedly consistent, that is as close to proving cause and effect as they get.

Now, with Parkinson's, this medical detective work has edged closer to proving the case than with almost any other human ailment. In most patients, scientists say, Parkinson's is a disease with environmental origins.

Scientists are "definitely there, beyond a doubt, in showing that environmental toxicants have to be involved" in some

cases of Parkinson's disease, said Freya Kamel, an epidemiologist with the National Institute of Environmental Health Sciences who has documented a high rate of neurological problems in farmers who use pesticides.

"It's not one nasty thing that is causing this disease. I think it's exposure to a combination of many environmental chemicals over a lifetime. We just don't know what those chemicals are yet, but we certainly have our suspicions."

For almost two centuries, since English physician James Parkinson described a "shaking palsy" in 1817, doctors have been baffled by the condition.

In most people, a blackened, bean-size sliver at the base of the brain -- called the substantia nigra -- is crammed with more than half a million neurons that produce dopamine, a messenger that controls the body's movements.

But in Parkinson's patients, more than two-thirds of those neurons have died.

After decades of work, researchers are still struggling with many unanswered questions, such as which chemicals may kill dopamine neurons, who is vulnerable and how much exposure is risky.

Expressed in legal terms, pesticides are not guilty beyond a reasonable doubt -- but there is a substantial, and rapidly growing, body of evidence, many scientists say.

Clues and breakthroughs are emerging from an odd menagerie of laboratory flies, mice, rats and monkeys, from bits of human brain, and from farmers like Rieke.

And it all started with a junkie named George.

It was July 1982, and a 42-year-old patient named George Carrillo had lingered in Santa Clara emergency rooms and psychiatric units for more than two weeks. He seemed catatonic, unable to move or speak. Dr. Bill Langston, who ran a neurology department, was brought in to try to figure out what was wrong.

Langston gently lifted the man's elbow. His arm was stiff, moving like a gearshift. Langston had seen this odd, rigid movement many times before, in patients with Parkinson's disease.

But this was no ordinary Parkinson's patient. His symptoms had developed virtually overnight.

The doctors soon tracked the source: a botched batch of synthetic heroin that contained MPTP, a compound that acted like an assassin, targeting the same neurons missing in Parkinson's patients.

Langston had stumbled across a powerful chemical that unleashed an immediate, severe form of Parkinson's.

Still, it was obvious that synthetic heroin wasn't the culprit for most Parkinson's patients. People are exposed to some 70,000 chemicals in their environment. Which others could cause the disease?

A few days later, a chemist contacted Langston. The formula for the heroin compound, the chemist said, "looks just like paraquat." Paraquat has been one of the world's most popular weedkillers for decades. It was a good place to start.

Since that discovery, scientists have conducted hundreds of animal experiments, at least 40 studies of human patients, and three of human brain tissue. They have found "a relatively consistent relationship between pesticide exposure and Parkinson's," British researchers reported online in September in the journal *Environmental Health Perspectives*.

The work has revolutionized the thinking about Parkinson's, shifting the decades-long debate about whether its roots are genetic or environmental. Among the research leaders are UCLA, the Parkinson's Institute in Sunnyvale, Calif., which Langston founded and now directs, and Atlanta's Emory University, each named national centers for Parkinson's research in 2001 and given a total of \$20 million in federal grants.

Head trauma contributes to some cases of Parkinson's, and it probably explains why boxer Muhammad Ali was stricken. But why does it afflict others with seemingly nothing in common, such as the late Pope John Paul II and actor Michael J. Fox?

A couple of genes seem to play a role in early onset of Parkinson's in the small percentage of people who are afflicted at a young age. But for 90% of people who get the disease, a broad array of environmental factors are believed responsible. In fact, when Parkinson's patients have identical twins who carry the exact same genes, most of the twins do not contract the disease.

"All told, the forms of Parkinson's with a known or presumed genetic cause account for a small fraction of the disease, likely 5% or less," epidemiologists Dr. Caroline Tanner of the Parkinson's Institute and Lorene Nelson of Stanford University reported in 2003.

