

## Original Article

# Visual performance and optical quality in eyes implanted with an aspheric or spherical monofocal intraocular lens: a systematic review with meta-analyses

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**Abstract:** Purpose: The aim of this study was to improve selection strategies among aspheric and spherical monofocal intraocular lenses (IOLs) in cataract surgery. Methods: Peer-reviewed literature was searched in MEDLINE, Cochrane Library, EMBASE, EBSCO, ScienceDirect, Trip Database, Ovid, and ClinicalTrials.gov using keywords “Tecnis”, “Sensar”, and “intraocular lens\*”. Selection criteria included randomized controlled trials comparing Tecnis aspheric IOLs with Sensar spherical IOLs. Postoperative best corrected visual acuity (BCVA), contrast sensitivity function (CSF), and ocular higher-order aberrations (HOAs) were pooled as outcomes for this systematic review using RevMan 5.3 software. Effects are calculated as standardized mean differences with 95% confidence intervals. They were pooled using a random-effects model. Results: Seven trials, with a total of 242 eyes implanted with Tecnis IOLs and 242 eyes implanted with Sensar IOLs, were included. Meta-analysis, including all 7 studies, showed no significant differences in BCVA between the two types of IOLs ( $P=0.60$ ). Inconsistent results under various illuminations and spatial frequencies were shown for CSF. Only 2 studies were available for meta-analysis. Meta-analysis, including 4 studies, showed significantly lower total ocular HOA (t-HOA) ( $P=0.005$ ) and spherical aberration (SA) ( $P<0.001$ ) in Tecnis IOL. No significant differences were shown in coma ( $P=0.89$ ) and trefoil ( $P=0.76$ ). Conclusion: Current research suggests that Tecnis and Sensar IOLs, which have similar optical features, except for asphericity, demonstrate similar postoperative BCVA. There is not enough evidence to suggest that Tecnis IOLs differ from Sensar IOLs in CSF. Tecnis IOLs demonstrate less postoperative t-HOA and SA than Sensar IOLs. However, they demonstrate similarly in coma and trefoil.

**Keywords:** Aspheric, intraocular lens, visual acuity, contrast sensitivity function, higher-order aberrations

## Introduction

The goal of aspheric design is to avoid spherical aberrations and improve optical quality, thereby improving visual function. Various controlled trials comparing aspheric monofocal intraocular lenses (IOLs) with spherical monofocal IOLs have been published. However, many of them compared aspheric IOLs with spherical IOLs from other manufacturers or platforms [1-4]. Evidence concerning whether aspheric IOLs differ from spherical IOLs in visual outcomes has lacked a consensus [1, 5]. Various design parameters from difference manufacturers, such as optic materials, might confound the goal of

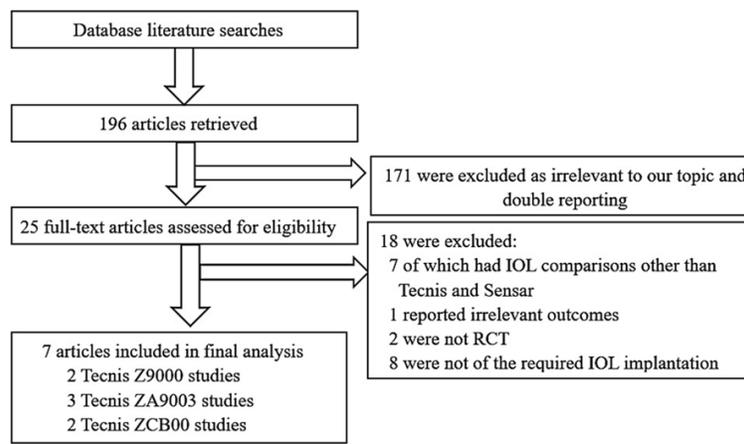
investigating differences between spherical and aspherical IOLs. Therefore, by avoiding these confounders and comparing aspherical and spherical IOLs from the same manufacturer, better insight may be attained regarding optical quality and visual function.

