Madrid 2024

21st November

22nd November

Rare Eye Diseases: scientific breaking news and AI

European Reference Network dedicated to Rare Eye Diseases

Madrid 2024
21st November
22nd November

Rare Eye Diseases: scientific breaking news and AI

Breaking news for rare diseases in neuro-ophthalmology

21-NOV-2024
15:00-15:30
axel petzold

Update in 2024:

The ROYAL COLLEGE of OPHTHALMOLOGISTS

www.nature.com/eye

EDITORIAL

Check for updates

Neuro-ophthalmology: recent advances and paradigm shifts

Eye (2024) 38:2233–2234; https://doi.org/10.1038/s41433-024-03188-w

The last decade has seen an unprecedented pace of translation and innovation in the field of neuro-ophthalmology, providing our previously diagnosable but untreatable patients with new management options that reduce morbidity and mortality. No longer are we the subspeciality that simply admires the disease, and now we have much more than steroids to offer patients.

Meanwhile working in counties like Cambodia or Mongolia, Ophthalmologists might see between two to three TON cases per day. Blanch and colleagues outline the triangulated opinion that glucocorticoids should not be used for traumatic injury [12]. Corneal neuropathic pain is a debilitating condition that currently lacks translational programs to deliver therapies to meet patient's needs: Watson and colleagues tackle this topic [13]. There is a thoughtful paper on dystrophic calcification and the relevance to optic disc drusen, while we still don't have a treatment,

25 items to be covered in the next 30 minutes

1. Laviers H, Petzold A, Braithwaite T. How far should I manage acute optic neuritis as an Ophthalmologist? A United Kingdom perspective. Eye (Lond). 2024. https://doi.org/10.1038/s41433-024-03164-4.
2. Bonelli L, Menon V, Arnold AC, Mollan SP. Managing idiopathic intracranial hypertension in the eye clinic. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03140-y.
3. Kamath A, Huang WC, Madill SA. How should I approach and manage adult-onset oscillopsia? Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03130-0.
4. Fraser CL. How do I recognise and manage visual snow syndrome? Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03059-4.
5. Ramsay N, McKee J, Al-Ani G, Stone J. How do I manage functional visual loss. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03126-w.
6. Parthasarathi P, Moss HE. Review of evidence for treatments of acute non arteritic anterior ischemic optic neuropathy. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03136-8.
7. Wang MTM, Meyer JA, Danesh-Meyer HV. Neuro-ophthalmic evaluation and management of pituitary disease. Eye. (Lond). 2024. (In press).
8. Jeyakumar N, Lerch M, Dale RC, Ramanathan S. MOG antibody-associated optic neuritis. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03108-y.
9. Ambika S, Lakshmi P. Infectious optic neuropathy (ION), how to recognise it and manage it. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03152-8.
0. Tao BKL, Soor D, Micieli JA. Herpes zoster in neuro-ophthalmology: a practical approach. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03030-3.
1. Reid GA, Halmágyi GM, Whyte C, McCluskey PJ. Ocular vs Neurosyphilis. Are they the same? Investigation and Management. Eye. (Lond). 2024. (In press).
2. Blanch RJ, Joseph IJ, Cockerham K. Traumatic optic neuropathy management: a systematic review. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03129-7.
3. Watson SL, Le DTM. Corneal neuropathic pain: a review to inform clinical practice. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03060-x.
14. Bentin JM, Heegaard S, Jørgensen NR, Grahnemo L, Hamann S. Optic disc drusen: Dystrophic calcification, a potential target for treatment. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03138-6.
15. Chen C, Singh G, Madike R, Cugati S. Central retinal artery occlusion: a stroke of the eye. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03029-w.
16. Shin HJ, Costello F. Imaging the Optic Nerve with Optical Coherence Tomography. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03165-3.
17. Cejvanovic S, Sheikh Z, Hamann S, Subramanian PS. Imaging the brain: diagnosis aided by structural features on neuroimaging studies. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03142-w.
18. Calcagni A, Neveu MM, Jurkute N, Robson AG. Electrodiagnostic tests of the visual pathway and applications in neuro-ophthalmology. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03154-6.
19. Bano T, Wolffsohn JS, Sheppard AL. Assessment of visual function using mobile Apps. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03031-2.
20. Philibert M, Milea D. Basics, benefits, and pitfalls of pupillometers assessing visual function. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03151-9.
21. Colman BD, Zhu Z, Qi Z, van der Walt A. From real world data to real world evidence to improve outcomes in neuro-ophthalmology. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03160-8.
22. Jacob S. Treating myasthenia gravis beyond the eye clinic. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03133-x.
23. Khalique MI, Arjunan M, Wood S, Mackie SL. The spectrum of giant cell arteritis through a rheumatology lens. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03153-7.
24. Pawar PR, Booth J, Neely A, McIlwaine G, Lueck CJ. Nerve fibre organisation in the human optic nerve and chiasm: what do we really know? Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03137-7.
25. Mollan SP, Menon V, Cunningham A, Plant GT, Bennetto L, Wong SH, Dayan M. Neuro-ophthalmology in the United Kingdom: providing a sustainable, safe and high-quality service for the future. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03141-x.

Coriticosteroids in rare ON

- MOG-ON
  - Incidence <2/100,000 population/year
  - About 50 % are monophasic
- AQP4-MOG
  - Incidence <2/100,000 population/year

- Start treatment immediately (<48 hours)
- Give high dose oral methylprednisolone (1.25 g) for 3 days with stomach protection (omeprazole 20 mg)
- Or I.V. bioequivalent of 1g for 3 days if clinic logistic permit for acute admission
- Continue with slow oral taper of prednisolone
- Start immunosuppression in relapsing cases of MOG-ON and all patients with AQP4-ON

1. Laviers H, Petzold A, Braithwaite T. How far should I manage acute optic neuritis as an Ophthalmologist? A United Kingdom perspective. Eye (Lond). 2024. https://doi.org/10.1038/s41433-024-03164-4.

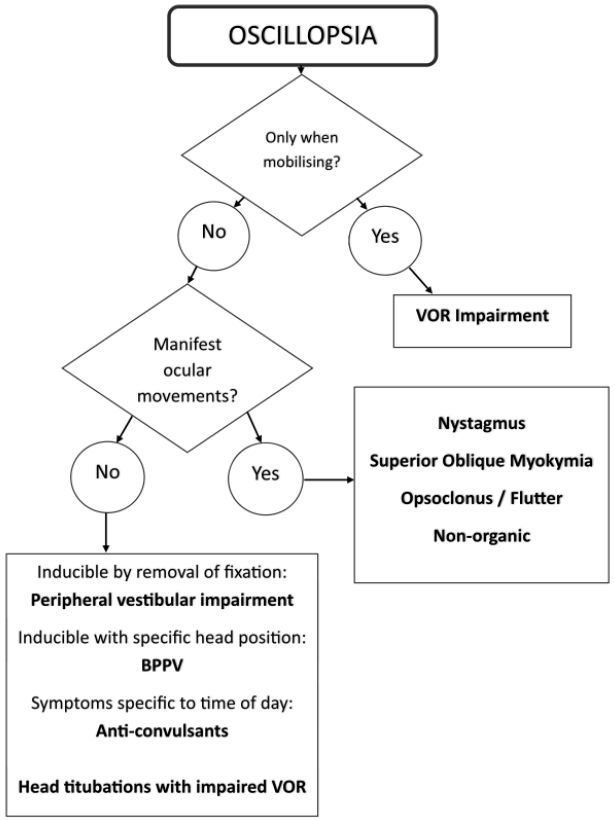
Management of rare IIH

- IIH
  - Incidence 2015 : 7.3
  - Incidence 2022 : 9.9
  - Black female (2022) : 22.7
- Vision loss in IIH
  - In ~33% of total
  - Incidence 2015 : 2.4
  - Incidence 2022 : 3/3

- Disk swelling ?
- If yes exclude anaemia (present in ~1- % of cases)
- Start acetazolamide 500mg BD if needed increase to 1g BD
- If no success offer surgical options

2. Bonelli L, Menon V, Arnold AC, Mollan SP. Managing idiopathic intracranial hypertension in the eye clinic. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03140-y.

Rare adult onset oscillopsia



- Superior oblique myokymia
  - Guttae Timolol
  - Propanolol
  - Gabapentine / Baclofen / Carbamazepine

3. Kamath A, Huang WC, Madill SA. How should I approach and manage adult-onset oscillopsia? Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03130-0.

