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Hepatitis C virus non-structural protein 3 (HCV NS3) resolves G4RNA structures

Binyam Belachew, Alicia K Byrd, Jun Gao, and **Kevin D Raney**
University of Arkansas for Medical Sciences, USA

Hepatitis C virus (HCV) is the major cause of chronic liver disease and hepatocellular carcinoma. It is currently estimated that over 71 million people in the world are infected with HCV virus. The HCV genome encodes for a polyprotein that is cleaved into 7 non-structural and 3 structural proteins. One of the non-structural proteins, non-structural protein 3 (NS3), has both protease and helicase domains and is the key protein in regulating HCV RNA replication. NS3 has been one of the major targets in the treatment of HCV infection. The current HCV drugs are extremely expensive and patients may develop resistance. Therefore, it is important to develop a cost-effective anti-viral compound that targets conserved regions within the HCV genome and prevent replication of various HCV genotypes and subtypes. Recent works have shown the presence of conserved guanine-rich consensus sequences within the HCV genome. These guanine sequences can form G-quadruplex (G4) secondary structures through Hoogsteen hydrogen bonding. It has been reported that both replication and translation of the HCV genome could be inhibited by the formation of G4 structures. However, it is still unknown how HCV G4RNA structures are regulated. The aim of this project is to investigate whether and how NS3 helicase resolves HCV G4RNA structures. Understanding the mechanism by which NS3 resolves HCV G4RNA might allow us to find processes and factors that could be targeted to prevent HCV replication in a host cell.

Biography

Binyam Belachew is a second year Ph.D. student in Kevin Raney's laboratory. He graduated from Wingate University (NC) in 2014 with a Bachelor of Science in Biology and a minor in Chemistry. As an undergraduate student, he conducted both Chemistry and Biology research with Wingate University professors; He also served as a laboratory assistant. Following his undergraduate program, Binyam worked as a laboratory analyst II for Charlotte Water Company in Charlotte, North Carolina before moving to Little Rock, Arkansas for his doctoral program at the University of Arkansas for Medical Sciences.

babelachew@uams.edu

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