The OCT Angiography in glaucoma what s new

by

Ahmed Aly El Said Senoun
National Eye Center

OCT Angiography

The recent introduction of optical coherence tomography angiography

OCT-A has sparked interest in evaluating vascular alterations in the retina and optic nerve head for diagnosis, staging, and monitoring in glaucoma.

OCT-A is an extension of OCT which allows non-invasive visualization of the retinal vasculature by detecting motion contrast from perfused blood vessels without the use of exogenous dye.

In principle, OCT-A compares sequential B-scans acquired at the same location to detect change. As stationary structures would appear static in sequential B-scans, changes detected by OCT-A are largely attributed to erythrocyte movement in the perfused vasculatures.

OCT Angiography

Various vascular

Parameters have been investigated in glaucoma suspects and established glaucoma patients including vascular density in the optic nerve head ,flow index of the optic disc vascular density in the peri papillary retina and vascular density in the macula. OCTA studies in primary open-angle glaucoma have consistently demonstrated reduced microcirculation in the superficial optic nerve, peri papillary retina and the macula of glaucoma patients. How will OCTA help the glaucoma clinician now and in the future? What else must we learn before achieving more practical usefulness from OCTA for glaucoma?

OCT Angiography

OCTA will supplement current glaucoma diagnostic tools to aid in the early detection of glaucoma.

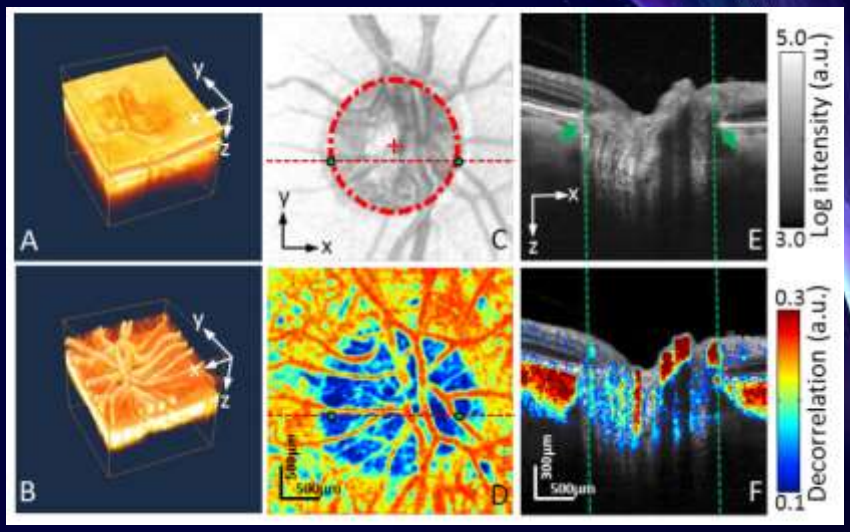
Diagnostic accuracy of OCTA vessel density measurements from small studies to date support its promise in this role. On the other hand OCT is a routine tool to aid in the detection of glaucoma and its progression, but this is not without limitations. For example, OCT scans of eyes with atypical optic nerve anatomic features such as myopic tilt are fraught with issues that reduce our confidence in the RNFL thickness findings.

