Cerebral blood volume as a prognostic marker in glioblastoma patients treated with bevacizumab: a systematic review

Amin Saberi*, Mehrdad Gazanchian, Hamidreza Ghodsi, Ali Mofatteh, Shahin Nazarpour

Mashhad University of Medical Sciences, Mashhad, Iran

INTRODUCTION

Bevacizumab (BVZ) is a FDA approved antiangiogenic agent for the treatment of recurrent glioblastoma. Patients have varied response to this treatment and it is important to identify biomarkers that can predict responders. The aim of this study is to systematically review the prognostic value of cerebral blood volume (CBV) in glioblastoma patients treated with bevacizumab.

METHODS

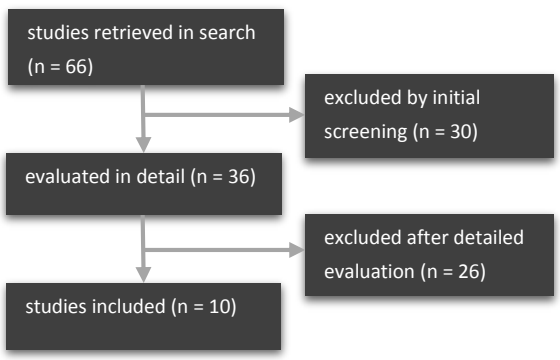
PubMed, Scopus and EMBASE databases were searched until March 2016 using the following search strategy: "glioblastoma AND bevacizumab AND ('cerebral blood volume' OR 'relative blood volume' OR CBV OR rCBV or RBV)". No language or time limit was applied.

Two authors independently reviewed the retrieved articles. All studies that evaluated the prognostic value of cerebral blood volume in glioblastoma patients treated with bevacizumab were included. Case reports, letters to editor and review articles were excluded.

Data extraction for included studies was performed and quality of studies was assessed using Oxford Center for Evidence-Based Medicine checklist for prognostic studies.

RESULTS

Ten studies (365 patients) were included.

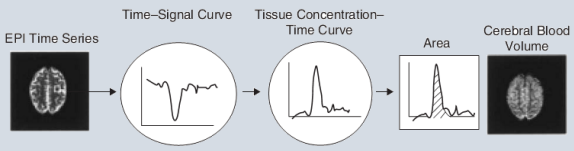


A summary of findings is reported in Supplementary Table (http://ow.ly/xPGe300gSYE). In eight studies all the patients had recurrent glioblastoma and in one study only patients with primary glioblastoma were included. One study included both primary and recurrent glioblastomas in addition to grade III glioma patients. Seven studies had retrospective designs. In five studies patients were treated with bevacizumab monotherapy and in five studies other treatments including radiotherapy, TMZ and irrinocetan were combined with bevacizumab.

Overall survival (OS) and progression-free survival (PFS) were the outcomes of interest in 9 and 7 studies respectively.

CBV was a significant predictor of OS and PFS in 5 and 3 studies respectively. PFS was significantly associated with pre-treatment CBV in 1 out of 6, post-treatment CBV in 2 out of 5 and CBV change in 1 out of 5 studies. OS was significantly associated with pre-treatment CBV in 2 out of 6, post-treatment CBV in 2 out of 5 and CBV change in 3 out of 8 studies.

			Sawlani 2010[1]	Verhoeff 2010[2]	Aquino 2014[3]	Leu 2014[4]	Omuro 2014[5]	Schmainda 2014[6]	Harris 2014[7]	Kickingereder 2015[8]	Schmainda 2015[9]	Leu 2016[10]
number of patients			16	15	42	32	40	36	45	71	21	47
result	PFS	pre			×	×	×	×	×	✓		
		post			×	×		✓	×	✓		
		delta	×			×	×		✓	×		
	OS	pre		×	×	×	×	✓	×	✓		
		post			×	×		✓	×	✓		
		delta		×		×	×	×	✓	×	✓	✓



CONLUSIONS

The conflicting results of included studies indicate that the application of cerebral blood volume as a prognostic factor in glioblastoma patients treated with bevacizumab is uncertain. We are performing a meta-analysis to further explore this prognostic role.

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*amnsbr@gmail.com