

repeatedly rate the benefits highly, in terms of more networking, new ideas, and new collaborations. The CCNA initiative has also had unexpected impacts in terms of facilitating the careers of junior faculty, providing a “home” and network for young neuroscience scientists, and allowing the dementia research community to have a voice nationally in political discussions.

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## 121380

### Bilirubin—Could it be a magic bullet for dementia and other neurodegenerative processes?

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#### Background and aims

Hyperbilirubinemia (HB) of Gilbert's Syndrome has long been associated with longevity and reduced atherosclerotic disease, cancer and other age associated diseases. This is well accepted. Many animal studies have shown that various manipulations resulting in modest HB have many wide ranging beneficial effects ranging from cancer prevention to survival from sepsis. The lack of significant study of HB in dementing diseases is surprising.

#### Methods

Inpatients were studied,  $N = 1,062,999$ . 4.0% had a bilirubin of  $>3.0$  and 1,021,724 (96.0%) had a bilirubin of 1.1 or less. Data were collected from TriNetX network between 1/1/2010 to 1/1/2023. Dementia, Alzheimer's disease, and other diagnoses/variables were analyzed. A propensity score matching (PSM) was conducted to define the non-HB comparison cohort.

#### Results

PSM created two well matched cohorts of (41,275/41,275). The HB group had less dementia (0.24% vs 1.11%,  $P < 0.0010$  and Alzheimer's disease (0.20% vs 0.82%,  $P < 0.001$ ). Other processes evaluated revealed ischemic heart disease (11.3% vs 21.7%,  $P < 0.001$ ) and all cancers (29.3% vs 31.6%,  $P < 0.001$ ) in the HB group. These results were confirmed with log rank tests.

#### Conclusions

This preliminary study revealed a greater than 4-fold lower dementia rate in those with modest HB (and no biliary disease), extremely indicative of a dramatic protective effect of HB. A detailed, population-based analysis of existing databases relative to the effects of HB and dementia is warranted. A large prospective epidemiologic analysis should be undertaken. Bilirubin levels can be manipulated relatively benignly by supplementation in humans and, in animals, by other methods with beneficial effects for various conditions.

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## 121381

### VR-EP-EEG-MRI digital biomarkers: Multi-modal machine learning model for detecting mild cognitive impairment

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#### Background and aims

As mild cognitive disease (MCI) is the last stage to prevent conversion to Alzheimer's disease, early detection of patients with MCI is crucial. Clinical studies have reported that multi-modal biomarkers are useful for early detection of MCI. Biomarkers include virtual reality (VR), evoked potential (EP), electroencephalogram (EEG) and magnetic resonance imaging (MRI). Although single modal biomarkers are also valid to early detect MCI, the combination of multi-modal biomarkers could offer complementary information for cognitive impairment. In this study, we developed a multi-modal machine learning model using digital biomarkers VR, EP, EEG, and MRI and assessed its accuracy to early detect MCI.

#### Methods

Thirteen healthy controls and thirteen MCI patients were recruited. All participants conducted VR, EP, EEG, and MRI tasks. For the classifier, a decision tree model was trained with aforementioned features, to discriminate MCI patients from healthy controls. Accuracy of the model was assessed by four-fold validation.

#### Results

The decision tree model with all multi-modal biomarkers?VR, EP, EEG, MRI reached the highest performance for classification between healthy controls and MCI patients (accuracy: 84.62%, sensitivity: 92.31%, and specificity: 76.92%). On the other hand, model with single modal biomarkers reached lower performance, including VR, EP, EEG and MRI.

#### Conclusions

In conclusion, multi-modal biomarkers VR, EP, EEG, MRI showed the highest accuracy for detecting MCI patients. This meant that multi-modal biomarkers could provide complementary information for cognitive function of MCI patients. In single modal biomarkers, VR and MRI biomarkers performed best for detection of MCI patients, as consistent.

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