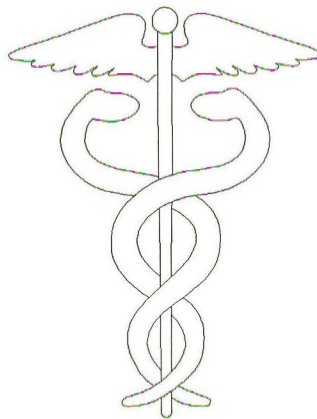


**Comparing Deposit Formation
Between Opaque and
Visibility Tint
Soft Contact Lenses**

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Abstract:

It has been previously noted that opaque tint soft contact lenses cause slight discomfort when compared to clear lenses. One theory to explain this is that the dot matrix on the anterior surface of the opaque lens may facilitate deposit formation, thus decreasing comfort.

A comparison study was done between opaque and visibility tint soft contact lenses to evaluate deposit formation differences. Using ten subjects, each as his/her own control, biomicroscopy was performed after two weeks of lens wear, using Wesley Jessen FreshLook Colors and LiteTint disposable lenses. Subjective ratings on comfort were also collected.

At the conclusion of the study, it was found that the opaque tint lenses had a lower tendency to deposit than did the visibility tint lenses. Therefore, no significant correlation was found between the presence of the dot matrix and deposit formation. However, the study did reveal a slight difference in subjective comfort of the lenses, with the visibility tint lens being more comfortable. Further studies in this area using a larger subject sample and more elaborate examination techniques might be indicated.

Introduction:

For several years, opaque tinted contact lenses have been a popular option for soft contact lens wearers. Not only can refractive error be corrected, but the benefit of changing existing eye color adds a cosmetic appeal for the consumer. However, this benefit may not come without a cost. It has been noted that not only has "hazy" vision been reported by opaque tinted lens wearers,¹ but a decrease in comfort when compared to clear lenses has been found to occur.² What causes that decrease in comfort to occur, unfortunately, is still in question. Although several possibilities exist they all have a common theme: the presence of the dot matrix tint that is on the anterior surface of most types of opaque tinted contact lenses. This dot matrix seems to be the likely cause of the

differences found in comfort when compared to a visibility tint soft contact lens, but an exact cause and effect relationship remains to be found. One possibility, and the subject of study for this experiment, is that the dot matrix on the anterior surface actually acts to facilitate the deposition of protein and/or other lens deposits, thus leading to a less comfortable lens.

By using each subject in this study as his/her own control, it was possible to examine the difference in protein or deposit build up between an opaque tinted contact lens and a visibility tint lens of equal material and water content. If indeed there were a direct relationship between the amount of protein deposition and the presence of the dot matrix on opaque tint contact lenses, a cause and effect relationship could be implied concerning the loss of comfort noted in opaque tinted lens wear. If this relationship exists, then it would give one more clue as to the possibility of a patient's success with this modality of soft lens wear.

Method:

Ten subjects were chosen to be fitted with a pair of contact lenses. Subjects were chosen that had healthy corneas, conjunctiva and a negative history of allergies or complications involving contact lens wear. Of the ten subjects eight were previous or current soft contact lens wearers. All subjects were myopic and agreed to take part in a two week experiment involving contact lenses.

Preliminary examinations were performed on each subject to insure that corneal and other ocular structures were free of abnormalities. Tear break up time was evaluated, and questions concerning dry eye symptoms were asked to eliminate any subject with KCS or tear film abnormalities. Biomicroscopy including a fluorescein evaluation of the cornea was performed to insure ocular and corneal integrity. Any signs of lid disease were ruled out during the preliminary exam as well.

Each subject was then refracted and fit with a pair of contact lenses of appropriate power. The lenses used in this study were Wesley Jessen FreshLook lenses, Colors (opaque tint) and LiteTint (visibility tint). Both types of lenses are composed of Phemfilcon A material, have a 55% water content, and have a dK value of 16.1. The right eye of each subject was fit with a FreshLook opaque lens of appropriate eye color. Color choice was based on the available color that most resembled the subject's own eye color to minimize obvious cosmetic differences between eyes. In this study, five blue and five hazel opaque tinted lenses were used. The lens was then evaluated for centration, movement, and resulting visual acuity to ensure a comfortable and clinically acceptable fit. The left eye was then fit with a Wesley Jessen FreshLook LiteTint lens and evaluated using the same criteria as the right lens.

