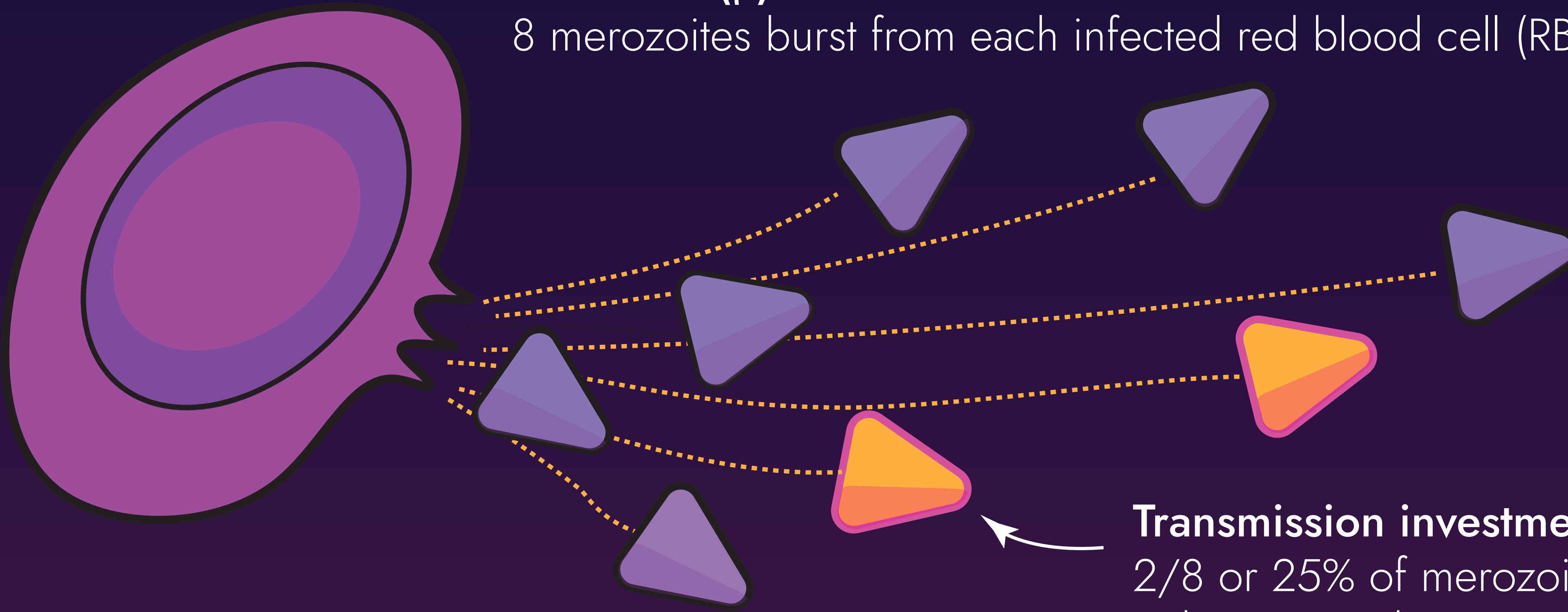


Resource availability constrains the proliferation rate of malaria parasites

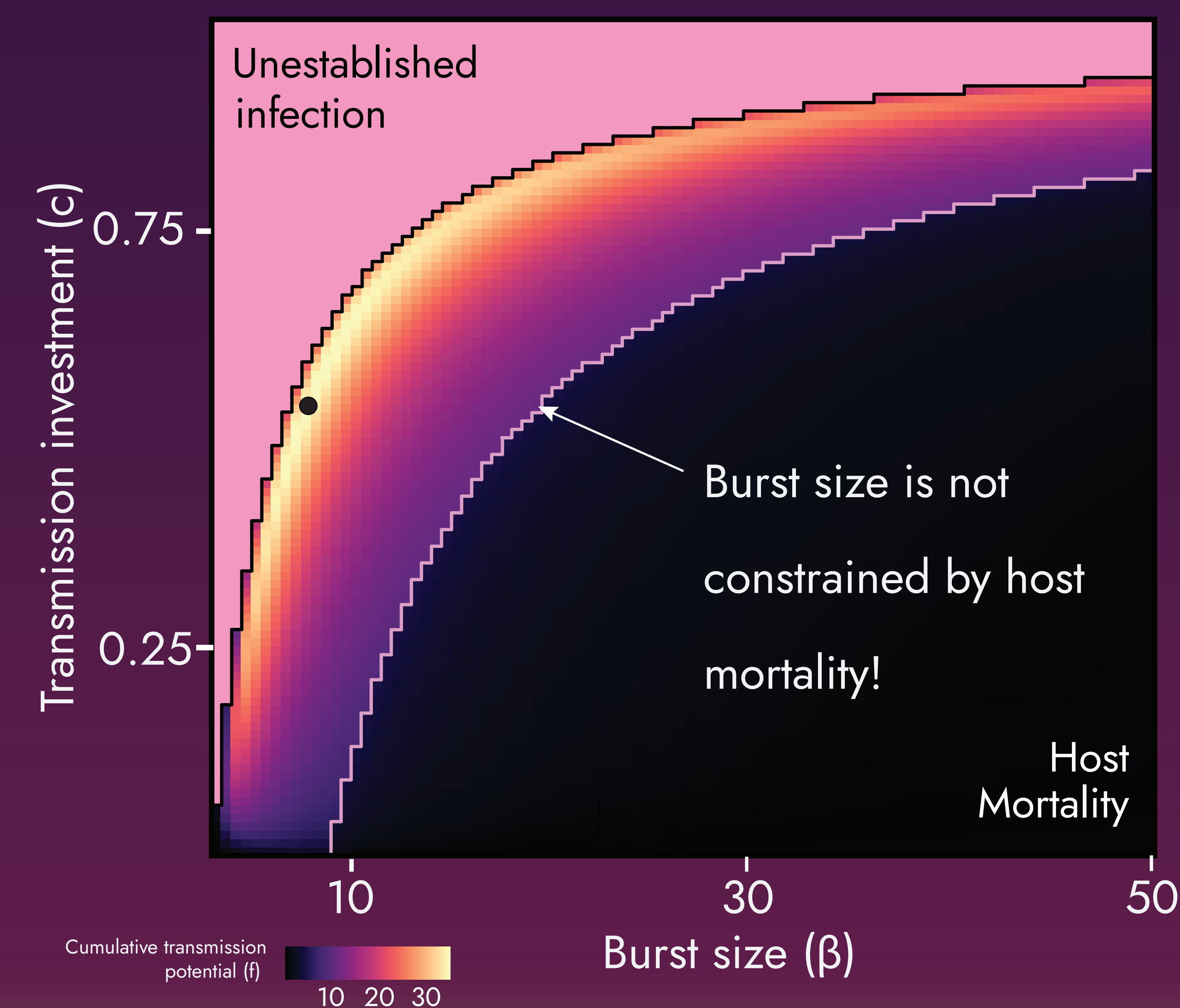
Damie Pak, Tsukushi Kamiya, and Megan Greischar

Burst size (β):
