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Sarcoidosis in the National Veteran Population:

Association of Ocular Inflammation and Mortality

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Abstract

Purpose—To describe the distribution of ocular sarcoidosis in the veteran population and to determine the association between ocular disease and all-cause mortality.

Design—Retrospective review.

Methods—The Veterans Health Administration National Patient Care Database information on medical diagnoses, date of diagnosis, age, race, gender, and Veterans Administration medical center station number for site-specific calculations for fiscal years 2010 through 2012 was collected. Mortality data were obtained from the Beneficiary Identification Records Locator Subsystem. The patient cohort was identified with a primary diagnosis of sarcoidosis using International Classification of Disease, ninth edition, code of 135 in outpatient treatment files for the study period. The sarcoidosis patients were divided into those with uveitis or orbital inflammation (defined as ocular inflammation for this study) and those without uveitis or orbital inflammation. Survival analysis was performed using the Cox proportional hazard method.

Main Outcome Measure—Association between ocular inflammation and 1-year mortality.

Results—Of 15 130 subjects with sarcoidosis, 3364 (22.2%) were evaluated in an eye clinic within a Veterans Administration Medical Center. Most patients were diagnosed with anterior uveitis ($n = 1013$; 80.7% of ocular inflammation), and the least common diagnosis was orbital granuloma ($n = 28$; 2.2% of ocular inflammation). Male gender was protective to the development of uveitis (estimate, 0.76; 95% confidence interval, 0.65–0.88; $P = 0.0005$). The overall 1-year all-cause mortality for all patients with a diagnosis of sarcoidosis was 2.0%. Ocular inflammation was associated with a decrease in 1-year all-cause mortality (simple model: hazard ratio, 0.36; $P = 0.0015$; complex model: hazard ratio, 0.35; $P = 0.013$).

Conclusions—Veterans with ocular inflammation had significantly lower 1-year all-cause mortality than those without documented ocular inflammation. The reason for this finding remains to be established.

Sarcoidosis is a multisystem inflammatory disease of unknown origin that often involves the lungs, skin, and eyes. The lungs and mediastinal lymph nodes are involved in up to 95% of patients with sarcoidosis,¹ and lung biopsy often is used to make a diagnosis even in patients with ocular disease.^{1,2} Diagnosis is made in patients with a clinical presentation consistent with sarcoidosis after exclusion of other causes of granulomatous disease and histologic confirmation of noncaseating granulomas.³ The clinical presentation of ocular disease can range from lacrimal gland involvement to severe vision-threatening uveitis. Two large prospective studies of patients with biopsy-confirmed sarcoidosis in the United States report rates of ocular involvement of 11.8% and 23%.^{1,3} Some patients with ocular disease consistent with sarcoidosis are unable to undergo biopsy or do not have an appropriate site for biopsy. In these cases, a diagnosis of probable or presumed ocular sarcoidosis is made based on clinical findings, laboratory testing, and chest imaging results. These diagnostic criteria have been formalized⁴ and validated⁵ previously.

Mortality resulting from sarcoidosis most often is related to respiratory, cardiac, and neurologic involvement.⁶ The relationship between mortality and inflammation of other organ systems is unclear. Patients with ocular disease often require higher doses of immunosuppression to achieve remission,⁷ and those treated with topical corticosteroids for sarcoid uveitis may be less likely to achieve spontaneous remission.⁸ This suggests a possible association between chronic disease and ocular involvement. The purpose of this study was to describe sarcoidosis in the predominantly male veteran population treated at Veterans Health Administration (VHA) medical centers across the country and to examine the association of ocular involvement with mortality.

Methods

Study Design and Patient Data

The VHA National Patient Care Database was accessed to collect information on medical diagnoses, date of diagnosis, age, race, gender, and Veterans Administration Medical Center station number for site-specific calculations. The clinical database consolidates information from approximately 5.3 million veterans at approximately 1300 sites of care throughout the nation. More than 95% of VHA enrollees are men; approximately 83% are white and 13% are black. Patient-specific clinical information from medical records was not available for review. De-identified, longitudinal, patient-specific data were available for fiscal years 2010 through 2012 (beginning October 1, 2010, and ending September 30, 2012).