Each subject then wore the lenses using a daily wear schedule for a period of two weeks, the maximum time for which FreshLook lenses are FDA approved.³ Daily wearing time varied between 10-15 hours per day depending on the subject's normal wearing schedule. Subjects were then instructed to clean and store the lenses daily using the Allergan Complete care system. A regimen of digital massage with three drops of Complete All-in-One solution applied to each lens surface prior to rinsing was implemented before overnight storage.

After eight to twelve hours of wear, subjects filled out a questionnaire asking to compare clarity of vision, ease of handling, and comfort between the two lenses. Regarding clarity of vision, excellent, fair, or poor were the response choices available to the subjects. Right lens better, equality, or left lens better were the options in the ease of handling category. For a subjective comfort rating, each lens was evaluated individually on a scale of 1 through 10; 1 representing "very uncomfortable" and 10 representing "very comfortable". The questions concerning ease of handling and clarity of vision were presented to act as distracters to keep the intent of the study at least partially masked from the subjects.

After two weeks of wear, the lenses of each subject were evaluated. First, visual acuity through the lenses was measured using Snellen acuity. Then, each lens was evaluated via biomicroscopy while still on the eye by two clinicians. The presence and location of lens deposits were subjectively evaluated and recorded. A comparison was made between the opaque and visibility tint lenses of each subject and recorded as well. Ocular health and corneal integrity were examined following removal of the lenses to insure that damage had not occurred as a result of this study. Examination of each lens was then conducted under light microscope (low magnification). Subjective comparisons of number and size of deposits on each lens and relative differences between lenses were made by two examiners. Results were recorded as either positive, a significant difference in number or size of deposits between the opaque and visibility tint lenses, or negative, no significant difference in deposits.

Results:

The subject selection process was a success in that only two subjects had to be eliminated; one due to punctate staining on the cornea and one due to poor contact lens fit. Only myopic individuals were approached since the availability of FreshLook lenses range in power from plano to -6.00 D.

Initial subjective ratings on clarity of vision, ease of handling, and comfort were collected after eight to twelve hours of contact lens wear. The opaque lens provided excellent clarity of vision for three subjects, fair clarity for six subjects, and poor clarity for one subject. The visibility tint lens was rated excellent seven times and fair three times. At the end of the two week trial period, final ratings of clarity of vision were gathered. Data for the opaque lens were the same as the initial ratings -- three excellent, six fair, and one poor rating -- while the ratings for the visibility tint lens differed minimally with six excellent, three fair and one poor rating (Figure 1).

Ease of handling ratings were consistent at both the onset and completion of the experiment. Both lenses were rated as equal in eight cases, while the left lens (LiteTint) was reported as being easier to handle in two cases.

A significant correlation between comfort and the differing lenses was found (Figure 2). After eight to twelve hours of wear, the opaque lens had an average rating of 4.9, while the visibility tint lens had an average rating of 7.5. At the conclusion of the study, the mean comfort of the opaque lens increased to 5.7, but the visibility tint lens remained static at 7.5.

The main focus of this study was to investigate deposit formation on opaque versus visibility tint lenses. This was done by two subjective evaluations of each lens with the lens still on the subject's eye. A slit lamp using white light was used to evaluate the surface of each lens. Upon slit lamp examination, eight of the ten opaque and eight of the ten visibility tint lenses had at least some protein or lipid deposition evident on the lens surface. However, it was noted that the visibility tint lens demonstrated a greater quantity of deposits when compared to its fellow opaque lens in six of those cases (Figure 3). In only one case did the opaque lens appear to have a greater number of deposits, and in three cases the two lenses appeared to have an equal number of deposits.

