Defective nuclear uptake impairs *Plasmodium* transmission in SFA mutants

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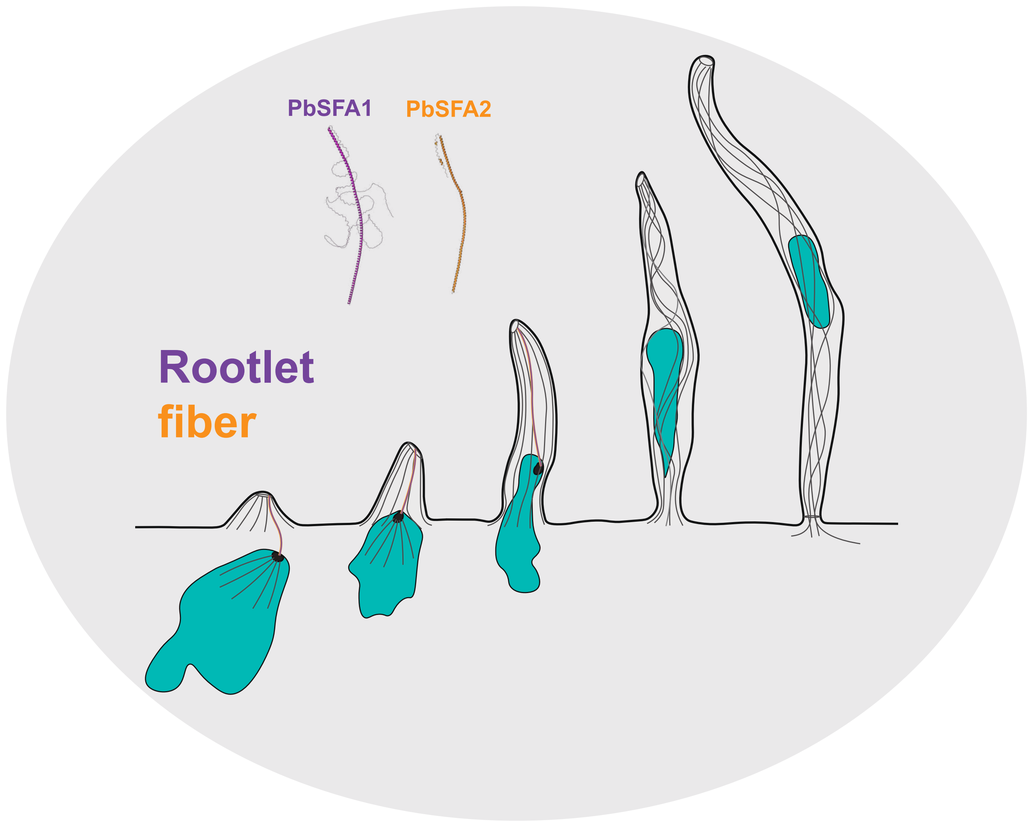
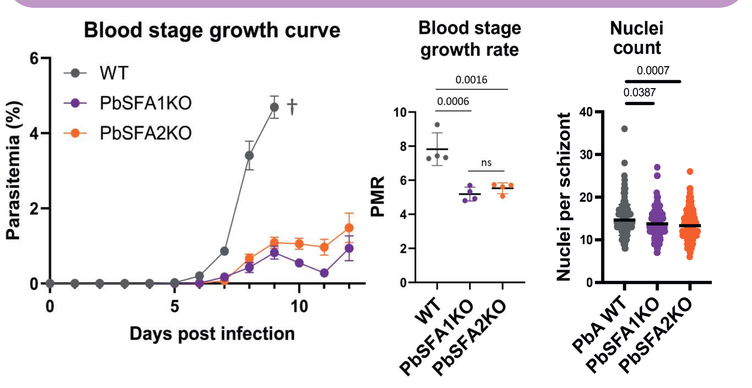
Summary

