# *Plasmodium berghei histone deacetylase 1 (HDA1) plays important, dual, sex specific roles in gametocyte maturation and viability.*

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In order for *Plasmodium* species to transmit to a mosquito vector they must transition from an asexual parasite of the erythrocytic cycle into a sexual male or female gametocyte. Epigenetically regulated expression of *ap2-g*, a member of the AP2 family of transcription factors was identified as orchestrating this developmental change, guiding the parasite through gametocytogenesis. Although some epigenetic actors controlling *ap2-g* expression and thus commitment have been identified the full extent of epigenetic regulation remains unclear. Histone Deacetylase 1 (*hda1*) has previously been shown to be upregulated in *P. falciparum* following upregulation of *ap2-g*, suggesting a role in gametocyte development or function.

To investigate the role of HDA1 in both the sexual and asexual life cycle of the rodent malaria species *Plasmodium berghei*, we generated *hda1*$^{-}$ knockout and *hda1::gfp* tagged lines. Analysis of the knockout by flow cytometry revealed a complex phenotype of slow growth and altered sex ratio. Further investigations using imaging flow cytometry revealed a defect in male exflagellation, which resulted in an absence of ookinetes in the knockout. Transcriptomic and chromatin accessibility studies on sorted male, female and schizont *hda1*$^{-}$ populations identified an upregulation of variant gene family members. Analysis of the *hda1::gfp* line revealed a punctate nuclear HDA1 signal distinct from the DAPI and H3K9me3 signal, suggesting a role in chromatin regulation. In summary, HDA1 plays a key role in gametocyte commitment and emergence.