AMMON-OHE: A Machine Learning Model to Predict Occurrence of Overt Hepatic Encephalopathy in Patients with Cirrhosis

A prognostic mathematical model to predict the likelihood of OHE development in patients with cirrhosis based on routinely available data.

Category
Healthcare Tools
Software/Bioinformatics

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Background

Overt Hepatic Encephalopathy (OHE) is a serious complication of cirrhosis associated with increased ammonia levels due to liver insufficiency or the presence of portosystemic shunts. Compared to other hepatic decompensation events, OHE has a higher risk of death and can lead to reduced quality of life, hospitalization, and increased costs. Predicting OHE using current neuropsychometric tests is challenging, and a new readily available diagnostic tool is needed.

Technology Overview

AMMON-OHE is a prognostic mathematical model developed using machine learning, which accurately predicts the likelihood of OHE development in patients with cirrhosis based on sex, diabetes status, albumin, creatinine, and normalized ammonia to upper limit of normal (AMM-ULN). This approach is advantageous uses routinely available data and does not require direct clinician involvement. The superior performance of AMMON-OHE compared to existing neuropsychometric tests suggests its potential to replace current gold standard approaches for predicting OHE. By identifying high-risk patients, AMMON-OHE enables proactive preventive therapy, potentially reducing morbidity, mortality, and associated costs. Additionally, as a companion biomarker, AMMON-OHE can enhance treatment monitoring and potentially prevent unnecessary interventions, further improving patient outcomes.

See Figure 1.

Stage of Development

To date, the AMMON-OHE model has been shown to accurately predict which patients with stable cirrhosis will develop the first episode of OHE within five years and the chance of recurrence of OHE in susceptible patients. Further work is being carried out to investigate whether a reduction in the AMMON-OHE model is associated with reduced risk of development of OHE and whether it can act as an accurate companion biomarker to define selection of patients for preventative therapy.

Benefits

• Enhanced Diagnostic Accuracy: AMMON-OHE model uses machine learning to accurately predict OHE in cirrhosis patients and outperforms current neuropsychometric tests.

• Broad Applicability: Non-invasive and suitable for various clinical settings, including outpatient clinics, hospitals and emergency departments.

• Predictive Modeling using readily available clinical and laboratory data for OHE risk assessment.

• Potential as a Companion Biomarker to assist prescription of therapeutic interventions to prevent or reduce risk of OHE.

Applications

• Companion diagnostic

• Patient stratification tool for clinical trials

• Clinical decision support tool

Opportunity

In 2017, there were 122 million cirrhosis cases globally. A recent prospective study showed that the incidence of OHE in cirrhotic patients without previous HE was 14% at one year. The rising prevalence of cirrhosis, shift towards personalized medicine, need for early intervention and lack of good stratifiers or meaningful endpoints in clinical trials are driving demand for an accurate OHE risk assessment tool. AMMON-OHE is well-positioned to meet these demands and add value to a diagnostics/prognostics provider’s portfolio. Likewise, the AMMON-OHE model presents a signficant opportunity for OHE therapy developers to enter the preventative market and combat the devastating effects of OHE in the cirrhosis population.

Seeking

Development partner, commercial partner, Licensing

IP Status

Patent application submitted,

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