Investigation of deposit formation on the lenses was also done by light microscope using low magnification. Two observers subjectively evaluated all twenty lenses, comparing the opaque and visibility tint lenses of each subject. However, findings using this method were highly erratic and inconsistent between the two examiners. Therefore, these findings were determined to be inconclusive and of little interest to the overall study.

Discussion:

Since the introduction of colored disposable contact lenses, a wide variety of parameters have been evaluated to determine their performance. The focus of our study

was to compare deposit formation on the surface of FreshLook Colors and LiteTint lenses. Secondary areas of interest compared clarity of vision, ease of handling, and comfort between the two types of lenses.

Although clarity of vision was not the main concern, it was interesting that the visibility tint lens was rated superior to the colored lens at the beginning and end of the two week trial period (Figure 1). This lower subjective rating may be due to scattering of light caused by the dot matrix near the pupil. However, this difference in clarity of vision was a subtle subjective finding in that both lenses provided 20/20 vision. A 5.0 mm pupil and the proper fit with good centration contributed greatly in providing clear vision with the opaque tint lenses.

Another ancillary observation pertains to the ease of handling between the lenses. Evaluations of ease of handling were identical both at the onset and conclusion of the study. Eight of the ten patients reported no difference between lenses and the remaining two reported that the visibility tint lens was easier to handle. This difference is unexplainable since the material, water content, and manufacturing process are identical for each lens type. Parameters such as overall diameter and center thickness are likewise the same.

Perhaps the most significant subjective finding was that of comfort differences reported by the subjects. At the onset of the study, the visibility tint lens was rated as being more comfortable than the colored lens (Figure 2). This may indicate that the dot matrix on the front surface of the colored lens alone may contribute to this difference in comfort. At the conclusion of this study, subjects still favored the visibility tint lens in comfort. It would appear that some adaptation did take place, however, as the comfort of the colored lens improved throughout the study. It was documented in two cases that the visibility tint lens fit slightly tighter than the colored lens. In these two cases, the visibility tint lenses were rated as being more comfortable. This relationship between subjective comfort and lens movement is to be expected, as excessive movement often

creates patient awareness of the lens. However, movement and centration were identical between the two lenses in the rest of the subjects who reported the visibility tint lens as being more comfortable.

The main focus of this study was in evaluating the deposits which formed on the lenses during the two week trial period. While deposit formation on the lenses was difficult to assess, biomicroscopy seemed to be an adequate method of evaluation for the purpose of this study. Perhaps a protein assay evaluation would provide more specific information, but this was beyond the scope of this study.

Although an equal number of lenses revealed deposits between the two groups, the density of the deposits was determined to be greater on the visibility tint lenses. A larger number of the visibility tint lens variety revealed more diffuse deposit formation than did the colored lenses (Figure 3). Of the colored lenses with deposits, the opacities noted were slightly more prevalent in the central portion. This may be due in part to the difficulty in observing subtle deposits on the tinted portion of the lens. Neither lens group showed deposition that was of a severe nature due to the relatively short evaluation period of two weeks.

Conclusion:

As noted in previous studies, clarity of vision and subjective comfort were better with a visibility tint lens when compared to an opaque soft contact lens. However, no significant correlation was found between the presence of the dot matrix and deposit formation. Therefore, this study does not support a cause and effect relationship between deposit formation on a colored lens and a decrease in comfort. Further studies in this area using a larger subject sample and more elaborate examination techniques might be indicated.

Special thanks to Dean Dicks for his valuable input and help in performing this study.

Figure 1: Graph comparing initial and final subjective clarity of vision between opaque and visibility tint soft contact lenses.

