Awaya Aniseikonia Test Diagnosis

Part Number: 137800

ANISEIKONIA

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Aniseikonia (pronounced “an’ih-si-ko’ne-ah”) is the visual condition in which a difference in image size exists between the two eyes. Typical symptoms are described above. A thorough binocular vision and aniseikonia evaluation is recommended. Common recommendations may include custom-designed iseikonic lenses (a.k.a. size lenses) and/or contact lenses. Vision therapy (a.k.a. orthoptics) and a prismatic prescription may simultaneously be employed to treat associated binocular dysfunctions (eye teaming problems) and/or accommodative dysfunctions (eye focusing problems).

Treatment Options

Iseikonic lenses Iseikonic lenses are custom-designed spectacle lenses that alter the magnification in one or both eyes by changing several lens parameters: front curvature, center thickness, vertex distance, and/or lens material. The perceptual disturbance caused by the image size difference between the two eyes are relieved by either magnification of the eye seeing through the smaller image or mignification of the eye seeing through the larger image.

- **Contact lenses** Contact lenses may be helpful in certain subtypes of aniseikonia, especially if the image size difference is induced by a difference in the front curvature of the cornea.

- **Vision Therapy** Vision therapy is the training of the visual system to become effective and comfortable in handling visual stress of the environment. It is especially helpful in cases of aniseikonia that have associated binocular dysfunction (eye-teaming problems) and/or accommodative dysfunctions (eye-focusing problems).

- **Occlusion Therapy** Aniseikonia is a binocular phenomenon. In other words, it exists only when both eyes are viewing. When one eye is partially or fully occluded with a specially-prescribed occluder contact lens or eye-patch, the symptoms due to aniseikonia is expected to be eliminated.

- **Monovision Correction** Monovision correction, either in the form of spectacles or contact lens, consists of correction of one eye for distance and the other for near-viewing. The final effect will be similar to a partial occlusion described above.

Following from www.nova.edu/hpd/otm/mba/ANISEIK

Diagnosis:

Heterophoric and strabismic patients Heterophoric patients with aniseikonia can be diagnosed using the space eikonometer. Many strabismic patients, and some heterophoric patients, cannot give reliable responses on the eikonometer and an estimate of the amount of aniseikonia present may need to be made. For estimation purposes, a good rule of thumb is 1 percent for each diopter of spherical anisometropia and 1.5 percent for each diopter of astigmatic anisometropia. However, clinically it is often initially preferable to ignore the possibility of aniseikonia and simply prescribe the lens correction that maximally corrects the refractive error. Then, if there are still symptoms of aniseikonia in heterophoric patients or if binocularity cannot be established in strabismus, an iseikonic prescription can be considered.

Inadvertent aniseikonia With regulations requiring “impact-resistant” lenses, patients can receive a replacement lens (or lenses) which is considerably different in thickness from their former lens(es). The heat treating process can cause a warpage of the lens surfaces - a cylinder on each surface introducing a meridional aniseikonic effect. Use chemical tempering to avoid this potential problem. Plastic lenses are especially vulnerable to warpage due to peripheral pressure from tight metal or zyl rimmed frames. A Geneva Lens Measure and thickness caliper are invaluable for determining how the curves and thickness of impact- resistant lenses differ from the patient’s former lenses. Attention to the possible curvature and/or thickness differences can help the practitioner detect the reason for patient discomfort with lenses which are of proper power when checked on the lensometer but, which induce aniseikonia by inadvertent changes in lens curvatures and/or thickness.

Iseikonic Lens Design

Initial prescription The first recommendation is to use the patient’s old spectacle lenses as a base for making magnification changes. If the patient does not have conventional spectacle lenses-prescribe them in whatever power you have decided on, and in minus cylinder form, because:

1. Subsequent changes in magnification are easier to calculate.

2. Distortions inherent in minus cylinder lenses are less and the lenses may be easier to tolerate - especially in iseikonic form.

An initial prescription is used for two reasons:

1. Some people can apparently adapt to almost anything and if the patient adapts
comfortably to conventional spectacles so much the better. There are only a small number of people with clinically significant aniseikonia – that is aniseikonia of “0.75% or more associated with symptoms related to use of the eyes and not relieved by accurate refractive or motility corrections.”

2. If the patient cannot adapt to conventional spectacle lenses

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then the initial prescription will serve as a base for testing and the parameters of the spectacle lenses can be altered to produce necessary magnification changes.

Iseikonic design Ophthalmic lenses are usually prescribed to correct the refractive error of the eye and magnification properties of the lenses are rarely considered. Proper design of lenses to correct difference in size and/or shape of perceived images of the two eyes involves application of principles of geometrical optics. Magnification of any ophthalmic lens is affected by the:

position of the lens in front of the eye (h),

front curve of the lens (D1), ÿ

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thickness of the lens (t), and

refractive power of the lens.

Of course, for any particular patient the refractive power of the lens is fixed so that only the first three factors are variable. There are also, obviously, physical restrictions on the amount of change which any single variable can undergo: e.g. thickness (t) cannot be reduced to zero. Therefore, in designing iseikonic lenses it is best to consider alteration of all relevant variables rather than attempting to produce desired magnification by changing just one variable.

