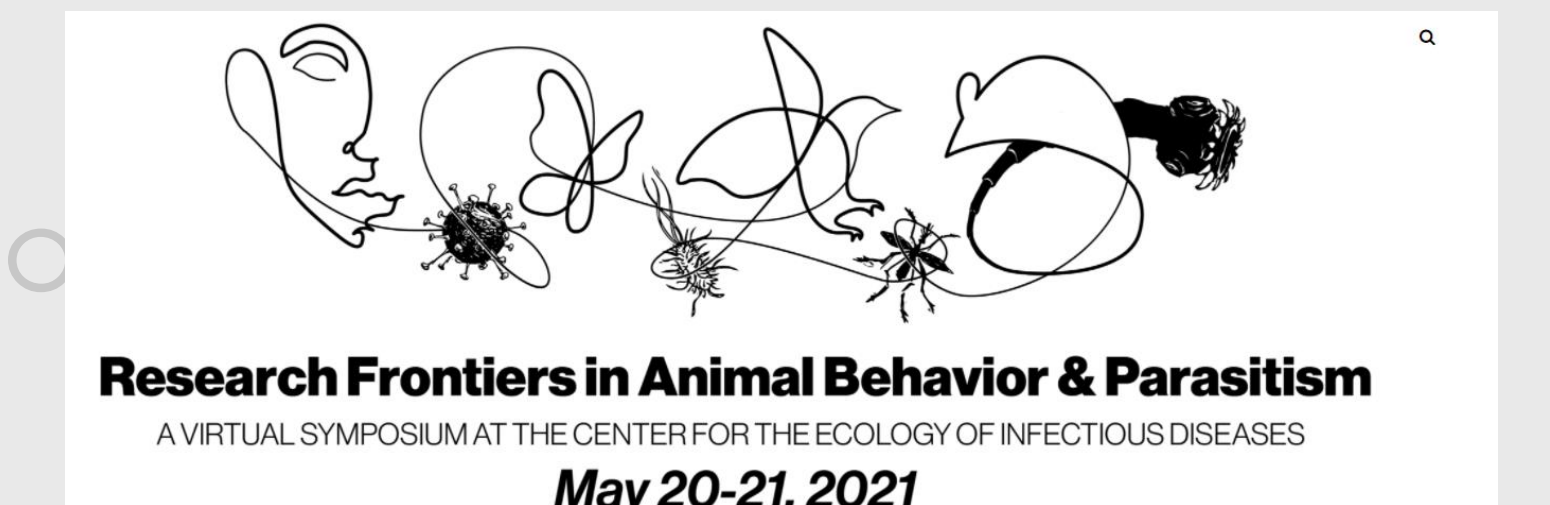


Generalized immune defense: Evolution of cross-resistance in fly populations selected for increased post-infection survival.



