



# City Research Online

## City St George's, University of London

**Citation:** Rodriguez-Carmona, M., Bastaki, Q. & Barbur, J. L. (2019). Loss of color and flicker sensitivity in subjects at risk of developing diabetes. *Investigative Ophthalmology & Visual Science*, 60(9), 1304.

This is the accepted version of the paper.

This version of the publication may differ from the final published version. To cite this item please consult the publisher's version.

**Permanent repository link:** <https://openaccess.city.ac.uk/id/eprint/23380/>

**Copyright and Reuse:** Copyright and Moral Rights remain with the author(s) and/or copyright holders. Copies of full items can be used for personal research or study, educational, or not-for-profit purposes without prior permission or charge, unless otherwise indicated, provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way. For full details of reuse please refer to [City Research Online policy](#).

ARVO 2019

---

# View Abstract

---

**CONTROL ID:** 3148977**SUBMISSION ROLE:** Abstract Submission**AUTHORS****AUTHORS (LAST NAME, FIRST NAME):** [Rodriguez-Carmona, Marisa](#)<sup>1</sup>; Bastaki, Qais<sup>1</sup>; Barbur, John L.<sup>1</sup>**INSTITUTIONS (ALL):** 1. Centre for Applied Vision Research, City, University of London, London, United Kingdom.**Commercial Relationships Disclosure (Abstract):** Marisa Rodriguez-Carmona: Commercial Relationship: Code N (No Commercial Relationship) | Qais Bastaki: Commercial Relationship: Code N (No Commercial Relationship) | John Barbur: Commercial Relationship: Code N (No Commercial Relationship)**Study Group:** IV**ABSTRACT****TITLE:** Loss of color and flicker sensitivity in subjects at risk of developing diabetes**ABSTRACT BODY:****Purpose:** Recent studies carried out in diabetic patients with no more than moderate maculopathy revealed that over 70% of these diabetic patients had a significant loss of both Yellow/Blue (YB) and Red/Green (RG) color vision (<https://doi.org/10.1111/j.1755-3768.2012.F073.x>). The purpose of this study was to investigate whether clinically normal subjects, identified as being at 'risk' of developing diabetes show significant loss of color vision and/or abnormal thresholds for rod and cone mediated flicker.**Methods:** Three groups of subjects were recruited from a healthcare centre that offers diagnostic and screening services, including vision assessment; G1 (normal subject group (n=11) with no risk factors and no history of eye disease), G2 ('high-risk' subject group (n=62)) and G3 (subjects diagnosed with diabetes (n=23)). The inclusion criteria for G2 required three or more recognised risk factors for diabetes (e.g., age >45, HbA1C >5.7, high blood pressure, smoking history, high BMI, family history of diabetes, FPG levels >100 mg/dl). In addition to ophthalmic assessment, VA and Functional Contrast Sensitivity (FCS), thresholds for rod and cone mediated vision and RG and YB vision were measured in each subject using the advanced vision and optometric tests ([www.avot/city.ac.uk](http://www.avot/city.ac.uk)).**Results:** All G1 subjects recruited from the healthcare centre had VA better than 6/9 and FCS values within the normal range, as well as rod and cone mediated flicker thresholds and RG and YB color thresholds below the upper limits for their corresponding age. G2 (high risk) subjects had RG and YB thresholds significantly higher than the normal group (P(T≤t): RG (0.007); YB (0.002)). Rod and cone mediated thresholds were also higher: Rod (0.0001), Cone (0.0014). G3 subjects had the highest thresholds revealing significant loss of color and rod and cone mediated flicker sensitivity.**Conclusions:** Consistent with previous findings, the diabetic group (G3) show significant loss of both RG and YB vision. They also have higher thresholds for rod and cone mediated vision. Surprisingly, the high-risk subject group who do not meet the clinical criteria for early diabetes also show significant loss of color and rod and cone sensitivity. These findings suggest that accurate assessment of color vision and rod and cone mediated thresholds qualify as important risk factors in prediabetic screening.

(No Image Selected)

**Layman Abstract (optional): Provide a 50-200 word description of your work that non-scientists can understand. Describe the big picture and the implications of your findings, not the study itself and the associated details.:** Color vision has been shown to be affected in patients diagnosed with diabetes. This study examines whether color vision and rod and cone mediated flicker sensitivity are also affected in subjects that cannot be clinically diagnosed with diabetes, but are at high risk of developing the disease. Participants had at least three or more of the common risk factors associated with diabetes. The results show that although subjects do not meet the clinical diagnosis of diabetes, subjects with high risk of developing the disease exhibit significant worsening of red-green and yellow-blue color vision as well as rod and cone mediated flicker sensitivity.**DETAILS**

**PRESENTATION TYPE:** #1 Paper, #2 Poster  
**CURRENT REVIEWING CODE:** 1630 color vision - VI  
**CURRENT SECTION:** Visual Psychophysics/Physiological Optics  
**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:**

#### AFFIRMATIONS

**Affirmations:** Affirmation of compliance with ARVO policy on registering clinical trials.  
**Affirmations:** Affirmation to present same work as abstract submission.  
**Affirmations:** Affirmation to pay Annual Meeting's full registration fee.  
**Affirmations:** Affirmation of compliance with ARVO's Statement for Use of Human Subjects and/or Declaration of Helsinki.  
**Affirmations:** Affirmation of copyright transfer from each author to ARVO, or certification of public domain abstract.  
**Affirmations:** Affirmation of compliance with ARVO's Statement for Use of Animals.  
**Affirmations:** Affirmation that submission of this abstract has been approved by the Principal Investigator.  
**Affirmations:** Affirmation to reveal essential structure, novel compound elements, or identify new gene compounds.  
**Affirmations:** Affirmation that abstract data/conclusions have not been published; not redundant with other submissions from same investigators.

---

© Clarivate Analytics | © ScholarOne, Inc., 2018. All Rights Reserved.  
ScholarOne Abstracts and ScholarOne are registered trademarks of ScholarOne, Inc.  
ScholarOne Abstracts Patents #7,257,767 and #7,263,655.

[@ScholarOneNews](#) | [System Requirements](#) | [Privacy Statement](#) | [Terms of Use](#)

Product version number 4.16.0 (Build 66). Build date Thu Nov 29 10:26:10 EST 2018. Server ip-10-236-29-218