

# **Updates On Optic Disc And Nerve Fiber Layer Imaging In Glaucoma**

*Essay submitted for partial fulfillment  
Of Master degree in Ophthalmology*

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قُلْ اسْبِغْكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْنَاكَ أَتَى الْعِلْمَ الْكُلَّ



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## List of Abbreviations

ION	Anterior Ischemic Optic Neuropathy
r	rachnoid
/D ratio	cup To Disc Ratio
RA	entral Retinal Artery
RV	entral Retinal Vein
SLO	onfocal Scanning Laser Ophthalmoscopy
SME	linically Significant Macular Edema
u	ura
CC	ixed Corneal Compensator
D	ourier Domain Technology
ig.	igure
PA GDx	uided Progression Analysis
ION	laucomatous Optic Neuropathy
RT	eidelberg Retina Tomography
TG	igh-Tension Glaucoma
LM	nternal Limiting Membrane
OP	ntroocular Pressure
SNT	inferior, Superior, Nasal Temporal
ASIK	aser Assisted in-Situ Keratomileusis
MIT	Massachusetts Institute of Technology
MPs	etalloproteinases
FI	erve Fiber Indicator
FL	erve Fiber Layer
TG	ormal-Tension Glaucoma
BF	ocular Blood Flow
CT	optical Coherence Tomography
HTS	ocular Hypertension Treatment Study
NH	ptic Nerve Head
OAG	rimary Open-Angel Glaucoma
P	erfusion Pressure
RK	hotorefractive keratectomy

V		ial Vessels
DS		anked Segment Distribution
GCs		etinal Ganglion Cells
NFL		etinal Nerve Fiber Layer
PE		etinal Pigment Epithelium
TA		etinal Thickness Analyzer
D		pectral Domain
LP		canning Laser Polarimetry
PCA		hort Posterior Ciliary Arteries
D		ime Domain
SD		opography Standard Deviation
SNIT	graphs	emporal, Superior, Nasal, Inferior, Temporal
SNIT SD		SNIT Standard Deviation
CC		, Variable Corneal Compensator
H		ircle of Zinn-Haller

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## **INTRODUCTION**

Glaucoma is a slowly progressive optic neuropathy that result in irreversible damage to the ganglion cell layer, retinal nerve fiber layer (RNFL), death of optic nerve axons and collapse of the lamina cribrosa leading to excavation of optic nerve head (ONH) and visual field loss(**Swiderski et al.,2000**).

Since glaucoma damage is irreversible, we need to diagnose it early and follow it up accurately. Investigations are trying to find better techniques for early detection of glaucoma(**Alm A.,2000**).

Both the diagnosis and assessment of progression of glaucoma are often based on a method of ophthalmic testing to identify and quantify the pattern of visual defects (i.e., functional defects) or structural defects(**Weinreb & Kaufman,2009**).

Because structural changes of optic disc often precede the development of visual field loss in glaucoma, detection of optic disc damage plays a vital role in diagnosis of glaucoma, especially in its early stages. Although ophthalmoscope and fundus photography are still used for assessing glaucomatous optic disc damage, they are limited by their subjective and qualitative nature(**Zangwill et al.,2005**).

Several imaging technologies have become available to evaluate objectively the optic disc and RNFL. One of these technologies, scanning laser polarimetry (SLP), provides quantitative estimates of RNFL thickness. Another, confocal scanning laser ophthalmoscopy (CSLO), evaluates the topography of the optic disc, although it also can provide indirect estimates of RNFL integrity(**Medeiro et al.,2004**).

The Heidelberg Retina Tomograph (HRT) confocal scanning laser ophthalmoscopy, with its new version of software, called Advanced

Glaucoma Analysis 3.0 (HRT3), provides larger, ethnic selectable normative databases and includes new data analysis tools(*Coops et al ., 2006*).

Optical coherence tomography (OCT) has become an important tool which has contributed to earlier and more accurate diagnosis of glaucoma over the past decade. Although OCT has been used, for the most part, to evaluate RNFL thickness, recent improvement in software also have made possible evaluation of ONH topography for glaucoma diagnosis and follow up(*Ferreras et al ., 2007*).

There are few studies involving the role of imaging in human glaucoma progression detection, hampered in part by rapidly evolving changes in technology that disrupt longitudinal studies. Progressive RNFL thinning measured with OCT and optic nerve cupping measured with CSLO, have been reported in experimental models involving non-human primates. At present there is limited evidence to support that imaging may assist the clinician in identifying progression of established glaucoma(*Shimazawa et al., 2013*)

Yet, many unanswered questions exist regarding how to integrate such measurements in glaucoma clinical practice and clinical trials. It is time to assess critically what we know as well as we still need to learn, about imaging in glaucoma clinical care and research(*Medeiro et al., 2005*).

## AIM OF THE STUDY

The purpose of this study is to discuss different new techniques concerning optic nerve head and nerve fiber layer evaluation for early detection and follow up of glaucoma.

***ANATOMY OF  
OPTIC NERVE HEAD  
AND NERVE FIBER  
LAYER***