

## Resident Perspective: Inflammatory markers of complete blood count in Fuchs uveitis syndrome



Understanding the underlying etiology and pathophysiology of ophthalmological disorders is paramount to achieving early diagnosis and improved patient outcomes. Although Fuchs uveitis syndrome (FUS) is a well-established and recognized disorder characterized by chronic, low-grade anterior uveitis, the precise etiology of this syndrome is not yet fully understood. FUS may very well be the result of a non-infectious inflammatory process; however, several studies have shown associations with infectious agents, including toxoplasma, herpes simplex virus, rubella virus and cytomegalovirus infections.<sup>1,2</sup>

Given that FUS is characterized by chronic intraocular inflammation and that previous studies have shown changes in the peripheral blood associated with intraocular inflammation, in this issue, Simsek and colleagues investigated potential inflammatory changes in complete blood count (CBC) of FUS patients.<sup>3</sup> This study is a cross-sectional and comparative study in which CBC samples from two groups of participants, a non-uveitic control group and an FUS group, were examined. These blood samples were analyzed for inflammatory indices, including white blood cell counts, neutrophil-to-lymphocyte ratio (NLR), lymphocyte-to-monocyte ratio (LMR), red blood cell distribution width (RDW), platelet count, mean platelet volume (MPV), MPV-to-platelet ratio (MPR), and platelet-to-lymphocyte ratio (PLR). The lymphocyte counts of Fuchs uveitis syndrome patients were found to be higher than age and sex-matched controls, leading to a significant decrease in the

NLR and significant increase in the LMR in FUS patients.<sup>3</sup> The study authors suggest that the chronic nature of FUS may lead to this rise in lymphocyte count, differentiating it from other, more acute uveitic syndromes which are generally associated with higher neutrophil count and, therefore, higher NLR values.<sup>3,4</sup> The usefulness of the LMR and NLR was also investigated using the receiver operating characteristic (ROC) curve analysis. The area under the curve (AUC) for both the LMR and NLR showed relatively high sensitivity and specificity for both ratios.

The results of this study suggest that Fuchs uveitis syndrome is associated with widespread systemic inflammatory changes as opposed to only local intraocular inflammation, bringing us one step closer to understanding the etiology of this fascinating disease entity.

There are, however, a few limitations of the current study that should be taken into consideration. Firstly, the study only performed PCR testing in cases suspicious for other uveitic etiologies. It would be ideal to have PCR testing for all participants to ensure exclusion of patients with uveitis due to a history remote infection or otherwise explained inflammation. Secondly, the study was limited by its retrospective nature and limited sample size. Prospective studies of larger cohorts of FUS patients will help add to our current understanding of systemic inflammatory changes associated with FUS.

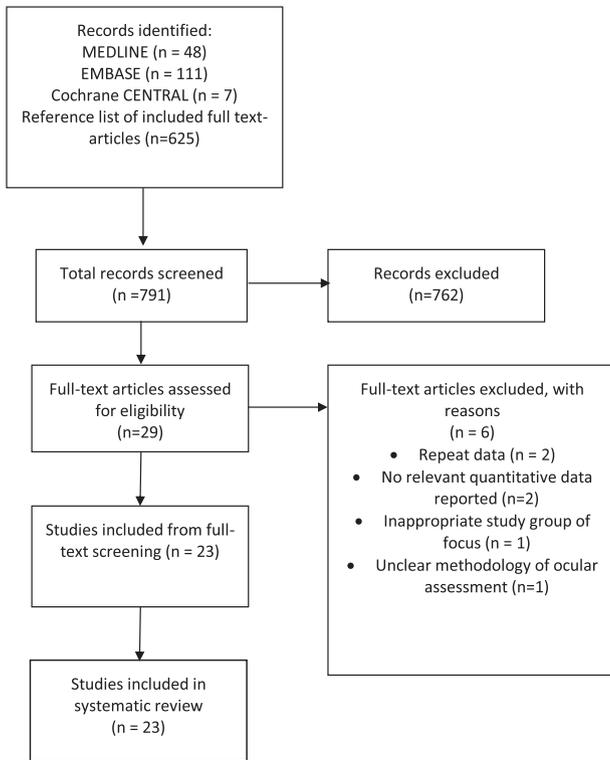
In summary, Simsek and colleagues have eloquently described the changes in peripheral blood inflammatory indices associated with Fuchs uveitis syndrome, indicating a component of systemic inflammatory change in FUS patients. Studies such as this are important to facilitate our understanding of the etiology and pathogenesis of this interesting uveitic entity, potentially allowing for earlier diagnosis and even more effective treatment of patients with FUS in the future.

