Primary nasolacrimal duct malignant mucosal melanoma

Primary nasolacrimal duct malignancy is rare. Only a few tumours have been reported originating from this location including lymphoma, \( \text{Kaposi's sarcoma}, \) \( \text{adenocarcinoma}, \) \( \text{angiofibroma}, \) and squamous cell carcinoma.\(^1\)

Mucosal melanoma represents 1–2% of all melanomas,\(^2\) with 25–50% in the head and neck—that is, upper respiratory tract, oral cavity, and pharynx. Other sites include urinary, female genital, and ano-rectal tracts. These tumours are uncommon, present in the fifth to eighth decades, have slight male preponderance and are more common in darker skinned individuals. Cutaneous melanoma presents two decades earlier and is more common in white people and is associated with sun exposure.

Case report

A 41 year old Asian male presented to the oculoplastic service with a 3 month history of right sided intermittent bloody tears and epistaxis. He described right simple epiphora for at least 2 years treated with a three snip procedure. Probing the right nasolacrimal system confirmed normal canaliculi and easy entry of the probe into the lacrimal sac. Irrigation demonstrated complete nasolacrimal duct block and reflux of dark bloody tears. Nasal endoscopy (rigid Hopkins nasal endoscope) revealed a greyish mass emerging from the lower end of the nasolacrimal duct into the inferior meatus (fig 1).

Magnetic resonance imaging (MRI) and computed tomography (CT) scans (fig 2) demonstrated dilation of the entire length of the nasolacrimal bony canal with a soft tissue mass occupying the lumen of the nasolacrimal duct. The mass was invading the osteometaial complex, extending into the anterior ethmoidal sinus, causing obstruction to drainage of both maxillary and frontal sinuses.

A transnasal incisional biopsy of the inferior meatus lesion was performed under local anaesthetic. Histopathological analysis of the biopsy showed sheets of epitheloid cells with prominent nucleoli and vesicular cells on a routine haematoxylin and eosin stain (fig 3). Although the lesion was pale, pigment was visible on the haematoxylin and eosin stain, suggestive of melanoma. Immunohistochemical studies were positive for immunological markers HMB45 and S-100 protein, confirming a diagnosis of melanoma.

No regional lymphadenopathy was present and PET (positron emission tomography) scan excluded the presence of metastases.

Wide local cranio-facial-orbital resection of the tumour was performed, via a lateral rhinotomy approach (fig 4). The nasolacrimal duct, part of the lateral wall of the nose, the lacrimal sac, distal upper and lower canaliculi, and inferomedial orbital fat were excised. Tumour extended into the maxilla but not into the lacrimal sac. Peroperative frozen sections from the excision margins, including orbital fat, demonstrated clearance of tumour. This allowed preservation of the eye.

Adjunctive therapy was given to limit local recurrence and distant spread. The patient received 20 sessions of radiotherapy (50 Gy) to the right maxillary antrum, and also immunological therapy (vaccination with autologous dendritic cells pulsed with allo-

genic tumour lysate, and whole body hyperthermia accompanied by low dose interferon).

Three years after presentation there was no local recurrence of tumour. Unfortunately, the patient developed bone pain and CT scan revealed metastatic spread to the right acetabulum and T8, T9, and T11 vertebrae with localised spinal cord compression. He underwent radiotherapy to the right acetabulum and spine. The patient died approximately 6 months later.

Comment

Nasolacrimal duct primary mucosal mela

noma is previously unreported. The closest relations are lacrimal sac melanoma (5% of lacrimal sac tumours)\(^3\) and sinonasal mucosal melanoma (5% of all sinonasal malignancies).\(^4\)

Lacrimal sac melanoma can present with epiphora, bloody tears, and epistaxis. Sinonasal melanoma can present with nasal obstruction and epistaxis. Orbital extension causes proptosis and diplopia. Both lacrimal sac melanoma and sinonasal melanoma are insidious in onset with poor visibility leading to late presentation.

Standard treatment of primary sinonasal melanoma is radical wide local surgical excision. Local recurrence can occur and the very vascular nature of mucosal tissue makes regional and distant metastases common, often accompanying late presentation. Postsurgical radiotherapy may prevent local recurrence, but is unlikely to prevent distant metastases.\(^5\) Other adjunctive treatments are not clinically proved to be beneficial. Chemotherapy has no positive effect, and newer immunological treatments are still under investigation.
Sinonasal mucosal melanoma has a high mortality rate, with 5 year survival between 10–50%. Lacrimal sac melanoma has a similar prognosis. This case demonstrates the importance of thorough clinical examination (including nasal endoscopy) and imaging in patients presenting with epiphora, bloody tears, and/or epistaxis. Delay in detection and treatment may be fatal.

A M Lewis
Western Eye Hospital, London, UK
P M Clarke
Charing Cross Hospital and Royal Marsden Hospital, London, UK
J M Olver
Western Eye Hospital, London, UK
Correspondence to: J M Olver, Oculoplastic and Orbital Service, The Western Eye Hospital, Marylebone Road London NW1 5YE, UK; janeolver@aol.com
doi: 10.1136/bjo.2005.073239
Accepted for publication 24 July 2005
Competing interests: none declared.

Glycosylation type Ic disorder: idiopathic intracranial hypertension and retinal degeneration

We report a young woman with type Ic congenital disorder of glycosylation (CDG) with new clinical features of idiopathic intracranial hypertension, retinal degeneration, and novel mutations of ALG6. Patients with known or suspected CDG should receive a full ophthalmic examination including dilated fundus examination and electroretinography.

CDG is a rare group of autosomal recessive metabolic disorders. The two major subgroups are type I, caused by dysfunction of glycosylated protein assembly, and type II, caused by abnormal processing of glycosylated protein end products after assembly.1 Patients with type Ic (OMIM #603147) have mental retardation, axial hypotonia, very low factor XI, and seizures; the gene defect is in z1-3-glycosyltransferase (human homologue of ALG6;OMIM #604566) encodes an enzyme that catalyses the transfer of the first glucose residue to the lipid linked oligosaccharide precursor for N-linked glycosylation. The reported ophthalmic manifestations of type I CDG are summarised in table I. We report a case of type Ic congenital disorder of glycosylation with new clinical features of idiopathic intracranial hypertension, retinal degeneration and novel mutations of ALG6.

Case report

Our patient, with non-consanguineous parents, was born at birth with incomplete digits on her hands and feet. She had episodes of apnoea early in life and the onset of seizures at age 20 months. Delayed physical and developmental milestones were evident early. Levels of folpilo stimulating hormone and luteinising hormone were low and a diagnosis of polycystic ovarian disease was made. She underwent esotropia surgery at age 4 years and at 19 years developed thrombosis of the superficial femoral vein. Coagulation factor studies revealed very low factor XI levels. Isoelectric focusing of serum transferrin was suggestive of a congenital disorder of glycosylation. Sequencing of the ALG6 gene showed a novel three base substitution, in the gene encoding phosphomannomutase-2 (PM2; OMIM #601785) gene. In CDG type Ic, much less common, a homozygous amino acid substitution, A337V substitution, in the gene encoding z1-3-glycosyltransferase is the most common mutation.3 There is no known biochemical link between CDG and idiopathic intracranial hypertension; the association in our patient may be coincidental. Grunwald and colleagues4 found strabismus to be present in all eight patients with CDG type Ic; neither idiopathic intracranial hypertension nor retinal abnormalities were reported.

