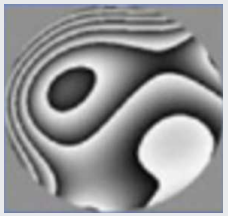
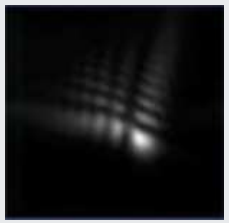
Spherical aberration correction may come at a cost if we consider the impact of coma

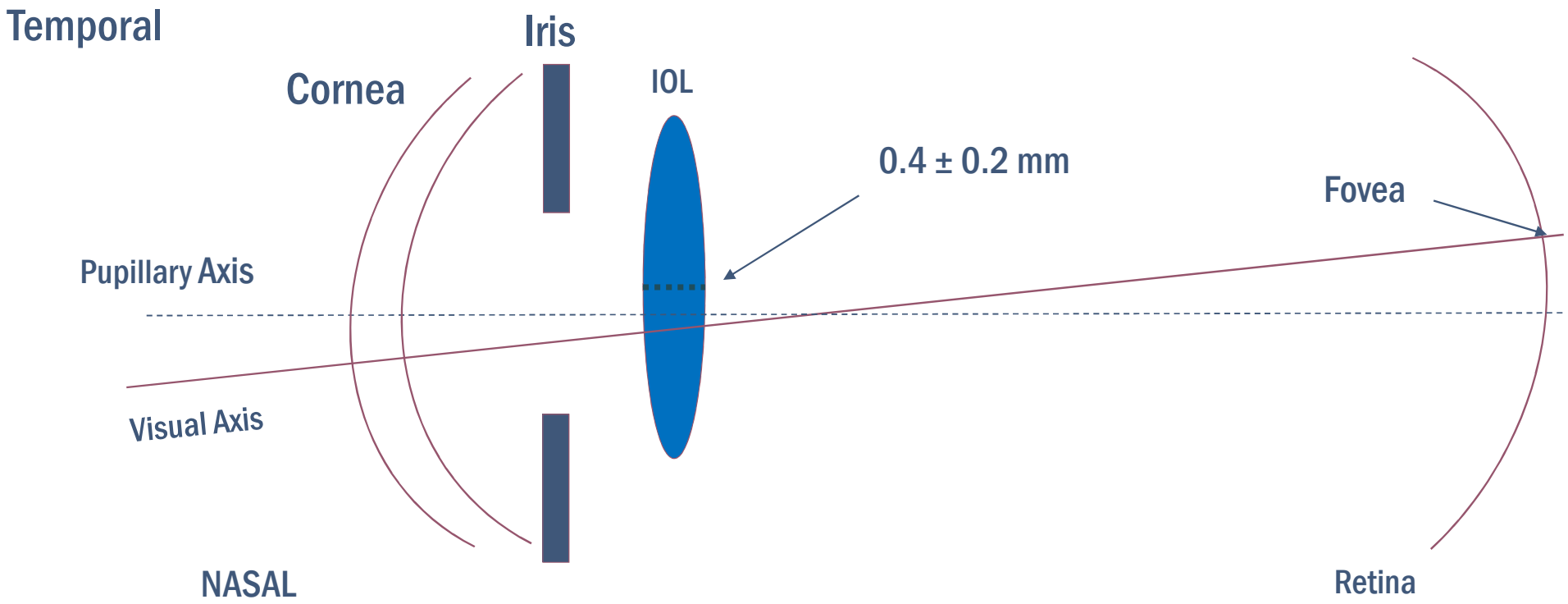
- Coma occurs naturally in the eye
- Coma can increase when the compensating effect of the natural crystalline lens is removed.
- Relative to spherical designs, lenses with negative spherical aberration are associated with image quality having higher sensitivity to being positioned “off visual axis”.

	Zernike polynomials	Point spread function (PSF)	Retinal image
Coma			

Images adapted from:
https://www.optometricmanagement.com/supplements/2007/june-2007/wavefront-dispensing/individualized-high-definition-vision

1. Bellucci R et al. J Cataract Refract Surg. Vol 33(2) 2007

Coma occurs because the visual axis and pupillary axis are not the same

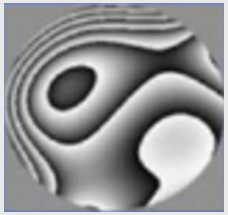
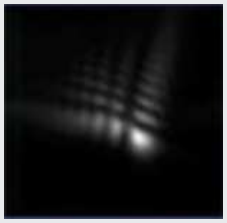


Studies have shown that the mean position "off visual axis" of an IOL following cataract surgery is 0.4 ± 0.2 mm with a range up to 1.7 mm.[1]

