The ability to noninvasively image the internal locations of drugs without tissue background is an important aspect of molecular medicine. While there are many drugs for the treatment of breast cancer, their efficacy is low. Moreover, drug monitoring after administration is limited. The reasons for this are due to a lack of visual identification and structural characterization at the cellular level. Therefore new approaches are needed. Thus, we propose to develop a preclinical model drug delivery system using the known breast cancer drug Trastuzumab and to visualize this drug at the cellular level. Our purpose is to precisely deliver and internally image Trastuzumab in Her-2 overexpressed breast cancer using three dimensional (3D) tumor models and ^{19}F MRI. Trastuzumab will be covalently attached to fluorinated dendrimers used as a vehicle for drug delivery. The efficiency of new drug binding to the Her-2 receptors will be measured using ^{19}F MRI that selectively images only targeted receptors. Due to different chemical environments, fluorine signals vary for fluorine alone, fluorinated dendrimer alone, and Trastuzumab-dendrimer-fluorine conjugates attached to the Her-2 receptor. The MRI experiments will be carried out using a conventional human scanner with field of 1.5 Tesla. Fluorine was selected due to its very low natural abundance, thus, there is virtual no signal without labeling. We anticipate that this technique could be applied to study the efficiency of other immunotherapeutic antibodies and receptors. If successful, this technique could be transferred to *in vivo* trials. We intend to understand how certain breast cancer cells may become resistant to Trastuzumab. If results from in vitro studies in 3D cell cultures are satisfactory, application of new drugs in small animal models *in vivo* will be sought. The ultimate goal is the development of new drug system *in vivo* and monitoring in patients.