Retinopathy

CURRENT DIABETES REPORTS

No gene for diabetic retinopathy should be left unexamined

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

1 Published evidence is accumulating demonstrating the underlying susceptibility to diabetes and also that genetic variation plays a role in its complications. This review focuses on the evidence for genetic involvement in the development of diabetic retinopathy (DR).

2 Many candidate genes for DR have been studied. The authors reason that genes associated with glycosylation, the polyol pathway, immune response, collagen formation, platelet adhesion and platelet aggregation are reasonable targets.

3 Retinopathy candidate gene studies have been done for both type 1 and 2 diabetes. The authors report that no differences have been observed between the two as far as the biology leading to hyperglycaemia goes.

4 Several failings in the published genetic studies exist, say the authors. Examples include: small sample sizes; a variation in the classification of retinopathy; and the fact that few genes have been studied exhaustively, with many being studied only once.

5 The two most commonly studied genes are those for aldose reductase and sorbitol dehydrogenase.

6 The results for aldose reductase remain ambiguous, yet it is an ideal candidate gene. Clinical trials of aldose reductase inhibitors have been disappointing to date say the authors.

7 The authors conclude that understanding of the genetics of DR is growing; however, more needs to be done to understand whether the genes are influencing susceptibility to retinopathy or whether they influence the ability to regulate blood glucose levels.

Hanis CL, Hallman D (2006) Genetics of diabetic retinopathy. *Current Diabetes Reports* **6**(2): 155–61

Genes: Risk factors for diabetic retinopathy?

Deborah Broadbent, Director of Diabetic Eye Screening, Royal Liverpool University Hospital

I am sure that many of you reading this commentary are completely conversant with the increasingly intricate processes of gene research, but I suspect many of you, like me, struggle with its complexity. At medical school I learnt, and understood, classic Mendelian genetics and even something of polygenic inheritance in the context of disease. These days I enthusiastically attend genetics lectures in the hope of extending my knowledge. I concentrate as hard as I can… and keep up for a while… and then suddenly we hit gene arrays and I get lost again! So it was excellent to find this single review (see left) on the genetics of diabetic retinopathy!

When I discuss risk factors for the development and progression of diabetic retinopathy I always include the possibility that genetic factors – either predisposing or protective – are involved, although no single gene has so far been identified. Anecdotally we can all describe people with immaculate metabolic control and aggressive retinopathy, and conversely those with many, many years of poor control and no retinopathy. There has to be a genetic explanation!

Nature versus nurture, genes or environment, gene–gene or gene–environment interactions? Many candidate genes have been studied, and it is not surprising that there have been extensive studies on genes related to aldose reductase, vascular endothelial growth factor, protein kinase C, receptors for advanced glycation end products and genes involved in chronic inflammation. However, the biological processes underlying the development of retinopathy are complex and interrelated. It would be foolish to suppose that there would not be similarly complex relationships between many genes with small interrelated effects and the environment. The authors themselves describe the search as a tough challenge, but acknowledge the vital importance of leaving no gene unexamined!

Every person is unique because of the infinite variations possible by interactions between the human genome and his or her own environment. An understanding of the processes is central to the prediction of risk and the response to treatment and thus the development of intervention strategies. Gene-directed therapy? Personalised medicine? Is this the future?

INVESTIGATIVE OPHTHALMOLOGY AND VISUAL SCIENCE

Assessment of an automated retinal image system

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

1 One thousand and thirty-nine retinal images from 489 people attending a diabetic retinopathy clinic were assessed using an especially designed algorithmic method in order to evaluate the performance of an automated retinal image quality assessment system.

2 Using a comprehensive grading system, the images were first examined by a clinician for image and field definition. The visibility of the macular vessels was used as the indicator for image quality.

3 Following manual grading automatic image-processing methods were developed with a training set of 395 images. The automatic system was then used on the 1039 manually graded images.

4 Of all images, 11.3% were manually graded as having inadequate overall quality defined as the presence of either inadequate clarity or field definition. The automated system demonstrated a high sensitivity and specificity (99.1% and 89.4%, respectively) for detection of inadequate quality and was deemed sufficiently accurate to form part of an automated diabetic retinopathy grading system.

Fleming AD, Philip S, Goatman KA et al (2006) Automated assessment of diabetic retinal image quality based on clarity and field definition. *Investigative Ophthalmology and Visual Science* **47**(3): 1120–5

'Intravitreal injection of triamcinolone prior to panretinal photocoagulation (PRP) may be useful in improving the effects of PRP in eyes with proliferative diabetic retinopathy by reducing neovascularisation and macular thickening.'

