



Genomics to Transform Glaucoma Care

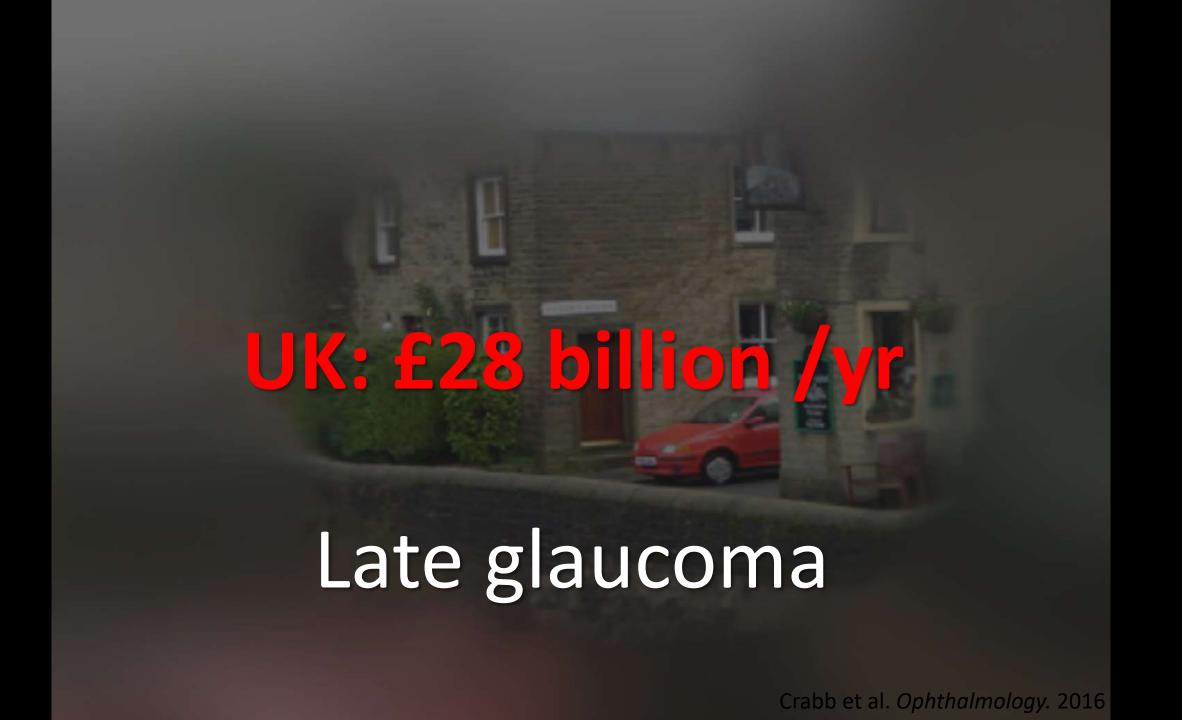
Anthony Khawaja

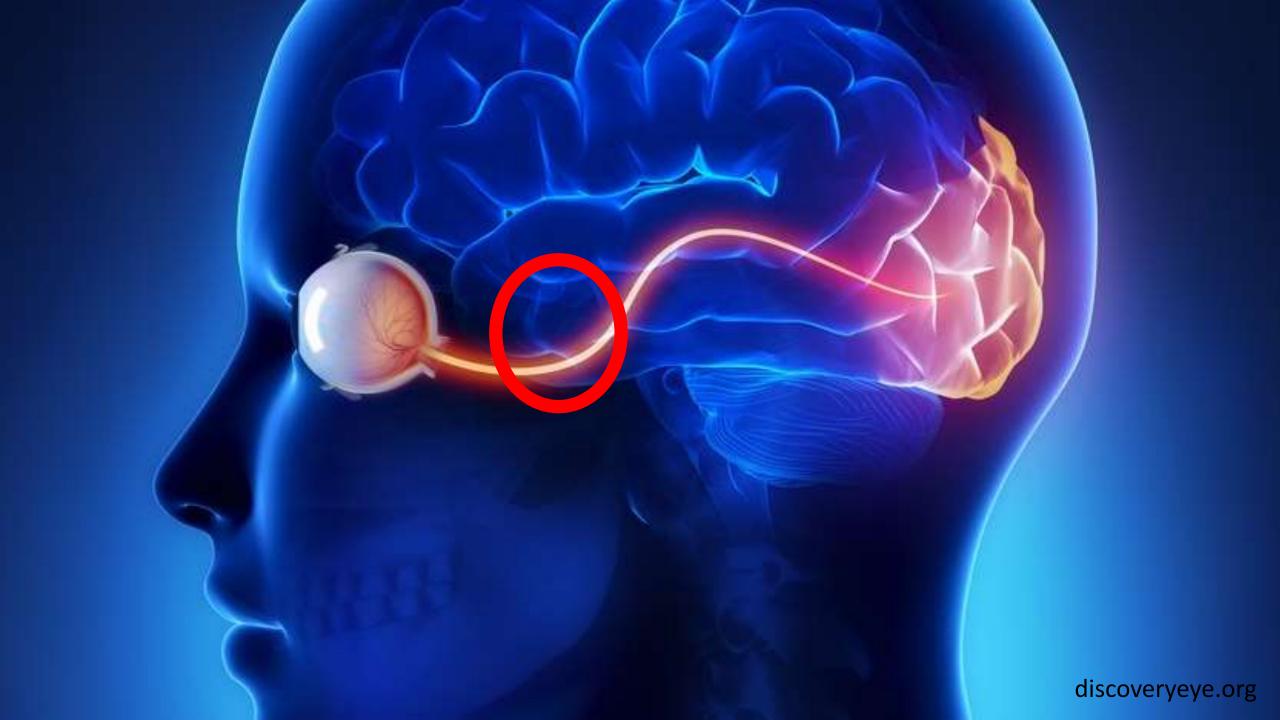
Honorary Consultant Ophthalmologist & Professor of Ophthalmology

