BACKGROUND: Pediatric brain and spinal cord tumors are the leading cause of cancer-related mortality in children. An incomplete understanding of brain tumor biology and associated limited access to high-quality biological samples for research are the main factors driving the lack of clinical therapeutic development for pediatric brain tumors that recur or progress. Post-mortem tissue donation provides an unprecedented resource for addressing some of these limitations. METHODS: The Gift from a Child (GFAC) program by the Swifty Foundation has a unique mission to increase post-mortem pediatric brain tissue donations through advocacy as well as the education of clinicians and families. Through GFAC's strategic collaboration with the Children's Brain Tumor Network (CBTN), CBTN has leveraged postmortem tissue to expand the Pediatric Brain Tumor Atlas (PBTA), a cross-histology multi-omics atlas resource. As part of the effort CBTN has sequenced and released data for over 350 post-mortem pediatric brain tumor specimens including multiple brain region sampling cases with specimen and sequencing quality metrics. RESULTS: Here we present an assessment of postmortem samples and available multi-omic data on postmortem samples within the PBTA dataset. Data have been harmonized and released with no publication embargo. To access data, researchers can utilize existing open source data resources and platforms including PedChitoPortal and OpenPedCan to: (1) Identify tumor spatial and temporal specific alterations (2) Establish tumor evolution trajectory leading to therapeutic resistance and tumor progression; (3) Understand tumor heterogeneity longitudinally across multiple ‘omics’ layers; and (4) Identify and request specimens and derived tumor models. CONCLUSIONS: Together, we present the largest deeply characterized cohort of postmortem pediatric brain tumor samples as powerful expansion of the PBTA cohort of >3,000 pediatric brain tumors. CBTN's open-science model supported by the GFAC mission highlights the value and utility of autopsy-based specimen collection on behalf of improving outcomes for children with brain tumors.