The rare Visual Snow Syndrome

- Incidence not known
- Diagnostic criteria proposed :

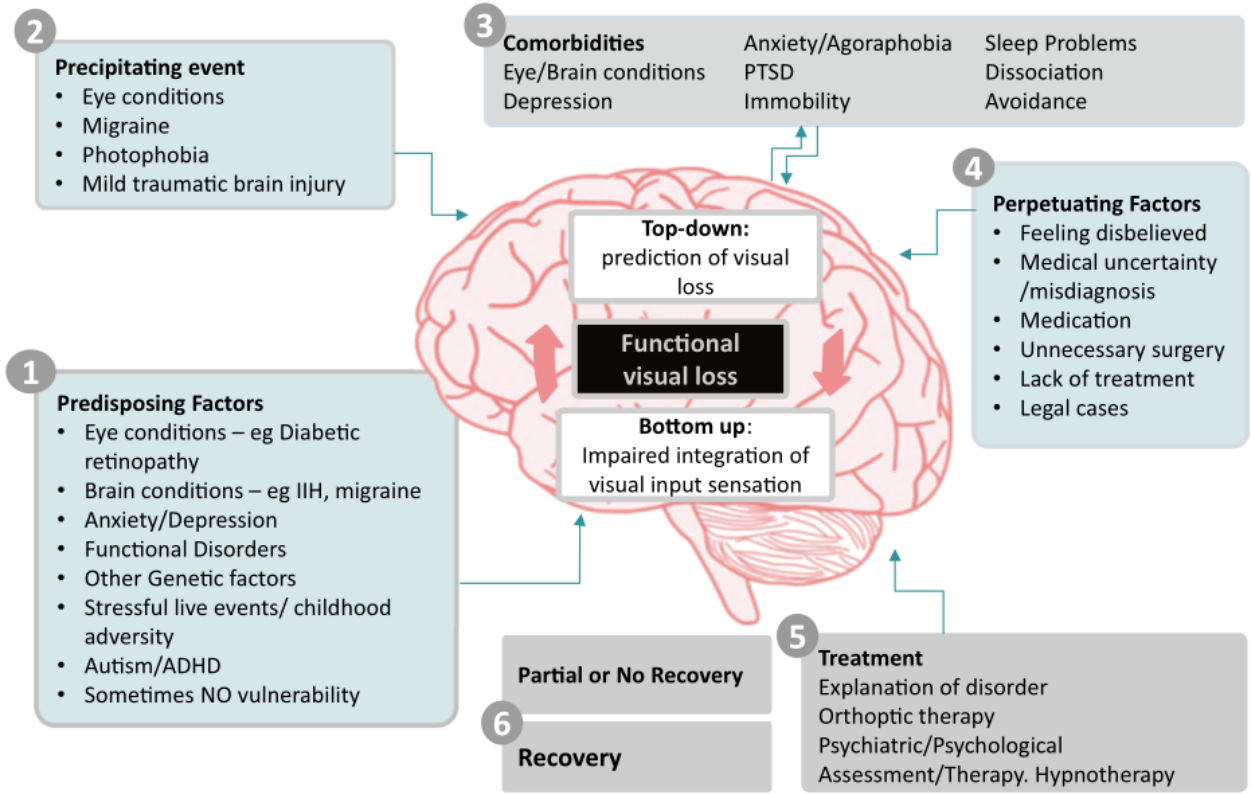
1	Visual snow: dynamic, continuous tiny dots in the entire visual field lasting longer than 3 months
2	Presence of at least two additional visual symptoms from the following: a) Palinopsia: afterimages or trailing of moving objects b) Photophobia c) Nyctalopia (impaired night vision) d) Other persistent positive visual phenomenon including (but not limited to): enhanced entoptic phenomena (excessive floaters or blur field entoptic phenomenon), kaleidoscope type colours with eyes open or closed, spontaneous photopsias
3	Symptoms are not consistent with typical migraine visual aura
4	Symptoms are not better explained by another disorder

<u>Present in rare retinal diseases:</u>

- Retinitis pigmentosa (with reduced central VA)
- Birdshot chorioretinopathy
- Autoimmune retinopathies
- Glycine recpetor seropositivity due to dysregulation of the GlyRα1 inhibitory neurotransmitter in the human retina

4. Fraser CL. How do I recognise and manage visual snow syndrome? Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03059-4.

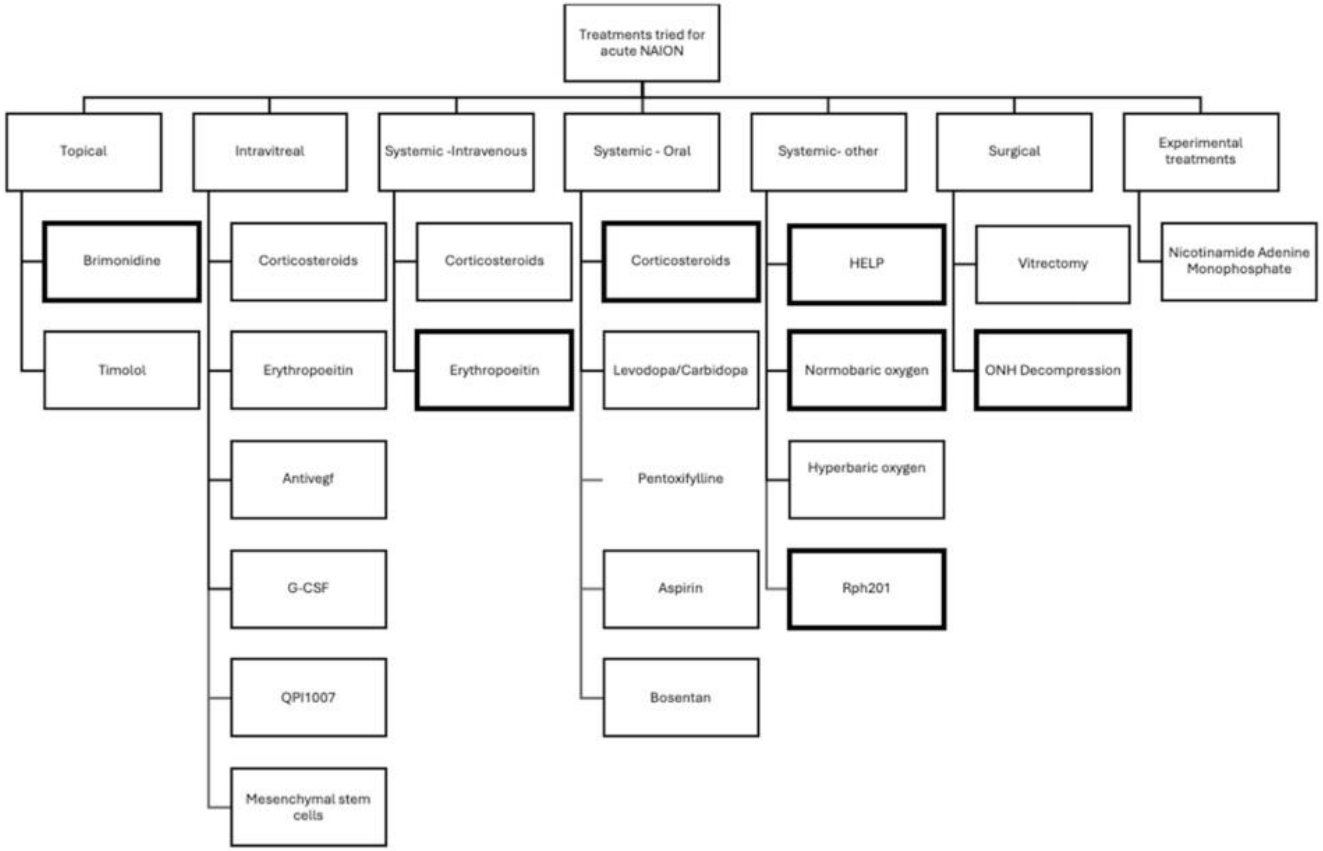
Is functional visual loss rare ?



Probably not.

5. Ramsay N, McKee J, Al-Ani G, Stone J. How do I manage functional visual loss. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03126-w.

