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LAY ABSTRACT

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

Introduction: Cadmium (Cd), a carcinogenic metal associated with increased risk of breast and endometrial cancers, is a pervasive contaminant throughout the Gold Country region of northern California as a result of extensive historic gold mining. The three most populous counties in Gold Country have age-adjusted breast cancer rates that rank in the top ten of the 58 counties in California. Preliminary findings from the CHIME study (Community Health Impacts of Mining Exposure), indicate that older women who are long term residents have a significantly increased body burden of Cd compared to younger women and women of the same age who are recent arrivals. This project seeks to expand this investigation by looking at the link between body burden of Cd and breast cancer incidence, and by measuring Cd contamination in the home environment.

Question(s) or hypotheses: The primary hypotheses of this proposal are that Cd body burden is elevated in women with a history of breast cancer and is associated with household environmental exposures.

General methodology: The proposed study is an effort to continue to engage the community in an investigation into the health consequences of living in a mining-impacted community. An established Community Advisory Board (CAB) will guide and oversee all phases of the study. A minimum of 60 women who are residents of western Nevada County will be recruited for the study, with 30 being breast cancer cases and the remainder age-matched and younger non-cases. Participants who were not part of the prior CHIME study will provide a biological sample consisting of first morning urine for the measurement of Cd and will complete a questionnaire to elicit basic demographic, residential and activity data, along with breast cancer status and exposure to breast cancer risk factors. Participants from the initial CHIME study who agree to continued participation will complete a survey regarding breast cancer status and exposure to breast cancer risk factors. In addition, all participants will be trained to collect soil, dust and water samples from their homes. Statistical analyses of the measured concentrations of Cd in the biological and environmental samples will be conducted to determine the contribution of home environmental levels of Cd on body burden; to assess whether there is an association between Cd body burden and breast cancer status; and to confirm the association identified in the CHIME study between length of residency and Cd body burden.

Innovative elements: The study will retain two innovative elements of the CHIME study: CHIME was the first ever CBCRP-funded CRC project to be awarded to a community partner as prime, with the academic partner as the sub-contractor. This structure reflects the project's genesis within the community, prompting SSI to seek out an appropriately qualified academic partner. CHIME also broke new ground as the first ever project approved by CPIC's IRB to return individual results to participants. This element of the project was identified by the CAB as critical to the community's right to know, and is an increasingly central tenet of community-based participatory research. The project will provide the academic partner institution with further opportunity to consider the merits of this approach, and serve as a model for other academic institutions.

Community involvement: The project was conceived by the community, prompted by concern among local residents about the health effects of their mining legacy in light of efforts to reopen mining operations and environmental assessments by SSI and others that reveal widespread heavy metal contamination. The primary aim of CHIME was to establish a community dialog and involve the community in all aspects of the study, guided by a CAB. The present proposal builds on this high level of community engagement. A key element of the project is to train participants as citizen scientists to collect environmental data, an approach that is central to SSI's stewardship model. With 15 years of citizen-generated validated environmental data, SSI will lead the environmental data collection effort by designing rigorous protocols and training participants in their use.

Future Plans: Further research is expected to include: expanding biological specimen collection to include a larger geographic area within Gold Country; expanded environmental sampling and identification of transmission routes for Cd; and study of other outcomes related to mining contaminants such as other cancers, birth outcomes, and overall mortality.

This planned future research will benefit residents of the target community by 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.