To pinpoint which environmental exposures are most important, scientists are trying to unravel how genes and toxic chemicals interact to destroy brain cells. One leading theory is that pesticides cause over-expression of a gene that floods the brain with a neuron-killing protein.

Exposure to chemicals early in life, followed by toxic exposures in adulthood, may be especially important, triggering a slow death of neurons that debilitates people decades later.

Compounds with little in common, such as a fungicide and an insecticide, apparently can team up to administer a one-two punch, decimating brain cells.

"Pesticides and related industrial chemicals, those classes of compounds, clearly are associated with some cases of Parkinson's," said Gary Miller, a toxicologist and associate professor at Emory University's Rollins School of Public Health. "The question is, how many? 5%, 10%, 50%? In a chemical-free society, people would still get Parkinson's disease. It would just occur later in life and at a lower incidence."

Even 5% would involve 50,000 Americans alive today.

More than 1 billion pounds of herbicides, insecticides and other pest-killing chemicals are used on U.S. farms and gardens and in households. Nearly all adults and children tested have traces of multiple pesticides in their bodies.

So far, animal tests have implicated the pesticides paraquat, rotenone, dieldrin and maneb -- alone or in combination -- as well as industrial compounds called PCBs, or polychlorinated biphenyls.

Pesticide industry representatives stress that there are many risk factors and insufficient evidence implicating any specific pesticide. Scientists agree that they cannot specify an individual culprit.

"We know for sure that if you expose animals to certain pesticides, it will kill the same neurons as Parkinson's disease. That's a fact. In humans, there is high suspicion, but there is no definite proof," said Dr. Marie-Francoise Chesselet, director of the UCLA Center for Gene-Environment Studies in Parkinson's Disease.

A connection to rural living or farming has turned up worldwide. Scientists first observed a high rate of Parkinson's in rural areas in the early 1980s in Saskatchewan, Canada. Since then a dozen published studies have reported an increase of 60% to 600% among people exposed to pesticides, according to the British scientists' review.

Still, the science of epidemiology has inherent weaknesses. Most of the human studies, for example, relied on patients' memories -- most of which cannot be validated -- to report their pesticide exposures.

"You need to be cautious in drawing conclusions when you know there are flaws in these studies," said Pamela Mink, an epidemiologist who evaluated the human studies in a peer-reviewed report partly funded by the pesticide industry.

Most patients probably were exposed decades before their diagnosis. Because there is no national registry for Parkinson's, as there is for cancer, no one knows whether rates are high in places such as the San Joaquin Valley.

Among those trying to obtain more definitive answers, UCLA environmental epidemiologist Dr. Beate Ritz has contacted nearly 300 Parkinson's patients and 250 healthy people in Tulare, Fresno and Kern counties. She is

pinpointing their pesticide exposures down to the day, the pound and the street corner by overlaying their addresses with California's extensive agricultural database, which details pesticide use on farms since the 1970s.

Also, 52,000 farmers and other pesticide applicators have been tracked by federal researchers since the mid-1990s and one goal is to document their exposure and see how many wind up with Parkinson's.

Animal studies provide more evidence but also have weaknesses. Mink and toxicologist Abby Li, who co-wrote the report financed partly by industry, concluded that the human and animal data "do not provide sufficient evidence" to prove pesticides cause Parkinson's.

Scientists first tested paraquat in rodents, but the findings were inconclusive. Neurologist Tim Greenamyre showed that rotenone, a pesticide, could kill rats' dopamine neurons and cause Parkinson's symptoms. But since rotenone is a natural plant compound that is not used much on farms, it was not a likely source of the human disease.

Neurotoxicologist Deborah Cory-Slechta has presented the most compelling evidence yet on how everyday environmental factors can play a role in Parkinson's disease. Her theory was that testing one chemical at a time for its impact on the brain was misguided.

"It's not how humans are exposed," she said. "You don't get a single dose of a pesticide. You get chronic, low-level exposure."

She injected mice with paraquat and the fungicide maneb. Use of the two sometimes overlaps on farms. Alone, paraquat and maneb did not harm mice in her laboratory. But "when we put them together, we were astounded," Cory-Slechta said.

