

EUROPEAN DRY EYE SOCIETY CONGRESS

EuDEC

JUNE 18-19, 2021

HÔTEL HYATT, PORTE MAILLOT

PARIS - FRANCE



Analysis of corneal nerve abnormalities in painful dry eye disease patients

A. Guerrero Moreno, H. Liang, N. Moreau, J. Luzu, G. Rabut, S. Mélik Parsadaniantz, A. Labbé, C. Baudouin, A. Réaux-Le Goazigo



Neuropathic corneal pain and dry eye

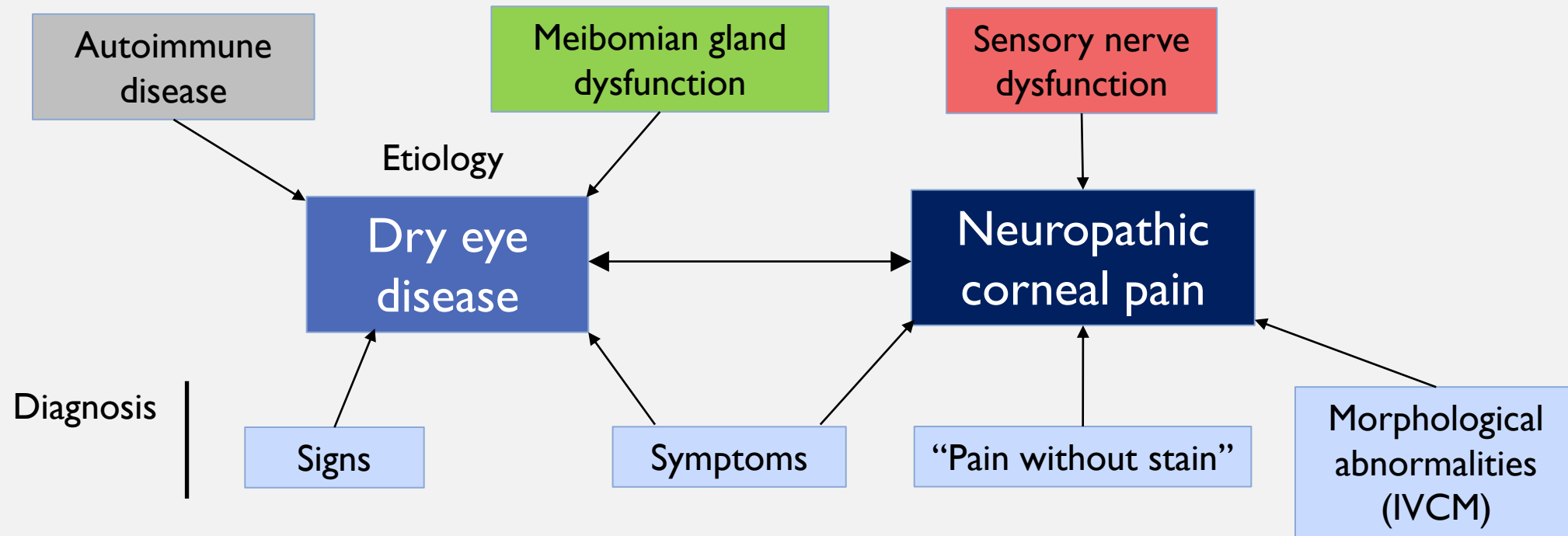
Rosenthal et al. *Ocul Surf.* 2009

Belmonte et al. *Ocul Surf.* 2017

Craig et al. *Ocul Surf.* 2017

Levitt, Galor et al. *Mol Pain.* 2017

Dieckmann, Goyal, Hamrah. *Ophthalmology.* 2017



Aim:

To compare corneal nerve abnormalities in patients with neuropathic corneal pain (NCP) associated with different aetiologies of DED: meibomian gland dysfunction (MGD) and autoimmune dry eye (AIDE).

