# Smartphones, labs to reveal health effects of environmental pollutants

New technologies for sensing chemicals that people are exposed to and their effects in the body will help scientists work towards a complete picture of how environmental pollutants influence health in a major EU initiative now being launched.

Researchers will use smartphones equipped with GPS and environmental sensors to monitor potential hazards that study participants are exposed to. This information will be combined with blood and urine analysis to investigate whether exposure to risk factors leaves chemical fingerprints that can be detected in bodily fluids.

The €8.7 million Exposomics project, involving 12 partner institutions led by Imperial College London, marks the EU's biggest investment in environmental health research to date.

The scientist leading the project, Professor Paolo Vineis, from the School of Public Health at Imperial College London, said: "The sequencing of the human genome has provided a wealth of information about genetic susceptibility involved in disease, but it's become clear that the diseases with the greatest burden, such as cancer, diabetes, heart disease and neurodegenerative diseases like Alzheimer's, are mainly caused by factors other than genetics. These are likely to include aspects of lifestyle and the environment, but the precise roles of different factors in causing diseases are not well understood."

The exposome is all of the environmental components, including lifestyle factors and chemicals we are exposed to, that influence our health over the course of a lifetime. The new project will develop high-tech tools to improve our ability to measure the exposome, with a particular focus on air and water pollution during critical periods of life.

Dr Christopher Wild, the Director of the International Agency for Research on Cancer, who first developed the concept of the exposome and is a partner on the project, said: "It is a major step forward to have European funding directed to this area of research, which is critical for effective prevention of a number of non-communicable diseases".

Professor Vineis added: "We are all exposed to low levels of environmental pollutants every day, such as diesel exhaust, tobacco smoke, and pesticides. It's very difficult to assess the health effects of these exposures, because often there are no unexposed people to compare with.

"This project will make use of new technologies that allow us to measure personal exposure to pollutants with much greater sensitivity and study their effects in the

body. The results will help us develop a better understanding of how exposure to many different pollutants combine to influence our risk of diseases."

The researchers are developing a personal exposure monitoring kit which could provide a more comprehensive assessment of study participants' environment. The kit, which could become commercially available in the future, includes a smartphone app that records the user's physical activity and location, and air pollution measurements from a sensor that plugs into the phone.

The researchers will also look for signatures left by risk factors inside the body, including changes in DNA, RNA, proteins and metabolites, and altered levels of chemicals in blood and urine. The first results are expected to emerge within two years.

Source:Imperial College London [1]

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