

DENTISTRY AND MAXILLOFACIAL SURGERY

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Patients with squamous cell carcinoma of the head and neck (SCCHN)

Introduction: Patients with squamous cell carcinoma of the head and neck (SCCHN) have a high risk of recurrence. We aimed to develop machine learning methods to identify transcriptomic and proteomic features that provide accurate classification models for predicting the risk of early recurrence in SCCHN patients.

Objectives: The objective was to build an artificial intelligence model by implementing a comprehensive analysis of SCCHN early recurrence risk using clinical data, high-throughput genomic, transcriptomic and reverse phase protein array (RPPA) proteomic data derived from TCGA datasets.

Methods: Clinical, genomic, transcriptomic and proteomic features distinguishing recurrence risk in SCCHN patients from The Cancer Genome Atlas (TCGA) were examined. Recurrence within one year after the treatment was regarded as high-risk and no recurrence as low-risk.

Results: Using conventional statistical analysis no significant differences in individual clinical characteristics, mutation profiles or mRNA expression patterns were seen between the groups. Using the machine learning algorithm extreme gradient boosting (XGBoost) ten proteins (RAD50, 4E-BP1, MYH11, MAP2K1, BECN1, NF2, RAB25, ERFF1, KDR, SERPINE1) and five mRNAs (PLAUR, DKK1, AXIN2, ANG and VEGFA) made the greatest contribution to classification. These features were used to build improved models to predict recurrence based on XGBoost, achieving the best discrimination performance when combining transcriptomic and proteomic data.

Conclusion: This study highlights machine learning to identify transcriptomic and proteomic factors that play important roles in predicting risk of recurrence in patients with SCCHN and develop such models by iterative cycles to enhance their accuracy, thereby aiding the introduction of personalized treatment regimens.

Recent Publications:

1. Reiterative Modelling of Combined Transcriptomic and Proteomic Features Refines and Improves the Prediction of Early Recurrence in Squamous Cell Carcinoma of Head and Neck
2. Comparison of Quality of Life among Patients with Oro-Hypopharyngeal Cancer after Tonsillectomy and Panscopy Using Transoral Robotic Surgery: A Pilot Study - FullText - Case Reports in Oncology 2020, Vol. 13, No. 3 - Karger Publishers (umu.se)
3. Comparison of Preoperative Positron Emission Tomography/Computed Tomography with Panscopy and Ultrasound in Patients with Head and Neck Cancer - FullText - Oncology 2020, Vol. 98, No. 12 - Karger Publishers (umu.se).

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Biography

Amir M Salehi is a fully accredited General ENT consultant and Dentist with an Oral & Maxillofacial Master of Science degree from UCLH, Eastman Institute London, UK. His practice is based out from a private clinic in Stockholm county. He qualified from Karolinska Institute as a dentist in 1995, Oral & Maxillofacial Master degree from UCLH, Eastman Institute London, UK in 1998, M.D license in 2006, Sweden. He has worked as Orthopedic resident (2007), GP resident (2008). To broaden his experience he has worked in head and neck centers in UCLH (1998,2018), Munich (2012) and Numberg (2013) - Germany. During his ENT residency at Umea University Hospital, Sweden, he became the first Console surgeon (while resident) for Trans Oral Robotic Surgery (TORS) in 2017. He was awarded his certificate of completion of specialist training in general ENT in March 2020, Sweden . Salehi 's main research interest is within Head and Neck surgery/ Oncology and his dissertation is planned for 2022.

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