Improving Purification and Investigating Substrate Specificity of Plasmodium BEM46-Like Protein (PBLP)

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Plasmodium BEM46-Like Protein (PBLP) is a protein expressed by the parasite Plasmodium yoelii, which causes malaria. A previous study found that knockout of PBLP affects both parasite maturation and the rate of infection, yet the protein's native substrate and its specific biological function remain unknown. Determining these properties is essential for understanding PBLP's role in malaria's biological mechanism, which may inform development of future intervention strategies to reduce disease fatality. To address this question, we aimed to express and purify PBLP from E. coli and test its enzyme activity. The first attempt at protein purification had low yield, so we modified the original protocol to improve sonication efficiency for cell lysis to address a potential factor contributing to low protein recovery. In addition, we identified candidate substrates of PBLP based on computational results and tested whether they could be hydrolyzed by PBLP. Among the substrates tested, PBLP had the highest catalytic activity against p-nitrophenyl acetate, countering our hypothesis that larger, more polar substrates bind more efficiently to PBLP. These findings provide preliminary insight into potential substrate specificity of PBLP and suggest a direction for identifying the potential native substrate of the protein. Future studies on similar hypotheses can include testing additional candidate substrates and further refining purification conditions to obtain higher yields of PBLP. Improved understanding of PBLP activity may reveal intervention strategies for malaria treatment and contribute to the broader understanding of parasite biology.