

# Combination of MUC1 and MUC4 expression predicts clinical outcome in patients with oral squamous cell carcinoma

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## Abstract

**Background** Both MUC1 and MUC4 are high molecular weight glycoproteins and are independent indicators of worse prognosis in many human epithelial cancers including oral squamous cell carcinoma (OSCC). However, there has been no investigation of the clinical importance of the co-expression of MUC1 and MUC4 in OSCC. The aim of this study was to evaluate the co-expression profile of MUC1/MUC4 and analyze the prognostic significance in OSCC.

**Methods** We examined the expression profile of MUC1 and MUC4 in OSCC tissues from 206 patients using immunohistochemistry. The co-expression profile of MUC1/MUC4 and its prognostic significance in OSCC was statistically analyzed.

**Results** MUC1 and MUC4 overexpression were strongly correlated with each other ( $p < 0.0001$ ) and a combination of both MUC1 and MUC4 expression was a powerful indicator for tumor aggressiveness such as tumor size ( $p = 0.014$ ), lymph node metastasis ( $p = 0.0001$ ), tumor stage ( $p = 0.006$ ), diffuse invasion ( $p = 0.028$ ), and vascular invasion ( $p = 0.014$ ). The MUC1/MUC4 double-positive patients showed the poorest overall and disease-free survival. Multivariate analysis revealed that MUC1/MUC4 double-positivity was the strong independent prognostic factor for overall and disease-free survival ( $p = 0.007$  and ( $p = 0.0019$ ), in addition to regional recurrence ( $p = 0.0025$ ).

**Conclusions** Taken together, these observations indicate that the use of a combination of MUC1/MUC4 can predict outcomes for patients with OSCC. This combination is also a useful marker for predicting regional recurrence. MUC1 and MUC4 may be attractive targets for the selection of treatment methods in OSCC.

Y. Kamikawa and Y. Kanmura contributed equally to this work.

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