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COMBINING DEEP LEARNING AND CASE-BASED REASONING FOR EARLY DETECTION OF OSCC: A PILOT STUDY

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Aim: dentists are responsible for secondary prevention of oral squamous cell carcinoma (OSCC) and the recognition of oral lesions, but a cursory oral examination during dental and medical recalls may be typical. OSCC is diagnosed at a late stage, indicating also potential case of professional liability for delayed diagnosis. Deep Learning (DL) and Case-Based Reasoning (CBR) can be used to detect and classify oral lesions, detecting suspicious OSCC and providing explanations for diagnosis. This study aims to explore the potential of combining DL and CBR to improve patient outcomes.

Methods: a DL-CBR decision support system was developed using a modified Faster-R-CNN (Region-based Convolutional Neural Network) FPN+ architecture trained on 30 cases of oral ulcers belonging to three classes: neoplastic, aphthous, and traumatic.

Results: DL has achieved state-of-the-art performance in detecting and classifying clinical images, with detection rates of 82% and classification rates of 90% (98% for neoplastic vs no-neoplastic binary classification).

DL-CBR decision process was tested by 9 residents and 6 specialized doctors in 10 challenging cases. This study revealed that resident doctors are more likely to rely on CBR than on DL.

Conclusions: the DL-CBR system provides reliable and effective support to medical professionals and has potential for supporting even less experienced doctors in diagnosing challenging cases.

The system and associated cases will be soon publicly available to promote collaboration and knowledge sharing among clinical centers and DL development centers.

ANALYSIS OF SALIVARY MIRNAS IN WOMEN AT HIGH RISK OF BREAST AND OVARIAN CANCER DEVELOPMENT

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Aim: the present pilot study aims to evaluate the effect of a nutritional and lifestyle intervention on miRNA expression (nutri-pigenomics) in Breast Cancer (BRCA) 1-2 genes mutated females. Subjects with a germ mutation of the BRCA 1-2 genes are more predisposed to develop ovarian cancer (16-59%) and breast cancer (55-60%). Here we report the preliminary results on the modification of salivary miRNA expression since the beginning of experimental intervention up to 12 months.

Methods: twenty-five females, aged between 18 and 40 years, with a germ mutation of the gene BRCA1-2 were included in the study. The experimental intervention involves a preliminary visit conducted in association with the Breast Unit of the Academic Hospital of Parma which includes medical history, diagnostic exams, dental visit, salivary and blood collec-

tion, questionnaire on the quality of life and a nutritional counselling. The patients underwent to periodic visits (6, 12, 18, 24 months). The whole saliva collected was spat into a sterile container, for a total of 2 mL of saliva. Presence and concentration of 84 selected miRNAs were evaluated through real-time polymerase chain reaction (RT-qPCR).

Results: forty-three salivary samples of 17 enrolled woman were analyzed. Nineteen miRNAs did not amplify in any sample. Instead, miR-27 a, miR221, miR-191, miR-16 had a proportional change in their expression with the beginning of the nutritional and lifestyle intervention.

Conclusions: salivary diagnostics is revolutionizing the concept of early diagnosis and monitoring of oral and systemic diseases.