

Spotlight on the School of Medicine The Ocular Hypertension Treatment Study and Its Impact

The Ocular Hypertension Treatment Study (OHTS), 1992-2012, was a randomized controlled multi-center clinical trial conducted in 22 clinical centers in the United States funded by the National Eye Institute of the National Institutes of Health ([EY09307](#)). OHTS was designed to determine whether lowering intraocular pressure (IOP) in individuals with ocular hypertension delays or prevents the development of primary open angle glaucoma (POAG) and risk factors for the development of POAG. The primary outcome paper was published in 2002. Michael A. Kass, MD, Professor, Department of Ophthalmology & Visual Sciences, is the Principal Investigator/Study Chairman, and Mae O. Gordon, PhD, Professor, Division of Biostatistics and Department of Ophthalmology & Visual Sciences, is the Director of the Vision Research Coordinating Center.

OHTS was the first trial to demonstrate definitively that treatment of elevated intraocular pressure (IOP) delays or prevents the onset of glaucomatous damage. OHTS also identified risk factors for developing primary open-angle glaucoma (POAG) including older age, higher IOP and larger cup/disc ratio, and was the first study to identify central corneal thickness (CCT) as an independent risk factor for the development of POAG.

To date, 51 peer-reviewed journal articles have been authored by OHTS. A full list of articles and abstracts is available in the [OHTS Bibliography](#).

In 2007 Becker Library performed a citation review of OHTS publications (26 articles as of August 2007). Several articles demonstrated significant citation rates. As follows are examples of publication metrics that were used in 2007 as well as updated examples for 2014.

As of **August 2007**, several of the OHTS papers were among the highly cited papers in the field of Clinical Medicine and were core papers for the subject of Glaucoma per Thomson Reuters *Essential Science Indicators*.

- Kass MA, et al. 2002. The Ocular Hypertension Treatment Study: A randomized trial determines that topical ocular hypotensive medication delays or prevents the onset of primary open-angle glaucoma. PMID: 12049574. 339 citations in Thomson Reuters *Web of Science* as of August 2007.
- Gordon MO, et al. 2002. The Ocular Hypertension Treatment Study: Baseline factors that predict the onset of primary open-angle glaucoma. PMID: 12049575. 267 citations in Thomson Reuters *Web of Science* as of August 2007.
- Brandt JD, et al. 2001. Central corneal thickness in the Ocular Hypertension Treatment Study (OHTS). PMID: 11581049. 118 citations in Thomson Reuters *Web of Science* as of August 2007.

As of **August 2007**, per Thomson Reuters *Essential Science Indicators*, the Kass and Gordon articles ranked in the top 0.10% of papers in Clinical Medicine based on citations (339 and 267 citations respectively), with the Brandt article in the top 1.0% of papers (118 citations).

Percentiles for papers published by field, 1997 – 2007												
Clinical Medicine	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	All Years
0.01 %	1440	1692	1068	1026	1030	1007	619	430	261	73	8	969
0.10 %	516	493	457	399	336	288	236	160	93	28	4	330
1.00 %	166	158	144	133	115	99	78	54	31	10	2	105
10.00 %	44	41	39	36	32	27	22	16	9	3	1	26
20.00 %	25	24	23	21	19	16	13	10	6	2	0	14
50.00 %	8	8	8	7	7	6	5	4	2	1	0	4

Screenshot of Thomson Reuters *Essential Science Indicators*; August 2007.

These three articles also exceeded average citation rates for papers in Clinical Medicine based on citations per Thomson Reuters *Essential Science Indicators*.

Average Citation Rates for papers published by field, 1997 - 2007 (How to read this data)												
Fields	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	All Years
All Fields	15.99	15.15	14.22	13.10	11.52	9.69	7.52	5.38	2.91	0.75	0.08	8.87
Agricultural Sciences	9.11	9.14	8.73	8.36	7.15	5.96	4.81	3.26	1.64	0.39	0.07	5.31
Biology & Biochemistry	27.62	25.36	23.40	21.83	18.94	15.65	12.22	8.60	4.57	1.15	0.08	15.24
Chemistry	14.17	14.05	13.07	12.58	10.81	9.72	7.66	5.64	3.22	0.86	0.05	8.44
Clinical Medicine	18.64	17.71	16.73	15.42	13.72	11.77	9.36	6.65	3.66	0.92	0.09	10.73
Computer Science	5.78	5.94	5.21	4.59	4.55	4.33	2.46	1.51	0.81	0.18	0.04	2.58
Economics & Business	9.09	7.96	6.98	6.13	5.07	4.43	3.17	2.06	0.97	0.25	0.06	4.32

Screenshot of Thomson Reuters *Essential Science Indicators*; August 2007.

