

ASTHMA, AUTISM AND VEHICLE EXHAUST



By Christina Elston

Kiana Coronado Ziadie lives in an apartment near the Los Angeles River. An overpass at the end of the block lifts the 101 Freeway over both the river and her street.

The day I visit, the eighth grader doesn't want to talk and she doesn't want her picture taken, even with her cool new blue hairdo. Asthma and a virus that's going around have her huddled beneath a blanket on the couch.

Between phone calls to nail down an appointment with the pediatrician and showing off a photo of Kiana at the White House, Kiana's mother, Diana Machado, tells me she and her three daughters, Kiana, Sarah and Daniela, have lived in this apartment since June. Before that, they lived in Hancock Park. All three girls have asthma, but Kiana's is by far the worst. Her first attack, when she was 2, hospitalized her for two weeks. "With her, I have to use medication every day," says Machado, showing me a list of at least six medicines Kiana takes regularly, including antihistamine pills, an inhaler and a nebulizer. Kiana is also allergic to dust and animal dander, and has an epi pen so she can inject herself if she has a particularly bad reaction.

More than 2.7 million children in L.A. County have asthma, and the government reported in January that the national rate is now 8.2%. Studies increasingly point to pollution from freeways as an aggravator, if not a cause, of childhood asthma. And that isn't the only health concern experts think they can pin on vehicular exhaust.

The latest is a December study examining the possible link between vehicle exhaust and autism. The CDC says autism rates jumped 57% between 2002 and 2006, but can't explain the increase. Heather Volk, Ph.D., lead author of the study that suggests an air pollution-autism connection, says nearness to freeways was a natural way to pinpoint families breathing high levels of toxins. "Within 300 meters (1,000 feet) of a freeway, those levels are quite high," says Volk, who holds appointments in the Community, Health Outcomes & Intervention Research Program at The Saban Research Institute of Children's Hospital Los Angeles, the Zilkha Neurogenetic Institute and the Department of Preventative Medicine at USC.

Children born to mothers in the study living this close to L.A. freeways appeared to be twice as likely to develop autism, Volk and her colleagues concluded. And because the study looked at the child's exposure both in the womb and immediately after birth, exposure as an infant could also be a factor. Future studies are set to help determine the dose of toxins, and the specific components of vehicle exhaust, most closely associated with autism.

Since 1999, John Froines and his colleagues at the Southern California Particle Center have been on the trail of what they consider one of the most toxic parts of vehicle exhaust: the ultrafine particle (See pg. 16, Dec. digital edition at LAParent.com). They are close to teasing out the exact pathway between breathing in these particles and developing asthma.

The airborne particles from diesel exhaust, Froines explains, are made up of a black carbon core with organic chemicals and metals packed around it. These particles are small enough to enter the body's cells, where the materials clustered around the core can react with the body's DNA. "The lung is remodeled, as it were," says



About This Series

"In the Air" is being produced as a project for The California Endowment Health Journalism Fellowships, a program of USC's Annenberg School for Communication & Journalism.

- **January:** In Utero, how air pollution affects babies in the womb.
- **February:** The Kids Aren't Alright, rising asthma rates among children.
- **March:** Teenage Lungs, the long-term effects of breathing smog.
- **April:** Clearing the Air, efforts at change and what you can do.

Got a question or a story to tell?
Email Christina.Elston@Parenthood.com.



Kiana Coronado Ziadie (center), who struggles with asthma, accepts an award from First Lady Michelle Obama with Harmony Project Founder Margaret Martin (left).

Froines. “You have changes in the lung itself.” Though they are still nailing down the specific protein signaling pathways involved, he and colleagues believe that eventually leads to asthma.

Froines says the autism-air pollution connection is likely more complicated, because it probably results from the contaminants the mother is breathing somehow being transferred to her unborn child. And there could be genetic factors at work as well. “On a mechanistic basis, it’s probably too early to say precisely how you go from A to Z,” he says.

Unlike larger particles (PM10 and PM2.5), which EPA can easily weigh, measure and set standards for, ultrafines are as yet unregulated. But Froines says that they make up about 90% of diesel exhaust, and that there are an average of 600,000 of them in a sugar cube-sized patch of air as the 710 Freeway approaches Long Beach. Sometimes that airborne cube can pack as many as 3 million. And while sampling these particles is more difficult, Froines says it is important to continue to learn about them. “We’ve shown that ultrafines are more toxic,” he says.

Work on the topic, however, suffered a blow last year when the center lost its EPA grant funding. EPA established five particulate matter research centers in 1999, and has funded them in five-year cycles ever since. But in 2010 the agency shifted the focus of its

grant program, and funded four “Clean Air Research Centers,” which an agency spokesperson says have “more of a focus on multi-pollutant air exposures,” instead. The Southern California Particle Center wasn’t awarded one of these grants.

The Southern California Particle Center grant runs through 2011, but without additional funding will end its work at the end of the year. Froines says it is the only center really focused on ultrafines. Centers in other areas – like the East Coast – are more focused on larger particulate in emissions from coal-fired power plants. “We’re the people who said you’ve got to focus on mobile sources. So now there’s no place that’s being funded by EPA where that emphasis is being addressed,” he says. “EPA was good to have put together these centers to really look at the particles, but I worry what will happen now,” Froines says.

In her neighborhood near the freeway, the air still can trigger Kiana’s asthma, especially in summer, but her condition is better controlled now. There was a time when attacks landed her in the ER at least twice a year. “Kiana was missing so much school they called me from the office,” Machado says. Thanks to help from the Los Angeles Unified School District Asthma Program, the family is more diligent about using control medications, and Kiana now uses a spacer with her inhaler to make it more effective. They make monthly visits to the Breathmobile, a mobile asthma treatment center funded by the county health department and the Asthma and Allergy Foundation of America, where doctors help her asthma management stay on track. “We didn’t do that before,” Machado says. “We just got treated when the asthma came.”

Kiana’s a student at Millikan Middle School’s performing arts magnet in Sherman Oaks and plays the violin in the

Harmony Project, a program that brings music programs to at-risk kids. In 2009 she got to visit the White House to help project founder Margaret Martin receive an award from First Lady Michelle Obama. She still misses school sometimes, but she’s hanging in there. “Of course her grades decay, but she’s a smart girl,” says her mother. And in the past year, she hasn’t been to the emergency room once. ♦

Christina Elston is Managing Editor of *L.A. Parent*.



Daniela Coronado Ziadie, Sarah Coronado Ziadie and their mom, Diana Machado.