Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

An In-Depth Impedance Analysis of Rectangle-Shaped Cell Layers Cultured on Microelectrodes[1] CHUN-MIN LO, LAVANYA BALASUBRAMANIAN, KAY-PONG YIP, University of South Florida — Transcellular impedance of smooth muscle cell layers cultured on microelectrodes is measured by electric cell-substrate impedance sensing (ECIS). An extended cell-electrode model for impedance analysis of cell layers where cellular shape is long rectangular is developed. This is especially appropriate for normal fibroblasts and smooth muscle cells in culture. The model considers two different pathways for the current flowing from the electrode through the cell layer: (1) in through the basal and out through the apical membrane, and (2) in through spaces between the ventral cell surface and the substratum and out through the paracellular space. By comparing model calculation with experimental impedance data, several morphological and cellular parameters can be determined: (1) the junctional resistance between cells, (2) the average cell-substrate separation, and (3) the capacitance of apical and basal cell membranes. This model is used to analyze impedance changes upon addition of RGD peptide to confluent SMC layers at different concentrations. The method shows that RGD peptide causes junction resistance between cells to drop and the distance between the basal cell surface and substratum to increase.

[1]Support: AHA Predoctoral Fellowship, NIH DK 60501.

Chun-Min Lo
University of South Florida

Date submitted: 17 Nov 2006 Electronic form version 1.4