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Sir,

In vivo confocal microscopy study of climatic droplet keratopathy

Climatic droplet keratopathy (CDK) is a corneal degenerative disease characterized by its progressive opacity because of accumulation of globular deposits in Bowman's layer (BL) and anterior stroma (AS), as well as abnormal corneal sensitivity.[1,2]

We report herein for the first time the study of three patients each with different grades of CDK using *in vivo* confocal microscopy (iVCM), a technique that has allowed the measurement of normal and pathological corneal components.[3–5]

Table 1, Figures 1 and 2 summarize the corneal abnormalities found in these patients. Cochet-Bonnet aesthesiometry (CBA) demonstrated a decrease of the mechanical sensitivity of the cornea in eyes with grade II and III CDK. Grade I CDK was characterized by incipient changes in the BL and AS but normal sub-basal and stromal nerve plexus. Grade II CDK showed hyper-reflectivity and globular non-reflective deposits in the BL and AS. In grade III, the AS showed fibrosis with increment of diffused hyper-reflective deposits and large non-reflective deposits. Concomitant to these changes, there was an increased number of dendritic cells (DC) at the peripheral cornea and limbus, but their role in the progression of CDK needs further studies. No abnormalities were found in the rest of the stroma and endothelium.

Although we were unable to study sub-epithelial nerves because they occupied the same area of the deposits in CDK, we found that the early changes in CDK did not affect the sub-basal and stromal nerves, but the progression of the disease lead to a significant density decrease of sub-basal nerves, and some structural changes in stromal nerves, such as uneven thickness and irregular configuration, that might be responsible for corneal hyposensitivity found in advanced stages of CDK.

In a recent study, Patel *et al*[5] showed that sub-basal nerve tortuosity but not mean total sub-basal nerve density varied with age in normal individuals. The loss of corneal sensation could not be attributed to the age