The most dramatic damage was in mice exposed to maneb as fetuses and then to paraquat as adults. Their motor activity declined 90% and their dopamine levels plummeted 80%.

The amounts used in those tests "are not high levels of exposure. These are very, very low doses," said Cory-Slechta, who now directs Rutgers University's Environmental and Occupational Health Sciences Institute.

Paraquat and maneb are unlikely to be the only combination with such a devastating effect. Yet the U.S. Environmental Protection Agency considers only single exposures when approving pesticides, an approach that "doesn't mimic environmental reality," Cory-Slechta said.

"There may be hundreds, if not thousands, of other compounds that are silent killers of dopamine neurons," said Dr. Donato Di Monte, director of basic research at the Parkinson's Institute.

"Each of these risk factors, they kill 10, 20 or 30% of your neurons. It's like eroding a house on a cliff, and the house finally falls over.

With so much emerging human and animal data, Chesselet predicts that "in two years, we will have a preponderance of evidence" against some classes of chemicals. Kamel thinks specific pesticides will be pinned down within five years.

For Rieke, it is impossible to determine which chemicals may have played a role in his disease. He owned two dry-cleaners -- handling industrial solvents for seven years -- and for 25 years he mixed and applied at least a dozen herbicides and insecticides on his Merced farm.

At 59, Rieke had to sell the farm and retire. Now 64, he seems 10 years older despite taking seven medications daily.

"Every year, there are things that we all take for granted that my dad can no longer do," said his son, Greg. "There's no cure, and it never gets better. There's not a lot of hope, if you will."

Though it's too late for Rieke, scientists are confident they'll soon be able to predict who is vulnerable to environmental assaults on their brains.

"That would be the Holy Grail for us," Miller said. "To actually pinpoint people at risk of this disease and protect them."

*
Parkinson's and pesticides

Scientists now believe that exposure to toxic substances, particularly pesticides, could explain some brain cell degeneration that leads to Parkinson's disease, a disorder that affects body movement and coordination.

--
Neurons

Neurons or brain cells in the mid-brain produce dopamine, one of two neurotransmitters that help the brain and body communicate to produce smooth muscle movements and body coordination.

--
People with Parkinson's disease lose 60% to 80% of their dopamine-producing neurons in a part of the mid-brain called the substantia nigra, hindering communication between the mind and body. Scientists think some pesticides may kill neurons in the substantia nigra.

--
When dopamine is present

In a normal mid-brain, the substantia nigra has cells that are pigmented, or colored black, a byproduct of dopamine production.

--

Absence of dopamine

Parkinson's patients lack this pigmentation because they've lost so many neurons.

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Source: Medline Plus

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<http://www.realcities.com/mld/krwashington/13285938.htm>

From: Knight-Ridder, Nov. 29, 2005

HEALTH PROBLEMS ABOUND MONTHS AFTER KATRINA ROARED ASHORE

By Seth Borenstein and Chris Adams

BILOXI, Miss. -- Three months after Hurricane Katrina raked the Gulf Coast, a major health crisis is emerging as residents struggle with the fouled air, moldy houses and the numbing stress the killer storm left behind.

Across Mississippi and Louisiana, people are afflicted with coughs, infections, rashes and broken limbs and they are jittery, tired, depressed and prone to bizarre outbursts, health professionals said.

Burning storm debris, increased diesel exhaust, runaway mold and fumes from glue and plywood in new trailers are irritating people's lungs and nasal passages. Weary residents trying to clean up and repair their homes are falling off roofs and cutting themselves with chainsaws. And stress is fracturing the psyches of countless storm victims.

"It's a cumulative effect here," said Claire Gilbert, a New Orleans surgical technician who works in a Louisiana occupational medical practice and volunteered at the New Waveland Clinic, a tent shelter complex that just closed in Mississippi. "You get a little cough. You get a nose that runs. You get eye irritation. Then you get falls. And you've got the stress. It's not just little things. It's how they all add up."

Consider Colin Landis of Biloxi. First, he lost his rented home when it filled with six feet of water as part of Katrina's storm surge. Then, his marriage of 16 years, already under stress, collapsed. His wife fled the coast with their three children. He felt alone and strained with only \$3,500 in federal help.

