

國立高雄大學應用數學系

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Complement System: Mathematical Modeling and Numerical Simulations of Alternative Pathway

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摘要：

This thesis is mainly to explore the mathematical modeling and numerical simulation of the alternative pathway of activate complements. We build model based on the law of mass action, and show the change in total concentrations of complements. We then include inhibitors in our model, which is an indispensable presence in the immune system. We also consider the diffusion and the transmission of biological signals to make the model closer to the real situation. In the numerical simulation, we use semi-implicit time integration method and finite difference method in space to solve our model. Our model can present three states of the complement system: health, pathogens removal, and pathogens survival. Finally, we will explain the meaning of the numerical results.