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## MEL 90 EXCIMER LASER



Proven experience and exciting  
advancement intelligently  
combined



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**BY PETTER MONTAGU-PETTERSEN, MD**

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# Flexibility and Function of the MEL 90

The FLEXIQUENCE switch function allows surgeons to choose between 250- and 500-Hz repetition rates.

**BY SRI GANESH, MBBS, MS, DNB**

In my 18 years in refractive surgery practice, I have used many excimer and femtosecond laser systems. Although I began my career performing LASIK with the LSX excimer laser (LaserSight; no longer available) in 1996, over the years I switched to different technologies and have strived to incorporate the latest procedures in order to remain on the cutting edge of care.

The excimer laser platforms I have experience with include the original Bausch + Lomb 217 (now Bausch + Lomb Technolas), the Zyoptix Z100 (Bausch + Lomb Technolas), the Visx Star S4 (Abbott Medical Optics), the Amaris 750 (Schwind eye-tech-solutions), and the MEL 90 (Carl Zeiss Meditec).

I transitioned from LASIK with mechanical microkera-

tones to femtosecond LASIK (Femto-LASIK) in 2008, first with the IntraLase (Abbott Medical Optics) and then with the VisuMax (Carl Zeiss Meditec). Most recently, I began performing ReLEx SMILE procedures in 2012 and acquired the MEL 90 workstation once it became available. The combination of the VisuMax femtosecond system and MEL 90 excimer laser allows me to offer the latest and most sophisticated technology to my patients.

## THE NEXT GENERATION OF EXCIMER LASER TECHNOLOGY

In addition to being built on the proven performance of the MEL 80 excimer laser—including its flying spot, Gaussian beam profile, and high frequency eye tracker—what sold me

on the MEL 90 is its variety of new features. Of special interest is the PRESBYOND Laser Blended Vision software and the option for topography-guided treatment. Both of these are only available with the MEL 90 and MEL 80 platforms, in conjunction with the CRS-Master treatment-planning workstation (Carl Zeiss Meditec).

MEL 90 is the next generation in excimer laser technology. It is not only one of the fastest ophthalmic excimer lasers in the world, but some of its newest features make refractive correction even safer and more predictable than ever before. This translates into improved visual outcomes for our patients and, as a result, more word-of-mouth referrals.

### FLEXIQUENCE

Another advantage of the MEL 90 is the new FLEXIQUENCE switch function. This software gives me the freedom to choose between 250- and 500-Hz repetition rates for maximum flexibility and preference. I prefer to use the faster of the two repetition rates for standard spherocylindrical (SCA) LASIK and the slower for surface ablation.

Ablations produced with the laser set to the 500-Hz repetition rate are applied directly to the cornea. As a result, refractive errors are corrected in a shorter operating time than those corrected with the 250-Hz repetition rate. This has the potential to reduce the laser's influence on corneal stromal dehydration, flap shrinking, and patient fixation fatigue.

Other technical advantages related to the FLEXIQUENCE switch function include an intelligent plume removal system for consistent atmospheric conditions and, thus, predictable outcomes; a fast eye tracker with a short response time; an evacuated beam path, eliminating the need for flushing gas; and a fast and simple fluence test procedure.

### TRIPLE-A PROFILE

The Triple-A—Advanced Ablation Algorithm—profile of the MEL 90 combines the tissue-saving properties of the profiles available with the MEL 80, the Tissue Saving Algorithm (TSA) and the aspherical optimization properties of the Aberration Smart Ablation (ASA), allowing me to use Triple-A for almost every Femto-LASIK treatment, with the exceptions of presbyopic LASIK and customized treatments.

Because the Triple-A treatment profile is aspherically optimized and fits all SCA treatments, treatment planning is easy, accurate for both smaller and larger corrections, and highly predictable for astigmatism correction. This translates into rapid visual recovery, stable results, and low rates of retreatment.

