

EDI OCT and visual field in optic nerve head drusen

1 Enhanced Depth Imaging Optical Coherence Tomography of Optic Nerve Head

2 Drusen: a Comparison of Cases with and without Visual Field Loss

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30

31 **Abbreviations**

32 AF Autofluorescence

33 EDI Enhanced Depth Imaging

34 MD Mean Deviation

35 ONHD Optic Nerve Head Drusen

36 PSD Pattern Standard Deviation

37 RNFL Retinal Nerve Fiber Layer

38 SD-OCT Spectral-Domain Optical Coherence Tomography

39 VF Visual Field

40

41 **Abstract**

42

43 **Purpose:** Enhanced depth imaging (EDI) spectral domain optical coherence
44 tomography (SD-OCT) has been recognized as the most sensitive tool to diagnose
45 optic nerve head drusen (ONHD). The relationship between OCT characteristics and
46 visual loss has not been well documented. This study compares EDI SD-OCT
47 determined morphological characteristics of drusen in eyes with or without visual field
48 (VF) defects.

49 **Design:** Descriptive study of patients attending the neuro-ophthalmology service of
50 Moorfields Eye Hospital between January 2013 and October 2014.

51 **Subjects:** Patients with diagnosed ONHD and EDI SD-OCT imaging of the optic
52 nerve head.

53 **Methods:** Eyes with and without VF defects were compared with regard to retinal
54 nerve fiber layer (RNFL) thickness, drusen morphology, size, extent, visibility on
55 funduscopy, ultrasound and fundus autofluorescence.

56 **Main Outcome Measure:** Difference in OCT characteristics of ONHD between
57 patients with or without visual field defects

58 **Results:** Of 38 patients, 69 eyes with ONHD were included. 33 eyes had a normal
59 VF with average mean deviation (MD) -0.96dB (± 1.2), pattern standard deviation
60 (PSD) 1.6dB (± 0.3) (group I), and 36 eyes had VF defects with MD -13.7dB (± 10.4),
61 PSD 7.2dB (± 3.6) (group II). Mean global RNFL thickness was $62\mu\text{m}$ (± 20.9) in the
62 latter group, and $99.0\mu\text{m}$ (± 12.9) in group I. In group I, the predominant drusen type
63 were peripapillary drusen, of variable size. In group II, most eyes had confluent ($p <$
64 0.02) and large ($>500\mu\text{m}$; $p < 0.003$) drusen, and drusen were more commonly
65 visible on funduscopy ($p = 0.001$), ultrasound ($p = 0.013$) and autofluorescence ($p =$

66 0.002). Differences between the two groups reached statistical significance in a
67 clustered analysis. RNFL thinning and autofluorescence showed relative sparing of
68 the temporal sector. 64% of patients with a VF defect in one eye also had a VF
69 defect in their fellow eye.

70 **Conclusions:** Drusen size and drusen type as classified by OCT morphological
71 characteristics are significantly different in patients with or without VF defects.
72 Confluent, large and autofluorescent drusen were more commonly found in patients
73 with VF defects. These findings may assist in clarifying how drusen give rise to visual
74 loss which is currently not known.

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76

77 **Introduction**

78 Drusen of the optic disc were first described by Liebrich in 1868^{1, 2}. Although the
79 clinical picture and associated complications of optic nerve head drusen (ONHD)
80 have been well described since the last century³⁻⁵, the pathogenesis of ONHD and
81 the mechanism of resultant visual field loss remain poorly understood. Based on
82 findings on electron microscopy, Tso⁶ concluded that drusen are related to axonal
83 degeneration in the optic nerve head. He suggested that intracellular mitochondrial
84 calcification with rupture of axons and subsequent progressive deposition of calcium
85 on the surface of these nidi form calcified microbodies in the extracellular space.
86 ONHD are known to consist of calcium phosphate ($\text{Ca}_3[\text{PO}_4]_2$), mucoproteins, acid
87 mucopolysaccharides, amino and nucleic acids, and occasionally iron^{2, 7}. Tso⁶ found
88 drusen size to vary between 5 and 1000 μm .

89 Until recently, imaging of ONHD was limited to fundus autofluorescence, computed
90 tomographic (CT) scanning and ultrasound, with ultrasound being most sensitive⁸.

