CHILDREN'S HANDPRINTS

A PUBLICATION OF CHILDREN'S HOSPITAL & RESEARCH CENTER OAKLAND

Can you stop smoking?

Children's primary care doctors are now training Northern California pediatricians to help parents quit smoking.

BONUS: BABYSITTER GUIDE
Inside is a helpful babysitting checklist that you can use to write down the essential information every babysitter should have.

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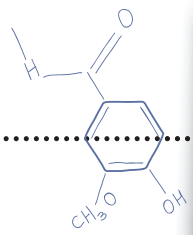
childrenshospitaloakland.org

RESEARCH UPDATE



Scientist Goes Back to School—To Teach 5th Graders

As a child growing up in Mobile, Alabama, David Killilea, PhD, was fascinated by science. Now a Staff Scientist at Children's Hospital Oakland Research Institute (CHORI), Dr. Killilea has been sharing his passion for science with local children since 2006 as a volunteer with the Bay Area Scientists in Schools (BASIS) program sponsored by the local nonprofit organization Community Resources for Science (CRS). BASIS volunteers provide hands-on activities and science instruction in the Oakland Unified School District and the Berkeley Unified School District.

"I was inspired to become a scientist in early childhood because I had teachers in elementary school who actually engaged us with real experiments that made science come alive," Dr. Killilea explains. "My own experience is what made me decide to volunteer with the BASIS program, to help instill a love of science in other children."

After graduating with a bachelor of science degree in molecular biology at Rhodes College in Memphis, Tenn., he went straight into the PhD program in pharmacology at the University of Alabama in Mobile.

"The pharmacology program had a significant overlap with biochemistry, and then I became interested in the field of nutrition," Dr. Killilea recalls. "I decided to come to CHORI in 2000 for post-doctoral work in nutritional minerals."

Dr. Killilea worked under renowned CHORI Senior Scientist Bruce Ames, PhD, who serves as director of CHORI's Nutrition & Metabolism Center and is professor emeritus of Biochemistry and Molecular Biology at the University of California, Berkeley. Dr. Killilea credits Dr. Ames with helping him "to understand the 'big picture' of nutritional science." He credits CHORI Senior Staff Research Associate Sandra Larkin, MS, with introducing him to the BASIS program.

"I volunteered for BASIS because I had been looking forward to teaching," Dr. Killilea notes. "BASIS offered me an opportunity to teach that didn't interfere with my heavy load of research work at CHORI. BASIS is a fantastic program, and it is very flexible. You can volunteer to teach as many—or as few—classes as you want. I teach about 8 to 10 classes a year, but I would teach more frequently if I had the time."

"There's nothing like the look on kids' faces when they are involved in and excited about science."
—David Killilea, PhD

CRS was founded in 1997 in response to the need for improving science education in local schools. A survey of 923 Bay Area elementary school teachers reported that about 80 percent of those teachers spent less than an hour each week teaching science, including 16 percent who spent no time at all on science. Teachers noted they often lack the time or professional preparation for teaching science. In addition to the BASIS volunteer program, CRS offers workshops and science resource field trips for teachers and other programs to enhance teachers' science teaching practices.

"The BASIS program works with the volunteers, providing us with the California Science Standards for kindergarten up to 7th grade," says Dr. Killilea. "I decided to work with 5th grade, which has the educational objective of learning the elements of the periodic table. I felt I had a good background for teaching the elements and then transition to a discussion of nutrition. My presentation is called 'Elements of Life,' and I tie it into real-world applications of the elements.

"When I learned about the periodic table of elements in middle school, basically all we did was memorize it," he adds. "Kids need to know about how those elements fit into everyday life—such as how different elements combine to form compounds, and how minerals and gases are part of our bodies. So I designed tactile, hands-on experiments that make it fun and interesting for them. There's nothing like the look on kids' faces when they are involved and excited. That's the reward for me—seeing them have that 'Oh, wow!' feeling."

Dr. Killilea notes that, in addition to taking part in the hands-on experiments, the students also pepper him with questions.

"I get lots of funny questions, such as what the element krypton has to do with Superman's home planet," he says. "But I also get health-related questions, such as how iron becomes toxic for people with sickle cell anemia and how calcium leads to bone formation. They also ask what I do as a scientist and how they can become a scientist. I really hope that my efforts will help inspire kids to pursue more science education and possible careers in science."

