In April 2010, the President's Cancer Panel – a group of three distinguished experts appointed by President Bush to evaluate the nation's cancer program – raised the alarm about our ubiquitous exposure to toxic chemicals. "The American people – even before they are born – are bombarded continually," the panel wrote. Chemical intruders invade our homes and our bodies without our knowledge or consent, making our lives a giant, uncontrolled experiment on the relationship between toxic chemicals and our health.

American children are growing up surrounded by synthetic chemicals. They are exposed to a prenatal mixture of synthetic chemicals. Their baby bottles and sippy cups are made with plastic. The trees they climb and the fields they play on are treated with pesticides. They bathe with shampoos and soaps that contain hundreds of manufactured additives. They sleep in beds and make forts from sofa cushions treated with flame retardant chemicals - also found in the computers and electronic devices that they play video games on. And the toxic legacy of chemicals banned in the 1970s – such as PCBs and DDT – remains with children born today.

Toxic chemicals often do not remain securely contained within factory waste ponds or bound to consumer goods. Many chemicals escape from consumer products and end up in household dust and in household air. These chemicals have become such a close part of our lives that scientists can find more than 100 industrial chemicals and pollutants in the bodies of every mother and child.

There are now more than 83,000 industrial chemicals on the market in the United States. While many of these chemicals have had many undeniable benefits for society, from improved medical care to increases in economic productivity made possible by electronics, the benefits have come with unintended consequences – harming our health often without our knowledge or consent.

Very little is known about most chemicals in commerce. The health effects of almost half of the major industrial chemicals have not been studied at all. Hundreds of these substances likely have the ability to persist in the environment or accumulate in the food chain. Of those that have been studied, approximately 1,400 chemicals with known or probable links to cancer, birth defects, reproductive impacts and other health problems are still in use today.

Scientists are continually uncovering more evidence linking chemical exposures – alone or in complex mixtures and at levels experienced by average people today – to the development of a variety of debilitating diseases. Exposure to these chemicals is a possible – and in some cases, likely – factor behind the rising rates of many diseases from asthma and allergies, to learning disabilities and attention deficit disorder, to birth defects and cancer.

The President's Cancer Panel noted that the true burden of disease induced by chemicals to which people are regularly exposed in their daily lives has been "grossly underestimated." Diseases linked to chemical exposures "needlessly increase health care costs, cripple our Nation's productivity, and devastate American lives."

This situation is unacceptable. The panel concluded that the United States should act on what scientists know about chemical threats – even before we are certain beyond a shadow of a doubt that a particular substance is causing harm. The evidence connecting chemical exposures to developmental abnormalities is strong enough to justify a larger effort to prevent harm to children's health.

Why are we here today? The *National Report on Human Exposure to Environmental Chemicals* is a series of ongoing assessments of the U.S. population's exposure to environmental chemicals by measuring chemicals

in people's blood and urine, also called bio-monitoring. In 2010, I worked with the Children's Environmental Health Protection Advisory Council on passing House Bill 181, a bill to study the feasibility of a bio-monitoring program within the State of Maryland. The impetus for 2010's House Bill 181 was in part a 2008 report done by the Maryland Department of the Environment and the Department of Health and Mental Hygiene (*Maryland's Children and the Environment*). This study specifically addressed the concern that I have had for a number of years surrounding the specific exposure of our most vulnerable population (children) to toxins on a daily basis by means of pesticides, flame retardants, preservatives and other man-made and environmental pollutants in our lives. The importance of this study was the way in which the data was collected and analyzed in order to present a more comprehensive look at the way in which our lifestyles are conducted as a general population and ways in which these habits can be changed through proactive action like legislation and regulation, or through more suggestive action like preventative care, public service information and education. This study and the results led me to explore the importance of prevention through research by first implementing a bio-monitoring program in the state.

Why Bio-monitoring? Bio-monitoring is the measurement of chemicals in the human body, specifically in blood, urine, serum, saliva or tissues. Measuring chemicals in human tissues is a highly effective means to assess human exposure to pollution. Bio-monitoring results are used to help make decisions about how best to protect people from diseases, birth defects, disabilities, dysfunction and death. Historically, public health regulations have been based on theoretical risk calculations according to known levels of chemical substances in air, water, soil, food, other consumer products and other sources of potential exposure. Human bio-monitoring offers the opportunity to analyze the actual internal levels of bodily substances from all potential routes of exposure at one time, which

may contribute to improving risk assessments. Scientific advancements have made it possible to detect a greater number of chemical substances in smaller concentrations in the body, with some chemicals detectable at levels as low as parts per trillion.

Bio-monitoring can help legislators answer key public health questions, including:

- Do pesticides pose a risk to constituents who farm, live near farms or eat certain types of foods?
- Are elevated drinking water contaminants accumulating in your residents?
- Have the state's no-smoking policies effectively reduced tobacco smoke exposure in non-smokers?
- Do increased levels of mercury, dioxin or polychlorinated biphenyls (PCBs) in game fish threaten a community's health?
- In the event of a terrorist or suspected terrorist attack, did the attackers use chemical or radiological weapons? Who was exposed and who needs medical treatment?

In examining the effects that chemicals have on our public health as a society, bio-monitoring can be very useful. Measurement tool development and exposure assessment research, including the development of new research models and endpoints, should be accelerated to enable better quantification of exposures at individual, occupational, and population levels.

- High-throughput screening technologies and related data interpretation models should be developed and used to evaluate multiple exposures simultaneously. It may be possible to screen apparently similar suspect chemicals together and regulate these as a group as indicated by findings.

- Methods for long-term monitoring and quantification of electromagnetic energy exposures related to cell phones and wireless technologies are urgently needed given the escalating use of these devices by larger and younger segments of the population and the higher radiofrequencies newer devices produce.

Additionally, public health messages should be developed and disseminated to raise awareness of environmental cancer risks and encourage people to reduce or eliminate exposures whenever possible. The United States must reform the policies protecting public health from chemical exposures. We need to ensure that information is available to make responsible choices as a society about what chemicals we choose to include in our lives – and our bodies. Consumers deserve the assurance that everyday products are safe to bring home from the store and to use in feeding, clothing, and caring for their families.

In moving forward with bio-monitoring in the state of Maryland, we are effectively taking control of the substances that are linked to chronic disease and taking steps to understand the lifestyle changes that maybe necessary to benefit our common public health.