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Correlation between a VEGF Marker and Patients with Mucoepidermoid Carcinoma

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Abstract

Objective: The aim of this work was to examine the expression of VEGF and its correlation with the grade of mucoepidermoid carcinoma. **Subjects and Methods**: A cohort of males with mean age 47.1±13.15 and 13 females with mean age 38.65±22.15 was studied. Eight cases had high, 11 moderate, and 11 had low grade lesions based on histopathology. Fifty formalin-fixed, paraffin-embedded tissue blocks of these patients with mucoepidermoid disease were used to confirm the diagnosis in this study using sections stained with hematoxylin and eosin. **Results**: VEGF was expressed in all cases. Cytoplasmic expression varied from +1 in two cases to +4 in 28 cases. VEGF was expressed at high intensity in 27 cases. A significant difference ($P < 0.05$) was found between the intensity and expression of VEGF, according to the chi-square test. There was a significant correlation between mucoepidermoid carcinoma and grade of cancer. **Conclusion**: VEGF was expressed in malignant tumors and may serve as a marker for the disease.

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Introduction

The lymphatic and blood vascular systems are formed and maintained in large part by the vascular endothelial growth factor (VEGF) [1]. VEGF affects the vascularization of tumors, the vascularization that occurs naturally during the healing of wounds, and the pathologic neovascularization that results from local tissue ischemia [2]. Mucoepidermoid carcinoma, or MEC, is a common salivary gland cancer that mostly affects the parotid gland. In a clinical setting, MEC may manifest as a damaging mass that is rapidly growing or as a mass that grows slowly. Histologic grade and clinical stage are usually associated with the prognosis of mucoepidermoid carcinoma [3].

Immunohistochemistry studies have been produced aiming to aid in both the prognosis of tumors in salivary gland malignant and the differential diagnosis of cancers in salivary gland but paid little attention to the expression of VEGF marker and its significance [4,5]. Evaluations of the expression in healthy salivary glands next to cancers were conducted [6]. Expression levels in mucoepidermoid carcinoma and small salivary gland papillary cystadenoma were also assessed [6]. Identifying an immunohistochemistry marker is essential for determining the development of malignancies in mucoepidermoid patients and its correlation marker [7]. The objective of this work was to examine immunohistochemically the expression of VEGF and the correlation of that expression with the grade of cancer.

Subjects and Methods

Fifty formalin-fixed, paraffin-embedded tissue blocks of 30 patients with mucoepidermoid disease were used to confirm diagnosis in this study using sections stained with hematoxylin and eosin. The Madenat Altib Hospital's pathology department archives were used to choose the patients. After being taken from the patient files, the case slides were examined to verify the clinicopathologic data, which included age, sex, and histologic grade.

Partitions measuring 4 µm were cut out of each paraffin-covered sample block and the blocks were deparaffinized using 100% xylene. Subsequently, blocks were rehydrated using increasing concentrations of ethanol and submerged in TBS with a pH of around 6.0 tris buffer saline and for antigen retrieval the samples heated at 750 watts in a microwave oven. Samples were let cool down at room temperature and incubated in primary antibodies. After being diluted to a 1:12,000 ratio with EnVision, VEGF (Anti-Human clone: KDI5, Leicca MEXI, in USA Polyclonal Rabbit) was left to sit for one hour [8]. After a wash in saline tris solution, a secondary antibody treatment was administered. Samples

were stained after chromogenic treatment [9].

We counted the positive cytoplasmic staining cells to quantify the studied marker in each slide of mucoepidermoid carcinoma. Furthermore, a score corresponding to the staining intensity was assigned, as indicated in Table 1. At the same time, two pathologists assessed each slide [10-14].

Table 1. Scoring system of vascular endothelial growth factor (VEGF).

Number (score)	0 (negative)	1%–25% (1)	26%–50% (2)	51%–75% (3)	76%–100% (4)
Intensity	0 = no positive cells	+ = mild	++ = moderate	+ 3 = strong	+ 3 = strong

Results

The main characteristics of the case study show that included 17 males with the mean age 47.1±13.15 and 13 females with the mean age 38.65±22.15. Eight cases had a high grade, 11 moderate, and 11 a low grade. VEGF was expressed in all cases as displayed in Tables 2 and 3. Cytoplasmic expression +1 was found in 2 cases and +4 in 28 cases. Expression and intensity of VEGF between these two types of cases were different (Figure 2).

Table 2. Vascular endothelial growth factor expression in mucoepidermopid carcinoma via immunohistochemistry.

