

# The epidemiology of optic neuritis

2<sup>nd</sup> Africa Mena Brain Week  
20<sup>th</sup> – 25<sup>th</sup> February 2024  
Demnat, Morocco  
axel petzold

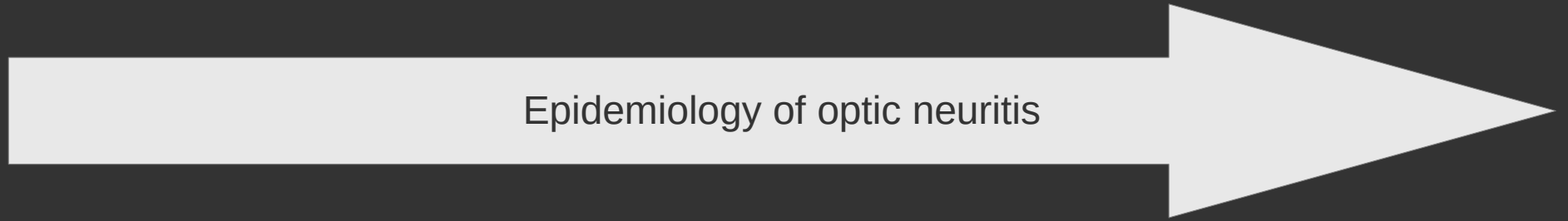
# Disclosures

NIHR UK, UCSF  
Heidelberg Academy  
Novartis, Roche, VUmc  
Stichting MS Research NL

# Background

“The epidemiology of optic neuritis (ON) has been studied less carefully than the epidemiology of multiple sclerosis (MS). The association of ON with many other diseases poses one of several challenges for inclusion of the ON as a 5<sup>th</sup> location in consensus diagnostic criteria for MS.”

# To be covered



UK

World  
literature  
review

World  
ICON  
survey

# Methods - UK

- Data on 75 million patient-years of follow up *from*
- 11,086,469 UK patients *from*
- The Health Improvement Network (THIN) *for*
- A retrospective cross-sectional and population cohort study for the association of optic neuritis multiple sclerosis (MS) and 66 other immune-mediated inflammatory disease