1. A.Harrer et al. Variability in angle k and its influence on higher-order aberrations in pseudophakic eyes JCRS 43 (8); 1015–1019; 2017

Choosing an IOL with optics that consider spherical aberration AND Coma

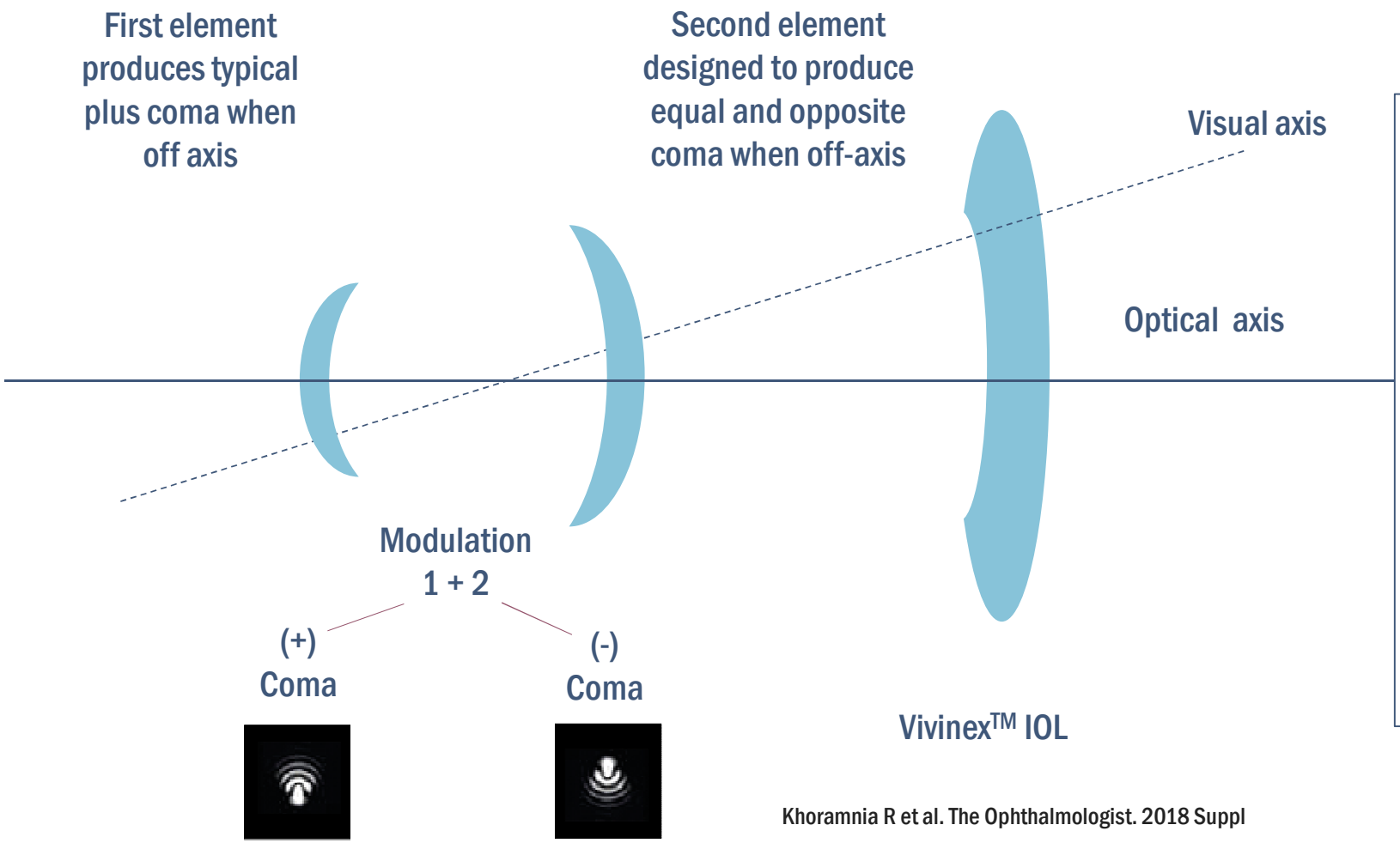
- Does the lens compensate for the spherical aberration of the cornea?
  - The Vivinex™ IOL provides -0.18 µm of spherical aberration correction
  - Partial correction of the average SA of the human cornea maintains the patient's depth of field[1]
- BUT, how tolerant are the optics to sources of coma?

