Role of Artificial intelligence (AI) –Smart detect in the Era of ACR BI-RADS lexicon.

Background: The American College of Radiology Breast Imaging and Data System [ACR BI-RADS] added a lexicon for breast ultrasonography which has been widely applied to daily practice with excellent diagnostic performance. Smart Detect [SD] is a new feature extraction technique which can complement the lesion assessment and provide an additional diagnostic tool to improve the performance of breast US in clinical practice. Our hypothesis is that SD can help in differentiation between benign and malignant breast lesions.

Aim to evaluate the diagnostic performance and specificity of Smart Detect in the characterization of different breast masses by ultrasonography.

Subjects and Methods: Two dedicated breast radiologists have performed breast US examination of 84 breast masses in 70 patients using RS80A (Samsung Medison Co., Ltd., Seoul, Korea) with the built in new application feature. The breast masses were retrospectively analyzed according to the fourth edition ACR BI-RADS lexicon. Cases were done between December of 2016 till February 2018. The final assessment of S-detect which was in dichotomized form: probably benign versus probably malignant was judged by agreement between the two radiologists. The suspicious masses have correlated with the pathological findings while the benign findings have correlated with follow up through the time of the study.

Results: Among 84 breast masses, 69 were benign (82%), 15 were malignant (18%). 62 breast masses were classified as BIRADS 2\3 according to ACR- BI-RADS lexicon, on S-detect they were probably benign(74%). 11 masses were BI-RADS 4\5 ,on S-detect, they were probably malignant (13%). 2 masses were BI-RADS 2, on S-detect, they were probably malignant(2.2%). 5 masses were BI-RADS 3,on S-detect, they were probably malignant (6%). 4 masses were BI-RADS 4, on S-detect, they were probably benign(4.8%). 73 breast masses showed agreement between radiologist assessment and S-detect using US descriptors for breast masses (87 %), while 11 breast masses showed disagreement criteria (13%). Sensitivity of S-detect in detection of malignant criteria was 73% and its specificity was 90%, PPV was 61% and NPV was 93%.

Conclusion: S-detect can be considered as additional diagnostic tool which can support the breast US specificity in differentiating benign and malignant breast masses in daily clinical practice.