



## Laser Blended Vision for presbyopia: (5 years FU)

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### **Presbyopia: The Challenge for Perfection**

- Clear vision at distance
- Clear vision at intermediate
- Clear vision at near
- Maintaining optical quality
  - Safety of CDVA
  - Contrast sensitivity
  - Night vision preservation
- Maintaining binocularity
- High patient tolerance
- Short adaptation time

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MEDICAL CENTER

Simultaneous correction of refractive error

QUINZE-VINGTS

University

Reversibility / repairability







### **Trends in presbyopic correction**



# Increase depth of field with spherical aberration

- None of them reported a nonspecific lack of adaptation.
- Naturally occurring aberration.
- Increases with age.
- Increases during accommodation.

### **Influence of Spherical Aberration on Depth of Field**



### **Influence of Spherical Aberration on Depth of Field**

	0.00 D	-0.50 D	-1.00 D	-1.50 D	-2.00 D		
<i>without</i> spherical aberration @ 7 mm	NHORZ KSNCV SHROC CNVHS VODRK KDNVO RACKT	NHORZ KSNCV SHROC CNVHS VODRK KSNYO	N H O R Z K S N C V S H R O C C H V H S V0 S H R O C	N H O R Z			
<i>with</i> spherical aberration @ 7 mm	NHORZ KSNCV SHROC CNVHS VODEK KDRVO SHROC	NHORZ KSNCV SHROC CNVHS VODRK VODRK VODRK	NHORZ KSNCV SHROC CNVHS VODEK SHROC	NHORZ KSNCV SHROC CNVHS VODVA SHROC	NHORZ KSNCV SHROC CNVHS YORKS		



## PRESBYOND Laser Blended Vision for Myopia, Hyperopia, and Emmetropia (Non-linear Aspheric Presbyopic Micro-monovision LASIK)

### LASIK for Myopic Astigmatism and Presbyopia Using Non-linear Aspheric Micro-monovision With the Carl Zeiss Meditec MEL 80 Platform

Dan Z. Reinstein, MD, MA(Cantab), FRCSC, FRCOphth; Timothy J. Archer, MA(Oxon), DipCompSci(Cantab); Marine Gobbe, PhD, MSTOptom

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Journal of Refractive Surgery Volume 25 January 2009

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### LASIK for Presbyopia Correction in Emmetropic Patients Using Aspheric Ablation Profiles and a Micro-monovision Protocol With the Carl Zeiss Meditec MEL 80 and VisuMax

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### Laser Blended Vision – Micro-Monovision



### **Blended Vision: Enhancement Rate**

	Myopia -8.50	Hyperopia +5.75	Emmetropia
AII	19%	22%	12%
Distance eyes (20/25 or worse)	9%	9%	6%
Near eyes (J3 or worse)	8%	9%	7%

### **Laser Blended Vision: Results**

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### **Reversibility: Simple Retreatment**



### **Expectations: Three Stages of Recovery**

### 1. Immediate & day one 2. First few weeks 3. Three/four months

(swelling, healing response)

- Slight discomfort
- Dry eye sensation
- Night vision halos
- Slight blurring
- Visual fluctuations

(swelling, healing, adaptation)



- Visual fluctuations
  - Morning to evening
  - Day to day
- NV good/DV bad
- DV good/NV bad

### (adaptation)



- Always use both eyes
- Don't 'test' each eye
- Prescribe temporary glasses if necessary
- Remain aware of adaptation process
- Often happens 'overnight'
- Retreatment if required

### **Adaptation Time: Cross-Blur**

- Adaptation time required to adjust to anisometropia
  - Patient notices the difference between the eyes
  - May require glasses for driving
  - Feels "uncomfortable" / distance "fogging" binocularly



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### **Just Prescribe Temporary Spectacles**





### **Expected Visual Course**

	Myopia	Hyperopia / Emmetropia
Distance vision	Expected to be good and remain good	May be slightly blurry due to initial overcorrection, but expected to improve over time
Near vision	May be slightly blurry due to initial overcorrection, but expected to improve over time	Expected to be excellent initially, but may reduce over time



### Our presbyopia laser correction

# Tadawi Surgical Center

### PURPOSE

We Prospectively studied the first consecutive 100 patients with presbyopia who underwent femtoLASIK with the wave frontguided Laser Blended Vision(®) Program by Zeiss(®) in our Excimer Laser Zeiss Mel-90 by Carl Zeiss Meditec(®) (Jena, Germany) over the last 60 months, for the correction of presbyopia with myopia, astigmatism, hyperopia or emmetropia.