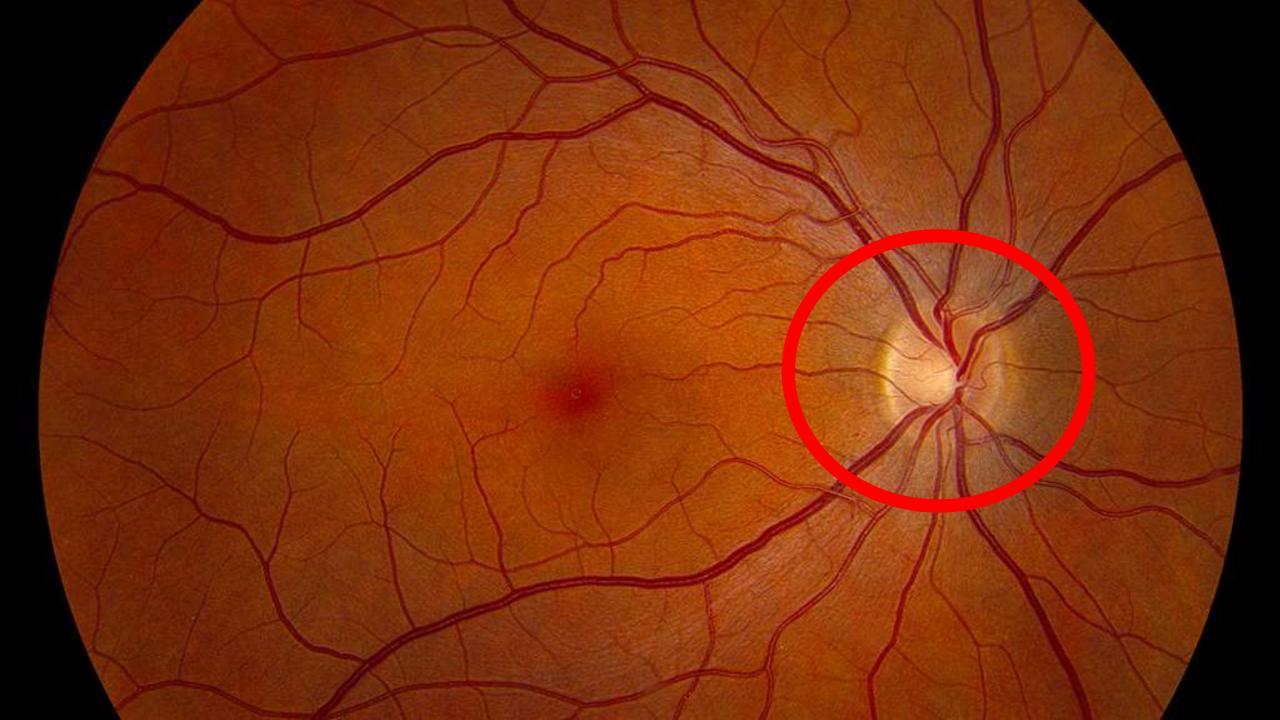
Moorfields Eye Hospital AGM

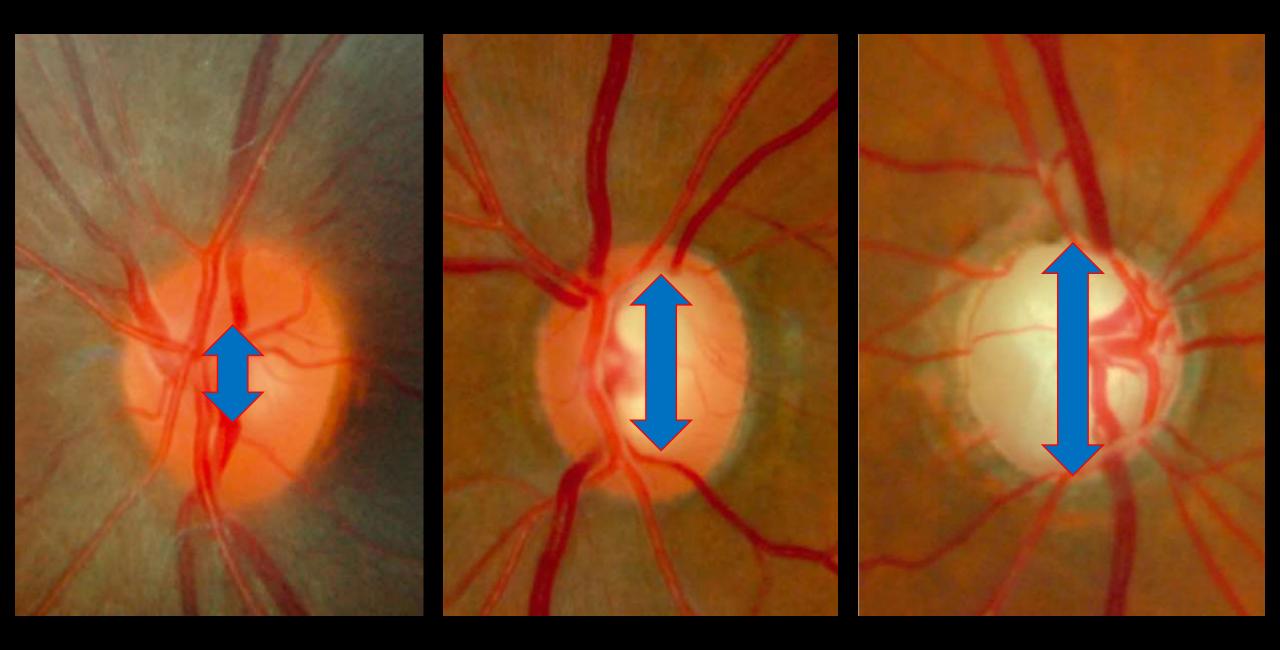
2nd October 2024



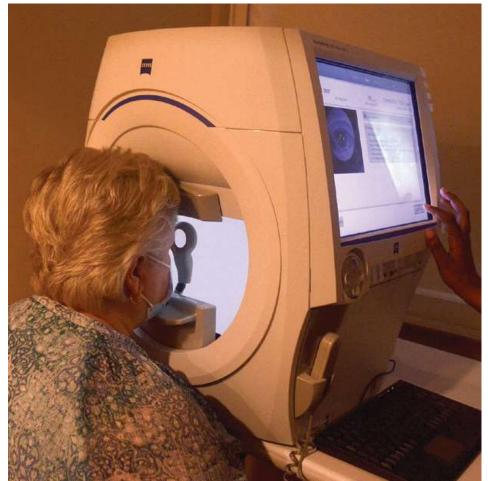




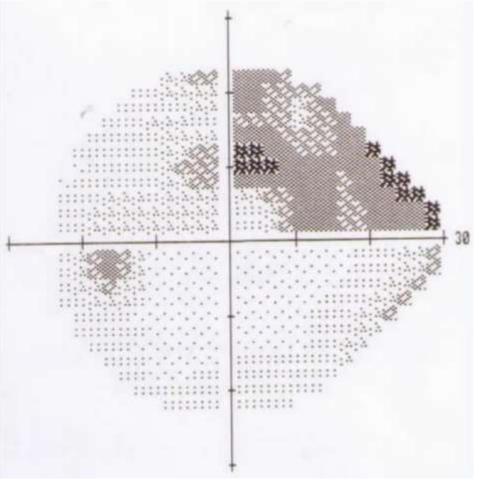


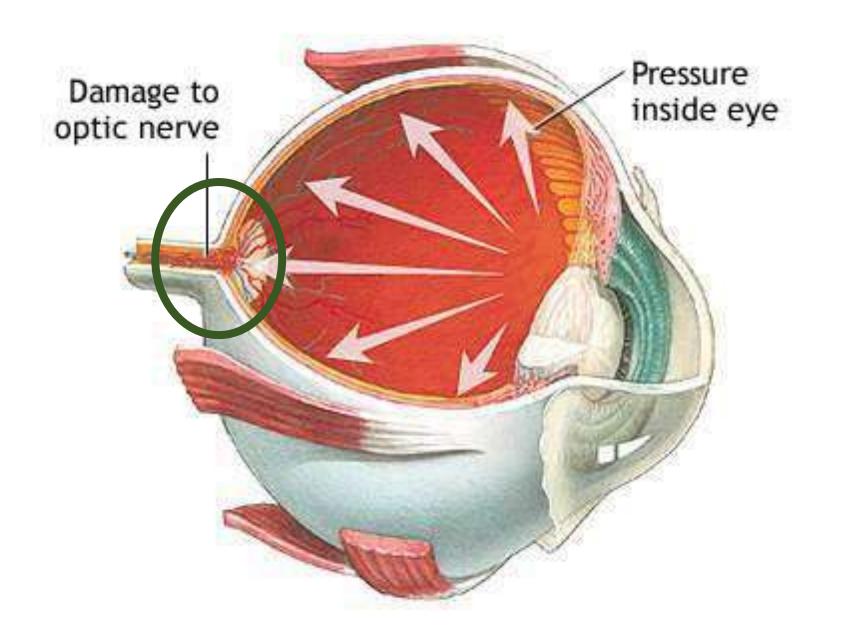












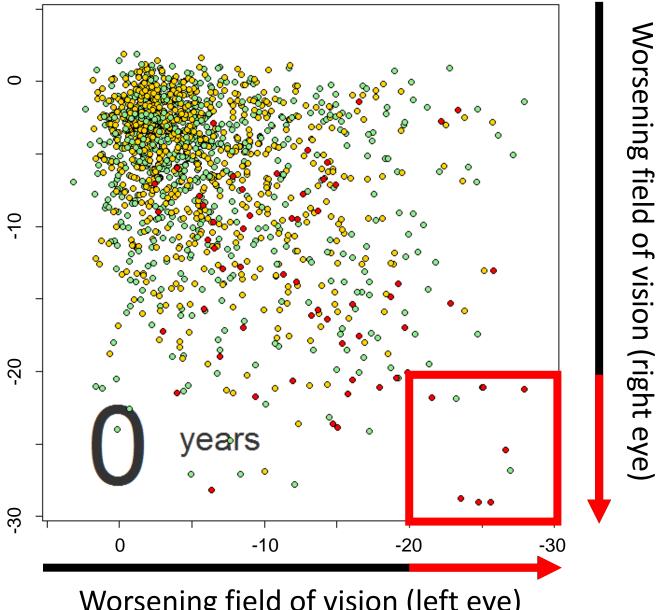
#1: Screening is not recommended





#1: Screening is not recommended

#2: Risk of blindness varies

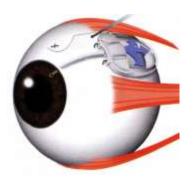


Worsening field of vision (left eye)

#1: Screening is not recommended

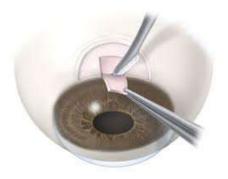
#2: Risk of blindness varies

#3: Treatment outcomes vary





