nature portfolio

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Reporting Summary

Nature Portfolio wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Portfolio policies, see our Editorial Policies and the Editorial Policy Checklist.

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a	Confirmed
☐	☒ The exact sample size (*n*) for each experimental group/condition, given as a discrete number and unit of measurement
☐	☒ A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
☐	☒ The statistical test(s) used AND whether they are one- or two-sided *Only common tests should be described solely by name; describe more complex techniques in the Methods section.*
☐	☒ A description of all covariates tested
☐	☒ A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
☐	☒ A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
☐	☒ For null hypothesis testing, the test statistic (e.g. *F*, *t*, *r*) with confidence intervals, effect sizes, degrees of freedom and *P* value noted *Give P values as exact values whenever suitable.*
☒	☐ For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
☒	☐ For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
☒	☐ Estimates of effect sizes (e.g. Cohen's *d*, Pearson's *r*), indicating how they were calculated

Our web collection on statistics for biologists contains articles on many of the points above.

Software and code

Policy information about availability of computer code

Data collection	ImageJ was used for oocysts number counting. Flow Jo v10 was used to process flow cytometry data.
Data analysis	Analyses were performed using GraphPad Prism 10 statistical software and R studio (version, 2024.12.1+563).

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio guidelines for submitting code & software for further information.

Data

Policy information about availability of data

All manuscripts must include a data availability statement. This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our policy

The 16S rDNA sequence data generated in this study have been deposited in the National Center of Biotechnology Information Sequence Read Archive database under accession code PRJNA1209247.

Research involving human participants, their data, or biological material

Policy information about studies with human participants or human data. See also policy information about sex, gender (identity/presentation), and sexual orientation and race, ethnicity and racism.

Reporting on sex and gender	Anonymous human blood obtained from the Chongqing Blood Bank. Human monocytes were collected from healthy donors who provided written informed consent at Southwest Hospital of Army Medical University.
Reporting on race, ethnicity, or other socially relevant groupings	Asians, adults, healthy individuals, without infectious diseases.
Population characteristics	N/A
Recruitment	Select healthy adult individuals without any infectious diseases to participate in the experiment.
Ethics oversight	This research was oversight and approval from the Ethics Committee of the Army Medical University Institute of Medical Research (KY2025153).

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☒ Life sciences ☐ Behavioural & social sciences ☐ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see nature.com/documents/nr-reporting-summary-flat.pdf

Life sciences study design

All studies must disclose on these points even when the disclosure is negative.

Sample size	No statistical methods were used to pre-determine the sample size. Samples sizes were selected based on previous experience to obtain statistical significance and reproducibility.
Data exclusions	N/A
Replication	Experimental findings were reproduced in multiple independent experiments as indicated throughout the manuscript. The number (n) of biologically independent samples/animals/independent experiments has been indicated in the corresponding Figure legends. The times of experimental replication have been provided in the Figure legends. The statistical tests used in this manuscript have been described in both the Statistics section of Methods and the Figure legends.
Randomization	All animals in our experiments were randomly allocated into different groups.
Blinding	The investigators were not blinded to the allocation during the experiments or to the outcome assessment. The data presented did not require the use of blinding.

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involved in the study
☐	☒ Antibodies
☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☐	☒ Animals and other organisms
☒	☐ Clinical data
☒	☐ Dual use research of concern
☒	☐ Plants

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☐	☒ Flow cytometry
☒	☐ MRI-based neuroimaging

