

# Varilux® Student Grant Award Program



**Case report: New Varilux® Physio® F-360° Fitting**

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Patient D.G. has come to the school’s dispensary to choose a new pair of corrective eyewear. Upon reading the patient’s chart and after inquiring about the patient’s needs, the following information was obtained:

**Patient case history**

*Chief complaints, occupation:*

Patient is a 59 year-old Caucasian male. His chief complaint is decreased near vision using his current progressive addition lenses (PAL) prescription glasses. Symptoms began appearing roughly 6 months ago; these included headaches and strained /fatigued eyes after light reading, as well as having to distance texts & books to read better. He also complains of poor night-vision. Otherwise, distance vision remains clear and satisfactory with PAL eyewear. His occupation is civil engineer, and therefore, he does a lot of reading. However, patient makes light use computers, at approximately an hour per day. His main hobbies are tennis and golf. Patient also wears contact lens on occasion (Air Optix O2 by CIBAVision).

*Ocular health:*

Patient D.G. has floaters in both eyes, but they’ve appeared a long time ago (more than 20 years), are stable and do not bother him. Patient also suffers from keratoconus OU.

*General health:*

Patient D.G. has hypercholesterolemia and takes medication for his condition (Lipitor). Otherwise, patient is healthy.

**Patient exam results:**

*Current Rx:*

Eye	Rx	Add	PAL design	Distance VA	Near VA
OD	-2.00/-0,75x105	+2.00	Varilux® Comfort®	20/25	0.50M
OS	-2.00/-0,50x108	+2.00	Varilux® Comfort®	20/20	0.50M

Patient’s current PAL eyewear was purchased nearly 4 years prior, in 2005.

*New refraction:*

Eye	Rx	Add	pupil-to-nose distance (mm)	Distance VA	Near VA
OD	-2.00/-1.00x105	+2.50	34.00	20/20	0.37M
OS	-2.00/-0.75x160	+2.50	34.50	20/15	0.37M

*Miscellaneous:*

Patient has a poorly compensated exophoria, which sometimes decompensate into an alternating exotropia. However, patient has not experienced diplopia, is asymptomatic and convergence reserves are sufficient.

## Dispensing

(N.B. Varilux® products used in this essay refer to those available in Canada, which may or may not be available in the United States.)

### Frame choice:

With all of this information in mind, I proceeded in helping patient D.G. pick an appropriate frame to his liking. After browsing through our inventory, the patient made his choice of the following prescription eyewear frame:

Collection	Model	Color	Caliber	Bridge	Cote B	Branches	Rim type
Adidas	A656	6053	50	19	30	145	½ metal/nylon



Figure 1. Stunning Adidas frame.

Considering patient D.G.'s low prescription, we were not overly concerned with the size of the frame (no need to have a smaller frame to minimize lens thickness), other than obtaining sufficient height for proper PAL fitting.

When comparing right/left pupil-to-nose distance with the distance between the geometrical center of left/right lens and the midline, we notice that they are nearly equal:

Distance between geometrical center of lens and midline:  $(50+19)/2 = 34.50$

Right pupil-to-nose distance (measured with PD meter) = 34.00

Left pupil-to-nose distance (measured with PD meter) = 34.50

Thus, the patient's pupils will be nearly centered with the optical center of the lenses and that way we will prevent inducing unwanted prismatic effect. This is especially important for this patient, considering his tendency to decompensate into an exotropia.

The vertical length (cote B) of the face frame is 30mm. We need a minimum of 10mm for distance vision, which leaves us 20mm for the progressive addition portion of the lens, which is more than enough to fit contemporary PAL designs. We measured the height where we will put our optic center from the bottom of the frame to the center of the pupil. We obtained 19,50mm OU. However, by looking at how the patient is used to wearing his previous PAL eyewear, we noticed that his progressive addition portion is centered lower than usual. Patient D.G. tells us that he prefers his progressive portion to be lower, as he is concerned about having it encroach into the distance vision portion of the lens. Thus we decide to drop the near vision centering down one millimeter to 18,50mm OU. Patient is aware of the possible problems encountered with PAL lenses and computer use and has already developed strategies to counter this, such as lowering his computer screen.

*Design choice:*

The patient's corrective eyewear that was purchased in 2005 was his first use of PAL. Patient D.G. had no issues adapting to the Varilux® Comfort® design. He maintains he was very satisfied with the all-around visual quality of the product, until his near vision began weakening a few months ago. Considering the success he's had with Varilux® lens, we've initially decided to upgrade him to the Varilux® Physio® 360 design. With a front & back design optimized for point-by-point correction of power and distortion, we expect the product to satisfy the patient's needs.

However, after inspection of the frame and examining the fit on the patient's face, we noticed that the frame's facial wrap was non-standard (too curved). This might cause a problem later on when inserting the lenses into the frame if their base curves differ too greatly. Ultimately, we may end up deforming the lenses and create unwanted aberration and distortion.

