SS02	Scientific Session 2
14:00-15:30	GBR 103
Chairperson(s):	
Eun Ju Son (Gangnam Severance Hospital, Yonsei University College of Medicine, Korea) Young Mi Park (Inje University Busan Paik Hospital, Korea)	

14:00-14:10 (SS02-P1)

Decoding the Molecular Subtypes of Breast Cancer Seen on Multimodal Ultrasound Images Using an Assembled Convolutional Neural Network Model: A Prospective and Multicentre Study

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PURPOSE: Preoperatively determining breast cancer molecular subtypes can facilitate individualized treatment plan-making and improve patient prognosis. We aimed to develop an assembled convolutional neural network (ACNN) model for the preoperative prediction of molecular subtypes using multimodal ultrasound (US) images.
MATERIALS AND METHODS: This multicentre study prospectively evaluated a dataset of greyscale US, colour Doppler flow imaging (CDFI), and shear-wave elastography (SWE) images in 807 patients with 818 breast cancers from November 2016 to February 2021. The St. Gallen molecular subtypes of breast cancers were confirmed by postoperative immunohistochemical examination. The monomodal ACNN model based on greyscale US images, the dual-modal ACNN model based on greyscale US and CDFI images, and the multimodal ACNN model based on greyscale US and CDFI as well as SWE images were constructed in the training cohort. The performances of three ACNN models in predicting four- and five-classification molecular subtypes and identifying triple negative from non-triple negative subtypes were assessed and compared. The performance of the multimodal ACNN was also compared with preoperative core needle biopsy (CNB).
RESULTS: The performance of the multimodal ACNN model (macroaverage AUC: 0.89–0.96) was superior to that of the dual-modal ACNN model (macroaverage AUC: 0.81–0.84) and the monomodal ACNN model (macroaverage AUC: 0.73–0.75) in predicting four-classification breast cancer molecular subtypes. The performance of the multimodal ACNN model was better than that of preoperative CNB. The multimodal ACNN model also outperformed the other two ACNN models in five-classification molecular subtypes and identified triple negative from non-triple negative breast cancers. Even for T1 lesions, the multimodal ACNN model obtained satisfactory prediction performance.
CONCLUSION: The multimodal ACNN model can preoperatively predict breast cancer molecular subtypes and assist clinicians in treatment plan-making.