

Claims

- [Claim 1] An intraocular lens, comprising:
a monofocal lens body that defines a focal length and is configured to add more higher order aberration (HOA) to an eye than a spherical IOL with the same focal length.
- [Claim 2] An intraocular lens as claimed in claim 1, wherein
the lens body defines an optical center, an outer edge, a first region that extends from the optical center to a radius between the outer edge and the optical center, and a second region located radially outward of the first region; and
the second region is configured to reduce the longitudinal HOA that would otherwise occur in low light conditions within an optical system defined by the lens body and the eye.
- [Claim 3] An intraocular lens as claimed in claim 2, wherein the lens body is configured to create, within the optical system, a higher order aberration to normalized radial distance ratio (HOA-NRD ratio) profile that increases in slope as NRD increases within at least a portion of the first region and does not increase in slope as NRD increases within at least a portion of the second region.
- [Claim 4] An intraocular lens as claimed in claim 3, wherein HOA-NRD profile increases in slope as NRD increases within the entire first region.
- [Claim 5] An intraocular lens as claimed in claim 3, wherein HOA-NRD profile decreases in slope as NRD increases within at least the substantial majority of the second region.
- [Claim 6] An intraocular lens as claimed in claim 3, wherein the first and second regions are separated by an HOA-NRD profile inflection point.
- [Claim 7] An intraocular lens as claimed in claim 3, wherein the inflection point is between 0.4 NRD and 0.8 NRD.
- [Claim 8] An intraocular lens as claimed in any one of claims 1-7 where the HOA is selected from the group consisting of spherical aberration, trefoil and coma.
- [Claim 9] An intraocular lens as claimed in any one of claims 1-7 where the HOA is spherical aberration.
- [Claim 10] An intraocular lens as claimed in claim 1, wherein the lens body comprises a 20 D monofocal aspheric lens body that adds 0.4 micrometer of spherical aberration to the eye at 6 mm entrance pupil and adds 0.1 micrometer of spherical aberration to the eye at 4 mm entrance

pupil.

[Claim 11]

A method comprising the step of:
adding a higher order aberration (HOA) to an eye by adding a
monofocal optical device to eye to improve depth of focus in the eye.

[Claim 12]

A method as claimed in claim 11, wherein the HOA is selected from
the group consisting of spherical, trefoil and coma.

[Claim 13]

A method as claimed in claim 11, wherein the monofocal optical device
comprises a monofocal aspheric IOL that adds spherical aberration to
the eye.

[Claim 14]

A method as claimed in claim 13, wherein the monofocal aspheric IOL
is a 20 D monofocal aspheric IOL that adds 0.4 micrometer of spherical
aberration to the eye at 6 mm entrance pupil and adds 0.1 micrometer
of spherical aberration to the eye at 4 mm entrance pupil.

[Claim 15]

A method as claimed in claim 13, wherein the eye comprises a first eye,
the method further comprising the step of:
correcting the spherical aberration in a second eye by inserting a
monofocal aspheric IOL.

[Claim 16]

A method as claimed in claim 15, further comprising the step of:
correcting chromatic aberration in the second eye with the aspheric
IOL.

[Claim 17]

A method as claimed in claim 11, wherein
the monofocal optical device defines an optical center, an outer edge, a
first region that extends from the optical center to a radius between the
outer edge and the optical center, and a second region located radially
outward of the first region; and
the second region is configured to reduce the longitudinal HOA that
will occur in low light conditions within an optical system defined by
the monofocal optical device and the eye.

[Claim 18]

A method as claimed in claim 17, wherein
the monofocal optical device comprises a monofocal aspheric IOL;
the HOA comprises spherical aberration; and
the longitudinal HOA comprises longitudinal spherical aberration.

[Claim 19]

A method as claimed in claim 17, wherein the monofocal optical device
is configured to create, within the optical system, a higher order
aberration to normalized radial distance ratio (HOA-NRD ratio) profile
that increases in slope as NRD increases within at least a portion of the
first region and does not increase in slope as NRD increases within at
least a portion of the second region.

- [Claim 20] A method as claimed in claim 19, wherein the monofocal optical device comprises a monofocal aspheric IOL; and the HOA comprises spherical aberration.
- [Claim 21] A method as claimed in claim 19, wherein HOA-NRD profile increases in slope as NRD increases within the entire first region.
- [Claim 22] A method as claimed in claim 19, wherein HOA-NRD profile decreases in slope as NRD increases within at least the substantial majority of the second region.
- [Claim 23] A method as claimed in claim 19, wherein the first and second regions are separated by an HOA-NRD profile inflection point.
- [Claim 24] A method as claimed in claim 23, wherein the inflection point is between an NRD of between 0.4 and 0.8.

1. An intraocular lens, comprising:
a monofocal lens body that defines a focal length and is configured to add more higher order aberration (HOA) to an eye than a spherical IOL with the same focal length, wherein
the lens body defines an optical center, an outer edge, a first region that extends from the optical center to a radius between the outer edge and the optical center, and a second region located radially outward of the first region; and
the second region is configured to reduce the longitudinal HOA that would otherwise occur in low light conditions within an optical system defined by the lens body and the eye.
2. An intraocular lens as claimed in claim 1, wherein the lens body is configured to create, within the optical system, a higher order aberration to normalized radial distance ratio (HOA-NRD ratio) profile that increases in slope as NRD increases within at least a portion of the first region and does not increase in slope as NRD increases within at least a portion of the second region.
3. An intraocular lens as claimed in claim 2, wherein HOA-NRD profile increases in slope as NRD increases within the entire first region.
4. An intraocular lens as claimed in claim 2, wherein HOA-NRD profile decreases in slope as NRD increases within at least the substantial majority of the second region.
5. An intraocular lens as claimed in claim 2, wherein the first and second regions are separated by an HOA-NRD profile inflection point.
6. An intraocular lens as claimed in claim 2, wherein the inflection point is between 0.4 NRD and 0.8 NRD.

7. An intraocular lens as claimed in any one of claims 1-6 where the HOA is selected from the group consisting of spherical aberration, trefoil and coma.

8. An intraocular lens as claimed in any one of claims 1-6 where the HOA is spherical aberration.

9. An intraocular lens as claimed in claim 1, wherein the lens body comprises a 20 D monofocal aspheric lens body that adds 0.4 μm of spherical aberration to the eye at 6 mm entrance pupil and adds 0.1 μm of spherical aberration to the eye at 4 mm entrance pupil.