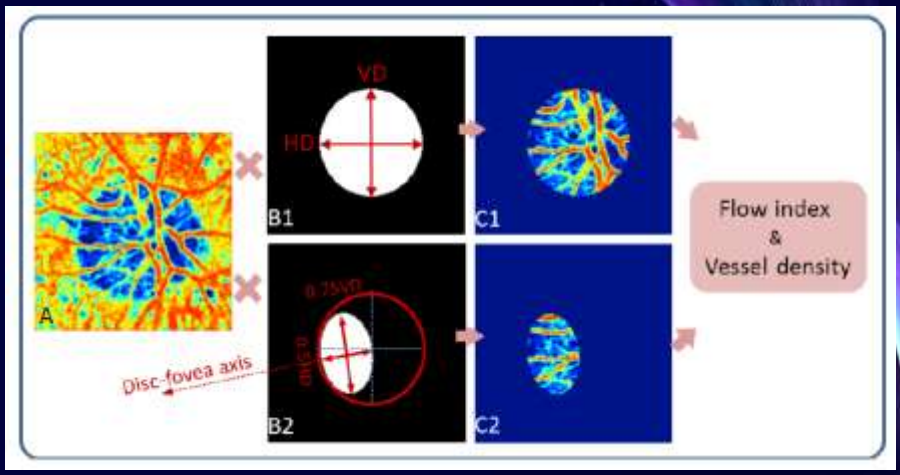
OCT Angiography

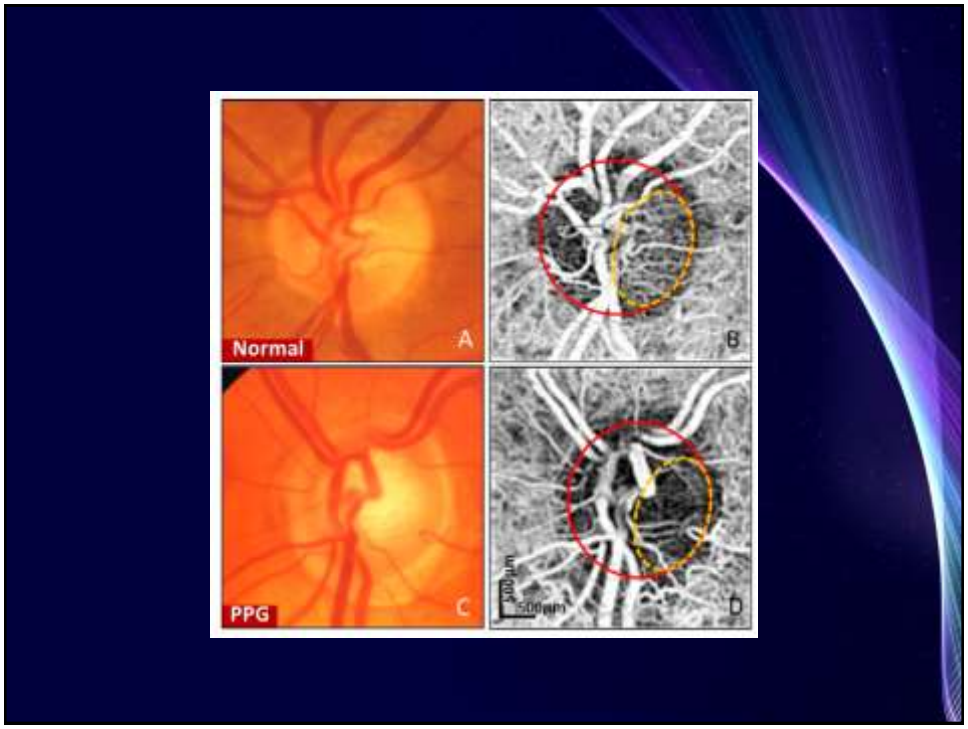
Additionally, OCT RNFL measurements in advanced glaucoma become unhelpful when the RNFL thickness has reached its floor of approximately 50 to 60 mm. It is possible that measuring the microcirculation rather than the nerve tissue itself may improve diagnostic usefulness over a wider range of anatomic features and disease. OCTA may explain the role of vascular pathophysiologic features in glaucoma. We have long known that glaucomatous eyes have reduced OBF, but we do not know whether reduced OBF is a cause or the simple result of glaucomatous optic neuropathy.