### SET-UP AND WORKFLOW

The design of the MEL 90 perfectly pairs with the VisuMax femtosecond laser, allowing easy and seamless

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data transfer. Additionally, constant atmospheric conditions are maintained with the laser's cone for controlled atmosphere (CCA+) unit, as the airflow automatically and intelligently adapts to either 250 or 500 Hz. The MEL 90 laser is also ergonomically designed, and the user can tilt and position the computer screen in x-, y-, and z-axes according to his or her preferences, ensuring that all functions are always within reach.

The graphical user interface (GUI) of the MEL 90 is user friendly, with the option to incorporate an individually positioned assistant touchscreen. This optional screen allows optimum adaptation to clinic-specific workflow, surgical processes, and space requirements. The GUI can be viewed on both screens or kept on the main screen only, with video playing on the assistant screen.

This flexible set-up can be adapted to any operating room requirements and teamwork specifics. Additionally, the advanced features of the GUI help to ensure a short overall procedure time and a hassle-free and smooth workflow.

### A BENEFICIAL PARTNERSHIP

I am one of the first surgeons in India to own the MEL 90. In my experience, the diagnostics, workflow, safety, and refractive results that this technology provides is superior to the other platforms I have experience with.

I decided long ago to partner with Carl Zeiss Meditec, as the company is a leader in optics and laser technology and has unique solutions to offer. In addition to the MEL 90, I have also used the company's microscopes, field analyzer, and IOLs for the past 15 years. The service and support extended by ZEISS have been exemplary, and the company has kept my equipment functioning well with minimum downtime. The academic, scientific, and research support I have received from ZEISS has helped my institution to grow, and the company continues to be my preferred partner of choice. ■

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# Advantages of the MEL 90 Excimer Laser

Proven experience and new advancements help to set this platform apart from others.

BY PETER BRINCKER, MD

At the time I started practicing refractive surgery, only two excimer lasers were commercially available. In 1989, only one of these platforms, the MEL 60 (Carl Zeiss Meditec), was introduced and approved by the University Eye Department in Aarhus, Denmark, where I was practicing. Although my initial choice to use this laser was one of convenience, over the years I have remained with the MEL technology (Figure 1) because of the excellent experience I have had in terms of clinical results and customer service.

## PREVIOUS GENERATIONS OF THE MEL LASER

When it was released, the new advances offered with the MEL 70, namely incorporation of the Topography Supported Custom Ablation (TOSCA) treatment profile and Wavefront Supported Custom Ablation (WASCA) Analyzer, allowed me to become much more precise with my postoperative outcomes.

The next generation of the excimer laser was the MEL 80, and the most impressive update to this technology was its fast eye tracker, which allowed me to treat a wider range of patients with 3.00 to -12.00 D of refractive errors. I still felt that it was the best technology on the market, as it was specifically designed to make refractive surgery even safer, efficient, and customizable. Other key developments with the MEL 80 included its high ablation rate and individual treatment planning with the optional CRS-Master (Carl Zeiss Meditec). It also had a wide range of applications like conventional and femtosecond LASIK (Femto-LASIK), PRESBYOND Laser Blended Vision, topography-guided treatments, PRK, LASEK, and phototherapeutic keratectomy.

## A NEW MILESTONE

MEL 90, a new milestone in the further development of the MEL excimer laser line, carries the legacy of the MEL technology forward to the next level. It is specifically designed for the modern refractive surgeon.

I received one of the first MEL 90 lasers and used it for about 6 months before purchasing it. It is not only fast and reliable, but the Triple-A—Advanced Ablation