The developmental delay evident in our patient was severe. She possessed simple communication skills limiting her ability to complain of visual changes or symptoms of intracranial hypertension. No specific clinical presentation has been identified for the CDG group of diseases. Failure to thrive, unexplained seizures, hypotonia, and developmental delays are all frequently present. In conclusion, we report an adult patient with CDG type Ic, confirmed by identification of mutations in the ALG6 gene, and describe new systemic and ocular features including idiopathic intracranial hypertension, optic

<table>
<thead>
<tr>
<th>Table 1 Reported ophthalmic manifestations in type I congenital disorder of glycosylation (CDG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDG 1a</td>
</tr>
<tr>
<td>Strabismus</td>
</tr>
<tr>
<td>Retinopathy</td>
</tr>
<tr>
<td>Optic atrophy</td>
</tr>
</tbody>
</table>

Figure 1 Left fundus showing attenuated vessels with retinal pigment cell granularity of the macula (white arrow).
Keratoconus in association with Woodhouse Sakati syndrome has been reported in clinical practice. It is most commonly an inflammatory degenerative condition of the stromal tissue, resulting in a cone-like deformation of the cornea. A mutation in the human ortholog of the Saccharomyces cerevisiae ALG6 gene causes carbohydrate-deficient glycoprotein syndrome type Ic, which is associated with keratoconus.

**Case report**

Two sisters (aged 14 years and 18 years) presented with bilateral keratoconus. Their mother and maternal aunt had similar symptoms. The sisters underwent penetrating keratoplasty, and UCVA was improved to 20/50 and 20/40 in the right eye, respectively. Slit lamp biomicroscopy showed central corneal protrusion and stromal thinning.

**Comment**

Woodhouse Sakati syndrome (MIM 241080) is an extremely rare genetically determined autosomal recessive disorder. It was first described in Saudi Arabian families, and later reported in a single Turkish family. Table 1 presents manifestations of the syndrome.

### Table 1: Variable manifestations in the nine reported patients with Woodhouse Sakati syndrome

| Manifestation                                                                 |
| Adamantinolysis of the surface       |
| Hypothyroidism, electrocardiographic abnormalities, dysmorphic features.    |
| Hypogonadism, primary amenorrhea, hyperandrogenism, electrocardiographic abnormalities, dysmorphic features.    |
| Delayed psychomotor development     |
| Variable degree of mental retardation (very frequent sign)                  |
| Alapoeia (very frequent sign), sparse/absent scalp and eyebrow hair (frequent sign), dystharia                  |
| Dysmorphic features: high forehead, flat occiput, triangular face, prominent nasal root, hypertelorism, and down-slanting palpebral fissures. |
| Hyper/hypogonadotrophic hypogonadism and late puberty (very frequent sign) |
| Sensorineural deafness (very frequent sign)                                  |
| Electrocardiographic abnormalities and insulin dependent diabetes mellitus (very frequent signs)                |

**References**


Woodhouse Sakati syndrome associated with bilateral keratoconus

Keratoconus is a non-inflammatory degenerative condition of the corneal tissue. It is characterized by a localized region of stromal thinning spatially associated with a cone-shaped deformation of the surface. It is most commonly an isolated sporadic condition. Recent reports demonstrate genetic mapping to chromosomes 16q, 21q, and 18p, as well as association of HLA-A26, B40, and DR 9. Keratoconus has been reported in clinical contexts with 36 other multisystem disorders. We describe the first two cases of keratoconus in association with Woodhouse Sakati syndrome.

### Table 1

| Variable manifestations in the nine reported patients with Woodhouse Sakati syndrome |
| Delayed psychomotor development |
| Variable degree of mental retardation (very frequent sign) |
| Alapoeia (very frequent sign), sparse/absent scalp and eyebrow hair (frequent sign), dystharia |
| Dysmorphic features: high forehead, flat occiput, triangular face, prominent nasal root, hypertelorism, and down-slanting palpebral fissures. |
| Hyper/hypogonadotrophic hypogonadism and late puberty (very frequent sign) |
| Sensorineural deafness (very frequent sign) |
| Electrocardiographic abnormalities and insulin dependent diabetes mellitus (very frequent signs) |

No ocular manifestations

---

**Figure 1** Features of keratoconus are seen. (A) Slit lamp biomicroscopy of the right cornea in the elder patient, showing advanced cone deformation and deep Descemet’s membrane scarring. (B) Slit lamp biomicroscopy of the left cornea in the younger patient, showing dense central scarring following hydrops attack. (C) Histopathological section of left corneal button illustrating the fragmentation of Bowman’s layer (large arrow) and large break in Descemet’s membrane (small arrows) (periodic acid Schiff stain, ×200).

---

For more information, please visit <http://www.bjophthalmol.com>.
Systemic occlusive arteriopathy associated with type 1 neurofibromatosis (NF-1) has been well described in the aortic and cerebral vasculature; however, it is poorly documented in the retinal vasculature with, to our knowledge, only three reported patients whose retinal vasculopathy was diagnosed at a later sequelae stage. We report the case of a young woman with NF-1 who presented with acute macular ischaemia combined with diffuse retinal arterial occlusive disease.

Case report
A 26 year old woman with NF-1 presented with a sudden painless loss of vision in her left eye. Visual acuity was counting fingers left eye and 20/20 right eye. NF-1 had previously been diagnosed on the basis of multiple café au lait spots, plexiform neurofibromas, and a paternal history of NF-1. Left fundus examination revealed confluent cottonwool spots in the perifoveal area, focal dilatations and narrowings of retinal venules, and progressive enlargement of retinal arterioles towards the periphery. The right fundus showed only peripapillary myelinated nerve fibres (fig 1).

Fluorescein angiography (FA) of the left eye showed no delayed perfusion in the choriocapillaris or central retinal artery, but a delayed retinal arteriovenous filling time. It revealed occlusion of macular arterioles, retinal arteriovenous communications in the mid-periphery, and a relatively well perfused retinal periphery (fig 2).

Cerebral and cervical magnetic resonance imaging and colour Doppler ultrasonography showed no vascular flow abnormalities. Internal medical examination and laboratory results excluded other diseases associated with retinal microvasculopathies.