91 Today, spectral domain optical coherence tomography (SD-OCT), particularly with
92 the application of enhanced depth imaging (EDI) algorithms, allows visualization of
93 ONHD of hitherto unknown resolution⁹.

94 Generally, EDI SD-OCT is known to improve image quality of deeper structures of
95 the posterior pole⁹⁻¹¹. In particular, it allows imaging of the posterior margin of buried
96 ONHD. EDI SD-OCT is now the most sensitive method of detecting ONHD⁹. Using
97 OCT, a number of different morphologic types of ONHD have recently been
98 described.

99 Johnson et al.¹² identified a druse as a peripapillary „subretinal hyporeflective space“
100 on Stratus OCT, an older „time-domain“ OCT system. This possibly corresponds to
101 the peripapillary „subretinal mass“ with a reflectance similar to that of the inner and

102 outer plexiform layers as described by Lee et al.¹³. Other published morphologic
103 features of ONHD are small isolated or clustered hyperreflective bands⁹, and
104 hyporeflectant areas with fine hyperreflective borders within the optic nerve^{9, 14}.
105 Based on the published literature and on our own EDI SD-OCT findings, we suggest
106 that ONHD can be differentiated into three morphological categories. 1) Peripapillary
107 subretinal hyperreflective drusen, 2) granular hyperreflective drusen, and 3) confluent
108 hyporeflective drusen. These three morphological categories will hence be referred to
109 peripapillary, granular and confluent drusen for ease of reference.
110 Disc drusen are often associated with visual field loss^{5, 15, 16}. Nerve fiber bundle
111 defects, a nasal step, enlargement of the blind spot as well as concentric visual field
112 constriction have all been described. There is usually preservation of central vision.
113 Retinal nerve fiber layer (RNFL) thinning of patients with ONHD is also well described
114 in the more recent literature¹⁷⁻¹⁹. Peripapillary RNFL thickness changes are believed
115 to be an indicator of anatomic location (superficial versus buried) of ONHD and to be
116 associated with visual field defects. In a large retrospective cross sectional study,
117 Malmqvist et al.²⁰ reported more RNFL loss as well as higher frequency and extent of
118 VF defects in patients with superficial ONHD. However, to our knowledge, the
119 relationship between OCT-determined morphological characteristics of ONHD and
120 visual field loss has not been investigated, see Silverman et al. for review²¹.
121 This study compares EDI SD-OCT characteristics of ONHD in patients with or without
122 visual field (VF) defects.

123

124 **Methods**

125 This retrospective descriptive study was approved by the institutional review board of
126 Moorfields Eye Hospital and adhered to the tenets of Declaration of Helsinki. 38

127 patients attending the neuro-ophthalmology clinics of Moorfields Eye Hospital
128 between 1/2013 and 10/2014 were included. Patients with diagnosed optic disc
129 drusen, with available EDI SD-OCT imaging of the optic nerve head, were included.
130 Diagnosis of ONHD was based on OCT, as this has been shown to be the most
131 sensitive diagnostic tool⁹. However, ultrasound, autofluorescence imaging, or both
132 were obtained in some patients as well. All patients had full ophthalmologic
133 examinations including slit lamp biomicroscopy, applanation tonometry, dilated
134 fundus examination, color disc photography, and automated perimetry (Humphrey
135 field analyzer, strategy SITA-standard, 24-2 threshold). Eyes with other ophthalmic
136 pathologies known to affect the optic nerve head structure or VF were excluded, as
137 well as fellow eyes without evidence of ONHD. Eyes with and without visual field
138 defects were compared with regard to best-corrected visual acuity (Snellen chart),
139 color vision (Ishihara plates), RNFL thickness, ONHD type, ONHD layer, ONHD size,
140 ONHD extent, and visibility on funduscopy, on ultrasound and autofluorescence.
141 The definition of visual field defects was based on the criteria published by the IIHTT
142 (Idiopathic Intracranial Hypertension Treatment Trial) group²². An abnormal visual
143 field test was defined as having a Glaucoma Hemifield Test (GHT) outside normal
144 limits and/or a pattern standard deviation (PSD) $p < 5\%$.
145 Patients included in this study had serial horizontal or vertical volume scans of the
146 optic nerve head with enhanced depth imaging using the Spectralis SD-OCT system
147 (Heidelberg Engineering GmbH, Heidelberg, Germany; Eye Explorer Version 1.9.3.0,
148 Acquisition Software Version 5.7.5.0, Viewing Module Version 6.0.7.0). Mean B-scan
149 distance was $87.9 \mu\text{m}$ ($\pm 61 \mu\text{m}$ standard deviation), mean scan quality 23.6 dB (\pm
150 5.7), and mean ART (automatic real-time function) 42.7 (± 10.4).

