Outer dynein arm light chain 1 of *Paramecium tetraurelia* is essential for regulating the ciliary motility in response to cAMP

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SUMMARY

Cyclic AMP, one of the second messengers in the ciliary movements, increases in the ciliary beat frequency and the swimming velocity in *Paramecium*. Also, this makes the ciliary orientation more posterior and suppresses Ca^{2+}-induced ciliary reversal. However, the molecular mechanism of ciliary response to cAMP is unclear. We have examined the role of the gene termed the outer dynein arm light chain 1 of *Paramecium tetraurelia* (*PtLC1*) in ciliary movements by RNA interference (RNAi) using the feeding method. Our previous study revealed the ciliary orientation on cortical sheets from *PtLC1*-RNAi lost the cAMP-dependent control. In this study, to clarify the reason for the defect of ciliary response to cAMP by *PtLC1* silencing, we analyzed the effects of *PtLC1* silencing on the composition of axonemal proteins. A 29-kDa protein phosphorylated in a cAMP-dependent manner in the control disappeared in the axoneme of *PtLC1*-RNAi. This result indicates that the *PtLC1* product is the 29-kDa protein phosphorylated by cAMP with an important role in controlling the ciliary response by cAMP-dependent phosphorylation.