Poster (#237) presentation at Pharmacology 2024 (December 11, 2024)

Use of the unified information devices (UID) matrix system for non-invasive monitoring of thermoregulation and activity in plasmodium-infected C57BL/6 mice to refine model endpoints.

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Introduction

Malaria, caused by Plasmodium parasites, is an infectious disease causing 240 million cases globally each year and animal models are an important tool for understanding the pathogenesis of malaria and the exploration of possible treatments (1,2, 3). This study investigates the effects of Plasmodium chabaudi and Plasmodium berghei infection on the thermoregulation and activity of C57BL/6 mice with the aim of optimizing animal study endpoints for profiling of antimalarial compounds.

Method

All animal procedures were carried out under protocols approved by the Institutional Animal Care and Use Committee, BioMedical Research. Animals were implanted with a subcutaneous transponder and maintained in the Unified Information Devices (UID) matrix system, an RFID-enabled set-up that allows real-time recording and monitoring of location, movement and temperature for animals in their home-cage environment. Mice (C57BL/6, male and female, n = 6/group) were then infected with 200 µL of 5 × 106 infected erythrocytes or Dulbecco's phosphate buffer saline (control) via intraperitoneal injection. Body weights, clinical observations and peripheral blood parasitemia (% infected erythrocytes) were measured periodically in addition to the UID monitoring. Results were plotted as mean +/- SEM and data analysed using a one-way ANOVA and a mixed two-way ANOVA with post-hoc comparisons via Tukey's test to determine any significance between the values of the infected and control groups.

Results

As parasitemia increased, there was a strong correlation with reduction in body temperature ($P = 0.003$) and activity ($P = 0.0008$) and to a lesser degree with body weight ($P = 0.02$) but not with clinical observations, e.g., a drop of approximately 6 °C from day 4 to day 7 corresponded to an increase in parasitemia from 10 to 20% in P. berghei-infected male mice (Figure 1).

Conclusions

The UID matrix system could effectively monitor temperature and activity across sexes and malaria strains, the decrease in temperature and in-cage activity appears to predict the peak of parasitemia and body weight decrease by several days. This should enable the incorporation of additional humane endpoints and assist in novel compound profiling.

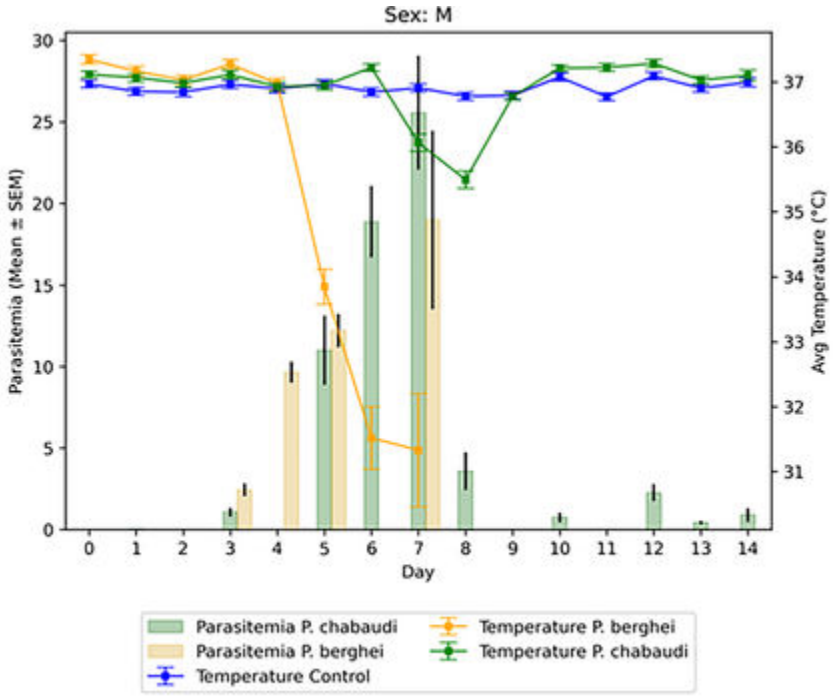

Figure 1. Changes in body temperature and parasitemia following *Plasmodium* infection in male C57/BL6 mice. Results are mean +/- SEM, n=6.

References

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British Journal of Pharmacology, Vol.182, Issue 3, Feb 2025, Pages 692-923 (https://doi.org/10.1111/bph.17399)