Landis ended up living in a borrowed RV on a friend's yard less than a mile from a burning pile of storm debris. With the RV's air conditioner broken, Landis slept with the window open. He'd wake up with a raw throat and irritated eyes.

"It was almost like I had strep throat," Landis said. "It was obviously due to the environment."

Landis, who isn't sleeping much anymore, said that stress is getting to him more now than it did in the first few hectic weeks after Katrina struck. And it's not just him who's under strain. His brother-in-law just hurt his back falling through a storm-damaged deck.

When Katrina bore down on Mississippi and Louisiana, health officials worried about a toxic gumbo of industrial chemicals that might flood the area and about the spread of infectious diseases. Instead, a more subtle health problem developed, said Dr. Howard Frumkin, director of the National Center for Environmental Health, a division of the Centers for Disease Control and Prevention in Atlanta.

"In many ways, this is the major environmental health disaster of our lifetime," Frumkin told Knight Ridder Newspapers. "It's a very complicated set of risk factors people face.... This is a huge set of environmental health challenges."

Frumkin listed several irritants and carcinogens emitted from burning Katrina's flotsam and from traffic emissions, including acrolein and formaldehyde. Those two chemicals trigger coughs and bad congestion in the short term and are linked to cancer after prolonged exposure. Recent measurements from Mississippi air monitors show that spikes in the chemicals are much higher than what federal standards allow. In October, acrolein levels measured 155 times higher than federal standards and formaldehyde levels were seven times higher than allowed.

Frumkin also mentioned such emissions as polycyclic aromatic hydrocarbons, which cause cancer, and deadly carbon monoxide. Mold is nearly everywhere, and cleanup-related injuries are often overlooked, he said.

But what hurts the Gulf Coast most -- and compounds the effects of everything else -- is stress, experts said.

"Stress isn't a strong enough word. I'd call it anguish," Frumkin said. "The level of grief and anguish there is palpable."

People can't sleep. They don't remember meetings or what day it is. Vietnam veterans suffer flashbacks and nightmares, psychologists say.

William Gasparrini, a Biloxi clinical psychologist, calls it "Post- Katrina Stress Disorder," in which residents suffer bouts of grief, shock, rapid mood shifts, confusion, anger, marital discord, guilt, escape fantasies and substance abuse.

"The effects are lasting longer than I suspected," Gasparri said. "I thought everything would be back to normal in three to four weeks. Now, three months later, it looks like it'll be one to two years -- if we are lucky. There are a lot of people in pain -- a lot of people who cry every day."

Making matters worse is that the devastation is so widespread that people can't escape it. Unlike a tornado or the terrorist attacks on the World Trade Center and Pentagon, the area of destruction in Mississippi and Louisiana is so wide that residents need to drive for miles to find a sense of normalcy.

"When you drive around Biloxi and see all those houses that have been very badly damaged and see people living in the rubble for weeks and weeks, it's easy to understand how traumatizing this has been for these families," said Irwin Redlener, director of the National Center for Disaster Preparedness at the Columbia University Mailman School of Public Health. Redlener has spent time since the storm in New Orleans and Mississippi.

"Because of the prolonged nature of this disaster, it's impossible to guess what rate of PTSD (post-traumatic stress disorder) we will see. It may be much higher than we would normally expect."

After other disasters, between 7 percent and 12 percent of the people directly affected eventually suffered PTSD symptoms, he said. Because Katrina victims number in the hundreds of thousands -- all the people who lost homes, lost relatives or were forced into temporary shelters - the mental toll could be huge, he said.

"Because the sheer size of the impact was so large, I think there is a greater sense of despair and loss that people are experiencing," he said. "This experience of dramatic, prolonged displacement will create a toll long into the future."

Before Katrina hit, a Mississippi mental health telephone help line received about 300 calls a month. After Katrina, the help line was flooded with calls: One night, director Jennie Hillman had the line roll over to her home; she was up much of the night fielding 27 calls.