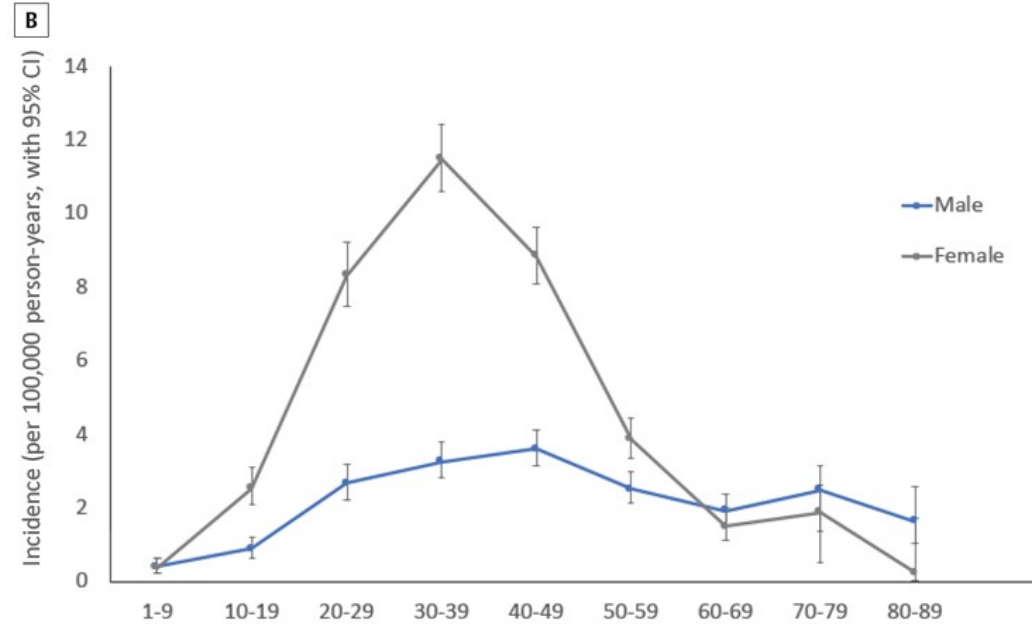
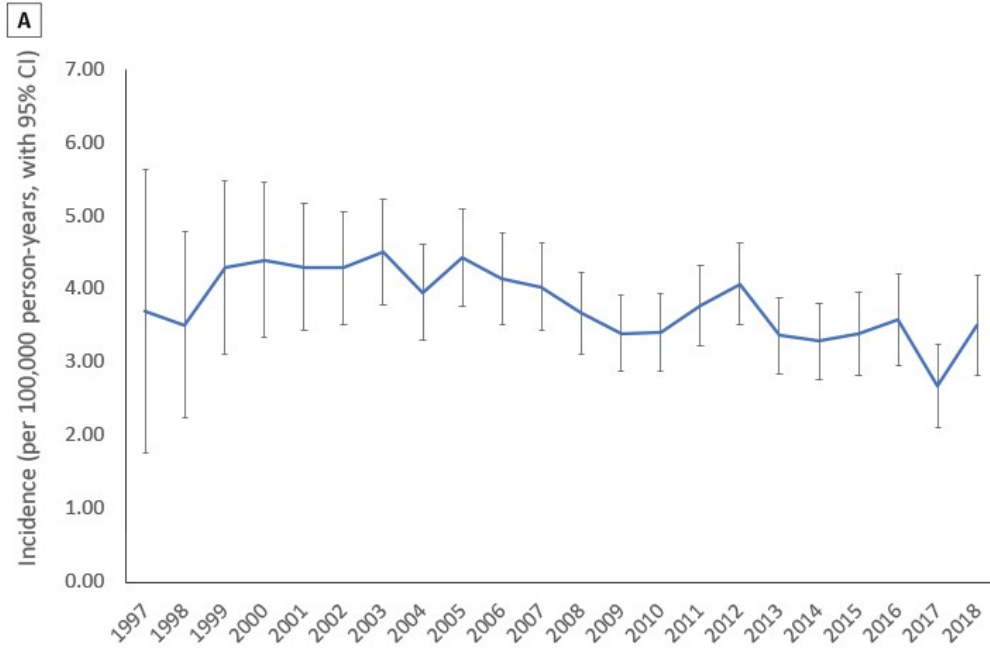
# Cohort description

	Characteristic at baseline	ON % (n)	No ON % (n)	Single variable IRR (95% CI), p value	Adjusted IRR (95% CI), p value
	Total, % (n)	2826	10,934,685		
<b>Gender</b>	Female, % (n)	69.4 (1,962)	50.9 (5,569,320)	2.26 (2.09-2.45), p<0.001	2.26 (2.08-2.45), p<0.001
<b>Age group at cohort entry</b>	1-10 years	4.3 (121)	19.9 (2,070,338)	1	1
	11-20 years	10.1 (284)	9.9 (1,081,405)	4.56 (3.69-5.64), p<0.001	4.53 (3.65-5.63), p<0.001
	21-30 years	24.9 (704)	18.2 (1,984,337)	7.81 (6.44-9.47), p<0.001	6.80 (5.50-8.40), p<0.001
	31-40 years	28.2 (796)	16.6 (1,814,484)	6.98 (5.77-8.45), p<0.001	6.04 (4.89-7.46), p<0.001
	41-50 years	16.7 (473)	12.1 (1,324,681)	4.84 (3.97-5.91), p<0.001	4.15 (3.33-5.16), p<0.001
	51-60 years	8.3 (235)	9.6 (1,045,254)	2.92 (2.35-3.64), p<0.001	2.45 (1.93-3.10), p<0.001
	61-70 years	4.4 (125)	7.0 (765,334)	2.21 (1.72-2.83), p<0.001	1.82 (1.39-2.38), p<0.001
	71-80 years	2.4 (67)	4.8 (526,666)	2.08 (1.55-2.81), p<0.001	1.69 (1.24-2.31), p<0.001
	81-90 years	0.7 (21)	2.5 (270,755)	2.11 (1.33-3.36), p=0.002	1.68 (1.05-2.69), p<0.001
	91-100 years	0	0.5 (50,687)		
	101+ years	0	0.0 (744)		
<b>Nation</b>	England	68.8 (1,943)	71.3 (7,790,740)	1	1
	Scotland	16.0 (452)	14.1(1,538,041)	1.22 (1.10-1.35), p<0.001	1.19 (1.08-1.32), p=0.001
	Wales	10.1 (285)	11.0 (1,203,405)	0.91 (0.81-1.04), p=0.158	0.91 (0.80-1.03), p=0.147
	Northern Ireland	5.2 (146)	3.4 (402,499)	1.07 (0.90-1.26), p=0.437	1.08 (0.91-1.28), p=0.376