Rarely treatment works in NAION

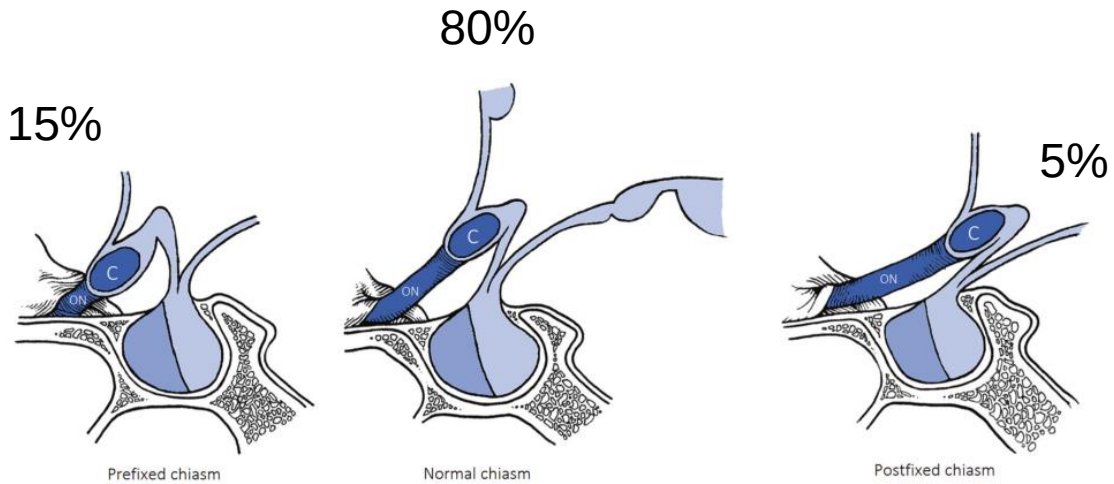


CONCLUSION

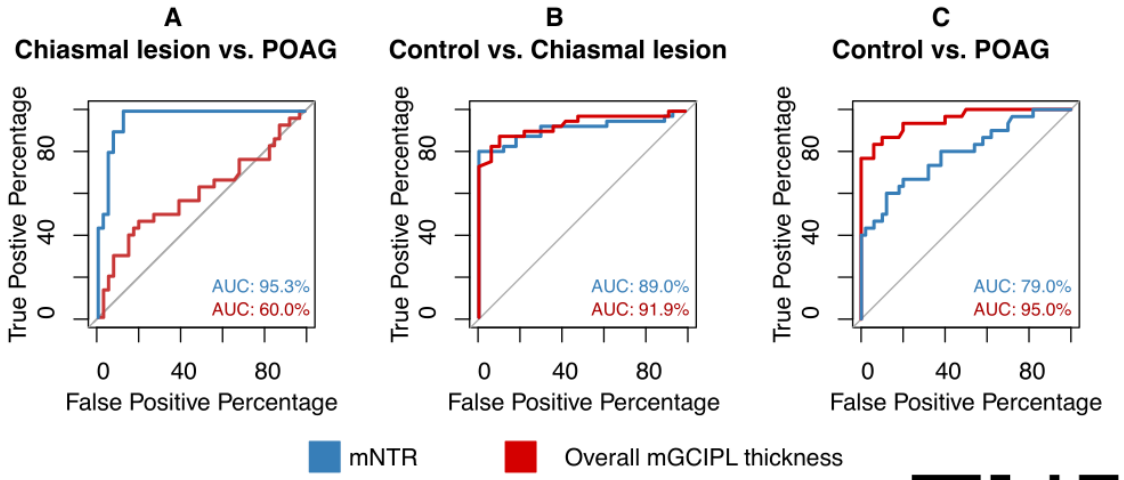
Many treatments have been studied for acute Non-Arteritic Anterior Ischemic Optic Neuropathy (NAION), ranging from conventional therapies to novel compounds. Although several treatments may be associated with improved visual outcomes, methodological shortcomings of small sample sizes, non-randomized treatments and lack of control groups limit the strength of the conclusions. In order to improve our understanding of effective therapy and, ultimately, the quality of life for those suffering from this vision-threatening condition, there must be continued collaborative research using rigorous study designs to advance treatment for acute NAION.

6. Parthasarathi P, Moss HE. Review of evidence for treatments of acute non arteritic anterior ischemic optic neuropathy. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03136-8.

Rare anatomical variations of the Chiasm

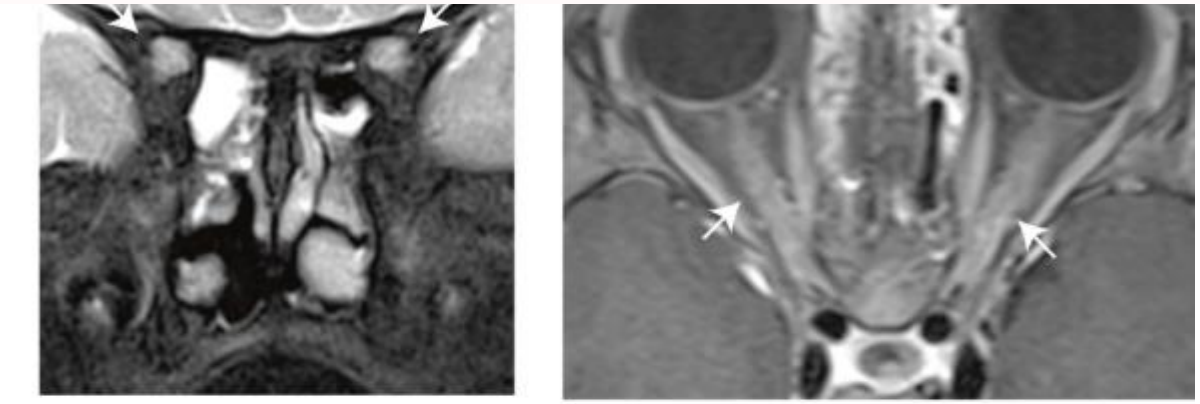


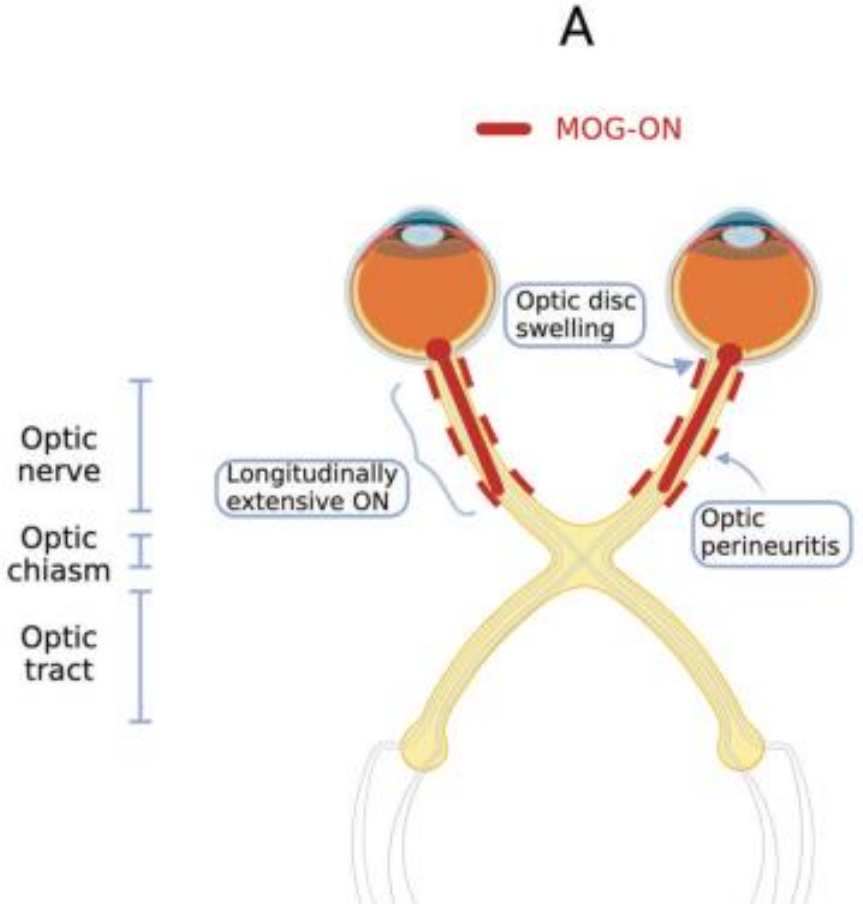
OCT: naso-temporal ratio:



7. Wang MTM, Meyer JA, Danesh-Meyer HV. Neuro-ophthalmic evaluation and management of pituitary disease. Eye. (Lond). 2024. (In press).

Relevant rare MRI findings

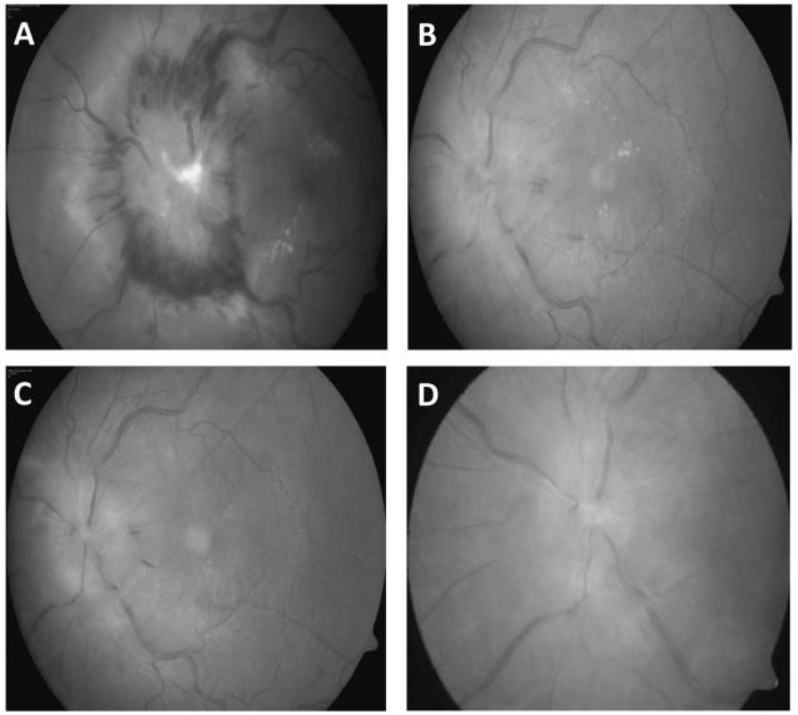




8. Jeyakumar N, Lerch M, Dale RC, Ramanathan S. MOG antibody-associated optic neuritis. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03108-y.

Rare infectious Optic Neuropathy

- Tuberculosis (bacterial)
- Incidence estimated to be <1/100,000 population/year
- A: OS @presentation
  B: OS @3m (on steroids)
  C: OS @6m (TB Rx)
  D: OS @ 1y (VA 6/6)



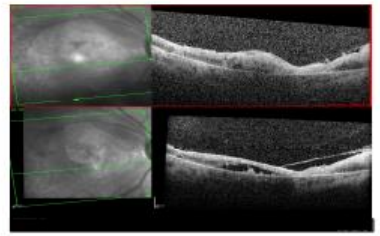
ig. 2 **A case of optic disc granuloma that responded well to anti-tuberculous therapy. CASE 1:** A 58-year old female presented with rapid

9. Ambika S, Lakshmi P. Infectious optic neuropathy (ION), how to recognise it and manage it. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03152-8.

