Electrical impedance measurements predict cellular transformation
Giljun Park\textsuperscript{a}, Chang K. Choi\textsuperscript{b}, Anthony E. English\textsuperscript{c} and Tim E. Sparer\textsuperscript{a}

\textsuperscript{a}The University of Tennessee, Department of Microbiology, 1414 Cumberland Avenue, Walters Life Sciences Building, Knoxville, TN 37996, USA

\textsuperscript{b}Bioscience Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831, USA

\textsuperscript{c}The University of Tennessee, Department of Mechanical, Aerospace and Biomedical Engineering, Knoxville, TN 37996, USA

Abstract

Cellular transformation is the first step in cancer development. Two features of cellular transformation are proliferation in reduced serum and loss of contact inhibition. Electronic Cell-Substrate Impedance Sensing (ECIS) measurements have been used to measure cellular proliferation, cytotoxicity, apoptosis, and attachment. We have used impedance measurements to distinguish normal cells from cells transformed with a constitutively active chemokine receptor, CXCR2. CXCR2, a member of the G-protein coupled receptor (GPCR) family, is normally involved in cellular activation and migration, but a single amino acid substitution leads to constitutive activity. NIH3T3 cells were transformed with a constitutively active CXCR2 (D143V\_CXCR2) and growth in reduced serum and foci formation were measured using established biological assays and compared to data from ECIS. The results of this study show that impedance measurements provide a quick and reliable way of measuring cellular transformation and provide real time assessment of transformed cellular parameters. Use of the ECIS system could allow a rapid screening of anti-cancer drugs that alter cellular transformation.

Keywords: Impedance; Transformation; CXCR2; Cancer; ECIS; GPCR