One month after the initial examination, all the cottonwool spots disappeared, and sheathing appeared in a few veins. FA showed worsening of the retinal arteriolar occlusions in the mid-periphery (fig 2). A panretinal photoocoagulation was subsequently performed. At 2 year follow up, left visual acuity remained unchanged, and the patient did not exhibit any preretinal fibrovascular proliferation.

Comment
To our knowledge, only three cases of retinal vascular occlusion in patients with NF-1 have been previously reported. All cases were diagnosed at a later sequelae stage. Moadel et al and Kadri et al, respectively, reported the cases of a child who presented with an unilateral amblyopia, and a young woman with a history of unilateral poor vision. They both presented with diffuse sheathing of retinal vessels, retinal arteriovenous communications, and avascular peripheral retina with fibroglial proliferation. Tholen et al described a young man whose routine eye examination showed narrowing of a superotemporal retinal arteriole with irregular diameter of the corresponding vein, fibroglial proliferation, and arteriovenous communications. These authors suggested the possibility of either a primary occlusion of a retinal arterial or venous branch or alterations of vessel development. In contrast with other reported cases, our patient presented with acute unilateral occlusion of macular arterioles, combined with diffuse retinal arterial occlusive disease, in adulthood. Panretinal photoocoagulation may have prevented fibroglial proliferation which was described in previous reported cases. Recent reports suggest that pathogenesis of NF-1 vasculopathy may result from dysfunction of neurofibromin, the NF-1 gene product, in vessel endothelial and smooth muscle cells.

Our case shows that NF-1 related occlusive retinal arteriopathy may suddenly appear during adulthood and should be considered in patients with NF-1 or in young adults with retinal vascular occlusive disease and unknown NF-1.

Figure 1. Fundus photographs of the left and the right eyes at presentation. (A) Colour fundus photograph of the left eye showing large confluent cottonwool spots in the perifoveal area. (B) Colour fundus photograph of the right eye showing peripapillary myelinated nerve fibres. (C) Red-free fundus photograph of the left eye. Upper periphery showing focal dilatations and narrowings of retinal venules, and capillary rarefaction. Retinal arteriovenous communications are also present (arrows).

Figure 2. Fluorescein retinal angiography of the left eye, 40 seconds after dye injection, at presentation (A) and 1 month later (B). (A) Occlusion of macular arterioles and retinal arteriovenous communications are visible (black arrow). (B) Retinal arteriolar occlusions have worsened in the temporal periphery.
therefore performed to test this hypothesis and determine whether biometric factors may be associated with formation of IFTMH.

**Methods**

Consecutive patients undergoing surgery for IFTMH had age, sex, axial length in millimetres (mm), and corneal keratometry (K) measurements in dioptres (D) recorded. For each case three age and sex matched controls were randomly identified from a cataract surgery database (Medisoft). Biometric measurements were made in all cases and controls using the IOL-Master (Zeiss, Jena). Mean corneal curvature was calculated by averaging the two K readings. Descriptive statistics and conditional logistic regression method for analysis of matched pair data were used to infer estimates.

**Results**

Thirty five consecutive cases and 105 controls were identified with a mean age of 67.3 years (35–77 years) and a female to male ratio of 24:11. The mean (SD) axial length in the cases was 22.94 (0.96) mm whereas in controls it was 23.48 (1.44) mm. The axial lengths of the cases also fell within a narrower range than those of the controls (fig 1). Mean K readings in cases was 44.04 D (range 40.56–47.92) and 43.44 D in controls. (range 41.87–46) and 43.44 D in controls.

Evidence suggests that the longer the axial length the less the odds of being a case; odds ratio (OR) 0.67 (p = 0.036, CI 0.47 to 0.77) and the higher the dioptric power of the curvature the higher the odds of being a case as opposed to a control; OR 1.50 (p = 0.02, CI 1.07 to 2.01).

**Comment**

As in previous studies our population sample demonstrates an increased risk of IFTMH in females with most cases clustering in the 60–70 year age group. The mean axial length in controls was also found to be similar to controls. We believe the significant corneal dioptric differences found may be a result of the natural process of enmetropisation of a shorter eye, or alternatively be an independent risk factor.

IFTMH are thought to arise from retinal surface traction which in turn arises from an abnormal and incomplete posterior vitreous detachment. Our results suggest that eyes with shorter than average axial lengths and lower volume vitreous cavity are either at increased risk of developing such incomplete and abnormal vitreous detachments or, in the presence of such an incomplete vitreous detachment, of developing a macular hole. We are not aware that shorter axial length has previously been shown to be significantly associated with IFTMH.

**Choroiditis and exudative macular detachments in a post transplant leukaemic patient: an unusual presentation of Pneumocystis jiroveci infection**

Pneumocystis jiroveci is a commensal found in the respiratory tract of healthy individuals. It can cause infections of almost any organ in immunocompromised hosts. P jiroveci choroiditis, featuring multifocal choroidal lesions, has been reported in immunocompromised patients despite prophylactic use of inhaled pentamidine. We report a post-transplant leukaemic patient whose posterior segment findings demonstrate an atypical picture of recurrent P jiroveci choroiditis.

**Case report**

A 20 year old woman presented with a 1 week history of bilateral blurred vision, dyspnoea, and dry cough. Visual acuity was reduced to 6/66 bilaterally with posterior subcapsular cataracts. Funduscopy disclosed multifocal, creamy-yellow choroidal lesions at both posterior poles with exudative retinal detachments at the maculae (fig 1). Optic discs and retinal vessels were normal. Fluorescein angiography showed early patchy hypofluorescence (corresponding to the choroidal lesions) and late hyperfluorescence with pooling beneath the detachments.

Three years earlier she had undergone a successful allogeneic bone marrow transplant for chronic myeloid leukaemia. Her maintenance therapy included inhaled pentamidine as prophylaxis against P jiroveci infection. However, she admitted to not taking her inhaled pentamidine. Molecular genetic and radiological investigations excluded leukaemic recurrence. Chest x ray showed left lung shadowing and bronchoalveolar lavage isolated P jiroveci. P jiroveci pneumonia with P jiroveci choroiditis was diagnosed and high dose oral co-trimoxazole 7.2 g/day (120 mg/kg/day) and prednisolone 60 mg/day commenced. Within 2 weeks her respiratory and ocular symptoms improved. Visual acuities returned to 6/9 and the fundal appearances resolved. She was discharged on daily oral co-trimoxazole 960 mg, prednisolone 20 mg, and inhaled pentamidine.
Three weeks later she was readmitted with increasing dyspnoea and blurred vision. Chest X ray and computed tomography findings were compatible with diffuse interstitial fibrosis in both lungs. Funduscopy revealed peripapillary choroidal lesions with disc swelling bilaterally (fig 2). This time the choroidal lesions were peripapillary only rather than throughout the posterior pole, with exudative detachments inferiorly. Recurrent P jiroveci pneumonia and choroiditis was diagnosed and oral atovaquone and high dose prednisolone were commenced. Within 3 weeks her fundal appearance resolved leaving only some pigmentary changes. Her discharge medication included daily oral prednisolone 40 mg, cotrimoxazole 960 mg, and inhaled pentamidine. There have been no further intraocular recurrences.