VZV retinitis (viral)

- 32 year old woman with RRMS
- Natalizumab for > 10 years
- Develops progressive cloudy vision in right eye
- Started on corticosteroids for suspected MS-ON
- MRI: no enhancement of right optic nerve, no new lesions
- Vision continues to worsen (HM)
- 22 days after onset seen @MEH

OCT & AI



- 5th case: VZV vitritis
- Observation: 1.71%
- Routine: 24.09%
- Semi-Urgent: 46.39%
- Urgent: 27.80%

(own case, patient gave permission to be presented)

Breaking news

UCL institute founder awarded Nobel Prize in Physics

8 October 2024

Professor Geoffrey E. Hinton, who founded the Gatsby Computational Neuroscience Unit at UCL, has been awarded the Nobel Prize in Physics for his pioneering work that enabled artificial intelligence used today.

Professor Hinton, who is currently based at the University of Toronto, was awarded the prize alongside Professor John J. Hopfield "for foundational discoveries and inventions that enable machine learning with artificial neural networks". He is UCL's 31st Nobel laureate.

UCL alumnus and AI innovator awarded Nobel Prize in Chemistry

9 October 2024

Neuroscientist, entrepreneur and artificial intelligence pioneer Sir Demis Hassabis, a UCL alumnus who has retained close connections to the university, has been awarded the 2024 Nobel Prize in Chemistry.

He shares the prize with his colleague at Google DeepMind, John M. Jumper,

Rare manifestations of HZV

- Global median incidence HZV

  4-4.5 per 1000 person-years
- VZO <0.5 % of HZO cases
- GCA
- CRAO/BRAO
- AION/PION

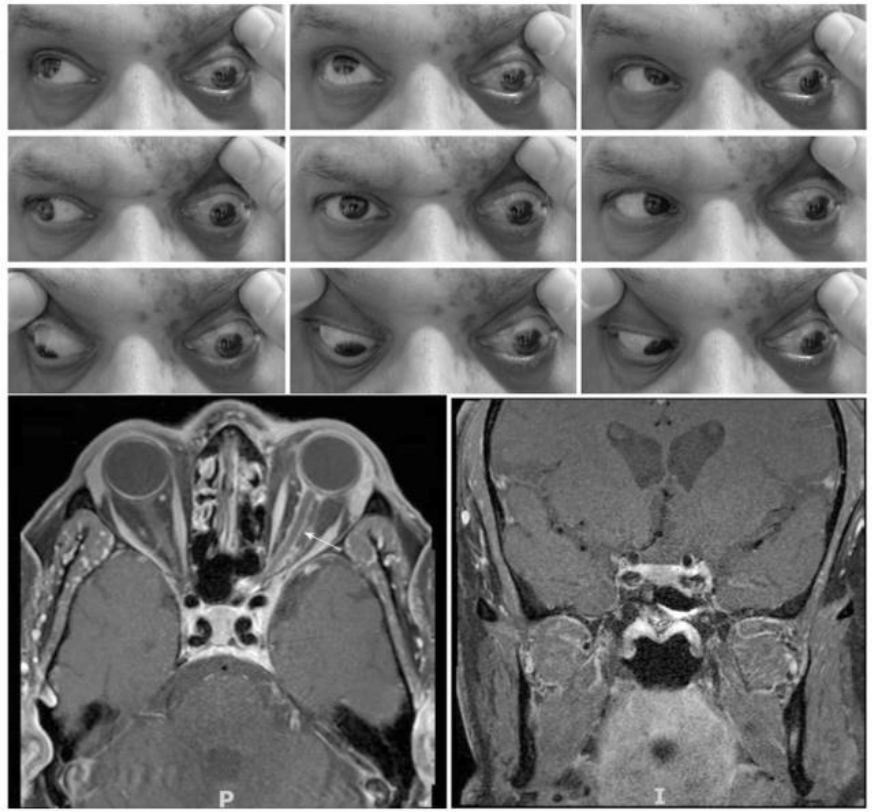


Fig. 4 Ocular motility in a patient with VZV affecting the left cavernous sinus and orbit. The patient had a complete left ophthalmoplegia; uropathy affecting ocular motility. T1-post gadolinium MRI of this patient showed enlargement of the left cavernous optic nerve sheath enhancement.

10. Tao BKL, Soor D, Micieli JA. Herpes zoster in neuro-ophthalmology: a practical approach. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03030-3.

Rare neuro-ophthalmological presentation of (I) neurosyphilis, (II) ON after penicillin

(I)

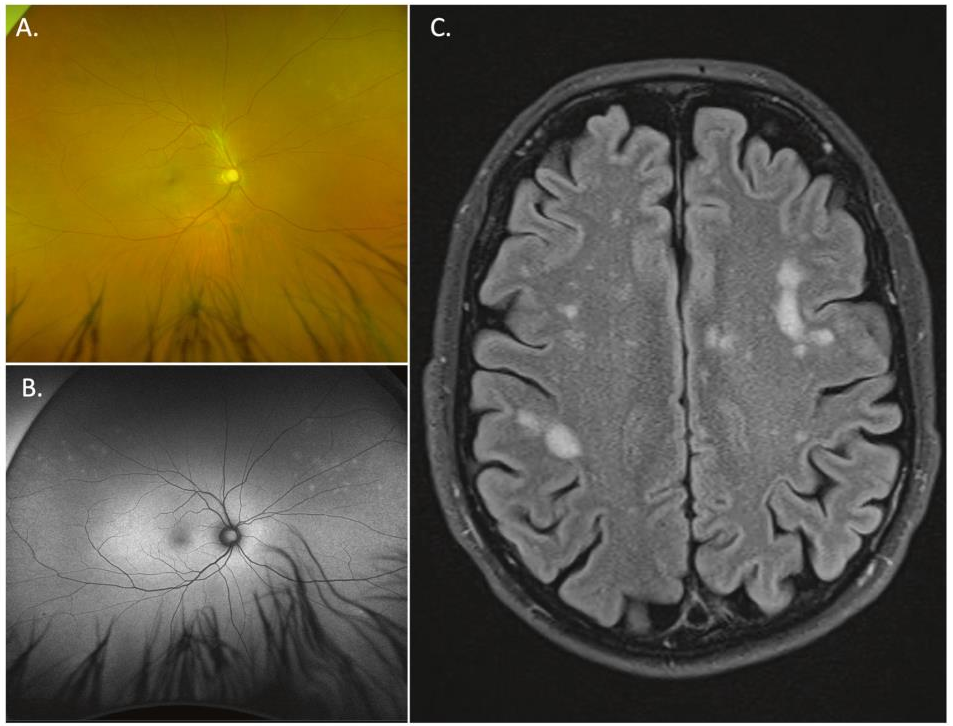


Fig. 11 A case of neurosyphilis with ocular syphilis. The patient initially presented with blurred vision in his right eye, VA 6/15 and findings of anterior uveitis. **A** fundal examination demonstrated focal periphlebitis. **B** Widefield fundus autofluorescence reveals peripheral hyperautofluorescent flecks which are suspicious of syphilitic posterior uveitis and are easily missed on fundal examination alone. This patient was subsequently diagnosed with ocular syphilis and due to non-specific neurological symptoms had an MRI brain, **C** that revealed multiple, T2/FLAIR hyperintense sub cortical lesions.

(II)

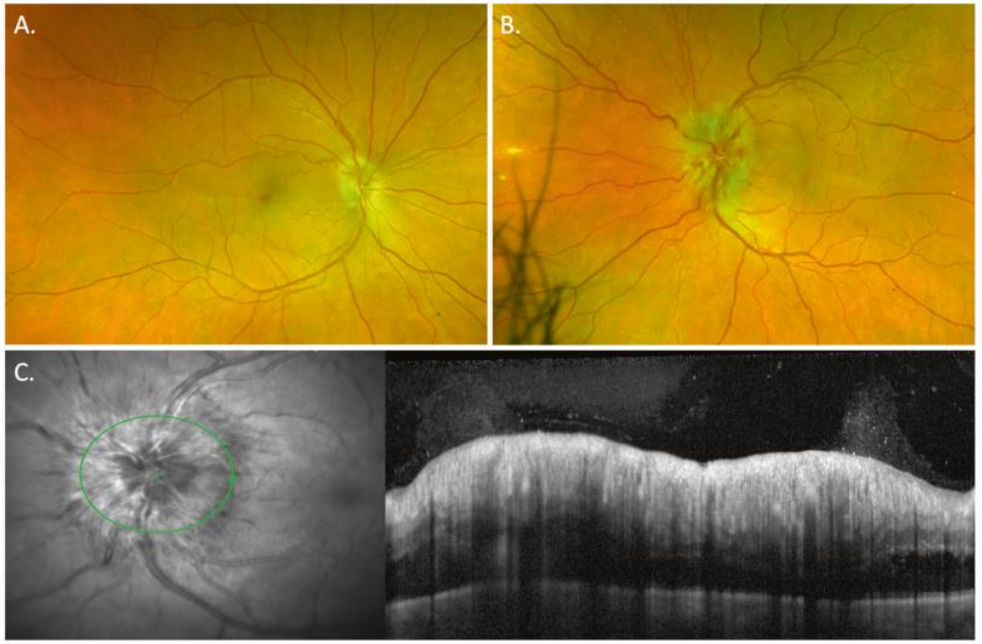


Fig. 8 This patient presented with blurred vision in his left eye following a single dose of intramuscular Benzathine penicillin G. He had been treated by his general practitioner with a single dose of systemic antibiotic after incidental findings of positive result on syphilis serology. The single antibiotic dose undertreated treponema spirochaetes, presumably located at his optic nerve head and in the absence of systemic steroid lead to paradoxical worsening and development of an optic neuritis (**B**), note that the right eye was unaffected (**A**). Spectral domain OCT of the optic nerve **C** shows marked RNFL oedema/swelling and an associated vitritis.