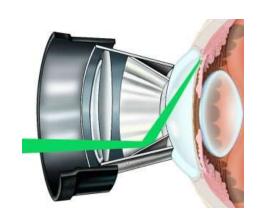




Many treatments!









Selective laser trabeculoplasty versus eye drops for first-line treatment of ocular hypertension and glaucoma (LiGHT): a multicentre randomised controlled trial



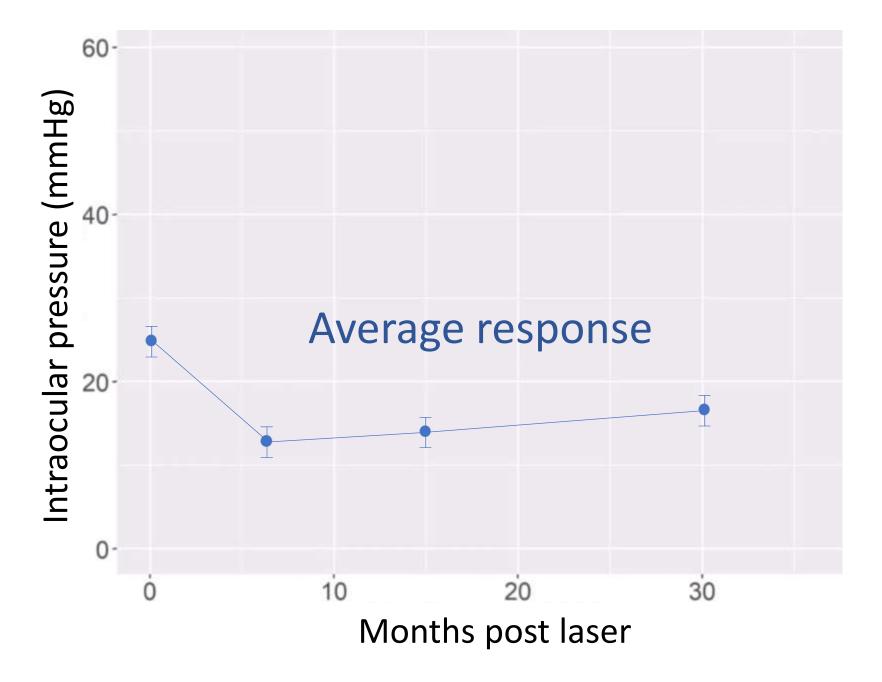
Gus Gazzard, Evgenia Konstantakopoulou, David Garway-Heath, Anurag Garg, Victoria Vickerstaff, Rachael Hunter, Gareth Ambler, Catey Bunce, Richard Wormald, Neil Nathwani, Keith Barton, Gary Rubin, Marta Buszewicz; on behalf of the LiGHT Trial Study Group*











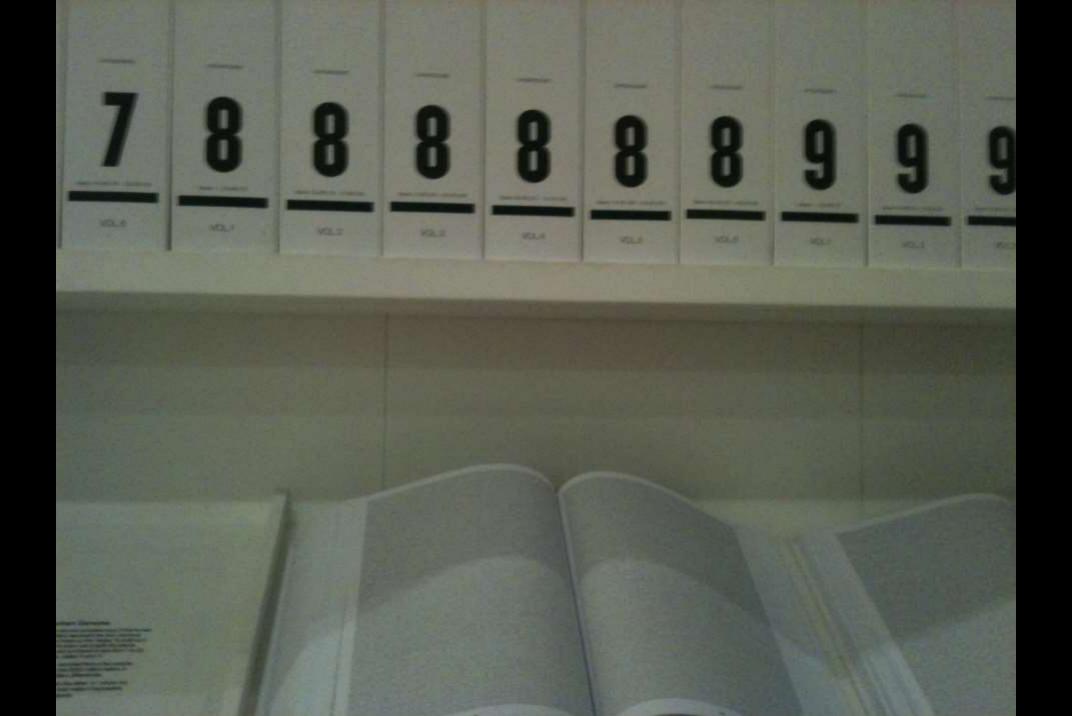
Khawaja et al. Ophthalmology 127, 748-757 (2020)