E = Excellent
 F = Fair
 P = Poor

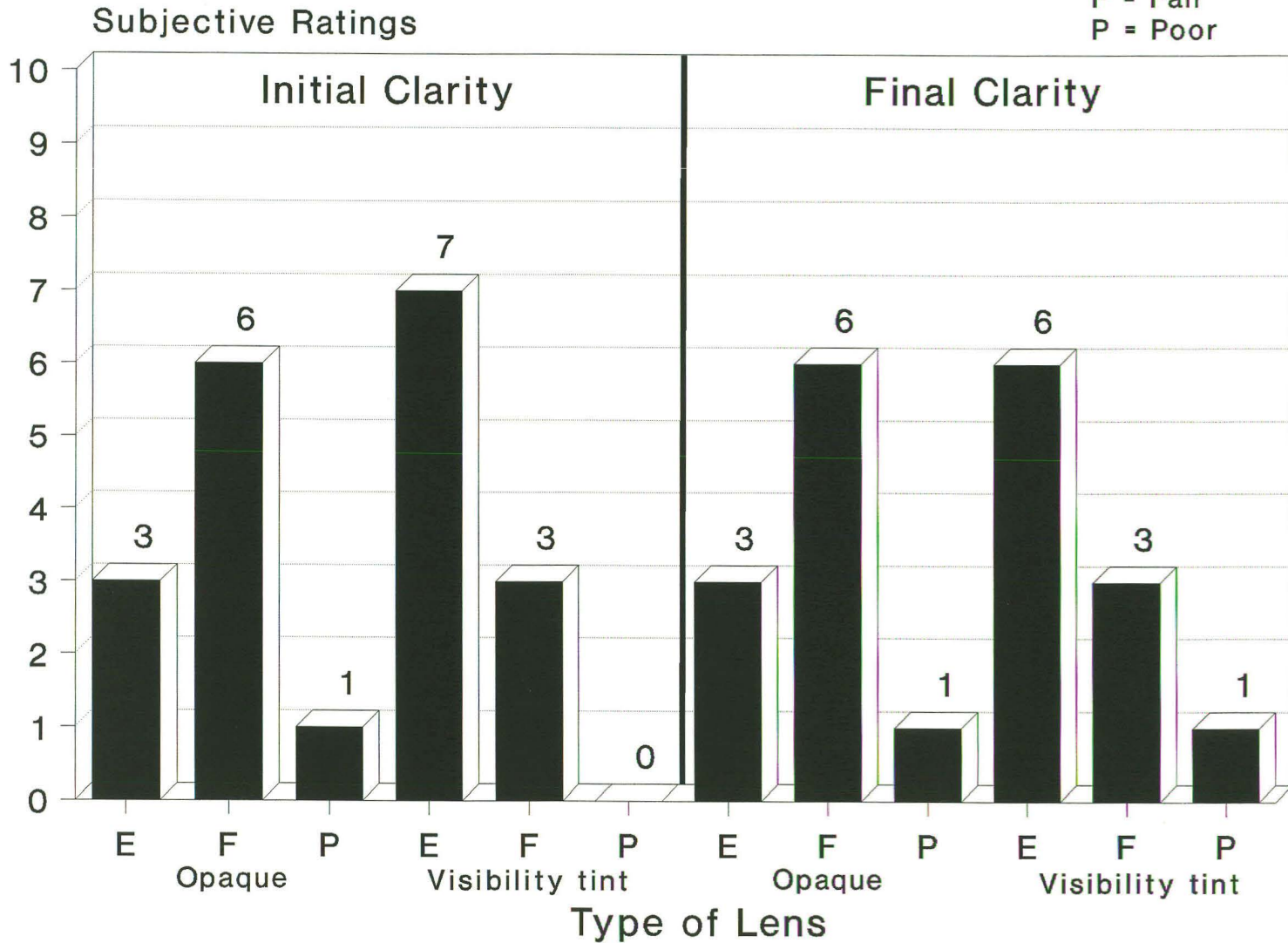


Figure 2: Graph comparing average initial and final subjective comfort between opaque and visibility tint soft contact lenses.

