

## Discovery of the Hepatitis Virus

In 2020, the Nobel Prize in Physiology or Medicine went to three researchers: **Harvey J Alter, Michael Houghton, and Charles M Rice**. All three were involved in the discovery of the hepatitis C virus.

Hepatitis is an inflammation of the liver that is triggered by various viruses and can heal completely. But it can just as easily become chronic and cause cirrhosis or liver cancer.

Hepatitis used to be a big danger – especially for people who received blood transfusions. When the hepatitis B virus was discovered in the 1960s, tests, drugs, and even a vaccination against this disease were developed. As a result, fewer people contracted the disease after a blood transfusion. However, a large number of people still developed some form of viral hepatitis.

In the 1970s, **Harvey J Alter** at the National Institutes of Health tried to find out what the reason for this was. He was first able to prove that the hepatitis diseases were not caused by the hepatitis A virus. But it was also not caused by the hepatitis B virus since it had already been diagnosed and treated. As a result, the disease was called non-A/non-B hepatitis. Later, Alter succeeded in infecting chimpanzees with hepatitis using the blood of non-A/non-B patients. The blood was therefore infectious. Alter assumed that it must be a special virus – but was not able to prove it.

It remained that way for more than a decade. A virus that caused the hepatitis could not be detected.

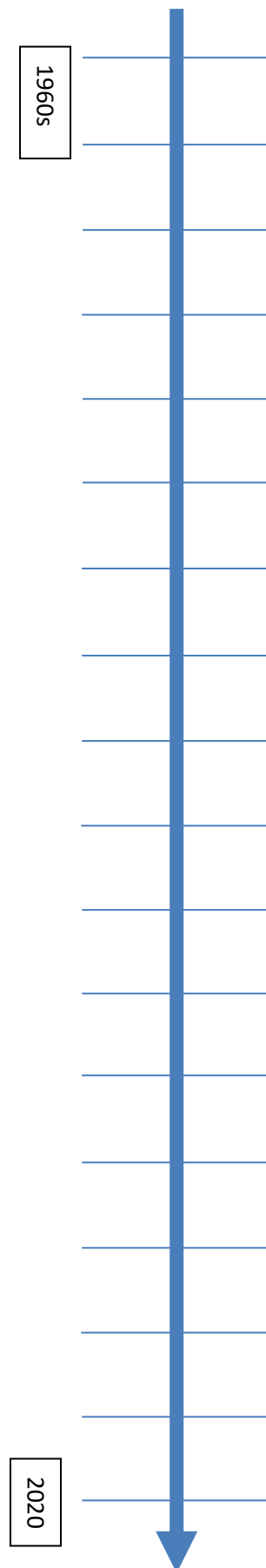
**Michael Houghton** did not achieve this until 1989. In order to find the virus, he examined blood from the infected chimpanzees for foreign DNA. Most of the DNA in the blood came from the chimpanzee itself. However, Houghton hypothesised that there must also be genetic material from the virus. To find this, he wanted to use antibodies from the blood of human patients. This was a completely new detection method at the time. But Houghton was successful with it. He found the hepatitis C virus in the blood.

This discovery led to the development of antibody tests that significantly improved the safety of blood transfusions.

What was still missing, however, was direct proof that the hepatitis C virus actually causes hepatitis. **Charles M Rice** proved this in 1997. He was able to produce a clone of the virus in the laboratory. He then injected it into the liver of a chimpanzee. The chimpanzee then contracted hepatitis C, the proof that Rice was looking for.

This discovery led to the development of drugs that can successfully treat hepatitis C today.

**Task 1:** Create a timeline that clearly shows the discovery and detection of the hepatitis C virus.



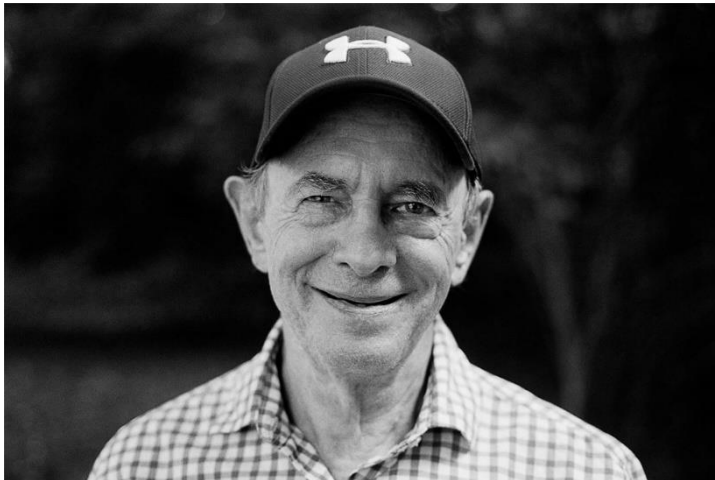


Fig. 1: Harvey J Alter

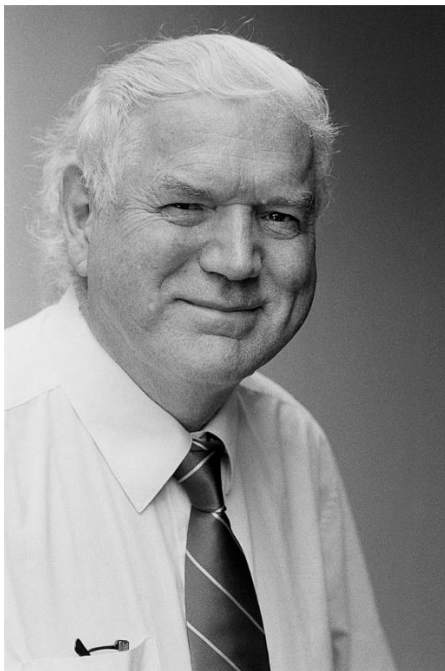


Fig. 2: Michael Houghton

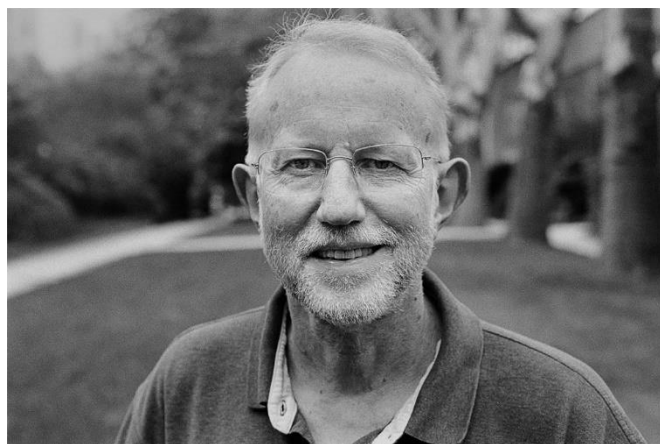


Fig. 3: Charles M Rice

Image source in each case: Peter Badge/typos 1 in cooperation with Lindau Nobel Laureate Meetings

**Task 2:** Watch the following video (in German):

<https://youtu.be/Xj1bz9rKu5A>

- Sketch the basic structure of a virus. What is the main difference between a virus and a human/animal cell?
- There are only a few really effective drugs against viral diseases. What measures can be taken to prevent a virus infection or to treat it after infection.
- Explain in one sentence why viruses are so “successful”.

