In search of the best test for hepatic encephalopathy

May 13 2024, by Stefan Zorn

Professor Maasoumy and Alena Ehrenbauer. Credit: Karin Kaiser / MHH.

Liver cirrhosis often results in a condition known as hepatic encephalopathy (HE). This is a functional disorder of the central nervous system with varying degrees of severity.

Experts distinguish between minimal hepatic encephalopathy (mHE) and clinically manifest hepatic encephalopathy, which is associated with personality changes, disorientation and impaired consciousness, including coma. mHE is characterized by impaired mental capacity. These cannot yet be recognized during a physical examination or in conversation, but can be detected using neuropsychological test procedures.

In a [study](#) now published in *Hepatology*, researchers from the Department of Gastroenterology, Hepatology, Infectiology and Endocrinology and the Department of Neurology at Hannover Medical School (MHH) compared six of the most commonly used tests for diagnosing and predicting the clinical course of mHE.

No symptoms, but limitations

Around a third of all patients with [liver cirrhosis](#) develop minimal hepatic encephalopathy. "Although they show no clinical symptoms, deficits in attention, concentration, fine motor skills and memory may occur. As a result, those affected are significantly impaired in their ability to work, drive and overall quality of life," explains Professor Dr. Benjamin Maasoumy from the Department of Gastroenterology, Hepatology, Infectiology and Endocrinology.

People with mHE have an increased risk of developing clinically manifest hepatic encephalopathy, having to be hospitalized repeatedly and dying earlier. However, mHE is difficult to diagnose due to the lack of visible symptoms.

"In order to be able to help patients with an adapted therapy, we need a test that not only reliably diagnoses mHE, but also provides information on the possible development of the disease," says Alena Ehrenbauer, who conducted the study as a KlinStrucMed doctoral project.

PHES test is considered the gold standard

The Portosystemic Hepatic Encephalopathy Score (PHES), in whose development MHH professor Dr. Karin Weissenborn played a leading role, is considered the gold standard for the diagnosis of mHE. The test consists of five individual paper-based tests.

"It covers a broad spectrum of cognitive aspects, is easy to use and very valid," reports Ehrenbauer. One disadvantage of this test is its relatively long duration—it is therefore not well suited for quick application in GP surgeries. However, alternative tests are not as well standardized.

In the study, the researchers compared a total of six tests with each other. In addition to the PHES test, these included the following:

- Animal Naming Test (ANT), in which as many animal names as possible have to be named in one minute
- Critical Flicker Frequency (CFF) test, which measures the threshold for perceiving light stimuli of different frequencies as flickering light
- Inhibitory Control Test (ICT), an attention test that measures the ability to suppress a reflex reaction in favor of a goal-oriented reaction
- EncephalApp Stroop test, which examines selective attention
- Continuous Reaction Time Test (CRT), a simple acoustic reaction test.

A total of 132 patients with liver cirrhosis took part in the study. All of them underwent the six test procedures. The researchers then observed the participants for a year and recorded the further course of the disease. They were particularly interested in whether mHE developed into clinically manifest HE and whether there were repeated hospitalizations or deaths.

No test winner—standard values missing

When comparing the different test procedures, the study team was able to show the expected basic similarities in the test results for most of the tests used. However, it was more important for them to point out that almost all tests lack well-defined standard values for diagnosing mHE.

"However, standard values are the prerequisite for a valid diagnosis and therefore also for therapeutic studies," explains Professor Maasoumy. Due to the lack of reliable standard values, a comparison and final evaluation of the tests is not possible.

"So far, the PHES test, for which valid standard values are available, appears to be the most accurate. In contrast, the CFF was not a reliable instrument for the diagnosis of the disease in our study," says Ehrenbauer.

Many cases of mHE

"Regardless of which diagnostic method we look at, our study confirms that a very large proportion of people with liver cirrhosis have mHE. It is therefore particularly important to have valid test procedures," emphasizes Professor Maasoumy.

The Department of Gastroenterology, Hepatology, Infectiology and Endocrinology will continue to pursue this topic together with the Department of Neurology in the future: Julius Egge, co-author of the study, will continue to work on the tests and hepatic encephalopathy as part of the KlinStrucMed study program.

  More information: Alena F. Ehrenbauer et al, Comparison of 6 tests for diagnosing minimal hepatic encephalopathy and predicting clinical

outcome: A prospective, observational study, *Hepatology* (2024).

Provided by Medizinische Hochschule Hannover