Comment

Pneumocystis jiroveci is a commensal, found in the respiratory tract of healthy individuals. It can cause infections of almost any organ in immunocompromised hosts.4–6 P jiroveci choroiditis has been reported in immunocompromised patients despite prophylactic use of inhaled pentamidine.4,5 The diagnosis is based on the clinical findings of multifocal yellowish circular choroidal lesions at the posterior pole. P jiroveci has been found in these lesions on histological sections6 and the lesions resolve on systemic anti-pneumocystis treatment.6 However, most cases of P jiroveci choroiditis are diagnosed histologically post mortem.6,7 Thus, the acute clinical findings may be more varied than previously described. In our patient, massive exudative retinal detachments were associated with the previously described choroidal lesions. The clinical picture varied on the second presentation, but there was complete and rapid resolution of the signs with anti-pneumocystis therapy. To the best of our knowledge, this is the first report of P jiroveci choroiditis causing exudative retinal detachments. P jiroveci should be considered in the differential diagnosis of susceptible patients, even if the ophthalmological findings are “atypical.”

K Sabri, K Bibby
Department of Ophthalmology, Leicester Royal Infirmary, Leicester LE1 5WW, UK

Correspondence to: K Sabri, Department of Ophthalmology, Leicester Royal Infirmary, Leicester LE1 5WW, UK, ksabri@yahoo.com
doi: 10.1136/bjo.2005.077479

Accepted for publication 21 August 2005

References


Prothrombotic and atherosclerotic risk factors lack significance in NAION patients harbouring mitochondrial DNA mutations

We recently reported that a group of patients with non-arteritic anterior ischaemic optic neuropathy (NAION) had an increased prevalence of potentially pathological mitochondrial DNA (mtDNA) mutations, implying a link between mitochondrial disease and this optic neuropathy.4 We decided to investigate the association of other risk factors for NAION in these same patients.

Case reports

NAION patients were genotyped for the presence of prothrombotic polymorphisms that have been reported in association with NAION,3 including factor II G20210A prothrombin variant, factor V Leiden G1691A variant, MTHFR C677T and A1298C variants, platelet glycoprotein receptor IIa (PIIa) allele, and apolipoprotein E (ApoE) allele, as described previously.8,9 These reports included large control groups that were ethnically matched to our NAION patients and that had been queried regarding the presence of atherosclerotic risk factors. Controls older than 50 years were selected for comparison with NAION patients.

Table 1 shows that the prevalence rates for prothrombotic variants among NAION patients did not differ from controls. Reported prevalence of diabetes, hypertension, and hyperlipidaemia was relatively high in NAION patients but was also not significantly different from controls.

Comment

The lack of a significant association between NAION patients and controls in relation to thrombophilic genetics markers has been reported before,10 and the role of these factors remains uncertain. More surprising is the lack of a statistical association with atherosclerotic risk factors. For example, in our group of NAION patients, 68% were diabetic, but this figure did not differ significantly from the prevalence of more than 50% in well matched controls. This observation reflects the high, and rising, frequency of diabetes and other atherosclerotic risk factors in the developing world.

A few qualifications are appropriate. NAION patients were a relatively small group of Middle Eastern Arabs, and it is possible that a larger group would have yielded statistically significant results or that the observations reported here are specific to this genetically homogeneous population. Atherosclerotic risk factors were assessed by individual report from patients and controls, and the actual prevalence of these disorders may be different from that recognised. Finally, other risk factors, such as homocysteine levels, nocturnal hypotension, or environmental factors11 were not consistently investigated.

Nevertheless, the fact that the occurrence of NAION cannot be easily explained by the presence of prothrombotic or atherosclerotic risk factors shifts focus to the possibility that mitochondrial abnormalities may be important in the development of NAION. Based on these observations, testing for mitochondrial abnormalities may be warranted in NAION patients, especially the ones without a
medical or family history of a thrombotic or vascular event.

K K Abu-Amero
Mitochondrial Research Laboratory, Department of Genetics, King Faisal Specialist Hospital and Research Centre, Riyadh, Kingdom of Saudi Arabia

T M Bosley
Neuro-ophthalmology Service, King Khaled Eye Specialist Hospital, Riyadh, Kingdom of Saudi Arabia

Correspondence to: Dr Khaled K Abu-Amero, Mitochondrial Research Laboratory, Department of Genetics, King Faisal Specialist Hospital and Research Centre (MBC, 303), PO Box 3354, Riyadh 11211, Kingdom of Saudi Arabia; kamerok@kfshrc.sa
doi: 10.1136/bjo.2005.078071
Accepted for publication 9 July 2005

Inflammatory cytokine of basal and reflex tears analysed by multicytokine assay

Tear cytokine has a major role in various pathophysiological conditions of the ocular surface. So far, studies on tear cytokines have shown significant progress in providing an understanding of ocular surface diseases. Moreover, it has become apparent that the relative balance between various cytokines and combinations of cytokines could be more important than absolute concentrations. Previous studies showed that the composition of basic and reflex tears was different, which made it more difficult to understand the ocular surface disorder correctly or to treat the patients suitably.13 Cytometric bead array (CBA) is a microarray based flow cytometric assay, which allows us to quantify multiple molecules from a very small sample. Using this method, we evaluated the inflammatory cytokines of basal and reflex tears from a single sample of individual eyes.

Methods

Twenty three normal volunteers (11 males and 12 females, 22–44 years of age, average 28 years) were recruited for this study. None of the subjects had signs of ocular diseases. The study was performed with the approval of the institutional review board. The basal tear samples of 10–15 μl were obtained from each eye by capillary flow, with no nasal stimulation or previous instillation of drugs or vital dyes. Each sample was collected at 5 pm. No anaesthetic drops were instilled. The samples were collected non-traumatically from the inferior meniscus. Successively, reflex tear samples were collected by inserting application sticks into a participant’s nose. The amounts of six inflammatory molecules interleukin (IL)-1β, IL-6, IL-8, IL-10, IL-12p70, and tumour necrosis factor α (TNF-α), were measured by CBA (BD Biosciences, San Diego, CA, USA), according to the manufacturer’s instructions. Briefly, for the tear sample and cytokine standard mixture, 10 μl of sample or standard were added to 40 μl sterile purified water, a mixture of 50 μl each of capture Ab-bead reagent and detector Ab-phycocerythrin (PE) reagent. The mixture was subsequently incubated for 5 hours at room temperature, and washed to remove any unbound detector Ab-peptide array software.