Retrospective nested case-control study flowchart



Ocular surface disease patient database

DED patients with VAS score = 0 or ≥ 8
Oxford score ≤ 1

Autoimmune-associated DE

Meibomian gland dysfunction

Healthy controls

No pain
VAS score = 0

Severe pain
VAS score ≥ 8

No pain
VAS score = 0

Severe pain
VAS score ≥ 8

Study groups

Healthy controls

Painless AIDE

AIDE-related NCP

Painless MGD

MGD-related NCP

9 females
1 male

8 females

7 females

7 females
1 male

9 females
2 males

Age (mean ± SD):
52 ± 14 years

Study procedure

In Vivo Confocal Microscopy

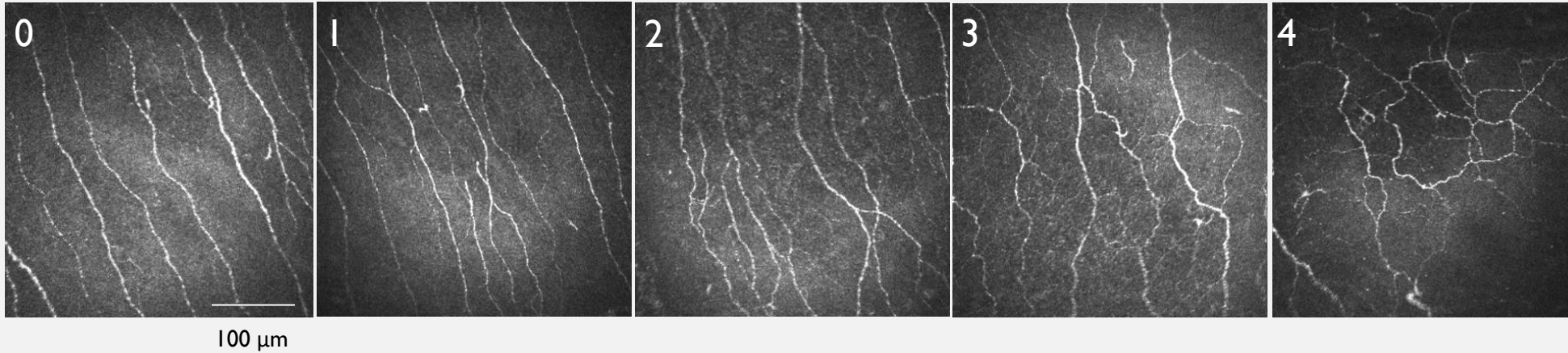
Nerve tortuosity

Nerve density

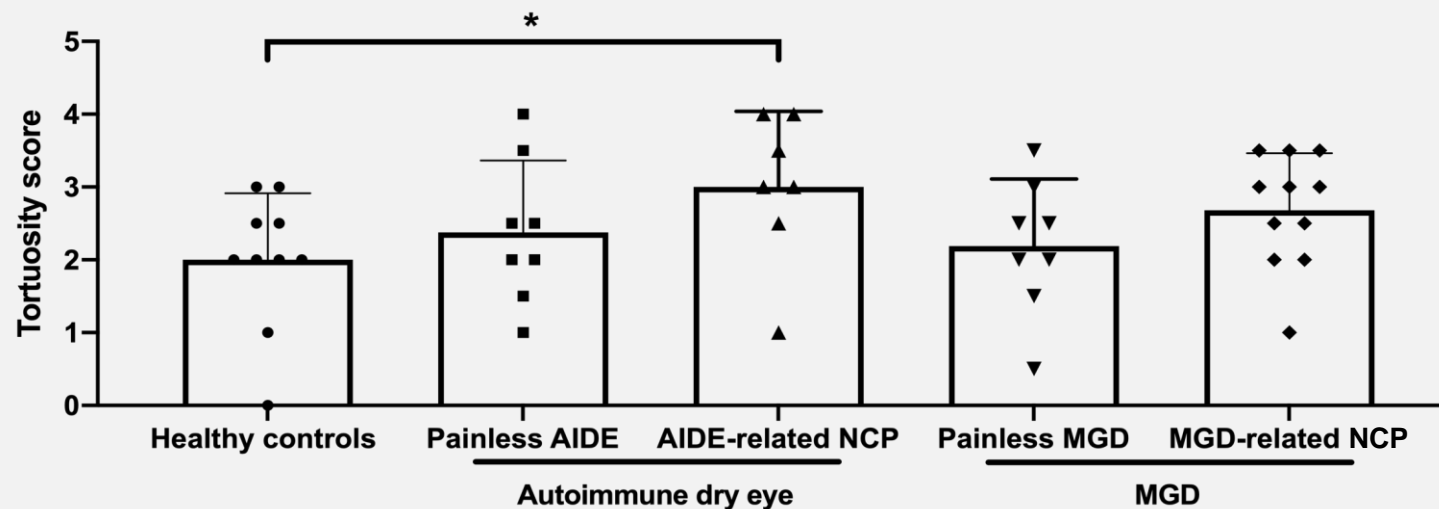
Microneuromas