Currently, available studies can be found for Tecnis and Sensar monofocal IOLs, both manufactured by Abbott Medical Optics, Inc. (AMO). They have been widely used throughout the world. Tecnis IOL is an aspheric IOL family with an anterior aspheric surface, comprised of different generations of IOLs. They can be divided into three subgroups in terms of materials and designs: 3-piece silicone (Z9000, Z9001,

**Table 1.** Features of the IOLs used in included studies

IOL	Lens style	Overall length (mm)	Optic diameter (mm)	Optic material	Optic design	AC depth (mm)	A-constant
Tecnis Z9000	3-piece	13	6	Silicone, UV-absorbing	Biconvex, aspheric anterior surface	5.55	119.0
Tecnis ZA9003	3-piece	13	6	Hydrophobic acrylic, UV-blocking	Biconvex, anterior aspheric surface	5.6	119.1
Tecnis ZCB00	1-piece	13	6	Hydrophobic acrylic, UV-blocking	Biconvex, anterior aspheric surface	5.4	118.8
Sensar AR40e	3-piece	13	6	Hydrophobic acrylic, UV-blocking	Biconvex	5.2	118.4

AC: anterior chamber; UV: ultraviolet; mm: millimeter.

**Figure 1.** Flowchart of systematic literature search.

Z9002), 3-piece acrylic (ZA9003), and 1-piece acrylic (ZCB00). Sensar AR40e is a standard spherical monofocal IOL with a 3-piece acrylic feature. These IOLs are similar in many features, except for asphericity. **Table 1** shows the features of all included IOLs in this study.

Higher-order aberrations (HOAs) have been one of the most important indicators for assessment of optical quality [6-11]. Increased rates of HOAs, after surgery, are closely related to functional vision deficiency [12]. Deficiencies in functional vision are identified by contrast sensitivity function (CSF), not by visual acuity (VA) [13]. CSF has been commonly applied to assess postoperative visual performance in varying IOL implantations [14-20]. Previous studies showing comparisons between Tecnis and Sensar IOLs were all single clinical trials, lacking a consensus in optical quality and visual performance [14, 16-21]. To assist surgeons in selecting the most appropriate IOL for their patients, the present study summarized avail-

able evidence on optical quality and visual performance after implanting Tecnis and Sensar IOLs from the same manufacturer.

## Materials and methods

### Literature search strategy

An extensive peer-reviewed literature search was completed, using MEDLINE, Cochrane Library, EMBASE, EBSCO, ScienceDirect, Trip Database, Ovid, and ClinicalTrials.gov, with the help of two reviewers (QQT, XL), independently.

Search language was limited to English, while the publication year was not limited. The following search keywords were used: "Tecnis", "Sensor", and "intraocular lens\*". Abstracts were read and full texts were retrieved if they met the objectives of this study. Related articles were compared and analyzed in detail.

### Inclusion and exclusion criteria

The following inclusion criteria were used to identify published articles: (1) Participants: Adult cataract patients; (2) Intervention: All participants underwent cataract surgery with Tecnis aspheric or Sensar spherical monofocal IOL implantations; (3) Study design: Randomized controlled trials (RCTs); and (4) Outcome measures: VA, CSF, and HOA.

Exclusion criteria were: (1) Participants that ocular pathology other than cataract; (2) IOLs other than Tecnis and Sensar were compared; (3) Use of refractive surgery other than cataract

**Table 2.** Characteristics of included studies

Studies	Country	Treatment Groups	Sample size (eyes)	Gender ratio (M/F)	Age (Mean $\pm$ SD)	Follow up	Drop out
Packer 2004	USA	Tecnis Z9000/ Sensar AR40e	22/24	15/15	66.8/70.3	3 months	9/39
Kasper 2006	Germany	Tecnis Z9000/ Sensar AR40e	21/21	Not specified	71 $\pm$ 6.28	3-4 months	1/21
Ohtani 2009	Japan	Tecnis ZA9003/ Sensar AR40e	41/41	13/28	75.3 $\pm$ 5.3	1 month	0/41
van Gaalen 2010	The Netherlands	Tecnis ZA9003/ Sensar AR40e	38/38	18/20	68.9 $\pm$ 12.0	>6 weeks	8/38
Muñoz 2011	Spain	Tecnis ZA9003/ Sensar AR40e	60/60	29/31	68.2 $\pm$ 9.4	6 months	4/60
Assaf 2010	Egypt	Tecnis ZCB00/ Sensar AR40e	28/28	10/18	66.05 $\pm$ 9.2	2 months	0/28
Wahba 2011	Egypt	Tecnis ZCB00/ Sensar AR40e	32/30	23/39	63.8 $\pm$ 10.4	6-8 weeks	Not specified

M/F: male/female; SD: standard deviation.

removal and IOL implantation; and (4) Double reporting.

