# Investigation of a Two-Patch Within-Host Model of Hepatitis B Viral Infection: a supplementary report

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Chronic infection with hepatitis B virus (HBV) can lead to formation of abnormal nodular structures within the liver. To address how changes in liver anatomy affect overall virus-host dynamics, we developed within-host ordinary differential equation models of two-patch hepatitis B infection, one that assumes irreversible and one that assumes reversible movement between nodular structures. We investigated the models analytically and numerically, and determined the contribution of patch susceptibility, immune responses, and virus movement on within-patch and whole-liver virus dynamics. We explored the structural and practical identifiability of the models by implementing a differential algebra approach and the Monte Carlo approach for a specific HBV data set. We determined conditions for viral clearance, viral localization, and systemic viral infection. Our study suggests that cell susceptibility to infection within modular structures, the movement rate between patches, and the immune-mediated infected cell killing have the most influence on HBV dynamics. Our results can help inform intervention strategies.

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