

# Abstracts

Edited by Prof. Tahir Mahmood

## **Turnover rate of tear-film lipid layer determined by fluorophotometry**

Mochizuki H, Yamada M, Hatou S, Tsubota K  
Br J Ophthalmol 2009; 93: 1535-38.

The precorneal tear film has traditionally been described as consisting of an outer lipid layer, a middle aqueous layer and an inner mucus layer. Although this remains valid, some modifications have been proposed. In the current model of the tear film, the aqueous-mucin layer is covered by two thin layers of lipids. Polar lipids such as phospholipids lie adjacent to the aqueous-mucin layer, and non-polar lipids such as cholesterol and wax ester are present at the tear-air interface. In addition, tears contain proteins that possess lipid-binding properties, such as tear lipocalin. Although lipids in tears are primarily located in the tear-film lipid layer, some lipids are presumably bound by lipocalin in the aqueous layer. Tear lipocalin is thought to have an important role in stabilising the tear-film lipid layer by transferring lipids to it from the aqueous layer.

Despite comprising a very small proportion of the overall tear-film thickness, the lipid layer is important for retarding evaporation and maintaining tear-film stability. Where the lipid layer is absent or where the integrity of the lipid layer is compromised, the evaporation rate of tears increases, accompanied by tear-film instability. To assess the lipid layer of tears, several techniques have been developed, including observation of lipid layer characteristics by interferometric methods, quantitative measurement of meibomian lipid on the lid margin by meibometry and measurement of evaporation from the ocular surface. Of these, observation of lipid layer characteristics by interferometric methods has been well established. In various pathological conditions, such as meibomian gland dysfunction, the appearance of the lipid layer can change. Lipid layer thickness, measured by interferometry, has been reported to correlate with tear-film evaporation, tear-film breakup time, and clinical symptoms. The concentration of lipocalin in tears from patients with meibomian gland dysfunction is significantly lower than in normal controls. Thus, lipids in tears, both in the lipid layer and in the

aqueous layer held by lipocalin, are important when considering the pathophysiology of evaporative dry eye, such as meibomian gland dysfunction. Until now, however, there has been no information about the flow rate of tear-film lipid layer.

The purpose of this study was to independently assess the turnover rates of aqueous and lipid layers of the tear film,

Two fluorescent dyes, fluorescein sodium and 5-dodecanoylamino fluorescein (DAF), which is a free-fatty-acid conjugate of fluorescein, were applied to the right eye of 12 healthy volunteers. Fluorescent intensity of the precorneal tear film was measured at the central cornea every minute for 10 min for fluorescein sodium, and every 5 min for 50 min for DAF. The turnover rate was calculated by plotting fluorescent intensity against time in a semilog plot and expressed as %/min.

Turnover rates of fluorescein sodium and DAF were 10.3 (SD 3.7)%/min and 0.93 (0.93 (0.36)%/min., respectively. The turnover rate of DAF was significantly lower than that of fluorescein sodium ( $p < 0.05$ , Mann-Whitney test). The turnover rate of DAF positively correlated with that of fluorescein sodium ( $r = 0.93$ ,  $p < 0.05$ ).

Authors concluded with the remarks that our results indicate that the turnover of lipids in tears is much slower than the aqueous flow of tears, and that this lipid turnover is associated with the aqueous flow of tears in healthy adults.

## **Cataract surgery and primary intraocular lens implantation in children <2 years old in the UK and Ireland: finding of national surveys**

Solebo AL, Russell-Eggitt I, Nischal KK, Moore AT, Cumberland P, Rani JS,  
B.J Ophthalmol 2009; 93: 1495-1498.

Primary intraocular (IOL) implantation has become accepted practice for older children with cataract. While primary IOL implantation is being increasingly undertaken in children in the first 2 years of life, the long-term benefits and the factors associated with positive and negative outcomes are unclear.

The British Isles Congenital Cataract Interest Group (BCCIG), a research network comprising British and Irish ophthalmic consultants, was established in 1995 in order to study the incidence, detection, causes, management and outcomes of congenital and infantile cataract. A national epidemiological study to investigate outcomes following primary IOL implantation in children < 2 years old with congenital and infantile cataract is now being undertaken through the BCCIG.

The purpose of this study was current patterns of practice relating to primary intraocular lens (IOL) implantation in children <2 years old in the UK and Ireland are investigated.

76% of 928 surveyed ophthalmologists replied. 47 (7%) of the respondents operated on children aged < 2 with cataract. 41 (87%) of respondents performed primary IOL implantation, but 25% would not implant an IOL in a child under 1 year old. 88% of surgeons used limbal wounds, 80% manual capsulotomies, 98% posterior capsulotomies and 100% hydrophobic acrylic lenses. The SRK/T formula was most commonly used (70%). Exclusion criteria for primary IOL implantation varied considerably and included micropthalmos (64% of respondents), anterior and posterior segment anomalies (53%, 58%), and glaucoma (19%).

Primary IOL implantation in children <2 has been widely adopted in the UK and Ireland. There is concordance of practice with regards to surgical technique and choice of IOL model. However, there is some variation in eligibility criteria for primary IOLs: this may reflect a lack of consensus on which children are most likely to benefit. Thus, there is a need for systematic studies of the outcomes of primary IOL implantation in younger children.

#### **Predicting visual success in macular hole surgery**

Gupta B; Laidlaw DAH, Williamson TH, Shah SP, Wong R, Wren S  
B.J Ophthalmol 2009; 93: 1488-1491.

