I. INTRODUCTION

Hepatitis C Virus (HCV), an enveloped RNA virus classified within the Flaviviridae family, remains a pressing global health concern, affecting an estimated 58 million individuals worldwide as of July 2023 (Catanese et al., 2013). Discovered in 1989, HCV intricately engages with the human body, targeting the liver and leading to chronic infections. One pathogenesis of HCV infection is the accumulation of lipids closely related to steatosis, commonly known as fatty liver, that significantly increases the risk of developing hepatocellular carcinoma (HCC) (Galli et al., 2021).

The asymptomatic nature of early infections and the absence of a vaccine pose challenges in HCV prevention (Parisi et al., 2014). However, recent advances in medical research, particularly the development of direct-acting antiviral drugs, offer hope in the ongoing efforts to combat and potentially eliminate this persistent public health threat. These medications target specific viral proteins, disrupting the viral life cycle and successfully achieving sustained virological response (SVR) in most cases. Achieving SVR indicates the absence of detectable HCV in the blood six months after completing treatment, signifying a cure (Krassenburg et al., 2021). However, despite the success in achieving SVR and eliminating the virus, studies have suggested that the risk of HCC and other liver-related complications persists. HCC after SVR occurs in approximately 2/100 patients/year with DAA treatment (Watanabe et al., 2023), with the exact underlying mechanisms not fully understood.

Lipid droplet is a ubiquitous organelle that stores and manages lipids, primarily consisting of triglycerides and cholesterol esters, serving as a dynamic reservoir for energy and lipid metabolism. HCV infection is known to hijack the host cell's lipid synthesis machinery, leading to lipid droplet accumulation in hepatocytes, a crucial factor for HCV proliferation (Monson et al., 2021). Fatty acid synthesis plays a pivotal role in the HCV life cycle, with synthesized fatty acids stored within lipid droplets as triglycerides. HCV induces an upregulation in de novo lipogenesis, creating lipid-rich environments that facilitate its entry, replication, assembly, and release processes (Awadh, 2023). This metabolic alteration is intricately linked to the development of hepatic steatosis (Sidorkiewicz, 2021). Understanding the intricate relationship between HCV and fatty acids is vital for developing targeted antiviral strategies that disrupt these lipid-dependent processes, potentially providing new avenues for therapeutic interventions against HCV infections.

This study aims to understand how HCV influences fatty acid synthesis in modulating hepatocyte lipid metabolism and to explore potential therapeutic interventions that could impede viral replication and prevent the progression of liver steatosis. The study objectives encompass observing the accumulation of lipids induced by HCV in hepatic cell lines, examining HCV manipulation of fatty acid pathways leading to the upregulation of LD synthesis, and analyzing the role of LDs in facilitating HCV replication. The hypothesis predicts that HCV potentially upregulates fatty acid synthesis pathways, thereby creating an environment conducive to viral replication and contributing to hepatic steatosis. By utilizing an HCV-infected hepatocyte cell line, this study is committed to offering valuable insights for potential therapeutic strategies through reducing viral replication, with the ultimate goal of preventing the progression of liver steatosis.