- *Plasmodium* replicates via schizogony (RBCs) and sporogony (mosquito), requiring tight coordination of nuclear division and daughter cell formation
- We analyzed the **striated fiber assemblins SFA1 and SFA2** in *P. falciparum* and *P. berghei*
- SFA1 and SFA2 coordinate nuclear segregation with daughter cell formation in *Plasmodium*
- Deletion mutants showed impaired exflagellation and resulted in reduced transmission efficiency
- Fewer oocysts are formed and exhibit almost no sporozoites are formed
- Sporogonydefects lead to morphological disrupted sporozoit-like structures

- **Conclusion:** SFA1 and SFA2 link nuclear segregation to daughter cell formation

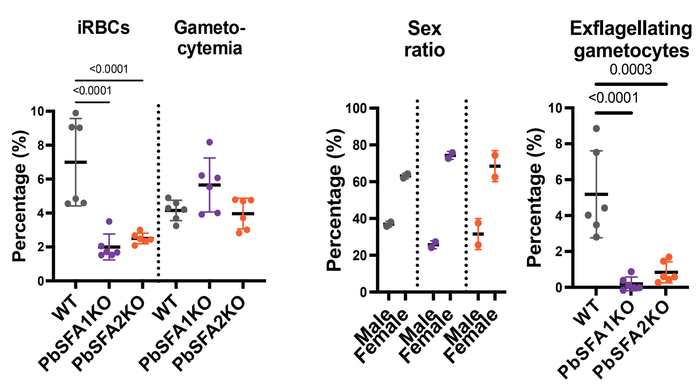


Asexual growth reduction in SFA



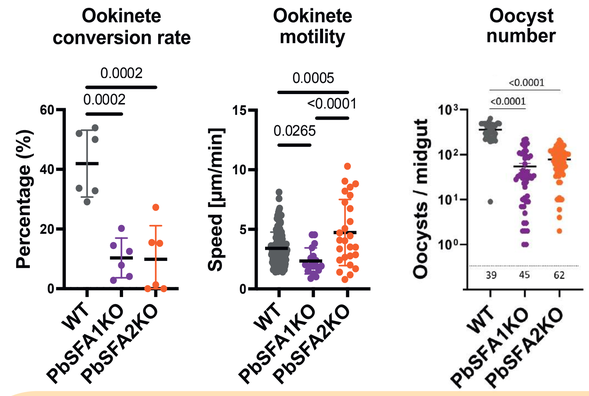
PbSFA1-KO and PbSFA2-KO parasites showed a **strong asexual blood-stage fitness defect**. Schizont nuclear counts were largely unaffected, indicating no major defect in nuclear replication.