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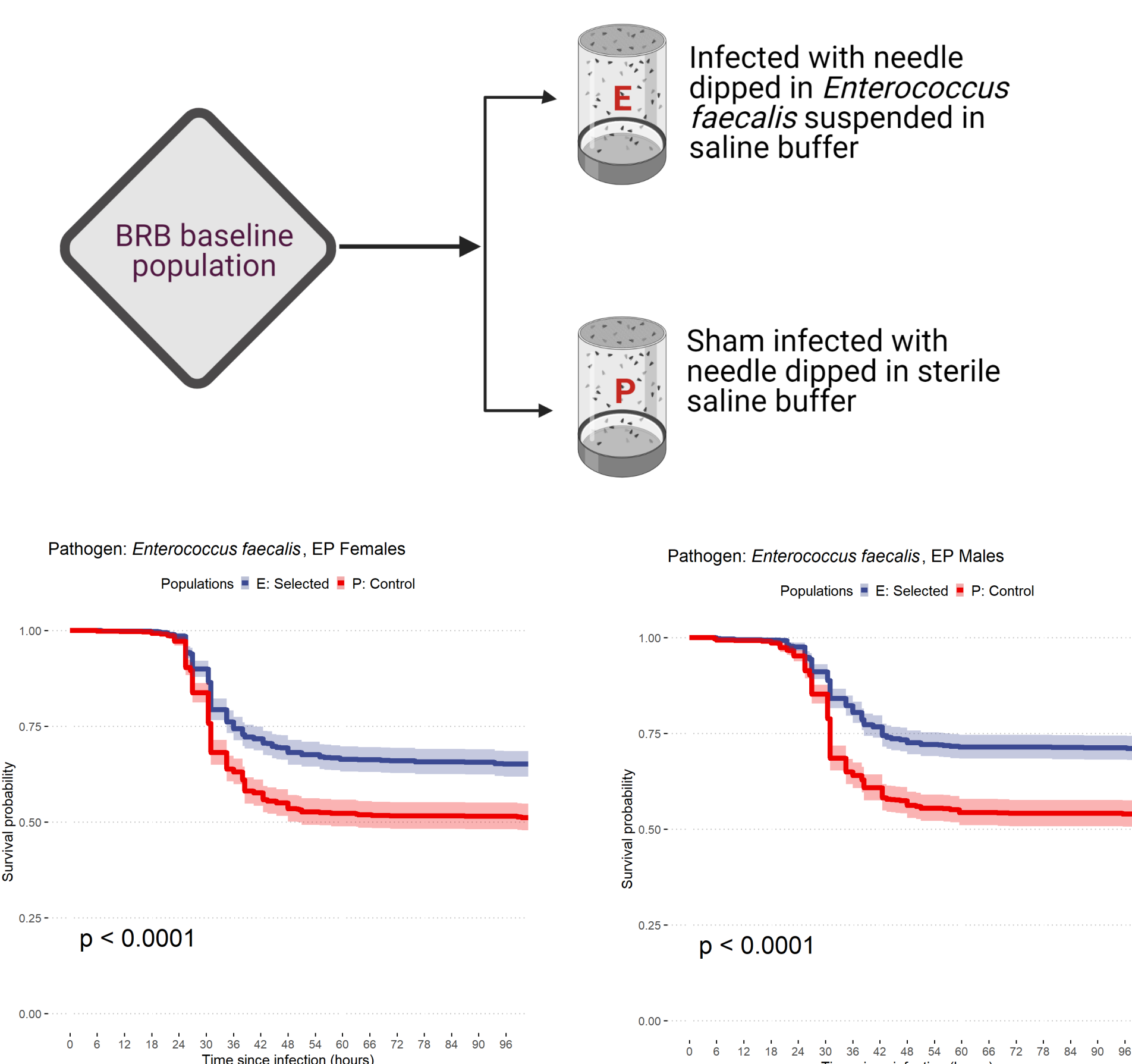


Abstract

Immune defence against pathogens and parasites demands substantial amount of hosts' energy and resources, and often requires resources allocation away from life history traits. Also, defence against different pathogens are not always positively correlated; better defence against one type of pathogen might make the hosts vulnerable to another. This costly nature of immune defence can make hosts to evolve specific immune defence, if host encounters same pathogen every generation.

This idea was tested on replicate populations of *Drosophila melanogaster* selected for improved defence against a bacterial entomopathogen, *Enterococcus faecalis*. We infected selected and control populations with a set of novel bacterial pathogens, one at a time or in combinations of two, in the background of *E. faecalis*. Selection for improved defence against *E. faecalis* makes flies cross-resistant to both Gram-negative as well as Gram-positive bacterial pathogens, with selected populations surviving better than controls irrespective of pathogen identity or the pathogens co-presence. In summary, we report that improved immune defence against *E. faecalis* achieved by experimental evolution does not evolve specific immune response but very generic immune defence and this defence is equally good against co-pathogenic challenges.

