Award ID:
RP180755

Project Title:
The Early-Life Exposome and Risk of Pediatric Acute Lymphoblastic
Leukemia

Award Mechanism:
High Impact/High Risk

Principal Investigator:
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Entity:
Baylor College of Medicine

Lay Summary:

Each year in the United States (U.S.), more than 15,000 children and adolescents
younger than 21 years of age are diagnosed with cancer, which is the leading cause of
morbidity and mortality in youth. Over 10% of these cases are diagnosed in Texas.
Pediatric cancer incidence has steadily increased by an annual average of 0.6% since
1975, with acute lymphoblastic leukemia (ALL) accounting for the largest proportion of
cases (23%). This steady increase suggests that pollutants in the environment may be
playing a significant role in pediatric ALL risk. However, we do not understand why most
children are diagnosed with ALL. Being exposed to environmental pollutants (e.g., heavy
metals like arsenic and organic chemicals like certain pesticides) has long been suspected
of contributing pediatric ALL risk. However, very few studies have been able to accurately
measure these pollutants in children diagnosed with ALL. This is partly because the
critical time of exposure is often in early life, long before a child is diagnosed with ALL.
There is growing evidence that primary teeth (i.e., baby teeth) serve as a stable
repository for exposures that occur during development and early childhood, similar to
growth rings on a tree. Therefore, emerging studies are utilizing primary teeth to
reconstruct multiple early-life exposures, referred to as the exposome. Our objective is to
pioneer a novel approach to advance discovery of the early-life environmental exposures
that cause pediatric ALL. The collection of teeth as a marker for early-life exposures has
enormous translational potential for uncovering the causes of pediatric ALL and, in the
future, for other cancer types. The results will provide information for a larger grant
application to examine the tooth exposome from a larger group of individuals. The
knowledge gained from this project and subsequent projects will profoundly impact
preventative strategies for childhood cancer.