#### Data extraction and assessment of risk of bias

Two reviewers (QQT, XL), independently, extracted the data following details from the studies: authors, publication year, study location, participants, methodology, interventions, IOL features, follow-up, and outcomes. Potential systematic bias in included trials was assessed according to the theory of *Cochrane Handbook for Systematic Reviews of Interventions* [22]. The following parameters were considered: 1) Random sequence generation; 2) Allocation concealment; 3) Blinding of outcome assessment; 4) Incomplete outcome data addressed; 5) Selective reporting; and 6) Intention to treat analysis. Each parameter was graded as low risk of bias, high risk of bias, or unclear risk of bias. Funnel plots were used to assess publication bias.

#### Statistical analysis

Meta-analyses were conducted using Review Manager analysis software (RevMan 5.3. Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration, 2014). Standardized mean differences (SMD) were calculated with 95% confidence intervals (CI) for all outcomes. They were measured with various devices and under different conditions. A random-effects model was used to calculate pooled estimates. One of the included studies provided median and range instead of mean and standard deviation [15]. Therefore, a mathematical solution by Hozo et al. [23] was used to transfer the provided data into data available for meta-analy-

sis. Heterogeneity between studies was tested using the  $I^2$  statistic, with  $I^2$  values over 50% indicating significant heterogeneity [24]. Under the assumption that different Tecnis aspheric IOL types would cause heterogeneity in VA, subgroups were defined according to Tecnis aspheric IOL types: Tecnis Z9000, Tecnis ZA9003, and Tecnis ZCB00. In addition, CSF was analyzed under different spatial frequency subgroups. HOAs were analyzed at different pupil diameter (PD) subgroups to interpret heterogeneity.

## Results

#### Literature search results

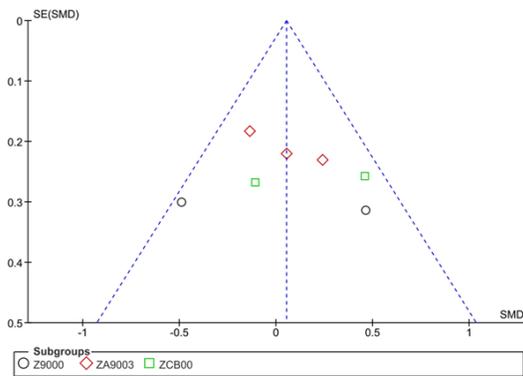
As indicated in **Figure 1**, database searches identified 196 titles and abstracts, of which 25 appeared to be relevant to the current study. Full texts were then read. Eighteen of the 25 studies were excluded. Seven had IOL comparisons other than Tecnis and Sensar, one reported other data from an included study, two were not RCTs, and eight were not of the required IOL implantation. A total of 7 RCTs were finally identified for review. Basic characteristics of these included studies are presented in **Table 2**, using the sequence of publishing year and type of Tecnis IOL implanted, as follows: Packer 2004 [18], Kasper 2006 [15], Ohtani 2009 [17], van Gaalen 2010 [19], Muñoz 2011 [16], Assaf 2010 [14], and Wahba 2011 [20].

#### Characteristics of included studies

In this systematic review, a total of 484 eyes (273 participants) were included. Mean age ranged from 63.8  $\pm$  10.4 to 75.3  $\pm$  5.3 years

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Intention to treat analysis
Assaf 2010	+	?	?	?	+	+	+
Kasper 2006	+	+	+	+	+	+	+
Muñoz 2011	+	+	+	+	+	+	-
Ohtani 2009	+	+	+	+	+	+	+
Packer 2004	+	?	?	?	-	+	-
van Gaalen 2010	+	+	+	+	-	+	-
Wahba 2011	+	?	?	?	?	?	?

