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Sumoylation regulation of lens development

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SUMOylation is now established as one of the key regulatory protein modifications in eukaryotic cells. It regulates chromatin organization, transcription, DNA repair, macromolecular assembly, protein homeostasis, trafficking, signal transduction, cell differentiation and stem cell development. It also acts as a molecular mechanism mediating global changes at the cellular and organism levels when stress conditions such as heat shock or oxidative stress occur. More importantly, SUMOylation plays causal roles in many major human diseases such as cardiovascular, neuronal diseases and cancers. In the eye, SUMOylation plays a key role in retina development, and it has causal effects on corneal dystrophy. Our recent studies revealed that SUMOylation is necessary to activate the p32 Pax6, the shortest isoform of Pax6, the master regulator for eye and brain development. Moreover, our studies further revealed that sumoylation plays an important role in regulating lens differentiation. Different isoforms of SUMO are differentially expressed in the ocular lens and plays contrast roles in regulating lens differentiation. While SUMO1 promotes lens differentiation, SUMO2 and SUMO3 inhibits this process. Mechanistically, SUMO1 and SUMO2/3 can either conjugate different transcription factors or conjugate to the same factor but with different preferred SUMOylation sites. In the present study, we discuss the functions of different SUMO isoforms in controlling lens development.

Biography

David Wan Cheng Li received his PhD degree in Molecular and Cellular Biology from the University of Washington in Seattle, and completed his Postdoctoral training in the Harkness Eye Institute of Columbia Medical Center in New York City. He is currently an elected One-Hundred Talent Professor in the State Key Laboratory of Zhongshan Ophthalmic Center in Sun Yat-Sen University, an elected Lotus Scholar Professor of Cellular and Developmental Biology in Hunan Normal University in China. He made numerous important discoveries in both eye development and ocular diseases as well as cancer research fields, published over 100 articles in *PNAS*, *NAR*, *Cancer Research*, *CDD*, *Oncogene*, *MBC*, *JBC*, and *IOVS*, etc. He has trained 30 PhD students and Postdoctoral fellows, and lectured in a dozens of countries including German, England, USA, Japan and China. He received the Outstanding Achievements Award of Cataract Research from the National Foundation for Eye Research, USA in 2006.

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