

## LASIK outcomes with SCHWIND AMARIS® 1050RS Three-month clinical results

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### Introduction

The AMARIS product family has a new addition. The SCHWIND AMARIS 1050RS is the new flagship, which is among the leading excimer laser technologies today. It is the only excimer laser system available in the market to operate at 1050 Hz, leading to an extremely short ablation time of just 1.3 seconds per dioptre<sup>1</sup>. Another innovative feature of the SCHWIND AMARIS 1050RS is active 7D eye tracking in space and time. With this feature, eye movements occurring during the period between acquisition of the eye-tracker image and triggering of the subsequent laser pulses are anticipated and pre-compensated. This results in zero latency time for the laser system, which means even greater safety during laser treatment. A recent study proves that results obtained with SCHWIND AMARIS 1050 RS are very precise and predictable.

### Methods

- All LASIK procedures were performed with the SCHWIND AMARIS 1050RS using the SCHWIND CAM "Aberration-free" treatment.
- The optical zone ranged from 6.30 mm to 8.00 mm.
- All data from 114 eyes were analysed for a postoperative period of three months.

- Preoperative refraction:  
SEQ: -0.75 D to -7.88 D  
Sphere: -0.50 D to -7.25 D  
Cylinder: up to 3.50 D

### Results

#### Scattergram

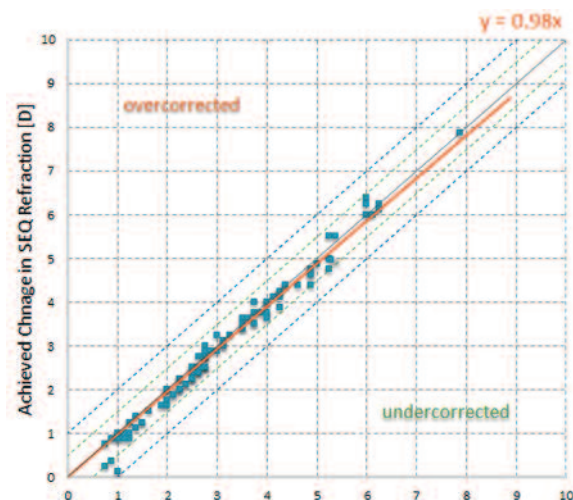


Figure 1: Predictability attempted vs. achieved SEQ in 114 eyes.

Figure 1 shows attempted refraction [D] vs. achieved refractive change for each single eye at three months postoperative.

<sup>1</sup>Myopia, without astigmatism, 12.5 mm vertex distance and 6 mm optical zone

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The narrow scatter between attempted and achieved change in SEQ (spherical equivalent) at three months is obvious. The mean post-operative SEQ was  $+0.02\text{ D} \pm 0.27\text{ D}$ .

### Refractive outcome

Figure 2 displays the refractive outcome in terms of spherical equivalent (SEQ). An impressive 54% of all 114 evaluated eyes were in the range of  $\pm 0.125\text{ D}$  and 99% were within  $\pm 0.50\text{ D}$  in terms of SEQ.

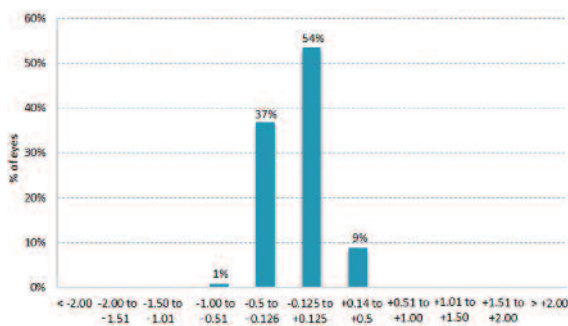


Figure 2: Refractive outcome within attempted SEQ [D], 114 eyes

### Change in BSCVA-safety

Safety is described by the change in best spectacle corrected visual acuity (BSCVA) measured by the gain or loss of Snellen lines from preoperative to postoperative. At three months, 55% of all evaluated eyes gained one or more Snellen lines. No patient lost more than one Snellen line in terms of BSCVA (see figure 3).