Table 1 Comparison of risk factors in NAION patients and controls

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>NAION patients</th>
<th>Controls</th>
<th>Odds ratio</th>
<th>95% CI</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apo E4</td>
<td>0/19</td>
<td>0/593</td>
<td>3.12</td>
<td>0.60 to 16.15</td>
<td>1</td>
</tr>
<tr>
<td>Factor II G20210A</td>
<td>0/19</td>
<td>0/593</td>
<td>3.12</td>
<td>0.60 to 16.15</td>
<td>1</td>
</tr>
<tr>
<td>Factor V G1691A</td>
<td>0/19</td>
<td>0/200</td>
<td>10.5</td>
<td>0.20 to 545.6</td>
<td>1</td>
</tr>
<tr>
<td>MTHFR C677T</td>
<td>0/19</td>
<td>2/1250</td>
<td>0</td>
<td>0.00 to 17.52</td>
<td>1</td>
</tr>
<tr>
<td>MTHFR A1298C</td>
<td>0/19</td>
<td>2/625</td>
<td>0.77</td>
<td>0.21 to 2.52</td>
<td>0.79</td>
</tr>
<tr>
<td>PLO allele</td>
<td>0/19</td>
<td>2/1250</td>
<td>0</td>
<td>0.00 to 2.71</td>
<td>0.39</td>
</tr>
<tr>
<td>Age, mean (SD)</td>
<td>58.8 (8.5)</td>
<td>57.1 (4.2)</td>
<td>–</td>
<td>0.12–1.89</td>
<td>0.41</td>
</tr>
<tr>
<td>Sex (M:F)</td>
<td>14:5</td>
<td>351:160</td>
<td>1.28</td>
<td>0.42 to 4.13</td>
<td>0.64</td>
</tr>
<tr>
<td>Diabetes</td>
<td>13/19</td>
<td>256/511</td>
<td>2.16</td>
<td>0.75 to 6.47</td>
<td>0.18</td>
</tr>
<tr>
<td>Hypertension</td>
<td>10/19</td>
<td>209/511</td>
<td>1.61</td>
<td>0.59 to 4.38</td>
<td>0.43</td>
</tr>
<tr>
<td>Hyperlipidaemia</td>
<td>2/19</td>
<td>59/511</td>
<td>0.68</td>
<td>0.11 to 3.17</td>
<td>1</td>
</tr>
<tr>
<td>CAD</td>
<td>1/19</td>
<td>27/511</td>
<td>0.55</td>
<td>0.03 to 4.03</td>
<td>1</td>
</tr>
<tr>
<td>NS mtDNA changes</td>
<td>14/19</td>
<td>11/100</td>
<td>22.6</td>
<td>6.03 to 91.07</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

NAION, non-arteritic ischaemic optic neuropathy; CAD, coronary artery disease; NS, mtDNA changes, non-synonymous (changing an amino acid in the resultant protein) mitochondrial DNA nucleotide change; Homo, homozygous; Hetero, heterozygous. Diabetes, hypertension, hyperlipidaemia, and CAD were assessed by questionnaires. The study was performed with the approval of the institutional review board. The basal tear samples of 10–15 μl were obtained from each eye by capillary flow, with no nasal stimulation or previous instillation of drugs or vital dyes. Each sample was collected at 5 pm. No anaesthetic drops were instilled. The samples were collected non-traumatically from the inferior meniscus. Successively, reflex tear samples were collected by inserting application sticks into a participant’s nose. The amounts of six inflammatory molecules interleukin (IL)-1β, IL-6, IL-8, IL-10, IL-12p70, and tumour necrosis factor α (TNF-α), were measured by CBA (BD Biosciences, San Diego, CA, USA), according to the manufacturer’s instructions. Briefly, for the tear sample and cytokine standard mixture, 10 μl of sample or standard were added to 40 μl sterile purified water, a mixture of 50 μl each of capture Ab-bead reagent and detector Ab-phycocerythrin (PE) reagent. The mixture was subsequently incubated for 5 hours at room temperature, and washed to remove any unbound detector Ab-peptide array software.

Results

The concentrations of IL-1β, IL-6, IL-10, IL-12p70, and TNF-α were not significantly different between basal and reflex tears. In contrast, the concentration of IL-8 was significantly decreased in reflex tears compared with basal tears in each eye (paired t test, p<0.01, fig 1). In order to illuminate the inter-relation of each cytokine, the ratio of two different cytokines is shown in table 1.

Comment

Previously published studies have demonstrated that CBA correlates well with enzyme linked immunosorbent assay (ELISA), but the absolute concentrations obtained from each assay were differed for kits of different manufacturers.7 Indeed, the concentrations of tear cytokines in the present results were almost equal to the previous report using the same kit.7 Nakamura et al performed ELISA for multiple cytokines measuring pooled tears.7 The pooled tears enable measurement of multiple cytokines; however the results

www.bjophthalmol.com
can be strongly influenced by samples with high concentrations. Because the absolute concentrations of tear cytokines varied widely, this can have a strong bias. In this study, to our knowledge, we measured the multiple cytokines of basal and reflex tears from a single sample for the first time, which can provide concentration ranges for these cytokines in normal subjects that may prove important for studies of ocular inflammation. Of note, only the concentration of IL-8 was decreased more significantly in reflex tears than in basal tears. Matichouk et al showed that there is no distinctive role of major and accessory glands in secreting basal or reflex tears, thus these tears might be produced primarily by the same tissue and differences might be only the result of the secretory rate of reflex tears. It was reported that a neuropeptide released from corneal sensory nerves stimulated conjunctival epithelium to secrete IL-8. Because sensory nerves are present in the cornea so abundantly, IL-8 can be produced constantly on the ocular surface. IL-8 is a potent pro-inflammatory cytokine, and has a pivotal role in the host defense system. But excessive IL-8 might be so harmful that constant washout might be helpful for homeostasis of the ocular surface. Indeed, a large amount of IL-8 was found in the tears of dry eyes. Thus, basal tears might be composed of products of the ocular surface including IL-8 and small amounts of reflex tears that are induced by mild stimulation such as blinks.

In summary, the present study showed that pro-inflammatory and anti-inflammatory cytokines/chemokines are present in the ocular surface even in the absence of inflammation and this was detectable from a small sample of single eyes. Stimulating tears, with the exception of IL-8, has minimal effect on cytokine concentration. We believe the CBA technique can make a valuable contribution in understanding the specific immunopathological mechanisms underlying cytokine interaction with the ocular surface.

**Figure 1** Change of concentrations of cytokines in basal and reflex tears. The concentration of IL-1β, IL-6, IL-10, IL-12p70 and TNF-α are not significantly different between basal and reflex tears. In contrast, IL-8 is significantly less in reflex tears compared with basal tears in each eye (paired t-test, *p* < 0.01).

