Microbiota and HCV Infection Interplay

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Abstract
Hepatitis C virus (HCV) is held responsible for about 17.5% of acute hepatitis cases and after acute infection, roughly 65% of patients develops a chronic infection. Intestinal microbiota’s relevance in the pathogenesis of HCV-induced chronic liver diseases is a promising topic within scientific community. Anyway, its role in chronic HCV infection is still not completely unraveled and it needs more detailed investigations. Although results on relationships standing between human microbiota and HCV infections are lacking, the few published articles are highly inspirational for both further studies and theoretical researches, giving a starting substrate to hypothesize the mechanisms underlying the relationships between microbiota and HCV in the context of gut-liver axis. The aim of this short review is to summarize the state of the art of microbiota/HCV interactions and possibly give a novel point of view based on the articles’ conclusions, using an eagle-eye perspective that will allow to open a door to new research studies concerning HCV infections.

Introduction
Several human body districts are colonized by a microbial community and the gathering of these pools makes up the microbiota. This huge population is formed by bacteria, fungi and these microorganisms are extimized to outnumber human cells [1-3]. Human physiological status greatly depends on microbiota, in fact it presence is necessary for a normal development, as well as for supporting immune system in the protection of the host from pathogens [4,5]. Intestinal microbiota’s relevance in pathogenesis of HCV-induced chronic liver diseases is a rising topic among scientific community. Anyway, its role in chronic hepatitis C virus (HCV) infection is still unclear and it needs more focused studies [6]. Microbiota nutritionally competes with pathogens for resources and colonization sites and it gives fundamental signals for immune priming, sustaining immune system correct development [7-10]. It has a controversial role, since it can limit or promote viral infection, or have no effect, but direct or indirect effects on viral infection itself can take place. For example, microbiota (or its metabolites) may interact with viral particles, altering response or infectivity [11-14]. Intestinal microbiota has also been recognized to have a pivotal importance in autoimmune diseases such as type 1 diabetes (T1D) [15-17]. The aim of this short review is to reassume the state of the art of microbiota/HCV interactions and possibly give a novel point of view based on the reviewed studies, using an eagle-eye perspective.

The HCV infection
Hepatitis C virus (HCV) is held responsible for about 17.5% of acute hepatitis cases and it was reported that, after acute infection, roughly 65% of patients develops a chronic infection [18]. According to the WHO (World Health Organization) statistics, HCV is currently infecting about 170 million people worldwide. Patients suffering from Chronic Hepatitis C (CHC) have a high probability to develop serious complications, i.e. cirrhosis and hepatocellular carcinoma (HCC) [19-21]. Under an epidemiological point of view, it was reported that HCV is associated with several extrahepatic manifestations such as type 2 diabetes mellitus, insulin resistance, oral manifestations and glomerulopathies [22-25].

Microbiota and viral infections
Since microbiota typically colonizes sites used by viruses to introduce their selves into hosts, its presence can is some cases affect the infection outcome. It was in fact reported that the commensal microbiota of Aedes aegypti (an insect vector) indirectly mitigates Dengue viral transmission [26]. Mosquitoes in which the commensal population is killed by antibiotic molecules show higher viral titers with the respect to those in which antibiotics are not administered. Moreover, mosquitoes having their natural microbial population highly express a broad set of immune-related genes, such as those encoding antimicrobial peptides modulated by Toll-like receptor (TLR) pathway (Xi et al. 2008).

On the other hand, while it is true that microbiota can be pivotal to fight viral infections and therefore shift the infective process balance, it may also enhance viral infection, either in a direct or indirect way. Previous studies demonstrated the indirect promoting activity exerted by microbiota on virus
It can be concluded that, although researches on relationships standing between human microbiota and HCV infections are lacking, the few published papers are highly inspirational for both further studies and theoretical investigations. As stated above, HCV infection and related liver disorders are influenced by microbiota, namely by loss of bacterial composition balance and lowering of phylotypes diversity. Taken together, these findings allow to point out that the gut-liver axis is very important within the HCV infection context and is particularly influential on its liver complication. It could be therefore useful to perform fecal transplantations on patients that are found in a condition of gut dysbiosis, in order to restore the phyla pattern. It remains unclear if particular microbiota alterations could act as a predisposing factor for an especially aggressive HCV infection or if such an infection causes dysbiosis.

**References**


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