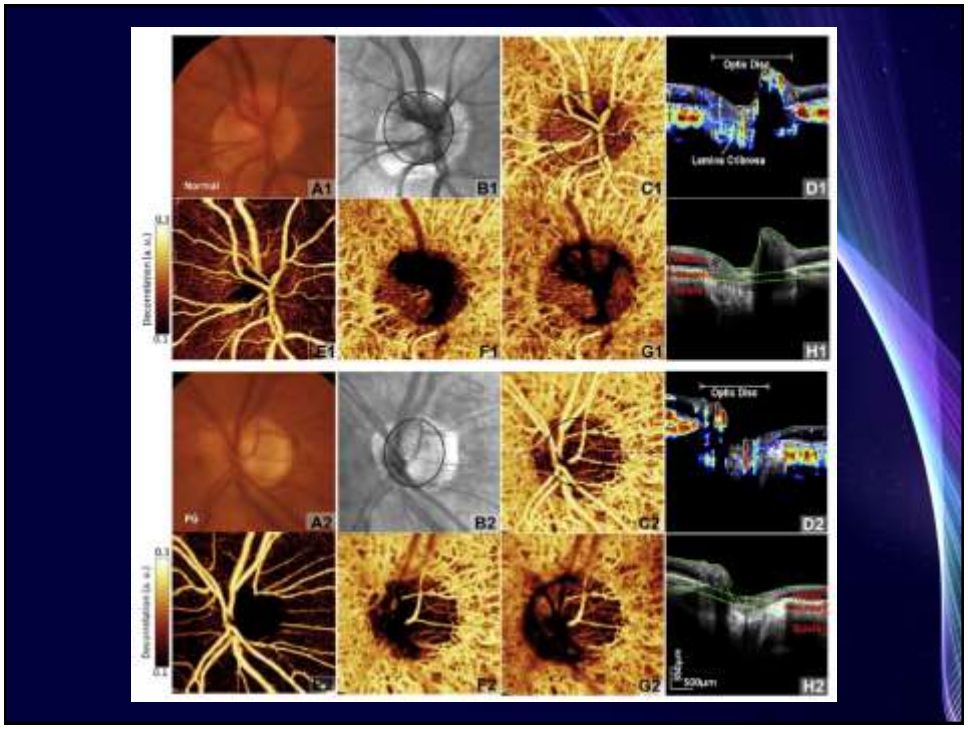
OCT Angiography

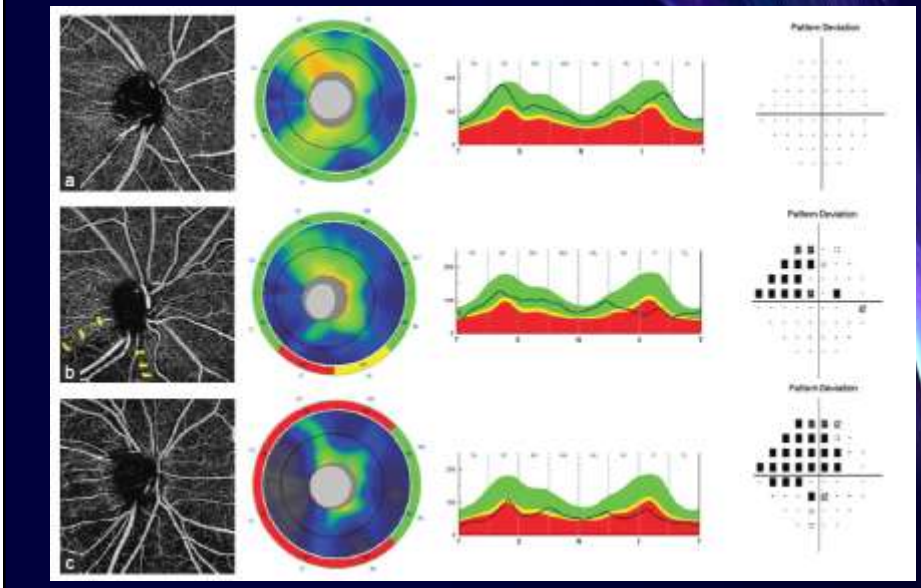
Although one explanation is that a reduced number of retinal ganglion cell (RGC) axons leads to lower metabolic demand and thus reduced circulation, the other possibility is that a vascular problem such as unstable OBF or microvascular abnormalities contributes to primary open angle glaucoma in some.

