Assembly of the novel ciliary protein FAP93 is dependent upon total ciliary length and ODA10 in *Chlamydomonas reinhardtii*

By Sarah Gordon
Oglethorpe University Honors Program
2023

ABSTRACT

Cilia are organelles that are required for cell motility and sensation. These organelles are located on nearly every cell in the human body. The axoneme is the highly conserved ciliary core with ninefold symmetry, with some notable exceptions. The proximal end of the eukaryotic cilium has not been well studied, however, the importance of this region for ciliary stability and motion has begun to be understood. *Chlamydomonas reinhardtii* is a unicellular green alga that has become a tractable model organism for ciliary research. Flagellar associated protein 93 (FAP93) is a novel ciliary protein that is localized to the proximal end of *C. reinhardtii* axonemes with an unknown function. The goal of this study is to further explore the assembly and function of FAP93. Immunofluorescence of FAP93 and acetylated tubulin has confirmed that the length of the FAP93 domain is correlated with total ciliary length in short ciliary mutants *shf1* and *shf2*. Length dependency of FAP93 implies that the mechanism regulating ciliary length is also regulating the length of the FAP93 domain. To elucidate a function of FAP93, FAP93 was localized to the proximal end of *oda10* and *vfl3* mutant cilia, under the hypothesis that FAP93 requires one of these proximal axonemal proteins for full assembly onto the axoneme. Immunoblot and densitometric analysis revealed that FAP93 is reduced in *oda10* isolated axonemes. FAP93, an intrinsically disordered protein, may require a binding partner, like ODA10, for its stabilized structure. Further understanding of asymmetrically-localized ciliary structures will help to progress the understanding of many ciliopathies.