151 The average peripapillary RNFL thickness was automatically obtained using a 12°
152 (3.5 mm) diameter circle centred on the optic disc. All scans were reviewed. Absence
153 of motion artefacts and good centering on the optic disc was checked. Scans also
154 were evaluated in terms of the adequacy of the algorithm for detecting the RNFL.
155 Scans with gross algorithm failure in detecting the retinal layers were excluded,
156 whereas scans with minor algorithm failures over an angle of less than two clock
157 hours were manually corrected and included in the present study. Mean RNFL scan
158 quality was 27.4 dB (\pm 4.8 standard deviation), and mean ART (automatic real-time
159 function) 57.1 (\pm 37.1).

160 Most patients had autofluorescence images that were obtained on the Heidelberg
161 Spectralis (Heidelberg Engineering GmbH, Heidelberg, Germany). The area of
162 autofluorescence was measured using the integrated caliper tool. Instead of
163 comparing absolute area values, the area was analysed in relation to the whole disc
164 area (autofluorescence area / disc area = autofluorescence ratio) to avoid
165 measurement inaccuracies related to possible differences in refraction.

166 ONHD size was categorized as small ($<$ 300 μ m), medium (300 - 500 μ m) and large
167 ($>$ 500 μ m) as described elsewhere²³.

168 ONHD extent is a qualitative estimate of the ONHD volume in relation to the total
169 optic nerve head volume. A quantitative ONHD volume measurement was not
170 considered appropriate as this was a retrospective study with some variability in OCT
171 acquisition and quality. An experienced observer categorised the ONHD volume into
172 the following groups: minimal ($<$ 10% ONHD volume compared to total optic nerve
173 head volume), small ($<$ 50%), moderate ($>$ 50%), large ($>$ 75%), and extensive ($>$ 90%).

174 Statistical analyses were performed using Stata 13.1 (StataCorp, College Station,
175 TX, USA). We used logistic regression with cluster-robust standard error with

176 ,visual field defect' as dependent variable. The alpha level (type I error) was set at
177 0.05.

178

179 **Results**

180 Sixty-nine eyes of 38 patients (26 women and 12 men) were included in this study.

181 For seven patients, only one eye was included. Four of these patients had no
182 detectable ONHD in the fellow eye, and three had other ophthalmic diseases in their
183 fellow eye (previous retinal detachment, herpetic corneal scar, segmental inferior
184 hypoplasia of the disc). Thus, both eyes were included in 31 patients. Among these,
185 28 patients either had a visual field defect in both eyes or in neither eye; only three
186 patients had a field defect in one eye but not in the other.

187 Of the 69 eyes in 38 patients, 33 had a normal VF (**group I**) with average MD -
188 0.96dB \pm 1.2, PSD 1.6dB \pm 0.3, and 36 had VF defects (**group II**) with MD -13.7dB
189 \pm 10.4, PSD 7.2dB \pm 3.6 (**Table 1**). VF defects in the latter group were non-specific in
190 6/36 eyes, either a nasal step or nerve fiber bundle defect in 16/36 eyes and a
191 concentric defect in 14/36 eyes. 64% of patients with a VF defect in one eye also had
192 a VF defect in their fellow eye.

193 Best-corrected visual acuity was slightly better in group I at 1.1 \pm 0.2 compared with
194 0.9 \pm 0.3 ($p = 0.003$). Differences in color vision did not reach statistical significance
195 (**Table 1**). *Global* RNFL thickness was 99.0 μ m \pm 12.9 in group I with none of the
196 individual patients having an abnormal global RNFL thickness compared with the
197 normative database of Heidelberg Spectralis. In patients with VF defects (group II),
198 global RNFL thickness was 62 μ m \pm 20.9 ($p < 0.001$) and 25/36 eyes (69%) had an
199 abnormal global RNFL ($p = 0.004$) (**Fig. 1 A and B**). Quantitative RNFL *sector*
200 analysis with measurement of absolute RNFL thicknesses showed thinner RNFL in

201 all sectors for group II, which reached statistical significance for all sectors (**Fig. 1 A**).
202 Qualitative RNFL sector analysis (**Fig. 1 B**) showed few eyes with abnormal sectors
203 in group I, whereas in group II, a majority of the eyes had atrophic sectors except for
204 the temporal sector. Differences in sector atrophy between group I and II reached
205 statistical significance except for the temporal sector. There seemed to be relative
206 sparing of the temporal sector in both groups.