Death data were obtained from the Beneficiary Identification Records Locator Subsystem (BIRLS). The BIRLS is a Veterans Benefits Administration database that contains death records of all beneficiaries. The BIRLS file is updated weekly through either a match process with the Social Security Administration Death Master File, or notification from a hospital, cemetery, or relative. The ascertainment of death sensitivity of BIRLS ranges from

80.0% to 94.5% and compares favorably with the 83.0% to 83.6% rate for Social Security Administration files and the 87.0% to 97.9% rate for the National Death Index.⁹

Study Population

The patient cohort was identified with a primary diagnosis of sarcoidosis using International Classification of Disease, ninth edition (ICD-9), of 135 in outpatient treatment files for fiscal years 2010 through 2012. The patients were divided further into those with uveitis or orbital inflammation based on the ICD-9 codes. Using the first 3 digits of the code, similar diagnoses then were grouped together: panuveitis, 360; anterior uveitis, 362 and 364; scleritis and episcleritis, 379; choroiditis and retinitis, 363; and orbital granuloma, 376 (Table 1).

Statistical Analysis

Survival analysis was performed using the Cox proportional hazard method. The dependent variable was death (death = 1; survival = 0) within 1 year or 365 days from the first date of a sarcoidosis diagnosis. Two models were used. The first model, designated the simple model, included age, black race, gender, and uveitis. A second model, designated the complex model, used all the same criteria as the simple model with adjustment for Elixhauser comorbidities. The Elixhauser methodology is a well-established health services research method that uses diagnosis codes to identify common comorbidities related to increased length of stay, hospital charges, and death.¹⁰ The Elixhauser comorbidities were applied to the VHA National Patient Care Data for our cohort as a means of measuring patient comorbidities. All analyses were conducted with Statistical Analysis Software version 9.3 (SAS Inc, Cary, NC). The protocol was approved by the Institutional Review Board and the Veterans Administration Research and Development Committee for Compliance with Human Protection (protocol no. 13-048).

Results

In a VHA population of 5.3 million (based on patients using services in 2010), a total of 15 130 patients were assigned the diagnostic code for sarcoidosis (ICD-9 code 135) between October 1, 2009, and September 30, 2012 (fiscal years 2010 through 2012). The mean age of this population was 55.7 years (standard deviation, 11.4 years), with a range of 21 to 94 years. The sarcoidosis population was 50.8% black and 86.0% male.

A diagnosis of ocular inflammation was assigned to 1256 subjects (8.3%) of the sarcoidosis population who were evaluated at 288 VHA hospitals and clinics nationally. During the 3-year period, 3364 (22.2%) patients with a diagnosis of sarcoidosis were evaluated in an eye clinic within a Veterans Administration Medical Center. This included 1889 (12.5%) patients evaluated by an optometrist and 1673 (11.1%) by an ophthalmologist, with some patients (n = 198) undergoing evaluation by both eye care providers. All patients with a diagnosis of ocular inflammation were evaluated by an ophthalmologist during this period. The number of subjects with sarcoidosis and ocular inflammation ranged from 1 to 34 per site. Most patients were diagnosed with anterior uveitis (n = 1013; 80.7% of ocular inflammation), and the least common diagnosis was orbital granuloma (n = 28; 2.2% of

ocular inflammation). The distribution of ocular inflammation is shown in Table 2. The mean age, gender, and race for each subset of ocular inflammation was calculated, and no significant difference was noted between the subsets of ocular inflammation.

Hazard ratios (HRs) and 95% confidence intervals (CI) were used to determine risk of ocular inflammation. Patient age did not impact the development of ocular inflammation in patients with sarcoidosis (HR, 1.00; 95% CI, 1.00–1.01; $P = 0.6593$). Black race was a risk factor for development of ocular inflammation (HR, 1.64; 95% CI, 1.45–1.85; $P < 0.0001$). Male gender was protective from the development of uveitis (HR, 0.76; 95% CI, 0.65–0.88; $P = 0.0005$). Several of the patients were assigned more than 1 diagnostic code for ocular inflammation during the 3-year period; therefore, the total number of diagnoses is greater than the number of unique patients.

