The goal of the proposed research is to develop a wearable “early warning” device attached to an implantable microelectrode array that will give otherwise untreatable epilepsy patients enough time to prepare for an impending epileptic seizure. Because current intracranial EEG methods are inadequate for identifying cortical regions from which focal seizures arise, we propose that current EEG methods, such as macroelectrodes, do not have the full capacity to characterize the epileptogenic zone (EZ) from which these focal seizures arise. To overcome this problem, we are currently using a high-density two-dimensional microelectrode array (MEA) consisting of 96 one-millimeter long microelectrodes arranged in a regular 10 X 10. Therefore, by using the research we are conducting to help develop a program project for effective seizure prediction, we hope to develop an implantable “early warning” device that can expand the fraction of epilepsy patients whose lives could be dramatically improved.