

# Variation in the use of bevacizumab and ranibizumab for branch retinal vein occlusion

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## BACKGROUND

Anti-vascular endothelial growth factor (anti-VEGF) agents including bevacizumab (Avastin®; Genentech) and ranibizumab (Lucentis®; Genentech, San Francisco, CA, USA) are used in treating macular edema secondary to retinal vein occlusion.[1,2] However, significant cost differences exist between agents; bevacizumab costs on average \$60 per dose while ranibizumab costs \$1985 per dose.[3] In addition, considerable variation exists with respect to the use of intravitreal anti-VEGF agents for the management of retinal vein occlusion; studies have identified regional and provider factors associated with overall variation in anti-VEGF use.[4-6]

## PURPOSE

To describe frequency and variation of intravitreal bevacizumab and ranibizumab use for branch retinal vein occlusion (BVO) in the United States (US) with the aim of improving cost effective ophthalmic treatment utilization.

## METHODS

We obtained a 5% sample of Medicare beneficiaries from the 2010-2013 Medicare Part B claims files and identified all beneficiaries with an ICD-9-CM code for branch retinal vein occlusion (BVO, 362.36). Patient age, gender, race, and Charlson Comorbidity Index (CCI) scores were collected. HSCPS codes for bevacizumab (J3590, J9035, and J3490) and ranibizumab (J2778) were used to identify the mode of treatment for each patient. Patients who met the following criteria were excluded: (1) patients who were under 65 years of age; (2) patients who did not reside in the 50 United States or the District of Columbia; and (3) patients who did not have Part-B coverage or with HMO coverage that was not processed by CMS. Patients were also excluded from the analysis if they did not receive either of the above two treatments or if they received both types of treatment. Geographic variation was examined by comparing injection frequencies across the nine US census divisions using Chi-squared analysis.

