

A Probabilistic Risk Assessment of Arsenic Toxicity in Children who Contact CCA-Treated Playsets and Decks in Bay Bridge Area of Alabama

Asundep Ntui, L. Ogden, T. Graham, T. Datiri

*Tuskegee University College of Veterinary Medicine and Allied Health
Tuskegee Institute, Al.*

ABSTRACT

Arsenic is a key ingredient in a pesticide called Chromated Copper Arsenate (CCA), and over 90% of all outdoor wooden structures in the United States are made with arsenic-treated lumber. CCA has been used to pressure treat lumber used for decks, playgrounds (playsets) and other outdoor use since the 1930s but have raised concerns regarding the safety of children who may contact arsenic residues while playing on and around these CCA-treated playsets and decks. After the twin Katrina and Rita hurricanes of 2005, the Bay Bridge area of Alabama experienced a surge in arsenic level 100 times the level prior to the storms. A quantitative risk assessment was developed to assess the risk children are exposed to and the probability of developing cancer as a result of this surge. Mean dose exposures of skin contact with and nondietary ingestion of, hand to mouth loading, and pica behavior of children (generally children under 6 years of age) who frequently come in contact with CCA-treated wood were considered. Using the product pathway as a guide, a scenario tree was developed which represents the risk pathway and @RISK software (palisade) student trial version was used to generate probability distributions using Monte Carlo simulations. The mean cumulative probability of a child being exposed to arsenic was of the order of $5.28 \text{ E-15 mg/kg/day}$ with predicted 95th percentile on the order of $1.796 \text{ E-15 mg/kg/day}$. Contact with the hands and skin was determined to be the most significant route of exposure.

KEY WORDS: Arsenic CCA-treated wood, children's exposure, Probabilistic risk assessment.