For more information about Community Resources for Science and the Bay Area Scientists in Schools program, go to www.crscience.org.

ELEMENTS OF LIFE

In his "Elements of Life" presentation, Dr. Killilea generally conducts three lessons to help illustrate how the periodic table of elements relates to everyday life.

HOW ELEMENTS CAN COMBINE INTO COMPOUNDS

"One of the most common compounds is the combination of sodium (Na) and chlorine (Cl), which is table salt (NaCl)," Dr. Killilea says. "I explain that if you had a lump of pure sodium and held it up in the air, it would react with water in the air, catch on fire and explode. Then I explain that pure chlorine is a substance that can make your eyes hurt—like when you get into heavily chlorinated water in a swimming pool. When I ask them what happens when you combine sodium and chlorine, they often correctly respond that the combination creates salt. They had never really thought about how different the elements are that make up everyday compounds that we use."

To show how the elements combine to form salt, Dr. Killilea gives the students small paper cups with two different colors of marshmallows representing sodium and chlorine, along with toothpicks representing chemical bonds.

"I help the kids use toothpicks and the marshmallows to create a model of the compound NaCl, being careful not to let the elements 'touch.' Afterwards, they get to munch on the marshmallows, which makes them extra happy," he explains.

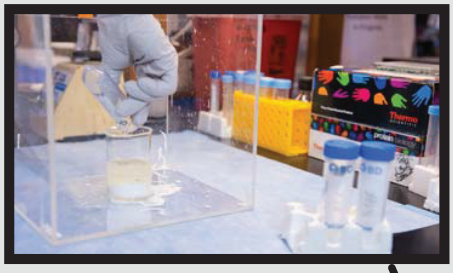
ELEMENTS FOUND IN THE HUMAN BODY

"I bring in small bottles containing real zinc, iron, copper, calcium, and other minerals that are part of the body," says Dr. Killilea. Each bottle contains the exact amount of that element found in a child's body. "They are really surprised by the amounts of these minerals, and it serves as a very visceral connection to why a good diet is important, to get enough nutrients like these minerals into our bodies. I also show them minerals that can be bad for you, such as lead, if you have too much of them in your body.

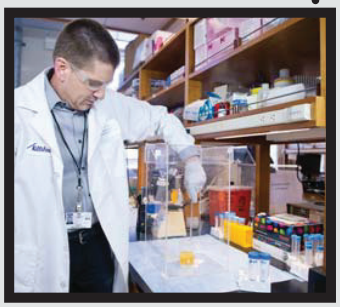
"The last thing I pass around are elements that are in our bodies in very tiny amounts, such as gold and silver," he adds. "They are all very excited to learn that they each have some gold in their bodies—even if it's only about 25 cents' worth."

HOW COMPOUNDS CAN BE BROKEN BACK DOWN INTO SIMPLE ELEMENTS

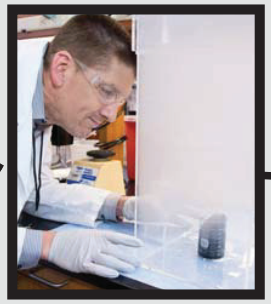
"I ask the kids if they think the elements are still inside the compounds, given that the compounds are so different from the individual elements," Dr. Killilea says. "They are often not sure, so I explain that, as scientists, we should devise an experiment to test this question."



Dr. Killilea pulls out some sugar and has the kids taste it to confirm that it really is just sugar. He pours the sugar into a beaker and then pours sulfuric acid into the sugar. Within minutes, the color of the sugar changes to yellow, then brown and then black. The temperature inside the beaker goes up, and the contents begin to bubble.



Do not attempt this at home!



"Soon, a black 'carbon snake' begins to grow up out of the beaker," says Dr. Killilea, "and the kids all get very excited. The carbon can rise up to over a foot high."

Dr. Killilea explains to the students that sugar is a compound of three elements: carbon, hydrogen, and oxygen. "The high strength of the acid 'dehydrates' the sugar, stripping away the hydrogen and oxygen, and leaving only carbon and steam," he notes. "Then I tell them that carbon, hydrogen, and oxygen are also part of our bodies."