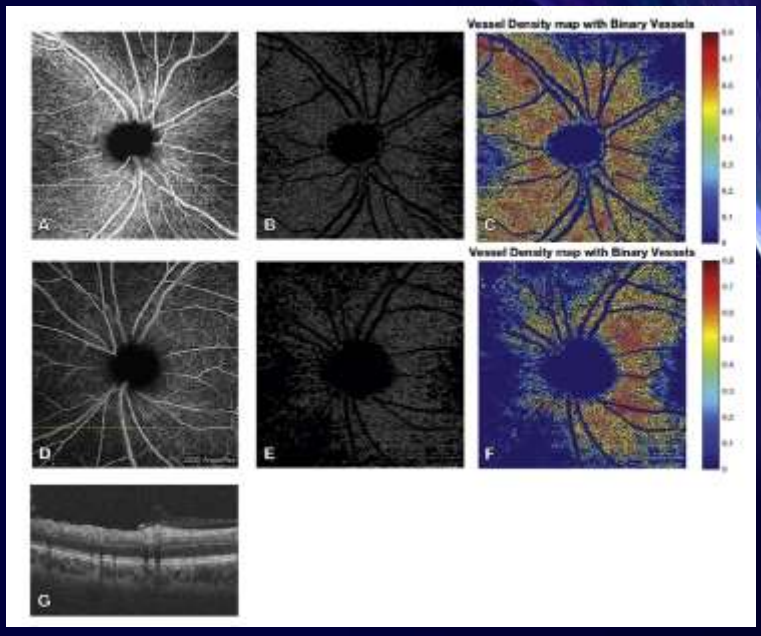

A
B
C
D
E
F
5.0
3.0
Log intensity (a.u.)
0.3
0.1
Decorrelation (a.u.)
500μm
300μm

