Biosensor technology for the screening of cancer risk biomarkers related to diet

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Biosensor technology for the screening of cancer risk biomarkers related to diet

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Colorectal cancer is one of the most common cancers found in the developing countries. Recently, it has been indicated that a diet with a high intake of red and processed meat increases the risk of colorectal cancer. This is mainly because high red meat consumption is known to enhance the endogenous formation of *N*-nitroso compounds, which are potent carcinogens. Studies have detected the presence of O^6-carboxymethyldeoxyguanosine (O^6CMdG), a DNA adduct due to the nitrosation of glycine, in human exfoliated colonocytes and human blood. O6CMdG in DNA, is resistant to repair proteins and may be a potential urinary biomarker of colorectal cancer risk. The aim of our present research is to develop analytical methodologies for the measurement of this adduct in urine and correlate it to dietary studies. Samples are from previous studies of human volunteers carried out at MRC Dunn Human Nutrition Unit at Cambridge in which high read meat diets were consumed over a period of 15 days and various samples collected including 24 h urine samples.

The ideal method for the routine screening in the general population of cancer risk biomarkers should be simple, fast, easy to perform and cost-effective. Biosensor technology fulfil this need, in particular thick film technology using screen-printing procedure allows inexpensive mass-production of disposable electrochemical sensors for point-of-care analyses. An immunosensor based on an indirect competitive assay is being developed and validated for the detection of O^6CMdG in synthetic urine. The detection of this DNA adduct is based on competition for binding to a polyclonal antibody with an ovalbumin conjugate, followed by incubation with a secondary antibody labelled with horseradish peroxidise.