The overall 1-year mortality for all patients with a diagnosis of sarcoidosis was 2.0%. In the simple model, the HR for 1-year mortality was increased based on age (HR, 1.06; 95% CI, 1.05–1.07; $P < 0.0001$), black race (HR, 1.34; 95% CI, 1.06–1.70; $P = 0.0136$), and male gender (HR, 2.52; 95% CI, 1.44–4.41; $P = 0.0015$). In the complex model, which also adjusted for Elixhauser comorbidities, advancing age (HR, 1.06; 95% CI, 1.05–1.07; $P < 0.0001$) and male gender (HR, 2.30; 95% CI, 1.31–4.05; $P = 0.038$) continued to be significant risk factors, whereas black race dropped out as a significant risk factor (HR, 1.27; 95% CI, 1.00–1.2; $P = 0.0518$). In both models, ocular inflammation was associated with a decrease in 1-year mortality (simple model: HR, 0.36; $P = 0.0015$; complex model: HR, 0.35; $P = 0.013$; Table 3).

The ICD-9 code 379 is used for both scleritis and episcleritis, which clinically are quite different processes. To correct for this, a second analysis was performed that excluded patients with the ICD-9 code of 379 ($n = 1189$). The results from this analysis were similar, however, with the risk of mortality in patients with ocular inflammation significantly lower than those without ocular inflammation (HR, 0.41; 95% CI, 0.21–0.79; simple model, $P = 0.0083$; complex model, $P = 0.0085$).

Discussion

The overall rate of ocular inflammation in the veteran population in this study (8.3%) was low relative to other reports in the literature. Rates of ocular inflammation in patients with systemic disease are 11.8% to 23% in studies conducted in the United States to as high as 48.8% in Japan.^{1,11} Most patients (80%) who demonstrate symptomatic ocular inflammation do so within 1 year of onset, and it is the presenting feature in 30%.⁷ The relative decrease is not surprising in the predominantly white and male population served by the Veterans Administration. Only 22% of the sarcoidosis population was evaluated at a VHA eye clinic, and the possibility exists that some patients may have received care from outside providers. This also may have contributed to the slightly lower rate of ocular involvement in this cohort of patients.

Anterior uveitis was by far the most common diagnosis assigned in patients with uveitis and sarcoidosis (80%), which is consistent with other studies, particularly in a predominately

white population.^{12,13} In one large study of patients with biopsy-confirmed and presumed sarcoidosis, 76.4% had anterior uveitis, 17.3% had intermediate uveitis, and 4.7% had posterior uveitis.¹² Intermediate uveitis does not have a separate ICD-9 code; therefore, it was grouped together with other ocular manifestations. The VHA patient population is reported to be approximately 13% black and 95% male. Black race was a risk factor for the development of ocular inflammation. This is in alignment with prior studies conducted in the United States describing organ involvement in systemic sarcoidosis. In one study, blacks had more frequent involvement of the eye, bone marrow, extrathoracic lymph nodes, and skin other than erythema nodosum. White patients were more likely to have abnormalities of calcium metabolism.¹ A second large study reported increased lung, neurologic, skin, eye, and liver involvement in blacks versus splenic involvement and hypercalcemia in whites.³

Female gender was another risk factor for ocular inflammation. This also supports previous studies that show more frequent eye and neurologic involvement in women.^{1,3} Other organs more commonly involved in women include skin, peripheral lymph nodes, and the liver.¹⁴

The ICD-9 code 379 is assigned to patients with scleritis, episcleritis, or both. Although the 2 diagnoses are grouped together in the ICD-9 nomenclature, ophthalmologists recognize that these 2 entities are quite distinct. Episcleritis refers to inflammation of the episclera and can be associated with conditions such as dry eyes and blepharitis, whereas scleritis refers to inflammation of the scleral wall. Scleritis can be associated with rheumatologic conditions such as rheumatoid arthritis or polyangiitis and can precede the systemic manifestations.¹⁵ Scleritis is an unusual manifestation of sarcoidosis, estimated to occur in less than 3% of cases,¹⁶ although the ICD-9 code was reported in 21% of veterans with sarcoidosis. To account for the likely overestimation of scleritis, the second analysis was performed that excluded all patients with episcleritis or scleritis. A decrease in the 1-year all-cause mortality rate in patients with ocular disease was significant in both the simple model, which adjusted for age, race, and gender, as well as in the complex model, which included adjustment for the Elixhauser comorbidities. After exclusion of scleritis and episcleritis, the overall 1-year mortality was relatively unchanged. In future studies, the use of ICD-10 codes will allow for a more accurate representation of the patient population in administrative studies.