Autoimmune DE-related NCP had significantly higher corneal nerve tortuosity

A: Nerve tortuosity scale



B: Quantitative analysis of corneal nerve tortuosity

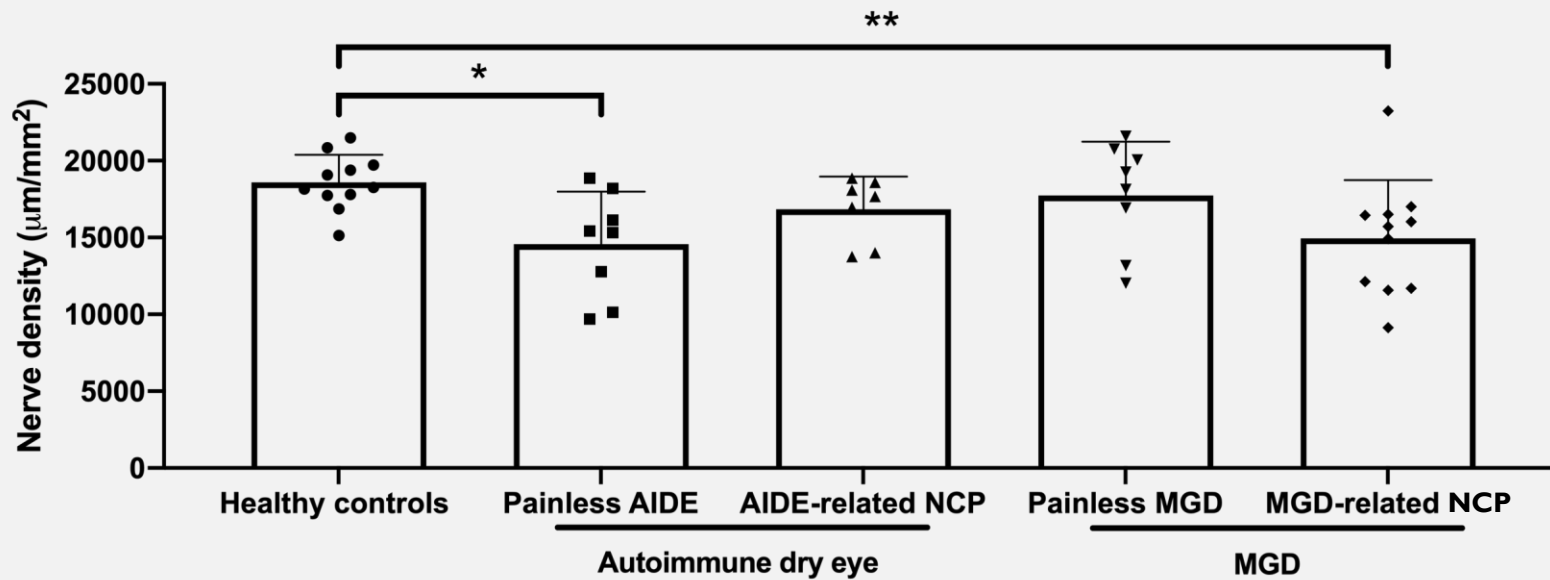


Data as mean \pm SD
 Intergroup comparisons:
 Mann-Whitney U test
 * p < 0.05

Number of Images
 analyzed per patient:
 Minimum: 30
 Maximum: 193
 Median: 77

Painless autoimmune DE and MGD-related NCP patients had reduced corneal nerve density

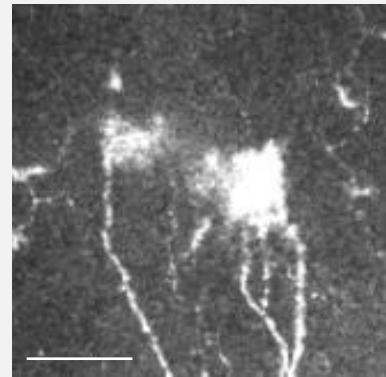
Corneal nerve density quantification (NeuronJ software):



Data as mean \pm SD
Intergroup comparisons: t-test
* $p < 0.05$ ** $p < 0.01$

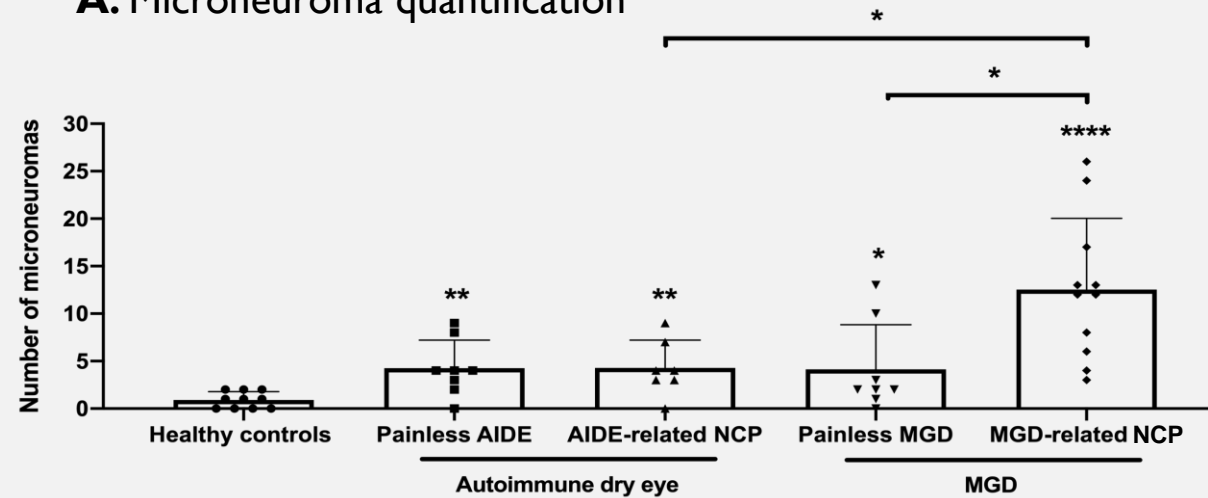
Number of representative images analyzed per patient:
Minimum: 5
Maximum: 31
Median: 11