207 We identified all three morphologic types of ONHD in our series: peripapillary ONHD
208 (hyperreflective), granular ONHD (hyperreflective) and confluent ONHD
209 (hyporefective) (**Fig. 2**). One single optic nerve head often showed more than one
210 type of ONHD. In that case, the predominant ONHD type was chosen for statistical
211 analysis. In group I, the predominant drusen type were peripapillary subretinal
212 masses, and drusen were of variable size. In group II, most eyes had large (>500um)
213 and confluent drusen. In line with these findings, ONHD extent was small in a
214 majority of group I patients and extensive in a majority of group II patients (**Table 1**).
215 Differences in ONHD type ($p=0.02$), size ($p=0.003$), and extent ($p=0.001$) reached
216 statistical significance. **Figure 3 A-C** plots mean deviation (MD) on 24-2 Humphrey
217 fields against different ONHD characteristics grouped for eyes without or with VF
218 defects. In eyes with VF defects, confluent drusen clearly show worst MD values and
219 there is a trend for worsening MD with increasing size and extent of the ONHD.

220 ONHD were visible in 11/33 eyes in group I compared with 30/36 in group II
221 ($p=0.001$). ONHD were detectable on ultrasound in 15/31 eyes and autofluorescent
222 in 11/31 eyes in group I compared to 30/36 ($p=0.013$) and 29/34 ($p=0.002$) in group
223 II, respectively (**Table 1, Fig. 3 D-F**). None of the eyes with only peripapillary ONHD
224 showed autofluorescence. There were three eyes with granular ONHD only, two of
225 those had positive autofluorescence. No eyes had exclusively confluent ONHD.

226 **Figure 4** shows an overlay of autofluorescence (AF)-positive images. AF images of
227 the left eye were laterally inverted in order to allow overlay of right and left optic
228 discs. **Figure 4 A** starts with those five optic discs each right and left with least
229 autofluorescence, stepwise adding another five right and five left AF images with
230 increasing AF areas. **Figure 4 D** finally shows a summation of all available AF-
231 positive images of our cohort. The sequence **A-D** corroborates the fact that there is
232 relative sparing of the temporal sector at least in an earlier stage of ONHD formation.

233

234 **Discussion**

235 Visual field (VF) defects are generally thought to be caused by impaired axonal
236 transport in an eye with a small scleral canal leading to gradual attrition of optic nerve
237 fibers, by direct compression by ONHD and/or ischemia within the optic nerve head⁵,
238 ^{6, 24}. Patients with ONHD-associated VF defects usually show a very slowly
239 progressive course of the disease. However, sudden VF loss even without disc
240 swelling has been described²⁵. In our study population, 64% of patients with a VF
241 defect in one eye also had a VF defect in their fellow eye.

242 Visual acuity, color vision and the central visual field as well as the temporal RNFL
243 are known to be least affected by ONHD^{17, 18} which was also true for our study.

244 Although the centro-caecal projection (papillomacular bundle)²⁶ is particularly
245 vulnerable in most optic neuropathies, there is relative sparing of the latter with
246 ONHD. The same is true for glaucoma and papilloedema. Not surprisingly, all three
247 conditions also share the same pattern of RNFL loss. **Figure 4 A-D** illustrates that in
248 the case of ONHD this is not only a matter of relative susceptibility of nerve fibers in
249 different sectors of the optic nerve head. Overlay of the autofluorescence pictures
250 demonstrates that ONHD do not tend to form in the temporal sector of the optic nerve

251 head unless there is extensive involvement. In the context of glaucoma, regional
252 differences of the lamina cribrosa structure are believed to affect the susceptibility of
253 axons to glaucomatous damage. Larger pores and thinner connective tissue were
254 found in the superior and inferior parts of the lamina cribrosa and might offer less
255 structural support for optic nerve axons as compared to the temporal and nasal
256 part.^{27, 28} Interestingly, Ogden et al. also found a naso-temporal difference with
257 smaller pores in the temporal part²⁹. In a similar way, the axoplasmatic transport
258 which is involved in the pathophysiology of both ONHD and papilloedema might be
259 differently affected by the lamina cribrosa structure. More structural support in the
260 temporal sector might protect the temporal sector from axoplasmatic stasis and might
261 thus protect central vision.