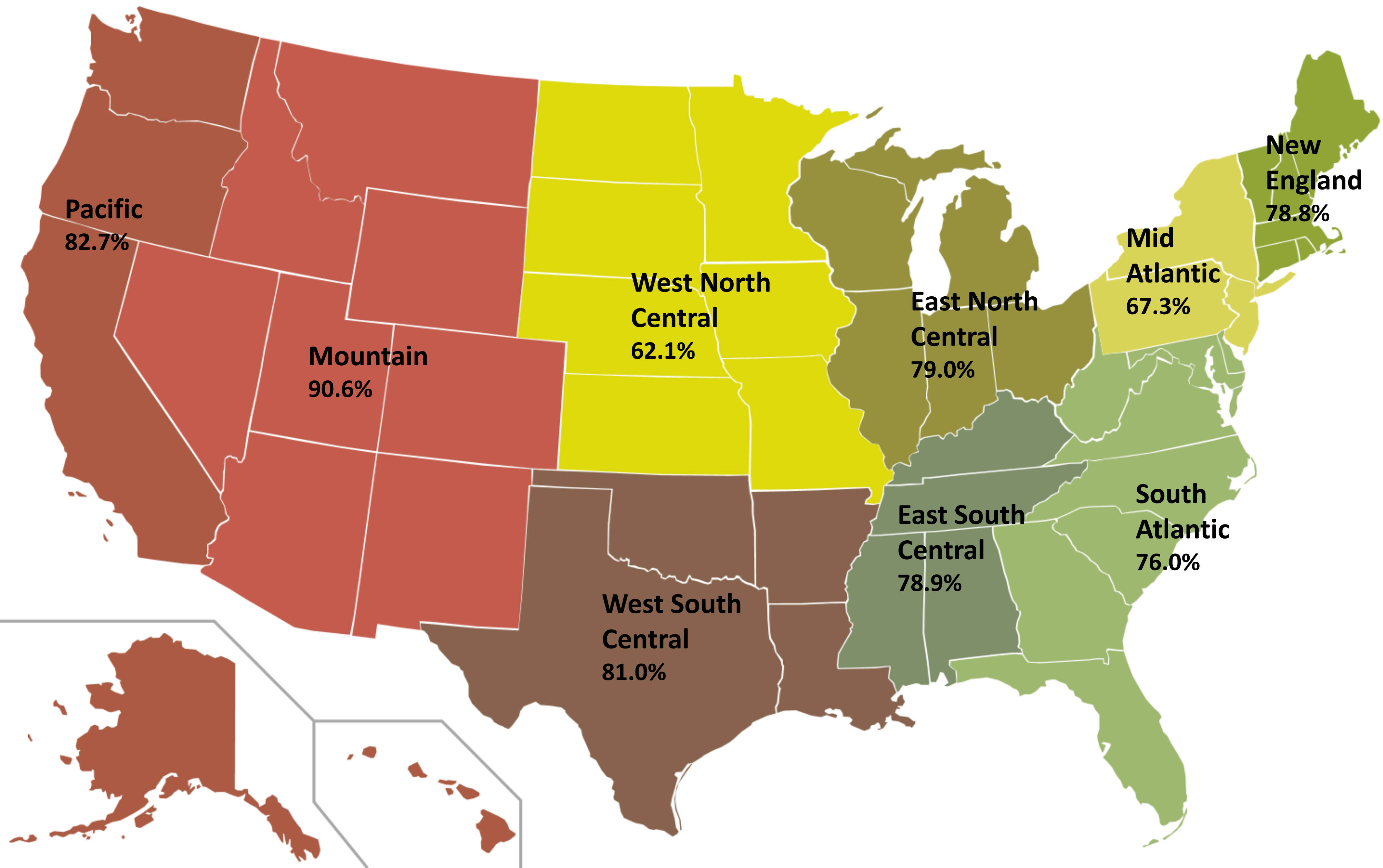
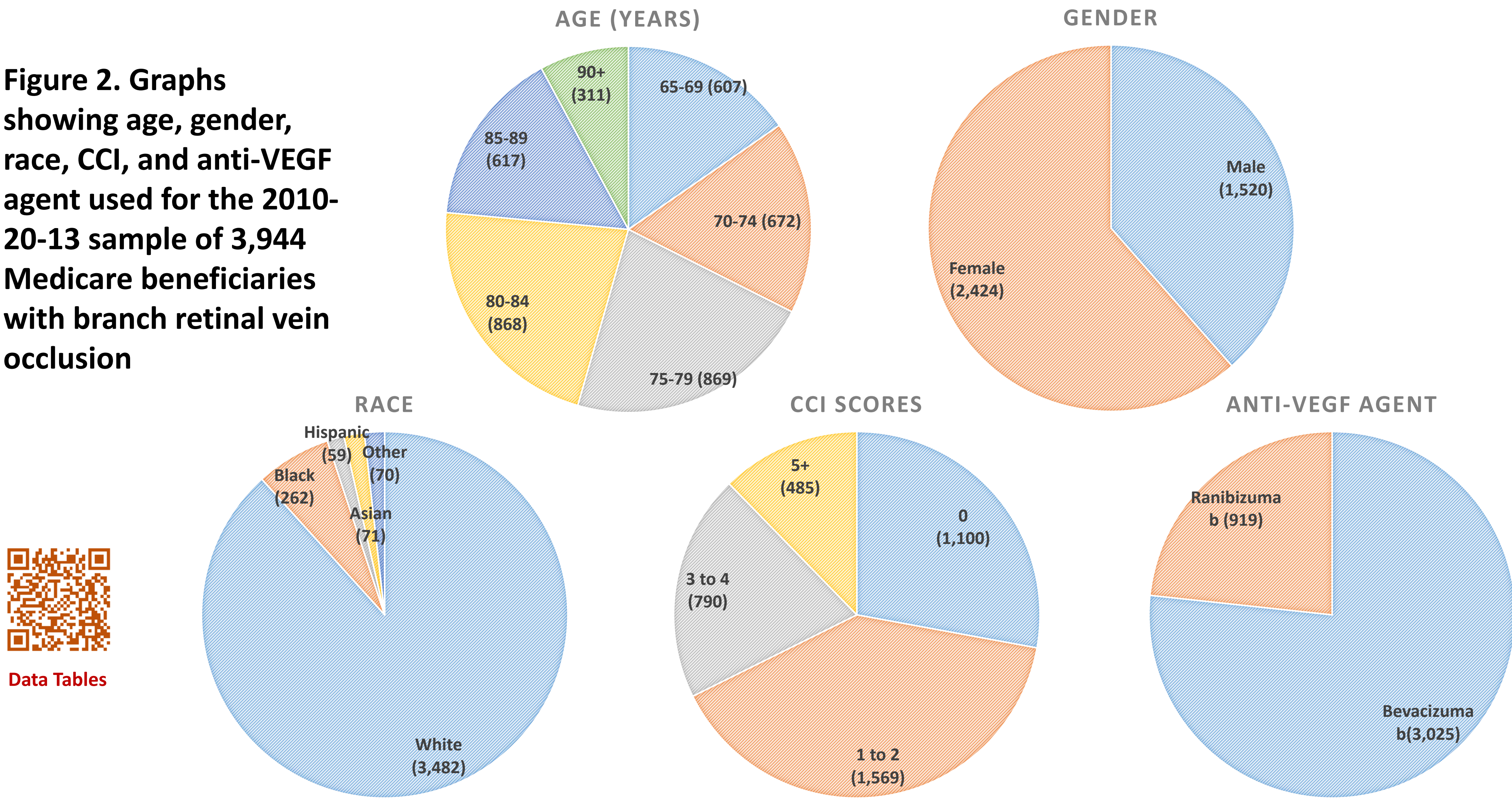