Painless and DED-related NCP patients had higher microneuromas.
 MGD-related NCP patients had higher microneuromas compared to
 painless MGD and autoimmune DE-related NCP patients.



50 μ m

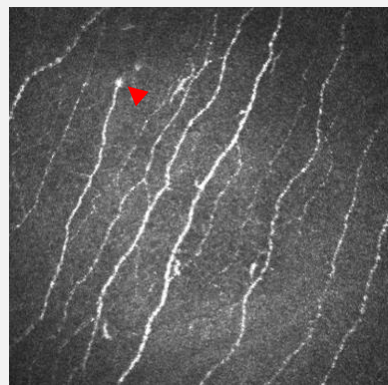
A: Microneuroma quantification



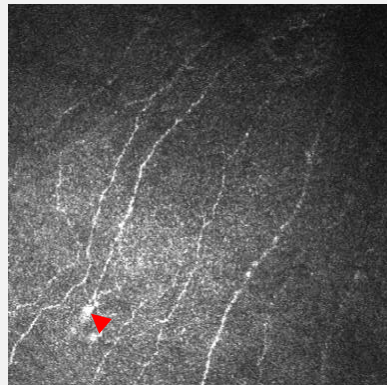
Data as mean \pm SD
 Intergroup comparisons:
 Mann-Whitney U test
 * $p < 0.05$
 ** $p < 0.01$
 **** $p < 0.0001$

Number of Images
 analyzed per patient:
 Minimum: 30
 Maximum: 193
 Median: 77

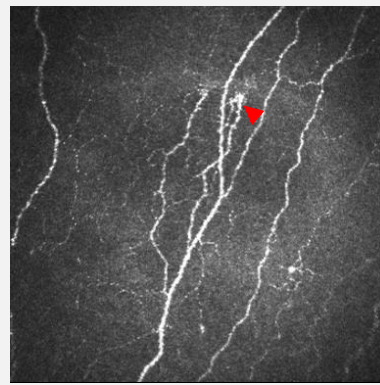
B: Microneuromas



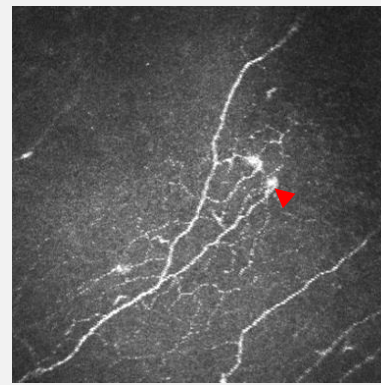
Healthy controls



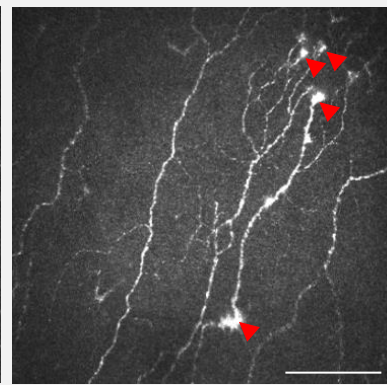
Painless AIDE



AIDE-related NCP



Painless MGD



MGD-related NCP

100 μ m

Autoimmune dry eye

MGD

Conclusions

- Patients suffering from MGD-related NCP could present a different neuropathic phenotype than AIDE-related NCP patients.
- Primary MGD-related NCP was associated with significantly more corneal nerve abnormalities than AIDE-related NCP or healthy controls.
- Although IVCN can be useful to evidence NCP-related corneal nerve changes in DED patients, the diagnosis of DED-related NCP will require an association of several IVCN-based criteria without relying solely on the presence of microneuromas.

Institut de la Vision, Paris, France

Team S12 «Pathophysiology of the anterior segment of the eye»

PhD student - Early Stage Researcher 9 (ESR9)

Integrated Training on Dry Eye Disease Drug Development (MSCA)

IT-DED³: a European consortium for innovation

19th June, 15h45-16h45

Contact email address: adrian.guerrero@inserm.fr