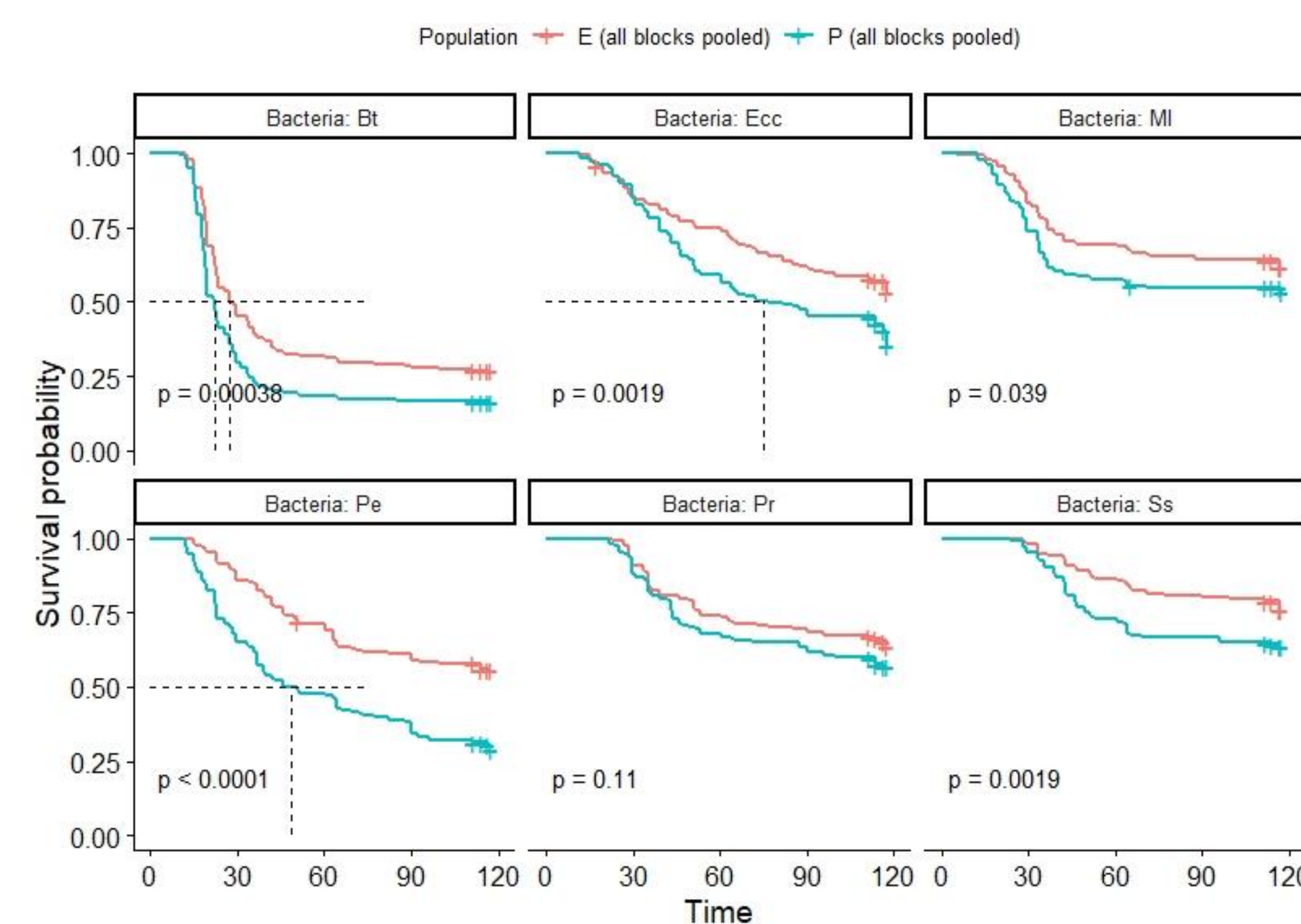
Selection Regime



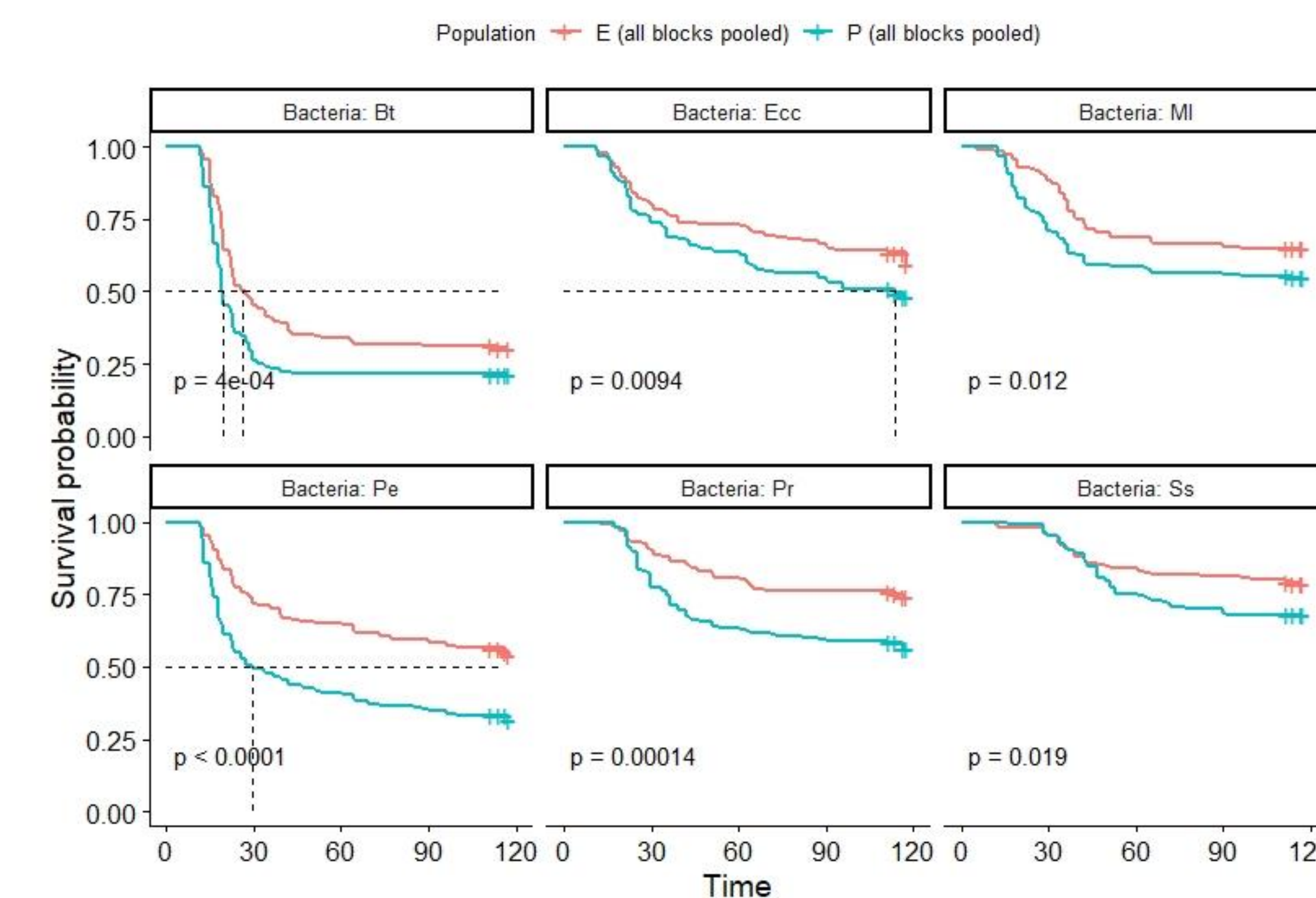
Results

Survivorship of EP flies against novel bacteria (single bacterial challenge):