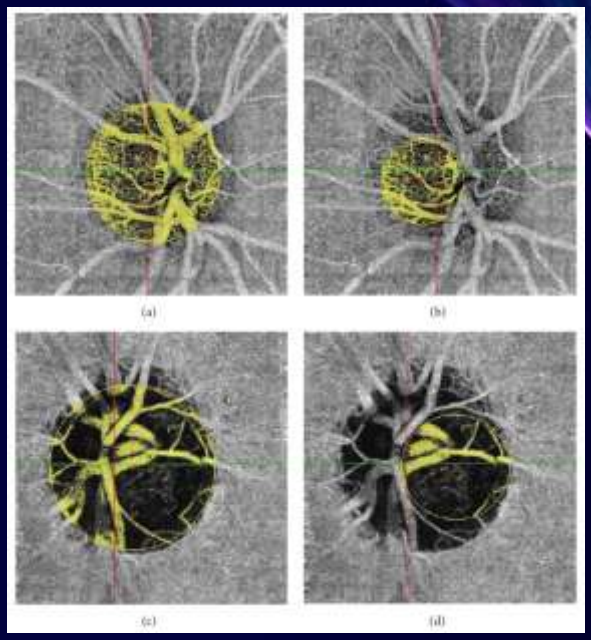

A
VD
HD
B1
C1
B2
C2
Disc-fovea axis
Flow index
&
Vessel density


Normal
A
B
PPG
C
D
500µm

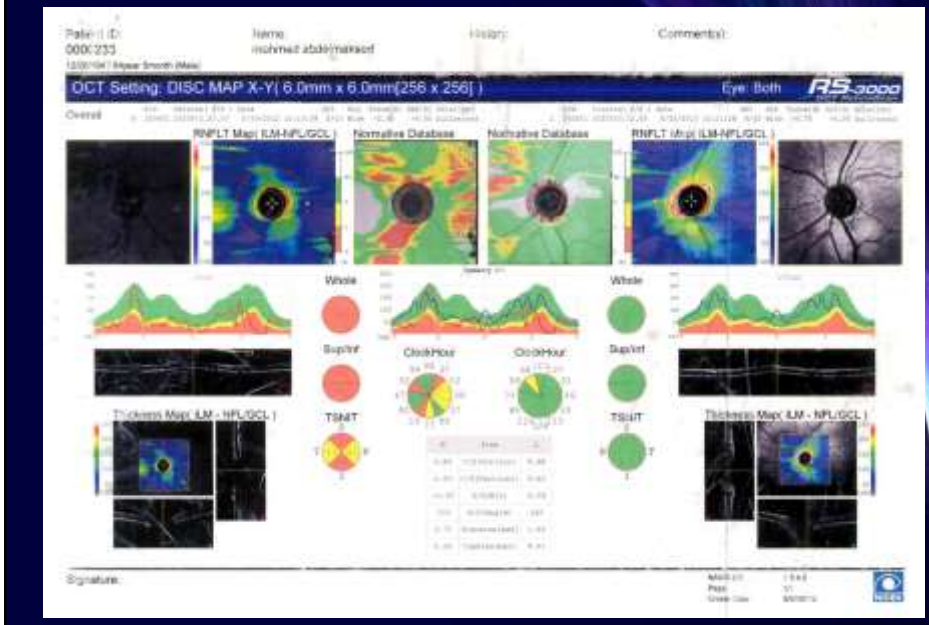

Normal
A1
B1
C1
D1
Optic Disc
Lamina Cribrosa
E1
F1
G1
H1
PG
A2
B2
C2
D2
E2
F2
G2
H2
500µm

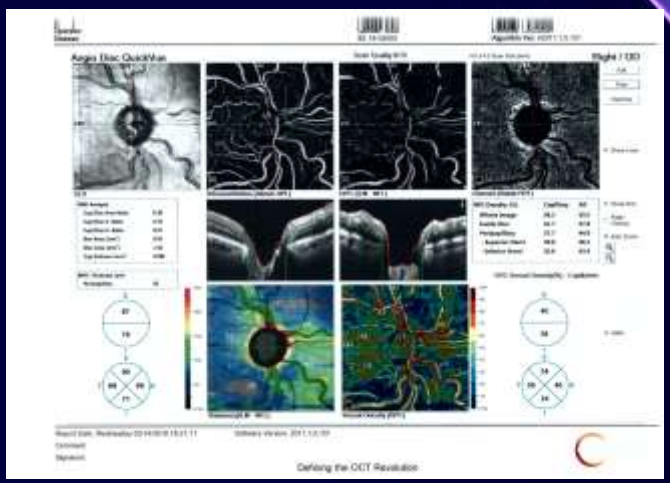

a
b
c
Pattern Deviation
Pattern Deviation
Pattern Deviation

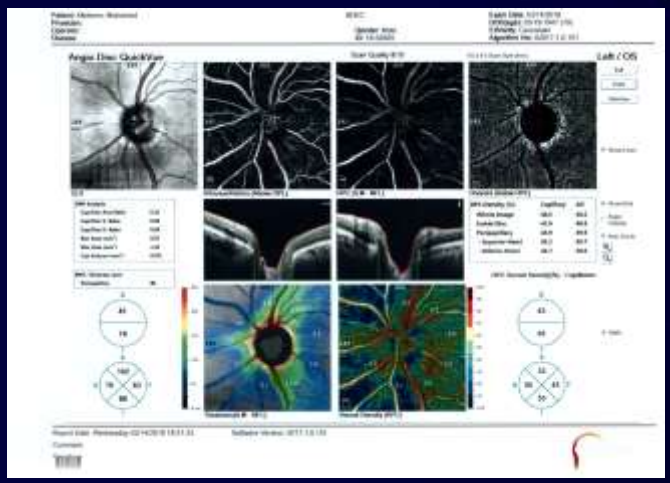

Vessel Density map with Binary Vessels
Vessel Density map with Binary Vessels
A
B
C
D
E
F
G



