In an ongoing project investigating lead and mercury poisoning, Dr. Leo H. Buchanan has traveled frequently during the last 14 years with an international research/medical team to remote villages in the Andes Mountains of Ecuador, South America where children and adults are exposed to lead from lead-glazing of ceramics, and to mercury from gold mining activities. The project is an international collaborative research, clinical, and educational effort conducted under the auspices of the Universidad San Francisco de Quito Medical School in Quito, Ecuador.

The aims of the project are to: (1) ascertain the prevalence and severity of lead and mercury poisoning in children and adults in rural/remote areas of Ecuador, (2) investigate auditory neurosensory and neurocognitive effects of these poisonous substances, especially on the children, (3) perform environmental analysis where appropriate, (4) investigate the validity of a portable lead testing and analysis system, (5) engage the inhabitants in an education and prevention program, and (6) offer medical assistance to the community and technical assistance to the Ecuadorian health and other government officials.

The project team found that the children in these Andean villages had extremely high blood lead levels. In some cases, the levels were potentially lethal at more than 10 times higher than the Centers for Disease Control and Prevention's action level of 10 microgram per deciliter. Contrary to previous research, the children showed no evidence of lead-associated auditory neurosensory impairment as indicated by normal behavioral auditory thresholds, normal middle ear functioning, the presence of otoacoustic emissions, normal auditory stapedial brainstem reflexes, and normal auditory brainstem neural transmission. The children, however, showed evidence of lead-related neurocognitive deficits, which place them at risk for learning disabilities and long-term health effects. After the project team initiated a lead education, prevention and treatment program, the blood lead levels of the children have decreased significantly over the years from average levels of 40-50 micrograms per deciliter to about 20 micrograms per deciliter.

Mercury exposure, like lead exposure, can lead to neurodevelopmental learning disorders, including impairments in language, visual-spatial reasoning ability, and motor skills. The Ecuador Project found elevated levels of mercury in blood, hair and urine of children and adults living or working in gold mining areas of Ecuador. The inhalation of elemental mercury vapors from the occupational burning of mercury amalgams to separate gold particles from alluvial sediment is a major source of the mercury intoxication. Another important source of mercury
poisoning is from eating fish and other foods contaminated by methylmercury, which is formed by microorganisms from the inorganic mercury discharged by gold-mining companies into the rivers and streams used by the inhabitants of the areas. Complaints from the mercury-exposed participants included frequent headaches and memory loss, and the project team found evidence of auditory neurosensory anomalies and neurocognitive deficits in the children. In the Nambija, Ecuador gold-mining settlement, the indigenous Saraguro AmerIndian children and adults, who are a major part of the labor force, showed higher levels of mercury poisoning than their non-Saraguro counterparts (Mestizo children and adults), although both groups had elevated mercury levels.

For details of the research, see abstracts of the publications of this project at PubMed. Also see the Shriver Center Spotlight Newsletter.