**Table 1** Ratios of cytokine concentration

<table>
<thead>
<tr>
<th>Cytokine</th>
<th>Basal Tear</th>
<th>Reflex Tear</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL-1β</td>
<td>0.022 (0.002)</td>
<td>3.71 (0.252)</td>
</tr>
<tr>
<td>IL-6</td>
<td>0.512 (0.03)</td>
<td>15.807 (1.976)</td>
</tr>
<tr>
<td>TNF-α</td>
<td>0.044 (0.002)</td>
<td>0.078 (0.007)</td>
</tr>
<tr>
<td>IL-12p70</td>
<td>0.512 (0.03)</td>
<td>21.357 (3.427)</td>
</tr>
<tr>
<td>IL-10</td>
<td>0.093 (0.005)</td>
<td>0.324 (0.018)</td>
</tr>
<tr>
<td>IL-8</td>
<td>0.022 (0.002)</td>
<td>144.913 (45.971)</td>
</tr>
<tr>
<td>IL-17</td>
<td>0.512 (0.03)</td>
<td>3.322 (0.316)</td>
</tr>
</tbody>
</table>

Ratio of cytokine concentration was calculated as A/B. Each cell shows the mean (SEM).
Outcome of implementing the national services framework guidelines for diabetic retinopathy screening: results of an audit in a primary care trust

Systematic screening for diabetic retinopathy is the key to achieving the targets set out in the recently published national service framework (NSF) guidelines. One of the two priorities and planning framework (PPF) targets is that by March 2006 a minimum of 80% of people with diabetes are to be offered screening, rising to 100% by December 2007. Digital photography is the modality for screening. The British Diabetic Association has established standards for any diabetic retinopathy screening programme of at least 80% sensitivity and 95% specificity.

Screening programme

Our screening programme was set up to evaluate the existing nationally recommended diabetic retinopathy screening service. In all, 2165 patients were invited over a period of 12 months; 909 participated. At the screening mydriatric drops (1% tropicamide and 2.5% phenylephrine) were instilled. The patients were photographed with a Topcon fundus camera and each photograph was screened and graded by consultant ophthalmologists (table 1).

Of the total 909; there were 198 patients with retinopathy (grades R1, M, R2, and R3), 644 patients without retinopathy (grade 0), 63 patients with OLO (other lesions), and one was (grade U) ungradeable (tables 2 and 3). The sensitivity was 98% and specificity 97%. The retinopathy present was 21% and the referral rate for retinopathy (STDR) was 7%; 59% did not take up the offer to be screened. Some of the reasons cited: 956 (44%) declined or did not respond, 251 (11%) are being screened elsewhere, 11 (0.5%) are not diabetic, five (0.18%) are dead, six (0.27%) are registered blind, and 21 (1%) have moved.

Comment

Our screening methods surpassed the standards set by the NICE guidelines. However 59% of patients did not take up the offer. The achievable standard to which strategic health authorities and primary care trusts are working is 90% uptake of those offered screening with the minimum standards of 70–80%, but even though quality assurance systems are in place uptake is still very poor.

In the intercollegiate audit, led by the Royal College of Ophthalmologists, data were analysed from 9827 patients with diabetes from 129 general practices in 25 health authorities. The lowest level of coverage in a district was 38% and the highest 85%. In general practice the coverage ranged from 14% to 97%. The likelihood of having an eye examination was marginally higher in districts with a systematic examination rather than opportunistic or without recognised schemes at all.

In the Hounslow Primary Care Trust our hospital episode statistics (HES) are the only existing screening programme. Patients registered with a GP are referred to the HES for the screening. The reasons for the 44% who did not respond were that some did not have the time, some were elderly living on their own with nobody to take them, some did not understand the screening leaflet, and some just forgot.

Problems about coverage could be tackled if we had a central electronic database linked to all screening programmes. Although software providers have been agreed for such a data collection exercise, primary care trusts have yet to implement this. People unable to attend during the week could be accommodated in weekend or evening clinics. These clinics could also be reserved, with bilingual support workers to explain the importance of screening for the ethnic patients. Community networks like the rotary, patient groups, ethnic resource centres, and senior citizens groups can be used. The National Service Framework targets will be achieved only if the diabetic population is convinced of the importance of screening.

M J Saldanha, U Meyer-Bothling
Ashford and St Peter’s NHS Trust

Correspondence to: Mr Mario J Saldanha, Ashford and St Peter’s NHS Trust, Ashford, TW15 3AA, UK; mariosaldanha@yahoo.com
doi: 10.1136/bjo.2005.076760
Accepted for publication 29 August 2005

Competing interests: none.

References


Table 1: Referred patients

<table>
<thead>
<tr>
<th>Patients type</th>
<th>Invited</th>
<th>Appointment made</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetic patients type 1</td>
<td>93</td>
<td>41</td>
</tr>
<tr>
<td>Diabetic patients type 2</td>
<td>1442</td>
<td>609</td>
</tr>
<tr>
<td>Diabetic patients type not stated</td>
<td>630</td>
<td>259</td>
</tr>
</tbody>
</table>

Table 2: Outcome by grade

<table>
<thead>
<tr>
<th>Grade</th>
<th>Sex</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>363</td>
</tr>
<tr>
<td>T</td>
<td>261</td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>624</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>74</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>M1</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>M2</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>F1</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>M3</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>T3</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>F2</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>T2</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>R3</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>M1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>F1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>OLO</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>F0</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>T6</td>
<td>63</td>
<td></td>
</tr>
<tr>
<td>F6</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>T6</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Final data

<table>
<thead>
<tr>
<th>Total patients screened</th>
<th>Sample size</th>
<th>Ungradable</th>
<th>True positives</th>
<th>False negatives</th>
<th>True negatives</th>
<th>False positive</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Retinopathy present</th>
</tr>
</thead>
<tbody>
<tr>
<td>909</td>
<td>909</td>
<td>1</td>
<td>198</td>
<td>6-44</td>
<td>8</td>
<td>98%</td>
<td>97%</td>
<td>21.78%</td>
<td></td>
</tr>
</tbody>
</table>
Late improvement in upward gaze in a patient with hydrocephalus related Parinaud dorsal midbrain syndrome

Acute hydrocephalus is a common cause of the Parinaud dorsal midbrain syndrome. Most patients with this condition improve either immediately following treatment of the hydrocephalus or within a few months, and it is generally assumed that those who do not do so have no potential for subsequent improvement. I recently evaluated a patient whose upward gaze spontaneously improved 4½ years after treatment of trauma related hydrocephalus.

Case report

A 23 year old Asian man was in his usual excellent general and ocular health until October 2000, when he was struck by a car while walking across the street. He was taken to a local hospital where he was found to have extensive injuries, including subdural and epidural haematomas. He also had evidence of increased intracranial pressure and required an emergency craniotomy. Postoperatively, he was evaluated by a neuro-ophthalmologist who noted that the patient’s only ocular disturbance was a mild left trochlear nerve paresis. The paresis resolved within about 3 weeks. About 6 months after the injury, the patient developed severe headaches and double vision. He was evaluated by the same neuro-ophthalmologist who had evaluated him previously. He noted that the patient now had a severe dorsal midbrain syndrome characterised by lack of elevation of either eye above the midline associated with an exotropia of 25–30 prism dioptres at distance and near, and a left hypotropia of 5 prism dioptres. An evaluation that included neuro-imaging and measurement of intracranial pressure revealed hydrocephalus, and the patient underwent placement of a ventriculo-peritoneal shunt with normalisation of intracranial pressure, resolution of neuro-imaging evidence of hydrocephalus, and resolution of headaches but without any change in ocular motility or alignment. He was eventually referred to the neuro-ophthalmology unit of the Wilmer Eye Institute at the Johns Hopkins Hospital for evaluation and management.