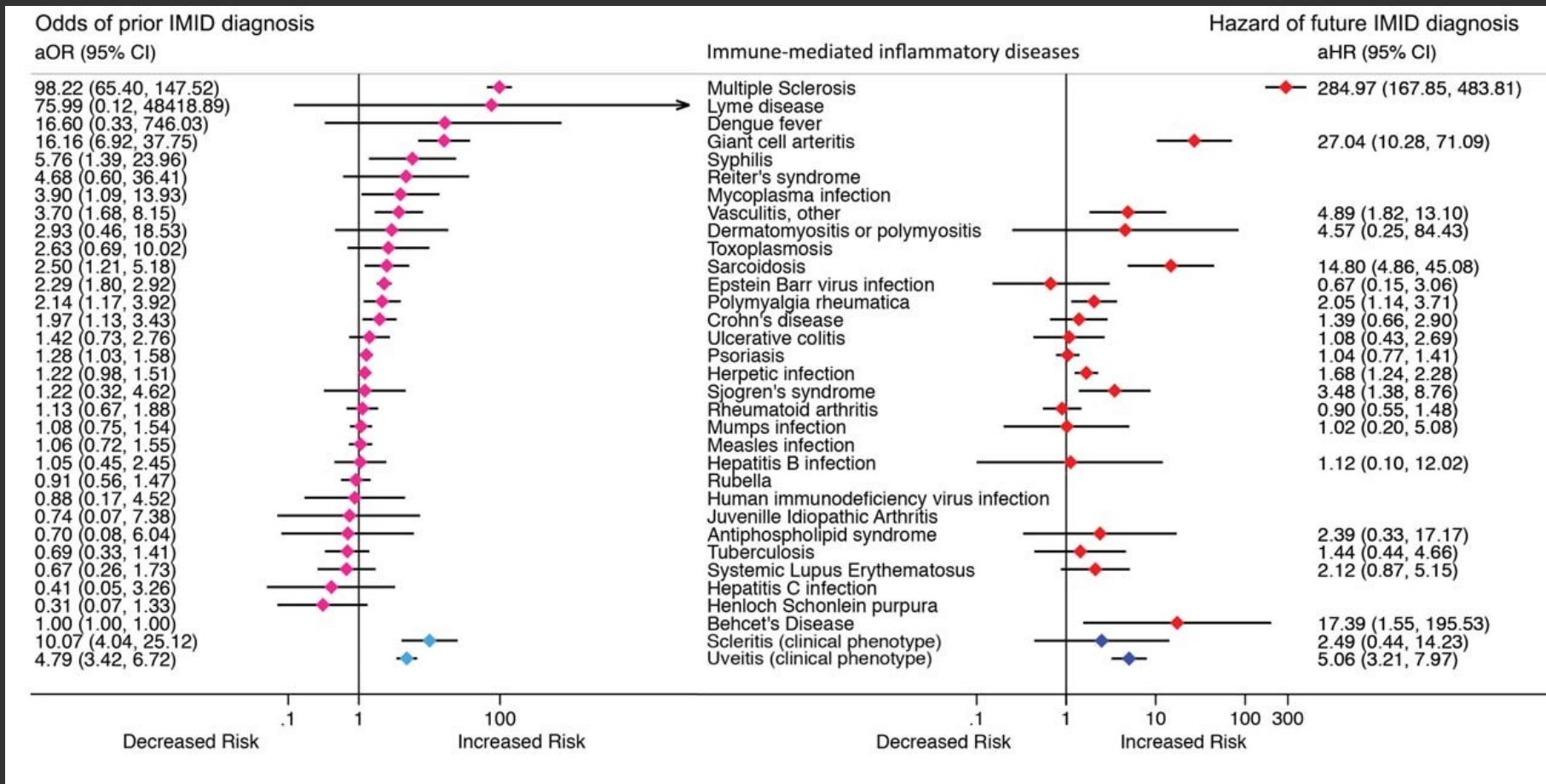
# Incidence of ON

22 year observation period

Age



# ON disease associations





# Conclusion from UK data

- Incidence of ON stable over past 22 years in UK
- Primary differential diagnosis: MS
- Cumulative MS-ON is outnumbered by other diseases!
- Relevant for future revision of consensus MS diagnostic criteria, to minimise misdiagnosis

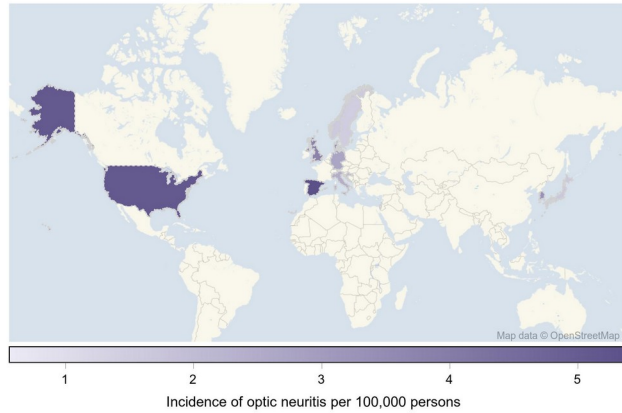
# World wide view on ON

**Table 2.** Incidence of undifferentiated optic neuritis cases from different countries listed from West to East starting from the United States of America.

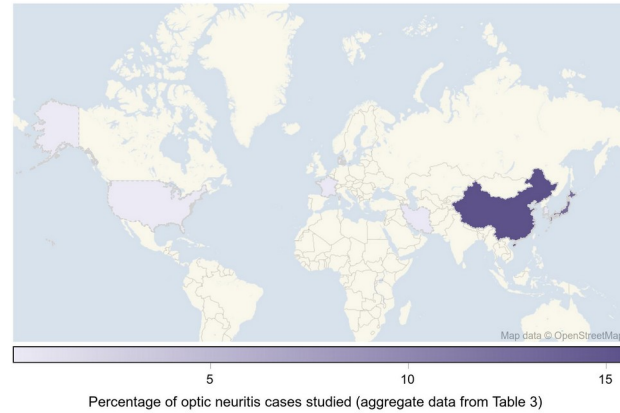
Country	Study period	At risk population	Ethnic distribution of at risk population	Annual incidence in adults
USA – Hawaii <sup>23</sup>	1961–1970	516,253	48.2% Oriental, 21.8% Hawaiian-mixed, 20.9% WC, 9.0% WC-Oriental	0.7 per 100,000 population/year
USA – Rochester, Minnesota <sup>24</sup>	1945–1954	30,000	NR	5.0 per 100,000 population/year
USA – Rochester, Minnesota <sup>25</sup>	1935–1964	NR	NR	3.5 per 100,000 population/year
USA – Olmsted County, Minnesota <sup>26</sup>	1985–1991	718,529	NR	5.1 per 100,000 population/year
USA – Olmsted County, Minnesota <sup>27</sup>	2000–2018	NR	86% WC	4.0 per 100,000 population/year
UK – Carlisle <sup>28</sup>	1955–1961	71,101	NR	1.4 per 100,000 population/year *
UK <sup>29</sup>	1995–2019	10,937,511	86.9% WC, 5.3% South Asian, 3.6% Black, 2.7% Mixed, 1.4% Other †	4.46 per 100,000 person-years
Spain – Eixample area of Barcelona <sup>30</sup>	2008–2012	nearly 300,000	NR	5.36 per 100,000 person-years
