Role of Metabolic Risk Factors and Chronic Inflammation in Non-proliferative Diabetic Retinopathy in Type 1 Diabetes

Authors: Johanna M. Blomqvist,[1,2] Marika I. Eriksson,[1,3] Kustaa Hietala,[4] Paula Summanen,[5] Fanny Jansson Sigfrids,[1,2] Per-Henrik Groop,[1,2] *Lena M. Thorn[1,3]

1. Folkhälsan Research Center, Helsinki, Finland
2. Department of Nephrology, University of Helsinki and Helsinki University Hospital, Finland
3. Department of General Practice and Primary Health Care, University of Helsinki and Helsinki University Hospital, Finland
4. Hospital Nova of Central Finland, Jyväskylä, Finland
5. Department of Ophthalmology, University of Helsinki and Helsinki University Hospital, Finland

*Correspondence to lena.thorn@helsinki.fi

Conflicts of interest: The authors reported support for the present manuscript from the Medical Society of Finland. Blomqvist received support for attending meetings from EASD and the Finnish Diabetes Association. Groop has received honoraria from Astellas, AstraZeneca, Bayer, Berlin Chemie, Boehringer Ingelheim, Eli Lilly, Elo Water, Genzyme, Merck Sharp & Dohme, Medscape, Menarini, Mundipharma, Novartis, Novo Nordisk, PeerVoice, Sanofi, and Sciarc; and has participated on data safety monitoring or advisory boards for AbbVie, Astellas, AstraZeneca, Bayer, Boehringer Ingelheim, Cebix, Eli Lilly, Janssen, Medscape, Merck Sharp & Dohme, Mundipharma, Nestlé, Novartis, Novo Nordisk, and Sanofi. Eriksson has received honoraria from the Finnish Diabetes Association; and is a shareholder in BCB Medical Oy. Jansson Sigfrids has received honoraria from Boehringer Ingelheim. The other authors have declared no conflicts of interest.

Keywords: Diabetic retinopathy, inflammation, metabolic syndrome, Type 1 diabetes.

Citation: EMJ Diabet. 2026;14[1]:41-42. https://doi.org/10.33590/emjdiabet/NCM3LF3H

SUMMARY OF KEY RESEARCH FINDINGS

The main risk factors for diabetic retinopathy are diabetes duration and poor glycaemic control. In this cross-sectional study, the authors aimed to assess the association between other metabolic risk factors and chronic inflammation with non-proliferative diabetic retinopathy in individuals with Type 1 diabetes in a large Finnish cohort. The authors presented preliminary results that have not yet undergone peer review in a full scientific publication. These preliminary results suggest that non-proliferative diabetic retinopathy is associated with higher high-sensitivity C-reactive protein concentrations even when accounting for other confounding factors. For metabolic syndrome, the results were less straightforward, but the odds of diabetic retinopathy increased with the number of metabolic syndrome components present. These preliminary findings suggest a potential role of chronic low-grade inflammation and the accumulation of several metabolic syndrome components in the early stage of diabetic retinopathy.[1]

WHAT CHALLENGE DOES THIS ADDRESS?

Diabetic retinopathy is one of the most prevalent complications of Type 1 diabetes.[2] Several metabolic risk factors have been suggested to be associated with diabetic retinopathy, but the link between metabolic syndrome and diabetic retinopathy in Type 1 diabetes is still unclear.[3] Metabolic syndrome is associated with chronic low-grade inflammation, which in turn is involved in the pathophysiological mechanisms underlying diabetic retinopathy. Yet, the link between markers of chronic low-grade inflammation and diabetic retinopathy in Type 1 diabetes remains uncertain,[4,5] and there are very few studies that have investigated the risk factors associated with non-proliferative diabetic retinopathy, an early disease manifestation.

CC BY-NC 4.0 Licence • Copyright © 2026 Author(s)

RELEVANCE TO EUROPEAN PRACTICE

The findings suggest that chronic low-grade inflammation is already associated with diabetic retinopathy at an early stage of the disease. In addition, the accumulation of multiple metabolic risk factors appears to be associated with non-proliferative diabetic retinopathy. As metabolic syndrome components and high-sensitivity C-reactive protein are readily assessable in clinical practice, they are potentially useful markers for risk stratification.[6] However, further research is needed to establish causality and determine whether these factors play a direct role in the development of diabetic retinopathy in Type 1 diabetes.

WHAT ARE THE NEXT STEPS FOR THE RESEARCH?

As these findings are preliminary and derived from a cross-sectional study design, further research is required to determine whether high sensitivity C-reactive protein and/or metabolic syndrome are associated with diabetic retinopathy development or progression. Further follow-up analyses will investigate the risk of progression to proliferative diabetic retinopathy in Type 1 diabetes.

References

1. Blomqvist JM et al. Role of metabolic risk factors and chronic inflammation in non-proliferative diabetic retinopathy in type 1 diabetes. Abstract 93. EASD Annual Meeting, 28 September-2 October, 2026.
2. De Meulemeester J et al. The association of chronic complications with time in tight range and time in range in people with type 1 diabetes: a retrospective cross-sectional real-world study. Diabetologia. 2024;67(8):1527-35.
3. Hainsworth DP et al. Risk factors for retinopathy in type 1 diabetes: the DCCT/EDIC Study. Diabetes Care. 2019;42(5):875-82.
4. Schram MT et al.; EURODIAB Prospective Complications Study Group. Markers of inflammation are cross-sectionally associated with microvascular complications and cardiovascular disease in type 1 diabetes -- the EURODIAB Prospective Complications Study. Diabetologia. 2005;48(2):370-8.
5. Gouliopoulos NS et al. Association of serum inflammatory markers and diabetic retinopathy: a review of literature. Eur Rev Med Pharmacol Sci. 2018;22(21):7113-28.
6. Blomqvist JM et al. Association between chronic low-grade inflammation and metabolic syndrome and their impact on the risk of coronary artery disease in type 1 diabetes. J Diabetes Complications. 2026;40(6):109331.