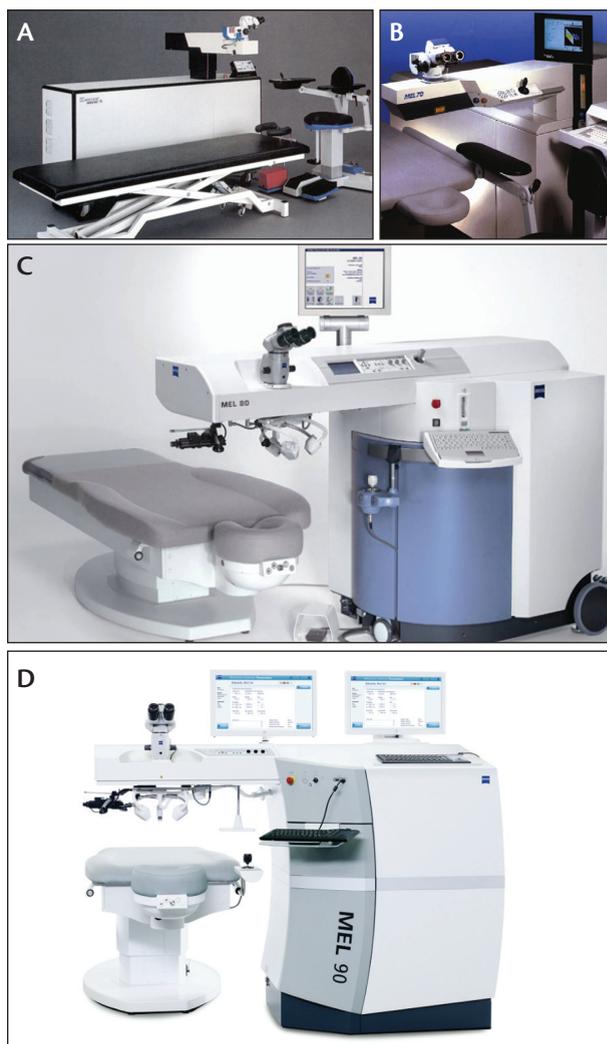


Figure 1. The MEL excimer laser throughout the years: MEL 60 (A): 1989; MEL 70 (B): 1997; MEL 80 (C): 2002; and MEL 90 (D): 2013.

Algorithm—profile further enhances the preciseness of my results. This aspherically optimized ablation profile allows me to perform a wide range of spherocylindrical (SCA) corrections including eyes with higher and lower

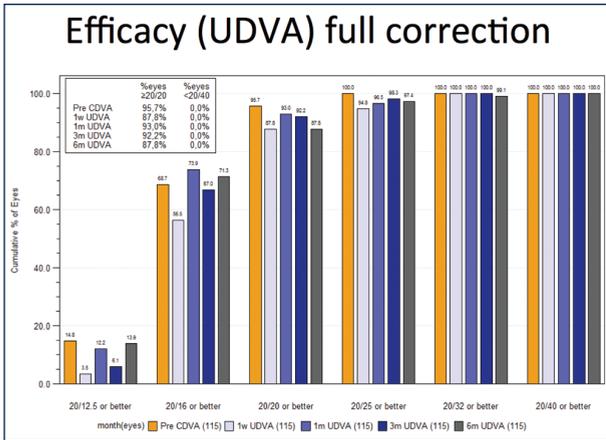


Figure 2. Distance UCVA results show efficacy of treatment.

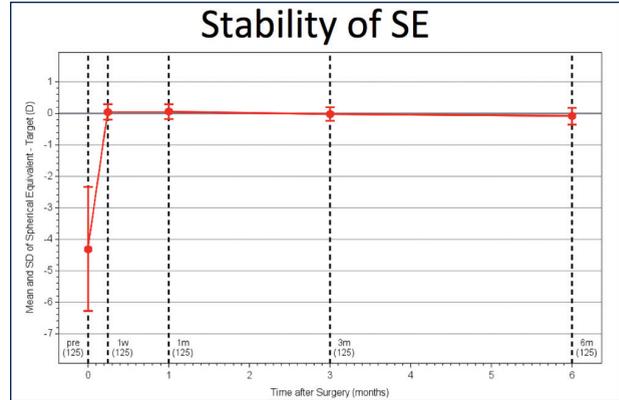


Figure 3. Stability of spherical equivalent.