Survivorship curves for EP females

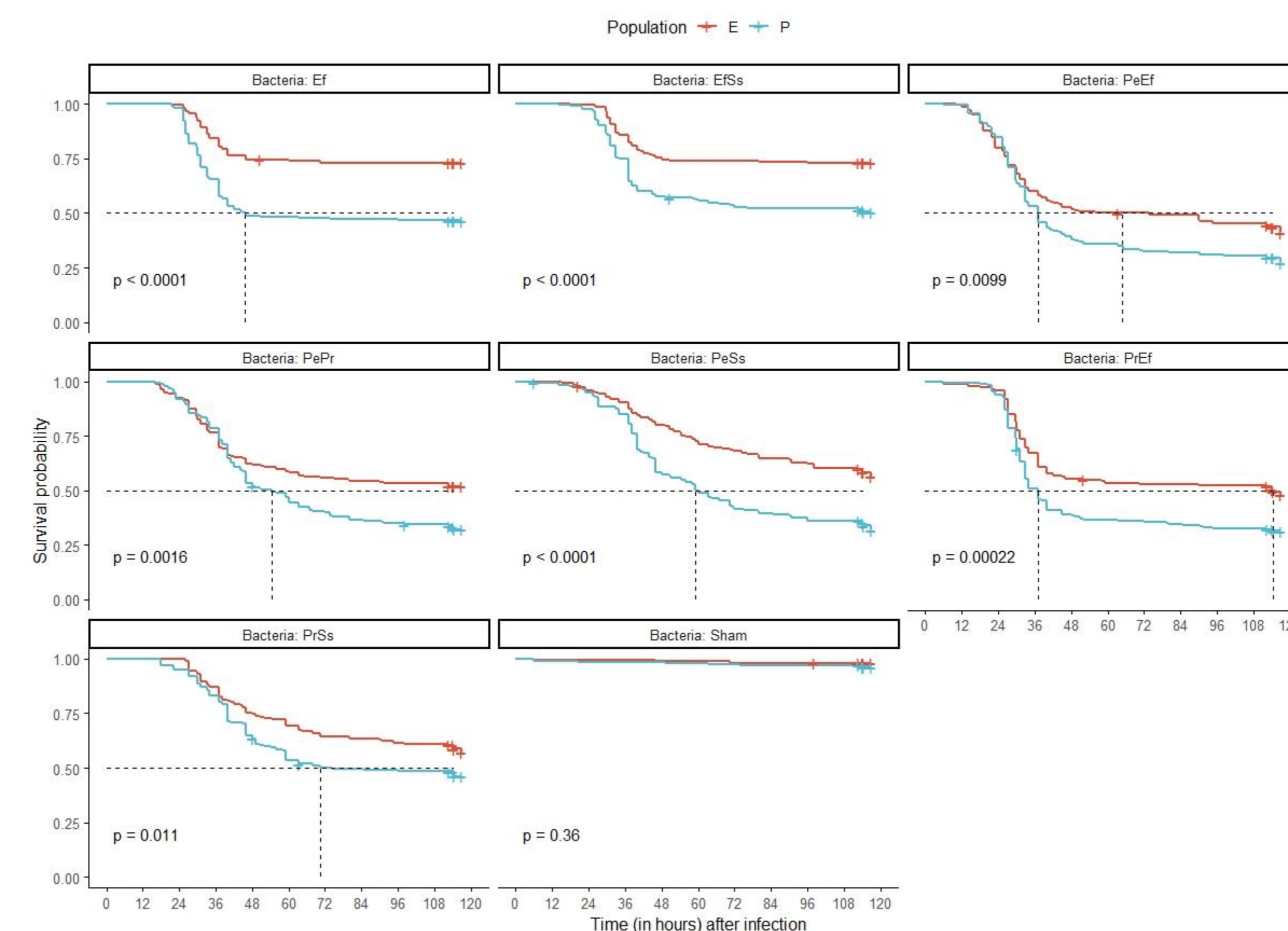


Survivorship curves for EP males

