

## **New approaches to toxicity screening using biosensor arrays**

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This paper focuses on the development of genotoxicity screening arrays based on monitoring DNA damage by enzyme-generated metabolites. Films of DNA and enzymes of nanometer thickness can provide active elements for sensors for screening the toxicity of chemicals and their metabolites. The unifying feature of this approach involves assembly of films designed to detect DNA damage. Films containing DNA and enzymes enable detection of structural damage to DNA as a basis for the toxicity screening. The first step is to bioactivate chemicals to their metabolites, which can then react with DNA in the films, mimicking toxicity pathways in the human liver. Detection involves electrochemistry, electrochemiluminescence or LC-MS. Catalytic redox polyions that catalyze DNA oxidation can be incorporated into DNA/enzyme films leading to “reagentless” sensors and arrays with electrical or optical detection. These sensors are suitable for detecting relative DNA damage rates in <5 min. of the enzyme reactions. *Molecular* screening information, with higher cost and longer times, can be obtained by using the same approach by detection of nucleobase adducts with capillary LC-MS/MS.