Defect in Gametogenesis



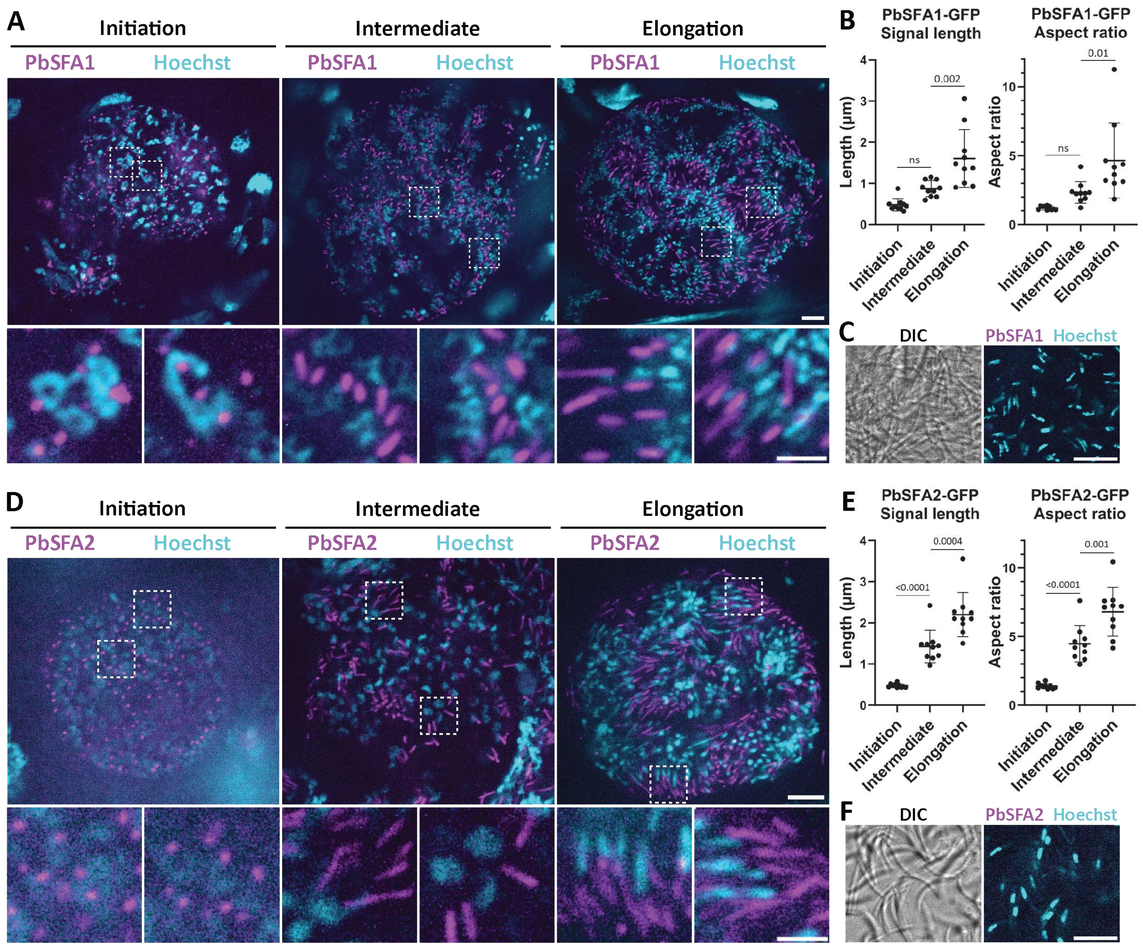
PbSFA1-KO and PbSFA2-KO parasites showed no defetct in gametocytogenesis and a uneffected ratio between male and female gametocytes, but show a **strong reduction in the exflagellation rate**.

Transmission-Stage Developmental Defects



PbSFA1-KO and PbSFA2-KO parasites showed reduction in ookinete conversion and slight differences in ookinete speed. Both mutant lines showed reduced oocyst numbers.

