Characterizing the Glycan and Collagen Biomarker Profiles of DCIS

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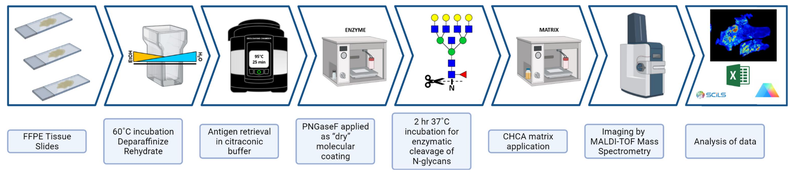
Introduction

- Ductal Carcinoma *in* situ (DCIS) represents 25% of diagnosed breast cancers. DCIS can, but rarely does, progress to Invasive Ductal Carcinoma (IDC), making overtreatment of DCIS a real problem [1,2].
- This study identified glycan tissue biomarkers using multi-enzymatic IMS approaches [3,4] to investigate the DCIS glycome and collagen distribution and how it differs during progression to IDC.

Methods and Materials



Results

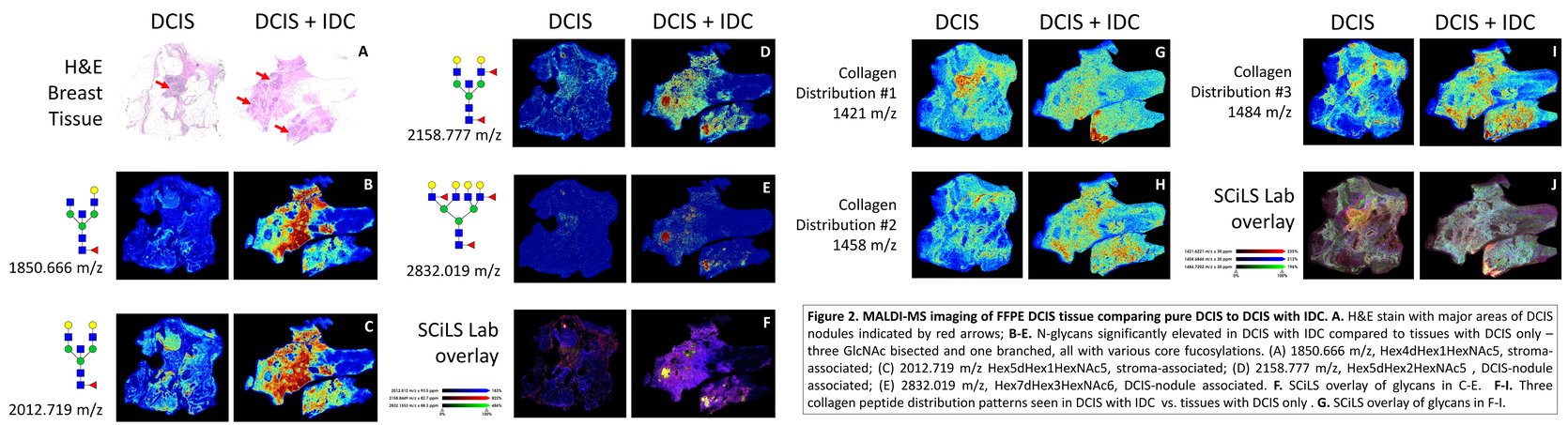


Figure 2. MALDI-MS imaging of FFPE DCIS tissue comparing pure DCIS to DCIS with IDC. A. H&E stain with major areas of DCIS nodules indicated by red arrows; **B-E.** N-glycans significantly elevated in DCIS with IDC compared to tissues with DCIS only – three GlcNAc bisected and one branched, all with various core fucosylations. (A) 1850.666 m/z, Hex4dHex1HexNAc5, stroma-associated; (C) 2012.719 m/z Hex5dHex1HexNAc5, stroma-associated; (D) 2158.777 m/z, Hex5dHex2HexNAc5 , DCIS-nodule associated; (E) 2832.019 m/z, Hex7dHex3HexNAc6, DCIS-nodule associated. **F.** SCiLS overlay of glycans in C-E. **F-I.** Three collagen peptide distribution patterns seen in DCIS with IDC vs. tissues with DCIS only . **G.** SCiLS overlay of glycans in F-I.

