Gliomas are brain tumours mainly affecting young adults. They are currently classified and treated based on several markers such as tumour grade that categorizes tumours based on how abnormal the cells and tissue are and several molecular markers. Typically, low grade gliomas (LLG) have a better outcome and less aggressive treatment than high grade gliomas (HGG). There is a subclass of LLG called “molecular glioblastomas” which resemble, due to their molecular biomarkers HGG. It remains unclear – should they be treated as low or high grade? Determining better prognostic markers to personalize the therapeutic approach for these types of brain tumours is needed.

We will study whether Magnetic Resonance Imaging (MRI) along with molecular markers improves molecular glioblastoma diagnosis. We will use MRI for microstructural and metabolic evaluation of tumour and its aggressiveness and molecular markers to further assess tumour type. We will:

1. Compare imaging and genetic characteristics of molecular glioblastoma to high and less invasive gliomas, to distinguish further glioma subtypes.

2. Monitor the molecular glioblastoma response of therapy with MRI imaging to define the best biomarker of response.

20 molecular glioblastoma patients will undergo MRI scans three times (before, at one week and one month after the onset of chemo- and radiation therapy). These tumours will be compared to two control groups: 20 patients with less invasive gliomas (which have special gene mutation) and 20 patients with GBM. We will use novel MRI techniques developed by our group that are more specific than standard, clinical imaging protocols, and state-of-the-art genotyping.

This project will provide a more precise stratification of molecular glioblastoma by developing non-contrast-based MRI to develop more precise treatment strategies leading to improved patient management and outcomes.