2009 Winner: Ravi Desai

We are pleased to announce that the winner of the 2009 JCS Prize is Ravi Desai, for his paper entitled 'Cell polarity triggered by cell-cell contact via E-cadherin' (Desai et al., 2009). The $1000 prize is awarded annually to the first author of the paper that is judged by the Editors and Editorial Board to be the best published in the Journal that year. To be considered for the prize, the first author must be a student or a postdoc of no more than five years' standing.

Ravi grew up in Manhattan, Kansas, and graduated with a bachelor's degree in Biomedical Engineering from the University of Minnesota. As an undergraduate, he worked in the laboratory of Dr David Odde on the problem of the inability of spinal cord neurons to heal following injury. Whereas most work in the field focused on the role of diffusible biochemical cues, Ravi was interested in understanding how the physical interaction between the neurons and their substrata regulates the neuronal cytoskeleton and promotes proper healing. This interdisciplinary research experience triggered Ravi's interest in cellular engineering, and he decided to further use engineered biomaterials to study adhesion and the cytoskeleton in the context of fundamental cell biology.

In 2004, Ravi entered the PhD program in Bioengineering at the University of Pennsylvania, where he is currently working on his thesis with Dr Christopher Chen. Ravi is studying how cells use local cues from their environment to orchestrate cell functions, such as migration and polarization. In the past, others have documented stereotypical reorientation of the microtubule-organizing center (MTOC)-nuclear axis in response to an experimental wound (Gotleib et al., 1981). Ravi observed that cells displayed polarity of the MTOC-nuclear axis even if not wounded, provided that they abutted nearby cells at the rear and sides. This observation, together with supporting data from classic experiments (Abercrombie and Heaysman, 1953), suggested that interaction between cells, and not just events triggered by a wound, is involved in establishing cellular polarity.

Ravi used a variety of cell-patterning techniques to directly test this hypothesis. In each case, interactions between cells gave rise to MTOC-nuclear orientation. Moreover, such orientation predicted migration direction: when cells were released from adhesive surface patterns, they migrated in a direction consistent with orientation that was established, before release, by interactions with neighboring cells. Using a combination of dominant-negative mutants, RNAi and pharmacologic inhibition, Ravi determined that E-cadherin, Cdc42 and the actin cytoskeleton are involved in relaying the polarization signal from cell-cell adhesion to form the MTOC-nuclear axis. E-cadherin-mediated cell-cell adhesion was essential also for experimental-wound-induced MTOC-nuclear axis reorientation, indicating that, even in a wound context, cell-cell adhesion is critical. The data further suggest that cell-cell adhesion is one microenvironmental cue that cells integrate to direct their function in a crowded cell environment (Desai et al., 2009).

Ravi is currently nearing completion of his dissertation research with Dr Chen and aims to pursue research while also training future scientists. In order to achieve these academic goals, Ravi plans on pursuing a postdoctoral position upon completion of his PhD.

Fiona Watt
(Editor-in-Chief)

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