

LAY ABSTRACT

Limit is 5000 characters, including spaces and subtitles.
This form is used for both the peer and programmatic review.

Project Title: Cadmium and arsenic exposure in a gold mining-impacted community

Introduction: Arsenic (As) and cadmium (Cd), both carcinogenic metals, are pervasive contaminants throughout the Gold Country region of northern California as a result of extensive gold mining that began with the California Gold Rush of 1849. Exposure to Cd has been associated with increased risks of breast and endometrial cancers while inorganic As at low concentrations causes increased growth of estrogen-responsive breast cells. No human health studies have been conducted in this region to determine whether residents have an elevated level of these contaminants in their bodies, despite the fact that the three most populous counties in Gold Country have breast cancer rates that rank in the top ten of the 58 counties in California. This project seeks to determine whether further study is warranted of a link between breast cancer incidence and exposure to legacy mining contaminants.

Question(s) or hypotheses: The primary hypothesis of this proposal is that build-up of legacy mining contaminants, namely Cd and As, is elevated in the bodies of residents in a gold mining community.

General methodology: The proposed study is an effort to engage the community in an investigation into the human health consequences of residence in a mining-impacted community. Community engagement will be accomplished by means of two community forums, to be hosted by Sierra Streams Institute (SSI), and the establishment of a Community Advisory Board. Community input will direct all phases of the proposed human health study. A total of 60 women over the age of 21 who are residents of western Nevada County will be recruited for a biological study. The participants will complete a questionnaire to elicit basic sociodemographic, residential, and activity data. The participants will provide minimally invasive biological samples consisting of first-morning urine for the measurement of As and Cd, and toenail clippings for the measurement of As. Statistical analyses of the measured concentrations of these metals and of questionnaire data will be conducted to determine the relative contributions of length of residence in Gold Country, residential proximity to mine waste, activity patterns, and sociodemographic characteristics.

Innovative elements: The proposed study would be the first human health study conducted in the Gold Country region focused specifically on body burden of mining-related toxins, and on the relationship between body burden and factors related to residence in Gold Country.

Community involvement: The project was conceived at the community level, prompted by widespread opposition to plans to reopen major gold mining operations. SSI is a non-profit scientific monitoring, restoration, education and research organization based in Nevada City. Founded as Friends of Deer Creek in 1996 by a group of concerned local residents to protect the creek, the group remains a citizen-based grassroots organization dedicated to engaging local people in the stewardship of their own environment. A 2011 community conference hosted by SSI and CBCRP, to encourage community-based projects that advance knowledge of breast cancer etiology, led to demand for a study of the health effects of living among abandoned mine waste. A community survey conducted by SSI volunteers in 2012 confirmed the level of concern, with 85% of respondents agreeing or strongly agreeing that abandoned gold mine waste is a human health hazard. SSI on behalf of the community has worked closely with CPIC and UNR over the course of fourteen months to develop a project that will address the community's concern. The primary aim of the project is to involve the community in all stages of the study, from participating in a community advisory board, designing the study, participating in the study, interpreting the findings, and guiding future plans.

Future Plans: The primary goal of the proposed pilot study is to determine whether the findings justify further epidemiological studies. Further research activities may include: evaluating the geographic distribution of breast cancer incidence in relation to the location of abandoned mine sites; biomonitoring of additional mining contaminants such as lead and mercury; expanding biological specimen collection to include a larger geographic area; residential dust sampling;

Co-Principal Investigators: Joanne Hild, Peggy Reynolds, Jane Sellen

studies of other outcomes related to exposure to mining contaminants such as other cancers, birth outcomes, and overall mortality. This planned future research will benefit residents of the targeted communities by validating and empowering the work of citizen scientists, determining and disseminating strategies that will minimize exposure, engaging the community in cleanup efforts and information campaigns, and supporting requests for funding to clean up mining's toxic legacy throughout Gold Country.