ARCHIVES OF OPHTHALMOLOGY

Triamcinolone injection improves effects of PRP

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

1 An interventional case series of nine people with bilateral proliferative diabetic retinopathy treated with intravitreal triamcinolone acetonide prior to laser panretinal photocoagulation (PRP) in one eye (the injected eye) and just PRP in the other eye (the control eye) was carried out to assess the effectiveness of triamcinolone as an adjunctive treatment to PRP.

2 Primary endpoints were the change in planimetric area of fluorescein leakage from retinal neovascularisation and the macular thickness as measured by optical coherence tomography at 3, 6, 9 and 12 months. Secondary endpoints were change in vision, intraocular pressure and cataract progression. All participants completed 9 months and five completed 12 months of follow-up.

3 At the 9- and 12-month intervals, the planimetric area of fluorescein leakage decreased by 86% and 88% in the injected eyes and by 33% and 50% in the control eyes, respectively.

4 Central macular thickness significantly decreased in the injected eyes and increased in the control eyes. Vision improved slightly in the injected eyes and worsened in the control eyes (both non-significant).

5 The authors concluded that intravitreal injection of triamcinolone prior to PRP may be useful in improving the effects of PRP in eyes with proliferative diabetic retinopathy by reducing neovascularisation and macular thickening.

Bandello F, Polito A, Pognuz DR et al (2006) Triamcinolone as adjunctive treatment to laser panretinal photocoagulation for proliferative diabetic retinopathy. *Archives of Ophthalmology* **124**(5): 643–50

AMERICAN JOURNAL OF OPHTHALMOLOGY

Awareness of HbA_{1c} in an eye care centre

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

1 One hundred and fifty people with diabetes examined for diabetic retinopathy at an ophthalmic centre were surveyed to assess their knowledge of HbA_{1c}.

2 Seventy-six (51%) understood HbA_{1c}, 25 (17%) were not sure and 49 (33%) did not understand HbA_{1c}.

3 A total of 76 people had diabetic retinopathy, of whom 33 (43%) understood HbA_{1c}. Sixty-nine people had non-proliferative diabetic retinopathy, of whom 39 (57%) understood HbA_{1c}. Five had no diabetic retinopathy, of whom four (80%) understood HbA_{1c}.

4 Further investigation is needed to evaluate the failure of some people to understand what HbA_{1c} means, the authors concluded.

Do DV, Nguyen QD, Bressler NM et al (2006) Hemoglobin A1c awareness among patients receiving eye care at a tertiary ophthalmic center. *American Journal of Ophthalmology* **141**(5): 951–3

TELEMEDICINE JOURNAL AND E-HEALTH

Cost-effective system for diabetic retinopathy screening

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

1 The authors report on the implementation of a digital imaging system (DigiScope; EyeTel Imaging, Columbia, US) for diabetic retinopathy in a primary care setting.

2 People with diabetes who had not undergone an eye examination in the previous year had their eyes imaged using the imaging system and the images sent to a central image reading centre where the need for referral to an opthalmologist was determined.

3 A total of 2771 people were imaged in the study period (01.10.2002–31.03.2003) of whom 468 (17%) were recommended for non-urgent referral and 71 (3%) for urgent referral. Two hundred and ninety-five cases (11%) had unreadable images.

4 Therefore, the DigiScope imaging system used in the primary care setting for people with diabetes is practical and allows screening of people who are not receiving any eye examinations, the authors concluded.

Zimmer-Galler I, Zeimer R (2006) Results of implementation of the DigiScope for diabetic retinopathy assessment in the primary care environment. *Telemedicine Journal and E-Health* **12**(2): 89–98

DIABETES TECHNOLOGY AND THERAPEUTICS

EAGLE model can calculate diabetes-related costs

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

1 The Economic Assessment of Glycemic control and Long-term Effects of diabetes (EAGLE) model was designed to develop the methodology of existing economic models, such as from the Wisconsin Epidemiological Study of Diabetic Retinopathy, in order to provide a more comprehensive assessment of the long-term effects of diabetes treatment and its related economic costs. Other models do not take into account, for example, switching of therapies.

2 This paper reports the full validation of the EAGLE model by comparing simulated event rates against published ones used as the basis for the model.

3 The authors conclude that the EAGLE model is a flexible, comprehensive and internally valid tool for predicting the long-term effects of diabetes treatment and related costs of diabetes.

Mueller E, Maxion-Bergemann S, Gultyaev D et al (2006) Development and Validation of the Economic Assessment of Glycemic Control and Long-Term Effects of Diabetes (EAGLE) Model. *Diabetes Technology and Therapeutics* **8**(2): 219–36