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JCS PRIZE

2016 Winner: Viswanadh Madugula

Michael Way (Editor-in-Chief)

We are pleased to announce that the winner of the 2016 JCS prize is Viswanadh Madugula for his paper entitled 'The ciliary membrane targeting by a ternary complex comprising transportin 1, Rab8 and the ciliary targeting signal' (Madugula and Lu, 2016).

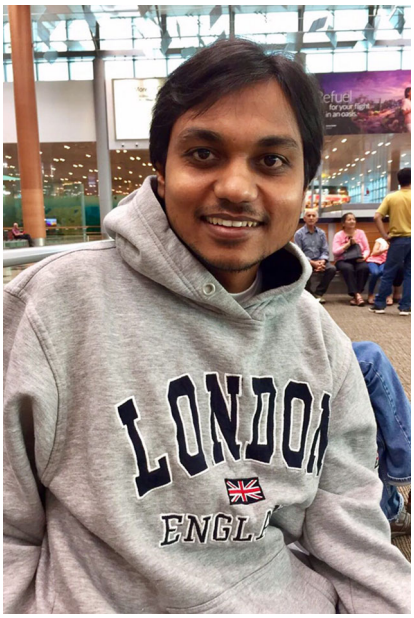
The prize, $1000, is awarded annually to a junior researcher who is the first author of the paper that is judged by the Editors and Editorial Board to be the best eligible paper published in Journal of Cell Science that year. To be considered for the prize, the first author must be a student or a postdoc of no more than five years' standing.

Viswanadh was born in Kakinada of Andhra Pradesh, India. He obtained his Master of Biotechnology from the Jawaharlal Nehru Technological University (Hyderabad, India), under the guidance of Rajkumar Ratinavelu at the Indian Tobacco Company (ITC), R&D center. For his master study, Viswanadh researched the pollen gene flow in *Eucalyptus camaldulensis Dennh* by using paternity analysis.

In 2011, Viswanadh was awarded a research scholarship from the Nanyang Technological University (Singapore) and joined the School of Biological Sciences. He then became fascinated by the subcellular world and decided to start his PhD in the newly set-up lab of Lei Lu, who studies biogenesis and trafficking of cellular organelles by using multidisciplinary approaches. His supervisor encouraged him to explore new research avenues in the field of membrane trafficking. One of the outstanding questions in cell biology then (and now) is how proteins are targeted to the cilium, a tiny protrusion from the plasma membrane that functions as an environment sensor. Around that time, the laboratories of Kristen Verhey and Benjamin Margolis published articles about the role of transportin 1 in ciliary targeting (Dishinger et al., 2010; Hurd et al., 2011). Despite the fact that this meant a new research direction for the Lu lab, Viswanadh decided to embark on a project, in which to test whether importins provide a generic and unified mechanism for ciliary targeting of membrane cargos.

For the next five years, Viswanadh was the only one in Lei Lu's lab, who worked on ciliary trafficking. He had to overcome unknown technical hurdles but, through all the challenges, his fascination with this tiny organelle grew. Although ciliary localization was considered to be a trait of ciliary proteins, one of the most difficult tasks for Viswanadh was to find a plasma membrane protein that was not within or on the cilium. CD8a, for example – which had been commonly used as a negative control for ciliary localization – always displayed a significant presence at the cilium. A puzzling observation, until he concluded that the ciliary membrane diffusion barrier must be leaky. Viswanadh realized that ciliary localization was quantitative instead of simply a 'yes' or 'no'. He, therefore, developed an imaging tool, the cilium-to-plasma-membrane-intensity-ratio (CPIR), that allowed him to quantitatively describe the ciliary localization of ciliary membrane proteins. He demonstrated that importin-binding motifs and -binding domains can promote the ciliary localization of reporters.

Viswanadh subsequently asked whether *bona fide* ciliary membrane residents utilize importins for ciliary targeting. He cloned the best-known ciliary membrane proteins or their ciliary targeting signal and tested each one for possible interactions with importin β1 and transportin 1. Several ciliary membrane proteins were found to interact with transportin 1. Interestingly, Gregory Pazour and colleagues found that the ciliary targeting signal of fibrocystin, which displayed positive interaction with transportin 1 in his screen, specifically binds to Rab8-GDP (Follit et al., 2010). Viswanadh, therefore, expanded his scope of interaction study to include Rab8 and found that transportin 1, Rab8 and the ciliary cargo of fibrocystin assemble as a complex to mediate fibrocystin ciliary translocation. Inspired by the better-known nucleocytoplasmic trafficking mechanism, he proposed a new model, whereby the guanine nucleotide exchange of Rab8 within the cilium provides the retention mechanism for ciliary membrane cargos (Madugula et al., 2016).



Viswanadh Madugula

Viswanadh also developed a single-molecule-based imaging tool to quantify the stoichiometry of the nuclear pore complex (Tie et al., 2016). He was recently awarded his PhD and is currently continuing to work in the same lab as a postdoctoral research fellow, pursuing to study the role of importins and Rabs in ciliary targeting.

References

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