Norway – Troms and Finnmark <sup>31</sup>	1972–1984	225,073	88.4% Norwegian, 11.6% Lapp	1.55 per 100,000 population/year
Germany – Hanover <sup>32</sup>	1976–1977	555,589	NR	2.69 per 100,000 population/year
Italy – Sardinia <sup>33</sup>	1977–1986	336,651	NR	2.40 per 100,000 population/year
Denmark – Region of Southern Denmark <sup>34</sup>	2014–2016	993,563	NR	3.28 per 100,000 person-years
Sweden – Stockholm County <sup>35</sup>	1990–1995	1,669,840	89.4% Nordic, 3.5% Asia, 1.3% Southern Europe, 0.9% Africa, 4.9% Other Countries	1.46 per 100,000 person-years
Croatia – Rijeka County <sup>36</sup>	1977–2001	NR	NR	2.18 per 100,000 population/year
Croatia – Split-Dalmatia County <sup>37</sup>	1985–2001	463,676	NR	1.6 per 100,000 population/year
Finland <sup>38</sup>	1967–1971	4,708,546	NR	0.94 per 100,000 population/year
Finland – Uusimaa <sup>39</sup>	1970–1978	1,111,067	NR	2.2 per 100,000 population/year
Finland – Vaasa <sup>39</sup>	1970–1978	428,122	NR	2.5 per 100,000 population/year
Finland – Helsinki and Uusimaa <sup>40</sup>	2008–2012	1,530,000	NR	3.0 per 100,000 population/year
Israel <sup>41</sup>	1955–1964	1,858,841	35.9% Israeli, 35.8% European, 28.4% Afro-Asian	0.56 per 100,000 population/year
Singapore <sup>42</sup>	2002–2004	3,487,000	76.0% Chinese, 13.7% Malay, 8.4% Indian, 1.9% Other	0.83 per 100,000 population/year
Taiwan <sup>43</sup>	2001–2004	191,761	NR	33 per 100,000 population/year
South Korea <sup>44</sup>	2012–2016	37,781,220	NR	3.29 per 100,000 population/year
South Korea <sup>45</sup>	2011–2017	50,000,000	NR	2.21 per 100,000 population/year
Japan <sup>46</sup>	1992–1993	NR	NR	1.62 per 100,000 population/year