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Article being referenced: [https://www.canadianjournalofophthalmology.ca/article/S0008-4182\(20\)30786-9/fulltext](https://www.canadianjournalofophthalmology.ca/article/S0008-4182(20)30786-9/fulltext)

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## Resident Perspective: Visual impairment and the prevalence of ocular pathology in homeless children and adults globally



Approximately 235 000 Canadians experience homelessness each year, and this number and the length of time they are homeless, continues to rise.<sup>1</sup> A global survey by the United Nations, the latest one from 2005, estimated that 100 million people are homeless worldwide.<sup>2</sup> Homelessness is associated with significant health inequalities, is a driver of poor health, and represents a population with an increased prevalence of a variety of medical conditions, including ocular morbidities.<sup>3,4</sup>

In this issue, Sayal and colleagues conducted a systematic review to investigate the impact of homelessness on ocular outcomes globally.<sup>5</sup> The review included 23 unique study samples. This amounted to data points on 5774 homeless individuals, the majority of which were male (71.1%) and with an average age of 37.4 years. Most of the studies were based on homeless populations within North America (11 from the United States and 6 from Canada), however it also included 2 studies from the United Kingdom, and 1 each from Germany, Nigeria, Nepal, and Australia.

Sayal and colleagues reported that 36.8% of homeless individuals self-reported dissatisfaction with their vision, 26.3% had uncorrected refractive errors, 25.6% were functionally impaired, and 4.0% had non-refractive visual impairment. 25.1% were assessed to have ocular pathology, which was mostly cornea/external disease related (13.4%).<sup>5</sup>

These rates among the homeless population are higher than those reported in the general population. Namely, functional visual impairment rates of 25.6% among the homeless are about 6 times greater than the global rate of 4.2%.<sup>6</sup> Uncorrected refractive error rates of 26.3% are approximately 9-10 times greater than in the general population at 2.7%.<sup>7</sup> Uncorrected refractive errors are a major cause of global disability and enormously reduce productivity and quality of life.<sup>8</sup> Of course, refractive errors can be corrected through spectacles, but with homeless individuals who have limited access to health care resources, this becomes a challenge. In fact, Sayal et al. found that only 17.0% of homeless individuals who needed glasses had them at the time of the study. Access to ophthalmic care among the homeless population was also low; 22% of homeless individuals had seen an ophthalmologist or optometrist in the preceding year, which is much lower when compared to 44% in the general population.<sup>5</sup> This is likely owing to a multitude of reasons, but ultimately resulting in inadequate care provision for the homeless. As providers of such health services, it is important to recognize and address these barriers to enable care that is more equitable. Certainly, there have been initiatives such as eyeglasses recycling programs and mobile eye screening clinics for lower income individuals and the homeless, but the disparity that continues to exist suggests this is an ongoing issue.

Some limitations of this review include a small sample size in the reviewed studies and lack of global representation, given that the majority of studies looked at homeless populations in higher income countries. In addition, they were unable to make country-to-country comparisons because there were no comparator groups to the general population. While future research is still needed to address these limitations and expand on the current review, the results by Sayal and colleagues demonstrate the high incidence of visual impairment among the homeless population. Recognition of this global disparity is important as it emphasizes the need for policy changes and additional resources needed for at-risk populations to reduce the rate of preventable visual impairment.

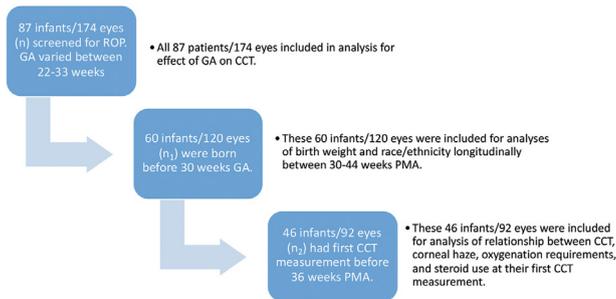
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## Resident Perspective: Central corneal thickness in premature infants with and without retinopathy of prematurity



In comparison to the extensive amount of research on retinopathy of prematurity (ROP), there is limited literature on corneal thickness and haze in premature infants. Hence, in this issue, Islam and colleagues seek to contribute to the current body of literature by investigating: 1) central corneal thickness (CCT) and its rate of decline, and 2) CCT's association with systemic features—gestational age (GA), birth weight (BW), race, oxygen requirements, and steroid use—in a racially diverse population of premature infants in the United States.<sup>1</sup>

Islam's group prospectively collected the data from 87 premature infants (174 eyes) at a single academic centre between 2018 and 2019. ROP screening was performed for all study participants. CCT was measured weekly or biweekly, starting at 30 weeks of GA or later until 44 weeks of GA. Multiple longitudinal analyses/ mixed model were performed to determine the association of CCT with GA, BW, race, corneal clarity, oxygen requirements, and steroid use.

