

## A PRELIMINARY MODEL TO THE AUTOMATIC PREDICTION OF AESTHETIC RESULTS IN BREAST CANCER CONSERVATIVE TREATMENT

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**Introduction:** Breast cancer conservative treatment (BCCT) is the standard of care for early-stage breast cancer. However, many women report breast asymmetry after this procedure. If a decade ago, a bad or fair aesthetic result may have been accepted as preferable to the often sole alternative of simple mastectomy, nowadays with the development of oncoplastic techniques, an excellent or good result has become the objective of both patients and caretakers. The prediction of a fair or bad result after classical choice can be determinant.

**Material and Methods:** Four measures of asymmetry captured in digital photographs from 30 patients with breast cancer (each of them in 4 positions: face arms down, face arms up, both sides arms up), taken before BCCT, were subjectively evaluated aiming at the prediction of their transformation due to treatment. Based upon given clinical information (age, tumour size and location, axillary status, thoracic perimeter, bra number and cup size) and the expert subjective evaluation of displayed photographs, we developed a learning model to predict the degree of asymmetry over those 4 measures (Breast Retraction Assessment: BRA; Breast Contour Difference: BCD; Lower Breast Contour: LBC; Breast Area Difference: BAD), the final global asymmetry and the aesthetic result. In each case we assumed that a "standard" breast-conserving procedure would be performed. Each intelligent system was trained to predict the aforementioned asymmetries measures from 60% of the patients as well to ascertain the final global asymmetry and the aesthetic result. Agreement between expert subjective and objective prediction (model) was calculated using the Linear Coefficient Correlation ( $p=1$  means highest agreement). Correlation between clinical information and prediction of results was also analysed.

**Results:** A moderate performance was obtained: BRA ( $p=0.76$ ), LBC ( $p=0.75$ ), BAD ( $p=0.38$ ), BCD ( $p=0.49$ ), final global asymmetry ( $p=0.50$ ) and aesthetic result ( $p=0.70$ ). From provided clinical factors, tumour size alone correlated well with BRA, BAD, final global asymmetry and aesthetic result. LBC required age, tumour size, thoracic perimeter and bra number and BCD required tumour size, thoracic perimeter, bra number and cup size.

**Conclusions:** The developed algorithm was capable, with moderate agreement, to predict the 30th postoperative day asymmetry measures. The most important clinical information for each measure was studied. A larger number of patients and a subjective evaluation from a larger group of experts are needed to validate the model.