The Origins of the Hepatitis C Virus

This article which originally appeared in the HCV Advocate, discusses the origins of the hepatitis C virus.

December 30, 2014 By Alan Franciscus

In 1996, I was diagnosed with hepatitis C and at first I was very frightened. What got triggered was the fear of the unknown. If I don’t know something about something that affects me my head imagines the worst possible scenario. Immediately after my diagnosis I started doing research to find out more about hepatitis C. It helped me on so many levels. Most importantly it helped me to be able to make important, informed decisions about my health and relieved some of that fear that comes with confronting the unknown.

I am having the same reaction to all the news about Ebola. All the news in the last 20 years about this devastating disease scares the hell out of me. Ebola has escaped out of Africa (not for the first time), and it’s very frightening. I have read a couple of books on it and listened to the TV (probably way too much). There is comfort in knowing how it is transmitted and how to prevent transmission. I believe that we do have the resources and knowledge to stop the spread of this terrible disease, at least in this country.

But this is not why I am writing this article. While I was reading about the history of Ebola, I started thinking again about the origins of hepatitis C. Did hepatitis C, like Ebola, jump species to humans? When a virus jumps from an animal to a human, it is called zoonotic. This is important information because if there is a reservoir in another species it could mean that we may not be able to eradicate the hepatitis C virus completely. I will discuss what we know about reservoirs of the hepatitis C virus in non-humans and also about reservoirs inside our bodies.

Hepacivius / Flaviviridae

The hepatitis C virus is part of genus or species of viruses called Hepacivirus within a family of
viruses called Flaviviridae or flavivirus. Flavus is yellow in Latin and this genus was given the name Flaviviridae because the first disease discovered in the family was Yellow Fever. The other infections in the Flavivirus family include West Nile Virus, Yellow Fever and Dengue Fever.

**Dogs & HCV**

In the past there has been some speculation that like HIV, hepatitis C jumped species—namely from primates (monkeys or apes) to humans. This theory has been 100% debunked.

The next zoonotic origin that was theorized was dogs, and it stood on pretty good ground. By chance, Kapoor and colleagues discovered an RNA virus that presented as a respiratory disease in dogs that was very similar to the hepatitis C virus. It was so similar in fact that when sequenced it was only 50% different from the hepacivirus (CHV). But respiratory symptoms are not seen with HCV; the dog disease does not infect the liver, and does not produce long-term or chronic infection. So it was decided that it is not an ancient form of the hepatitis C virus and therefore not a reservoir.

Recently, another study conducted by the same group tested 80 dogs, 81 deer, 84 cows, 103 horses, and 14 rabbits for antibodies that resemble the HCV gene. Eight of the horses were found to have antibodies similar to the hepatitis C gene. None of the other animals tested had antibodies including the dogs. The virus found in the horses was named NPHV.

In a later study, 136 horses in Scotland were given a viral load test to find out if they had NPHV—3 horses tested positive for NPHV. The study authors reviewed veterinary records and tried to understand if the horses had any evidence of hepatitis or any other kind of disease that would have been caused by NPHV. One of the horses had a high viral load that correlated with a viral load seen in people with hepatitis C. Also noted were some elevated liver enzymes and other tests that might be an indication of liver disease. No biopsies of the horses were made available.

So where do we stand with horses and hepatitis C? The authors of the current study summarized that large screenings have eliminated dogs, cats, pigs and rodents. Horses are probably the most likely non-human vector of a relative of the hepatitis C virus, but they stated that it was just speculation: “There is clearly much to be learned in the short term from more extensive screening.”

**Hepatitis C and Mice**

Just as I was researching and writing an article on the origins of HCV a study titled “Detection of Zoonotic Pathogens and Characterization of Novel Viruses Carried by Commensal Rattus norvegicus in New York City” was just published. Cadhla Firth and colleagues examined 133 Commensal Rattus norvegicus (Norway rats) caught in New York City. It was found that the rats tested for some human-related diseases. The rats also tested positive for the flavivirus family—the hepatitis C virus is a flavivirus. The results of this study do not confirm that the Norway rats carry the hepatitis C virus.

*Important note*: Just to be clear: A bite from a Norway rat cannot transmit hepatitis C. A
Norway rat might harbor a distant relative of the hepatitis C virus, but we don’t know yet if it is a reservoir. What we do know is that NYC and other cities should develop a program to eradicate rats to prevent the transmission of other diseases, but hepatitis C is not one of them. People might also want to think about a natural eradication program – a family cat!

**Reservoirs**

Back to the two questions of reservoirs: Is there a reservoir in our body, and is this a reservoir in an animal species and why is that important? Let’s take the second question first—the answer is we don’t yet know. It is important because a reservoir can harbor a disease that would make it difficult to eradicate in the future. But as we know hepatitis C drugs can cure almost everyone, so the question of an animal reservoir may be an interesting, but not a very important question.

**Reservoirs in the Body**

Regarding hepatitis C and a reservoir in the body; the hepatitis C virus enters the body and does not (unlike HIV and HBV) integrate into our cells when infecting and multiplying. As a result when the body naturally fights off hepatitis C or when a person is treated and cured, there are no reservoirs where the virus is lurking or hiding. This is why hepatitis C can be cured.

**Resources:**


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