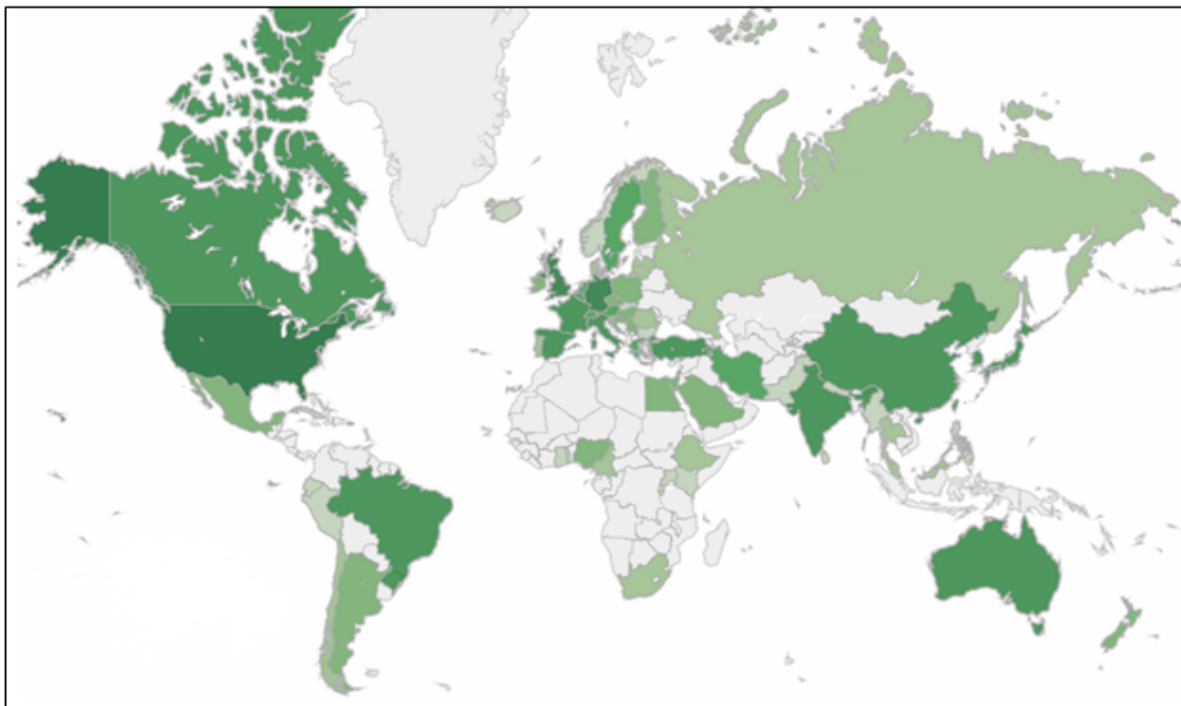
As of **July 2014**, the citation counts in Thomson Reuters *Web of Science* were as follows:

- Kass MA, et al. 2002. The Ocular Hypertension Treatment Study: A randomized trial determines that topical ocular hypotensive medication delays or prevents the onset of primary open-angle glaucoma. PMID: 12049574. 1,219 citations in Thomson Reuters *Web of Science* as of August 2014.
- Gordon MO, et al. 2002. The Ocular Hypertension Treatment Study: Baseline factors that predict the onset of primary open-angle glaucoma. PMID: 12049575. 981 citations in Thomson Reuters *Web of Science* as of August 2014.
- Brandt JD, et al. 2001. Central corneal thickness in the Ocular Hypertension Treatment Study (OHTS). PMID: 11581049. 227 citations in Thomson Reuters *Web of Science* as of August 2014.

A search in Elsevier *Scopus* was also performed in **July 2014**. A search in Elsevier *Scopus* for article and review document types with the keyword of “Glaucoma” resulted in 53,534 publications, dating from 1895 to current. Two OHTS articles were in the top ten cited publications:

- Kass MA, et al. 2002. The Ocular Hypertension Treatment Study: A randomized trial determines that topical ocular hypotensive medication delays or prevents the onset of primary open-angle glaucoma. PMID: 12049574. Ranked two of 53,534 publications with a citation count of 1,457.
- Gordon MO, et al. 2002. The Ocular Hypertension Treatment Study: Baseline factors that predict the onset of primary open-angle glaucoma. PMID: 12049575. Ranked seven of 53,534 publications with a citation count of 1,143.

As of **July 2014**, 50 of the 51 peer-reviewed journal articles by OHTS as noted in Elsevier *Scopus* were cited 4,417 times by 3,069 documents in Scopus. The languages represented by the citing documents include 17 non-English languages: German, French, Chinese, Spanish, Portuguese, Japanese, Turkish, Czech, Polish, Croatian, Dutch, Slovene, Bulgarian, Norwegian, Serbian, Slovak, and Swedish. The citing author affiliations were from institutions worldwide from over 70 countries as noted in the geographic map below which demonstrates global impact and influence.

