

Diabetic retinopathy and vascular endothelial growth factor

Sir,

Recently, I read with interest the article of Javanmard *et al.*, who reported that the aqueous level of vascular endothelial growth factor (VEGF) in non-proliferative diabetic retinopathy (NPDR) was not different compared to non-diabetic patients, while soluble form of VEGF receptor-1 (sVEGFR-1) was lower in NPDR than non-diabetic subjects.^[1]

Several diabetic complications are related to imbalances between angiogenic and antiangiogenic factors.^[2] Diabetic retinopathy is a microvascular diabetic complication and previous studies reported the role of angiogenic factors especially VEGF in this process.^[3] It was shown that the VEGF/sVEGFR-1 ratio is a better indicator for angiogenesis process.^[4] Although, in this study, the authors did not compare VEGF/sVEGFR-1 ratio between two groups, however, we should consider that we cannot estimate the angiogenesis process in NPDR patients solely by measurements of aqueous level of VEGF. In a recent paper, Waltenberger discussed regarding the VEGF resistance and angiogenic paradox in diabetes.^[5] He indicated that the monocyte is a suitable cellular model for VEGF resistance. Although, the angiogenic response of VEGF is elevated in diabetes mellitus, however, the response to VEGF is reduced. On the other hand, it is important to distinguish between angiogenesis and arteriogenesis which may be involved in this

paradox. According to this hypothesis, it seems that during the short period, arteriogenesis is reduced in diabetes mellitus due to VEGF resistance, however, in long-period, angiogenesis increases in spite of VEGF resistance the results of high and continuous stimulation of VEGF.^[5] Increase in arteriogenesis is associated with collateral vessel formation, while, increase in angiogenesis is associated with diabetic retinopathy.^[5,6] Thus, it seems that the role of VEGF and their receptors in proliferative or NPDR are more complex.

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REFERENCES

1. Javanmard SH, Hassanpour Z, Abbaspoor Z, Naderian GA, Jahanmard M. Aqueous concentrations of VEGF and soluble VEGF receptor-1 in diabetic retinopathy patients. *J Res Med Sci* 2012;17:1124-27.
2. Tahergorabi Z, Khazaei M. Imbalance of angiogenesis in diabetic complications: The mechanisms. *Int J Prev Med* 2012;3:827-38.
3. Gupta N, Mansoor S, Sharma A, Sapkal A, Sheth J, Falatoonzadeh P, *et al.* Diabetic retinopathy and VEGF. *Open Ophthalmol J* 2013;7:4-10.
4. Bando H, Weich HA, Brokelmann M, Horiguchi S, Funata N, Ogawa T, *et al.* Association between intratumoral free and total VEGF, soluble VEGFR-1, VEGFR-2 and prognosis in breast cancer. *Br J Cancer* 2005;92:553-61.
5. Waltenberger J. VEGF resistance as a molecular basis to explain the angiogenesis paradox in diabetes mellitus. *Biochem Soc Trans* 2009;37:1167-70.
6. Costa PZ, Soares R. Neovascularization in diabetes and its complications. *Unraveling the angiogenic paradox*. *Life Sci* 2013; [Epub ahead of print].