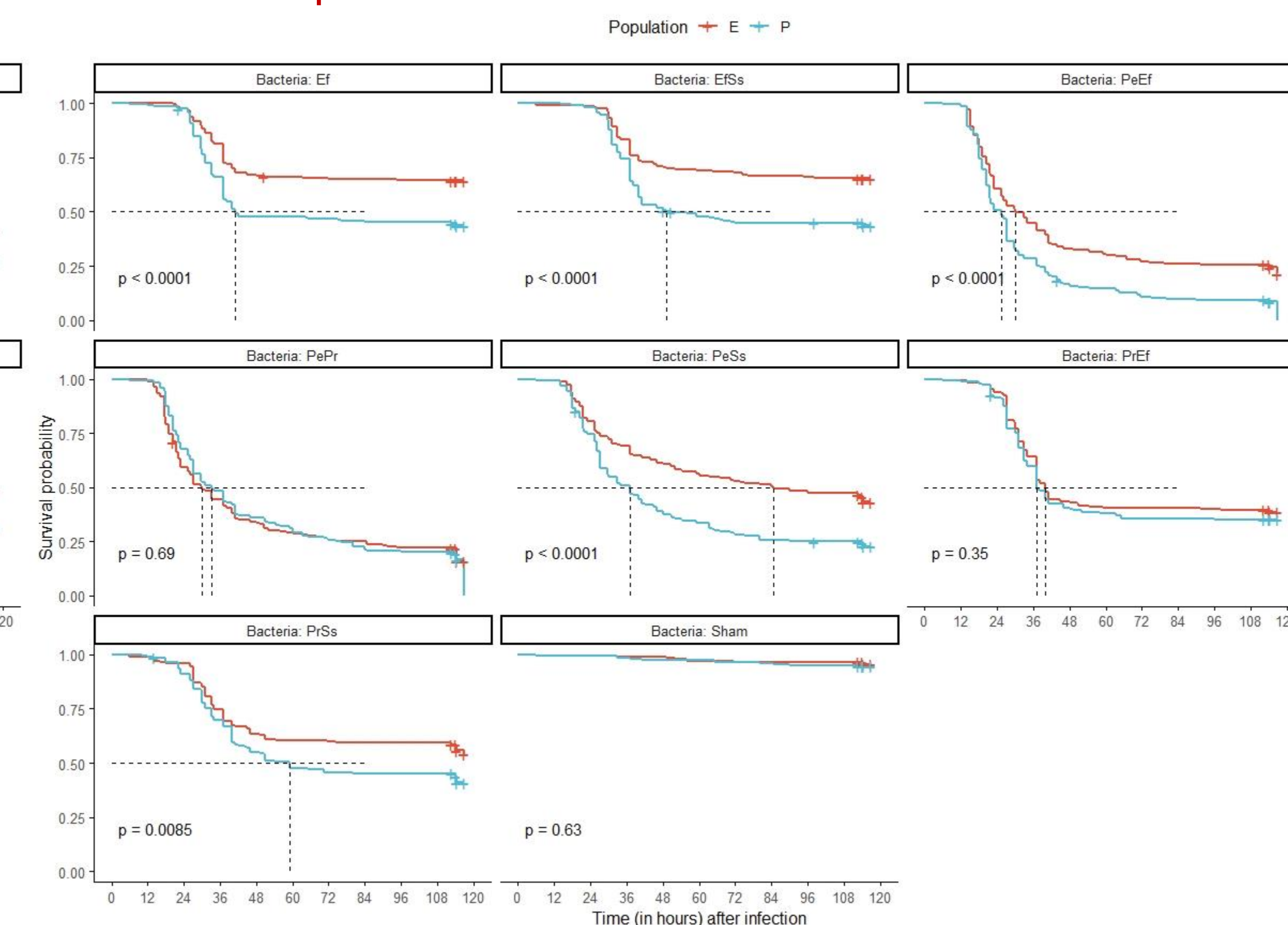


Survivorship of EP flies against bacterial mix (paired bacterial challenge):

