

The roles of phospholipase C δ 1 in the formation of hair follicles

Kiyoko Fukami

Laboratory of Genome and Biosignal, Tokyo University of Pharmacy and Life Science

Nude mice exhibit athymia and hairlessness by a loss-of-function mutation in the transcription factor *Foxn1* gene. Although the immunologic functions of Foxn1 have been studied intensively, there have been relatively few studies of its functions in skin. Foxn1 regulates expression of hair keratins, which is essential for normal hair structure; however, it was largely unknown how Foxn1 regulates hair keratin expression and hair formation. In the present study, we found that mice lacking phospholipase C (PLC)- δ 1, a key molecule in the phosphoinositide signaling pathway, and nude mice show similar hair abnormalities, such as lack of cuticle and bending. We also found that expression of hair keratins was remarkably decreased in skin of PLC δ 1 knockout mice. Furthermore, expression of PLC δ 1 was induced in Foxn1-transfected U2OS cells. In addition, we showed that PLC δ 1 expression was remarkably decreased in skin of nude mice. In skin and keratinocytes of nude mice, activation of PLC downstream effectors, such as PKC and NFAT, was impaired as well as those of PLC δ 1 KO mice. These results indicate that PLC δ 1 is an essential molecule downstream of Foxn1 in normal hair formation, and strongly suggest that hairlessness in nude mice is caused by insufficient expression of PLC δ 1.