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Focus on Cecelia Moens; A Woman in Neuroscience**Rosa Dale-Moore, Neuroscience 201**

Women in the field of neuroscience are hugely underrepresented and marginalized simply as a residual inequality of the gender gap in STEM fields. However, there are prominent women in this quickly expanding field. Cecilia Moens is a researcher at the Fred Hutchinson Cancer Research Center in Seattle, Washington. Her lab works extensively with zebra fish researching early neural development. Zebrafish are very useful for projects like this because their eggs are completely transparent to hide the embryos from predators in the water, but it also allows for researchers to easily visualize inside the embryo to observe different stages of development. While this research does not involve humans, it provides numerous insights into developmental changes that are also observed in humans and can provide outlets for research on the genetics and treatment of cancer.

Dr. Moens received her Bachelor of Science at York University in 1987, majoring in Biology. She then earned her Ph.D in Molecular Genetics at the University of Toronto in 1993. Dr. Moens was previously employed straight out of graduate school as a post-doctoral fellow in the Neuroscience department of the University of Oregon. She also worked as a faculty member at the Marine Biological Laboratories teaching a class of Genetics and Neural Development of Zebrafish. Along with Fred Hutchinson Cancer Research Center, Dr. Moens is also an Affiliate Professor in the Department of Biology at the University of Washington. She was also a member of the National Institute of Health Board from 2005-2007.

Awards

Most recently, Dr. Moens has been awarded the U.S. Presidential Early Career Award in Science or Engineering in 2000, and the Basil O'Connor Starter Scholar Award in 1999-2001, associated with the March of Dimes from. Dr. Cecilia Moens' work with zebrafish presents new research on possibilities of more medical understanding of the genetics of cancer and craniofacial defects. In light of this new research, Dr. Moens was publically commemorated by President Bill Clinton and received the prestigious Presidential Early Career Awards for Scientists and Engineers. This is the highest honor for young people beginning promising careers in research of any kind. Dr.

Moens says upon receiving the award: "I'm delighted to have been chosen for this award - it's a very great honor to receive this kind of recognition so early in my career. It's a testament to the broad-mindedness of the people at the National Institutes of Health that they recognize the relevance of zebrafish developmental biology to human development and disease" (2). Dr. Moens also received two fellowships, the first from 1994-1996, in the Human Frontier Science Program, which is an international organization that supports promising researchers in pursuing their long-term projects. The second fellowship was through the medical research council of Canada and lasted from 1997-1998. Previously in her career, Dr. Moens received the Graduate Studentship from 1991-1993, also from the Medical Research Council of Canada; the Gold Medal for Excellence in Science from her undergraduate institution, York University; and the Governor General's Award in Canada for Undergraduate study.

Current Projects

Currently, Dr. Moens' lab is working on several projects. The first, assisted by Crystal Davey, Andrew Mathewson, and Dan Berman is The Role of Planar Polarity in Directed Neuron Migration, which is using a genetic screen to identify components of the planar cell polarity pathway. This helps to better understand migration of neurons. Most of the neurons in a vertebrate brain do not stay where they are formed, but instead 'migrate' to where they can make synaptic connections. This research aids in clarifying the basis of cell migrations in neural development and disease (1).

The second project that the Moen Lab is working on is entitled 'The Mauthner neuron as a model for electrical synapse formation'(1). Adam Miller, Ph.D. and Lisa Voelker are also working on this project, which is a continuation of the research into neuron migration. This research has to do with synapse formation once the neurons have reached their destination. Chemical synapses are fairly well understood by the neuroscience community, but electrical synapse assembly is still very unclear to researchers. This lab is using the Zebrafish neural circuit involving Mauthner neurons, which cause a very clear escape response. The tools Dr. Moens is using will enable a better understanding of "How genes control behavior at the level of the synapse, the neuron and the circuit"(1). This project could help scientists understand the mechanisms behind neural circuits.

The last project mentioned in Dr. Moen's the lab page is entitled 'Generating Mutations in Zebrafish Genes of High Biomedical Relevance' performed by Dr. Luyuan Pan, Ph.D., and Arish Shah. This project has been running working for over 10 years on generating many different genetic mutations of zebrafish. The lab catalogs and screens the fish to identify different mutations. These genes can be used by other projects for numerous other projects. Recently, they have been working on a technology that can identify mutations without any amplifying fragmentation. These Zebrafish mutants are very useful because they provide information about mechanisms of disease, early embryonic patterning, myogenesis, angiogenesis, neural tube morphogenesis, and patterning, cell migration, myelination, organ development, joint formation and germ cell development.

Recent Publications

Dr. Moens and Julia Cooke recently published a paper in the journal Trends in Neurosciences entitled 'Boundary formation in the hindbrain: Eph only it were simple...' (3). The research focused mostly on the differentiation and segmentation of the vertebrate hindbrain as a step in the development of neurons from the neuroepithelium. Drs. Moens and Cooke discuss the Eph family of receptor tyrosine kinases and their ligands, known as ephrins (3). This research is crucial to furthering the still limited understanding of differentiation of neurons in neural development. Dr. Moens also worked on a team to research and write the paper entitled 'Role of *mef2ca* in developmental buffering of the zebrafish larval hyoid dermal skeleton' at the Institute of Neuroscience through the University of Oregon. The paper worked with phenotypic robustness and bone regrowth, which has many future implications in the field of health and regenerative medicine (5).

Conclusion

As a neuroscientist, Dr. Cecilia Moens has developed research that is helping to save lives and will continue to do so in the future. Gage Crump, at Eli and Edythe Broad Center for Regenerative Medicine and Stem Cell Research at University of Southern California are currently using research originally worked on by Dr. Moens and her team to try and understand

and prevent genetic defects. Crump says “In the future as we get better at harnessing stem cells to create organs, we hope to be able to bioengineer these cells to make a particularly shaped organ,” What we’re learning in zebrafish by studying these pouches will be generally applicable and we can pursue these basic principles to come up with new types of technology involving cellular therapy.” (7). However, Cecilia Moens is also a pioneering scientist because of her gender in a field that is very traditionally male. According to the Society for Neuroscience, 21 percent of members in 1982 were women, compared to 43 percent as of 2011 (6). The Society for Neuroscience is part of an ongoing three-year project to help young women become successful in the field of neuroscience to right this injustice. They provide discussions about ‘implicit bias’, which is the cause of this gender gap. This opens the floor to male and female neuroscientists to have a conversation and try to consciously change how women in science are frequently treated as lesser. (6). This is an impressive step to pulling together the gender gap in the rapidly evolving field of neuroscience, hopefully resulting in groundbreaking woman leaders like Dr. Moens.

References

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