Survivorship curves for EP females

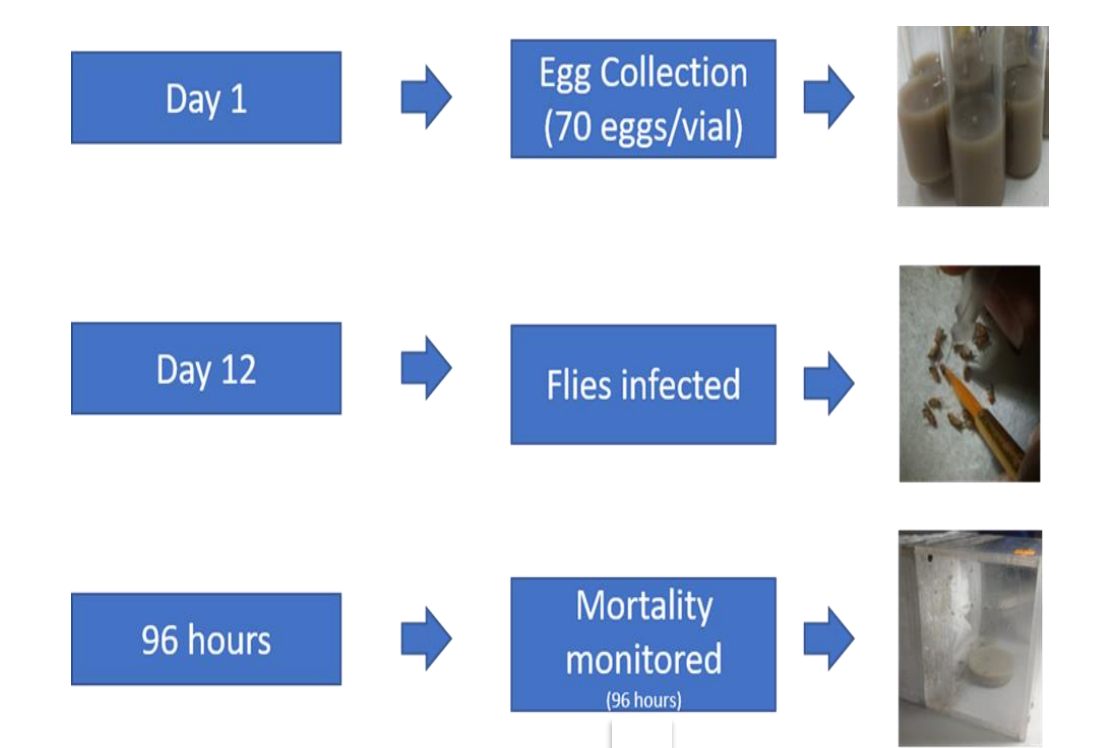


Survivorship curves for EP males



Materials and methods

- N=50 flies/sex/block/bacteria.
- Flies were either sham infected or infected with bacteria at OD₆₀₀=1.
- Bacteria used were: *Pseudomonas entomophila* (Pe), *Providencia rettgeri* (Pr), *Erwinia carotovora carotovora* (Ecc), *Enterococcus faecalis* (Ef), *Staphylococcus succinus* (Ss), *Bacillus thuringiensis* (Bt), *Micrococcus luteus* (MI).



Conclusions

- E populations survived better than P populations irrespective of the novel pathogen used for infection; there is no apparent effect of pathogen Gram character or host sex on the cross-resistance exhibited by E populations.
- E populations survived better even when infected with pathogens in pairs, indicating that co-infection does not affect cross-resistance of E populations.

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