Comment on “Race distribution in non-arteritic anterior ischemic optic neuropathy”

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The article by Banc et al highlights the phenomenon of non-arteritic ischaemic optic neuropathy (NA-AION) to preferentially affect those of White ethnicity[1]. We would like to share corroborating findings from our academic center in London, UK and some evidence towards a potential mechanism. It should be noted that i) London is among the most ethnically diverse populations in the Western hemisphere and ii) the UK adopts a universal health care system, the National Health Service (NHS), somewhat mitigating the authors' concerns about disparate healthcare access and cost among ethnic minority groups.

As part of a larger health data linkage project, we have curated acute neurophthalmic conditions presenting to the Moorfields Eye Hospital emergency department[2]. Between August 2014 and April 2018, 231 patients received a diagnosis of NA-AION. Among those who self-reported their ethnicity (n=170), 81.1% identified as White, 11.8% as South Asian and 7.1% as Black. Yet the 2021 UK Census documented only 36.8% of the London population identifying as White (44.9% in 2011)[3]. Even if all individuals who chose not to self-report their ethnicity were Non-White, this would represent a significant under-estimate relative to the Census.

Racial differences in optic nerve morphology were cited by the authors as a potential reason[1]. We investigated the optic nerve morphology of 50,413 participants of the UK Biobank (approved under application ID: 36741), a national prospective cohort study with community-based recruitment of NHS users, using AutoMorph, an openly available deep learning-based pipeline for extracting retinovascular and optic nerve features[4]. White participants were significantly older (56.3 [standard deviation [SD] 8.1 years]) than South Asian (52.6 [8.6] years), Black (51.7 [7.8] years) and Chinese participants (53.5 [7.5] years, all $p<0.001$). White participants also had smaller optic nerve disc height. Mean (SD) disc

height was 1.29 (0.20) mm for White participants, 1.38 (0.18) mm for South Asian, 1.42 (0.20) mm for Black participants, and 1.37 (0.22) mm for Chinese participants (White versus others, all $p<0.001$). Interestingly, refractive error does not follow the same pattern – spherical equivalent of White (-0.38 +/- 2.6 diopters), South Asian (-0.55 +/- 2.4 diopters) and Black participants (-0.44 +/- 2.3 diopters) are similar with Chinese participants significantly more myopic (-2.28 +/- 3.2 diopters). The proportion of participants who have undergone cataract surgery prior to autorefraction in UK Biobank is very small.

The epidemiological importance of racial differences in NA-AION incidence is clear however they may also reveal mechanistic insights into NA-AION onset[5,6]. The data suggest that a mechanical risk factor to the disc needs to be tested quantitatively in future studies alongside the traditional comorbidity risk factors. Measurement of optic nerve morphology, particularly feasible now given modern fully automated deep learning-based segmentation tools, should be considered by all researchers investigating the precipitants, biology and outcomes of NAION.

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