262 Visual field loss is more often associated with visible ONHD^{5, 15, 30, 31}. Sato et al.³²
263 published a case series of 15 patients showing a negative correlation between
264 drusen diameter and autofluorescence area with RNFL thickness. Our study
265 corroborates this finding. The data presented here not only provide structure-
266 structure correlation but also structure-function correlation in that visible,
267 autofluorescent and ultrasound-positive ONHD were significantly more common in
268 eyes with VF defects. Moreover, ONHD size and type were relevant with regard to
269 VF function meaning that most eyes had large (>500um) and/or confluent drusen in
270 group II which we conclude reflects the severity of the disease.

271 Sixteen eyes had evidence only of peripapillary ONHD. These eyes were both
272 autofluorescence- and ultrasound-negative. Peripapillary drusen also were the
273 predominant drusen type in patients with normal VF. Thus the question arises
274 whether or not these OCT structures truly are ONHD? On histologic sections similar
275 structures have been described as peripapillary retinal scarring by Friedman et al.³³

276 **(Fig. 5)**. However, the fact that we found confluent drusen within peripapillary drusen
277 in our patients seems to corroborate the assumption that peripapillary drusen are
278 possibly an early or parallel form of ONHD. We hypothesize that the different OCT
279 morphologies of ONHD correspond to the pathogenesis cascade with peripapillary
280 ONHD indicating axonal stasis as an initial step of ONHD formation. Calcified
281 mitochondria released into the extracellular space then become apparent as granular
282 hyperreflective structures on OCT³⁴ until further deposition of calcium on the surface
283 of these nidi leads to formation large confluent drusen. Of note, a great majority of
284 the eyes had evidence of peripapillary ONHD on OCT (group I 29/33, group II 29/36;
285 **Table 1**), however, in group II this was not the predominant drusen type. It seems
286 counterintuitive that large calcified drusen become *hyporefective* on OCT. However,
287 Yi et al.³⁵ were able to correlate hyporefective drusen on OCT with histology in the
288 same patient who sadly underwent exenteration for a melanoma. Slotnik and
289 Sherman¹⁴ suggested that a lack of change in the index of refraction leads to this
290 hyporefective appearance.

291 To conclude, we have identified three morphological types of ONHD on EDI SD-OCT.
292 1) Peripapillary subretinal hyperreflective drusen, 2) granular hyperreflective drusen,
293 and 3) confluent hyporefective drusen. ONHD that are larger and of the confluent
294 hyporefective type are more commonly found in patients with field defects, whereas
295 field defects are rare in patients with peripapillary subretinal drusen. Thus, other
296 causes must be ruled out if field defects are detected in patients with peripapillary
297 subretinal ONHD only. In patients with field defects, ONHD are also more frequently
298 visible on funduscopy, autofluorescence and ultrasound. 64% of patients with a VF
299 defect in one eye had a VF defect in their fellow eye. Our data show relative temporal
300 sparing of both RNFL and autofluorescence which possibly explains how drusen

301 produce visual field and not acuity loss. For future research, EDI SD-OCT may assist

302 in clarifying how drusen give rise to visual field loss which is currently not known.

303

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- 391

392 **Legends**

393 Table 1

394 Clinical and EDI SD-OCT features of eyes without (group I) or with (group II) visual
395 field defects. In group I, both ultrasound and autofluorescence were not available for
396 two eyes each. In group II, autofluorescence was not available for five eyes.

397 n: number of eyes, MD: mean deviation, PSD: pattern standard deviation, BCVA:
398 best corrected visual acuity, Ishihara: color vision, RNFL: global retinal nerve fiber
399 layer thickness, abnormal RNFL: eyes with abnormal global RNFL, ONHD: optic
400 nerve head drusen, +Funduscopy: ratio of eyes with visible ONHD, remaining
401 patients had burried ONHD, +Ultrasound: ratio of eyes with gross ONHD on
402 ultrasound, +Autofluorescence: ratio of eyes with autofluorescent ONHD.

