

# Treatment of presbyopia with Laser Blended Vision to provide a continuous range of quality vision

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## CASE HISTORY

A 53-year-old male engineer presented requesting a solution that would give him spectacle independence for all of his vision needs. He was a low myope with a manifest refraction (sphere, cylinder, and axis) of -0.5 -1.5 D x 179 OD and -1.0 -1.0 x 3 OS. His BCVA was 1.0 OU.

The patient was using varifocal glasses to correct his ametropia and presbyopia and stated that he was bothered wearing his glasses when using his computer for work and while participating in his leisure activities.

The patient was informed about the possible treatment options that included clear lens exchange with implantation of a trifocal intraocular lens, corneal inlays, or excimer laser corneal surgery using PRESBYOND® Laser Blended Vision (Carl Zeiss Meditec AG, Jena, Germany). The patient stated he did not want to have a clear lens exchange and chose PRESBYOND Laser Blended Vision.

## PREOPERATIVE ASSESSMENT

The diagnostic evaluation for patients who are interested in PRESBYOND Laser Blended Vision includes tests to evaluate their suitability for the procedure and to obtain measurements for surgical planning. The assessments include objective and subjective refraction, Schirmer test, IOP and corneal biomechanics (Corvis® ST tonometry, OCULUS Optikgeräte GmbH, Wetzlar, Germany), Purkinje reflex, corneal topography (ATLAS 9000, Carl Zeiss Meditec AG, Jena, Germany), and corneal pachymetry, tomography, and topography (Pentacam®, OCULUS Optikgeräte GmbH, Wetzlar, Germany). Wavefront aberrometry and pupil diameter are also determined, and patients undergo testing to determine eye dominance and tolerance to anisometropia of up to -1.5 D.

The patient was determined to be a very good candidate for PRESBYOND Laser Blended Vision. He had no contraindications to LASIK, his dominant eye was his right eye, and he tolerated 1.5 D of anisometropia.

## TREATMENT

The treatment was planned using the CRS-Master® (Carl Zeiss Meditec AG, Jena, Germany). Flaps with a thick-

ness of 110 µm OU in both eyes were created using the VisuMax® femtosecond laser (Carl Zeiss Meditec AG, Jena, Germany). The ablation was performed using the MEL® 90 excimer laser (Carl Zeiss Meditec AG, Jena, Germany) with the following parameters: optical zone 6.5 mm OU; and residual stroma 293 µm OU. The right eye was targeted for 0.0 D (plano) and the left eye was targeted for -1.5 D.

## OUTCOME

The surgery was completed uneventfully, and the patient had no postoperative complications. The table summarizes the findings from measurements of refraction and binocular distance UCVA (UCDVA) at follow-up visits through 1 year after surgery. The serial assessments showed his subjective refraction remained stable from 1 week to 1 year. The patient had no loss of BCVA at any visit.

Visit	Refraction		UCDVA
	OD (Dominant eye)	OS (Non-dominant eye)	
Week 1	+0.25 -0.5 x 125	-2.25 -0.25 x 155	1.0
Month 3	+0.25 -0.25 x 155	-1.75 -0.5 x 152	1.0
Month 12	+0.00 -0.5 x 170	-1.75 -0.75 x 160	1.0

Table. Postoperative refraction and binocular UCDVA

The patient said that he was very glad that he made the decision to have PRESBYOND Laser Blended Vision. He reported that he was spectacle independent at all distances and stated that he was particularly happy that he was now able to work at his computer, use his mobile phone, and read books and newspapers without glasses. When asked about his vision for driving, he reported he had no problems, even at night.

## DISCUSSION

PRESBYOND Laser Blended Vision is a LASIK approach to the treatment of presbyopic patients that is performed using the MEL 80 or MEL 90 excimer laser and proprietary planning software for the CRS-Master work-

station. The procedure compensates for presbyopia by combining micro-monovision with a non-linear aspheric ablation profile that induces spherical aberration to increase depth of field, and it has many advantages compared with other surgical approaches for reducing spectacle dependence in presbyopic patients.

PRESBYOND Laser Blended Vision is more attractive than clear lens exchange for many patients because it is less invasive and avoids the risks of intraocular surgery. Unlike corneal inlay procedures, PRESBYOND Laser Blended Vision is suitable for patients with a broad spectrum of refractive errors, including emmetropes and patients with  $\leq -8.0$  D of myopia,  $\leq +2.0$  D of hyperopia, and  $\leq 2.0$  D of astigmatism. Because of the induced spherical aberration, PRESBYOND Laser Blended Vision provides good near vision with less anisometropia than traditional monovision. Due to the lower level of anisometropia, a much higher percentage of patients are able to tolerate micro-monovision (concept of PRESBYOND) compared with traditional monovision. In addition, compared with other LASIK approaches that create monovision or a multifocal cornea, PRESBYOND Laser Blended Vision provides a continuous range of vision from near to far, and it aims for the preservation of stereoacuity, contrast sensitivity, and quality of vision.

For the surgery, the dominant eye is targeted for plano and the non-dominant eye is made slightly myopic. The optical zone is determined based on pupil size, and taking into account spherical aberrations and the functional age of the eye, the planning software generates a wavefront-optimized, nonlinear aspheric ablation profile to create a continuous refractive power gradient for the entire optical zone.

The result of the treatment is that the dominant eye is focused for distance vision and the non-dominant eye for near vision, but because of the increased depth of field provided by the nonlinear aspheric profile, each eye also achieves some intermediate vision. The overlap between fellow eyes in the intermediate vision range results in a “blend zone” instead of the “blur zone” that occurs with traditional monovision. The overlap in intermediate vision makes it easier for the brain to merge the images of both eyes. In other words, patients benefit from maintaining stereoacuity.

My personal experience with PRESBYOND Laser Blended Vision is consistent with published results showing that it is associated with excellent uncorrected vision. Studies from Dan Reinstein, MD, who developed the treatment, show that binocular distance UCVA of 20/20 or better and near UCVA of J2 or better was achieved by 95% of myopic patients, 77% of hyperopic patients, and

95% of emmetropes.<sup>1-3</sup> Patient satisfaction rates are also high, although if a patient is unhappy for any reason, the treatment can be reversed with spectacle wear or even with another laser procedure. Future enhancement is also possible to adjust for progressive presbyopia.

## CONCLUSION

I have been using PRESBYOND Laser Blended Vision successfully in my practice to treat presbyopia in patients without cataract for 1.5 years, and it is a good choice for refractive surgeons who are already performing Femto-LASIK because it requires no new skills. As with any elective surgery, however, achieving good outcomes depends on conducting a careful preoperative evaluation to ensure that the patient is a suitable candidate and to obtain precise measurements to plan the treatment.

Patient education about the course of visual recovery is also critical. Although patients can experience good uncorrected vision on the first day after surgery, they need to understand that there may be some vision fluctuation initially while their eye heals and that it may take some time for their brain to adapt to their new vision. In my experience, well-informed patients have appropriate expectations and are very satisfied with the functional outcomes they have achieved.

**Dr. medic Liliana Bányai:** with more than 35,000 laser eye surgeries Doctor-medic Bányai is a recognized expert in ophthalmic surgery. She is Medical Director and Lead Surgeon of Augenlaserzentrum Bányai in Leonberg, and three other locations in the south of Germany. She is not a paid consultant for Carl Zeiss Meditec AG.



## References

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