MEASURING CHEMICAL PRESENCE IN HUMANS: WHAT ROLE FOR BIOMONITORING?

As more advanced techniques allow scientist to detect trace levels of residues in human bodies, public concern about the risk posed by the presence of pesticide residues has grown. But **pesticides are the most thoroughly tested chemicals in existence.** The safety of pesticide products is the plant science industry's highest priority. Consequently, the health of pesticide applicators and other users as well as consumers is also of high priority.

Pesticides undergo rigorous tests, continual reviews, and monitoring by the industry and government agencies for possible effects on humans, animals and the environment. In addition, further mechanisms are in place to ensure that safety is accorded the highest priority, such as widespread stewardship programmes to educate users on responsible and safe use, reporting to regulatory authorities on adverse effects and adherence to the International Code of Conduct on the Distribution and Use of Pesticides.

The presence of an environmental chemical in tissues or fluids does not mean that the chemical causes harm. Biomonitoring data alone are therefore not very informative in helping the public understand individual health risks. The plant science industry fully supports strong, appropriate and science- and risk-based regulation of pesticides across the world. Biomonitoring programmes can play an important role in public health policy. However, they must be based on good science and public health principles, findings must be communicated carefully in a public health context, and government agencies must play a larger role in the interpretation and communication of the data

What is Biomonitoring?

Biomonitoring is a scientific technique that measures human exposure to natural and synthetic chemicals. This is achieved by collecting and analysing samples of bodily tissues or fluids such as blood, urine, or breast milk.

Biomonitoring takes advantage of the knowledge that once chemicals have entered the human body, they leave markers reflecting this exposure. The marker may be the chemical itself, a breakdown product of the chemical, or some change in the body that is a result of the action of the chemical.

This technique provides information about the amounts of chemicals in the body but the data themselves do not determine the source, how it was absorbed (i.e. eating, drinking, breathing) or whether the chemical or its metabolites pose any health risk.

How is Biomonitoring useful?

Biomonitoring can be a useful public-health tool in understanding human exposure to a wide range of substances. Scientists use biomonitoring results to assess current levels of chemicals in human tissues and fluids, and then guide future research needs such as investigating sources of human exposure, possible health effects and ways to reduce or prevent future exposures.

Knowledge gained from this research can be passed on to health professionals and policy makers to enhance public and private health and safety.

Current applied uses of biomonitoring include assessing people's exposure to environmental tobacco smoke, responding to emergencies involving exposure to toxic chemicals and in work place occupational monitoring (e.g. in factory workers).

Where is biomonitoring heading?

Modern biomonitoring techniques are now extremely advanced, and even trace amounts of chemicals can be detected. However, biomonitoring of a large number of chemicals in representative human populations is just beginning. In these early stages of biomonitoring, it is important to:

- Establish valid scientific reference values for substances already occurring both inside and outside our bodies,
- Assess the current levels of natural and synthetic chemicals in human tissues and fluids,
- Provide the data for decision-making about future research needs.

DID YOU KNOW?

BIOMONITORING ONLY MEASURES HUMAN EXPOSURE TO CHEMICALS, AND **BY ITSELF DOES NOT PROVIDE ANY INFORMATION ABOUT THE SOURCE OR TOXICITY OF THE CHEMICALS**. BIOMONITORING DATA MUST BE PROPERLY INTERPRETED, TAKING MANY OTHER FACTORS INTO ACCOUNT, BEFORE DETERMINING WHETHER A CHEMICAL FOUND IN THE BODY POSES ANY RISK.

BIOMONITORING DATA CANNOT BE USED ALONE TO ASSESS RISK. SOMETIMES, BIOMONITORING DATA IS MISUSED AND THE PRESENCE OF CHEMICALS IS AUTOMATICALLY ASSUMED TO BE LINKED TO ADVERSE HEALTH OUTCOMES. BIOMONITORING RESULTS ARE INDICATIVE OF POTENTIAL ADVERSE HEALTH OUTCOMES, IF SCIENTISTS HAVE ESTABLISHED A CONNECTION BETWEEN PARTICULAR ADVERSE EFFECTS (THAT IS, TOXICITY) AND THE LEVELS OF A SPECIFIC CHEMICAL IN BODY FLUIDS OR TISSUES; FOR EXAMPLE, BLOOD LEAD LEVELS HAVE BEEN SHOWN TO CORRELATE WITH NEUROLOGICAL PROBLEMS IN CHILDREN.

THE TERM "BODY BURDEN" IS MISLEADING. THE LEVELS OF CHEMICALS DETECTED THROUGH BIOMONITORING ARE SOMETIMES REFERRED TO AS "BODY BURDENS". THIS IS MISLEADING IN THAT IT SUGGESTS THAT THE DETECTION OF A SUBSTANCE ALWAYS CAUSES ADVERSE EFFECTS. IN FACT, BIOMONITORING ITSELF CAN ONLY MEASURE EXPOSURE, NOT TOXICITY OR HEALTH RISK.

SOMETIMES, **STEPS TAKEN TO REDUCE EXPOSURE CAN INCREASE RATHER THAN DECREASE OVERALL RISK**. FOR EXAMPLE, A MOTHER MAY CHOOSE TO REFRAIN FROM BREAST FEEDING WHEN INFORMED THAT CERTAIN CHEMICALS HAVE BEEN FOUND, OR ARE LIKELY TO BE FOUND, IN MOTHERS' BREAST MILK. IN ALMOST ALL CASES, THE BENEFITS OF BREAST FEEDING OUTWEIGH ANY POSSIBLE RISKS FROM THESE CHEMICALS – A CONCLUSION THAT IS REFLECTED IN THE ADVICE GIVEN TO NURSING MOTHERS BY PUBLIC HEALTH AUTHORITIES.