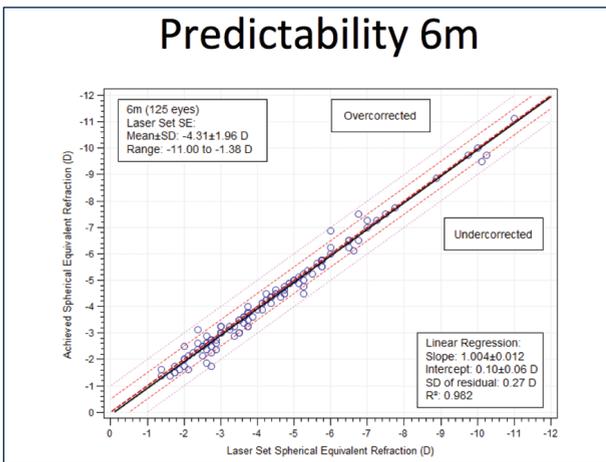


Figure 4. Predictability at 6 months postoperative.

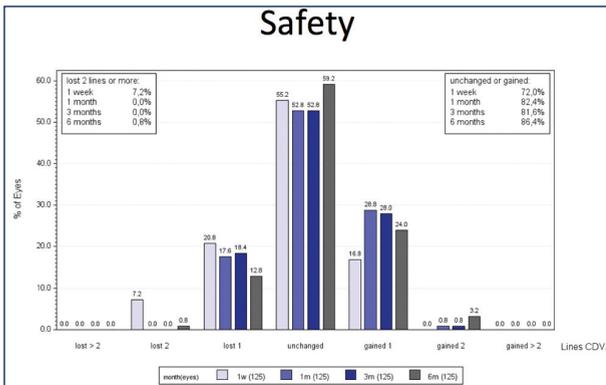


Figure 5. Treatment safety.

levels of ametropia, it simplifies treatment planning because I no longer have to decide between several ablation profiles, and it minimizes tissue removal.

The MEL 90 has an ablation speed of up to 1.3 seconds per 1.00 D. I also appreciate the FLEXIQUENCE switch function, as it allows me to switch between 250- and 500-Hz frequencies and perform new procedures. I highly appreciate the 500-Hz frequency, especially for treating patients with high-diopter corrections, as it significantly reduces treatment time and lowers the risks associated with longer treatment times.

### PERSONAL EXPERIENCE

I have performed PRESBYOND Laser Blended Vision with the MEL 90 in 196 hypermetropic and myopic eyes. Due to the laser's excellent predictability, I have decreased my retreatment rate for PRESBYOND Laser Blended Vision for my presbyopic patients down to 5%. As way of comparison, my enhancement rate is about 14% for other similar treatments. Additionally, none of my patients treated with MEL 90 have had symptoms of glare, haze, bad night vision, asymmetric astigmatism, or other side effects.

I also took part in a MEL 90 multicenter study that included 125 cases performed at three sites (Riga, Latvia; Munich, Germany; and Charlottenlund, Denmark). The mean sphere of the treated myopic patients was  $-3.99 \pm 1.97$  D (range,  $-10.00$  to  $-1.00$  D), the mean cylinder was  $-0.76 \pm 0.83$  D, and the mean preoperative spherical equivalent was  $-4.37 \pm 2.02$  D (range,  $11.38$  to  $-1.38$  D). At 6 month postoperatively, 97.4% of patients had a distance UCVA of 20/25 or better and 71% of 20/16 or better. Furthermore, 94.4% were within  $\pm 0.50$  D of intended correction and 100% were within  $\pm 1.00$  D. The predictability was also good, with a standard deviation of only 0.27 D and an R<sup>2</sup> of 0.982. When taken collectively, the results of our study showed that Femto-LASIK with the MEL 90 can be considered to be a precise procedure (Figures 2 through 5).

### CONCLUSION

In my experience, there is no better excimer laser technology than the MEL 90, and integration with the VisuMax femtosecond laser (Carl Zeiss Meditec) is seamless. The MEL 90 has allowed me to increase the preciseness of my postoperative outcomes, improve my patients' experiences, and still have the amazing customer service that I have always experienced with ZEISS. ■

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# The MEL 90: Producing Outstanding Results

In addition to its femtosecond LASIK capabilities, the MEL 90 technology offers new treatment potentials and achieves excellent results postoperatively.

