

Research Brief

Exploring the significance of EGFR, MMP-2, MMP-9, HIF-1 α , and CAIX as molecular biomarkers in ocular surface squamous neoplasia

Remya Girija Ramachandran,¹ Sowmya Parameswaran,² Rama Rajagopal,³ Jyotirmay Biswas⁴ & Subramanian Krishnakumar¹

Departments of ¹L&T Ocular Pathology, and ²Radheshyamkanoi Siem Cell Laboratory, Vision Research Foundation, Kamalnayan Bajaj Institute for Research in Vision and Ophthalmology, Departments of ³Cornea, and ⁴Uvea & Ocular Pathology, Medical and Vision Research Foundations, Sankara Nethralaya, Chennai, Tamil Nadu, India

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Background and objectives: Ocular surface squamous neoplasia (OSSN) encompasses a spectrum of tumours, including conjunctival squamous intraepithelial neoplasia (CSIN), carcinoma in situ (CIS), and invasive squamous cell carcinoma (iSCC). The roles of biomarkers such as epidermal growth factor receptor (EGFR), matrix metalloproteinase-2 (MMP-2), matrix metalloproteinase-9 (MMP-9), hypoxia-inducible factor-1 α (HIF-1 α), and carbonic anhydrase IX (CAIX) in OSSN progression are incompletely understood. This study aimed to investigate their expression patterns in Asian Indian OSSN tumours.

Methods: This observational immunohistochemistry (IHC) study was conducted on 21 formalin-fixed, paraffin-embedded tissue specimens from patients with CSIN, CIS, or iSCC. OSSN tumours were categorised into Group A (CSIN and CIS) and Group B (iSCC). Immunohistochemical staining was used to assess the expression of EGFR, MMP-2, MMP-9, HIF-1 α , and CAIX. Statistical analysis was performed to determine significant differences in biomarker expression between the groups.

Results: Significantly higher expression of EGFR ($P=0.03$), MMP-2 ($P=0.02$), and CAIX ($P=0.03$) was observed in Group B (iSCC) compared to Group A (CSIN and CIS). MMP-9 expression did not differ significantly between the groups ($P=0.14$). HIF-1 α expression in tumour cells was also not significantly different ($P=0.41$). HIF-1 α expression in inflammatory cells was significantly higher in Group B (iSCC) compared to Group A ($P=0.038$).

Interpretation and conclusions: This study suggests that EGFR, MMP-2, and CAIX may play a role in OSSN progression from CSIN/CIS to iSCC. Elevated HIF-1 α expression in inflammatory cells highlights the potential involvement of inflammation in OSSN development. These biomarkers may serve as potential therapeutic targets and could also be integrated into diagnostic tools for OSSN.

Keywords Epidermal growth factor receptor; Hypoxia-inducible factor-1 α ; Matrix metalloproteinase-2; Matrix metalloproteinase-9; Ocular surface squamous neoplasia