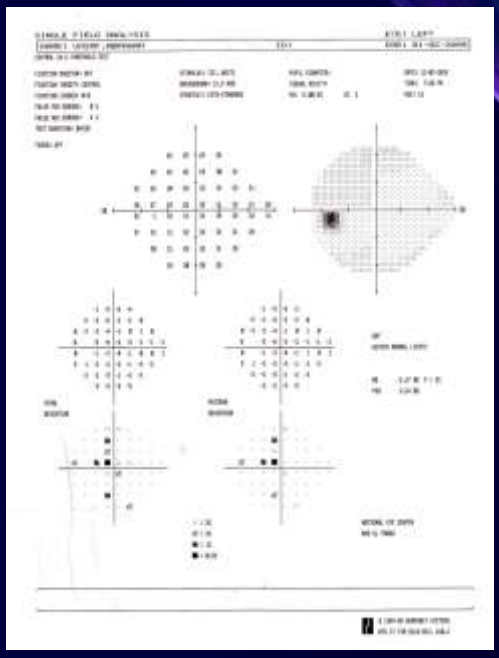
- Male patient 71 years old
- IOP in right eye is 17 and in left eye is 16 under anti glaucoma eye drops ,cup-disc ratio is 0.8 in right eye and 0.6 in left eye


Name:
mohmed abdelnakeel
OCT Setting: DISC MAP X-Y(6.0mm x 6.0mm(256 x 256))
Eye: Both
RS-3000
RNFLT Map(ILM-NFL/GCL)
Normative Database
Normative Database
RNFLT Map(ILM-NFL/GCL)
Whole
Sup/Inf
TS/NT
ClockHour
ClockHour
Whole
Sup/Inf
TS/NT
Thickness Map(ILM - NFL/GCL)
Thickness Map(ILM - NFL/GCL)
Signature:

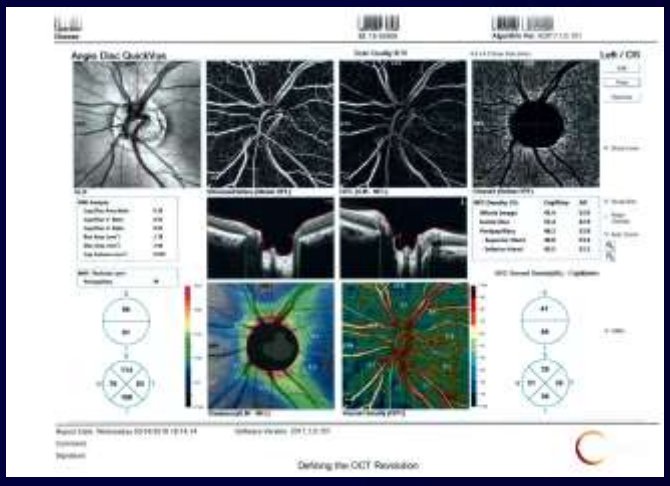

Angio Disc QuickView
Defining the OCT Revolution

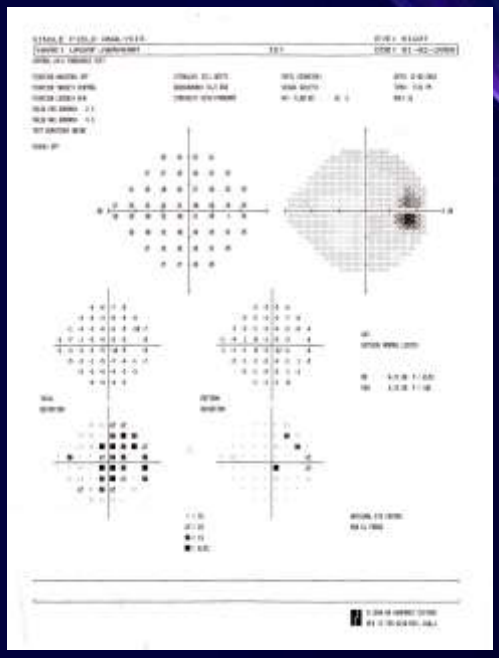


- Male patient 18 years old
- IOP is 18 in right eye and 12 in left eye without any medications
- Cup disc ratio is 0.7 in right and 0.5 in left