wellcome collection



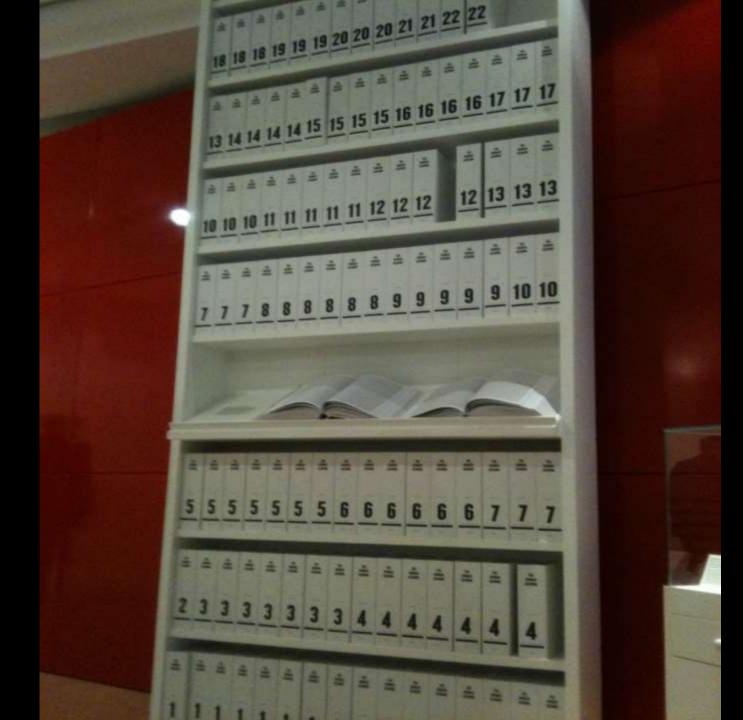




```
The second control of 
                                                                                                                     and the state of t
                                                                                                                   and a property of the control of the
                                                                                                                     According to the control of the cont
                                                                                                             determined the street of the s
                                                                                                        passed alto control of the control o
                                                                                                    osconstant protective of the control of the control
                                                                                                    orals of the second sec
                                                                                                  The transfer of the transfer o
                                                                                              grammantellantemental and the contract of the 
                                                                                              patrigettaggagittggetass.

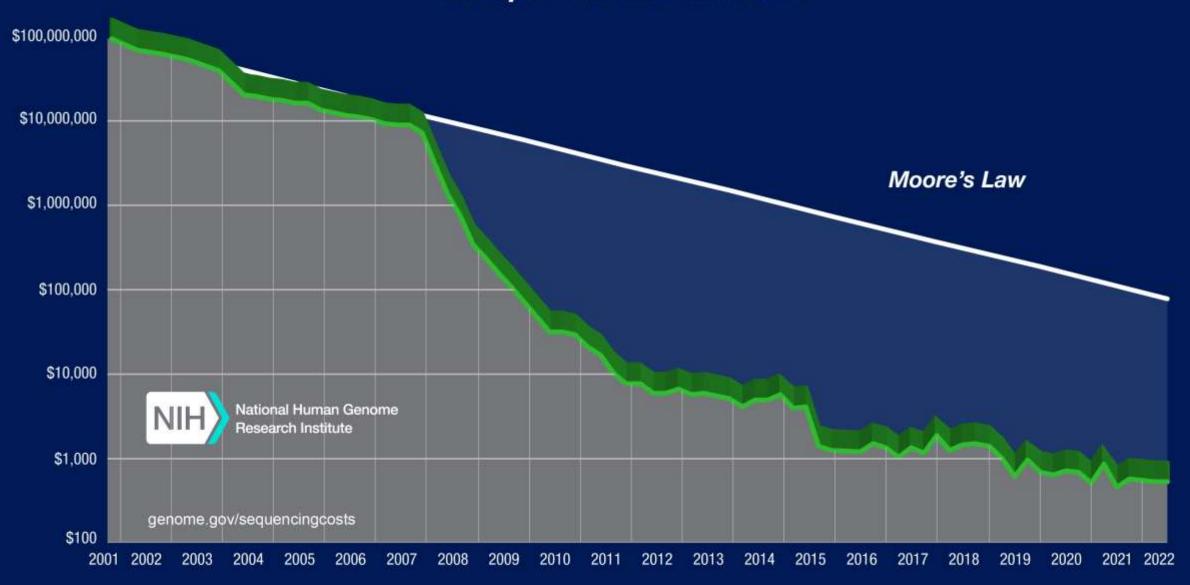
patrigettaggagittggagittggetass.

patrigettaggagittggagittggagittggagittggagittggagittggagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgagittgag
                                                                                          termatortersers areas and the contract of the 
                                                                                        #CLAST Loss of parally and the content of the conte
                                                                                        ancessass and an experience of the contest of the c
                                                                                      to glarest the control of the contro
                                                                                    aretter against agains
                                                                                  An approximate approximate the content of the conte
                                                                            artiticat provincial total page and province and page and considered to the considered and consi
                                                                            pertexpolations product of the content of the conte
                                                                     THIS ASSET OF THE PROPERTY OF 
                                                                   restratistatite portrategar at taggraphic gaggraphic gaggraphic gat gaggraphic gaggraphi
                                                                 oprargative in the state of the
                                                             pastcrary; pracegorage transport of the capture of 
                                                             promiter age as a second accordance age age to a second age to
                                               gas para service to the contract of the contra
                                               atti organization del proporti de processo de la pr
                                             gazztyttyrttyrttyrtyrgygagcort.ggzzarogaggtcaggggtcacaggagggctctgaaggcttcaatgcatctctcaagttgtaccttgtaccttgtacctgttcaaggcctaagtttcaaggcctcaagggcttcaaggcttacatctgtacctttattaacatctgtggaggatagaacccaattgctccaaggccttacatctgactactttattaacatctgtggaggatagaacccaattgctccaaggcctgagaacctaagcattagcatatctgactactttattaacatctgtggaggatagaacccaattgctccaagacctagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagacctaagac
                                           ANNIAR DESCRIPTION OF THE PROPERTY OF THE PROP
                          ANALYMENT OF THE PROPERTY OF T
                          to paral distances assessment assessment and the process of the parallel pa
                        PARTICIPATION OF THE PARTICIPATION OF THE GOODS TO CONTROL MODIST THE PARTICIPATION OF THE PA
                    CHEADACTE TO THE TOTAL PROPERTY OF THE PROPERT
                  DESCRIPTION OF THE PROPERTY AND THE PROPERTY OF THE PROPERTY O
              Parallite to the control of the cont
          PARTY AND DESCRIPTION OF THE PROPERTY OF THE P
          engances processor processor processor party processor and processor and
      promputations to the transport of the tr
      ACTIVITY DESCRIPTION OF THE PROPERTY OF THE PR
    SECURPTION ACCOUNTS ASSESSED A
CONSTRUCTION OF A THE ASSESSED OF THE PROPERTY OF THE PROPERTY
                                                                          enturphysiomagnous contranguage and contract contract or an appropriate of the contract of the
                                                                                                                                                                                ANY PROPERTY OF THE PROPERTY O
```



3 billion letters a/c/g/t

Cost per Human Genome



Superch

Shop Categori

Home > Health > Home Te



The best DNA gift with the most to give.