BY PETTER MONTAGU-PETTERSEN, MD

In my practice, the patient demographic most often inquiring about refractive surgery has shifted from those in their 20s to 40s to those in their late 40s to mid 60s. Most times, these middle-aged patients have small refractive errors and presbyopia, with clear lenses and excellent BCVA.

Throughout my years of practice, I have performed laser vision correction in approximately 20,000 eyes, and I have used various platforms including the 217z Zyoptix System (Bausch + Lomb Technolas), the WaveLight Allegretto (Alcon), and the MEL line of excimer lasers (Carl Zeiss Meditec) for these treatments. However, as a result of the changing patient demographic, I knew that I needed a refractive surgery technology that, in addition to LASIK, is capable of producing a presbyopic solution that is less invasive than intraocular procedures, has negligible surgical risks, and provides patients with excellent visual outcomes at all ranges of vision. This technology must also be reliable, cause minimal optical disturbances, and ensure that I can customize treatments to my patients' individual needs.

The MEL 90 with the Triple-A—Advanced Ablation Algorithm—profile and PRESBYOND Laser Blended Vision have indeed proved to handle these tasks. I now exclusively use the MEL 90 for femtosecond LASIK (Femto-LASIK) treatments and the ATLAS Corneal Topography System linked to the CRS-Master (both by Carl Zeiss Meditec) for treatment planning. These tools help me more than ever before to achieve superior outcomes, and I am now confident that I have a refractive solution suited to meet the needs of my refractive patients and, especially, most presbyopes, regardless of their age.

I use PRESBYOND Laser Blended Vision in middle-aged presbyopic patients and the Triple-A profile in younger patients, always aiming for binocular emmetropia. Both of these ablation algorithms provide excellent asphericity control and good vision at all distances.

Other advantages of the MEL 90 are its fast treatment time, thanks to the 500-Hz laser, and excel-

lent treatment accuracy, thanks to the 1,050-Hz eye-tracking system.

## PRESBYOND LASER BLENDED VISION

My solution of choice for treating presbyopic patients is PRESBYOND Laser Blended Vision. The principle of this treatment is to enhance the effects of a micro-monovision system with a safe and conservative addition (-1.00 to -1.50 D) in the nondominant eye. The asphericity factor is also lightly manipulated and thoroughly controlled to increase the depth of field, meaning that the conservative reading addition is sufficient at distances up to 40 cm and creates little distraction of the binocular vision. This is an important point, as an addition of 2.25 D is usually necessary with other platforms to achieve the same visual outcomes.

When using PRESBYOND Laser Blended Vision, the aim in the dominant eye is near emmetropia (0.00 to -0.25 D). This eye also undergoes a subtle and controlled change in asphericity to achieve slightly better intermediate and near vision than what is achieved in an emmetropic presbyopic eye with a standard physiological asphericity.

A lot of my patients have their greatest demands for visual accuracy in the intermediate vision range. An advantage of the PRESBYOND Laser Blended Vision treatment is that both eyes achieve good visual acuity at this range, hence the term *blended vision*.

In this fashion, excellent near, intermediate, and distance visual acuity are achievable without the use of any implants. I appreciate this option, because I can now offer my presbyopic patients the same surgical safety and fast visual recovery as modern Femto-LASIK has given thousands of younger patients in the past few years.

In essence, PRESBYOND Laser Blended Vision has created the possibility for surgeons to reliably treat a new category of patients: monofocal pseudophakic patients who desire spectacle independence.

## THE TRIPLE-A PROFILE

Triple-A, the latest algorithm from Carl Zeiss Meditec, is precise, maintains excellent asphericity control, and ablates even less tissue than the company's previous tissue-saving algorithm.

Combined, this makes LASIK treatments applicable to a larger number of patients with high myopia, especially, and patients with borderline corneal thicknesses in general. It also makes it easier for surgeons, as they no longer have to decide between two ablation profiles.