Between 1988 and 2007, the average age-adjusted sarcoidosis-related mortality rate in the United States was 4.32 per 1 000 000 population. During this period, the annual mortality rate increased over time (3% annually, on average), with the highest rate of increase in non-Hispanic blacks and women.¹⁷ The increase was most notable in patients older than 55 years. The 1-year mortality rate of 2.0% is on par with other national studies.¹⁷ The reason for this lower mortality in individuals with ocular disease remains unclear. We speculate it may be associated with lower end-stage lung disease in a group of patients with ocular disease. Mirsaeidi et al¹⁸ recently showed that respiratory failure and cardiac arrest are the most common causes of mortality among patients with sarcoidosis. We adjusted for Elixhauser comorbidities, which includes cardiac arrhythmia and chronic pulmonary disease. The comorbidities do not include respiratory failure, and the possibility exists that the patients with ocular disease may have less severe pulmonary diseases and less respiratory failure.

Age at onset of sarcoidosis may be a contributing factor to overall mortality rate as the effect of Lead bias.¹⁹ This study was not designed to measure age at diagnosis, but one study demonstrated that patients with late-onset sarcoidosis (65 years or older at first presentation) are more likely to experience asthenia and have uveitis.²⁰ The possibility exists that the patients with ocular disease in the VHA cohort were older at presentation and had less time for pulmonary fibrosis to develop than in their counterparts without ocular disease. It is also possible that patients with ocular disease were treated more aggressively with higher doses of immunosuppression to treat their ocular disease.^{7,21} This intense treatment may be associated with a decrease in progression of pulmonary disease.

One of the limitations of this study is the reliance on administrative data. Review of individual patient charts to verify diagnoses was not permitted. The gold standard for diagnosis of sarcoidosis is histologic confirmation of non-caseating granulomas and exclusion of other causes of granulomatous inflammation. It is likely that several of the patients included in this study did not meet these criteria. When working with administrative data, it is difficult to guarantee correct coding of ocular disease. However, this screening study allowed a national perspective of more than 15 000 sarcoidosis patients and their mortality across an integrated system not typically feasible with chart review or patient recruitment. Future studies of sarcoidosis may be enhanced with the use of text data from electronic medical records available through the Veterans Administration Informatics Computing Infrastructure for more definitive review using natural language process and text mining. A second limitation of this study is the ascertainment bias that may have been introduced by inclusion of only VA medical data. Clinical information on patients referred to an affiliated institution through the fee basis care program would not have been captured. The use of fee-basis care for nonthreatening conditions requires a preauthorization that is not based on disease severity. Specifically, VHA policy states that referral of a veteran to a private or public hospital at VA expense will be authorized only when VHA health care facilities are not feasibly available, in accordance with 38 Code of Federal Regulations (CFR) section 17.53.²² Moreover, because most of the patients were treated at VA medical centers with ophthalmologists on staff, fee-basis care likely would not have been indicated. However, it is possible that veterans sought care outside the VA, which is most often associated with priority status and Medicare eligibility. Future studies may be expanded to include the use of VA Medicare data for the study of older patients with this condition.²³

Although most experts agree that sarcoidosis is an immune response to environmental triggers in susceptible individuals, a genetic susceptibility was proposed recently.^{24,25} In this study, veterans with ocular inflammation had significantly lower 1-year all-cause mortality than those without documented ocular inflammation. Future studies should attempt to understand the genetic and environmental factors that are associated with ocular inflammation.