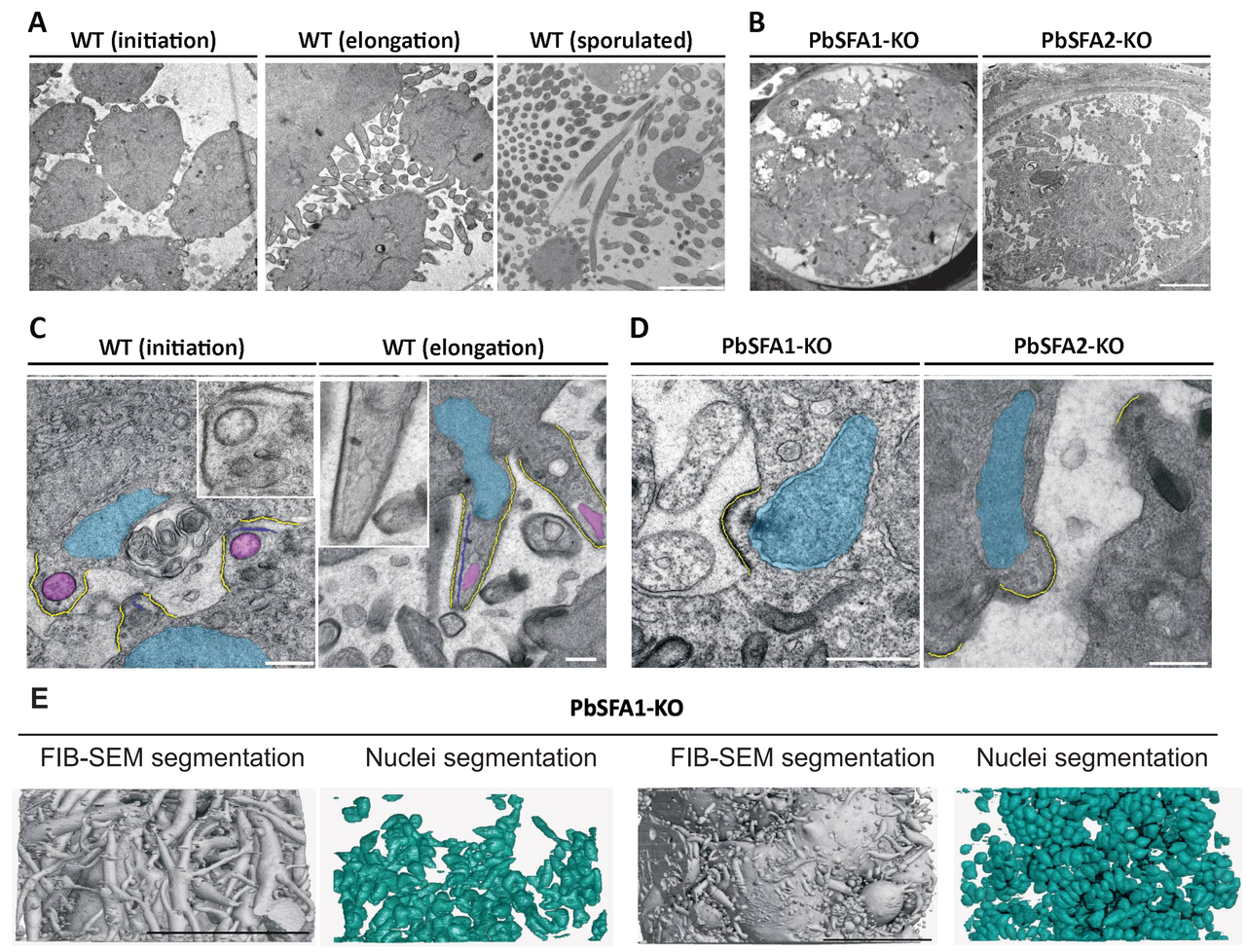
Rootlet Fiber driving Sporozoite formation



Dynamic localization of PbSFA1-GFP and PbSFA2-GFP during sporozoite formation. GFP-positive fibers associate with nuclei throughout oocyst development and change in length and morphology over time. No GFP signal was detected in mature salivary gland sporozoites.

(A+D) Scale bars: 5 µm (top), 2 µm (bottom). (C+F) Scale bar: 10 µm.

Arrest of Sporozoite Formation



Sporozoite budding defects in PbSFA1-KO and PbSFA2-KO parasites. Electron microscopy revealed impaired nuclear segregation and incomplete sporozoite budding in mutant oocysts. Unlike WT, mutant buds lacked rootlet fibers and rhoptry anlagen, indicating defective sporozoite formation.

(A-B) Scale bar: 5 µm. (C-D) Scale bar: 500 nm. (E) Scale bar: 10 µm.

LinkedIn

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Reference:

He, B., Ali, I., Dorner, L.P. et al. Essential nucleus-apical pole linkage maintains division fidelity during Plasmodium progeny formation. EMBO J 45, 5388–5422 (2026). https://doi.org/10.1038/s44318-026-00836-7

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