8 merozoites burst from each infected red blood cell (RBC)



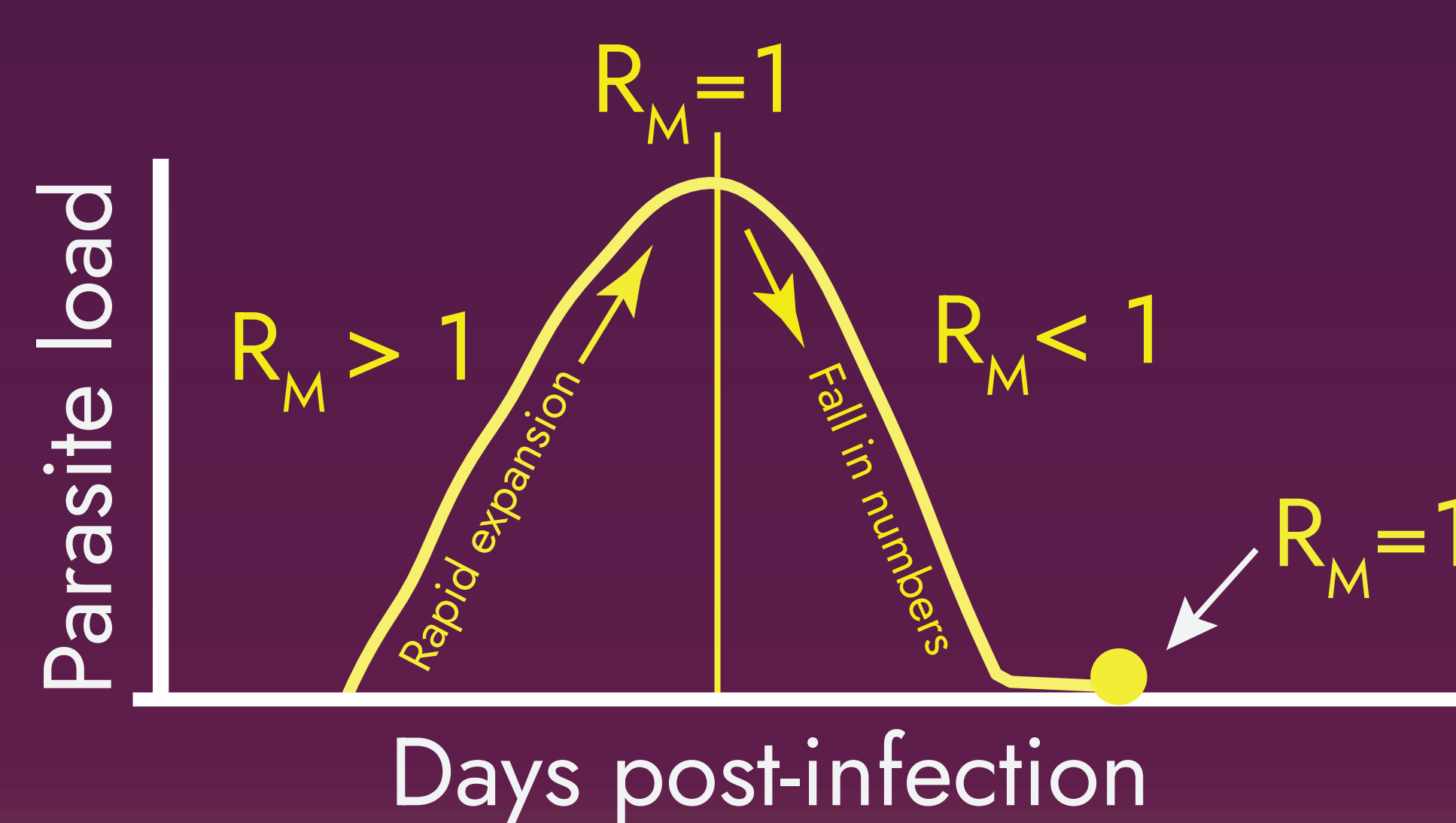
To maximize transmission, how should malaria parasites optimize **burst size** and transmission investment?