**Figure 2.** Methodological quality summary (+ low risk of bias; - high risk of bias; ? unclear risk of bias).



**Figure 3.** Funnel plot for included studies (SE: standard error; SMD: standardized mean difference).

old. Sample sizes were from 42 eyes (21 participants) to 120 eyes (60 participants). A standard spherical monofocal IOL (Sensar AR40e) was implanted as the control group in all 7 studies. As shown in **Table 2**, 3 different types of Tecnis aspheric IOLs (Z9000 in 2 studies

[15, 18], ZA9003 in 3 studies [16, 17, 19], and ZCB00 in 2 studies [14, 20]) were implanted as experimental groups for comparison with control groups. Follow-up durations of postoperative outcomes were at least 1 month (range 1 to 6 months, **Table 2**). During the follow-up, 4 studies lost some participants [15, 16, 18, 19], all of which explained reasons for losses to follow-up. Two studies had no loss to follow-up [14, 17]. One study did not specify the loss to follow-up [20]. In all 7 studies, VA was measured and was available for meta-analysis. All studies measured CSF, while data from 2 studies was available for meta-analysis. Ocular HOAs were measured in 5 studies, while data from 4 studies was available for meta-analysis.

**Risk of bias of included studies (Figures 2, 3)**

Using assessment criteria stated previously, the current study evaluated the risk of bias in each of the 7 studies. Two studies [18, 19] were judged to have a high risk of bias, while the other 5 studies [14-17, 20] were judged to have a low risk of bias.

Funnel plots were conducted to assess publication bias of included studies. Funnel plots of all included studies were symmetric, with no evidence of publication bias.

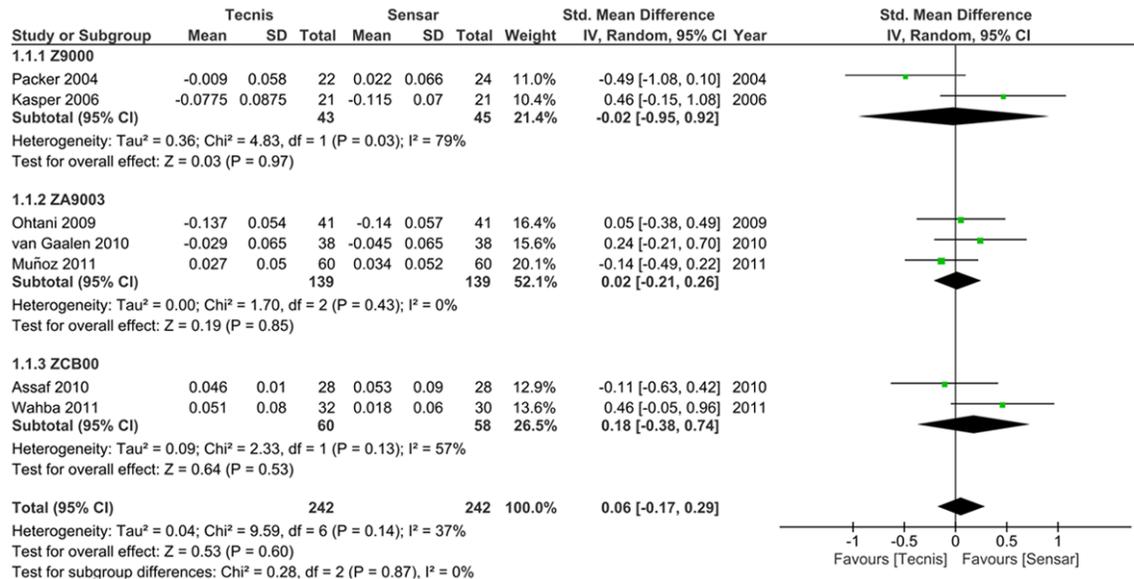
**Visual acuity (Figure 4)**

There were no significant differences in LogMAR best corrected visual acuity (BCVA) in the overall effects (95% CI, 0.06 [-0.17, 0.29];  $P=0.60$ ). Studies were characterized by low heterogeneity ( $I^2=37%$ ,  $P=0.14$ ). Subgroup analysis showed no significant differences among the 3 subgroups ( $I^2=0%$ ,  $P=0.87$ ).

