Approximately 40% of patients with systemic cancer will develop central nervous system (CNS) metastasis. In adults, metastases to the brain arise most commonly from primary tumors of the lung, breast, skin and gastrointestinal tract. Breast cancer is the second most common cause of brain metastasis occurring in ~20% of patients. Current systemic treatments have failed to prevent the development of CNS metastasis of these malignancies. CNS involvement is almost always fatal, even in case the primary tumor is under control. Therefore, preventing the development of CNS metastases would be a great step forward in the treatment of patients with potentially disseminating, or disseminated tumors. The molecular basis of breast cancer metastasis to brain is largely unknown and no therapeutic agents preventing tumor cells to colonize the brain are available. Our study aims at the identification of gene expression patterns of breast primary tumors which are involved in the formation of cerebral metastases. To this aim, gene expression profiles of patients with metastasized breast cancers with and without cerebral metastases were compared. All tumors were negative for ER/PR/her2neu. Among various genes the cell adhesion associated, oncogene regulated (BOC) and microtubule associated protein 2 (MAP2) were prominently present. These genes were validated by RT-PCR and immunohistochemistry. Currently, we are carrying out functional studies to reveal the specific involvement of BOC and MAP2 in the formation of brain metastasis.