403

404 Figure 1

405 **A:** Comparison of group I and II with regard to RNFL thickness [μm] of the global
406 RNFL and the different RNFL sectors. Both the global RNFL and all RNFL sectors
407 were statistically significantly thinner in group II.

408 **B:** Relative number of eyes in both groups with abnormally thin RNFL sectors
409 compared to the normative database of Heidelberg Spectralis (Heidelberg
410 Engineering GmbH, Heidelberg, Germany). In group I, RNFL sector analysis showed
411 few eyes with atrophy of the nasal, inferonasal, inferotemporal, superotemporal and
412 superonasal sectors, whereas in group II more than half of the eyes had abnormal
413 sectors nasally and more than two third of the eyes had abnormal sectors
414 inferotemporally, superotemporally, superonasally as well as globally. Differences in
415 abnormal sector thickness between group I and II reached statistical significance
416 except for the temporal sector.

417 G: global RNFL; N: nasal, NI: inferonasal, TI: inferotemporal, T: temporal, TS:
418 superotemporal, NS: superonasal sector

419

420 Figure 2

421 Three different types of ONHD were identified on EDI SD-OCT. **A)** peripapillary
422 subretinal hyperreflective drusen (box: scanning laser ophthalmoscopy (SLO) image
423 of the optic disc; the horizontal green line shows the peripapillary location of the OCT
424 B-scan) **B)** granular hyperreflective drusen, **C)** confluent hyporefective drusen. Often
425 more than one type of ONHD was detected in one eye. **D-F** shows the corresponding
426 histologic sections of the different ONHD types. However, there is a doubt whether
427 section **D** really represents drusen tissue. In the original publication it has been
428 described as peripapillary scarring.

429 **D** and **E** reproduced from Friedman et al.³³ with permission from BMJ Publishing
430 Group Ltd. (Licence has to be obtained once the article is accepted and ready for
431 publication.), and **F** reprinted from Tso⁶ with permission from Elsevier.

432

433 Figure 3

434 All graphs (**A-F**) show the 24-2 Humphrey visual field index mean deviation (MD) on
435 the y-axis plotted against different drusen characteristics grouped for eyes without
436 (group I, circle) or with (group II, square) visual field defects. Whiskers indicate the
437 95% confidence interval. **A)** Group II patients with the confluent drusen type had the
438 highest MD indicating the most severely impaired visual fields. Interestingly, group I
439 patients could also have confluent drusen despite having normal visual fields. This is
440 likely explained by differences in drusen size between group I and II. Peripapillary
441 and granular drusen had a similar MD in group II. **B)** After Lee et al.²³, drusen size

442 was categorized as small (< 300µm), medium (300-500µm), large (> 500µm) based
443 on the maximum drusen diameter on OCT. Large ONHD are associated with worse
444 MD in group II. **C)** Drusen extent is an approximation of drusen volume. An
445 experienced ophthalmologist rated the ratio [drusen volume / optic nerve head
446 volume] as minimal [<10%], small [<50%], moderate [>50%], large [>75%], extensive
447 [>90%] based on the EDI optic nerve head volume scan. In group II patients, MD
448 gets progressively worse as a function of increasing drusen volume. **D-F)** In group II,
449 visible drusen (**D**), ultrasound positive drusen (**E**), and autofluorescent drusen (**F**) are
450 associated with worse MD.

451

452 Figure 4

453 Overlay of autofluorescence (AF)-positive images. AF-positive images of the right and
454 left eye respectively were put into an order of increasing AF area and then overlaid
455 in groups of five. AF images of the left eye were laterally inverted in order to allow
456 overlay of right and left optic discs. **Figure 4 A** starts with those five optic discs each
457 right and left with least autofluorescence. In **figure 4 B** another five right and five left
458 AF images were superimposed, which was repeated in **figure 4 C** with further AF
459 images of increasing AF area. **Figure 4 D** finally shows a summation of all available
460 AF-positive images of our cohort. The sequence **A-D** corroborates the fact that there
461 is relative sparing of the temporal sector at least in an earlier stage of ONHD
462 formation.

463

464 Figure 5

465 EDI SD-OCT image with evidence of confluent ONHD (arrow head) within a
466 peripapillary subretinal ONHD (arrow).