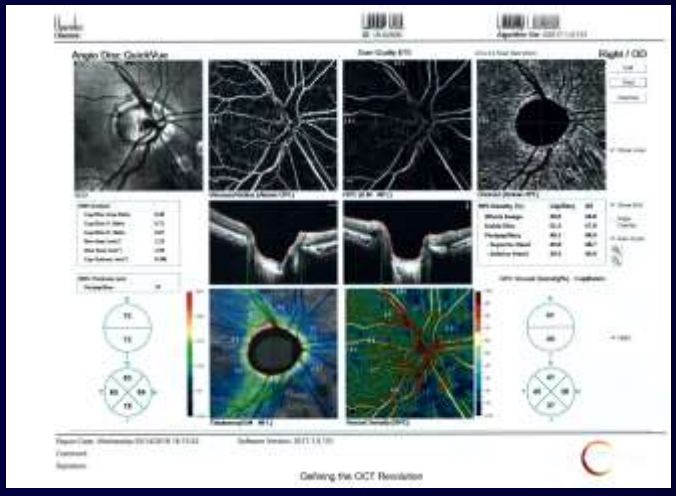


OCT A OF OPTIC DISC IN LEFT EYE

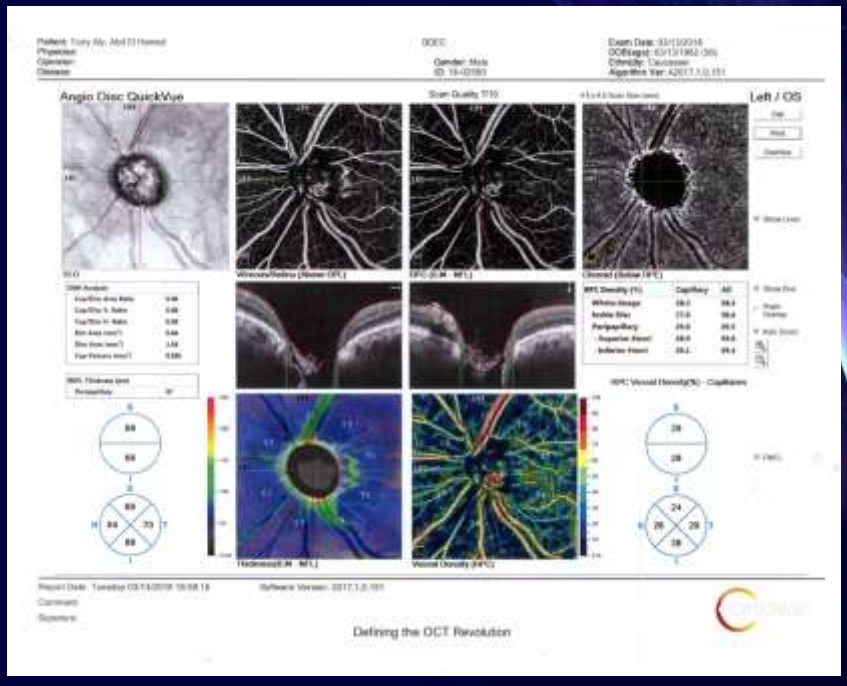




OCT A OF OPTIC DISC IN RIGHT EYE



- Male patient 56 years old
- IOP is 20 in both eyes without any medication
- Cup disc ratio is 0.7 in left eye 0.2 in right eye



OCT Angiography

Take Home Message

OCTA could more clearly reveal who is at risk for glaucomatous progression and guide early treatment decisions. OCTA may identify glaucomatous damage before standard perimetry shows defects. Furthermore OCTA retinal vessel density measurements could differentiate primary open-angle glaucoma, pre perimetric glaucoma, and normal eyes.