The patient was examined by me for the first time in September 2001, 11 months after the original injury and about 5 months after he had first been noted to have a dorsal midbrain syndrome. At that time, the examination revealed visual acuity of 20/20 in both eyes at distance and near. Automated perimetry revealed bilateral, incomplete, congruous, superior homonymous quadrantic field defects. Pupils were normally reactive to both light and near stimulation. In primary position, the patient had a 25 prism dioptre exotropia that increased to 35 prism dioptres on attempted right gaze and decreased to 15 prism dioptres on attempted left gaze. There was also a 5 prism dioptre left hypotropia. The patient could elevate just barely to the midline. There was no difference in degree of elevation with pursuit versus saccades, and elevation did not improve with the oculocephalic manoeuvre. Lateral gaze and downgaze were normal bilaterally for both pursuit and saccadic eye movements. I recommended consideration of subarachnoid surgery and asked the patient to return in 4 months for reassessment. He did so in January 2002, at which time his ocular motility and alignment were stable. Specifically, neither eye was able to elevate above the midline, either voluntarily or by the oculocephalic manoeuvre.

In May 2002, I performed a left lateral rectus muscle recession of 7.5 mm and a left medial rectus muscle recession of 6.5 mm with the superior transposition of both the lateral and medial rectus muscles one muscle width. Postoperatively, the patient had excellent horizontal alignment, although he still had a small left hypotropia of about 5 prism dioptres and was still unable to elevate either eye above the midline.

I subsequently followed the patient at regular intervals. When I examined him in April 2004, he had no change in his ocular motility or alignment, and I recommended that he consider obtaining a small vertical prism to try to eliminate his residual vertical diplopia. I also recommended that he return in 1 year for reassessment. He did so in August 2005.

When I examined the patient in August 2005, he indicated that he thought his vision had improved. He stated that although he was aware of some double vision, it was somewhat less than it had been previously. He also thought his eyes were “moving better.”

On examination, the patient’s visual acuity with correction was 20/15 in each eye at distance and J1 in each eye at near. Colour vision testing using Hardy-Rand-Rittler pseudoisochromatic plates was 10/10 bilaterally. Visual fields were performed by static technique and showed stable bilateral, incomplete, congruous, superior homonymous quadrantic defects, consistent with damage to both inferior occipital lobes. Pupils were isocoric and normally reactive to light and near stimulation. The patient had full abduction, adduction, and infraction of both eyes. In addition, he now was able to elevate both eyes about 35° above the midline. He had normal velocity saccades in all directions, but he developed convergence–retraction nystagmus when looking at an optokinetic drum whose targets were being rotated downward. When the targets were moving upward, to the right, or to the left, the response was normal. In response to convergence, the patient had a 4 prism dioptre intermittent left hypotropia at distance and near, associated with 4° of intorsion of the left eye using double Maddox rods. He was most comfortable with a 4 prism dioptre prism placed base up over the left spectacle lens, and a Fresnel prism of this strength and orientation was placed on the left lens of his glasses. He had no ptosis or lid retraction, and the results of slit lamp biomicroscopy, applanation tonometry, and ophthalmoscopy were normal.

Comment

The dorsal midbrain syndrome of Parinaud usually results from damage to premotor pathways for binocular upward gaze in the dorsal mesencephalon. Depending on the extent of ophthalmic surgery performed by the surgeon, the patient may have developed saccadic dissociation, with better upward gaze during pursuit than when attempting upward saccades, and some patients have improved upward gaze with the oculocephalic manoeuvre, indicating sparing of infranuclear pathways. The dorsal midbrain syndrome may be caused by extrinsic or intrinsic lesions, with hydrocephalus being a common aetiology in some series. Depending on the nature and extent of damage as well as the length of time the condition has been present before the underlying disorder is treated, some patients improve, often substantially, whereas others do not. In general, patients whose underlying condition is treated successfully but who do not regain improved upward gaze within weeks to months are thought to have no potential to improve; however, our patient’s spontaneous improvement about 4½ years after onset and treatment of the underlying condition indicates that some patients retain the potential to improve even after several years have passed. This information may be of value in counselling patients with the dorsal midbrain syndrome who ask if there is any chance of improvement when none has occurred after months to a few years.

Correspondence to: N R Miller, Wilmer Eye Institute, Johns Hopkins Hospital, 600 North Wolfe Street, Baltimore, MD 21287, USA; nrmiller@jhmi.edu

doi: 10.1136/bjo.2005.081810

Accepted for publication 7 September 2005

References


MAILBOX

Purification of triamcinolone acetonide suspension for intravitreal injection

In the article by García-Arumí and associates, the authors reported the results of several techniques used for purification of triamcinolone acetonide suspension for intravitreal injection (two non-parametric techniques). I very much appreciate that they finally recommended our method (centrifugation for 5 minutes at 3000 rpm with extraction of 0.9 ml of the supernatant and pellet resuspension with 0.9 ml of balanced salt solution, BSS) among those compared. This could have been an interesting report but I want to raise some important issues mentioned in their paper. The source of the evaluated techniques was not clearly specified by the authors. Are they previously published techniques? Are they techniques developed entirely by García-Arumí et al? As far as I know, the centrifugation technique described by García-Arumí et al was first reported by Hernaez-Ortega in 2003 and it was first published by Hernaez-Ortega and myself in the 2004 July/August issue of Ophthalmic Surgery, Lasers & Imaging. In fact, the term “purification” was first applied to removal of most of the vehicle from a non-parametric test to be more powerful than non-parametric tests if their distributional assumptions are met. However, non-parametric methods require fewer...
assumptions, and they are generally robust against problems like outliers and non-constant variances. The authors tested statistical significance by the Kruskal-Wallis test, a non-parametric procedure that is a K-sample generalisation of the two sample rank sum test (also called the Mann-Whitney U test). It tests the null hypothesis of identical group medians, rather than means. With the data available in this report, the authors should have noticed that figures 1 and 2 show means and standard deviations; they should instead have shown group medians. Moreover, their results should have been expressed as medians.

The pellet resuspension with 0.9 ml of BSS in the centrifugation technique appeared in their final recommendation at the end of the paper. However, the authors stated in the methods section that the pellet was resuspended with 1 ml of BSS. This point needs to be explained.