11. Reid GA, Halmágyi GM, Whyte C, McCluskey PJ. Ocular vs Neurosyphilis. Are they the same? Investigation and Management. Eye. (Lond). 2024. (In press).

Nothing works in rare Traumatic ON

Incidence of TON in UK: 1.005/million population/year

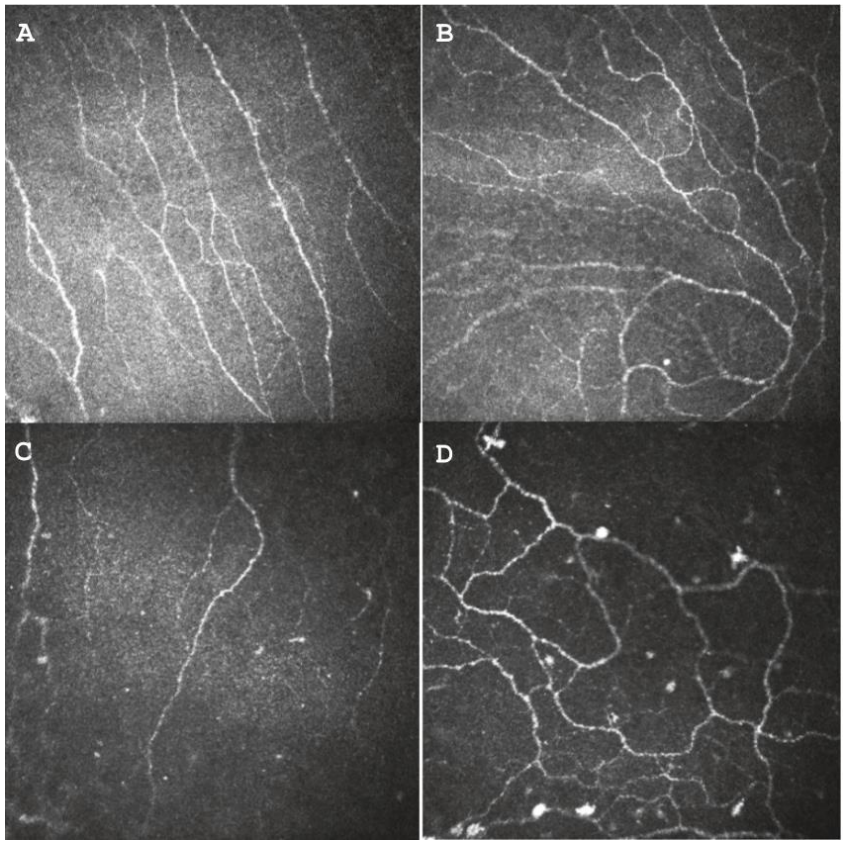
Table 3. Characteristics of included patients.

First Author, year	Country	Male/ female	Age (years)	Inclusion Criteria	Exclusion Criteria	Patients recruited	Patients included in the analysis	Length of Follow-Up
Kashkouli, 2017 [32, 33]	Iran	88 male 12 female	53% <25	Indirect TON; <3 weeks prior	Other injuries affecting visual function; reduced consciousness level; glaucoma; diabetic neuropathy	117 (EPO, 85; Obs, 16; IVMP 16)	100 (EPO, 69; Obs, 15; IVMP 16)	Protocol > 3 months; mean 208 days
Razeghinejad, 2010 [34]	Iran	26 male 1 female	LD 21 ± 8.9; Pl 25 ± 6.1	Indirect TON < 6 days prior	Direct TON; ON avulsion; open globe/ orbital injury; orbital/optic canal fractures	32 (LD 20, Pl 30)	26 (LD 16, Pl 10)	LD 17.5 ± 6.6 months; Pl 14.3 ± 5.3 months
Entezari, 2007 [35]	Iran	31 male	Pl 29 ± 10.2; IVMP 30.2 ± 10.6	Indirect TON < 7 days prior	Direct TON; open globe injury; other cause of reduced vision; optic nerve decompression surgery; orbital fractures	31 (IVMP 16; Pl 15)	31 (IVMP 16; Pl 15)	3 months

EPO erythropoietin, *IVMP* intravenous methylprednisolone, *LD* levodopa-carbidopa combination, Obs observation, *Pl* placebo, *TON* traumatic optic neuropathy.

12. Blanch RJ, Joseph IJ, Cockerham K. Traumatic optic neuropathy management: a systematic review. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03129-7.

Corneal neuropathic pain (CNP): *in vivo* confocal microscopy & novel Rx

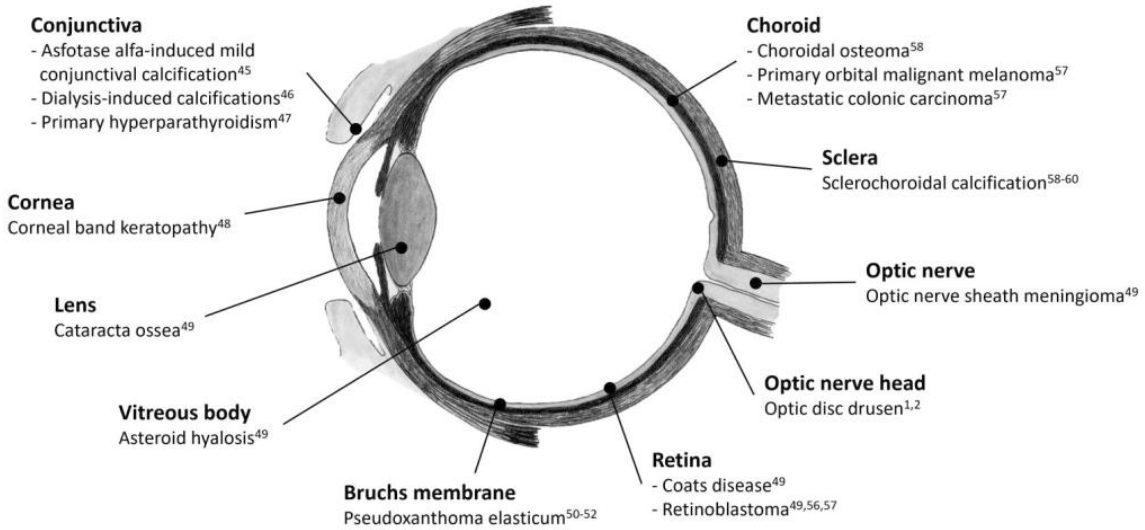


13. Watson SL, Le DTM. Corneal neuropathic pain: a review to inform clinical practice. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03060-x.

Topical Rx in peripheral CNP:

- Corticosteroids
- Autologous serum
- Lacosamide
- Low dose naltrexone
- Enkephalin modulators
- Libvatrep
- Topical nerve growth factor

Calcification in rare genetic eye disease. Decalcification as Rx in ODD ?



- Chelation (EDTA)
- Early genetic gene theraphy
- Surgical

Treatment strategy	Number of patients	Procedure/intervention	Outcome
	Case report/1 case [68]	Vitrectomy and surgical removal	Without success. Variable consistency and hardness of ODD
Surgical	Case report/1 case [69]	Surgical approach	Without success. Nerve tissue and vessels passing through the ODD
	6 patients [70]	Radial optic neurotomy to lower pressure in the optic nerve	2 patients unchanged. 4 patients improved visual field defects.
Lowering the intraocular pressure	236 normotensive eyes [71]		No association between intraocular pressure and visual field defects
Vasoactive therapy	Anecdotal reports [2]	Pentoxifylline	No clinical studies yet performed

14. Bentin JM, Heegaard S, Jørgensen NR, Grahnemo L, Hamann S. Optic disc drusen: Dystrophic calcification, a potential target for treatment. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03138-6.

Breaking news on CRAO

Nonarteritic (embolic):

- Incidence CRAO USA: 1.9
- Incidence CRAO Japan 5.84

Arteritic CRAO (very rare):

- GCA
- Susac
- SLE
- Granulomatosis with polyangiitis

Embolic:

- Thrombolysis
  - Experimental: full recovery if treated within **1.5h**
  - Clinical: 4.5h window
  - THEIA trial was safe but negative (unpublished)
  - 2 Trials are ongoing

Arteritic:

- Corticosteroids
- Steroid saving immunosuppresion
- IVIG
- PLEX

15. Chen C, Singh G, Madike R, Cugati S. Central retinal artery occlusion: a stroke of the eye. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03029-w.