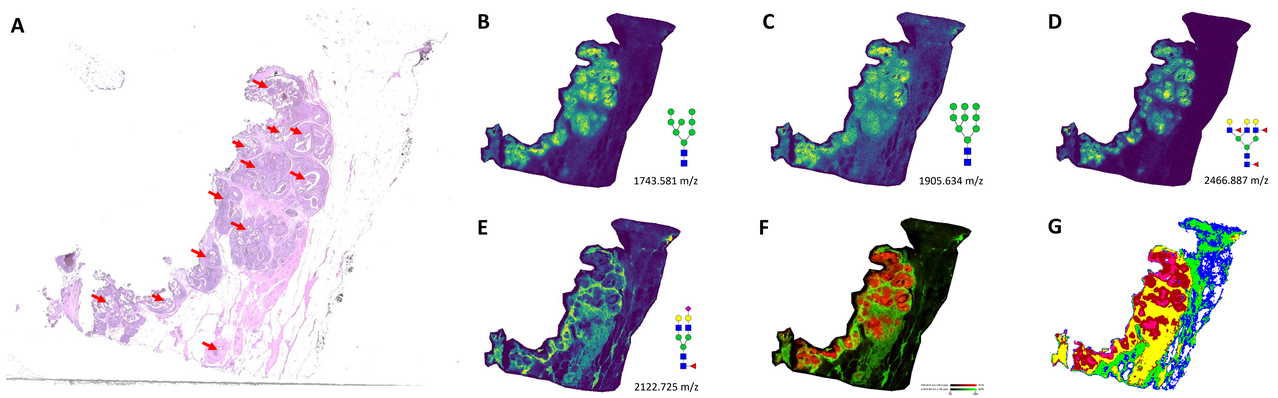
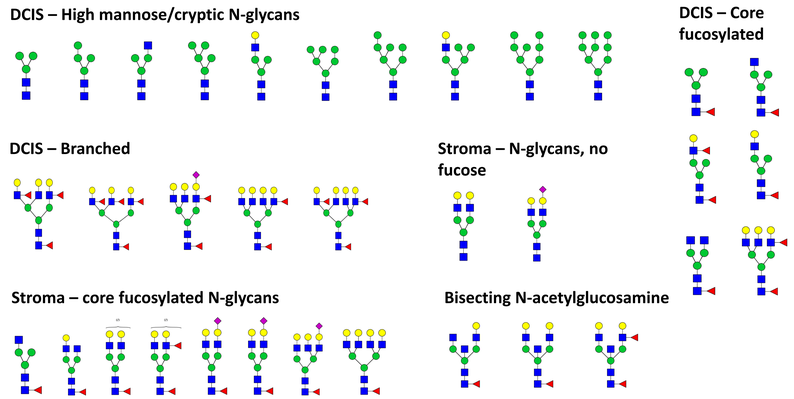


Figure 1. MALDI-MS imaging of example FFPE DCIS tissue. A. H&E stain with major areas of DCIS nodules indicated by red arrows; **B.** Example high-mannose N-glycan 1743.581 (Hex8HexNAc2) localized to DCIS nodules; **C.** Example high-mannose N-glycan 1905.634 (Hex9HexNAc2) localized to DCIS nodules; **D.** Example branched and core fucosylated N-glycan 2466.887 (Hex6dHex3HexNAc5) localized to DCIS nodules; **E.** Example sialylated N-glycan 2122.725 (Hex5dHex1HexNAc4NeuAc1 + 2Na) localized to stroma. **F.** Overlay of nodule-localized high-mannose N-glycan Hex8HexNAc2 and stroma-localized example glycan Hex5dHex1HexNAc4NeuAc1. **G.** SCiLS Lab Segmentation analysis 54 glycans.

N-glycans detected localized to DCIS or stroma around DCIS nodules



Conclusions

- DCIS shows distinct glycans in nodules and stroma, with higher proportions of branched glycans in nodules.
- DCIS in progression to IDC shows significant increases in bisecting GlcNAc and branched N-glycan structures, which are associated with immune suppression and cancer metastasis [5,6].
- DCIS in progression to IDC has different distributions of collagen peptides that may indicate alterations in tissue ECM as DCIS progresses.

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References

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