Contribution ID: **256** Type: **Oral Presentation**

Multiscale modelling of saliva secretion

Thursday, 12 July 2018 11:00 (30 minutes)

The parotid salivary gland consists of groups of acinar cells all transporting water into a lumen with a complex branched structure. In addition, each acinar cell itself has a complex spatial structure, with heterogenous spatial distributions of the channels that control water transport. The goal of our model is to determine the relationships between structure and function, both at the level of individual acinar cells, and at the level of the entire salivary gland.

To answer this question we have constructed an anatomically accurate model, based on reconstruction of a z-series of optical slices through a group of acinar cells. Our model shows how the structure of each acinar cell is critical for an understanding of how water flow through each cell is controlled, and how the multicellular branching structure of the lumen can affect total fluid flow.

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Session Classification: Internal flows in soft tissue tubes: Evo + Devo + Physio

Track Classification: Minisymposium: Internal flows in soft tissue tubes: Evo + Devo + Physio