

An investigation of the role of the ubiquitin-proteasome system using zebrafish

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The ubiquitin-proteasome system regulates a wide range of cellular processes, including proliferation, differentiation, and apoptosis. Primary cilia, nonmotile antenna-like structures observed in a variety of vertebrate cells, detect extracellular cues and transduce these signals into cells to regulate proliferation and differentiation. It has been known that the ubiquitin-proteasome system regulates assembly and disassembly of primary cilia. However, the molecular mechanisms underlying the regulation remain incompletely understood. We have revealed that trichoplein, a centriolar protein originally identified as a keratin-binding protein, suppresses ciliogenesis through the activation of Aurora A kinase. We have also revealed that trichoplein is ubiquitinated by CRL3-KCTD17 and deubiquitinated by USP8. To analyze the functions of trichoplein, KCTD17, and USP8 in vivo, we have generated knockout zebrafish lines for these genes. In this symposium, I would like to discuss the phenotypes of these zebrafish lines and the involvement of the ubiquitin-proteasome system and the primary cilia in the phenotypes.