

Retinopathy

Time, HbA_{1c} and blood pressure: Influences on cumulative incidence of macular oedema



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Recently, Klein et al (2009; summarised alongside) published report XXIII from the Wisconsin Epidemiologic Study of Diabetic Retinopathy. This important paper presents 25-year follow-up data on the incidence of diabetic macular oedema in people with type 1 diabetes.

Macular oedema is a leading cause of visual impairment in people with diabetes. Proliferative retinopathy can almost always be effectively treated, if detected early, but the detection, management and treatment of maculopathy has proven to be more challenging. While many people with diabetic maculopathy do not reach the level of vision loss necessary for registration, they may still suffer considerable reductions in quality of life related to impaired sight.

Klein et al (2009) found the 25-year cumulative incidence (CI) of any macular oedema to be 29%, and 17% for clinically significant macular oedema (that is, treatable oedema). The annual incidence of oedema was very similar after 4, 10 and 14 years of follow-up, at 2.3%, 2.1% and 2.3%, respectively. At 25-years follow-up, this dropped to 0.9%.

It is not clear whether the improvement in annual incidence of macular oedema was due to improvements in the management of diabetes (the mean HbA_{1c} at the first follow-up was 10.7% [93 mmol/mol], dropping to 9.4% [79 mmol/mol] by the fourth) or to selective mortality, or rather (as the authors put it) “survival of the healthiest” – an important take-home message!

The data showed that lower HbA_{1c} levels were associated with a lower incidence of oedema, regardless of the duration of diabetes. Furthermore, a 1% (10.9 mmol/mol) increase in HbA_{1c} between baseline and follow-up resulted in a 22% increase in the 25-year CI of macular oedema, corroborating evidence from the Diabetes Control and Complications Trial (DCCT Research Group, 2000).

Interestingly, although systolic blood pressure had a moderate association with the 25-year CI of macular oedema following univariate and multivariate analysis, there was no change in the mean systolic blood pressure during the follow-up period, suggesting that this was unlikely to have influenced the final fall in annual incidence. The study also confirmed the expected association between retinopathy and nephropathy (evidenced by gross proteinuria), albeit weakly. Interestingly, heavy smoking was a risk factor on univariate, but not multivariate, analysis.

The Wisconsin Epidemiologic Study of Diabetic Retinopathy has provided unique data on the prevalence, incidence and risk factors for the development and progression of diabetic retinopathy both in types 1 and 2 diabetes over a quarter of a century. Meticulous attention to detail and engagement of the study cohort has provided unparalleled epidemiological data for healthcare professionals and a fascinating overview of the changing face of diabetes and diabetic retinopathy during this period.

Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions and Complications Research Group (2000) Retinopathy and nephropathy in patients with type 1 diabetes four years after a trial of intensive therapy. *N Engl J Med* **342**: 381–9

OPHTHALMOLOGY

Does selective mortality influence long-term incidence of macular oedema?

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓✓

1 In this population-based longitudinal study, participants with insulin-dependent type 1 diabetes were followed-up to assess the relationship between the length of follow-up and the development of macular oedema (MO).

2 Participants ($n=955$; aged 4–80 years) from southern Wisconsin in the US were recruited, with the primary inclusion criteria being younger-onset diabetes (diagnosis before 30 years of age), and participation at baseline and at least one of four follow-up eye examinations at 4, 10, 14 and 25 years.

3 MO was found to have a 25-year cumulative incidence of 29%, with the incidence of clinically significant MO being 17%. Annual incidences of MO decreased over time, from 2.3% to 0.9% from the first to the fourth follow-up period of the study.

4 The incidence of MO was significantly associated with higher baseline HbA_{1c} levels (hazard ratio [HR] per 1% = 1.17; 95% confidence interval [CI] 1.10–1.25; $P<0.001$) and also with higher systolic blood pressure (HR per 10 mmHg = 1.15; 95% CI 1.04–1.26; $P=0.004$).

5 Good glycaemic and blood pressure control were shown to reduce the incidence of MO. Reductions in MO in the final period of follow-up suggest a number of possible conclusions, including improved diabetes management.

Klein R, Knudtson MD, Lee KE et al (2009) The Wisconsin epidemiologic study of diabetic retinopathy XXIII: the twenty-five-year incidence of macular edema in persons with type 1 diabetes. *Ophthalmology* **116**: 497–503

GRAEFE'S ARCHIVE FOR CLINICAL AND EXPERIMENTAL OPHTHALMOLOGY

Glycaemia predicts retinopathic lesions

Readability	✓✓✓✓
Applicability to practice	✓✓✓
WOW! factor	✓✓✓

- The association between glycaemia and diabetic retinopathy abnormalities in people with type 2 diabetes was studied in this 10-year prospective trial.
- Participants ($n=83$) with newly diagnosed diabetes had their

glycaemic values and fundus photographs recorded at baseline, 5- and 10-year follow-up.