Cutting edge imaging updated

- OCT (pRNFL, mGCIPL, mINL)
- ONH volume, EDI, AI
- OCTA
- Swept Source
- En face
- Near infrared reflectance (NIR)
- BONSAI group (AI)

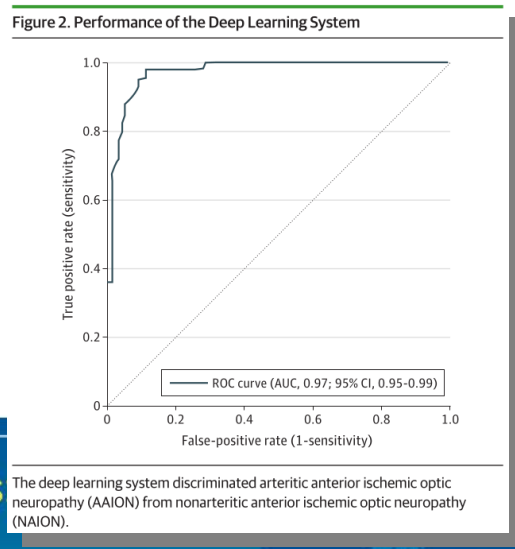
JAMA Ophthalmol. 2024 Oct 17. doi: 10.1001/jamaophthalmol.2024.4269. Online ahead of print.

Deep Learning to Discriminate Arteritic From Nonarteritic Ischemic Optic Neuropathy on Color Images

Ayse Gungor [1 2], Raymond P Najjar [3 4 5], Steffen Hamann [6 7], Zhiqun Tang [3], Wolf A Lagrèze [8], Riccardo Sadun [9], Kanchalika Sathianvichitr [3], Marc J Dinkin [10 11], Cristiano Oliveira [10 11], Anfei Li [11], Federico Sadun [9], Andrew R Carey [12 13], Walid Bouthour [14 15 16], Mung Yan Lin [14 15 16], Jing-Liang Loo [3 4 5], Neil R Miller [12 13 17], Nancy J Newman [14 15 16], Valérie Biousse [14 15 16], Dan Milea [2 3 4 18]; BONSAI Group

Collaborators, Affiliations + expand

PMID: 39418057 DOI: 10.1001/jamaophthalmol.2024.4269



16. Shin HJ, Costello F. Imaging the Optic Nerve with Optical Coherence Tomography. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03165-3.

Breaking news on MRI & OCT

Table 1. Common reasons for choosing computed tomography (CT) and magnetic resonance imaging (MRI) in Neuro-Ophthalmology.

Imaging modality	Best for....	Comments
CT	Visualization of bone	e.g., fracture, hyperostosis, sphenoid wing hypoplasia/aplasia in neurofibromatosis-1, craniosynostosis, paranasal sinus disease, certain clival pathology, bone destruction or erosion
	Observing calcification	e.g., optic disc drusen, craniopharyngioma, meningioma, retinoblastoma, low- or no-flow vascular malformations
	Acute intracranial haemorrhage	e.g., subarachnoid haemorrhage
	Emergencies	e.g., acute stroke, brain abscess, pituitary apoplexy
MRI	Normal anatomy	T1 sequences T1-weighted sequences provide the best visual contrast for paramagnetic contrast agents (e.g. gadolinium-containing compounds).
	Pathology	T2 sequences
	Demonstrating oedema or inflammation	FLAIR (fluid attenuation inversion recovery) e.g., multiple sclerosis
	Demonstrating restricted diffusion	DWI and ADC (diffusion-weighted imaging and apparent diffusion coefficient) e.g., hyperacute stroke, abscesses and cellular tumours DWI is also beneficial for degenerative (e.g., Alzheimer dementia) and demyelinating (e.g., multiple sclerosis) conditions. DWI helps distinguish hyperintense proteinaceous (e.g. epidermoid) cysts from low-signal fluid-filled (e.g. arachnoid) cysts. ADC pathology appears as decreased signal denoting restricted diffusion.
	Haemorrhage	Gradient echo or susceptibility weighted images (SWI) e.g., vascular malformations, intracerebral haemorrhage, or traumatic brain injury.

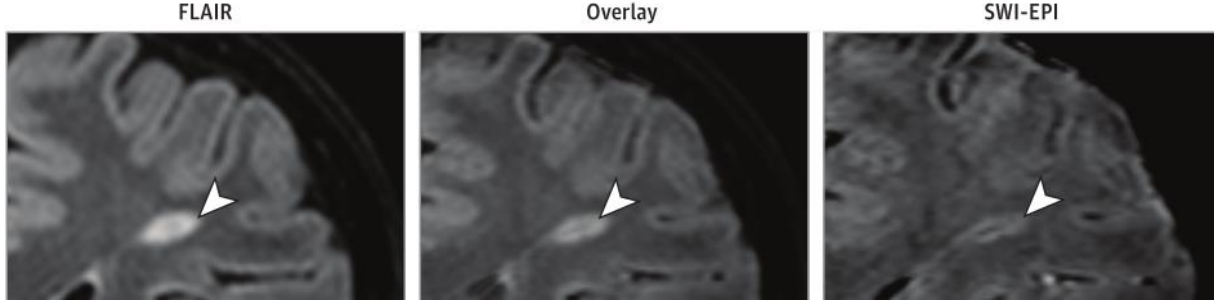
17. Cejvanovic S, Sheikh Z, Hamann S, Subramanian PS. Imaging the brain: diagnosis aided by structural features on neuroimaging studies. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03142-w.

<u>New (unpublished) diagnostic criteria for MS:</u>

- ON as 5th location for DIS (MRI, OCT)
- DIT not needed

<u>Novel MRI signs:</u>

- Paramagnetic rim lesion (PRL)
- Central vein sign (CVS)

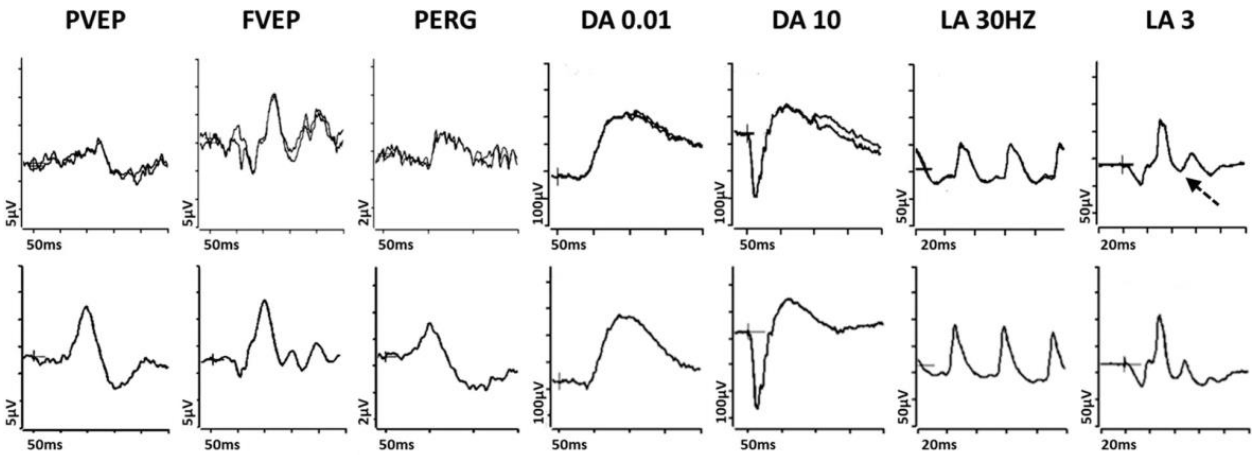


Sinnecker, T et al. JAMA Neurol 2019

VEP/ERG update in rare, novel, genetic disease

- FDXR-associated disease
- NSUN3-variants
- ROSAH syndrome
  - Retinal dystrophy, Optic nerve oedema, Splenome galy, Anhidrosis and Headache
  - mutations in ALPK1 gene

VEP/ERG in ROSAH (top), control (bottom):



18. Calcagni A, Neveu MM, Jurkute N, Robson AG. Electrodiagnostic tests of the visual pathway and applications in neuro-ophthalmology. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03154-6.

Update on mobile Apps

VA:
- Peek Acuity
- AAPOS Vision Screening application
- Eye Chart
- Eye Chart Pro
- Smart Optometry
- Trec Oculista
- K-VA

Near VA:
- Smart Optometry
- K-VA
- NYU Lagone Eye Test
- Sightbook

Contrast sensitivity:
- Peek Acuity
- OdySight (=digital Pelli-Robson)

Stereoacuity:
- Tablet Stereo Test (TST)
- Android STA

Colour vision:
- Ishihara (Android, Eye2-Phone)
- City University
- Gamified ColourSpot test

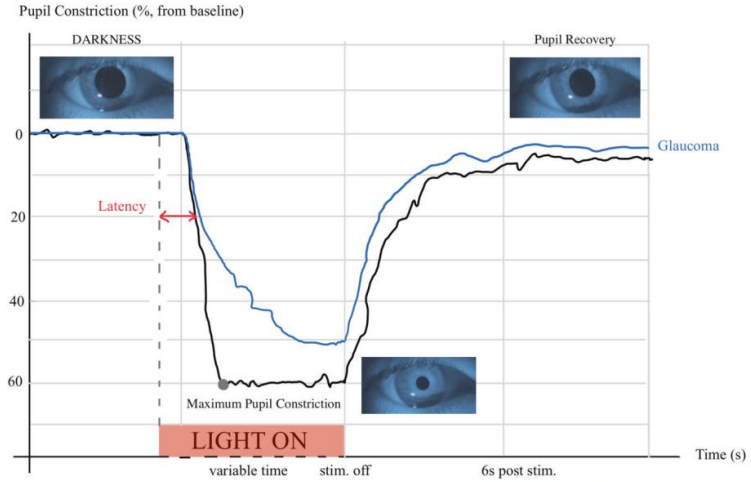
VF:
- Smartphone-based campimetry
- Visual Fields Easy
- Vision Impairment Screening Assessment (VISA)
- Stroke Vision app

19. Bano T, Wolffsohn JS, Sheppard AL. Assessment of visual function using mobile Apps. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03031-2.