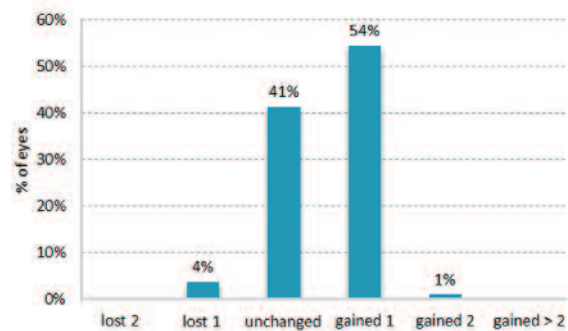


Figure 3: Change in BSCVA-safety, 114 eyes

### Preop. BSCVA versus postop. UCVA

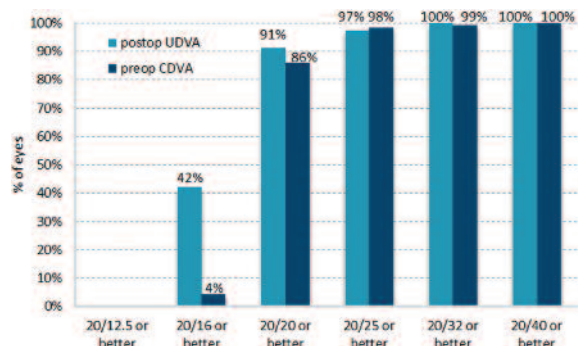


Figure 4: Preop. BSCVA vs. postop. UCVA – Percentage, 114 eyes

Figure 4 displays the preoperative best spectacle corrected visual acuity (BSCVA) vs. the postoperative uncorrected visual acuity (UCVA) at three months. It shows that post-operatively 42% of all treated eyes have an uncorrected visual acuity (UCVA) of 20/16 or better.

In summary a significant change towards an improved visual acuity is clearly obvious.

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**Astigmatism**

Figure 5 shows the refractive astigmatism preoperatively and three months postoperatively.

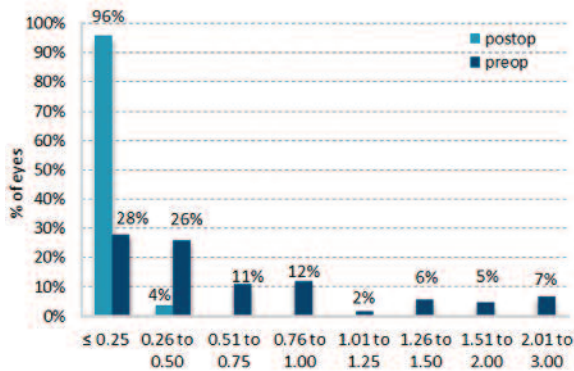


Figure 5: Refractive astigmatism [D] preoperative and three months postoperative, 114 eyes

The mean postoperative cylinder was -0.10 D ±0.19 D. In general, a significant reduction in refractive astigmatism is obvious. Postoperatively, 96% of all treated eyes have a refractive astigmatism of equal to or smaller than 0.25 D. All eyes are within +/- 0.5 D of astigmatism.

**Achieved correction over time – stability**

The stability of the results for the follow up examinations of one month and three months in figure 6 shows the highly successful rate.

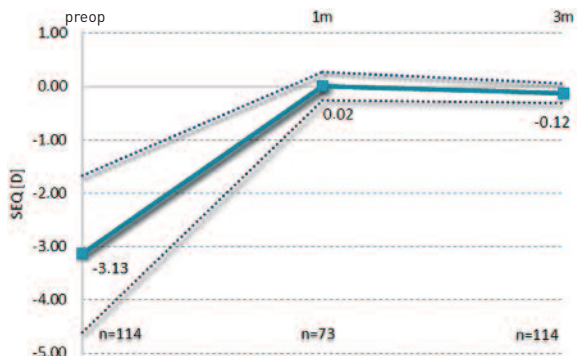


Figure 6: Stability timeline of the spherical equivalent, 114 eyes

**Aberrations**

When a patient is selected for non-customised aspherical treatment, the global aim of the surgeon should be to leave any existing higher order aberrations (HO) unchanged because the best corrected visual acuity, in such patients, is unaffected by the pre-existing aberrations. Hence, all factors that may induce HO, such as biomechanics, need to be taken into account prior to the treatment to ensure that the preoperative HO are unchanged after treatment.

