Digital pathology in the immunohistochemical evaluation of biomarkers in breast cancer

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Background
Currently, the evaluation of biomarkers HER-2 and ER is critical for targeting therapy for breast cancer and is performed by experienced pathologists, which takes time and causes a certain interobserver variability. The use of histological slide scanners coupled with the application of software for immunoexpression quantification can be profitable in pathological laboratories routine. This study aims to compare the quantification of HER-2 and ER immunoexpression employing automatic algorithms, using as standard the evaluation performed by a pathologist.
Methods
From the archive since 2016 to 2018 were retrieved 75 immunostained slides for HER-2 and 76 immunostained slides for ER with invasive breast carcinoma diagnosis. The slides were scanned in Aperio CS2 and the immunostaining signal was quantified in Aperio Imagescope using a membrane and nuclear algorithm, respectively. The concordance between the scores obtained and the previous assessment was calculated by Cohen's Kappa coefficient as well as the sensitivity and specificity for each algorithm.
Results
Both algorithms showed an almost perfect concordance with the conventional method ($k = 0.94$ for HER-2; $k = 0.92$ for ER). Digital evaluations presented a sensitivity of 100% for both biomarkers, and a specificity of 100% for HER-2 and 80% for ER.
Conclusions
This assay showed that applying signal quantification software for HER-2 and ER in digitized slides is accurate, as these tools have potential to be implemented in laboratory routine. However, it will be necessary to increase the sample to obtain more reliable values and extend this study to the PR and Ki67 biomarkers since both carry prognostic and predictive information as well.
Keywords: Breast cancer, Biomarkers, Digital Pathology, Immunoexpression.