The process of designing lenses to correct aniseikonia combined with refractive correction (known as “translation”) is a complex task. The calculation portion of this program is constructed to allow you to design iseikonic lenses from parameters that you input. This text is to refresh your memory about the issues in iseikonic lens design so that you will be able to determine whether the iseikonic lens design you determine for an individual patient “makes sense”.

Iseikonic prescription rules If the patient is wearing spectacle lenses the dimensions (base curve, thickness, and position in front of the eye) of these lenses can be changed to introduce the necessary (or an approximate) correction for aniseikonia. This procedure makes it unnecessary to consider magnification properties of trial lenses and simplifies procedures of translating data into iseikonic lenses. When patients are already wearing spectacles lenses the only thing that has to be considered is how much magnification needs to be added by altering the design of the spectacle lenses. It is not even necessary to know the magnification properties of the spectacle lenses.

There are three general rules to follow when altering dimensions of a patient’s spectacle lenses to arrive at an approximate correction for aniseikonia:

Any change in vertex distance (h) of a lens results in a change in magnification.

increasing front surface curvature (D1) of a lens results in an increase in magnification.

increasing the thickness (t) of a lens increases magnification.

See Scheiman M & Wick B “Clinical Management of Binocular Vision” JB Lippincott, Phila, PA 1994; pp 562-568

Magnification By Changing Vertex (Eyewire) Distance In general, change eyewire distance the maximum amount so that as much magnification change can be realized from this change as possible. Reduce eyewire distance as much as possible (keeping in mind that 9-10 mm is the practical minimum) when the aniseikonic correction is in the same direction as the anisometropia. Increase the eyewire distance as much as possible when the aniseikonic correction is opposite to that expected from the anisometropia. Changes in eyewire distance are preferred because they are most acceptable cosmetically.

If the spectacle frame is moved away from the eyes change in eyewire distance (Dh) is positive. A minus lens that is moved closer to the eye increases; moved farther from the eye decreases magnification A plus lens that is moved closer to the eye decreases; moved farther from the eye increases magnification

Because minus lenses have thicker edges it is also possible to change magnification by shifting the bevel of the right and left lenses. A lens with a center bevel has, as the term implies, 1/2 of the bevel toward the front of the lens and 1/2 toward the back. A 1/3-2/3 bevel is one where 1/3 of the bevel is toward the front and 2/3 toward the back. A 2/3-1/3 bevel is the opposite. Moving the bevel forward (1/3-2/3) moves a lens nearer to the eye (increasing magnification for minus lenses) and an anterior bevel (2/3-1/3) moves a lens away (decreasing magnification-minus lenses).

Magnification By Changing Base Curve Change base curve as much as possible keeping in mind that very steep base curves (greater than +12.50) or very flat (less than +1.00) are not cosmetically appealing so some restraint has to be used. To save both time and money, select base curves which correspond to the 2, 4, 6, and 8 D front surface powers available from local laboratories.

The magnification of a lens can be altered when the base curve, front surface power, is changed in fixed steps. The advantages of increasing lens base curve to increase magnification are greatest in plus (hyperopic) corrections and much less in minus (myopic) corrections. In fact, myopic corrections of - 2.50 D and greater actually have a decrease of magnification with an increase in base curve (if other parameters remain the same). This is because an increase in base curve displaces the lens vertex away from the eye. This magnification change (from the increase in vertex distance

with increased base curve) is additive for hyperopic corrections but for minus lenses the increase in magnification due to base curve increase is offset by a decrease in magnification due to vertex displacement-particularly for higher power minus correction.

Magnification By Changing Thickness Change the thickness of the lens as much as possible. Keep in mind that the practical minimum for lens thickness is about 1.5mm and the maximum is about 7.5mm. Lenses above 3.5 mm minimum thickness become very heavy.

OTHER ISSUES: Anti-reflective and edge coats A thickness increase of 2.0 mm is a large change as is a base curve increase of 4 D. This is why all three variables - eyewire distance (h), base curve (D1), and thickness (t) - should be altered to achieve desired magnification changes. Often, however, very steep base curves and/or very thick lenses will be needed to produce desired magnification effects. The combination of steep base curves and/or increased lens thickness can cause a rather strange looking pair of spectacles in addition to unwanted internal reflections from the steeper base curve and increased thickness. Morgan recommended an anti- reflective coat as a means of eliminating excessive front surface reflections so that steeper base curves can be successfully used. Use of anti-reflective coating plus a frame-matching edge coat on any lens with an edge thickness over 2.6 to 3.1 mm will greatly enhance acceptability of iseikonic prescriptions by reducing internal reflections and improving cosmetic appearance.

Frame size Obviously careful considerations should be given to selection of frames for iseikonic prescriptions. A fairly heavy frame which will stay in adjustment will be a good choice because a small change in eyewire distance can have a large effect - especially with significant anisometropic prescriptions. Frames with small lateral/vertical differences (5 mm or less) are also better choices than more stylish large difference frames. The frame selected should have as small an eye size as possible (preferably not over 50 mm) so that lens thickness can be kept to a minimum. Thick edges of iseikonic lenses can be concealed better by a zyl frame than by a rimless or metal frame.