	Zernike polynomials	Point spread function (PSF)	Retinal image
Coma			

Images adapted from:
https://www.optometricmanagement.com/supplements/2007/june-2007/wavefront-dispensing/individualized-high-definition-vision

Rocha, Karolinne Maia et al. Journal of Cataract & Refractive Surgery , Volume 35 , Issue 11 , 1885 - 1892

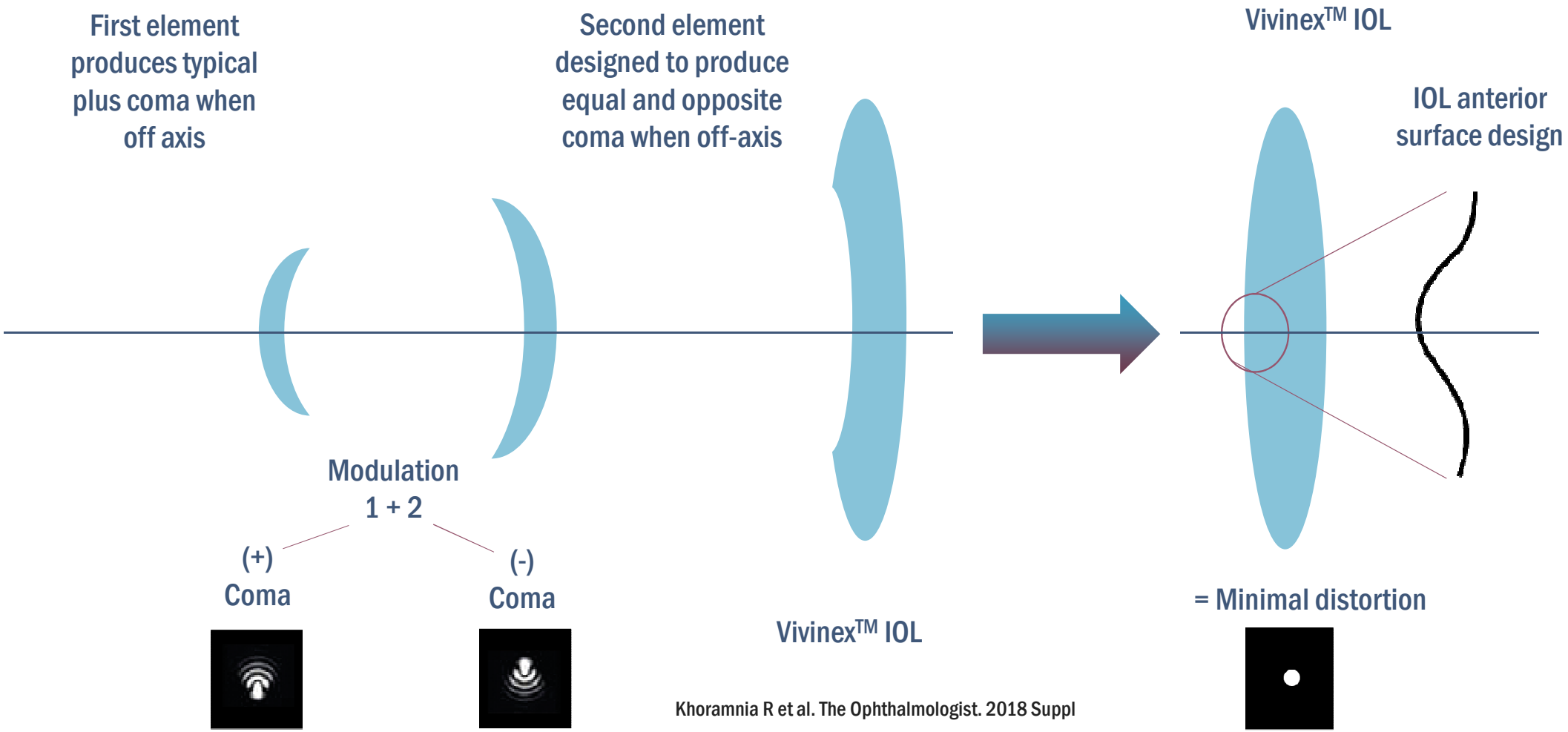
The Vivinex™ IOL is designed to minimise the impact of Coma on image quality



Two distinct aspheric elements in the centre of the IOL which work in harmony
The central 1.2 mm optical zone induces positive coma by using a convex meniscus structure, while the 1.2 mm area around this central zone induces an equal negative coma through a concave meniscus structure

