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Background

- Hypoxic-ischemic encephalopathy (HIE) is a severe brain injury that occurs in neonates due to perinatal oxygen deprivation and is characterized by abnormal cerebral blood flow and metabolism.
- Cerebral near-infrared spectroscopy (NIRS) provides real-time non-invasive information about changes in brain hemodynamics, oxygenation, and metabolism.
- This study examined the potential clinical utility of cerebral NIRS components to predict magnetic resonance imaging (MRI) outcome and/or death using machine learning and deep learning methods.

Results

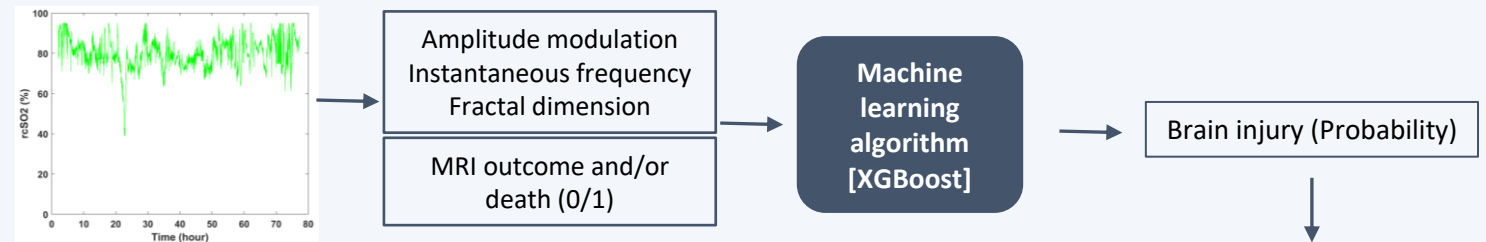
Model	ROC-AUC	95% CI	MCC
XGBoost	0.722	0.579 - 0.849	0.324
CNN	0.671	0.520 - 0.816	0.246

Conclusion

- AI based methods provide an automated analysis of the cerebral NIRS signal and may allow for early objective identification of infants at risk of adverse outcome.

Methods

- N = 58 infants (>36 weeks GA) enrolled in the Multimodal Assessment of Newborns at Risk of Neonatal Hypoxic Ischaemic Encephalopathy (MONItOr) trial.
- All infants were clinically categorised into grade of HIE (mild, moderate, severe) based on modified Sarnat score.
- MRI was performed during the first week of life and graded using the Barkovich classification.
- Abnormal outcome was defined as abnormal MRI and/or death in the first week of life.
- NIRS signals were pre-processed
 - Machine learning → Prolonged relative desaturations (PRDs) were moved → Epochs of 4h (50% overlap) → Feature extraction → XGBoost



- Deep learning → Epochs of 30 min (50% overlap)