1. I recommend that the authors clarify the above mentioned issues. I also suggest that they learn the golden rule of fair use of another author’s protected material: take from someone else only what you wouldn’t mind someone taking from you.

Correspondence to: Dr Enrique Soto-Pedre, European Innovative Biomimetic Institute, C/Jardines #2, Apt 1-G, 39700 Castro-Urdiales, Cantabria, Spain; ebi1@eurodiab.com

The author does not have commercial interest in any product mentioned in the manuscript. doi: 10.1136/bjo.2005.083501

Accepted for publication 26 September 2005

References


PHEMA as a keratoprosthesis material

An aim to provide an optimised keratoprosthesis, with excellent biointegration, and all other properties meeting ideal requirements, is one we share with Mehta et al. However, their report, though it includes some points that require clarification.

PHEMA (poly(2-hydroxyethyl methacrylate) is a non-toxic polymer of the toxic monomer HEMA, though cytotoxicity is still persisting. This water soluble monomer has not been fully removed. The “polyhydroxyethyl methacrylate” the authors obtained for their study was not fully described, and may have been contact lens blanks, unlikely to have been processed for “implantable quality.” Whether the samples had been fully extracted was not stated, nor was the hydration of the samples when used for the study. Contact lens blanks are not designed for cell adhesion and the results of this study, with regard to PHEMA, are entirely predictable and have been previously reported.

The commercially available keratoprosthesis AlphaCor is made from a form of PHEMA, specifically modified for its intended purpose within the cornea. In particular, the AlphaCor OPTIC is made from a relatively low water content, but hydrated, microporousous form, similar to the samples evaluated by the authors, specifically because it does not encourage cellular adhesion (epithelial coverage is not desired for this model, nor would adherent posterior cells and membranes be desirable).

In contradistinction, the biointegratable SKIRT region of AlphaCor is made from a macroporous form of PHEMA with a very high water content; this material, with its interconnecting channels, has been optimised to promote viable biocolonisation, which has been extensively described in the literature. Mehta et al do concede that cells “may behave differently in colonising a 3-D porous keratoprosthesis skirt”; indeed they do. Further, very subtle modifications of the sponge structure significantly affect all aspects of biointegration.

Both early trial results, such as the preliminary cases cited by Mehta et al, and current results for over 250 AlphaCor devices, have been extensively presented and made available to all device users. Histology now available from AlphaCor devices explanted from human recipients confirms that the biointegration process in humans is similar to that previously shown in the animal model, and maintained in the long term. As expected, specific inflammatory processes can cause localised reversal of biointegration in areas of stromal melting. Certainly, porosity itself does not prevent melting processes, as is also seen in relation to hydroxyapatite keratoprothses and orbital implants.

There is no argument that keratoprosthesis materials and device design require ongoing revision and improvement. The authors’ findings in relation to hydroxyapatite are interesting although, as they note, this rigid material has its own limitations. Novel approaches are undergoing early evaluation and may offer benefits. However, at present, in our view, AlphaCor is a device worthy of consideration for those in whom a donor graft would fail.

C R Hicks, T V Chirila, S Vijayasekar, G J Crawford

Lions Eye Institute, Perth, Western Australia

Correspondence to: Celia Hicks, Lions Eye Institute, Perth, Western Australia; crhicks@cyllene.uwa.edu.au
doi: 10.1136/bjo.2005.084855

Accepted for publication 11 October 2005

References


Expression of TSH-R in normal human extraocular muscles

We read with interest the paper published by Boschi et al, in which immunohistochemistry was performed on orbital tissues of patients with thyroid associated ophthalmopathy (TAO) and compared with non-dis eased orbital tissue.

Our laboratory recently reported positive TSH receptor staining within normal human muscle fibres, using one of the same antibodies (3G4) as Boschi et al (supplied by Costagliola) and a commercial antibody (3B12). Our findings differ from Boschi et al’s as no staining of the muscle fibres was visible in their experience.

Assessing the techniques used suggested some possibilities as to why our findings differ. Our paraffin embedded tissues were subjected to a proteolytic antigen retrieval step, as commonly used in avidin-biotin staining. The reason for this is that formalin used in fixation is notorious for altering protein immunoreactivity, and hence masking protein expression. Moreover, the amplification immunohistochemistry kit used in our experiments is possibly more sensitive than conventional immunohistochemistry used in the experiments of Boschi et al.

We do not dispute the finding that TSH-R expression is elevated in orbital connective tissue of diseased patients. Combined with our findings, Boschi et al’s paper also suggests that expression of TSH-R on normal muscle fibres is lower than in the connective tissue of diseased patients. Boschi et al have successfully produced more evidence that connective tissues in the orbit are active in TAO affected patients; however, the potential role of the extraocular muscle in the pathogenesis of TAO should also be considered.

S J Klaprooge, A G Frauman

Department of Medicine, University of Melbourne, Clinical Pharmacology and Therapeutics Unit, Level 5, Lance Townsends Building, Austin Health, Stadley Road, Heidelberg, Victoria, 3084, Australia

Correspondence to: Mr Steven Klaprooge, Department of Medicine, University of Melbourne, Clinical Pharmacology and Therapeutics Unit, Level 5, Lance Townsends Building, Austin Health, Stadley Road, Heidelberg, Victoria, 3084, Australia; s.klaprooge@pgrad.unimelb.edu.au
doi: 10.1136/bjo.2005.084863

Accepted for publication 11 October 2005

References


Trabeculotomy versus trabeculotomy-trabeculotomy for congenital glaucoma

The article by Al-Hazmi et al. states that combined trabeculotomy-trabeculotomy with mitomycin C (CTTM) gave better results than trabeculotomy alone for primary congenital glaucoma (PCG) at the King Khaled Eye Specialist Hospital (KKESH) in Riyadh, Saudi Arabia, between 1982 and 2002. For moderate PCG the success rate was stated as 40% and 80% for trabeculotomy and CTTM, respectively. However, with more specific information regarding when the trabeculotomies were performed at KKESH, the authors cannot advocate CTTM over trabeculotomy for moderate and severe PCG.

As the article states, over the years at KKESH the success rate for trabeculotomy for PCG dramatically improved (29% from 1982–90; 47% from 1991–4; 82% from 1995–2002). The authors attribute these improved results over the years to improved primary healthcare facilities within the kingdom, earlier referrals, better equipment availability, and surgeons becoming more adept at surgical intervention. In contrast, CTTM for PCG was first performed at KKESH in 1994 with less of a “learning curve”; the success rate from 1994–2002 was 72%. The complication rate, however, was higher for CTTM than for trabeculotomy.

Because initial trabeculotomy success for PCG at KKESH has dramatically increased with time, it is important to know how many trabeculotomies were from the early periods in the hospital. This information was not in the paper. It may be that trabeculotomy as currently performed at KKESH for moderate and severe PCG has a success rate similar to that of CTTM for the same patient population with fewer surgical complications.