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IMPROVED METHOD OF RETMARKER SCREENING PRESENTS SAFER IDENTIFICATION OF REFERABLE DR WITH SIGNIFICANTLY BETTER BURDEN REDUCTION (HIGHER SPECIFICITY)

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TAKEAWAY

Improved Retmarker Screening method shows better safety (sensitivity) and significantly higher burden reduction (higher specificity)

Retmarker

Abstract EASDEC 2018

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Title of Abstract: Improved Method of Retmarker Screening presents safer identification of referable Diabetic Retinopathy with significantly better Burden Reduction (higher Specificity)

Design of Study: Retrospective study for the performance evaluation of an improved method of automated Diabetic Retinopathy (DR) detection (integrated in Retmarker Screening, Retmarker SA, Coimbra, Portugal) with anonymized data from our screening programs.

Purpose: Evaluate Sensitivity and Specificity of the improved method when compared to the previous method, understanding its safety in identifying sight threatening DR and possible burden reduction aiming to replace former, possibly less efficient, algorithms.

Methods: Retmarker technology has been used in several DR Screening Programs since 2011 with more than 170.000 patients. Sensitivity and Specificity values are in the order of 95% and 65% respectively.

To improve classification accuracy of a former algorithm, a feature engineering process was carried out, new machine learning classifiers were trained with a subset of 11.957 patients. The used test dataset was composed of 5.918 patients, balanced referable/not referable and with no overlap with training dataset, composed of mixed data from multiple screening programs. Preliminary results were obtained using the test dataset and ultimately, a Random Forests classifier was chosen in what we call the “Improved Method (IM)”.

For a further reality check, a third dataset of 3.402 patients was used to validate the results. These were classifiable patients from a 6-months period of one of our Programs. All the referable patients (381) and around half (randomly chosen) of the not referable patients (3021) were available and included. All patients had human grading.

Results: In the test dataset (5.918 patients) the IM showed a Sensitivity of 95.30% and a Specificity of 91.70%.

In the validation dataset (3.402 patients), the IM presented a Sensitivity of 96,95% while Retmarker formerly presented 96,49% (IM obtained 12 False Negatives, two less than Retmarker; none was Proliferative Retinopathy). Regarding Specificity, the performance improved from 60,15% (Retmarker) to 87,95% (IM).

Conclusions: the proposed improvements maintain and slightly improve the safety of the automated DR screening algorithms of Retmarker Screening, while significantly improving the potential Burden Reduction due to the much better Specificity.