

# A score that predicts 1-year functional status in patients with anti-NMDA receptor encephalitis

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## Study objective

To construct a score for predicting neurologic function 1 year after the diagnosis of anti-NMDA receptor (NMDAR) encephalitis.

## Summary results

This study developed a score that predicts neurologic function 1 year after the diagnosis anti-NMDAR encephalitis.

## What is known and what this paper adds

No standardized tool for predicting long-term functional status in patients with anti-NMDAR encephalitis is currently available. This study reports the development of a prognostic score for addressing this unmet need.

## Participants and setting

This study examined 382 patients with confirmed anti-NMDAR encephalitis (82% female) whose serum or CSF samples were sent to the University of Pennsylvania or the University of Barcelona between 2002 and 2011.

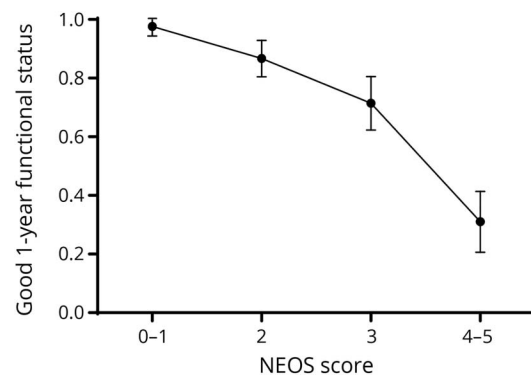
## Design, size, and duration

This study obtained demographic and clinical data for the selected patients. Functional status was assessed with the modified Rankin Scale (mRS), and mRS scores recorded 1 year after diagnosis were dichotomized as good (i.e., scores  $\leq 2$ ) or poor (i.e., scores  $\geq 3$ ). Various univariate analyses were used to identify variables associated with poor 1-year functional status, and the identified variables were incorporated into a multivariate logistic regression model that was used to construct a prognostic score called the Anti-NMDAR Encephalitis One-Year Functional Status (NEOS) score.

## Main results and the role of chance

At the 1-year timepoint, good functional status was recorded in 281 patients (74%), and poor functional status was recorded in the other 101 patients (26%). Intensive care unit (ICU) admission, treatment delay  $>4$  weeks, lack of clinical improvement after 4 weeks of treatment, abnormal MRI, and CSF white blood cell count  $>20$  cells/uL were independent predictors for outcome in multivariate

**Figure** Relationship between NEOS scores and probabilities of good 1-year functional status



regression modeling. These 5 variables were assigned 1 point each to create the NEOS score. Higher NEOS scores were associated with greater likelihoods of poor 1-year functional status ( $p < 0.001$ ).

## Bias, confounding, and other reasons for caution

mRS scores were sometimes calculated retrospectively, and this might have introduced recall bias.

## Generalizability to other populations

The samples sent to the University of Pennsylvania and the University of Barcelona came from 200 centers in 35 countries. This favors the generalizability of the results.

## Study funding/potential competing interests

This study was funded by the NIH, the Dutch Epilepsy Foundation, the Dutch government, Instituto Carlos III, and various Spanish medical research consortia. Some authors report holding antibody test patents and receiving consulting fees, funding, advisory board appointments, and autoantibody test-related royalty payments from health-care companies. Go to [Neurology.org/N](http://Neurology.org/N) for full disclosures.

*A draft of the short-form article was written by M. Dalefield, a writer with Editage, a division of Cactus Communications. The authors of the full-length article and the journal editors edited and approved the final version.*

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