

Novel, versatile capillary electrophoresis instrument with laser induced fluorescence for analysis of various lipid peroxidation biomarkers.

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When polyunsaturated fatty acids are attacked by reactive oxygen species, the oxidation products such as malondialdehyde (MDA), 4-hydroxynonenal, and dienals are formed. Malondialdehyde (MDA) is the most frequently studied biomarker of lipid peroxidation. The common method for analysis of MDA is by fluorescence using the thiobarbituric acid (TBA) assay. The resulting product is highly fluorescent (excitation 532 nm, emission 550 nm) and negatively charged. Its negative charge allows an efficient separation and detection by CE with laser induced fluorescence (LIF) that is an ideal combination for the analysis of low concentrations of analytes in small volumes of biological samples. In this work, we have built a versatile CE-LIF system that allows easy exchange of different laser modules for sensitive detection. A 532 nm green laser module was incorporated in the system for sensitive determination of MDA. The reaction conditions of MDA with TBA was optimized, including reaction time, reaction temperature, ratio of reagent to analyte and pH of reaction solution. The separation conditions in the counter-electroosmotic mode were optimized for sensitive MDA analysis. Other oxidative stress markers can potentially also be separated and detected.

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