Recent advances in both hardware and software have resulted in significant improvements in non-invasive imaging methods used for studying animal tumor models. This overview will focus on the approaches and results using MRI/S for studying rodent brain tumors. Serial images of intracerebral tumors using MRI over time following therapeutic intervention can be used to quantitate cell kill in vivo. In fact, increases in animal survival elicited by therapy are not solely attributable to the fraction of tumor cells killed but are a function of cell kill and altered tumor cell repopulation kinetics. Methods allowing earlier and more accurate quantitation of therapeutic response in individual patients are still needed. Because diffusion MRI is sensitive to tissue structure, this technique has the potential to detect important quantitative information about tumor cellular changes that occur following successful therapeutic intervention. Examples on the use of diffusion MRI to quantitate heterogeneous changes within tumor tissue following therapeutic interventions will be presented. Moreover, the ability of MRS to distinguish signals from chemically distinct compounds offers the potential to measure the expression of transgenes encoding enzymes that catalyze therapeutic reactions. The use of MRI/S for quantitative noninvasive evaluation of expression of a therapeutic transgene in experimental tumors will be presented for the yeast cytosine deaminase gene therapy paradigm. Finally, the use of imaging for the detection of apoptosis and mutagenesis using specific molecular reporter molecules will also be presented. In conclusion, the use of noninvasive imaging modalities for quantitation of therapeutic outcome, gene delivery and monitoring of cellular events is emerging as an important approach for translating findings from the lab into animal and humans.