## INTEGRATION

Integration of the MEL 90 excimer laser, ATLAS corneal topographer, and CRS-Master into my workflow is easy and fast. The CRS-Master and ATLAS units are located next to the slit lamp and phoropter. After refraction and eye dominance testing, I examine the patient's eyes with the corneal topographer and then test the reading addition on the nondominant eye in order to assess where this starts to disturb distance visual acuity; for most people, it is around 1.50 D.

The treatment file is then produced on the CRS-Master and stored for surgery. Corneal thickness, intraocular pressure, and a general eye examination are also performed to ensure the ablation of the cornea and bright light on the retina will not distract the refraction and topography.

## RESULTS

In my experience, I have treated 47 presbyopic patients with PRESBYOND Laser Blended Vision and 12 pre-presbyopic patients with Triple-A aimed for emmetropia between March 3 and May 21, 2014. Preoperatively, refractions ranged from 4.50 to -9.25 D of sphere and 0.00 to -1.75 D of cylinder. The treatment zone diameter for PRESBYOND Laser Blended Vision was 6.5 mm, and the reading addition was performed in the nondominant eye. All flaps were created with the femtosecond laser using a superior flap hinge of 9 to 9.5 mm and a flap thickness of 110  $\mu$ m. Distance vision was measured using Snellen visual acuity and near vision was measured using the Carl Zeiss Meditec reading chart, with smallest print size set to Jaeger 1.0.

To date, 26 of the PRESBYOND and seven of the Triple-A patients have completed 1-month follow-up, and all have had excellent results. Surgery was uneventful in every case, and there have been no postoperative complications.

**PRESBYOND Laser Blended Vision group.** Preoperatively, the average BCVA in this group was 1.2. By 1 month, all patients had achieved distance UCVA of 1.2 or better. Additionally, 15 patients had achieved distance UCVA of 1.5 and three of 2.0. With regard to near and intermediate vision, all patients had achieved Jaeger 1.0 at a distance of 40 cm

Clinical results with PRESBYOND Laser Blended Vision and the Triple-A profile stand out among the results of other procedures in use today, especially those available for presbyopia correction.

and described their intermediate vision as excellent, with no noticeable thresholds between near, intermediate, and distance vision.

None of the PRESBYOND patients experienced anisometropia problems after 4 weeks, and they described their vision as very good at all distances. All patients are happy with their results.

**Triple-A group.** Preoperatively, all patients in this group had BCVAs of 1.2. By 1 month, all had achieved the intended postoperative refraction (UCVA of 1.5 or better), and four achieved UCVA of 2.0. Postoperatively, all patients described their vision as very good at all distances.

**Efficacy and safety.** Across the two groups, all patients achieved the intended postoperative refraction and had as good as or better UCVA than they did BCVAs preoperatively. Additionally, no patients lost lines of visual acuity.

## CONCLUSION

Our clinical results with PRESBYOND Laser Blended Vision and the Triple-A profile stand out among the results of other procedures in use today, especially those available for presbyopia correction (eg, multifocal IOLs, multifocal LASIK, pinhole corneal inlays combined with LASIK, standard monovision with IOLs, and LASIK). Although the results presented above only speak to 1-month outcomes, I believe that our longer-term results will follow the same trend.

In the meantime, I am extremely happy that I ordered the MEL 90 excimer laser right after market introduction in early 2014. I started working with the laser in March, and I look forward to continuing treatment of my patients using PRESBYOND Laser Blended Vision software for presbyopic patients and the Triple-A profile for pre-presbyopic patients. ■

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The moment twice the speed puts  
the finishing touch on proven experience.  
**This is the moment we work for.**



// MEL 90  
MADE BY ZEISS

The excimer laser that intelligently combines experience and advancement – that is the MEL® 90 from ZEISS. Refractive surgeons will be fascinated by its practical flexibility. With the FLEXIQUENCE switch function, they can easily choose between 250 Hz or 500 Hz operation as their personal or individual practice situation requires. The innovative Triple-A profile and intra-operative ablation speed of 1.3 seconds per diopter enable fast, safe and tissue-saving treatments. These along with many other performance features make the MEL 90 a customized, success-oriented power package.

**MEL 90 – your preferences, your workflow, your expectations precisely.**

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We make it visible.