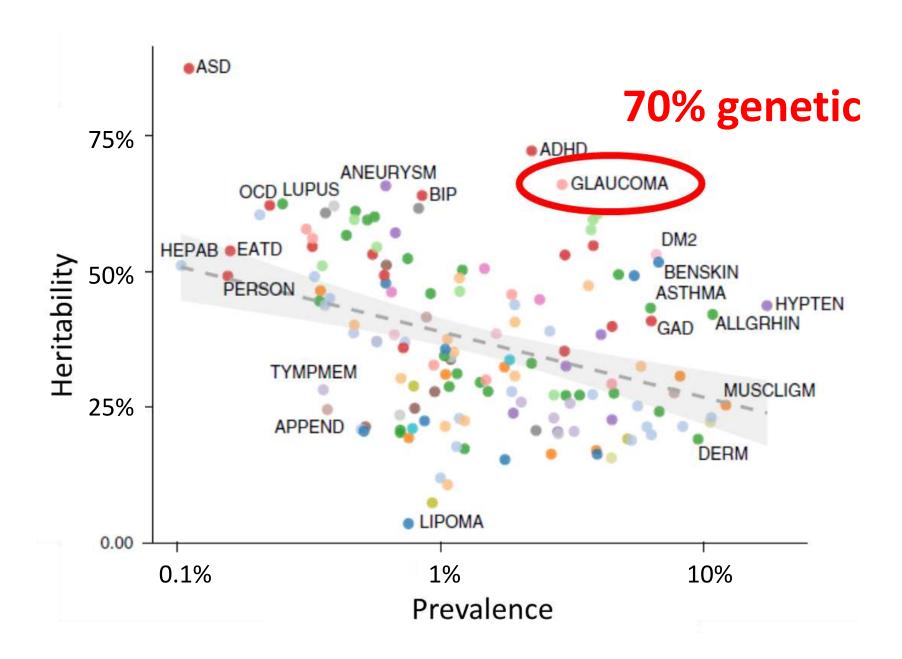


£63 + FREE gift wrap Ancestry + Traits £99 + FREE gift wrap Health + Ancestry Search produc

Store & Services

nome Service:

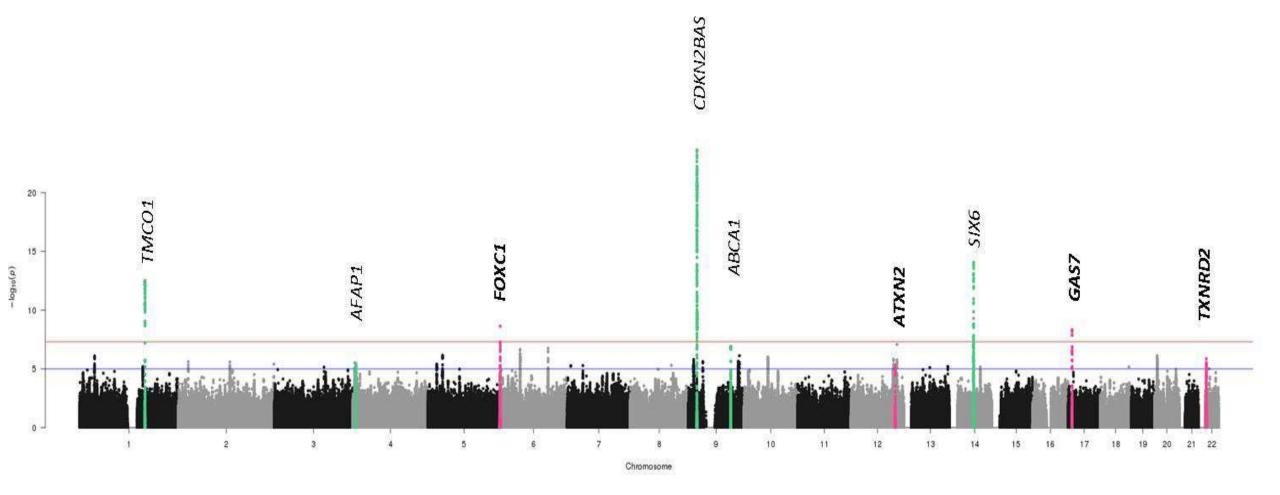
shlist



Wang et al. Nature Genetics. 49, 1319–1325 (2017)



Genome-wide association analysis identifies *TXNRD2*, *ATXN2* and *FOXC1* as susceptibility loci for primary open-angle glaucoma