To summarize the study's findings, CCT decreased from baseline (mean 744.8 $\mu$ m) to the end of the study (547.1 $\mu$ m) at an average of 12.3 $\mu$ m/ week. With regards to analyses of CCT's associations with systemic features, first, infants born before 27 weeks of GA had a higher CCT at baseline (mean 717.0 $\mu$ m vs 682.4 $\mu$ m,  $p=0.036$ ), and had a faster rate of decrease (13.3 $\mu$ m/ week vs. 10.1 $\mu$ m/ week,  $p=0.029$ ) compared to those born at a later GA. Second, infants with a BW <1000g had higher CCTs at baseline (mean 723.2 $\mu$ m vs. 674.5 $\mu$ m,  $p=0.002$ ) and had a faster rate of decrease (13.4 $\mu$ m/ week vs. 9.9 $\mu$ m/ week,  $p=0.020$ ) compared to those with a BW 1000g. Third, Caucasian infants had the

thickest corneas while Hispanics had the thinnest corneas; African American and Hispanic infants had slower rate of decrease in CCT compared to the Caucasian infants. Fourth, presence of corneal haze was positively correlated with thicker corneas (738 $\mu$ m vs. 682.3 $\mu$ m,  $p=0.002$ ). Lastly, oxygen requirements and steroid use were not significantly associated with CCT ( $p=0.643$  and  $p=0.632$ ).

CCT and corneal haze are important features that should be taken into consideration when assessing and managing pediatric anterior segment disorders, congenital glaucoma, and subsequently resulting amblyopia. With the growing evidence that prematurity is a risk factor for congenital glaucoma and angle abnormality, it is crucial to have a good understanding of CCT and its change over time in premature infants and associated systemic features. This study by Islam's group is the first study to investigate CCT and associated systemic features in a racially diverse population, as opposed to racially homogenous populations in previous studies. Hence, given its higher external validity in comparison to the previous papers on CCT, this study's findings may have higher applicability and clinical utility, especially in Canada, one of the most ethnically diverse nations in the world. Furthermore, this study is the first to study the relationship between CCT and steroid/ oxygen use exclusively in pre-term infants, adding more originality to it. Many pre-term infants may often require oxygen/ steroid treatment as they are at high risk for airway diseases such as respiratory distress syndrome and bronchopulmonary dysplasia. This study's novel findings provide reassurance that neither oxygen nor steroid use has any effect on CCT. To conclude, Islam's group presents a valuable original study that is an asset to the current literature that unfortunately does not have much information on CCT in pre-term infants. Larger studies in the future can hopefully help reinforce and expand the findings discovered by Islam's group.

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Article being referenced: [https://www.canadianjournalofophthalmology.ca/article/S0008-4182\(20\)30738-9/fulltext](https://www.canadianjournalofophthalmology.ca/article/S0008-4182(20)30738-9/fulltext)

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## Resident Perspective: Validating the use of a stereoscopic robotized teleophthalmic drone slit lamp



Telemedicine is the “the use of electronic information and communications technologies to provide and support health care when distance separates the participants.”<sup>1</sup> In ophthalmology, the most established used of telemedicine is in screening for diabetic retinopathy, which relies on the remote acquisition of colour fundus photographs for asynchronous retinopathy grading. Such programs have greatly expanded access to DR screening particularly for people living in geographically remote areas.<sup>2</sup> There is a recognized potential for telemedicine to further improve accessibility and efficiency of ophthalmic care.<sup>3</sup> However, currently available technologies are limited as to the types of clinical data they can provide to inform diagnostic and management decisions.<sup>3</sup> For example, a significant challenge for tele-glaucoma is the inability to remotely examine the anterior chamber angle to distinguish open- from closed-angle etiologies.

In the current issue, Luna and colleagues contribute to the efforts to overcome such limitations by validating a robotized drone slit lamp for use in examination of the anterior chamber (AC).<sup>4</sup> They compared the reliability of AC cell, flare and depth gradings between different examiners

and between the same examiner using both the drone slit lamp and conventional slit lamp to examine real patients. They found substantial agreement for AC cells and flare and moderate agreement for AC depth. Agreement did not seem to be significantly affected by the level of training of the examiner. They also found that agreement on qualitative findings such as conjunctival injection, and corneal abrasion and ulceration was also good.

These promising findings support a technology that could significantly improve the quality of eye care offered to people living in remote Canadian communities, potentially reducing the number of costly, disruptive medical trips. However, several outstanding issues deserve attention. As raised by the authors, establishing a means of examining the fundus and anterior chamber angle using the drone slit lamp would greatly increase the number of conditions that could be evaluated. Subsequent validation steps might explore the extent to which clinical impression and treatment recommendations differ when comparing examinations conducted using drone versus conventional slit lamps. It might also be of interest to compare clinician confidence in management decisions taken based on drone slit lamp examination versus those based on more readily available technologies, such as smart phone photographs. Ultimately, it would be beneficial to conduct a formal health technology assessment of the drone slit lamp so as to properly appraise the anticipated and unanticipated costs and benefits of this tool when deployed in real-world health systems.

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Article being referenced: [https://www.canadianjournalofophthalmology.ca/article/S0008-4182\(20\)30775-4/fulltext](https://www.canadianjournalofophthalmology.ca/article/S0008-4182(20)30775-4/fulltext)

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