Update on pupillometry

- Field revolutionised by melanopsin expressing retinal ganglion cells (mRGCs)
- OPN4 gene identified
- Pupillomtery relevant for 54 rare (and some not so rare) conditions
- Chromatic pupillometry
- mfPOP comparable to mfERG, mfVEP
- Main limitation: reproducibility
- Web-based & open source:
  - MEYE/Web App
  - PupilEXT

- mRGCs are more resistent to neurodegeneration
- Preserved (chromatic) PLR in LHON, ADOA
- Higher PLR threshold for dim blue and high intesity red in RP
- Useful anciallary diagnostic test in limited resou



20. Philibert M, Milea D. Basics, benefits, and pitfalls of pupillometers assessing visual function. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03151-9.

Rare diseases are rare = > need for big data

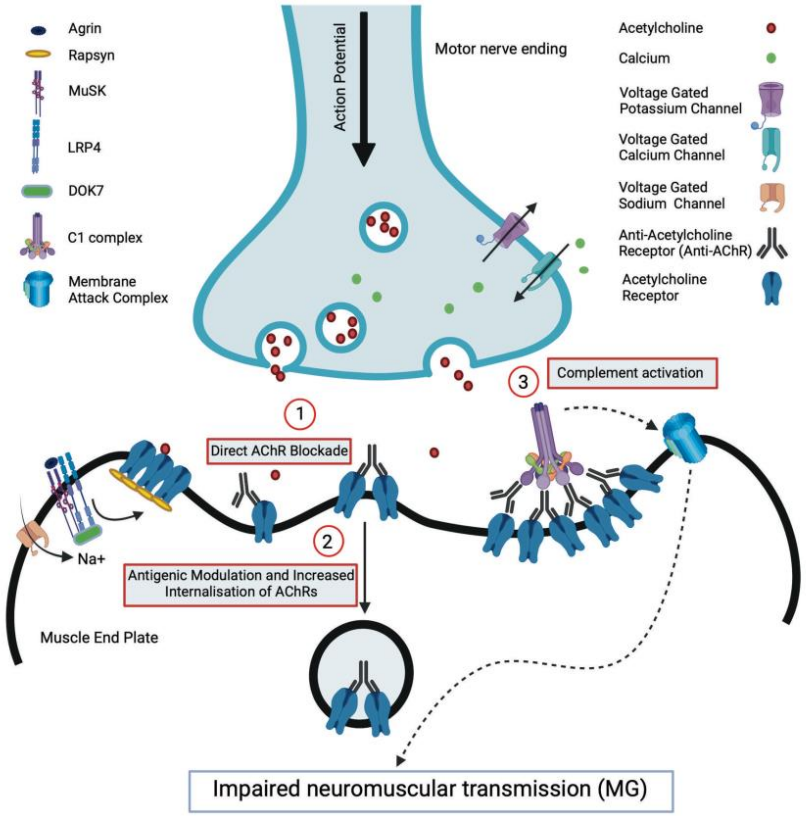
- INSIGHT (UK)
- IRIS (US)
- UIC Neuro-ophthalmology registry (US)
- NODE (Australia)
- MSBase/NMOBase (Australia)
- MGBase (Australia)
- SOURCE (US)
- VEHSS (US)
- UKBB not mentioned in paper, but as member of the Eye and Vision UKBB Consortium and being involved with the Eye/brain re-imaging study, another resource to consider.

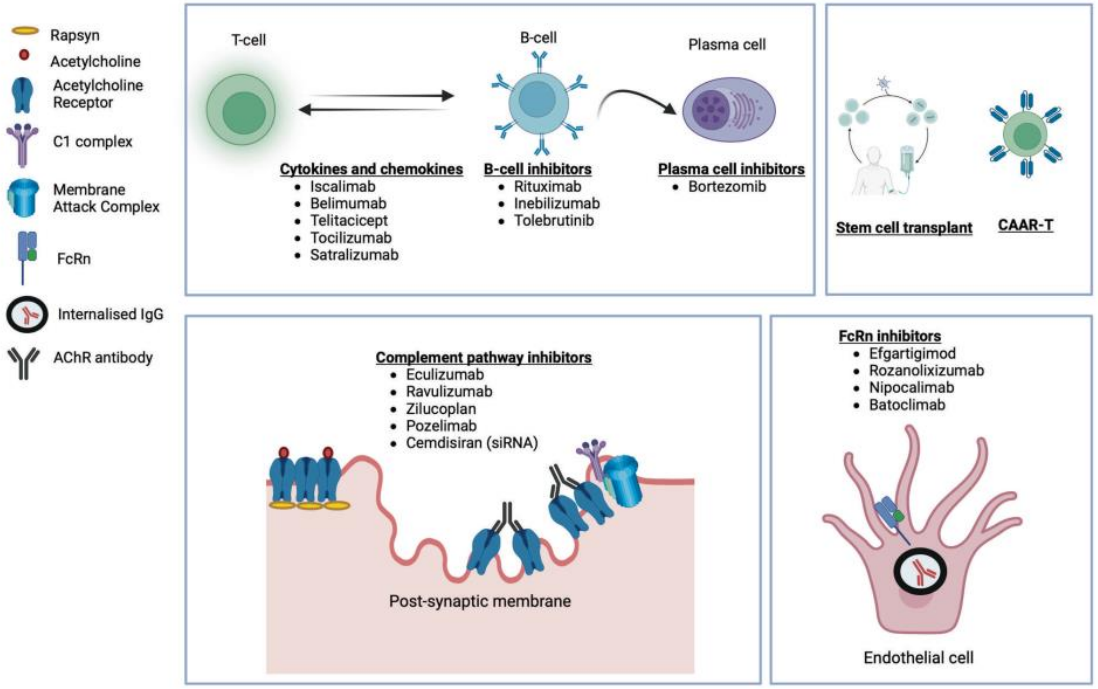
Table 3. Definitions [51] and examples of core information requirements in neuro-ophthalmology research.

Term:	Definition:	Relevance to neuro-ophthalmology:
Core dataset.	A collection of variables that serve as the fundamental components across various initiatives and their corresponding minimal datasets. These variables establish foundational data elements across diverse areas of interest and represent critical components of collection.	Variables pertaining to patient demographics (e.g., age, sex) visual function assessments (e.g., visual acuity, visual fields, colour vision), neurological evaluations (e.g., cranial nerve function), ophthalmic imaging metrics (e.g., OCT findings), patient reported outcomes (e.g., quality of life measures).
Minimal dataset.	An agreed upon set of variables within a specific initiative, tailored to address defined objectives or support collaborative efforts. Typically tailored to meet the specific needs of the initiative and may not be universally applicable.	Variables selected for a clinical trial assessing the effectiveness of a novel neuro-ophthalmic intervention (e.g., treatment regimen, adverse events).
Common data element (CDE) [52]	A standardised, precisely defined question that is paired with a set of specific allowable responses, used systematically across different sites, studies or clinical trials to ensure consistent data collection.	Visual acuity evaluation (e.g., "what is the patient's best corrected visual acuity?"), neurological assessments (e.g., "what is the patient's cerebrospinal fluid opening pressure?").

21. Colman BD, Zhu Z, Qi Z, van der Walt A. From real world data to real world evidence to improve outcomes in neuro-ophthalmology. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03160-8.

Breaking news in (rare ocular) MG





22. Jacob S. Treating myasthenia gravis beyond the eye clinic. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03133-x.

Novel trials in GCA

Aproved:

- Tocilizumab

Ongoing:

- Abatacept (targets T-cells)
- Secukinumab (targets Th17 singallying pathways)

GCA PMR spectrum disease?

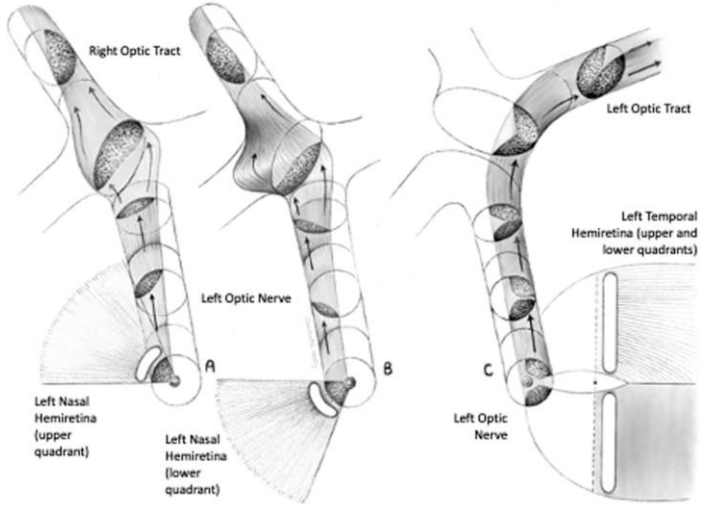
THE GCA SPECTRUM: FUTURE PROSPECTS

The rheumatology field has recently attempted to reconcile these two apparently conflicting perspectives—the academic concept of a continuous spectrum, combined with the clinical drive to stratify patients according to level of need for care—by creating a new umbrella term of "GCA PMR spectrum diseases" [107]. It is hoped that this will improve granularity and thoroughness of clinical characterisation of patients, and discourage extrapolation of historic evidence from one small part of the spectrum to another part.