500,000 participants

22 centres

Eye measures supplement















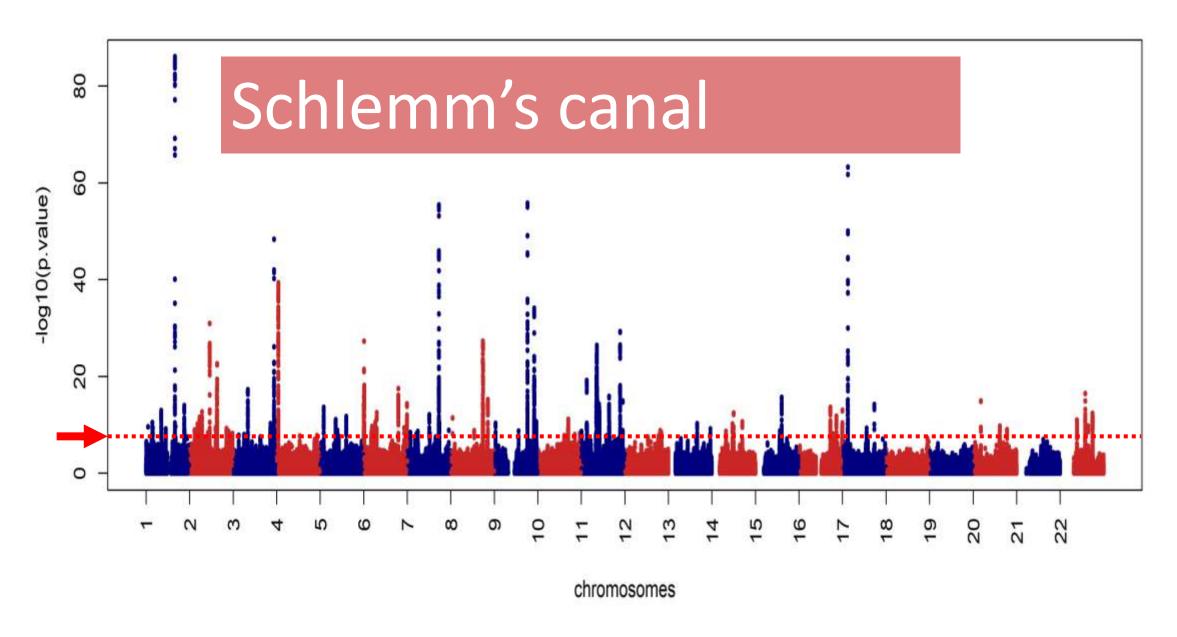




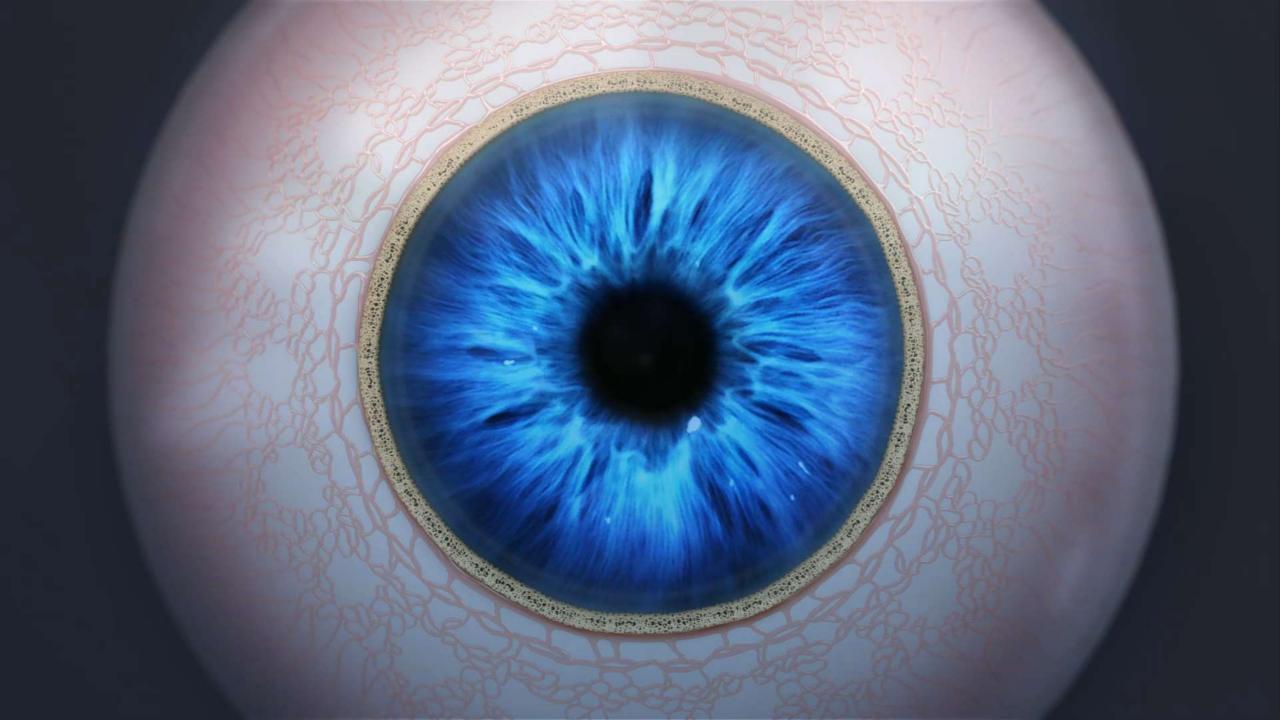








Khawaja et al, Nature Genetics, 2018





Moorfields Glaucoma BioResource

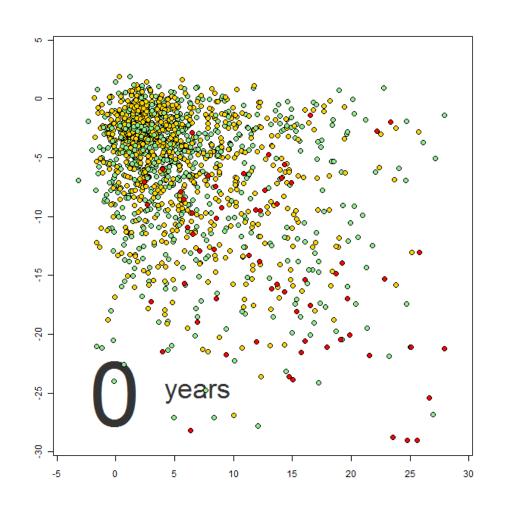


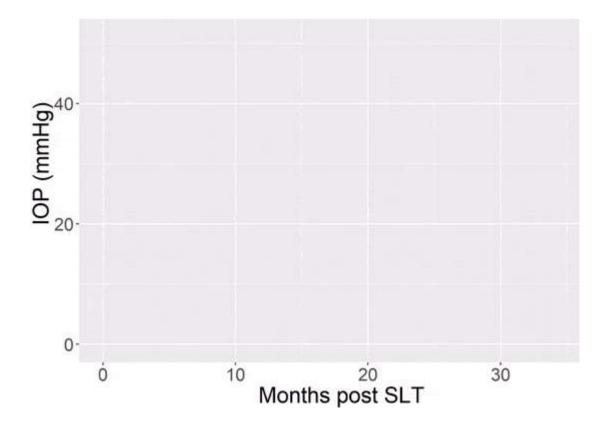


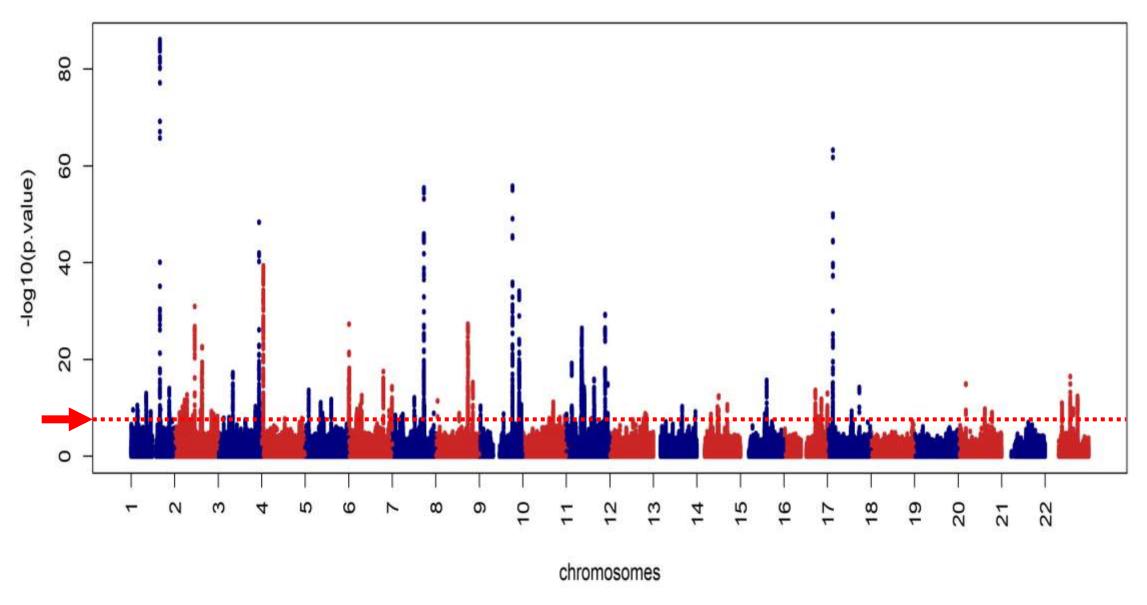
Moorfields Glaucoma BioResource







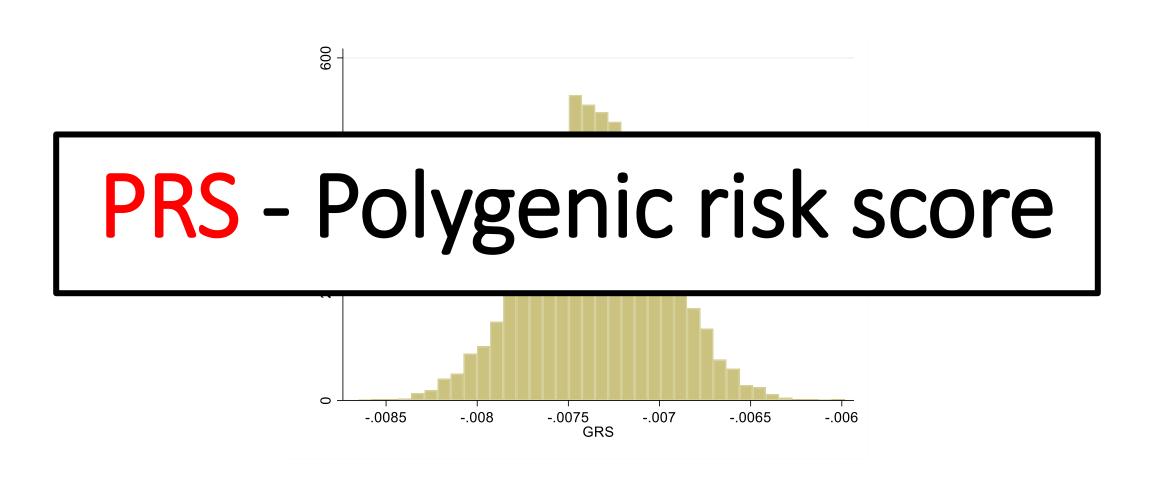




Khawaja et al, Nature Genetics, 2018

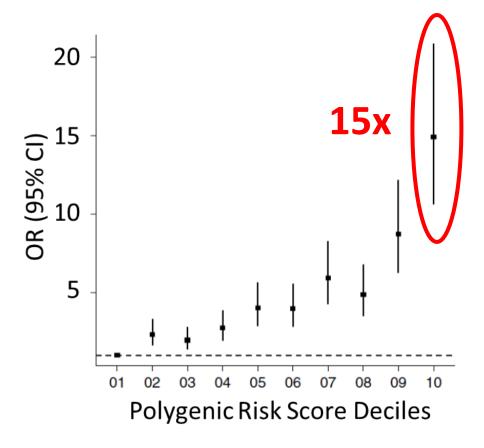
One number!

