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*Anal Biochem.* 2009 Dec 1;395(1):54-60. doi: 10.1016/j.ab.2009.07.038. Epub 2009 Jul 30.

## Spectroelectrochemical characterization of pain biomarkers.

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### Abstract

This article reports the first electrochemical characterization of pain biomarkers that include arachidonic acid (AA), prostaglandin G(2) (PGG(2)), and cyclooxygenase 2 (COX-2). These biomarkers are mediators of pathophysiology of pain, inflammation, and cell proliferation in cancer. The article also reports the development of an electrochemical immunosensor for monitoring these pain biomarkers. The results revealed that direct electron transfer between AA metabolites and the electrode could be easily monitored and that an enzyme-modified electrode dramatically enhanced bioelectrocatalytic activity toward AA. Cyclic voltammetric analysis of AA revealed a concentration-dependent anodic current with a slope of 2.37 and a limit of detection (LOD) of 0.25nM. This unique AA/gold electrode electron transfer provides a good electrochemical sensing platform for prostaglandin H(2) (PGH(2)) as the basis for quantitation of pain. An amperometric signal intensity of a COX-2 antibody-modified gold electrode was linear with COX-2 concentration in the range of 0.1-0.5microg/ml and an LOD of 0.095microg/ml. The results also revealed a linear correlation of the concentration of PGG(2) with an LOD of 0.227microM.

PMID: 19646944 DOI: [10.1016/j.ab.2009.07.038](https://doi.org/10.1016/j.ab.2009.07.038)

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