○○○○に関する△△△△△△△の影響について
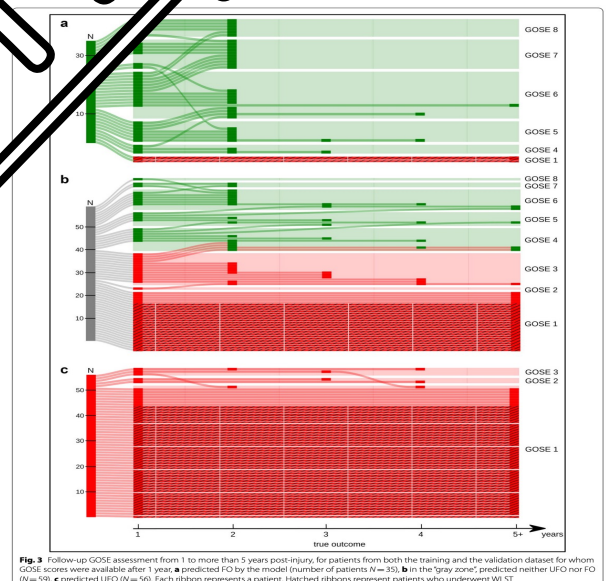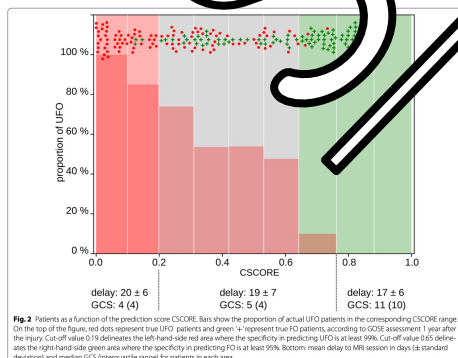## －☆☆を対象として－

Keywords: Traumatic brain injury, Outcome, Prognosis, Difusion tensor imaging, Deep white matter

Purpose: A reliable tool for outcome prognostication in severe traumatic brain injury (TBI) would improve intensive care unit (ICU) decision-making process by providing objective information to caregivers and family. This study aimed at designing a new classifcation score based on magnetic resonance (MR) difusion metrics measured in the deep white matter between day 7 and day 35 after TBI to predict 1-year clinical outcome.

Methods: Two multicenter cohorts (29 centers). The MRI-COMA cohort (NCT00577954) was split into MRICOMA-Train (50 patients enrolled between 2006 and mid-2014) and MRI-COMA-Test (140 patients followed up in clinical routine until 2014) sub-cohorts. These latter patients were pooled with 56 ICU patients (enrolled from 2014 to 2020) from CENTER-TBI cohort (NCT02210221). Patients were dichotomised depending on their 1-year Glasgow outcome scale-extended (GOSE) score: GOSE 1–3, unfavorable outcome (UFO); GOSE 4–8, favorable outcome (FO). A support vector classifier incorporating fractional anisotropy and mean difusion measured in deep white matter, and age at the time of injury was developed to predict whether the patients would be either UFO or FO.

Results: The model achieved an area under the ROC curve of 0.93 on MRI-COMA-Train training dataset, and 49% sensitivity for 96.8% specifcity in predicting UFO and 58.5% sensitivity for 91.1% specifcity in predicting FO on the pooled MRI-COMA-Test and CENTER-TBI validation datasets.

Table 2 Characteristics of patients in the validation dataset

Table ? Characteristics of patients in the training dataset

Fig. 2 Patients as a function of the prediction score CSCORE. Bars show the proportion of actual UFO patients in the corresponding CSCORE range. On the top of the figure, red dots represent true UFO patients and green '+' represent true FO patients, according to GOSE assessment 1 year after the injury. Cut-off value 0.19 delineates the left-hand-side red area where the specificity in predicting UFO is at least 99%. Cut-off value 0.65 delineates the right-hand-side green area where the specificity in predicting FO is at least 95%. Bottom: mean delay to MR session in days (± standard deviation) and median GCS (interquartile range) for patients in each area.

Fig. 3 Follow-up GOSE assessment from 1 to more than 5 years post-injury, for patients from both the training and the validation dataset for whom GOSE scores were available after 1 year, **a** predicted FO by the model (number of patients $N = 35$), **b** in the "gray zone", predicted neither UFO nor FO ($N = 59$), **c** predicted UFO ($N = 56$). Each ribbon represents a patient. Hatched ribbons represent patients who underwent WLST.

Conclusion: The model successfully identifed, with a specifcity compatible with a personalized decision-making process in ICU, one in two patients who had an unfavorable outcome at 1 year after the injury, and two-thirds of the patients who experienced a favorable outcome.