# World: from literature

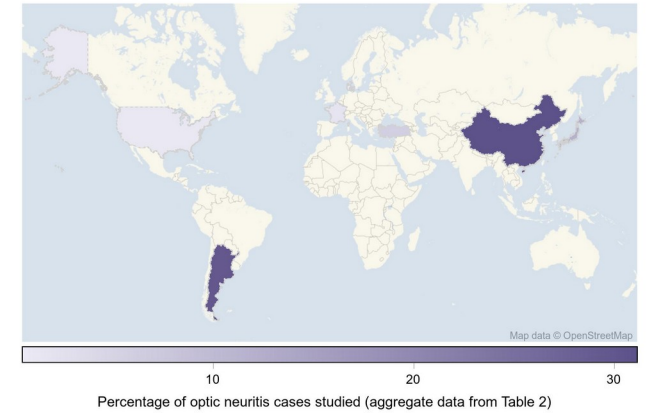
Incidence of optic neuritis



MOG seropositive optic neuritis



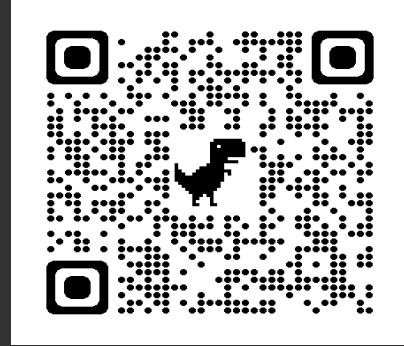
AQP4 seropositive optic neuritis



Tables 2 & 3 in reference:  
Simon Hickmann *et al.* Neuro-ophthalmology 2021

# World: ICON

- ICON 2022 Diagnostic Criteria for Optic Neuritis:  
ICON study group The Lancet Neurology 2022  
doi:10.1016/s1474-4422(22)00200-9  
UCL library: translated to 116 languages  
URL: <https://discovery.ucl.ac.uk/id/eprint/10156457/>

