Purpose: Breast cancer kills more women in the United States than any other cancer except for lung cancer. Treatment is generally surgery followed by radiation therapy, chemotherapy and/or hormonal therapy. Many of these patients will have side effects to the treatment, including 80% of patients receiving radiation therapy, where 48% will have long term effects. The purpose of this paper is to identify if tracking breast density through treatment is possible, and if that breast density is indicative of side effects.

Methods: Patient data were acquired from patients recruited into ongoing studies in accord with a Karmanos Cancer Institute and Wayne State University approved research protocol. Patients were selected if they exhibited a suspicious mass after mammography and/or follow-up ultrasound. We tracked the patient volume-averaged breast density throughout the course of treatment, starting on the first day of treatment. We recorded the volume-averaged breast density of each breast generally once every week.   To analyze this data, we plot the left and right volume-averaged breast density to determine if and how the breast density is changing. We used excel to determine the slope (the change of volume-averaged breast density in km/s vs. time in s) and the coefficient of determination ($r2$) for our data.

Results: Our results show that the change in breast density over the course of radiation treatment, Tamoxifen treatment, and a combination of the two, is measureable.

Conclusions: We can detect a small change in breast density, in-vivo, on a weekly basis, throughout the course of treatment. The limitation to this study is the small number of patients, in this study only 5.   Future studies are needed to determine the significance of our results. Currently, we believe that edema, and possibly fibrosis would be observable, which will be shown in future studies.