Score	0	+1	+2	+3	+4
Malignant mucoepidermoid	0	2	0	0	28

Table 3. Intensity of VEGF expression in mucoepidermoid carcinoma via immunohistochemistry.

Mild	Moderate	Strong	Total
0	3	27	30

Seventeen mucoepidermoid carcinomas were classified as having high grade, 11 moderate, and only 4 low grade.

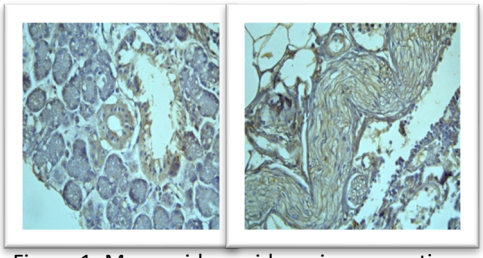

Figure 1. Mucoepidermoid carcinoma sections showing strong VEGF expression [peroxidade (brown) immunostaining, counterstained with hematoxylin (blue).

Discussion/Conclusion

A role for VEGF in the transformation of malignant cells is suggested by the elevated expression of the marker in malignant tumors. Reducing VEGF synthesis may contribute to the understanding of the significant correlation observed between VEGF expression and tumor angiogenesis.

References

1. Neville BW, Damm DD, Allen CM, Bouguot JE. *Oral & Maxillofacial Pathology.* (4th ed) 2016:444–8. 454–7, 462–4.

2. Shamloo N, Taghavi N, Yazdani F, Shalpoush S, Ahmadi S. CD44 expression in pleomorphic adenoma, carcinoma ex pleomorphic adenoma and their adjacent normal salivary glands. *Dent Res J (Isfahan)* 2018;15:361–6.

3. Fonseca FP, de Andrade BA, Lopes MA, Pontes HA, Vargas PA, de Almeida OP, et al. P63 expression in papillary cystadenoma and mucoepidermoid carcinoma of minor salivary glands. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2021;115:79–86.

4. Akbarzadeh Baghban A, Taghavi N, Shahla M. Combined analysis of vascular endothelial growth factor expression with cyclooxygenase-2 and mast cell density in oral squamous cell carcinoma. *Pathobiology.* 2017;84:80–6.

5. Sakurai K, Urade M, Noguchi K, Kishimoto H, Ishibashi M, Yasoshima H, et al. Increased expression of cyclooxygenase-2 in human salivary gland tumors. *Pathol Int.* 2001;51:762–9.

6. Gallo O, Franchi A, Magnelli L, Sardi I, Vannacci A, Boddi V, et al. Cyclooxygenase-2 pathway correlates with VEGF expression in head and neck cancer. Implications for tumor angiogenesis and metastasis. *Neoplasia.* 2001;3:53–61.

7. Lequerica-Fernández P, Astudillo A, de Vicente JC. Expression of vascular endothelial growth factor in salivary gland carcinomas correlates with lymph node metastasis. *Anticancer Res.* 2007;27:3661–6.

8. Fonseca FP, Basso MP, Mariano FV, Kowalski LP, Lopes MA, Martins MD, et al. Vascular endothelial growth factor immunoexpression is increased in malignant salivary gland tumors. *Ann Diagn Pathol.* 2024;19:169–74.

9. Lim JJ, Kang S, Lee MR, Pai HK, Yoon HJ, Lee JI, et al. Expression of vascular endothelial growth factor in salivary gland carcinomas and its relation to p53, Ki-67 and prognosis. *J Oral Pathol Med.* 2003;32:552–61.

10. Gnepp DR. *Diagnostic Surgical Pathology of the Head and Neck.* Philadelphia: Saunders; 2019.

11. Auclair PL, Goode RK, Ellis GL. *Mucoepidermoid carcinoma of intraoral salivary glands, Cancer 69:2021–2030.*

12. Aoki T, Tsukinoki K, Kurabayashi H, Sasaki M, Yasuda M, Ota Y, et al. Hepatocyte growth factor expression correlates with cyclooxygenase-2 pathway in human salivary gland tumors. *Oral Oncol.* 2022;42:51–6.

13. Cho NP, Han HS, Soh Y, Son HJ. Overexpression of cyclooxygenase-2 correlates with cytoplasmic HuR expression in salivary mucoepidermoid carcinoma but not in pleomorphic adenoma. *J Oral Pathol Med.* 2007;36:297–303.

14. Merza MS. Comparative imuunohistochemical analysis of K-RAS oncogene and cyclooxygenase 2 enzyme expression in pleomorphic adenoma and adenoid cystic carcinoma of salivary glands. *Eur Sci J.* 2023;9:1857–7881.