Khoramnia R et al. The Ophthalmologist. 2018 Suppl

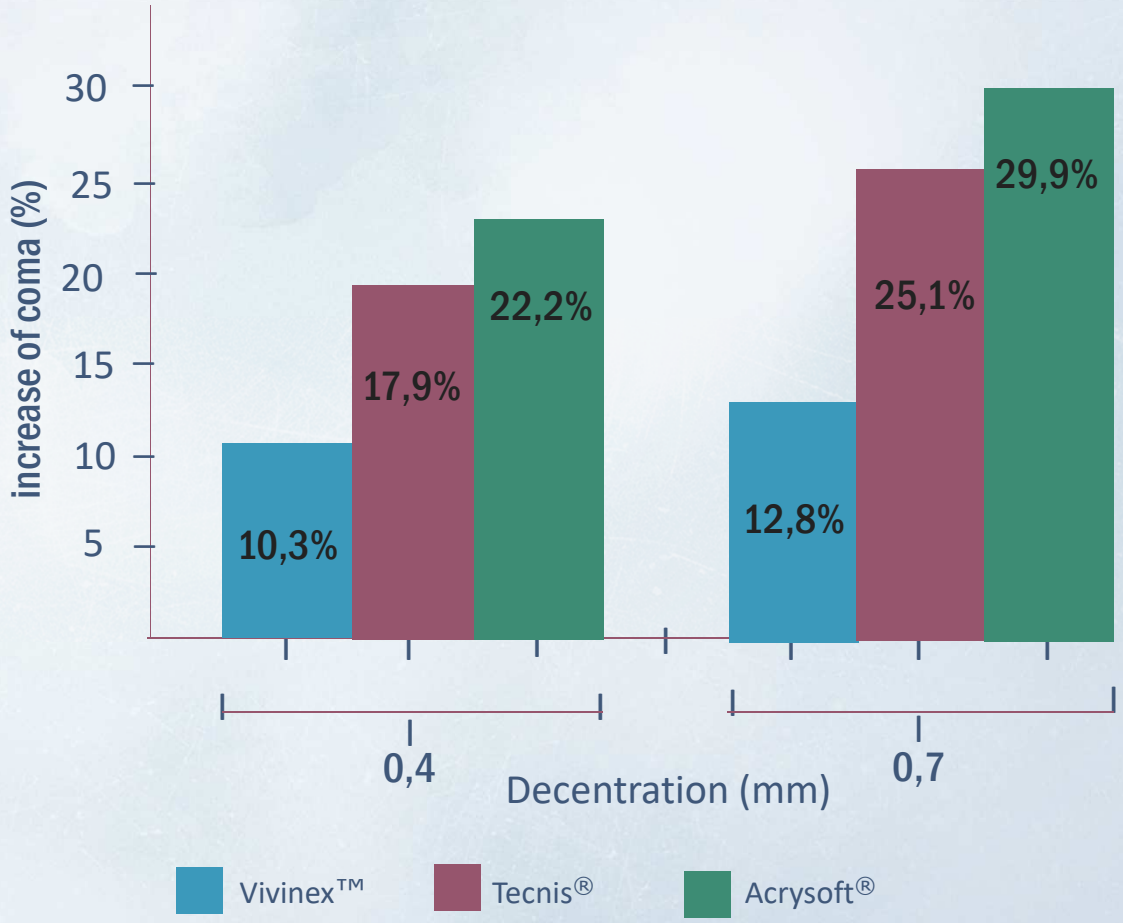
The Vivinex™ IOL is designed to minimise the impact of Coma on image quality



Khoramnia R et al. The Ophthalmologist. 2018 Suppl

It has been demonstrated that the Vivinex™ IOL has greater resistance to coma

Perez-Merino *et al.* 2018, demonstrated Vivinex was more immune to optical degradation caused by off axis positioning when compared to Tecnis® and Acrysof®



Perez-Merino et al. 2018

It has been demonstrated that the Vivinex™ IOL has greater resistance to coma

IOL	Spherical aberration correction (µm)	Rate of increase in astigmatism at 0.4mm decentration (µm/mm)	Rate of increase in coma at 0.4mm decentration (µm/mm)	Decrease in visual Strehl ratio at 0.7mm decentration
Vivinex™ XY1	-0,18	0,18	0,19	2,23
TECNIS® IP ZCB00V	-0,27	0,20	0,32	2,8
Acrysof® IQ SN60WF	-0,17	0,26	0,39	3,2

Perez-Merino et al. 2018

The Vivinex™ IOL incorporate optics that correct spherical aberration AND which are less sensitive to sources of coma

- ***Does the lens compensate for the spherical aberration of the cornea?***
  - The Vivinex™ IOL provides -0.18 µm of spherical aberration correction[1]
  - Partial correction of the average SA of the human cornea maintains the patient's depth of field[2]
- ***Are the optics of the IOL, and therefore image quality, tolerant to sources of Coma?***
  - The cornea is a natural source of ocular coma in the eye
  - IOLs are not routinely centred on the visual axis during or after cataract surgery
  - Studies have shown that the mean position "off visual axis" of an IOL following cataract surgery is 0.4 ± 0.2 mm with a range up to 1.7 mm.[3]
  - It has been shown that when positioned "off visual axis" the Vivinex™ IOL induces less coma when compared to leading competitors[1]

1. Perez-Merino et al. 2018; 2. Rocha, Karolinne Maia et al. 2009 3. A.Harrer et al. 2017