

ARVO 2025

## View Abstract

**CONTROL ID:** 4262905**SUBMISSION ROLE:** Abstract Submission**AUTHORS**

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**Study Group:** (none)**ABSTRACT****TITLE:**

Retinal pigment score to assess diabetic retinopathy detection across multiple artificial intelligence vendors in a large diverse cohort

**ABSTRACT BODY:****Purpose:**

Automated retinal image analysis systems (ARIAS) promise to tackle the rise in DR screening demands. Non-white ethnic groups show higher sight-threatening DR (STDR) rates and bias may be encoded if ethnicity is the only metric used to assess performance equity. We use the retinal pigment score (RPS), a novel objective continuous metric to assess performance equity across available ARIAS.

**Methods:** Eight anonymised CE-marked ARIAS were independently tested for DR detection using a curated dataset from the North East London diabetic eye screening programme (DESP, 01/01/2021-31/12/2022). A total of 201,438 screening episodes (1.2 million images) with sociodemographic variables were available for analysis. We included 188,858/201,438 (93.8%) episodes with retinal images and calculated episode-level

mean RPS. Multivariable linear models adjusting for age, sex, ethnicity, diabetes type and duration, DR severity, and index of multiple deprivation, were used to explore RPS associations. ARIAS screening test results (test-positive/technical failure vs test-negative) were compared with quality-assured multilevel human grading (up to 3 graders) as the reference standard and by RPS quintiles.

**Results:** The mean RPS was 1.4 (SD 14.3). Non-white ethnic groups showed an 0.9 to 1.2 SD increase in RPS when compared with white ethnic groups. When compared with no DR, STDR (R1M1, R2M0, R2M1, R3M1) showed a small RPS decrease ranging from -0.06 to -0.16 SD ( $p < 0.001$ ). Sensitivity was stable across RPS quintiles for R2 and R3, ranging from 96.4% (95%CI 95.1%, 97.4%) to 99.4% (98.7%, 99.7%) in least-pigmented fundi, and from 95.2% (93.5%, 96.6%) to 100% (99.6%, 100.0%) in most pigmented fundi. Sensitivities for proliferative DR ranged from 93.1% to 100.0% with no heterogeneity across RPS quintiles. False positive rates for no DR varied widely among vendors and RPS, with percentage point difference variation between first vs fifth RPS quintiles within vendors ranging from 6.7 (vendor B) to 28.9 (vendor A).

**Conclusions:** We demonstrate the utility of an objective continuous metric (RPS) to characterize the retinal fundus background in a retinal image dataset, revealing consistent ARIAS sensitivity for STDR detection across RPS quintiles. These findings highlight the potential of the RPS to enhance equity in ARIAS-based DR detection.

(No Image Selected)

## **DETAILS**

**PRESENTATION TYPE - PLEASE NOTE, IF YOU CHANGE YOUR PRESENTATION TYPE AFTER APPLYING FOR AN AWARD (BELOW), YOU MUST GO BACK AND RESELECT THE APPLY BUTTON.: #1**

Paper, #2 Poster

**CURRENT REVIEWING CODE:** 1280 AI in the retina

**CURRENT SECTION/GROUP:** Retina

**Clinical Trial Registration (Abstract):** No

**Other Registry Site (Abstract):** (none)

**Registration Number (Abstract):** (none)

**Date Trial was Registered (MM/DD/YYYY) (Abstract):** (none)

**Date Trial Began (MM/DD/YYYY) (Abstract):** (none)

**Grant Support (Abstract):** No

**Support Detail (Abstract):** None

## **TRAVEL GRANTS and AWARDS APPLICATIONS**

**AWARDS:** ARVO Members-in-Training Outstanding Poster Award|ARVO Foundation Early Career Clinician-Scientist Research Award

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