**Contrast sensitivity function (Tables 3, 4)**

All 7 studies compared CSF under photopic conditions. Six studies compared CSF under mesopic conditions and two studies compared CSF under scotopic conditions. Under photopic conditions, 2 studies [14, 18] showed significantly better CSF in Tecnis IOLs, while the other 5 studies [15-17, 19, 20] showed no significant differences between the 2 types of IOLs. Under mesopic conditions, 3 studies [14, 18, 20] showed significantly better CSF in Tecnis IOLs, while the other 3 studies [15-17] showed no significant differences. Under scotopic condi-

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**Figure 4.** Forest plot and pooled results of BCVA between Tecnis and Sensor IOLs (SD: standard deviation; IV: inverse variance; CI: confidence interval).

**Table 3.** Comparison of higher-order aberrations and contrast sensitivity function

Studies	HOAs					CSF		
	Measuring PD	t-HOA	SA	Coma	Trefoil	Photopic	Mesopic	Scotopic
Packer 2004	-	-	-	-	-	3, 6 cpd ↑	1.5, 3, 6 cpd ↑	-
Kasper 2006	Natural	-	↓	NS	-	NS	NS	NS
Ohtani 2009	4 mm	↓	↓ (4 <sup>th</sup> )	NS (3 <sup>rd</sup> )	NS (3 <sup>rd</sup> )	NS	NS	3, 6, 12 cpd ↑
van Gaalen 2010	5 mm	NS	↓	NS	NS	NS at optimum focus*	-	-
Muñoz 2011	4 mm	NS	↓	NS	-	NS	NS	-
	6 mm	↓	↓	NS	-	-	-	-
Assaf 2010	6 mm	-	↓	NS	NS	6 cpd ↑	3, 6, 12, 18 cpd ↑	-
Wahba 2011	-	-	-	-	-	NS	6 cpd ↑	-

Measuring PD: artificial PD used in measuring aberrations under dilating; Natural: measure aberration under natural pupil; ↓: Significantly lower aberrations in eyes with Tecnis IOL implantation (P<0.05); 3<sup>rd</sup>: 3<sup>rd</sup> order aberrations (including coma and trefoil); 4<sup>th</sup>: 4<sup>th</sup> order aberrations (mainly SA); ↑: Significantly better CSF in eyes with Tecnis IOL implantation (P<0.05); NS: Difference was not significant (P>0.05); \*: Eyes with Tecnis IOL implantation had significantly lower CSF when -2.00 D defocus was applied at 3 cpd and 6 cpd.

tions, 1 study [17] showed significantly better CSF in Tecnis IOLs, while the other study [15] showed no significant differences. Some included studies provided only graphs instead of data. Therefore, CSF data under photopic and mesopic conditions from only 2 studies [19, 20] was available to be pooled in this meta-analysis. Analysis was performed for 4 different spatial frequencies, including 3 cycle per degree (cpd), 6 cpd, 12 cpd, and 18 cpd. No significant differences in photopic CSF were shown at 3 cpd (95% CI, 0.27 [-0.19, 0.73]; P=0.25) and 6 cpd (95% CI, 0.32 [-0.33, 0.98]; P=0.33). Significantly better photopic CSF was

shown in Tecnis IOL at 12 cpd (95% CI, 0.75 [0.23, 1.27]; P=0.004) and 18cpd (95% CI, 2.29 [1.64, 2.93]; P<0.001), but only 1 available study was analyzed (ZCB00 [20], graded at high risk of bias). For mesopic CSF, only 1 study (ZCB00 [20], graded at high risk of bias) was available for meta-analysis. Significantly better mesopic CSF was shown in Tecnis IOL at 6 cpd (95% CI, 1.57 [1.00, 2.15]; P<0.001) and 12 cpd (95% CI, 1.30 [0.75, 1.85]; P<0.001), whereas significantly better mesopic CSF was shown in Sensor IOL at 3 cpd (95% CI, -0.66 [-1.17, -0.15]; P=0.01) and 18 cpd (95% CI, -3.51 [-4.32, -2.7]; P<0.001).

