Luciferase bioluminescence, micro-magnetic resonance imaging (micro-MRI), micro-computerized tomography (micro-CT), and micro-positron emission tomography (micro-PET) have expanded the portfolio of tools available to study this disease. Hypoxia, a key oncogenic driver of glioma and mechanism of resistance, can be studied in vivo by the concomitant use of noninvasive MRI and PET imaging. We present a protocol involving stereotactic injection of syngenic F98 luciferase-expressing glioma cells generated by our laboratory into Fischer 344 rat brains and imaging using luciferase. In addition, 18-F-fludeoxyglucose, 18F-fluoromisonidazole, and 18F-fluorothymidine PET imaging are compared with quantified luciferase flux. These tools can potentially be used for assessing tumor growth characteristics, hypoxia, mutational effects, and treatment effects [1)].

1)
Karsy M, Gillespie DL, Horn KP, Burrell LD, Yap JT, Jensen RL. Correlation of Glioma Proliferation and Hypoxia by Luciferase, Magnetic Resonance, and Positron Emission Tomography Imaging. Methods Mol Biol. 2018;1742:301-320. doi: 10.1007/978-1-4939-7665-2_26. PubMed PMID: 29330810.