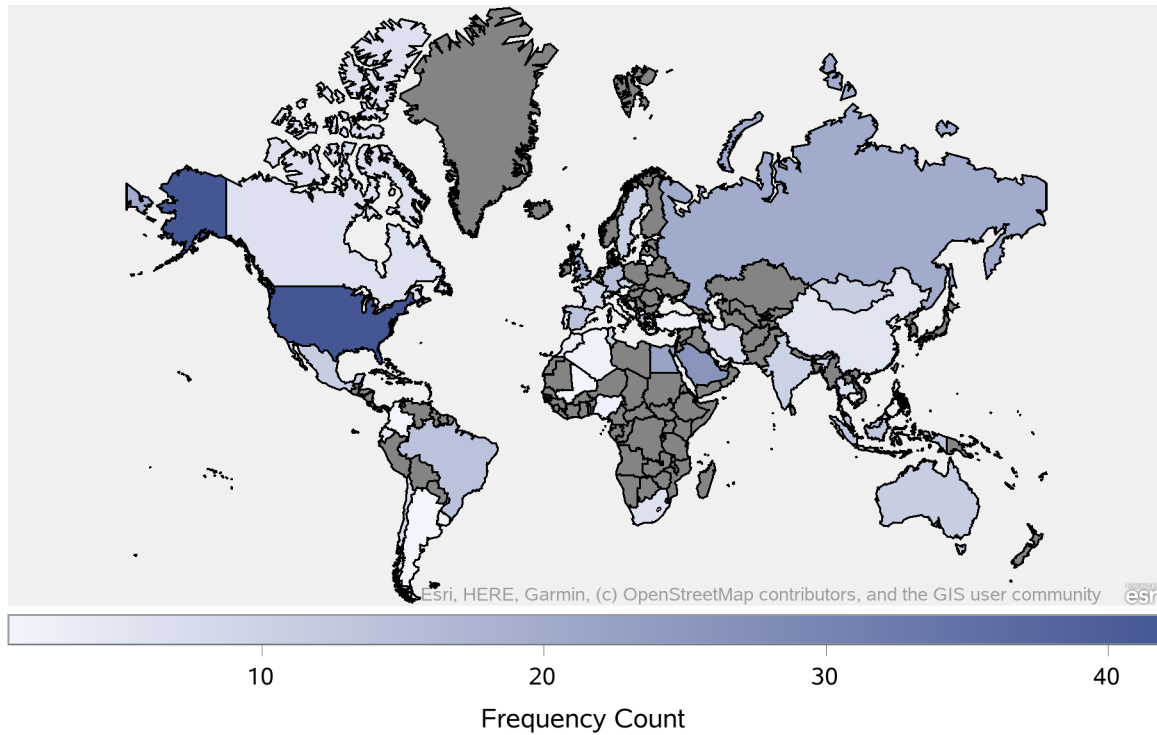


- ICON survey  
NOV-2023 to DEC-2024 still ongoing  
please participate  
best from smart-phone: QR code