**Table 4.** Meta-analysis results of higher-order aberrations and contrast sensitivity function

Variables	Number of available studies	Effect size (SMD <sup>§</sup> [95% CI])	Heterogeneity (I <sup>2</sup> )	Test for overall effect Z; P value
<b>t-HOA</b>				
4 mm PD	1	-0.19 [-0.55, 0.17]	-	1.04; 0.30
5 mm PD	1	-0.33 [-0.78, 0.12]	-	1.42; 0.16
6 mm PD	1	-0.43 [-0.80, 0.07]	-	2.34; 0.02*
<b>SA</b>				
Natural PD	1	-0.98 [-1.63, -0.34]	-	3.00; 0.003*
4 mm PD	1	-1.33 [-1.72, -0.93]	-	6.56; <0.001*
5 mm PD	1	-2.00 [-2.55, -1.44]	-	7.05; <0.001*
6 mm PD	2	-3.15 [-6.83, 0.52]	97%	1.68; 0.09
<b>Coma</b>				
Natural PD	1	0.30 [-0.30, 0.91]	-	0.98; 0.33
4 mm PD	1	0.06 [-0.30, 0.41]	-	0.30; 0.76
6 mm PD	2	-0.14 [-0.44, 0.16]	29%	0.92; 0.36
<b>Trefoil</b>				
6 mm PD	1	0.08 [-0.44, 0.61]	-	0.31; 0.76
<b>Photopic CSF</b>				
3 cpd	2	0.27 [-0.19, 0.73]	46%	1.15; 0.25
6 cpd	2	0.32 [-0.33, 0.98]	73%	0.97; 0.33
12 cpd	1	0.75 [0.23, 1.27]	-	2.85; 0.004*
18 cpd	1	2.29 [1.64, 2.93]	-	6.91; <0.001*
<b>Mesopic CSF</b>				
3 cpd	1	-0.66 [-1.17, -0.15]	-	2.52; 0.01*
6 cpd	1	1.57 [1.00, 2.15]	-	5.36; <0.001*
12 cpd	1	1.30 [0.75, 1.85]	-	4.61; <0.001*
18 cpd	1	-3.51 [-4.32, -2.70]	-	8.49; <0.001*

<sup>§</sup>: SMD shows the standardized mean difference that subtracting Sensor group from Tecnis group; \*: showing significant difference.

#### Ocular higher-order aberrations (Tables 3, 4)

Total ocular HOA (t-HOA) was reported in 3 ZA9003 studies. One study [19] showed no significant differences between the 2 types of IOLs. Two studies [16, 17] showed significantly lower t-HOA in Tecnis IOLs. SA was reported in 5 studies [14-17, 19], all of which showed significantly lower values in Tecnis IOLs. Coma and trefoil were, respectively, reported in 5 studies [14-17, 19] and 3 studies [14, 16, 19]. None of these studies reported significant differences between the 2 types of IOLs. Meta-analyses were performed in available data from 4 studies [14-16, 19]. Analyses were performed for 4 different PD, including natural, 4 mm, 5 mm, and 6 mm. Significantly lower t-HOA was shown in Tecnis IOL at 6 mm PD (95% CI, -0.43 [-0.80, -0.07];  $P=0.02$ ). No significant differences were shown at 4 mm and 5 mm PD. Significantly lower SA was shown in Tecnis IOL at natural PD

(95% CI, -0.98 [-1.63, -0.34];  $P=0.003$ ), 4 mm PD (95% CI, -1.33 [-1.72, -0.93];  $P<0.001$ ), and 5 mm PD (95% CI, -2.00 [-2.55, -1.44];  $P<0.001$ ). For 6 mm PD, overall effects showed no significant differences (95% CI, -3.15 [-6.83, 0.53];  $P=0.09$ ). However, highly significant heterogeneity was discovered ( $I^2=97%$ ,  $P<0.001$ ). Thus, subgroup analysis was performed according to IOL types. Finally, significantly lower SA was found in Tecnis IOL in both subgroups: ZA9003 [16] (95% CI, -1.31 [-1.70, -0.91];  $P<0.001$ ) and ZCB00 [14] (95% CI, -5.06 [-6.17, -3.96];  $P<0.001$ ). No significant differences were shown in coma (95% CI, -0.02 [-0.23, 0.20];  $P=0.89$ ) and trefoil (95% CI, 0.08 [-0.44, 0.61];  $P=0.76$ ) at any PD.

#### Discussion

This systematic review aimed to identify whether Tecnis aspheric monofocal IOLs differ from Sensor spherical monofocal IOLs in BCVA,

CSF, and HOAs. Data for VA demonstrated that Tecnis IOLs are of no significant advantage, compared to Sensar IOLs, even in a Z9000 study [15] in which VA was measured under different contrasts and luminance. Moreover, no significant differences were shown among the 3 subgroups in terms of different types of Tecnis IOLs. Results suggest that postoperative VA is not dependent on optic materials, optic design, or other special IOL features.