One number!



Multitrait analysis of glaucoma identifies new risk loci and enables polygenic prediction of disease susceptibility and progression

Jamie E. Craig^{1,40}, Xikun Han^{0,2,3,40*}, Ayub Qassim^{0,1,40}, Mark Hassall^{0,1}, Jessica N. Cooke Bailey^{0,4}, Tyler G. Kinzy⁴, Anthony P. Khawaja^{0,5}, Jiyuan An², Henry Marshall^{0,1}, Puya Gharahkhani^{0,2},



What can I do to help with my glaucoma?

vegetables activity food outdoors vegetarian tea
coffee sunlight fibre
coffee drugs
fruit smoking
Mediterranean drink fat diet nutrition sedentary exercise alcohol medications

activity food outdoors

Modifiable Risk Factors for Glaucoma Collaboration

Mediterran and the Mount Sinai







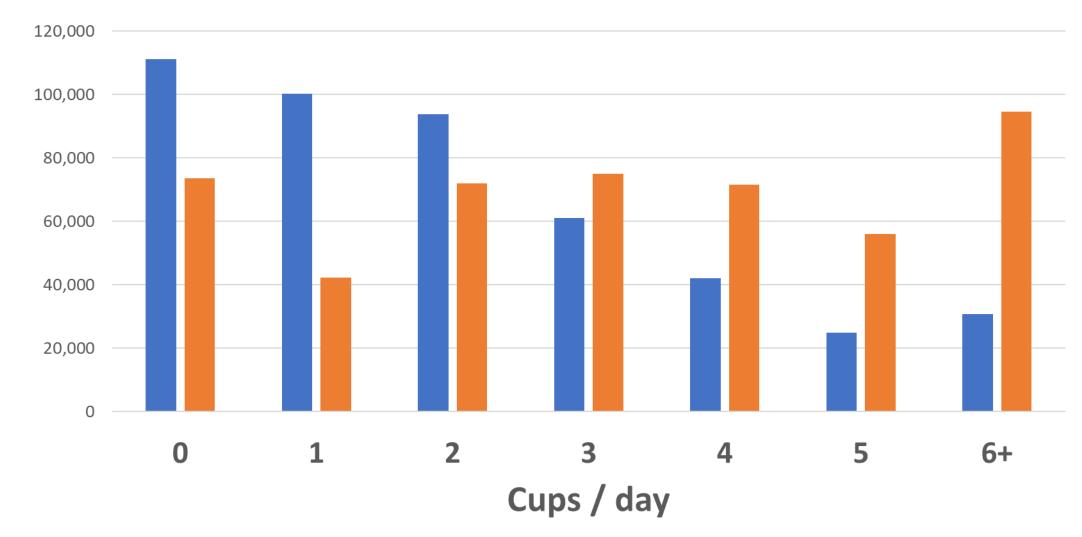
modity

neat









Oxford WebQ



	it any bread or crackers yesterday? sandviches, rice cakes, bread rolls, hob		Yes opets, lort	illa wi	raps.			1011	ow H	O ego
Bread		Amount	None	1/4	1	2	3	4	5	6+
	Sliced bread	Slice	0	0	(C)	0	0	0	0	0
	Flour type:									
	☐ White									
	Granary, brown, mixed flours/grains, white with extras (e.g. Best of Both, 50/50)									
	Granary, brown, mixed flo	urs/grains, w	hite with	extras	(e.g.	Best	of Bot	h, 50	(50)	
	Granary, brown, mixed flo	urs/grains, w	hite with	extras	(e.g.	Best	of Bot	h, 50/	(50)	
	Company of the Laboratory of the Company of the Com	urs/grains, w	hite with	extras	(e.g.	Best	of Bot	h, 50/	(50)	
	☐ Wholemeal	urs/grains, w	hite with	extras	s (e.g.	Best	of Bot	h, 50/	(50)	
	☐ Wholemeal ☐ Other- please describe:		hite with	extras	(e.g.	Best	of Bet	h, 50/	(50)	
Bread	☐ Wholemeal ☐ Other- please describe: Extras:		None	extras	(e.g.	Best 2	of Bot	h, 50/	(50)	6+
Bread	☐ Wholemeal ☐ Other- please describe: Extras:	top)		71	11			4 ()		6+

Caffeine derivation



Oxford WebQ instrument covering **24-hour recall**



Instrument repeated up to **5 times** between 2009-2012

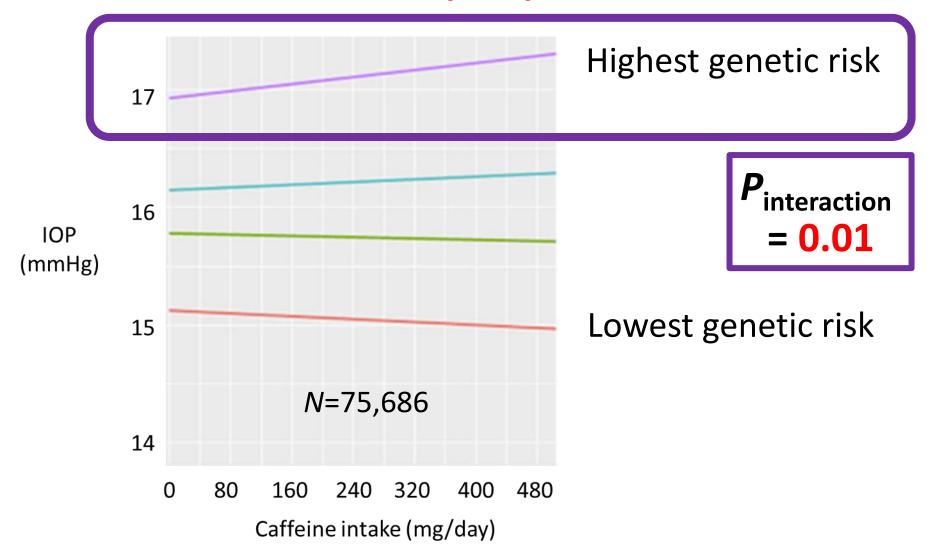


19 questions on caffeine containing foods and beverages

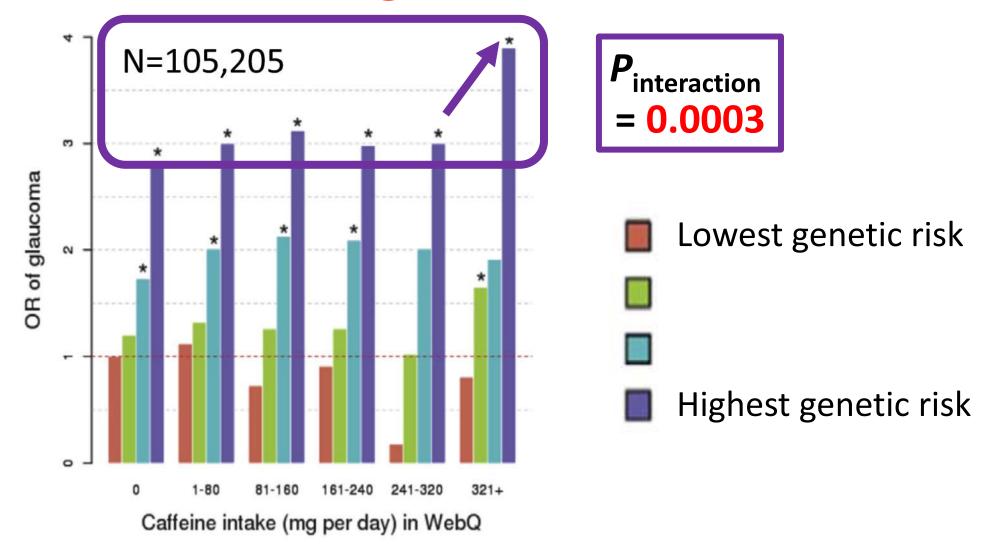


Total caffeine consumption calculated using published reports on caffeine content.