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References

1. Baughman RP, Teirstein AS, Judson MA, et al. Clinical characteristics of patients in a case control study of sarcoidosis. *Am J Respir Crit Care Med*. 2001; 164(10 Pt 1):1885–9. [PubMed: 11734441]
2. Gilman MJ, Wang KP. Transbronchial lung biopsy in sarcoidosis. An approach to determine the optimal number of biopsies. *Am Rev Respir Dis*. 1980; 122:721–4. [PubMed: 7447156]
3. Judson MA, Boan AD, Lackland DT. The clinical course of sarcoidosis: presentation, diagnosis, and treatment in a large white and black cohort in the United States. *Sarcoidosis Vasc Diffuse Lung Dis*. 2012; 29:119–27. [PubMed: 23461074]
4. Herbot CP, Rao NA, Mochizuki M. members of Scientific Committee of First International Workshop on Ocular S. International criteria for the diagnosis of ocular sarcoidosis: results of the first International Workshop On Ocular Sarcoidosis (IWOS). *Ocul Immunol Inflamm*. 2009; 17:160–9. [PubMed: 19585358]
5. Takase H, Mochizuki M. The role of imaging in the diagnosis and management of ocular sarcoidosis. *Int Ophthalmol Clin*. 2012; 52:113–20. [PubMed: 22954933]
6. Gerke AK. Morbidity and mortality in sarcoidosis. *Curr Opin Pulm Med*. 2014; 20:472–8. [PubMed: 25029298]
7. Rothova A. Ocular involvement in sarcoidosis. *Br J Ophthalmol*. 2000; 84:110–6. [PubMed: 10611110]
8. Nara M, Sasamori K, Shimura S, et al. Long-term use of corticosteroid eye drops delays the spontaneous remission of pulmonary sarcoidosis. *Tohoku J Exp Med*. 2004; 202:275–82. [PubMed: 15109125]
9. Cowper DC, Kubal JD, Maynard C, Hynes DM. A primer and comparative review of major US mortality databases. *Ann Epidemiol*. 2002; 12:462–8. [PubMed: 12377423]
10. Elixhauser A, Steiner C, Harris DR, Coffey RM. Comorbidity measures for use with administrative data. *Med Care*. 1998; 36:8–27. [PubMed: 9431328]
11. Matsuo T, Fujiwara N, Nakata Y. First presenting signs or symptoms of sarcoidosis in a Japanese population. *Jpn J Ophthalmol*. 2005; 49:149–52. [PubMed: 15838733]
12. Heiligenhaus A, Wefelmeyer D, Wefelmeyer E, et al. The eye as a common site for the early clinical manifestation of sarcoidosis. *Ophthalmic Res*. 2011; 46:9–12. [PubMed: 21099232]
13. Birnbaum AD, Oh FS, Chakrabarti A, et al. Clinical features and diagnostic evaluation of biopsy-proven ocular sarcoidosis. *Arch Ophthalmol*. 2011; 129:409–13. [PubMed: 21482866]
14. Korsten P, Mirsaeidi M, Sweiss NJ. Nonsteroidal therapy of sarcoidosis. *Curr Opin Pulm Med*. 2013; 19:516–23. [PubMed: 23884295]
15. Lin P, Bhullar SS, Tessler HH, Goldstein DA. Immunologic markers as potential predictors of systemic autoimmune disease in patients with idiopathic scleritis. *Am J Ophthalmol*. 2008; 145:463–71. [PubMed: 18061135]
16. Jamilloux Y, Kodjikian L, Broussolle C, Seve P. Sarcoidosis and uveitis. *Autoimmun Rev*. 2014; 13:840–9. [PubMed: 24704868]
17. Swigris JJ, Olson AL, Huie TJ, et al. Sarcoidosis-related mortality in the United States from 1988 to 2007. *Am J Respir Crit Care Med*. 2011; 183:1524–30. [PubMed: 21330454]
18. Mirsaeidi M, Machado RF, Schraufnagel D, et al. Racial difference in sarcoidosis mortality in the United States. *Chest*. 2015; 147:438–49. [PubMed: 25188873]
19. Tunnell RD, Millar BW, Smith GB. The effect of lead time bias on severity of illness scoring, mortality prediction and standardised mortality ratio in intensive care—a pilot study. *Anaesthesia*. 1998; 53:1045–53. [PubMed: 10023272]
20. Varron L, Abad S, Kodjikian L, Seve P. Sarcoid uveitis: Diagnostic and therapeutic update. *Rev Med Interne*. 2011; 32:86–92. [PubMed: 20970226]
21. Rothova A, Lardenoye C. Arterial macroaneurysms in peripheral multifocal chorioretinitis associated with sarcoidosis. *Ophthalmology*. 1998; 105:1393–7. [PubMed: 9709748]
22. Department of Veterans Affairs. [Accessed December 8, 2008] VHA Directive 1601: Non-VA Medical Care Program. Available at: http://www.va.gov/vhapublications/ViewPublication.asp?pub_ID=2859