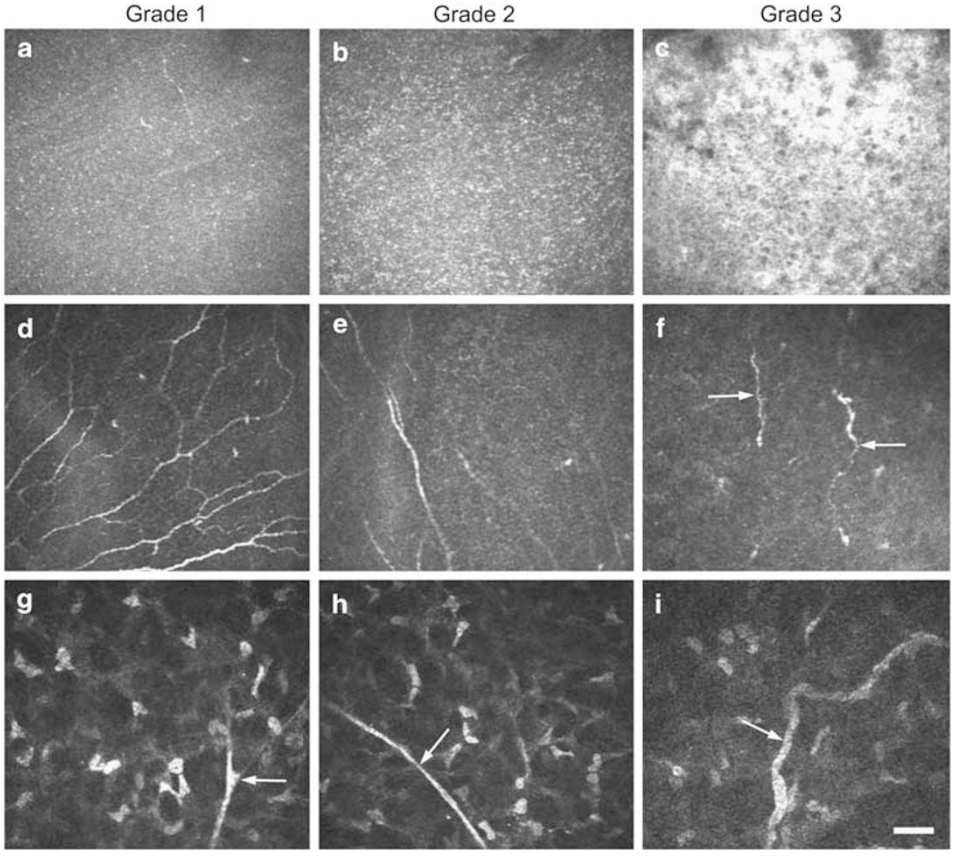

Figure 1 *In vivo* confocal laser scanning microscopy images. BL: (a) Grade 1: dot-like hyper-reflective deposits in the central cornea. (b) Grade 2: increased density of the deposits. (c) Grade 3: confluent hyper-reflective deposits. Sub-basal nerves: (d) Grade 1: normal appearance and density of sub basal nerve plexus. (e) Grade 2: decrease density of nerve fibres with abrupt nerve termination. (f) Grade 3: extremely diminished nerve density and fragmented nerve fibres (arrows). Stromal nerves: (g) Grade 1: normal nerve and branching (arrow). (h) Grade 2: nerve with uneven thickness (i) Grade 3: irregular configuration of nerve (bar = 50 μm).

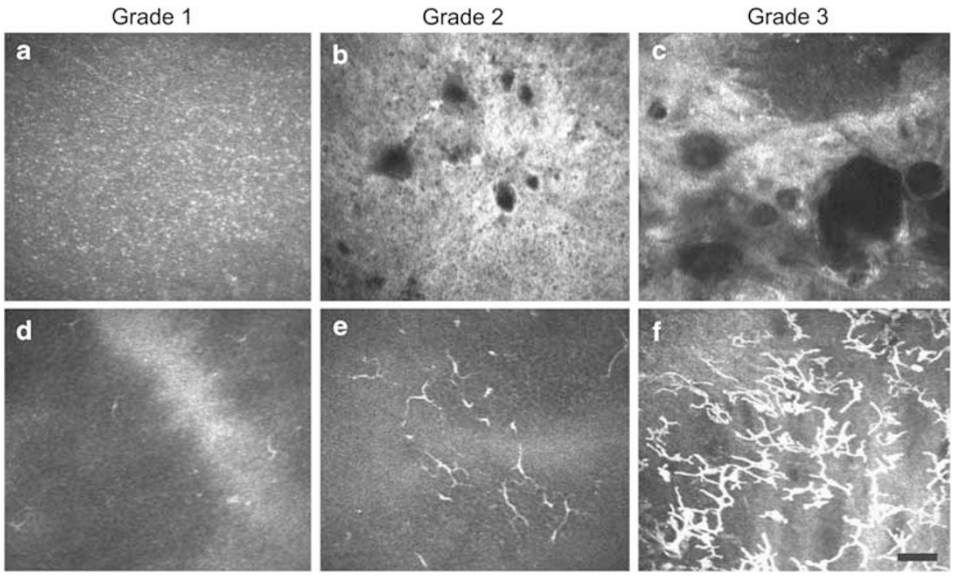

Figure 2 *In vivo* confocal laser scanning microscopy images. Deposits at the peripheral cornea: (a) Grade 1: reflective punctiform or dot-like deposits. (b) Grade 2: hyper-reflective punctate and homogeneous round globular non-reflective deposits. (c) Grade 3: condensation of punctiform deposits; large globular non-reflective deposits. DC at the peripheral cornea and limbus: (d) Grade 1: low density of DC. (e) *G*rade 2: moderate density of DC and (f) Grade 3: high density of DC (bar = 50 μm).

Table 1 Abnormalities found in corneas of CDK eyes according to biomicroscopic grade of the disease

	Case 1		*Case 2*		*Case 3*	
Age (in years)	48		58		70	
Genre	Male		Male		Male	
	OD	OS	OD	OS	OD	OS
BCVA	20/20	20/20	20/30	20/20	20/70	20/70
Biomicroscopy	Grade 1	Grade 1	Grade 2	Grade 2	Grade 3	Grade 3
Aesthesiometry[a]	Normal	Normal	Normal	Moderate hyposthesia	Severe hyposthesia	Very severe hyposthesia
CCFM						
BL	Reflective punctiform or dot-like deposits		Hyper reflective punctate and homogeneous round globular non-reflective deposits		Condensation of punctiform deposits; large globular non-reflective deposits	
Sub basal nerves	Normal		Abrupt endings		Sharp endings	
Density[b]	22.351 ± 1.482 mm/mm^2		9.965 ± 1.927 mm/mm^2		4.870 ± 0.122 mm/mm^2	
AS	Diffuse mild back-scattered reflectivity Regular arrangement of keratocytes		Hyper reflective punctate and homogeneous round globular non-reflective deposits of variable size Relative regular arrangement of keratocytes		Large globular non-reflective deposits; hyper-reflective plaques Loss of keratocytes	
Stromal nerves	Normal nerves and branching		Uneven thickness		Irregular configuration	
DC density[c]	88.3 ± 7 cells/mm^2		101 ± 6 cells/mm^2		236 ± 8.7 cells/mm^2	

