Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

**On the relationship between velocities, tractions, and intercellular stresses in the migrating epithelial monolayer**[1] YOAV GREEN, Ben-Gurion University of the Negev, JAMES P. BUTLER, JEFFREY J. FREDBERG, Harvard T.H. Chan School of Public Health — The relationship between velocities, tractions, and intercellular stresses in the migrating epithelial monolayer are currently unknown. Ten years ago, a method known as Monolayer Stress Microscopy (MSM) was suggested from which the intercellular stresses could be computed given a traction field. The core assumption of MSM is that the intercellular stresses within the monolayer obey a linear and passive constitutive law such as a Hookean solid or a Newtonian fluid. Due to the lack of independently measured intercellular stresses, a direct validation of the 2D stresses predicted by MSM is presently not possible. An alternative approach, which we give here and denote as the Stokes method, is based on simultaneous measurements of the monolayer velocity field and the cell/substrate tractions. Using the same assumptions as those underlying MSM, the velocity field suffices to compute tractions, from which we can then compare with those measured by traction force microscopy. We find that the calculated tractions and measured tractions are uncorrelated. From which it follows that some serious modification of the underling rheology is needed. We will discuss a number of alternatives including the contribution of active stresses for which we have derived a novel constraint.

[1]This work was supported by National Institutes of Health (NIH) Grants No. U01CA202123, No. PO1HL120839, No. R01HL148152, and No. T32HL007118.

Yoav Green
Ben-Gurion University of the Negev

Date submitted: 18 Nov 2020 Electronic form version 1.4