

Abstract Title: Automatic detection and classification of cell nuclei in immunohistochemical images with Estrogene Receptor marker

Franco Doimi (Oncosalud, Peru), Julio Oscanoa (PUCP, Peru), Jhajaira Araujo (Oncosalud, Peru), Joseph Pinto (Oncosalud, Peru), Richard Dyer (Oncosalud, Peru), Benjamín Castañeda (PUCP, Peru), Carlos S. Vallejos.

BACKGROUND:

Estrogen Receptor (ER) in immunohistochemical (IHC) staining for breast tumors samples has been used for the detection of endocrine dependence since the 80`s. The percentage of cell nuclei that react to this marker from the total is related with the response to anti-endocrine treatment and a good prognostic. Thus, the accurate counting of both positive and negative cell nuclei is critical in breast cancer treatment. Nowadays, the IHC evaluation is done visually by the pathologists and is a process subjective depending of pathologist experience.

HYPOTHESIS: Our digital image processing algorithm is able to accurately detect both positive and negative cell nuclei stained with immunohistochemistry for ER, compared to a pathologists` cell-by-cell evaluation.

METHODS: In this project, a fuzzy c-means based algorithm was developed to automatically segment and classify tumor cells. To validate this software, a set of 10 images with tissue samples of breast cancer was selected from the Stanford Tissue Microarray Database (<https://tma.im/cgi-bin/home.pl>). The positive and negative cell nuclei were visually identified and the results were validated by two expert pathologists (FD and RD). From each of these images, the in a cell-by-cell basis percentage of positive cells was obtained. The results were confronted with the percentages obtained with the software

RESULTS: The software successfully detected and classified the stained and not stained cell nuclei within the images. The percentages obtained with the software differed from the cell-by-cell evaluation by 5%, in average.