BiophysTO Lunchtime Talks

Sevan Hopyan

Division of Orthopaedic Surgery, The Hospital for Sick Children

Biophysical regulation of mandibular arch shape

The nuanced shapes of organ primordia profoundly influence pattern and function, although mechanisms that shape a volume of tissue are not well understood. Branchial arches are composed of mesenchyme surrounded by an epithelium. During outgrowth, the mandibular portion of the first arch acquires a proximally narrow and distally bulbous shape that is common to other embryonic appendages. By incorporating experimental data into a finite element model, we estimate that cell divisions and viscoelastic properties are insufficient to explain mandibular arch shape. Time lapse light sheet microscopy of mouse embryos reveal that 3D cell rearrangements volumetrically converge and extend the narrow waist of the arch and likely refine its shape. Cell intercalations in the waist region correlate with high amplitude cortical tension oscillations that we documented using a transgenic FRET-based vinculin force sensor and are promoted by Wnt5a and other pathways with overlapping phenotypes. We are currently examining the mechanism of cortical oscillation by testing a potential feedback loop involving Ca^{+2} transport. Multiple pathways likely coregulate oscillatory properties that underlie cell intercalation.

Host: Dr. Anton Zilman

(Refreshments and pizza will be provided)

SPONSORS

UTM
Chemical and Physical Sciences/VP Research/Vice-Dean Graduate
UofT St. George
Biochemistry/Physics/IBBME/Chemistry/Medical Biophysics

Thursday, January 26, 2017 – 12:00 pm, noon
McLennan Physical Laboratories, Room MP606
(and via streaming to DV3129 at UTM)