23. French DD, Margo CE. Factors associated with the utilization of cataract surgery for veterans dually enrolled in Medicare. *Mil Med.* 2012; 177:752–6. [PubMed: 22730855]
24. Rossman MD, Thompson B, Frederick M, et al. HLA-DRB1*1101: a significant risk factor for sarcoidosis in blacks and whites. *Am J Hum Genet.* 2003; 73:720–35. [PubMed: 14508706]
25. Spagnolo P, Sato H, Marshall SE, et al. Association between heat shock protein 70/Hom genetic polymorphisms and uveitis in patients with sarcoidosis. *Invest Ophthalmol Vis Sci.* 2007; 48:3019–25. [PubMed: 17591867]

Abbreviations and Acronyms

BIRLS	Beneficiary Identification Records Locator Subsystem
CI	confidence interval
HR	hazard ratio
ICD-9	International Classification of Disease, ninth edition
VHA	Veterans Health Administration

Table 1
List of International Classification of Disease, Ninth Edition, Codes for Ocular Inflammation Identified

Uveitis Diagnosis	International Classification of Disease, 9th Edition, Code
Panuveitis	360.12
Iritis, acute	362.00
Iritis, uveitis, acute NOS	364.00
Iridocyclitis, recurrent	364.02
Hypopyon	364.05
Uveitis, chronic NOS	364.10
Uveitis, anterior	364.30
Scleritis and episcleritis	379.00
Anterior scleritis	379.03
Scleritis with corneal involvement	379.05
Posterior scleritis	379.07
Focal choroiditis chorioretinitis juxtapapillary	363.01
Focal choroiditis chorioretinitis posterior pole	363.03
Other and unspecified forms of chorioretinitis and retinochoroiditis	363.20
Focal choroiditis chorioretinitis	363.04
Focal retinitis and retinochoroiditis juxtapapillary	363.05
Focal retinitis and retinochoroiditis macular paramacular	363.06
Focal retinitis and retinochoroiditis posterior pole	363.07
Focal retinitis and retinochoroiditis peripheral	363.08
Disseminated chorioretinitis posterior pole	363.11
Disseminated chorioretinitis unspecified	363.10
Disseminated chorioretinitis generalized	363.13
Orbital granuloma	376.00

NOS = not otherwise specified.

Table 2
Distribution of Diagnostic Codes for Ocular Inflammation in Patients with Sarcoidosis*

Site of Ocular Inflammation (International Classification of Disease, Ninth Edition, Code)	No. (%)	Age (yrs), Mean (Standard Deviation)	Male Gender, No. (%)	Black Race, No. (%)
Total ocular inflammation	1256	55.1 (11.1)	1028 (81.9)	782 (62.3)
Orbital granuloma (376)	28 (2.2)	55.8 (7.3)	22 (78.6)	19 (67.9)
Panuveitis (360)	48 (3.8)	51.3 (9.5)	40 (83.3)	32 (66.7)
Anterior uveitis (362 and 364)	1013 (80.7)	55.2 (11.1)	823 (81.2)	644 (63.6)
Scleritis (379)	269 (21.4)	55.7 (10.8)	219 (81.4)	156 (58.0)
Retinitis and choroiditis (363)	100 (8.0)	53.1 (9.8)	87 (87.0)	66 (66.0)

* Patients may have received more than 1 diagnostic code during the course of the study; therefore, the sum of diagnostic codes is greater than the number of unique patients.

Table 3
One-Year Survival Analysis*

	Hazard Ratio (95% Confidence Interval), Simple Model	<i>P</i> Value	Hazard Ratio (95% Confidence Interval), Complex Model	<i>P</i> Value
Age	1.06 (1.05–1.07)	<0.0001	1.06 (1.05–1.07)	<0.0001
Black	1.34 (1.06–1.70)	0.0136	1.27 (1.00–1.62)	0.0518
Male (%)	2.52 (1.44–4.41)	0.0013	2.30 (1.31–4.05)	0.0038
Ocular inflammation	0.36 (0.19–0.68)	0.0015	0.35 (0.19–0.67)	0.0013

* Multivariate analysis of 1-year survival based on age, black race, gender, and presence of ocular inflammation. Hazard ratio, simple model, was performed without inclusion of Elixhauser comorbidities, whereas hazard ratio, complex model, adjusted for the Elixhauser comorbidities.