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FIRST PERSON

First person – Bipasha Dey

First Person is a series of interviews with the first authors of a selection of papers published in Journal of Cell Science, helping early-career researchers promote themselves alongside their papers. Bipasha Dey is first author on 'DE-cadherin and Myosin II balance regulates furrow length for onset of polygon shape in syncytial *Drosophila* embryos', published in JCS. Bipasha has recently completed her PhD and is continuing to work in in the lab of Dr Richa Rikhy at Indian Institute of Science Education and Research, Maharashtra, India, where she is broadly interested in studying how mechanical forces in cells and tissues guide morphogenesis.

Bipasha Dey

How would you explain the main findings of your paper in lay terms?

Each cell in the body has a distinct shape that allows it to carry out various functions. Epithelial cells that line various organs in the animal body have a characteristic polygonal shape when observed from cross-sections of tissues. Spherical to polygonal epithelial cell shape transition occurs in the early stages of embryogenesis. In my study, I used the fruit fly embryo to elucidate the role of cell–cell contact length in bringing about the circular to polygonal shape transition. The early fruit fly embryo is a syncytial system where nuclei share a common plasma membrane and cytosol and have incomplete 'pseudo' cells that lack plasma membrane boundaries. Nevertheless, they show epithelial-like polygonal architecture. We show that these 'syncytial cells' undergo circular to polygonal transition after the contacts between them, called the lateral furrow membranes, achieve an optimal length. We find that the activity of a motor protein, non-muscle Myosin II, relative to a cell–cell adhesion molecule, E-cadherin, regulates this optimal length for shape transition. Decreasing Myosin II activity shifts the transition point to a lower length compared to controls. On the other hand, increasing Myosin II activity prevents the optimal length from being achieved resulting in circular cells that fail to undergo polygonal shape transition. This optimal lateral membrane length possibly reflects a minimum extent of attachment between neighbouring cells that allows the cell to integrate into the tissue. This is interesting as cells move in and out of tissues in many physiological, as well as in many diseased, scenarios, like cancer. Factors regulating this optimal length of attachment, therefore, regulate an important decision-making point of either retaining or expelling cells from the tissue.

Were there any specific challenges associated with this project? If so, how did you overcome them?

Working with the early syncytial *Drosophila* embryo made me realize the robustness of this system, as screening for architecture defects using mutants of many polarity-related proteins, gave only mild phenotypes. The major challenge was, therefore, in finding a mutant where the polygonal cell shapes were severely disrupted. In addition, getting optimal knockdowns was challenging as strong mutants did not lay eggs, while mild knockdowns showed no phenotypes. Playing around with different conditions of mutant expression during oogenesis allowed me to achieve an optimal knockdown such that viable embryos could be obtained for live imaging.

When doing the research, did you have a particular result or 'eureka' moment that has stuck with you?

There are two significant milestones I distinctly remember from my graduate study years. The first was when I noticed from live imaging of syncytial embryos that the transition from circular to polygonal shape takes place within a fixed lateral furrow length range, irrespective of the cell cycle phase, cell numbers and division cycle. The second 'eureka' moment was when I found out that the Myosin II hyperactivity mutants lacked lateral furrow extension and had completely circular syncytial cells with no polygonal organization. This was the most distinct loss of polygonal shape phenotype I had seen in my entire graduate work after screening through many mutants in polarity and adhesion that showed more subtle effects.

Why did you choose Journal of Cell Science for your paper?

Journal of Cell Science caters for a wide range of cell biological research. I have personally referred to many articles from this journal during my PhD. In addition, the fast decision timelines offered by the journal makes it easier for researchers to publish their work quickly. This work will be of combined interest to the fields of cell biology and developmental biology; thus, we thought our work would nicely fit into the scope of this journal.

Have you had any significant mentors who have helped you beyond supervision in the lab? How was their guidance special?