Transmission investment (c):
2/8 or 25% of merozoites are committed to becoming the transmissible forms or gametocytes



Simulating within-host infections, we find the **optimal strategy is not maximizing the burst size.**

To explore why, we quantify the effective merozoite number, R_M , which shows how many merozoites committed to asexual replication will infect a red blood cell.



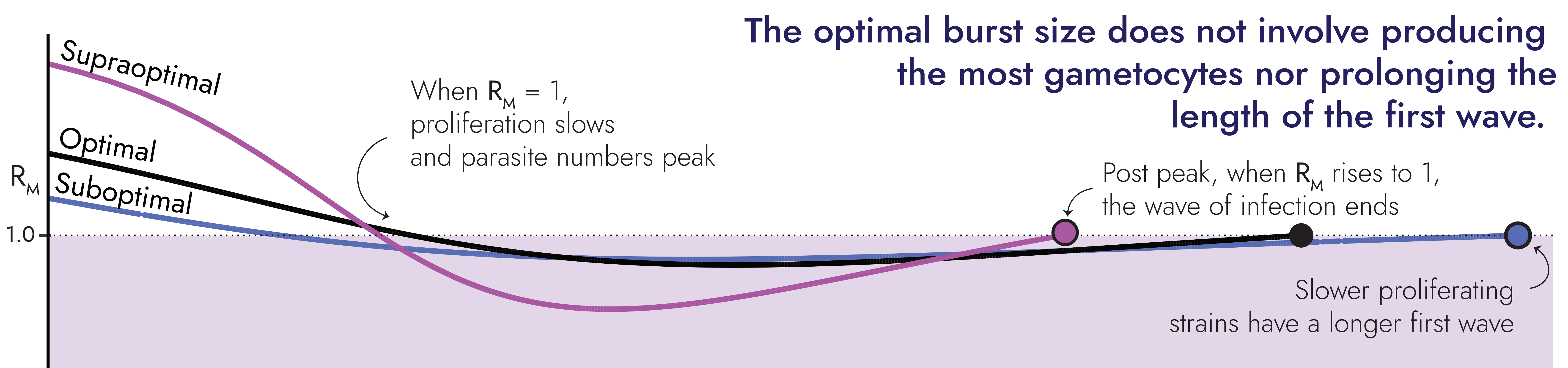
$$R_M = \beta (1-c) \frac{pR(t)}{pR(t) + \mu_M}$$

Uninfected red blood cells

Merozoite invasion rate $pR(t)$

Merozoite mortality rate μ_M

Burst size \times Proportion committed to asexual replication \times Probability of infecting an RBC



The optimal burst size does not involve producing the most gametocytes nor prolonging the length of the first wave.

