Our approach enables MRI harmonization while preserving anatomy for improved tumor analysis from 38.2±3.9% to 93.4±2.2% with GM volume error of 100% means the best possible harmonization was achieved. RESULTS: Before harmonization, nWD between grayscale appearance of MRIs from sites A and B was 27.3±3.1%. After harmonization, the similarity became 93.4±2.2%. CONCLUSIONS: These brain tumor volume analysis tools are readily available to be efficiently tested on diverse populations. METHODS: We participated in the well-established international brain tumor segmentation challenge (BraTS 2023) and benchmarked our automatic tool against the best performing tools in the challenge. We also performed a retrospective analysis of 180 pediatric T1-weighted MRIs of brain tumors to evaluate the performance of our tool. We found that our tool was ranked first for pediatric high-grade glioma (Peds), third for meningioma (MEN), and fourth for low-grade glioma (LGG). Our tool was also able to achieve near-ideal performance (99.9%) on a test set of 60 pediatric brain tumors. IMPLICATIONS: Our tool has the potential to improve the accuracy and consistency of brain tumor volume analysis in clinical practice if it only relies on human interpretation of magnetic resonance imaging (MRI).
patient-derived and syngeneic BRAF-V600E mutant models (AM38, 2341).

RESULTS: Our studies indicate that Dab/Tra downregulates glucose metabolism to lactate in AM38 and 2341 cells. *In vivo* infusion with [U-13C]-glucose in mice bearing intracranial AM38 tumors confirmed that Dab/Tra downregulates 13C-lactate production in the tumor. Mechanistically, Dab/Tra destabilizes hypoxia inducible factor-1a and downregulates glycolytic genes, including SLC2A1, HK2, PKFB3, and LDHA. Importantly, deuterium metabolic imaging using [6,6'-2H]-glucose, which is a clinical stage method of imaging glycolysis, shows a reduction in lactate production within 48h of treatment with Dab/Tra in AM38 tumor-bearing mice.

CONCLUSIONS: Our studies mechanistically link BRAF/MEK inhibition with reduced glycolysis and identify [6,6'-2H]-glucose as a novel, non-invasive agent for imaging early response to therapy. Since [6,6'-2H]-glucose is a safe, orally administered agent, our studies can be rapidly translated to the clinic, where they will provide physicians with a much-needed tool to determine whether patients are responding to therapy at an early timepoint that predicts extended survival.