Figure 1. Map displaying frequency of bevacizumab injections (vs ranibizumab) within each US Census Division among patients with branch retinal vein occlusion from 2010-2013 (n=3,944)



Data Tables

## RESULTS

- During 2010-2013, 3,944 BVO patients met the inclusion criteria; a majority received bevacizumab compared to ranibizumab (76.7% vs 23.3%)
- Most patients were aged 85-89 (22.0%), female (61.5%), white (88.3%), and had a CCI score of 1-2 (39.8%)
- Frequencies of bevacizumab and ranibizumab injections for BVO varied significantly between the US census divisions (p<0.0001)
- Divisions with highest bevacizumab use: Mountain (90.6%) and Pacific (82.7%). Divisions with highest ranibizumab use: West North Central (37.9%) and Mid Atlantic (32.7%)

## CONCLUSIONS

A majority of Medicare beneficiaries with BVO received bevacizumab compared to ranibizumab, with significant geographic variation in the use the two anti-VEGF agents. Future research into factors driving geographic variation in the use of these agents may help direct cost-effective strategies for the management of BVO.

## REFERENCES

1. Thach AB, et al. Time to clinically significant visual acuity gains after ranibizumab treatment for retinal vein occlusion: BRAVO and CRUISE trials. *Ophthalmology*. 2014;121:1059–1066.
2. Yilmaz T, Cordero-Coma M. Use of bevacizumab for macular edema secondary to branch retinal vein occlusion: a systematic review. *Graefes Arch Clin Exp Ophthalmol*. 2012;250:787-793.
3. Taylor SC, et al. Physician-Industry Interactions and Anti-Vascular Endothelial Growth Factor Use Among US Ophthalmologists. *JAMA Ophthalmol*. 2016;134(8):897-903.
4. Erie JC, et al. High Variation of Intravitreal Injection Rates and Medicare Anti-Vascular Endothelial Growth Factor Payments per Injection in the United States. *Ophthalmology*. 2016;123(6):1257-1262.
5. Pershing S, et al. Treating age-related macular degeneration: comparing the use of two drugs among medicare and veterans affairs populations. *Health Aff (Millwood)*. 2015;34(2):229-238.
6. Baisiwal S, et al. Physician Utilization Patterns for VEGF-Inhibitor Drugs in the 2012 United States Medicare Population: Bevacizumab, Ranibizumab, and Aflibercept. *Ophthalmic Surg Lasers Imaging Retina*. 2016;47(6):555-562.

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