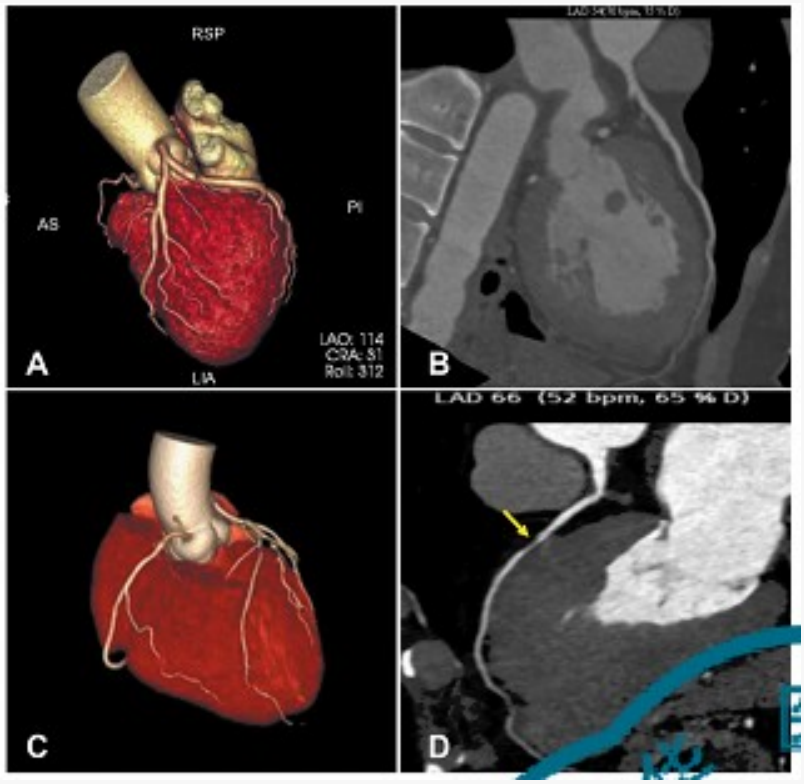
Chinese Neurosurgical Journal Study Explores AI Tool to Predict Medulloblastoma Subtypes and Genetic Risks

Deep learning models identify four molecular subgroups and key genetic risk factors in pediatric brain cancer, potentially guiding personalized treatment



Capital Medical University researchers developed an AI model that analyzes MRI scans to identify medulloblastoma subtypes and key genetic risks, potentially enabling faster and less invasive treatment planning.

BEIJING, BEIJING, CHINA, November 5, 2025 /EINPresswire.com/ -- A new deep learning framework can accurately classify four molecular subgroups of medulloblastoma and predict critical genetic risk factors using magnetic resonance imaging, according to a study by researchers from China. The artificial intelligence model achieved a median accuracy of 77.5% for subgroup classification and up to 91.3% for predicting high-risk genetic alterations. This approach could help clinicians stratify risk and tailor therapies without invasive testing.

Medulloblastoma is the most common malignant pediatric brain tumor, and outcomes vary greatly depending on the molecular subtype. Current classification typically requires invasive tissue testing, which may delay risk stratification and treatment decisions. Additionally, previous studies have not explored high-risk genetic signatures with an insufficient cohort size. Against this backdrop, a new study published in Volume 11 of the Chinese Neurosurgical Journal on September 15, 2025, explored an artificial intelligence (AI) tool that identified medulloblastoma subgroups based on magnetic resonance imaging (MRI) scans.

The team was led by Dr. Yanong Li from the Department of Radiation Oncology, Capital Medical

University, China. The researchers developed a model, called MB-CNN, which was trained on MRI images from 449 patients treated between 2015 and 2023. The model learned to sort tumors into four major subtypes as wingless (WNT), sonic hedghog (SHH), Group 3, and Group 4, which are tied to different outcomes and treatment strategies. The model then classified the tumors appropriately (nearly 8 out of 10 times.)

“Our goal is to give doctors a fast, less invasive way to understand a patient’s tumor based on molecular subgroup classification and actionable genetic risk assessment,” says Dr. Li. But the model didn’t stop at classification. In a second step, it also predicted whether a tumor carried certain genetic changes linked to prognosis including TP53 mutations in SHH tumors, MYC amplification in Group 3, and chromosome 11 loss in Group 4. The model nailed these predictions with impressive accuracy: 91% for TP53, 84% for MYC, and 87% for chromosome 11 loss.

“These mutations can tell us a lot about how aggressive a tumor might be and how best to treat it,” explains Dr. Li. “Being able to predict this from an MRI could make a real difference for patients.”
To see how the model compared the molecular subgroups, the researchers tested the AI against a traditional model that used only clinical and radiology data. The older method got about 59% accuracy, while the AI achieved 77.5%. When they combined both approaches into a hybrid model, the accuracy jumped to 82.2%.

This approach may help shorten the time needed for molecular risk assessment and provide an additional diagnostic tool in settings where advanced genetic testing is not readily available. But the study isn’t without caveats. The study was retrospective and conducted at two institutions, and scanner variability could influence performance. Larger, prospective, multicenter studies will be needed to confirm generalizability and clinical utility.

“This is a step toward integrating AI into molecular diagnostics,” Dr. Li adds. “The technology could support more precise and timely treatment decisions without replacing standard genetic testing.”

Reference
Title of original paper: Exploring deep learning and hybrid approaches in molecular subgrouping and prognostic-related genetic signatures of medulloblastoma

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About Beijing Tiantan Hospital, Capital Medical University
Beijing Tiantan Hospital, affiliated with Capital Medical University, is a leading hospital in China,

known for its expertise in neurology and neurosurgery. Combining patient care, teaching, and research, it trains future medical professionals while advancing medical knowledge. The hospital emphasizes innovation, teamwork, and compassionate care, working closely with national and international partners.

Website: https://m.incsg.com/EN/partner-hospitals/beijingtiantan/

About Dr. Yanong Li from Capital Medical University, China
Dr. Yanong Li is a Medical Doctor at Beijing Tiantan Hospital, affiliated with Capital Medical University. Dr. Li specializes in radiation oncology and is involved in advanced research on brain tumors like medulloblastoma and intracranial germ cell tumors.

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Dr. Yanong Li
Beijing Tiantan Hospital, Capital Medical University
qiuxiaoguang@bjtth.org