The change in spherical aberration, horizontal and vertical coma, horizontal and vertical trefoil and average value for higher order aberrations (RMS HO) was analysed at a zone of 6 mm for all eyes in which pre- and post-operative topographies were available (see figure 7).

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The mean change from preoperative to three months was +0.016  $\mu\text{m}$  for spherical aberration ( $p = 0.10$ ), -0.048  $\mu\text{m}$  for vertical coma ( $p < 0.05$ ), -0.045  $\mu\text{m}$  for horizontal coma ( $p < 0.05$ ), +0.059  $\mu\text{m}$  for vertical trefoil ( $p < 0.05$ ), -0.020  $\mu\text{m}$  for horizontal trefoil ( $p = 0.413$ ) and -0.157  $\mu\text{m}$  for RMS HO ( $p < 0.05$ ). The change in spherical aberration and horizontal trefoil appeared to be not statistically significant. RMS HO was reduced slightly, although targeting for no change in higher order aberrations.

As far as our experience goes, the amount of induced corneal spherical aberration in

“Aberration-free” LASIK is clearly lower compared to other published articles. In wavefront-guided ablation, the objective is not only to reduce the induction but also to reduce the aberration of the eye. In the case of aspheric “Aberration-free” treatment the aim is to remodel the slope of the cornea to compensate for the attempted sphere and cylinder components, without inducing new aberrations.

In summary the results of the aberration analysis prove the minimum induction of aberrations with “Aberration-free” profile.

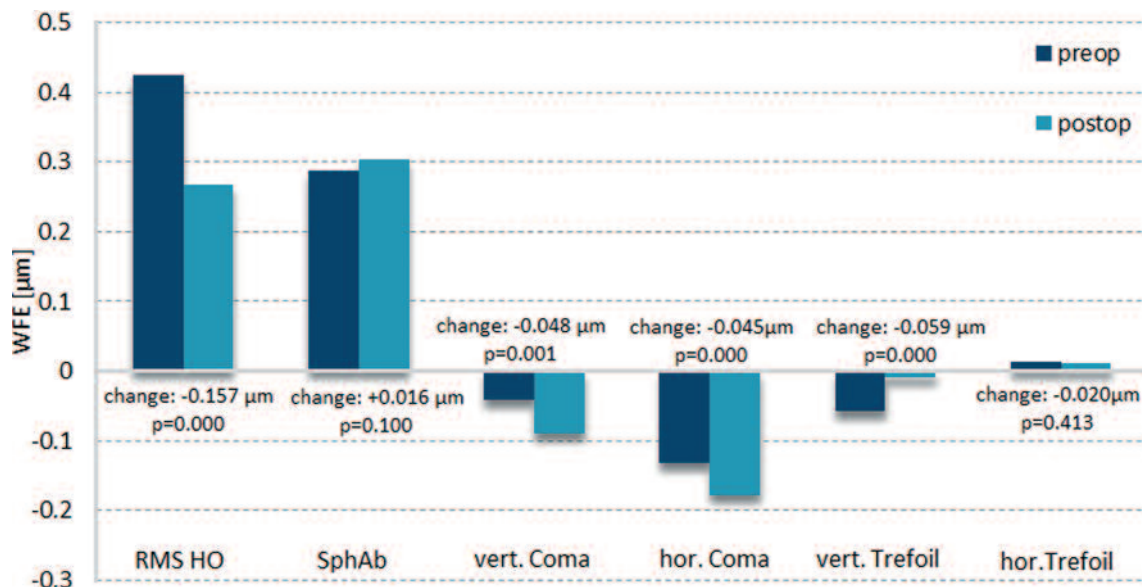


Figure 7: Corneal aberrations preoperative and three months postoperative, analysis diameter 6mm, 114 eyes