When MDA-MB-231 cells are injected into the mammary fat pads of mice, they either remain at the location of injection as TMD cells or metastasize to the bone as BMD cells. Recent research (Chen et al., 2017) has demonstrated that there are identifiable differences in the genetic codes of pre-metastatic, migratory TMD and metastatic, non-migratory BMD breast cancer cells. Specifically, it has been shown that the S100A4 and GRM3 genes are downregulated after metastasis. Suppressing these genes may lead to the prevention of bone metastasis. Current methods of observing these differences between BMD and TMD cell lines include nucleic acid sequence analysis, which is invasive and necessitates harvesting cells. Numerous studies (Lavra et al., 2015; Thriumani et al., 2016) have demonstrated the use of Solid Phase Microextraction (SPME) and Gas Chromatography-Mass Spectrometry (GC-MS) to analyze Volatile Organic Compounds (VOCs) in the headspace of cancer cells. SPME concentrates VOCs in the headspace onto a fiber and GC-MS separates and identifies the compounds. For this project, it was hypothesized that there are differences in the VOCs present in the headspace of TMD and BMD breast cancer cells. The determination of these differences could lead to less invasive ways of differentiating between BMD and TMD cancer cells. To identify the VOCs in question, a SPME fiber was placed in the headspace of flasks containing BMD or TMD cells to adsorb the VOCs and injected into the GC-MS instrument for analysis. Results were compared statistically to identify measurable differences in VOC signature. Initial results demonstrate that there are differences in the VOC profiles of the two cell lines and SPME/GC-MS is able to noninvasively differentiate between TMD and BMD breast cancer cells.