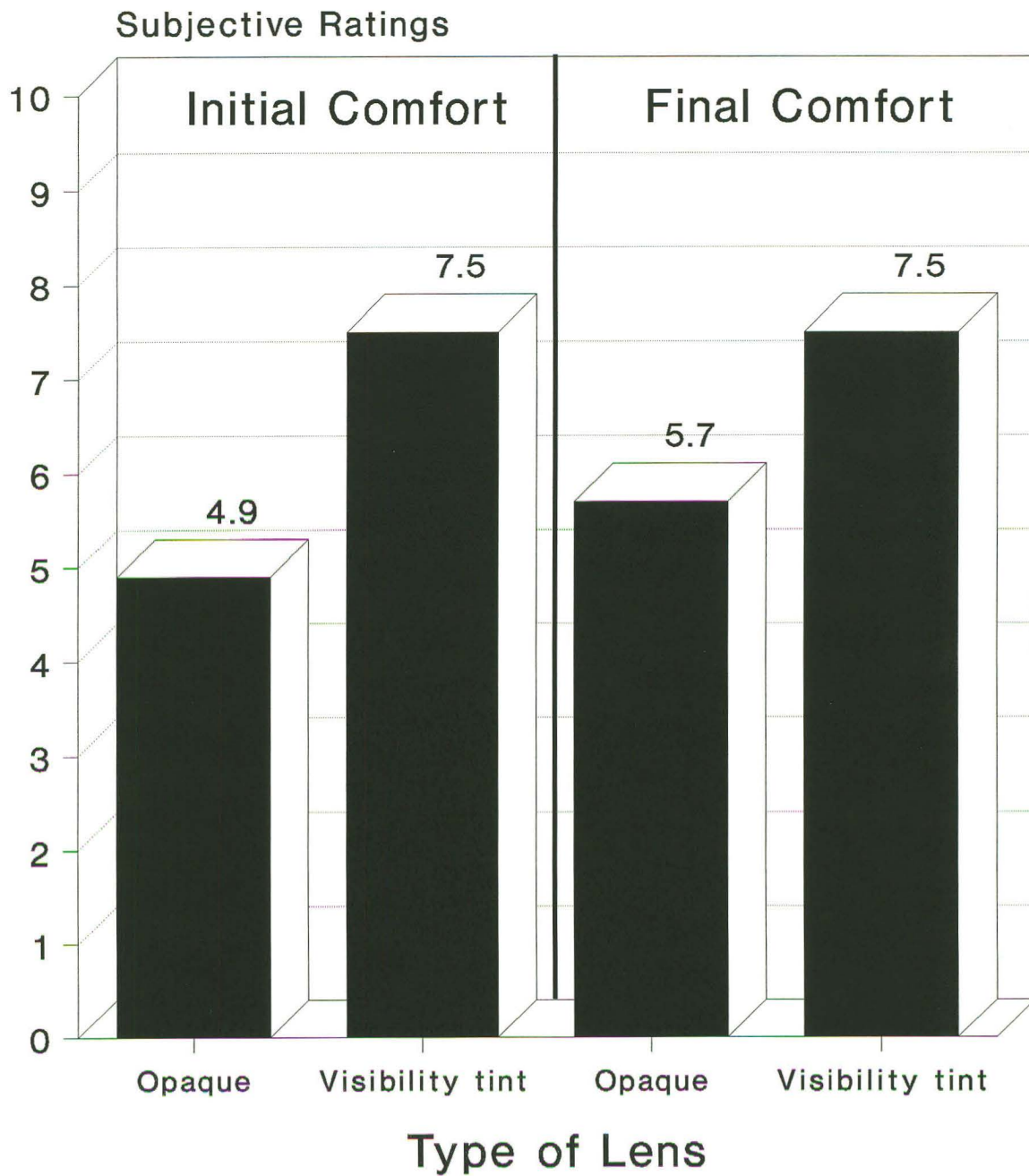
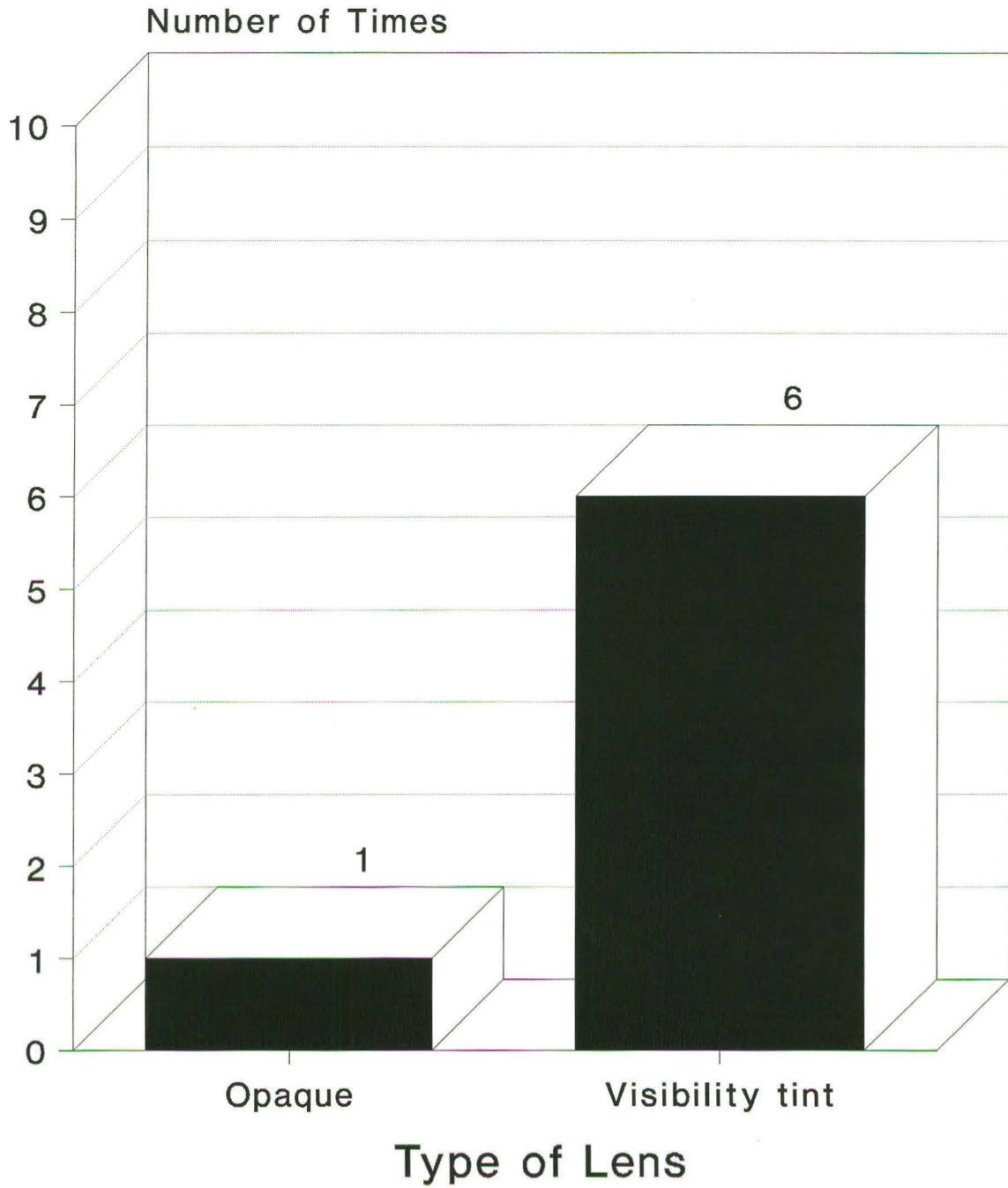


Figure 3: Graph showing number of times each lens type revealed significantly greater surface deposits when compared to the other type of lens.



¹ Gauthier CA, Grant T and Holden BA. *Clinical performance of two opaque tinted soft contact lenses.* J Am Optom Assoc 63(5): 344-349, 1992.

² Steffen RB and Barr JT. *Clear verses opaque soft contact lenses: initial comfort comparison.* Int Contact Lens Clin 20(9&10): 184-186, 1993.

³ Cannon W. *A first look at FreshLook.* Contact Lens Spectrum 9(7): 30-32, 1994.