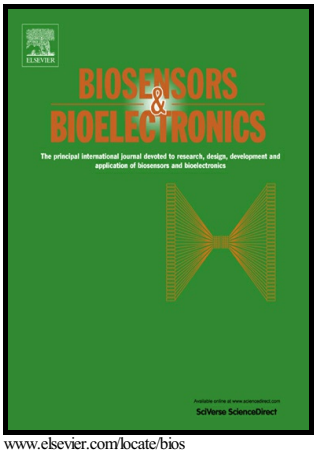

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ABSTRACT

In today's neurodevelopment and -disease research, human neural stem/progenitor cell-derived networks represent the sole accessible *in vitro* model possessing a primary phenotype. However, cultivation and moreover, differentiation as well as maturation of human neural stem/progenitor cells are very complex and time-consuming processes. Therefore, techniques for the sensitive non-invasive, real-time monitoring of neuronal differentiation and maturation are highly demanded.

Using impedance spectroscopy, the differentiation of several human neural stem/progenitor cell lines was analyzed in detail. After development of an optimum microelectrode array for reliable and sensitive long-term monitoring, distinct cell-dependent impedimetric parameters that could specifically be associated with the progress and quality of neuronal differentiation were identified. Cellular impedance changes correlated well with the temporal regulation of biomolecular progenitor