My PhD supervisor Dr Richa Rikhy has been a great mentor not just in guiding me scientifically but also in teaching me the correct work

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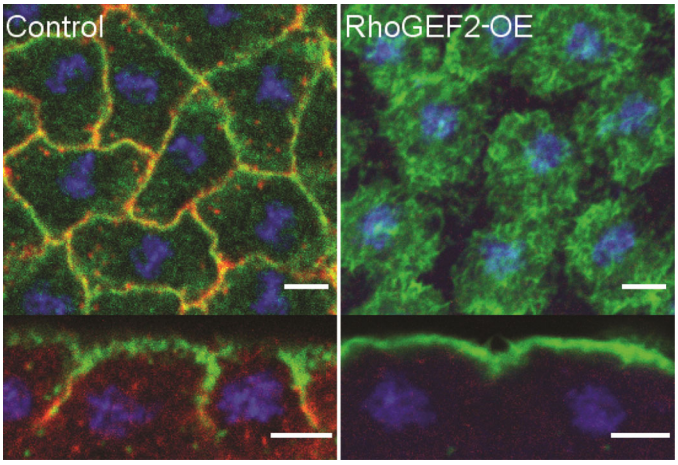

Loss of polygonal shape in Myosin II hyperactivity mutant. Control and RhoGEF2-Overexpression (OE) embryos stained with Phalloidin for actin (green), DE-cadherin (red) and Hoechst for DNA (blue). Control embryos show nice polygonal organization of syncytial cells while RhoGEF2-OE embryos show circular architecture with loss of the adhesion molecule DE-cadherin (red). Scale bars: 5 µm.

attitudes, especially tireless perseverance. She has also been instrumental in ensuring a fun and healthy work environment in the lab where productive discussions are held to facilitate brainstorming. In addition, I would like to thank Dr Nagaraj Balasubramanian, Dr Mahendra Sonawane and Dr Girish Ratnaparkhi who always provided me with useful suggestions. I am also grateful to Dr Girish Deshpande for his timely advice and counsel, inside and outside the lab. I was fortunate to have the opportunity to discuss my work with several leading scientists at conferences, including Dr Thomas Lecuit, Dr Alpha Yap, Dr Pernille RØrth and Dr Yu Chiun Wang, all of whom provided useful insights. Apart from help in the scientific arena, I received tremendous encouragement and guidance through all ups and downs in these years from the writings of Dr Daisaku Ikeda, a philosopher and peace activist. My favourite learning from his writings that I have always striven to apply is that "more important than winning is not getting defeated".

What motivated you to pursue a career in science, and what have been the most interesting moments on the path that led you to where you are now?

I had not planned to pursue research until I did my final year B.Tech project in a basic science lab. This is where I decided to venture more into cell biology. Studying many research papers for my master's thesis and for lectures during my masters further piqued my interest and I decided to pursue a career in research.

Who are your role models in science? Why?

I strongly believe that we can learn from anywhere and anyone as long as we have a seeking spirit. I do not have any particular role models in science. Instead I try to learn from interactions with whomsoever I meet in conferences and scientific meetings, especially the senior scientists and colleagues.

What's next for you?

I am currently applying for postdoctoral positions. I am interested in basic science research and looking forward to exploring morphogenesis in other model systems with the focus on how various forces govern cell and tissue movements.

Tell us something interesting about yourself that wouldn't be on your CV

I have learned an Indian classical dance form, Kathak, and enjoy being part of various cultural events. I also enjoy sketching and singing in my free time. In addition, I am a part of a non-profit organization, Soka Gakkai International, that promotes the principles of equality and respect for the dignity of each life using various activities like cultural discussion meetings, peace symposiums and exhibitions.

Reference

Dey, B. and Rikhy, R. (2020). DE-cadherin and Myosin II balance regulates furrow length for onset of polygon shape in syncytial *Drosophila* embryos. *J. Cell Sci.* **133**, jcs240168. doi:10.1242/jcs.240168