### **METHODS**

- The program has a non-linear aspheric ablation profile that increases the spherical aberration in both eyes.
- A slight myopia of -1.5 diopters (D) in the non-dominant eye is also programmed.
- We analyzed the results patient satisfaction, efficacy, safety and predictability of the procedure.
- ▶ Follow-up was from 24 to 60 months.



А	В	С	D	Е	F	G	н	1	J	K	L	М	N	0	P	Q	R	S	Т	U	V	W	х
DEMOGRAPHIC DATA PRE OP DATA POST OP																							
							PRE OP		RE	FRACTIC	DN		K REA	DINGS		BV	VA	VA				RE	FRACTION
S. NO	OP NO	NAME	SEX	AGE	EYE	SX DATE	NV	SE	SP	CYL	AX		KF	KS	X BLUR	DV	DV	NV	SP	CYL	AX	CVA	TOLERATION/ SATISFACTION
1	54733	SHEIKA MOSLEH AL ZAHRANI	F	44	OD	MAY 21 2019	N6	-1.75	-1.5	-0.5	110	20/20	43.0 X 152	43.3 X 62	-1.25	20/25	20/50	N6	-1.5	0	0	20/30	TOLERATED BUT NOT VERY SATISFIED
2	54733	SHEIKA MOSLEH AL ZAHRANI	F	44	OS	MAY 21 2019	N6	-1.5	-1.5	-0.25	35	20/20	42.5 X 19	43.0 X 109	0		20/25	N10	-0.25	-0.5	30	20/20P	TOLERATED BUT NOT VERY SATISFIED
3	107355	HUSSAINA RAZAQ ZEHAMI	F	57	OD	MAY 23 2019	N24	1.5	1.5	0	0	20/25	41.8 X 05	42.5 X 95	0	20/25	20/25	N10	0	0.5	60	20/25	TOLERATED & SATISFIED
4	107355	HUSSAINA RAZAQ ZEHAMI	F	57	OS	MAY 23 2019	N24	1.5	1.5	0	0	20/20	42.4 X 02	43.0 X 92	-1.5		20/40	N9	-1	0	0	20/25	TOLERATED & SATISFIED
5	14001	ZAKIA HOMOUD AL HARTHI	F	53	OD	JUN 27 2019	N24	3.75	1.75	-4.25	30	20/25	43.4 X 20	47.8 X 110	-1.5	20/25	20/100	N6	-1.5	-1	180	20/25	TOLERATED & SATISFIED
6	14001	ZAKIA HOMOUD AL HARTHI	F	53	OS	JUN 27 2019	N24	2.5	1.25	-2.5	160	20/25	43.7 X 155	46.6 X 65	0		20/25	N18	-0.25	-1	180	20/25	TOLERATED & SATISFIED
7	45030	AYED AWAD AL GAMDI	М	55	OD	JUN 27 2019	N15	1.5	1.25	0.5	160	20/20	42.6 X 105	42.8 X 15	0	20/20	20/20P	N18	0.25	0.5	180	20/20P	TOLERATED BUT NOT VERY SATISFIED
8	45030	AYED AWAD AL GAMDI	Μ	55	OS	JUN 27 2019	N15	1.25	1	0.5	28	20/20	42.3 X 145	42.7 X 35	-1.5		20/40	N9	-1.5	-0.5	100	20/25	TOLERATED BUT NOT VERY SATISFIED
9	110673	MARZOUQA RZAG AL JABRI	F	42	OD	JUL 02 2019	N9	0.25	0.25	0	0	20/20	43.2 X 180	43.3 X 90	0	20/20	20/20	N6	0	0	0	20/20	TOLERATED & SATISFIED
10	110673	MARZOUQA RZAG AL JABRI	F	42	OS	JUL 02 2019	N9	0.25	0.25	0.25	45	20/20	42.9 X 145	42.9 X 55	-1.5		20/40	N6	-1.25	0	0	20/20P	TOLERATED & SATISFIED
11	110765	MESOON MOHD AL SWAT	F	55	OD	JUL 02 2019	N19	2.25	2.25	0	0	20/30	43.9 X 169	44.4 X 79	0	20/30	20/40	N24	0	0.75	110	20/30	TOLERATED BUT NOT SATISFIED
12	110765	MESOON MOHD AL SWAT	F	55	OS	JUL 02 2019	N19	2.25	2.25	0.25	155	20/30	43.9 X 164	44.6 X 74	-1.5		20/60	N10	-1.5	-1	10	20/40	TOLERATED BUT NOT SATISFIED
13	97525	BADRIA MOHD AL GAMDI	F	46	OD	JUL 18 2019	N10	0.25	0	0.25	130	20/20	39.9 X 36	40.0 X 126	0	20/20	20/20P	N10	0	-0.25	160	20/20	TOLERATED & SATISFIED
14	97525	BADRIA MOHD AL GAMDI	F	46	OS	JUL 18 2019	N10	0.25	0	0.5	85	20/20	39.5 X 08	40.0 X 98	-1.5		20/80	N6	-1.75	0	0	20/20	TOLERATED & SATISFIED
15	111382	AMAL AAZIZ AL HARTHI	F	48	OD	JUL 18 2019	N6	-4.5	-4.5	-0.25	140	20/20	44.1 X 05	45.1 X 95	0	20/25	20/25	N10	0	-0.5	100	20/20	TOLERATED & SATISFIED