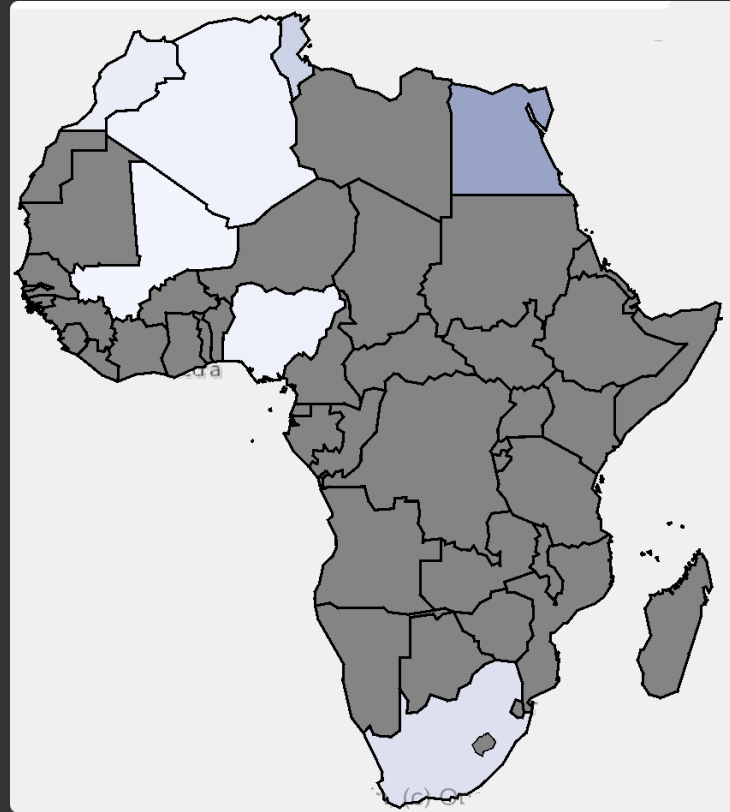
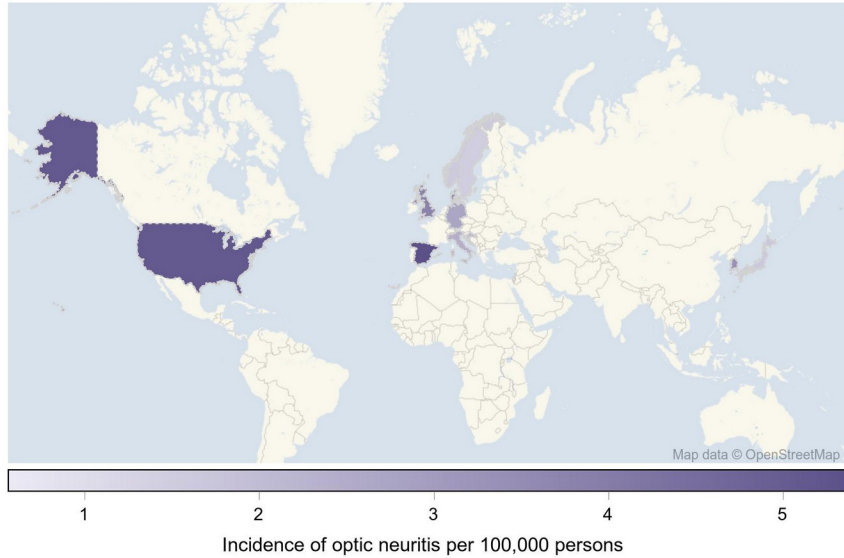
# World: ICON