In late September, federal money helped pay for a new mental health help line called Project Recovery. It also has been swamped with calls: In the last four weeks, Project Recovery has received 960 calls, while workers in the field have made contact with an additional 800 people, Hillman said.

The Gulf Coast Mental Health Center lost nearly half its patients during and just after the storm, yet new patients streamed in to replace them and then some, said psychologist Steve Barrilleaux, director of the adult outpatient program. Now nearly half of those the center sees have Katrina-related problems.

Diane Lufreniere, a therapist at the center, developed strange rashes on both arms.

"I was itching all the time and I just couldn't figure it out," she said. She went to three doctors, and they tried different medicines to no avail. Finally, they figured it was the stress of housing friends who were homeless. When the stress went away, so did the rashes.

While the stress is overwhelming, the part of the body that shows the most symptoms is the respiratory system, said directors of local medical centers and makeshift clinics.

In just nine days, from Nov. 9 to Nov. 17, the New Waveland Clinic saw 473 patients -- 121 of them were for respiratory problems. The second most common symptom was skin problems with 68 patients.

Dave Farragut of DeLisle, Miss., got one of the first new trailers from the Federal Emergency Management Agency. The first couple of days, the smell from the trailer made his eyes burn. When his girlfriend moved in a few days later, she also got sick at first.

For more than a decade, federal health officials have known about irritating chemicals emitted from the glue and plywood of new trailers, said professor Stan Glantz, of the University of California at San Francisco.

Volunteer Claire Gilbert at the Waveland clinic had mold problems of her own in her New Orleans apartment. Nearly every structure touched by the floodwaters has mold growing.

Mold is serious. In addition to irritating people and triggering asthma and allergy attacks, it can cause infections and can be toxic and cause cancer, said Sam Arbes, a scientist who specializes in mold issues at the National Institute of Environmental Health Sciences in North Carolina.

"It doesn't get any worse" than the mold levels Arbes said he saw in New Orleans. Testing there by the Natural Resources Defense Council, an environmental group, found mold levels in New Orleans nearly 13 times higher than what's considered very high levels by allergists.

Increased traffic is also creating breathing problems for vulnerable people, Frumkin said. And diesel exhaust -- increased because of ever-present construction and debris-clearing vehicles with diesel engines - causes cancer, he said.

With bridges and roads out, traffic in parts of the Mississippi Gulf Coast is down to a crawl, so it can take two to three times longer than usual to get places, increasing emissions.

For example, on Interstate 10, just west of U.S. 49 in Gulfport, the average daily traffic has increased from about 37,000 last year to 52,000 last month, according to Trung Trinh, a planner for the Mississippi Department of Transportation.

Skin problems are also plentiful. New Waveland Clinic director Brad Stone told of a disabled woman who lived in her car for three months while waiting for FEMA to come up with a handicapped accessible trailer. The woman developed a fungal infection on her body that was "extremely painful and dehumanizing," Stone said.

It's the aftermath that's come close to killing her.

Heatherton, a 68-year-old woman with emphysema, got a severe lung infection from the mold spreading in her apartment.

It all comes down to environmental factors, Stone said.

"I love it (in Biloxi), but my life comes first," Heatherton said, gasping for air. In about a week, she's moving to Nevada, saying: "I'm not going to sit here and mold to death."

Take Alicia Heatherton of Biloxi. During Katrina she stayed in her retirement home apartment right on the beach. Even though nearby buildings were obliterated, she survived.

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Rachel's Democracy & Health News (formerly Rachel's Environment & Health News) highlights the connections between issues that are often considered separately or not at all.

The natural world is deteriorating and human health is declining because those who make the important decisions aren't the ones who bear the brunt. Our purpose is to connect the dots between human health, the destruction of nature, the decline of community, the rise of economic insecurity and inequalities, growing stress among workers and families, and the crippling legacies of patriarchy, intolerance, and racial injustice that allow us to be divided and therefore ruled by the few.

In a democracy, there are no more fundamental questions than, "Who gets to decide?" And, "How DO the few control the many, and what might be done about it?"

Rachel's Democracy and Health News is published as often as necessary to provide readers with up-to-date coverage of the subject.

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