Caffeine and eye pressure

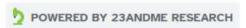


Caffeine and glaucoma





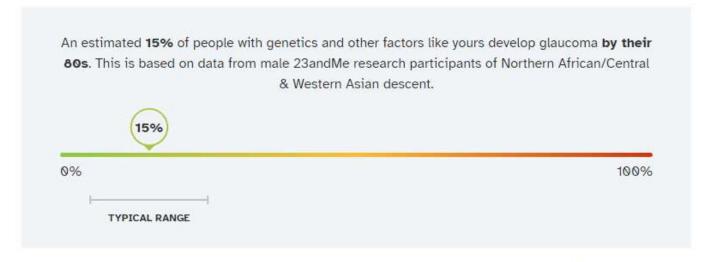
Glaucoma



Glaucoma is a group of eye conditions that occurs when the nerve in the back of the eye (called the optic nerve) is damaged, most commonly due to high eye pressure. Optic nerve damage can cause gradual vision loss that may start as blind spots or loss of side (peripheral) vision and worsen over time.



Anthony, your genetic result is associated with a **typical likelihood** of developing glaucoma.



This estimate is based on currently available data and may be updated over time.



Ways to take action

Experts agree that for people who have glaucoma caused by high eye pressure, it is important to reduce eye pressure to slow vision loss. Evidence suggests that healthy lifestyle habits may help manage eye pressure.

- Get regular, moderate exercise. Some exercises may increase eye pressure, like inverted yoga positions or headstands. Talk to your doctor about an appropriate exercise program.
- Wear eye protection to avoid injuries, such as when using power tools or playing racket sports.
- · Limit caffeine consumption.

Talk to your doctor if you notice any changes to your vision, such as reduced side (peripheral) vision or blind spots. If you have concerns about glaucoma, talk to a healthcare professional about whether getting regular dilated eye exams is right for you. You may be referred to an eye specialist, such as an ophthalmologist.



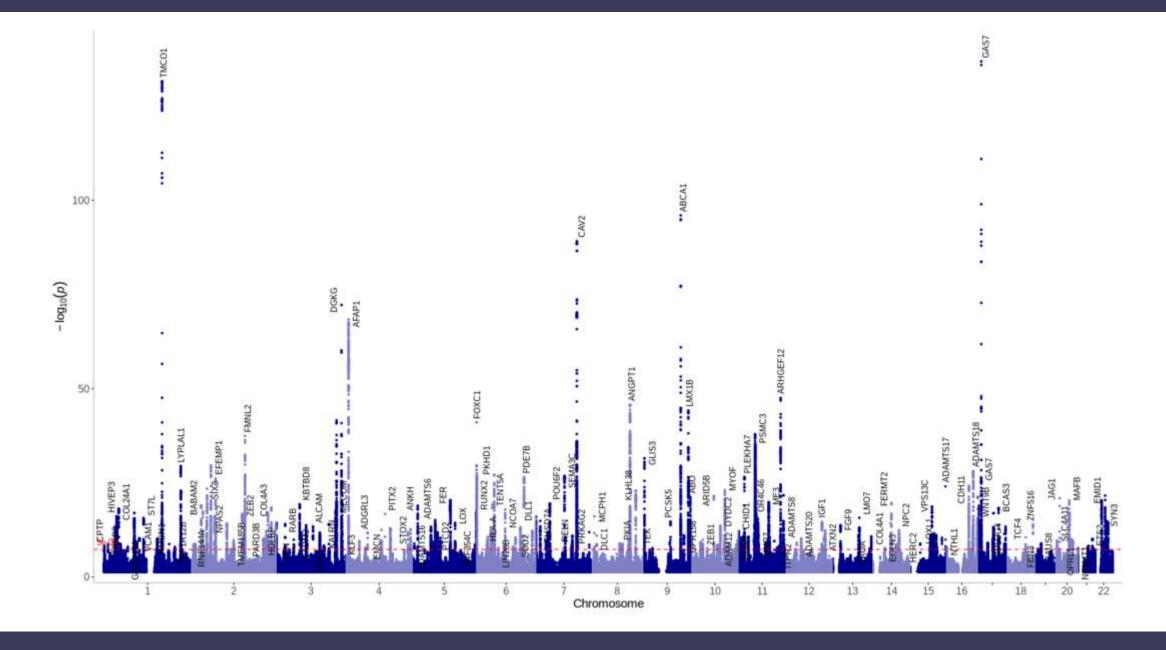
+ Our Future Health



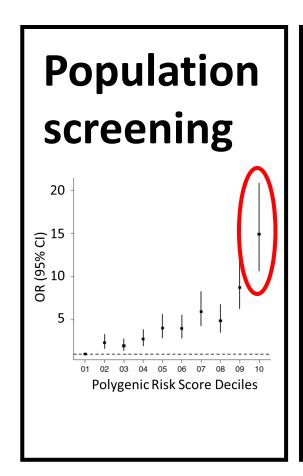
£20/p

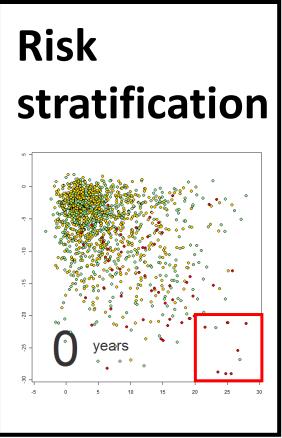
5 million adults

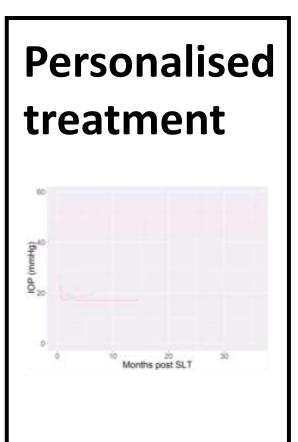


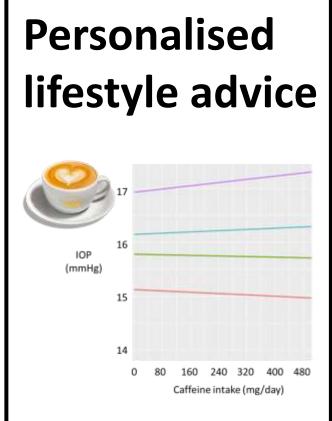


Genomics for personalised glaucoma care













Thank you













Any questions?







Thank you for attending Moorfields Annual General Meeting

The presentation and a recording of the meeting will be posted on www.moorfields.nhs.uk



