Novel functions of Piwi- interacting RNAs (piRNA) and PIWI proteins in somatic cells: Missing link revealed by bioinformatic tools

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piRNAs are small non-coding RNA which maintain genomic integrity in germline cells. Along with PIWI proteins, piRNAs silence the transposable elements. Their presence were thought to be restricted to germ cells but recent studies have indicated the elevated levels of piRNAsand PIWI proteins in cancerous conditions. To analyse whether piRNAs are present in retinal cells, small RNA sequencing dataset of (GSE55376) mouse retinal samples were downloaded from Gene Expression Omnibus.Interestingly, three mouse piRNAs matched with the human piRNA sequences, hsa_piR_001184, hsa_piR_021063 and hsa_piR_015254which should be further validated in human retina. Intriguingly, we detected all four members of PIWI-like proteinsin human ocular tissues and somatic cell lines, which are important for piRNA function. Although the role of PIWI proteins in germ cells has been documented, their presence and function in somatic cells remains unclear. When HIWI2 was silenced in retinal pigment epithelial cells, the typical honeycomb morphology was affected. Further analysis showed that the expression of tight junction (TJ) proteins, CLDN1 and TJP1 were altered in HIWI2 knockdown. Moreover, confocal imaging revealed disrupted TJP1 assembly at the TJ. Previous studies report the role of GSK3β in regulating TJ proteins. Accordingly, phospho-kinase proteome profiler array indicated increased phosphorylation of Akt and GSK3α/β in HIWI2 knockdown, suggesting that HIWI2 might affect TJ proteins through Akt-GSK3α/β signaling axis. Taken together, our study demonstrates the presence of PIWI-like proteins in somatic cells and the significant role of HIWI2 in preserving the functional integrity of epithelial cells possibly by modulating the phosphorylation status of Akt and GSK3α/β.