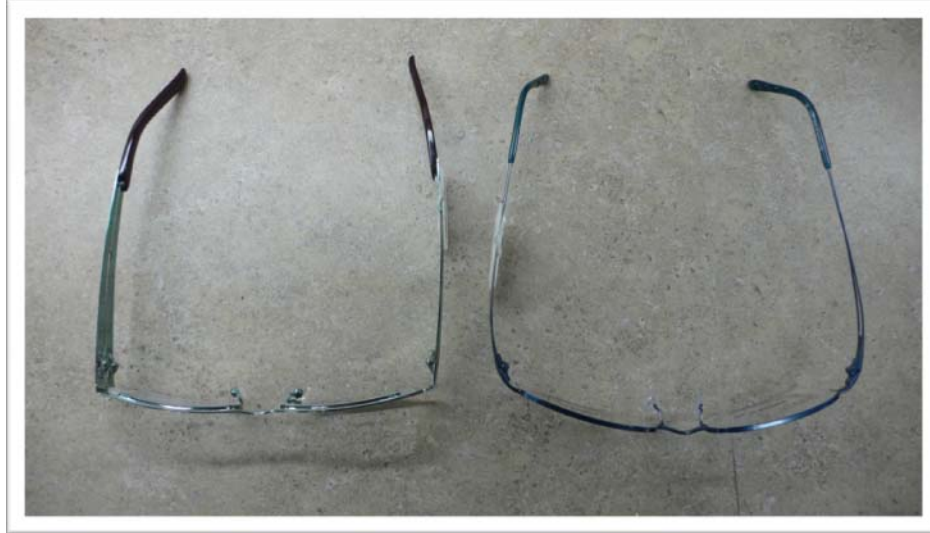


Figure 2. Standard frame on left, Adidas frame on right. Notice the pronounced curvature on the Adidas frame.

Therefore, we chose to fit patient D.G. with the new Varilux® Physio® F-360° PAL design. Indeed, this technology is custom-made to fit the patient’s personal physiognomy. It has the same features as the Physio® 360°, but with added personalization. Indeed, by taking in account of additional fitting parameters, the manufacturer will be able to create a custom lens to cater to the patient’s specific characteristics. To achieve this, additional data on the eyeglasses’ fit on the patient are required:

- Fitting height (already measured)
- Monocular pupillary distance (already measured)
- Pantoscopic angle
- Dihedral angle
- The vertex distance

Using the handy tool provided by Essilor, and making sure that the frame is fitted properly on the patient’s face we measure on patient D.G. the following:

Eye	Pantoscopic angle (°)	Dihedral angle (°)	Vertex distance (mm)	Monocular PD (mm)	Fitting height (mm)
OD	11	12	15	34.00	18.50
OS	11	12	17	34.50	18.50

This data is included in the order.



Figure 3. Essilor fitting tool.

Another interesting design feature of the Physio® lenses is the W.A.V.E.™ technology. Indeed, Physio® lenses are not only produced with point-by-point correction of power, but also provide correction of distortion originating from higher-order aberrations. Traditional surfacing of lenses is unable to address these problems.

Patient D.G. suffers from keratoconus OU. This condition, which involves a protrusion of the cornea, is well known to cause decreased visual acuity as well as decreased contrast sensitivity due to aberration (astigmatism, coma, and higher-order)<sup>i</sup>. Decreased contrast sensitivity will not deter visual acuity, but it will affect the quality of vision. We believe that using the Varilux® Physio® PAL may prove to be beneficial to the patient. In summary, he may not necessarily see gains in VA's, but potentially may still see better.

*Material choice:*

As for the material, we chose Airwear because of greater impact resistance during sports (ex. Tennis), excellent UV protection as well as producing a thinner and lighter lens.

*Treatments choice:*

In terms of lens treatment, patient D.G. was very keen on the hydrophobic properties of newer designs such as Crizal Avancé. Wanting the best performance for his new eyeglasses, he opted with Crizal Avancé D. He also added Transitions in brown.

## Delivery and impressions

Patient D.G. returned two weeks later to pick up his corrective eyewear. He eagerly tried them on for the first time and was very satisfied with the quality of both his near and distance vision. Adaptation was nearly instantaneous, and satisfaction level was high.

Of great interest to me was to obtain a subjective impression on whether or not the Physio® W.A.V.E.™ technology did improve contrast sensitivity compared to older generation PAL lenses. In order to this, patient consent was obtained to use the Pelli-Robson contrast sensitivity chart.

The patient D.G. was first tested using his old PAL prescription eyeglasses. Then, the test was performed once again with his new PAL prescription eyeglasses. Test distance was 1 meter.



Figure 4. Pelli-Robson contrast sensitivity chart.

We obtained the following results:

*Pelli-Robson test results:*

Eye	Older generation PAL design	New Physio® PAL design
OD	1.35 log	1.65 log
OS	1.50 log	1.65 log
OU	1.50 log	1.65 log

According to a study, in their sample, they discovered that the average contrast sensitivity log in healthy older individuals (mean age is  $70.2 \pm 6.7$  years) is 1.65 log or above, and that a significant change in contrast sensitivity score is 0.30 log units<sup>ii</sup>. Our patient has a lower base score than the average older population (1.35 log OD, 1.50 log OS, and 1.50 log OU), most likely due to his keratoconus. However, with the Physio® PAL design, there is a statistically significant difference in the right eye, as seen with an increase in the contrast sensitivity score by exactly +0.30 log to 1.65 log. The effect is less significant in the left eye, where there is only a +0.15 log increase.

This test was only meant to be a rough and subjective assessment of the Varilux® Physio®'s ability to correct higher aberrations and improve contrast sensitivity. To be more precise, we should have used older PAL lens with the exact same prescription, frame and fit as the newer PAL lenses, because differences may have influenced results. Objective measurement of correction of higher aberration would also prove to be interesting. In any case, this small test can lead us to assume that Physio® W.A.V.E. may indeed help improve contrast sensitivity (especially useful in night vision) and ultimately, visual quality.

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<sup>i</sup> Okamoto C, Okamoto F, Samejima T, Miyata K, Oshika T. *Higher-order wavefront aberration and letter-contrast sensitivity in keratoconus*. Eye. 2008 Dec;22(12):1488-92. Epub 2007 Jun 8.

<sup>ii</sup> Elliott D, Sanderson K, Conkey A. *The reliability of the Pelli-Robson contrast sensitivity chart*. Ophthalmic and Physiological Optics Dec 2007;Volume 10, Issue 1: 21–24