Antibodies

Antibodies used

The anti-APC-A MHC II (Cat# ab93559) was purchased from Abcam. PE-A CD11c (Cat# 117308) was purchased from Biolegend. PerCP-Cy5-5-A B220 (Cat# 103235) was purchased from Biolegend. FITC-A CD19 (Cat# 152404) was purchased from Biolegend. FITC-A CD3 (Cat# 100204) was purchased from Biolegend. PE- Cy7A CD4 (Cat# 100408) was purchased from Biolegend. APC-A CD8a (Cat# 162306) was purchased from Biolegend. APC-A F4/80 (Cat# 123116) was purchased from Biolegend. PerCP-Cy5-5-A CD11b (Biolegend) was purchased from Biolegend. FITC-A Ly6G (Cat# 127606) was purchased from Biolegend. PE NK1.1 (Cat# 156504) was purchased from Biolegend. APC-Cy7-A Live/Dead (Cat# L34992) was purchased from Thermo. CD12/CD36 (Cat# 101320) was purchased from Biolegend. Anti SR-A (Cat# AF1797) was purchased from R&D. Purified Mouse IgG2a, Isotype Ctrl Antibody (Cat# 401501) was purchased from Biolegend. InVivo MAb anti-mouse Ly6G (Cat# BE0075-1) was purchased from Bio X Cell. InVivo MAb anti-mouse NK1.1 (Cat# BE0036) was purchased from Bio X Cell. Anti- Pfs25 antibody was customized by GenScript (Shanghai, China). For FACS related experiments, antibody was diluted by 100 times; for neutralizing antibody was not diluted, and the amount was indicated in method section.

Validation

Based on the catalog number, the information of this commercial antibody, including validation statements, relevant citations and antibody profiles in online databases. The validation of anti-Pfs25 was determined by it's inhibition of P.b-pfs25 transgenic parasite transmission, relative reference has been described in method section.

Animals and other research organisms

Policy information about studies involving animals; ARRIVE guidelines recommended for reporting animal research, and Sex and Gender in Research

Laboratory animals

Female C57BL/6J mice, aged 6-8 weeks, were obtained from GemPharmat Animal Institute (Nanjing, China). C3−/− mice with C57BL/6J background were purchased from Jackson Laboratory. The mice were housed in a controlled environment with regulated temperature and humidity and maintained on a 12-hour light/dark cycle, with lights off at 18:00 hours.
An. Stephensi (Anopheles stephensi, Hori strain) were maintained were reared and maintained under standard laboratory conditions at 27°C with 75% RH (relative humidity) on a 12-hour light-dark cycle.

Wild animals

The study did not involve wild animals.

Reporting on sex

Female mice, female mosquito.

Field-collected samples

The study did not involve feld-collected samples.

Ethics oversight

All animal procedures were reviewed and approved by the Animal Ethics Committee of the Army Medical University Institute of Medical Research under protocol number AMUWEC20218022.

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Plants

Seed stocks

N/A

Novel plant genotypes

N/A

Authentication

N/A

Flow Cytometry

Plots

Confirm that:

☒ The axis labels state the marker and fluorochrome used (e.g. CD4-FITC).

☐ The axis scales are clearly visible. Include numbers along axes only for bottom left plot of group (a 'group' is an analysis of identical markers).

☒ All plots are contour plots with outliers or pseudocolor plots.

☒ A numerical value for number of cells or percentage (with statistics) is provided.

Methodology

Sample preparation	Peripheral blood of mice infected with P. yoelii or P. berghei was collected from orbital vein and RBCs were lysis by Gey's solution. Then cells were incubated with anti-CD16/CD32 antibodies (Biolegend, USA) for 10 min to block Fc receptors and then incubated with the antibodies of interest for 45 minutes. Antibodies used for flow cytometry analysis were as followed: anti-CD11b, anti-Ly6G, anti-MHC II, anti-CD3a, anti-CD4, anti-CD19, anti- CD8a, anti-CD3, anti-NK1.1, and live/dead antibody (Biolegend, USA). Dead cells were excluded using LIVE/DEAD Fixable Dead Cell Stain Kit (Invitrogen) according to the manufacturer's instructions
Instrument	BD FACS Canto II cytometer (BD Biosciences, USA)
Software	Flow Jo software v10.8
Cell population abundance	Cell was collected from 50 µl peripheral blood.
Gating strategy	Gating strategy was described in supporting information.

☒ Tick this box to confirm that a figure exemplifying the gating strategy is provided in the Supplementary Information.