5340 - Quantitative imaging and characterization of collagen patterns in high grade serous ovarian carcinoma (HGSOC)

Ruby Yun-Ju Huang1,2,3, Tuan Zea Tan2, Jieru Ye1,2, Diana GZ Lim4, David SP Tan2,5

1School of Medicine, College of Medicine, National Taiwan University, Taiwan, 2Cancer Science Institute of Singapore, National University of Singapore, Singapore, 3Department of Obstetrics and Gynecology, National University Hospital, Singapore, 4Department of Pathology, National University Hospital, Singapore, 5Department of Haematology and Oncology, National University Cancer Institute Singapore.

BACKGROUND

• HGSOC is known to demonstrate diverse molecular heterogeneity. It is unclear whether the tumor microenvironments such as the stromal components in the extracellular matrix (ECM) also exist heterogeneity.

METHODS

• As a proof-of-concept study, characterization of collagen patterns was performed on 60 unstained formalin-fixed paraffin embedded (FFPE) HGSOC samples (three sections from each of the 20 patients).

• Each section with 5 micron thickness and a minimum tumour surface area of 40 mm² were scanned by using a multiphoton imaging system (Genesis 200, HistolIndex) following deparaffinization.

• Parameters including Collagen Area Ratio (CAR), Collagen Fiber Density (CFD), Collagen Reticulation Index (CRI), Collagen Fiber Number (CFN), Collagen Fiber Thickness (CFT), and Collagen Fiber Length (CFL) were analysed (Clinnovate Health Pte Ltd). Unsupervised hierarchical clustering analysis was performed.

RESULTS

Unsupervised hierarchical clustering of the collagen parameters revealed four distinct patterns in HGSOC samples.

• G1 tumors consisted of long and thick collagen fibers with high CFT and CFL.

• G2 tumors were low in all the collagen parameters, suggesting a relatively "clean" stromal without collagen deposition.

• G3 tumors consisted of dense collagen fibers with high CRI suggestive of extensive cross alignment among the fibers.

• G4 tumors were high in CFN and low in CRI, CFT and CFL, suggesting a stroma loaded with high amount of thin and short collagen fibers without high cross alignment.

• The collagen patterns were not exclusive for specific organ sites (ovary, fallopian tube, other metastatic sites) except that the collagen pattern from the omental metastases were mainly G2 (10/18; 55.6%) and G4 (6/18; 33.3%).

Heterogeneity in the collagen pattern within the ECM of HGSOC

CONCLUSION

The stromal component in the ECM of HGSOC can be successfully quantified by the multi-photon imaging technology on unstained FFPE sections. The collagen component exhibited significant heterogeneity in terms of the number, thickness, length, and reticulation patterns. The contribution of different collagen patterns to clinical outcomes and the correlation with known molecular subtypes in HGSOC warrants further investigation in larger cohorts.

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Email correspondence: rubyhuang@ntu.edu.tw