Application of a hyperplexed fluorescence microscopy method (MultiOmyx™) to dissect proteomic biomarkers of [18]F-fluorodeoxyglucose ([18]FDG) uptake in breast cancer

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ABSTRACT

Background: Tumor FDG uptake is related to tumor aggressiveness and may represent the activity of the PI3K-AKT-mTOR signaling pathway, which is associated with various tumor phenotypes. Understanding the relationship between proteomic markers and tumor FDG uptake is critical for an accurate diagnosis and prognosis. We aimed to develop a method for dissecting proteomic biomarkers related to FDG uptake in breast cancer.

Methods: A hyperplexed fluorescence microscopy method (MultiOmyx™) combined with fluorescence in situ hybridization (FISH) was used to analyze 18 breast tumors. The tumors were classified into low and high FDG uptake groups based on SUVmax. The staining of each tumor was analyzed with the MultiOmyx platform to detect the expression of different proteins. The proteins were divided into five clusters based on their expression profiles. The relationship between FDG uptake and the expression of specific biomarkers was analyzed using a ROC curve.

Results: Our study confirmed the reported relationship between PI3K-AKT-mTOR signaling pathway activation and tumor FDG uptake. We identified multiple biomarkers associated with low or high FDG uptake.

Conclusions: The MultiOmyx platform provides quantification of FDG uptake and downstream PI3K-AKT-mTOR signaling pathway activity, which may help differentiate between high and low aggressive tumors. This information can aid in the early detection and prognosis of breast cancer.

REFERENCES


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