16	111382	AMAL AAZIZ AL HARTHI	F	48	OS	JUL 18 2019	N6	-4.75	-4.75	0	0	20/20	44.2 X 152	45.2 X 62	-1.5		20/100	N6	-1.5	-0.5	130	20/20P	TOLERATED & SATISFIED
17	111901	SAFIA SAAD AL TAKAFI	F	41	OD	JUL 18 2019	N6	-3	-3	-0.25	180	20/20	46.8 X 168	47.5 X 78	0	20/20	20/20	N9	0	-0.25	70	20/20	TOLERATED & SATISFIED
18	111901	SAFIA SAAD AL TAKAFI	F	41	OS	JUL 18 2019	N6	-3.5	-3.25	-0.5	40	20/20	47.2 X 18	48.1 X 108	-1.25		20/50	N6	-1	-0.5	55	20/20P	TOLERATED & SATISFIED
19	111137	BADRIA SALHIA AL HARTHI	F	43	OD	JUL 25 2019	N6	-6	-4	-4.25	5	20/50	43.7 X 07	47.4 X 97	0	20/30	20/30	N8	-0.5	-0.5	180	20/30	TOLERATED & SATISFIED
20	111137	BADRIA SALHIA AL HARTHI	F	43	OS	JUL 25 2019	N6	-5.5	-4.25	-3.75	175	20/50	44.0 X 170	47.5 X 80	-1.25		20/50	N6	-1.25	-0.75	180	20/30	TOLERATED & SATISFIED
21	111743	SULTAN MOHD AL SOFIANI	М	43	OD	JUL 25 2019	N4	-1.25	-1.25	0	0	20/25	42.6 X 31	43.0 X 121	0	20/30	20/30	N8	0	0	0	20/30	TOLERATED BUT NOT SATISFIED
22	111743	SULTAN MOHD AL SOFIANI	М	43	OS	JUL 25 2019	N4	-1.25	-1.25	0	0	20/25	42.7 X 142	43.2 X 52	-1.5		20/60	N6	-1.25	0	0	20/25	TOLERATED BUT NOT SATISFIED
23	112936	AYEDA SAAD AL ASAIMI	F	42	OD	AUG 07 2019	N12	1.25	1	0.5	95	20/20	43.2 X 24	44.1 X 114	-1.5	20/20	20/30	N6	-1.5	-0.25	90	20/25	TOLERATED & SATISFIED
24	112936	AYEDA SAAD AL ASAIMI	F	42	OS	AUG 07 2019	N12	1.25	1	0.5	95	20/20	42.9 X 164	43.6 X 74	0		20/20	N8	0	0.25	170	20/20	TOLERATED & SATISFIED
25	16178	AMAL SALMAN QRASHI	F	42	OD	AUG 01 2019	N10	1	0.75	0.75	95	20/20	39.8 X 07	41.3 X 97	0	20/20	20/20	N9	0	-0.5	180	20/20	TOLERATED BUT NOT VERY SATISFIED
26	16178	AMAL SALMAN QRASHI	F	42	OS	AUG 01 2019	N10	1	0.75	0.5	100	20/20	40.4 X 170	41.8 X 80	-1		20/40	N6	-0.75	-0.5	15	20/20	TOLERATED BUT NOT VERY SATISFIED
27	111748	AMAL AAZIZ AL DUWAIBI	F	45	OD	AUG 01 2019	N4	-2.25	-1.75	-0.75	10	20/20	43.8 X 18	44.5 X 108	0	20/25	20/25	N8	0	-0.5	180	20/25	TOLERATED & SATISFIED
28	111748	AMAL AAZIZ AL DUWAIBI	F	45	OS	AUG 01 2019	N4	-2.25	-1.75	-0.75	158	20/20	43.6 X 173	44.0 X 83	-1.5		20/60	N6	-1.5	-0.5	175	20/25	TOLERATED & SATISFIED
29	113239	NOURA AWAD AL HARBI	F	43	OD	AUG 29 2019	N6	-3.25	-3.25	0	0	20/20	45.5 X 11	46.5 X 101	-1.25	20/20	20/60	N6	-1.25	-0.5	45	20/25	TOLERATED BUT NOT VERY SATISFIED
30	113239	NOURA AWAD AL HARBI	F	43	OS	AUG 29 2019	N6	-3.25	-3	-0.5	85	20/20	45.7 X 17	46.4 X 107	0		20/20	N6	0	-0.25	80	20/20	TOLERATED BUT NOT VERY SATISFIED
31	114093	SALIM FARHAN AL BOGAMI	Μ	45	OD	AUG 29 2019	N10	1.25	1	0.5	103	20/20	41.1 X 13	41.5 X 103	0	20/20	20/20	N8	0	0.5	100	20/20	TOLERATED & SATISFIED
32	114093	SALIM FARHAN AL BOGAMI	Μ	45	OS	AUG 29 2019	N10	1.25	1	0.5	92	20/20	41.4 X 179	42.1 X 89	-1.5		20/50	N6	-1.5	0	0	20/20P	TOLERATED & SATISFIED
33	115677	MOSLEH HAMAD AL HAJI	Μ	42	OD	AUG 29 2019	N6	-1.25	-0.75	-1.25	147	20/20	42.4 X 161	44.1 X 71	0	20/25	20/25	N6	-0.25	-0.25	120	20/20	TOLERATED & SATISFIED
34	115677	MOSLEH HAMAD AL HAJI	Μ	42	OS	AUG 29 2019	N6	-1.25	-0.5	-1.5	60	20/20	42.9 X 39	43.7 X 129	-1		20/40	N6	-1.25	-0.5	55	20/20P	TOLERATED & SATISFIED
												20/20-2				20/25+2						20/25+2	



