

## Relationship between expression of vascular endothelial growth factor and intratumoral hemorrhage in human pituitary adenomas

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### ABSTRACT

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**Aims and background.** Although pituitary adenoma is a primary brain tumor that occasionally accompanies intratumoral hemorrhage, there are little reports about the molecular mechanism of intratumoral bleeding in pituitary adenoma. Vascular endothelial growth factor (VEGF) plays an important role in angiogenesis and vascular permeability of various brain tumors. The authors studied the relationship between intratumoral hemorrhage and the expression of VEGF in human pituitary adenomas.

**Methods.** VEGF expression was assessed by reverse transcriptase polymerase chain reaction (RT-PCR) in 71 pituitary adenomas. Clinical factors to investigate were age, gender, hormonal functioning, and radiological findings of pituitary adenomas. Radiological findings which were investigated by magnetic resonance (MR) images were intratumoral hemorrhage, cystic change, tumor size, and cavernous sinus invasion. The relationship between these factors and VEGF expression was statistically analyzed.

**Results.** VEGF was expressed in 25 cases (35.2%). Functioning tumors, hemorrhage, cystic change, and cavernous sinus invasion were 32 (45.1%), 18 (25.4%), 12 (16.9%), and 21 (29.6%) respectively. The expression of VEGF showed a significant relationship with the intratumoral hemorrhage of the adenomas ( $P < 0.001$ ). However, age, gender, tumor size, hormonal functioning, cyst formation, and cavernous sinus invasion had no relationship with VEGF expression ( $P > 0.05$ ).

**Conclusions.** This study suggests that VEGF expression may be responsible for intratumoral hemorrhage of pituitary adenomas. Therefore, VEGF can be a novel target to prevent a catastrophic apoplexy in pituitary adenomas and to establish roles in angiogenesis-based therapeutics of pituitary adenomas.

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**Key words:** angiogenesis, intratumoral hemorrhage, pituitary adenoma, vascular endothelial growth factor.

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