

Recent Developments in Optical
coherence Tomography for Imaging of
the Retina and Optic Nerve Head

Essay

*Submitted in Partial fulfilment of master degree
In Ophthalmology*

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الطرق الحديثة للرسم الطبقي البصرى المتناسك
لشبكة العين و العصب البصرى

رسالة
توطئة للحصول على درجة الماجستير
في
طب وجراحة العين

مقدمة من
الطبيب/ نيفين فتحي احمد شلبي

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Summary

Optical coherence tomography (OCT) is a new, noninvasive, noncontact, transpupillary imaging technique that produces high resolution, cross sectional images of the retina.

It was developed in the early 1990s.

It is based on the principle of low-coherence interferometry and the information concerning various ocular structures is extracted from time delays of the reflected signals.

Different scanning protocols can be used according to the retinal pathology studied; and the image presented is either a cross sectional image or a topographic map.

It provides *quantitative data* about the thicknesses of the retinal layers; and *qualitative data* about morphology of the retina and optic nerve head and reflectivity defects. It also provides topographic parameters of the retina and optic nerve head.

OCT diagnoses many pathologies e.g retinal edema, serous retinal detachment, RPE detachment, macular holes, and macular pseudo-holes, drusen, choroidal neovascularization, diabetic retinopathy, cystoid macular edema, epiretinal membranes, optic disc pits and pathological optic disc and nerve fiber layer changes in glaucoma. It can diagnose early cases before any visual complaints appear. This helps out in better management of glaucoma and minimizing disability.

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- ⇒ Some new innovations of SD-OCT.
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☒ Summary

☒ References

☒ Arabic summary

List of abbreviations

3-D	3-Dimensional
ANSI	American national standards institute
AMD	Age related Macular Degeneration
AO	Adaptive Optics
BM	Bruch's Membrane
BS	Beam Splitter
CARS	Coherent anti-stokes raman scattering
CC	Choriocapillaries
CCD	Charge-Coupled Device
CME	Cystoid Macular Edema
CMOS	Complimentary Metal-Oxide Semiconductor
CNV	Choroidal Neovascularization
CRL	Conventional Retinal Laser
DL	Double-Layer
DME	Diabetic Macular Edema
ELM	External Limiting membrane
ERM	Epiretinal Membrane
FA	Fluorescein Angiography
FDA	Food & drug association
FD-OCT	Fourier Domain Optical Coherence Tomography
FTMH	Full thickness macular hole
GA	Geographical atrophy
GCC	Ganglion Cell Complex
GCL	Ganglion Cell Layer
HD	High-Definition
HRT	Heidelberg retinal tomogram
IA	Indocyanin Angiography
ICSC	Idiopathic Central Serous Chorioretinopathy
IFT	Improper Central Foveal Thickness
ILM	Internal Limiting Membrane
INL	Inner Nuclear Layer
IPL	Inner Plexiform Layer
ISL	Inner Segment Layer

IS/OS D	Inner Segment/Outer Segment photoreceptor layer Defect
IS/OS PR	Inner Segment/Outer Segment photoreceptor
LMH	Lamellar Macular Hole
MDB	Median Distance Band
ME	Macular Edema
MH	Macular Hole
MP	Macular Pucker
MTM	Myopic traction maculopathy
NFL	Nerve Fiber Layer
OCT	Optical Coherence Tomography
OCT/SLO	OCT and Scanning Laser Ophthalmoscopy
ODT	Optical Doppler tomography
OLM	Outer Limiting Membrane
ONH	Optic Nerve Head
ONHD	Optic Nerve Head Drusen
ONL	Outer Nuclear Layer
OPD	Optical Path Difference
OPL	Outer Plexiform Layer
OS	Outer Segment
OSL	Outer Segment Layer
PCV	Polypoidal Choroidal Vasculopathy
PD	Pattern Deviation
PED	Pigment Epithelial Detachment
PPC	Photoreceptor Pigment epithelium Complex
PRL	Photoreceptor layer
PS	Posterior Segment
PS-OCT	Polarization sensitive OCT
PVD	Polypoidal Choroidal Vasculopathy
RAP	Retinal Angiomatous Proliferation
RNFL	Retinal Nerve Fiber Layer
RNFLT	Retinal Nerve Fiber Layer Thickness
ROP	Retinopathy of Prematurity
RP	Retinitis Pigmentosa
RPE	Retinal Pigment Epithelium
RPE/BM	Retinal Pigment Epithelium/Bruch's membrane
RT	Retinal Thickness

RTA	Retinal thickness analyzer
SBS	Shaken Baby Syndrome
SD-OCT	Spectral Domain OCT
SH-OCT	Second harmonic OCT
SLD	Superluminescent Diode
SLO	Scanning Laser Ophthalmoscopy
SNR	Signal-to-Noise Ratio
SRF	Subretinal Fluid
SRT	Selective Retina Treatment
SS	Swept Source
TD	Time Domain
Ti:Al₂O₃	Titanium Aluminum Oxide
UHR	Ultrahigh Resolution
VF	Visual Field
VM	Verhoeff membrane
VMIA	Vitreomacular interface abnormality
VMT	Vitreomacular traction
VMTS	Vitreomacular Traction Syndrome

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