Data on the outcome of surgery facilitate informed preoperative patient counseling. Most data on the outcome of idiopathic full thickness macular hole (IFTMH) surgery have concentrated on techniques and rates of anatomical closure. The aim of this study was to identify factors predicting restoration of good visual acuity (VA) (better than 20/40; 6/12 UK Snellen) and to present these data in a clinically usable format for

use in preoperative counseling. As surgical techniques are known to differ widely, in building the cohort we only included patients that had the same surgical technique and postoperative instructions, so that this study had one of the largest cohorts of patients undergoing standardised macular hole surgery.

The purpose of this study was data on the outcome of surgery facilitate informed preoperative patient counselling. Most studies on the outcome of surgery for idiopathic full thickness macular hole surgery have concentrated on rates of anatomical closure. The aim of this study was to identify factors predicting visual success (better than 20/40; 6/12 Snellen) following macular hole surgery.

A retrospective study of 133 patients undergoing standardised macular hole surgery with at least 3 months of postoperative follow-up. All patients underwent preoperative measurement of the maximum macular hole diameter using optical coherence tomography.

Multivariable regression analysis identified that age, preoperative visual acuity and macular hole size were significant predictors of visual success. The resulting model correctly classified the visual outcome of 80% of cases. Predicted rates of visual success varied from 93% in patients <60 years old with visual acuity better than 6/24 and a hole diameter of <350 um, to 2% in patients those >79 years old with visual acuity of 6/60 or worse and hole diameter of >500 urn.

Authors concluded with the remarks that the results provide a simple and clinically useful model to employ when counseling patients on macular hole surgery.

#### **Aqueous Vascular Endothelial growth factor as a predictor of macular thickening following cataract surgery in patients with diabetes mellitus**

Hartnett ME, Tinkham N, Paynter L, Geisen P, Rosenberg P, Koch G, Cohen KL  
Am J Ophthalmol 2009; 148: 895-901.

Cystoid macular edema (CME) and exacerbated diabetic macular edema (DME) can adversely affect visual outcomes following cataract surgery in patients with diabetes mellitus (DM). With technical improvements in cataract surgery, better glycemic control in patients with diabetes, and preoperative laser treatment for clinically significant macular edema (CSME), long-lasting macular edema (ME)

following cataract surgery is reported less often now than in the past, but the problem of postoperative ME still exists. A 30% increase in the center point thickness as measured by optical coherence tomography (OCT) was reported in 22% of patients with diabetes at 1 month postcataract extraction. More than half had resolution at 3 months in this study. However, delay in treatment of macular edema has been shown to reduce visual improvement following cataract extraction in some patients. Therefore, preoperative measurements that identify patients at risk for ME after cataract surgery may be beneficial to initiate treatment early and reduce vision loss from ME.

Vascular endothelial growth factor (VEGF) and insulin-like growth factor-1 (IGF-1) have been implicated in the pathogenesis of ME and diabetic retinopathy (DR). VEGF is a vasopermeability factor and has been associated with DME. Intravitreal injections of agents that neutralize the bioactivity of VEGF have stabilized or improved visual acuity (VA) and reduced central subfield thickness (CSF) as measured by OCT in phakic patients with DME<sup>12</sup> and have had mixed reports in nondiabetic pseudophakic patients with CME. Another study reported that elevated aqueous levels of VEGF, IL-6, and protein were associated with exacerbated fluorescein leakage in the maculas of diabetic patients 6 months following cataract surgery. A recent report showed that 8 patients with diabetes who had had intravitreal bevacizumab (Avastin; Genentech Inc, South San Francisco, California, USA) for CSME prior to cataract surgery had reduced aqueous VEGF levels at the time of surgery 2 months later, but only a transient reduction in CSF. The efficacy of anti-VEGF treatment for prevention or treatment of postoperative CME or exacerbation of CSME from cataract surgery in patients with diabetes remains indeterminate and may require further study.

The purpose of this study was to study association between serum and aqueous vascular endothelial growth factor (VEGF) and insulin-like growth factor 1 ((IGF-1) and macular edema measured with optical coherence tomography (OCT) following phacoemulsification in diabetic patients.

A pilot study of 36 consecutive diabetic patients undergoing planned phacoemulsification with IOL in 1 eye by one surgeon at the university of North Carolina consented to preoperative and postoperative OCT central subfield (CSF) thickness measurements and aqueous and blood samples for VEGF and IGF-1. Four patients with clinically significant macular edema (CSME) received laser preoperatively. Spearman-rank correlations were performed between growth factors and mean CSF or a clinically meaningful percent change in CSF (>11% of preoperative measurement) at 1 and 6 months postoperatively.

There were no surgical complications or new cases of CSME following surgery. Mean aqueous VEGF in patients with retinopathy, determined preoperatively, increased with increasing level of severity. Patients with preoperative CSME also had severe or worse retinopathy and the greatest mean aqueous VEGF. Significant preoperative correlations existed between aqueous VEGF and more severe retinopathy whether CSME was present or absent ( $r=0.49$ ;  $p=.007$ ), and between aqueous VEGF and CSME ( $r=0.41$ ;  $P=.029$ ). At 1 month postoperative, aqueous VEGF was positively correlated with > 11% change from preoperative CSF regardless of CSME status ( $r=0.47$ ;  $P=.027$ ). No noteworthy associations existed between CSF and IGF-1 values.

Authors concluded with the remarks that the aqueous VEGF was significantly positively associated with a clinically meaningful change in CSF in diabetic patients 1 month following cataract surgery. Accounting for preoperative CDF was important. Further study is indicated.

The aim of glaucoma management is to preserve vision for remaining lifetime with least possible inconvenience, complications, and financial strain.

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