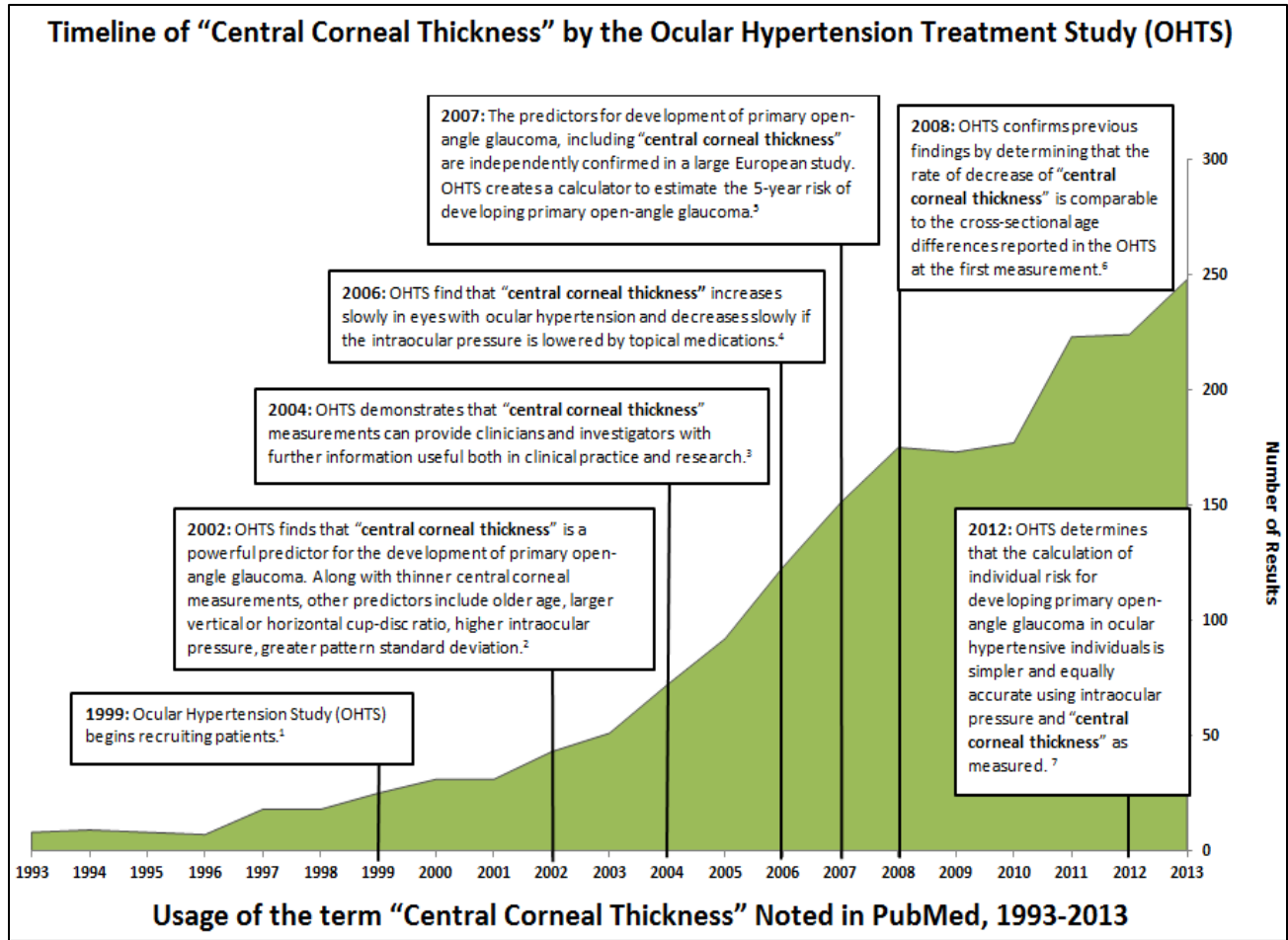


Geographic Map Displaying Countries Represented by Author Affiliations of Citing Publications to OHTS Articles (Colorized by number of citing countries)

Map created by Amy Suiter using *Tableau*

OHTS was the first study to identify central corneal thickness (CCT) as an independent risk factor for the development of POAG. This finding was published in the 2002 article: The Ocular Hypertension Treatment Study: Baseline factors that predict the onset of primary open-angle glaucoma. The term of “central corneal thickness” was searched in PubMed to determine if there was an uptake in usage of the

term. While there is an increase in the term as noted in PubMed, the cause may be temporal and not directly correlate to OHTS.



PubMed search done by Karen Gutzman

Chart created by Karen Gutzman and Michelle Doering using Excel

The 2007 review of the OHTS articles raised questions regarding the suitability of metrics based on publication data to illustrate meaningful health outcomes or clinical applications. The project further expanded to identify and locate evidence of research impact beyond use of publication metrics. Impact includes meaningful health outcomes and other outcomes correlated with the diffusion of knowledge such as new research studies, synthesis into clinical applications, or influence on public policy. Examples of impact resulting from OHTS findings were identified and are illustrated in the *Wordle* image below.



Image generated by Cathy Sarli using *Wordle*