



## HUMAN HEALTH RESEARCH PROGRAM

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### RESEARCH SHOWS HOW BIOMARKERS CAN BE USED TO UNDERSTAND ENVIRONMENTAL EXPOSURES

#### Issue:

Every day, people come into contact with a variety of environmental chemicals through the food they eat, the water they drink, the air they breathe, and objects they touch. This contact with chemicals – known as exposure – affects everyone. To understand exposures and their potential health risks, scientists at the U.S. Environmental Protection Agency’s Office of Research and Development are working to identify tools, called biomarkers, that can be used to assess a person’s exposure to chemicals and, in some cases, identify an early health effect from the exposure. Biomarkers are substances, structures or processes that can be measured in biological samples (such as urine, blood, or saliva) that indicate an exposure or susceptibility, or predict the incidence or outcome of disease. They help us to understand how chemicals move through the body and cause biological changes that can lead to illness and disease.

#### Science Objective:

Scientists in biomarkers research are developing and validating biomarkers that can be used in clinical screening, epidemiological studies, and risk assessments. The EPA’s Science to Achieve

Results (STAR) grants program supports biomarkers research including:

- **Meconium Validation Studies.** Researchers have studied meconium, an infant’s first set of stools, as a potential biomonitoring matrix for analyzing fetal exposure to pesticides.
- **Saliva Research.** Saliva offers an easy, noninvasive way to collect samples for assessing exposure to chemicals. Several projects have demonstrated that saliva is a useful biomarker for measuring children’s exposure to pesticides.
- **Application of Biomarkers in Epidemiology.** Research has incorporated biomarkers of exposure (for example, organophosphate metabolites) into epidemiology studies in the U.S. and internationally.

#### Application and Impact:

Biomarkers help scientists understand what makes some individuals or groups of people more susceptible to the harmful effects of toxins. Biomarkers also can be used to improve risk assessment and evaluate the impact of regulatory actions. Biomarker research has provided data showing that EPA regulatory action was successful at

reducing prenatal exposures to certain insecticides among African-American and Dominican mothers and newborns in New York City. Researchers also have shown that saliva can be used as a simple and noninvasive biomarker to measure exposure to certain pesticides in both children and adults. In another study, researchers used validated biomarkers to demonstrate that pest management techniques provided an effective strategy for reducing internal doses of pesticides during pregnancy.

#### REFERENCES:

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