23. Khalique MI, Arjunan M, Wood S, Mackie SL. The spectrum of giant cell arteritis through a rheumatology lens. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03153-7.

Updated « wiring »

Old “wiring”



Proposed new “wiring”

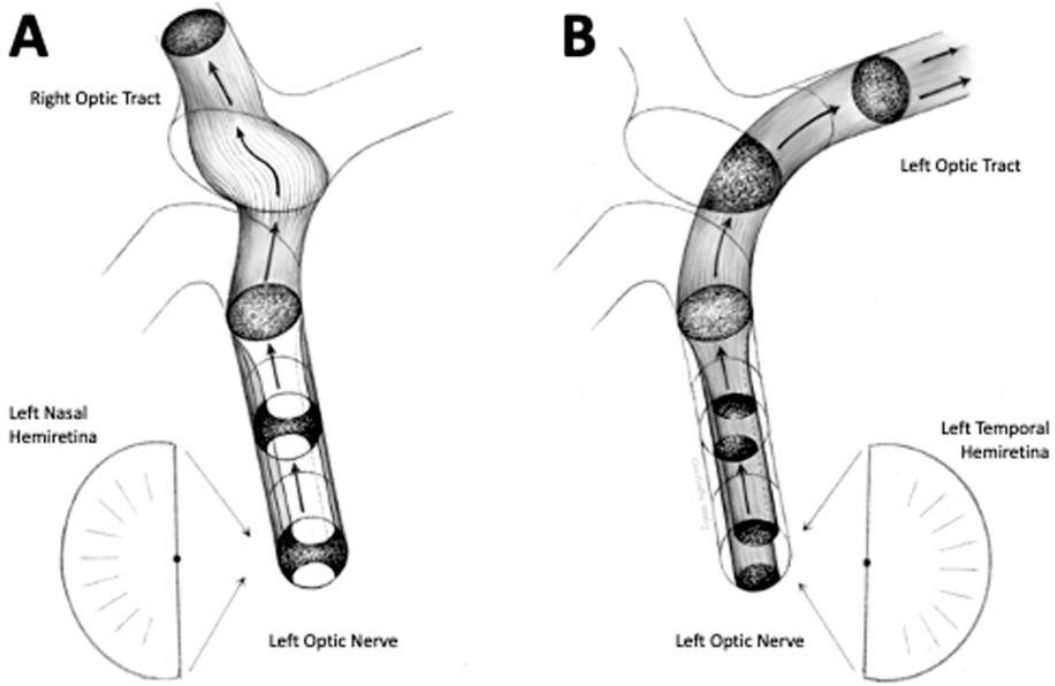
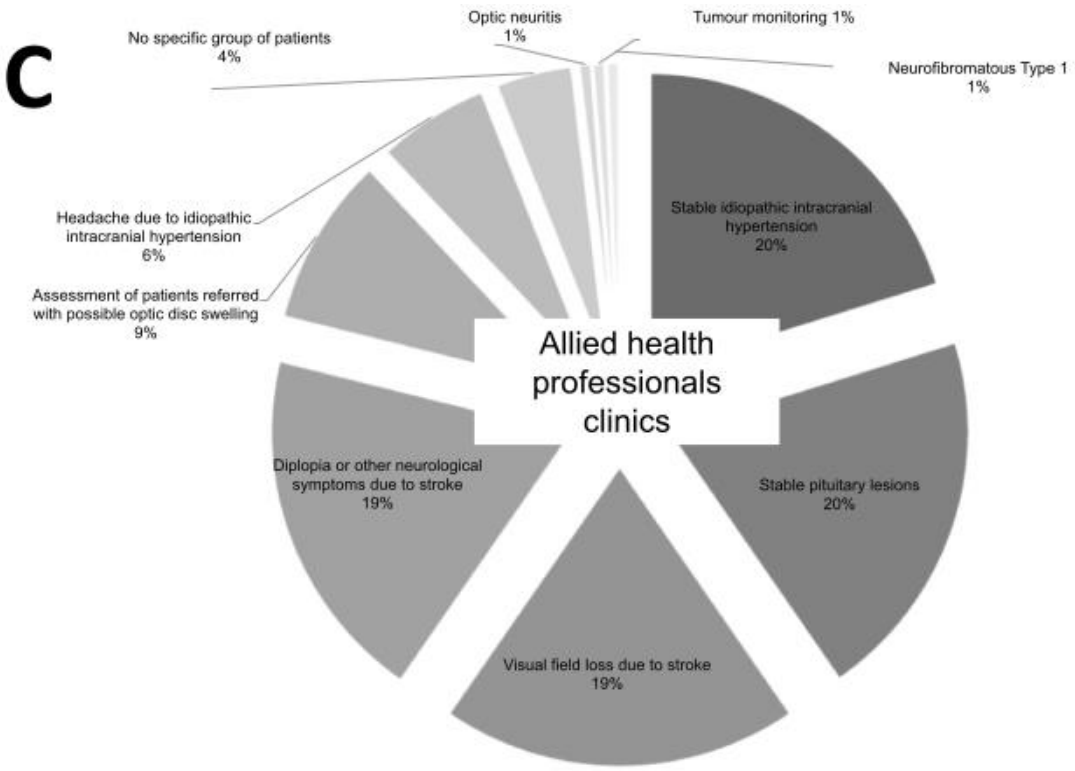
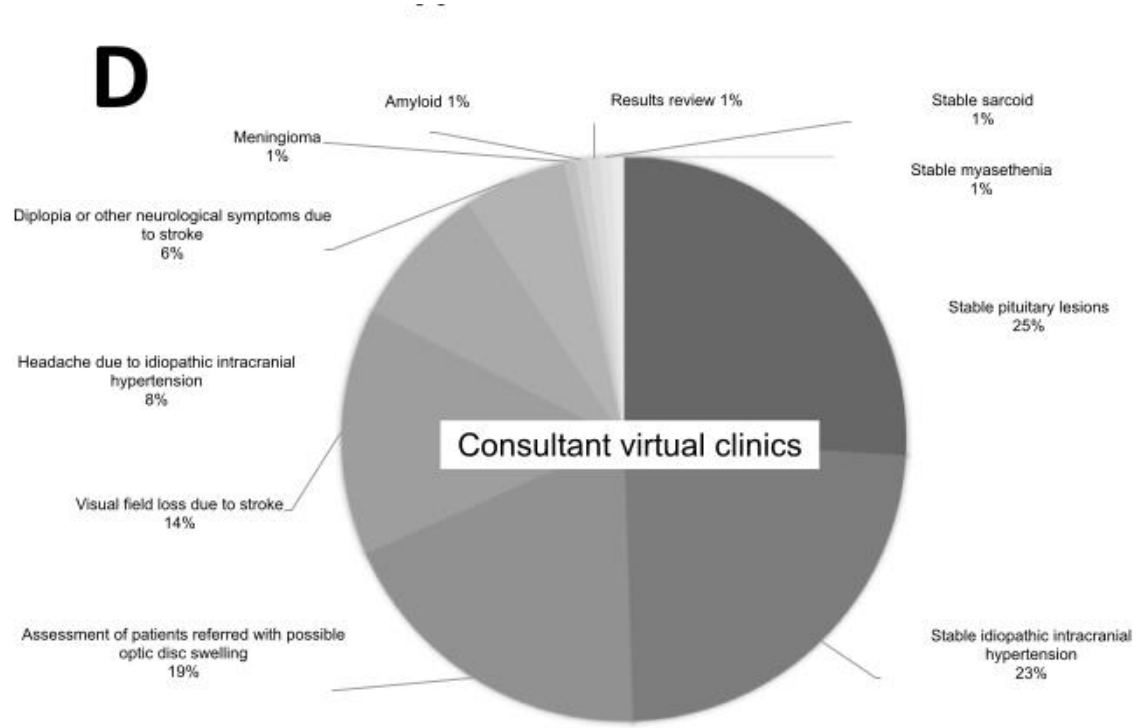


Fig. 8 **Proposed revision of nerve fibre anatomy in the human optic nerve and chiasm.** Fibres arising from the temporal retina are arranged in two bundles separated by fibres arising from the nasal retina (see Fig. 6). As they travel posteriorly in the nerve, all fibres gradually mingle with each other so that they are intermingled by the time they reach the chiasm. **A** Fibres from the nasal retina then travel in parallel along the ‘cross-bar’ of the chiasm to reach the contralateral optic tract. **B** fibres from the temporal retina pass directly backwards to the ipsilateral optic tract.

24. Pawar PR, Booth J, Neely A, McIlwaine G, Lueck CJ. the human optic nerve and chiasm: what do we rea https://doi.org/10.1038/s41433-024-03137-7.

Novel clinics and novel workforce





25. Mollan SP, Menon V, Cunningham A, Plant GT, Bennetto L, Wong SH, Dayan M. Neuro-ophthalmology in the United Kingdom: providing a sustainable, safe and high-quality service for the future. Eye. (Lond). 2024. https://doi.org/10.1038/s41433-024-03141-x.

Madrid 2024

21st November
22nd November

Thank you

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