- Statistically significant positive correlations were found between all glycaemic parameters measured (HbA_{1c} , fasting blood glucose, plasma glucose, and 1- and 2-hour post-load glucose values) at 5 years and the extent of diabetic retinopathic lesions at 10-year follow-up ($P<0.003$).

Kalesnykiene V, Sorri I, Voutilainen R et al (2009) The effect of glycaemic control on the quantitative characteristics of retinopathy lesions in patients with type 2 diabetes mellitus: 10-year follow-up study. *Graefes Arch Clin Exp Ophthalmol* **247**: 335–41

ACTA OPHTHALMOLOGICA

Low risk of diabetic retinopathy for those with screen-detected diabetes

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- In this study, of 12708 people with previously undiagnosed diabetes invited by mail for screening, 763 were found to have type 2 diabetes.
- Of those newly diagnosed with diabetes, 670 underwent medical examination, including HbA_{1c} and

blood pressure measurement, and an ophthalmological examination.

- None of the participants were found to have severe non-proliferative or proliferative diabetic retinopathy, 93.2% (625/670) had no retinopathy at all, and 6% (40/670) had minimal retinopathy.
- HbA_{1c} , systolic and diastolic blood pressure were significantly higher among the participants with retinopathy than those without (all $P=0.05$).
- People with screen-detected diabetes were found to have a low prevalence of diabetic retinopathy, and the authors concluded that screening for diabetic retinopathy should be concentrated on those diagnosed with type 2 diabetes.

Bek T, Lund-Andersen H, Hansen AB et al (2009) The prevalence of diabetic retinopathy in patients with screen-detected type 2 diabetes in Denmark: the ADDITION study. *Acta Ophthalmol* **87**: 270–4

DIABETES CARE

Higher prevalence of retinopathy among South Asian people with diabetes

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- This community-based, cross-sectional, UK-based study recruited people with type 2 diabetes to compare prevalence and risk factors for diabetic retinopathy between those of South Asian and White European ethnicity.

- Participants (421 of South Asian and 614 of White European ethnicity) with diabetic retinopathy, sight-threatening retinopathy, maculopathy, or previous laser photocoagulation therapy were assessed, and data were collected on traditional risk factors.
- People of South Asian ethnicity were significantly more likely to have any retinopathy ($P=0.0078$).

- The authors recommended that the modifiable risk factors be targeted in people with diabetes of South Asian ethnicity to control the risk of diabetic retinopathy and maculopathy.

Raymond NT, Varadhan L, Reynold DR et al (2009) Higher prevalence of retinopathy in diabetic patients of South Asian ethnicity compared with white Europeans in the community: a cross-sectional study. *Diabetes Care* **32**: 410–15

RETINA

Pars plana vitrectomy is effective long-term in diabetic MO

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- The authors used an interventional, retrospective, consecutive case series to assess the long-term results of pars plana vitrectomy (PPV) in improving visual acuity in people with diffuse macular oedema (MO).

- The primary outcome measured was best-corrected visual acuity achieved during follow-up.

- Consecutive clinical records for people with diabetic MO without thickened and taut posterior hyaloids were reviewed, with 486 eyes of 326 people who underwent PPV with the creation of a posterior vitreous detachment by the same surgeon being included in the sample.

- Five-year follow-up data were available for 356 of 486 eyes. Postoperative follow-up ranged from 12 to 170 months, with a mean follow-up of 74 months.

- One-year and final visit mean preoperative best-corrected visual acuities increased significantly from 0.19 (20/105) to 0.32 (20/63) and 0.30(20/67), respectively ($P<0.0001$).

- The final best-corrected visual acuity improved in 256 (52.7%) of the 486 eyes, was unchanged in 152 (31.3%), and worsened in 78 (16.0%).

- Major postoperative complications included hard exudate deposits in the macular (21 eyes, 4.2%), and glaucoma (22 eyes, 4.5%).

- The authors concluded that improved vision associated with the majority of cases of diffuse MO treated with PPV suggests that this surgery offers long-term effective treatment of diffuse MO.

Kumagai K, Furukawa M, Ogino N et al (2009) Long-term follow-up of vitrectomy for diffuse nontractional diabetic macular edema. *Retina* **29**: 464–72

“The improved vision associated with the majority of cases of macular oedema treated with pars plana vitrectomy suggests long-term effectiveness of this surgery.”