Model of NOS/TGF-Beta1/Plasmodia system in humans and mosquitoes

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Malaria, one of the world's Top 10 deadliest diseases, has been shown to be regulated by two key chemicals: nitric oxide and TGF-Beta1 protein. Nitric oxide kills plasmodia and activates TGF-Beta1 protein in both humans and mosquitoes. TGF-Beta1, however, inhibits the production of NOS in humans, but induces the production of NOS in mosquitoes. This implies a NOS/TGF-Beta1 positive feedback loop in the mosquito, but in humans, the growth of Nitric Oxide is limited by TGF-Beta1, so Nitric Oxide may not be able to kill as many malaria parasites. This project will attempt to model the transmittance of malaria, TGF-Beta1, and Nitric Oxide between mosquitoes and humans. After the system has been successfully modeled with proper differential equations and accurate constants, our aim will be to determine the proper range of Nitric Oxide and TGF-Beta1 levels needed (in humans and mosquitoes) to suppress the malaria situation at an optimum level.