# We are **highly selective** for our **>** patients

### RESULTS

### ► SEX:

30 male and 70 female patients between 42 and 57 years old were studied, for a total of 200 eyes.

### ► AGE :

- ▶ 44 patients (44%) were between 40 and 44;
- ▶ 33 patients (33%) were between 45 and 49;
- ▶ 23 patients (23%) were 50 years or more.





### Refractive error type:

- 11 patients (11%) were emmetropic (0.5 or less spherical equivalent).
- 48patients (48%) were myopic or myopic astigmatic,
- 41 patients (41%) were hyperopic or hyperopic astigmatic.



### Satisfaction 60 months



### Unsatisfied patients



## Enhancement rate

Reoperation 6%



## Enhancement rate 6%

## Highly selective

Myopia	Hyperopia	Emmetrope
%1	%3	%2

# Epithelial down growth 66% in reoperated cases



### Distance vision

- Post-operative visual acuity without correction for distance was 20/20 in 47patients (47%).
- 20/25 or better in 83 patients (83%) (Binocular).



## DISTANCE VISION



## Near vision PRE & P.O

![](_page_32_Figure_1.jpeg)

### Near vision

### PREOP

- ► 53 patients (53%) had pre-op near vision between N9 N24.
- ▶ 47 MYOPIC patients (47%) had pre-op near vision between N4 N6.

### ► PO

- ▶ 77 (77%) has PO near vision N4 or better (efficacy).
- 23 patients (23%) has post-operative near vision between N9 and N10.(Hypreope With Poor Pre-Op NV)

## Predictability

![](_page_34_Figure_1.jpeg)

## Safety & expectation

- ▶ The predictability within 0.5 D was 83%. (Safety 99.7%).
- A total of 88% were satisfied (complete & partial satisfaction ) with the procedure and the toleration was 100%.
- ▶ 12% did not achieve their expectations (severe dry eye).
- ▶ 90% reported dry eye.

![](_page_35_Figure_5.jpeg)

### Safety & expectation

- No patient reported lack of adaptation.
- No complications except epithelial down growth in 4 cases
- No permanent eye-glasses required.
- enhancement needed for 6 patients (6%),all within 1<sup>st</sup> year.
- > 2 patients ask for extra glass either for reading or driving .

### CONCLUSIONS

- Laser Blended Vision(®) is an excellent option, well tolerated, stable and effective for patients with presbyopia, myopia, astigmatism, hyperopia or emmetropia.
- Excellent alternative for intraocular procedure.
- Satisfaction may need more than 6 mo.
- Patient selection & counseling are important.
- May start with minimal micromonovision (0.75-1.0) then increase to 1.5-2.0 latter if needed.

### CONCLUSIONS

# Be highly selective

## Thank you very much

![](_page_39_Picture_1.jpeg)