21-JAN-2024: 461 cases  
ICON link: <https://forms.gle/5jVBt5WFHCdX9Xvj8>



# ON epidemiology in Africa

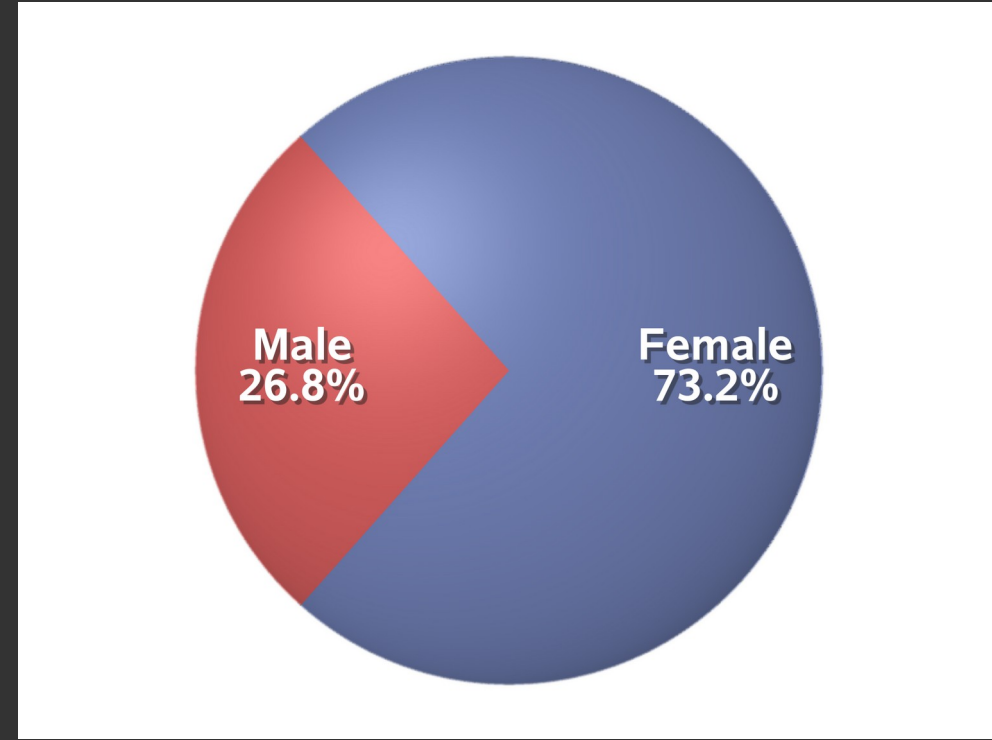
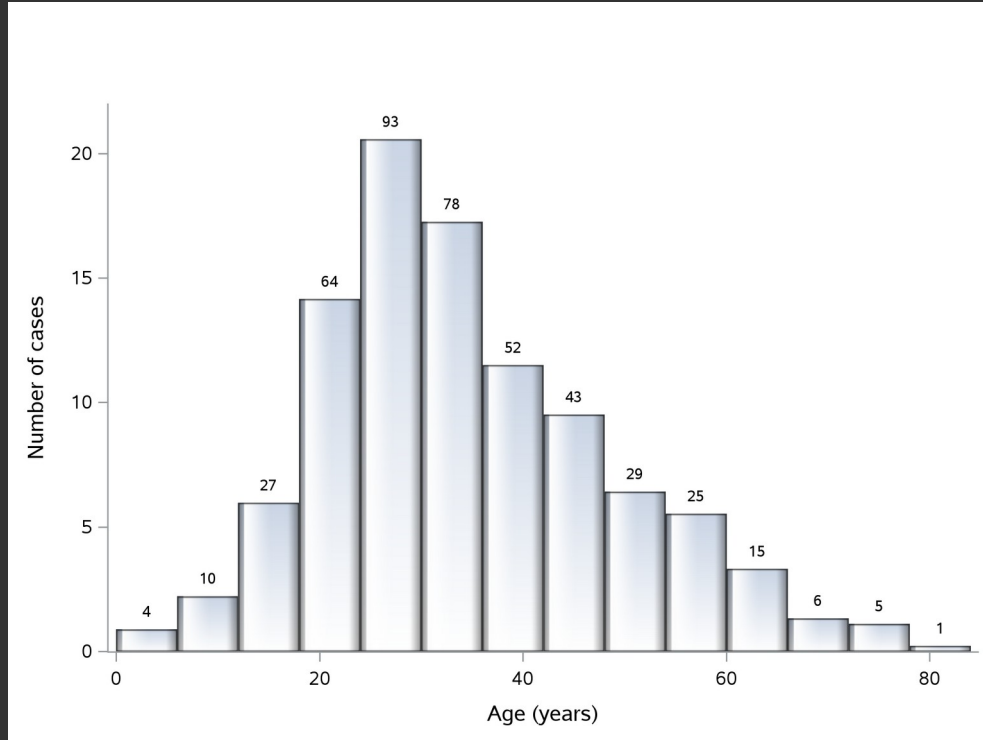
Incidence of optic neuritis



From literature  
Simon Hickman *et al.* 2021

ICON survey (ongoing)

# ON demographics world wide



ICON survey (ongoing)

# Conclusion



- Incidence of optic neuritis (ON) stable at 3.74 per 100,000 person-years
- Multiple Sclerosis most common association with ON in studies biased to Caucasian populations
- World wide ON aetiology more heterogeneous
- Need for epidemiological data on ON from Africa
- ICON survey aims to bridge this gap in the literature



fofo Zikhomo Me Yega Asante Dalu  
Na gode Ngiyabonga  
Ahinya  
Motsu mi  
Ndolivhuwa  
Enkosi Ndinchi Kanimambo Weebale  
Dankie Melesi Aika Ti pagi da  
E dupe Openo  
Akpe  
Foo Barka Djerdjef Kea leboga Nlonlo  
Ndatenda Urakoze  
Medaase  
Theguo A ni che  
Kea leboha  
Mahadsanid Ashe

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