Abbreviations: BCVA, best corrected visual acuity; OD, right eye; OS, left eye; CCFM, confocal microscopy; BL, Bowman's layer; AS, anterior corneal stroma; DC, dendritic cells.
[a] Spearman's r correlation = −0.96; (P = 0.0015) was found between mechanical sensitivity and the CDK progression.
[b] When analysed according to case, using the one-way analysis of variance (ANOVA), nerve density demonstrated significant differences between the cases (P < 0.0001).
[c] When analysed according to case, using the one-way analysis of variance (ANOVA), DC density demonstrated significant differences between the cases (P < 0.0001).

of our patients as we have previously found in a case–control study that corneal sensation was related to CDK grades and not to the age of individuals.[2]

Conflict of interest

The authors declare no conflict of interest.

Acknowledgements

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Sir,

Surgical repair of bilateral full thickness macular holes in a patient with blue sclera secondary to osteogenesis imperfecta

The management of full thickness macular holes (FTMH) in patients with osteogenesis imperfecta has not to our knowledge been reported. We describe a patient with blue sclera secondary to osteogenesis imperfecta, who underwent surgical repair of bilateral FTMH.

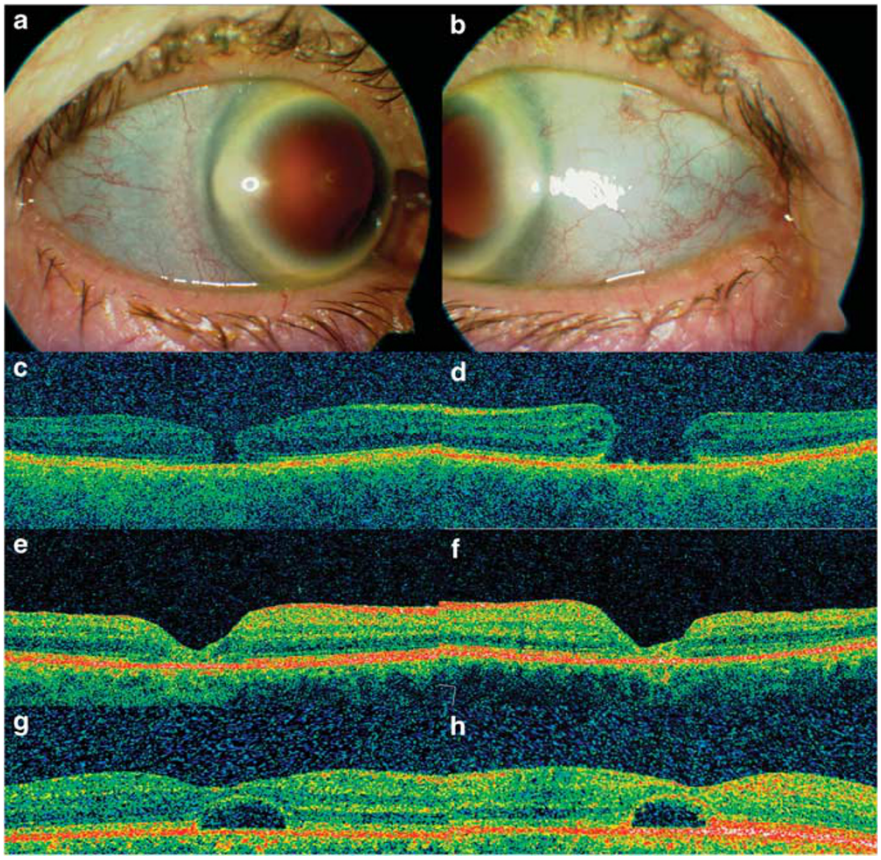

Figure 1 Photographs showing bilateral blue-grey scleral colouration OD (a) and OS (b). Pre-treatment OCT appearance of FTMH OD (c) and OS (d). Post-treatment OCT appearance showing closure of FTMH OD (e) and OS (f). Punched-out retinal defect on OCT in patient's son OD (g) and OS (h).