Table 1. Macular thickness: segmentation analysis.

	AD	Controls	p-value*
Macular volume (mm^3)	8.51 (0.40)	8.69 (0.21)	0.146
Total macular thickness			
Fovea	280.47 (18.00)	281.867 (17.19)	0.853
Inner ring	339.63 (11.33)	343.69 (9.00)	0.286
Outer ring	292.67 (11.46)	297.30 (8.34)	0.216
RNFL			
Fovea	12.70 (2.07)	13.17 (1.68)	0.503
Inner ring	21.92 (1.91)	21.81 (1.73)	0.872
Outer ring	34.17 (3.33)	35.57 (3.92)	0.303
GCL			
Fovea	15.47 (3.90)	15.67 (3.36)	0.881
Inner ring	50.73 (2.99)	51.26 (2.83)	0.620
Outer ring	34.47 (2.16)	35.05 (2.02)	0.456
IPL			
Fovea	21.67 (3.72)	22.00 (3.39)	0.799
Inner ring	41.55 (1.90)	41.88 (2.05)	0.648
Outer ring	28.57 (1.62)	28.94 (1.47)	0.512
INL			
Fovea	22.33 (5.74)	21.57 (3.57)	0.664
Inner ring	41.18 (2.87)	40.91 (2.63)	0.786
Outer ring	32.47 (1.62)	32.54 (1.56)	0.902
OPL			
Fovea	26.93 (4.66)	25.87 (3.40)	0.480
Inner ring	32.39 (4.30)	33.49 (3.30)	0.439
Outer ring	27.28 (1.97)	27.78 (2.23)	0.515
ONL			
Fovea	94.97 (11.05)	97.13 (8.48)	0.552
Inner ring	70.21 (8.66)	72.71 (6.78)	0.386
Outer ring	56.54 (6.81)	58.68 (5.92)	0.367
RPE			
Fovea	16.50 (1.31)	16.30 (1.10)	0.654
Inner ring	15.18 (0.60)	15.58 (1.39)	0.323
Outer ring	13.50 (0.70)	13.78 (1.30)	0.476

Retinal thickness in μm (SD) in the macula of all individual layers and macular volume do not significantly differ between 15 patients with AD and 15 controls.
* Independent sample *t*-test.
AD = Alzheimer's disease, GCL = ganglion cell layer, INL = inner nuclear layer, IPL = inner plexiform layer, ONL = outer nuclear layer, OPL = outer plexiform layer, RNFL = retinal nerve fibre layer, RPE = retinal pigment epithelium. Inner ring = ETDRS regions 2-5, Outer ring = ETDRS regions 6-9.

do we know of such an interpretation within the Heidelberg software.

We are concerned that the automated segmentation and/or its interpretation did not provide valid data on the exact layer thickness in micrometre and are reluctant to accept conclusions drawn from these numbers. The main finding of correlation between GCL thickness and disease severity remains, in our opinion, therefore doubtful. Reanalysis and interpretation of the data are highly recommended.

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Success of ophthalmic pharmaceutical start-up companies

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Dear Editor

An ageing population worldwide, coupled with a higher occurrence of eye conditions and diseases such as diabetic retinopathy, dry eye, glaucoma and age-related macular degeneration, has resulted in increased growth in the ophthalmic pharmaceutical market. Despite the obvious need for medicines, developing a new medicine is a risky business as well as costly in time and finances. It takes an average of 10 years for a new medicine to arrive to market (Phrma 2015). The average cost to develop a medicine is estimated to be $2.5–5 billion with the overall probability of clinical success (drug approval) estimated to be 10–12% (Herper 2013; Millman 2014; Phrma 2015).

A recent study examined ophthalmic pharmaceutical start-ups and found only 20% were able to licence their product after 4–15 years of existence (Stewart et al. 2013a). Further when ophthalmic CEOs and Board of Director members were surveyed regarding the challenges facing device and pharmaceutical start-ups, they noted many financing and regulatory burdens made it difficult to bring new products to market (Stewart et al. 2013b).

A recent review of ophthalmic pharmaceutical and device companies with a new product in development showed a concentration of effort into relatively few indications (Sharpe et al. 2015). The purpose of this study was to examine the outcomes of ophthalmic start-ups followed over 5 years to determine the success rate and factors associated with success.

The companies followed in this study came from an existing database of 190 ophthalmic companies with a new product in development (Sharpe et al. 2015). The subanalysis included mid-sized companies (<200 employees) developing an ophthalmic pharmaceutical or device with information available online in English.

Baseline, follow-up and exit (licence/sale of products, or sale of company) details were retrieved from company websites and/or general Internet searches. If exit details could not be found and there was no active website, the company was considered out of business.

Companies were classified as follows: 'unsuccessful' if they were no longer in business (could not be found online) or left ophthalmology; 'unchanged' if there was no successful financial exit, but still developing the product; or 'success' if the company was acquired, a product was acquired, the company went public or the company was purchased.

The study followed 63 ophthalmic companies of which, after 5 years of follow-up, there were three categories: unsuccessful (19%), unchanged (43%) and successful (38%). Data are summarized in Table 1.

Statistically more unsuccessful companies (92%) were private versus public compared to unchanged (81%) and successful companies (42%; $p = 0.001$). Other measures did not show a statistical difference for success, including clinical indication, products per company, time in business, CEO retention, geographic location, device or pharmaceutical product, or development phase ($p > 0.05$).

The number of companies that apparently failed in ophthalmology over 5 years was only 19% while 38% had a successful licence or exit. This contrasts to a prior report of 20% success (Stewart et al. 2013a). This success rate compares favourably with other therapeutic areas and their start-up success rates, usually noted around 10–12% (rates for autoimmune, endocrine and infectious diseases) (Berkrot 2011).

The one statistical difference found, companies who went public were more successful, is not a surprise as it was probably their success that led to the initial public offering. The other measures did not show a statistical difference in this study, but they differ, at least in 'time to exit', compared to a prior report showing a statistical difference at exit in most companies that were <5 years in business (Stewart et al. 2013a). Our current finding may indicate the usefulness of extending development beyond 5 years.

Ophthalmic start-up companies have a reasonable chance of exiting their product, perhaps easier than other indications, although success factors are difficult to determine. Additional research is needed to understand more fully the reasons for success or failure of start-ups.

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Table 1. Summary of companies evaluated over 5 years.

	Details	Unsuccessful	Unchanged	Successful	p-value
Companies		12	27	24	
Products in development		16	39	34	
Products discontinued		16	5	13	
Product type	Pharmaceutical	13	26	47	0.49
	Device	3	13	16	
Indication*	Glaucoma	3	7	21	0.09
	AMD-wet	4	8	13	
	Dry eye	3	4	8	
	AMD-dry	0	6	3	
	DME	0	3	3	
	Uveitis	0	1	5	
	AMD-both	0	2	1	
	CRVO	1	1	0	
	Presbyopia	0	2	0	
	Conjunctivitis	0	0	2	
Phase	Preclinical	9	9	16	0.07
	Phase I/II	7	23	33	
	Phase III	0	4	10	
	Phase IV	0	1	0	
	FDA approved	0	2	1	
	Unknown	0	0	3	
Years in business	<5	3	0	1	0.08
	5–10	4	11	8	
	11>	5	16	15	
Location	USA	9	19	18	0.92
	Other	3	8	6	
CEO	Original	10	18	14	0.30
	Changed	2	9	10	
Stock	Private	11	22	10	0.001
	Public	1	5	14	

* Indications with 1 incidence ($n = 17$) are not shown in the table.

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