

Case Study

Monitoring Diet through Biomarker Technology

Research Theme: Health Intensity



RESEARCHERS

Professor John Draper
 Dr Manfred Beckmann
 Dr Amanda Lloyd
 Dr Tom Wilson

THE OVERVIEW

Investigating the relationship between diet and health is complicated. Self-reported dietary intake data often contains inaccurate information as a result of misreporting or bias. Research undertaken by the Department of Life Sciences (DLS) at Aberystwyth University (AU) has led to the development of a technology platform that analyses urine chemistry, objectively reporting dietary exposure. This provides accurate tools to show, for example that public health initiatives can positively impact eating behaviour; to provide protocols for nutritional assessment in clinical trials; to support health claims associated with foods and to provide a method for detecting malnutrition in vulnerable members of society.



THE RESEARCH

People often inaccurately record their own diets. Inaccurate food intake data skews the conclusions of many clinical trials and national surveys in which dietary intake and nutritional status are important. The measurement of food-derived metabolites in biofluids provides an alternative approach.

Our research team were the first to describe an experimental protocol for the discovery of intake biomarkers for several foods of high public health significance. The collaborative Medical Research Council Programme Grant (MAIN) to develop urine biomarker technology to investigate dietary intake in free-living populations produced a study protocol based on complex food interventions that mimics exposure to the whole of a typical UK diet. For the first time this allowed the validation of food intake biomarker specificity in populations and discovered and/or validated biomarker leads for a wide range of foods. The dietary intake biomarker technology was validated in a range of clinical trials and provided the first comprehensive biomarker panel to measure habitual diet.

Universal deployment of food intake biomarker technology depends on appropriate and affordable methods to obtain urine samples. The team were able to demonstrate that small spot urine samples collected at specific times were suitable replacements and highly acceptable to study participants. This led to bespoke commercial urine collection kits being developed and manufactured.

THE IMPACT

IMPACT ON COMMERCE AND ECONOMY

In collaboration with Shuttlepac Ltd and with support from the European Institute of Technology (EIT) Health, the research team developed a new methodology for biological sampling in community settings. A commercial kit for collecting urine samples is now being manufactured by Co-Vertec Ltd. The first sales to a major clinical trial were achieved in 2018.

The urine collection kit, combined with biomarker technology has been integrated into two major industry-led projects with Abbott and Groupe SEB in Spain, France and the UK, to validate eating behaviour changes correlated with the use of novel digital 'health coaching' tools.

IMPACT ON CLINICAL TRIAL DESIGN

Following the successful development of both a biomarker panel and urine sampling methodology appropriate for community settings, the research team provided input into the design of a range of clinical trials. For example, to improve the way that the NHS and NGOs support vulnerable members of society.

IMPACT ON NATIONAL AND INTERNATIONAL POLICY

In 2016, the dietary exposure biomarker technology was integrated into the National Food, Nutrition and Physical Activity Survey of the Portuguese general population. Professor Draper also contributed to a major strategic review of nutrition research in the UK through the Office for Strategic Coordination of Health Research (OSCHR), which resulted in the development of the MRC Nutrition Research Partnership, of which he is a founding member. In 2017, Professor Draper joined a similar expert advisory group funded by Wellcome, with input from the World Health Organisation (WHO). As a result, the MRC and Wellcome decided to specifically highlight dietary intake assessment research due to the need to find more accurate and objective ways to measure dietary intake.

The National Diet and Nutrition Survey team established the NIHR BRC Nutritional Biomarker Laboratory to incorporate biomarker technology developed by Professor Draper in future UK population surveys.

Professor Draper was also invited to help design and participate in a workshop on Biomarkers of Dietary Intake and Exposure for the US National Institute of Health (NIH) (an agency of the US Department of Health) and has been influential in the acceleration of nutrition research in the USA.

IMPACT ON PUBLIC AWARENESS

Professor Draper was approached by Firecracker Films to help develop a 90-minute documentary "The Great British Urine Test" for Channel 5 which was shown in March 2020 with almost one million viewers.



Our research team were the first to describe an experimental protocol for the discovery of intake biomarkers for several foods of high public health significance.