Two out of the 7 studies showed better CSF in Tecnis IOLs, at certain spatial frequencies under photopic conditions, and almost all special frequencies under mesopic conditions. Interestingly, both ZCB00 studies [14, 20] showed significantly better CSF, especially under mesopic conditions, whereas none of the ZA9003 studies showed significant CSF differences in either photopic or mesopic conditions. One ZA9003 study showed even worse CSF when applying -2.00D defocus at 3 cpd and 6 cpd [19]. Several studies [25, 26] reported that 1-piece design IOL demonstrates more stable refraction at different PD, which means less postoperative myopic shift and defocus. This may explain why ZCB00 IOLs showed better CSF, compared to other Tecnis monofocal IOLs, according to present results. Unfortunately, only 2 studies compared CSF under scotopic conditions, in which 1 ZA9003 study [17] showed significantly better results at 3 cpd, 6 cpd, and 12 cpd. Results suggest that Tecnis ZA9003 IOLs demonstrate better CSF in dark environments. Previous studies [11, 16, 27] have revealed that eyes implanted with aspheric IOLs benefit more from reducing SA and t-HOA, as PD increases. It was suggested that reducing SA might increase CSF, as well as reduce myopic shift, as PD increases [7, 19, 28]. This may explain why Tecnis ZA9003 demonstrated better CSF under scotopic conditions, but not under photopic and mesopic conditions. Meta-analysis was feasible in only 2 of the included studies, showing that Tecnis ZCB00 IOL had a significantly better photopic and mesopic CSF. However, this ZCB00 study [20] is graded at high risk of bias for this systematic review. Thus, it could not be considered as overwhelming evidence.

It has been proven that various incisions of phacoemulsification do not change the corneal SA [29, 30], which is the most important component of HOAs. IOL implantation is most likely

the main cause of postoperatively ocular SA or t-HOA change. Aspheric IOLs are designed with prolate the optical surface to compensate the physiologically positive corneal SA (average +0.28  $\mu\text{m}$ ) [31]. Therefore, the whole ocular optical quality is improved. Tecnis IOLs are designed with a SA value of -0.27  $\mu\text{m}$  to enable the ocular SA to be close to zero after cataract surgery. Based on present results, all included Tecnis IOLs showed significantly lower SA, especially at larger PD, compared to Sensar IOLs. Two out of 3 included studies showed significantly lower t-HOA in Tecnis IOLs, especially at larger PD. With respect to coma and trefoil, none of the included studies showed significant differences between Tecnis and Sensar IOLs. Results indicate that coma and trefoil are independent of IOL's optical designs. However, it was proven that coma and trefoil might be affected by other factors. Coma might be correlated to IOL tilt [32, 33] and trefoil might be correlated to optical changes of corneal incisions [30, 34]. Based on the results of coma and trefoil in the present study, both Tecnis and Sensar monofocal IOLs, regardless of 1-piece or 3-piece, silicon or acrylic, and aspheric or spherical, seem to have unchanged corneal optics and a stable IOL postoperative position.

The present study had some limitations, however: 1) For studies with unspecified methodological descriptions, the authors were contacted. Unfortunately, none of them responded, making it difficult to assess the quality of studies; and 2) Subjective assessment of visual satisfaction was not available.

There are some recommendations for further studies on this topic: 1) Controlled trials comparing visual outcomes among different types of Tecnis aspheric monofocal IOLs should be conducted; and 2) Questionnaires should be commonly used to assess patient visual satisfaction.

In conclusion, this systematic review provides an up-to-date and comprehensive summary of the best available evidence for doctors and patients about postoperative visual outcomes of eyes implanted with various Tecnis aspheric monofocal and Sensar monofocal IOLs from the same manufacturer. The current systematic review revealed significant superiority of Tecnis aspheric monofocal IOLs, in terms of ocular t-HOA and SA, compared to Sensar spherical

monofocal IOLs. They showed equal effects on VA, ocular coma, and trefoil. Current evidence regarding CSF is less consistent and is not enough to suggest significant differences between these two types of IOLs.

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## Disclosure of conflict of interest

None.

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