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Novel members of the Wnt/β-Catenin pathway in heart development and aging

The heart is the first organ that forms and functions during embryonic development and is one of the organs most closely related to human health. In the early 1990's, the author was the first to demonstrate that canonical Wnt signaling controls the embryonic heart development using fruit fly model, and thus the signaling was introduced into the cardiac development field. Our finding was further proved by other studies with vertebrate models such as Xenopus, zebrafish and mice. Nowadays, Wnt signaling has become one of the most important signaling pathways in the cardiac development field. However, it was found that studies with different animal models and even in the same animal model can lead to opposed findings. For example, the author demonstrated that canonical Wnt signaling promotes cardiac development in Drosophila, while the others showed that it inhibits the heart development in vertebrate. The two contradictory conclusions about the role of canonical Wnt signaling in the regulation of heart development were not solved until 2007. However, in the same year, it emerged as a new paradox that canonical Wnt signaling activates or inhibits cellular aging. We performed a genomic screen with Drosophila P- and chemical mutagenesis and obtained several candidates such as pygo (pygopus), Nulp1 (the nuclear localized protein-1) and SMRHD (super master regulator of heart development). Pygo is a new member of canonical Wnt signaling, but unexpectedly, its role in adult heart aging is independent of canonical Wnt signaling. We reported that Nulp1 may act as a novel bHLH transcriptional factor to mediate cellular functions. Our recent findings revealed a new in vivo function of Nulp1 to act as a positive cofactor in canonical Wnt signaling. Unexpectedly, the role of SMRHD is likely to act as a negative switch in canonical Wnt signaling expression. Here our studies on the candidates of the canonical Wnt signaling for cardiac development and aging will be discussed based on our recent findings.

Speaker Biography

Xiushan Wu completed his PhD from Stockholm University in 1986-1990, postdoctoral studies from Michegan University and etc in 1990-1994 and Scientist in Karolinska Institute in 1994-2000. He is the Director and Professor of The Center for Heart Development, Hunan Normal University. His research focuses on understanding the mechanisms by which embryonic heart is developed using Drosophila, zebrafish and mice as models. He has published more than 350 papers including over 110 SCI papers.

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