Paying Attention to the Details

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Abstract

The Michigan College of Optometry initiated a program to enhance the instruction of ophthalmoscopy to first year students. This program expanded the student's knowledge and experience base of normal fundus variations by providing each student with a catalog of their classmates' retinal photographs. During ophthalmoscopy laboratories, students identified to whom each pair of unmarked photos belonged by comparing the images to views obtained through the ophthalmoscope. Instructors also received a catalog of the same images, but each image was labeled to identify the student's name. The purpose of this key copy was to provide instructors with an overview of each student's posterior pole features, without requiring the instructor to perform ophthalmoscopy themselves, thereby reducing the time required to guide students to exemplary fundus findings in their classmates. Students were tested before initiating and after completing the program using timed, online quizzes to determine if the new methodology had any impact on developing attention to fundus details. Subjective feedback was collected from the instructors implementing the program to help determine its success.

Introduction

Attention to detail plays an important role in learning to perform many of the procedures in optometry. Ophthalmoscopy may be one of the more demanding procedures, requiring rapid identification and localization of anatomic landmarks of the fundus, while at the same time distinguishing abnormal from normal findings. While performing an ophthalmoscopic examination, the optometrist must make a determination of healthy versus unhealthy anatomy based on the recall from memory of images previously encountered, including previous patients, textbooks, journals, digital media, and other sources.

Instructing first-semester optometry students to perform ophthalmoscopy is a demanding task. Instructors are not only required to teach the technique of proper instrument handling to allow the student to view the fundus, but must also educate the student to localize and identify fundus details to differentiate between healthy and diseased eyes. The difficulty exists in recognizing that not every healthy eye has the same appearance. A wide range of variation exists among individuals, and even between the retinas of a single individual. Instructors are challenged to expose students to as many variations of normal as possible, given the limited population students examine while learning ophthalmoscopy.

In past practice, unique or exemplary fundus variations were sometimes noted when a student, who in his or her first semester of optometric education with very limited exposure to retinal anatomy, brought an observation to the attention of an instructor. Typically, instructors were required to spend several minutes examining each student with their own ophthalmoscopes, to discover these exemplary findings. After identifying fundus variations, laboratory instructors spent time guiding other students to localize these fundus details. This method often required the students and instructors to alternate viewing the patient's fundus several times while coordinating descriptions of the findings, a time-consuming process in the early stages of ophthalmoscopy instruction.

The faculty at the Michigan College of Optometry is continuously researching methods to improve student education. The authors designed and implemented a program to enhance the existing method of ophthalmoscopy instruction and improve student education. The objectives of the program were to (1) increase instructor awareness of exemplary fundus variations within the class, thereby increasing student exposure to the exemplary findings, (2) broaden student awareness of normal variations in fundus appearance, and (3) improve student attention to fundus detail. It was hoped that the incorporation of the three parts of the program into current teaching methods would improve the efficacy and efficiency of ophthalmoscopy instruction, and increase the observational competency of students as they examined eyes.

Methods

Retinal photographs were obtained using Helioasis' Digivid (www.helioasis.com), a non-mydriatic digital retinal camera and image processing system. During orientation activities at the Michigan College of Optometry, first year students were directed to the camera room and educated on the purpose of using the photographs to enhance ophthalmoscopy education. All 34 students from each of the classes entering in the Fall of 2000 and 2001 participated in the photography. Initially, two images were acquired from each eye, a 45-degree area of the retina and a 2X magnified image encompassing the macula and optic nerve head, and major vessel arcades. After analysis of the photos, it was determined the 2X image provided better image detail and still included most of the central retina, an area where attention to detail is critical and where many variations exist among eyes. The 2X images were exported to a ZIP disk in JPG format, labeling each image with the student's name and OD or OS, and identifying it as right eye or left eye, respectively.

The acquired images were compiled using ThumbsPlus by Cerious Software (www.cerious.com). This software displays a thumbnail of each image in a folder and provides a visual interface to scale and arrange the images for printing catalogs of the images. The printed size of the images, number of images to print on each page, the order the images will print on each page, and many other options can be specified. To evaluate potential print quality and to estimate costs to complete the required materials, the images were test-printed at highest quality on a variety of papers, each differing in weight and glossiness, using a Hewlett Packard HP 895C inkjet printer (www.hp.com). Cost of paper and printer ink, and time required to print a page of images were all considered. An estimate of total expense to print the required number of pages was calculated for each grade of paper. The best combination of cost and quality was found using 37 lb, matte finish, ultra white, inkjet photo paper, available from Great White (www.greatwhitepaper.com). Highest quality settings were chosen on the printer.

Quiz booklets were constructed using ThumbsPlus for the purpose of testing student attention to detail. Each booklet contained 40 retinal images on a total of two pages. The order of the photographs was scrambled to provide a mixture of light and dark pigmented retinas, as well as a mixture of left and right eye photographs on each page. Each printed image was identified only with a sequential number, one through 40. The pages were inserted into a clear report cover for protection.

An image-matching quiz was written to test each student's attention to detail. The quiz was administered to the students as a pre-test, prior to any formal instruction on retinal features or the use of ophthalmoscopes. The quiz involved matching an image presented on a computer screen to images printed in the quiz booklet. When a quiz item was presented on the computer, the student searched through the booklet of 40 images. After locating the matching image, the corresponding number of the image was entered in the quiz, the answer saved, and the next question presented. Eight of the 40 booklet images were selected at random for use as the quiz items. An image that was not represented in the booklet was chosen to serve as a false-positive catch trial. The students were instructed that a match may or may not be present in the booklet, thus all 40 images had to be considered before the student could respond with "0" to indicate they found no match (see sample question). Another image deemed to be an obvious match was included in the quiz to serve as a false-negative catch trial. The quiz consisted of a total of 10 items to be answered within a strict 15-minute time limit.

The quiz administration tool was WebCT (www.webct.com). WebCT is a course management software system utilized by the university to provide access to course content and interactive tools via the Internet. The features of WebCT include authoring, delivering, and scoring online quizzes. Each student is identified with a unique ID for accessing his or her WebCT account. The elapsed time required to complete each quiz item and the student's saved response is recorded for every student who takes the quiz.

WebCT calculates some basic statistics for each quiz, including mean and standard deviation for scores, but a more comprehensive analysis was required for our evaluation of the quiz results. The statistical analysis software chosen to explore the quiz results was SPSS 10 (www.spss.com). After the quiz scores and times were compiled, each student's total time to take the quiz and the percent of questions answered correctly was entered onto a data sheet in SPSS and labeled by student ID.

Students were instructed on how to take the quiz via a computer demonstration in the classroom, and further reinforcement via a printed instruction page in the quiz booklet and online instructions displayed before starting the quiz. Students were informed that the questions would be presented one at a time and must be answered in the order given. Questions could be skipped, but skipped questions could not be answered at a later time. Students were allowed 15 minutes to take the quiz and no answers would be accepted after time was expired. The quiz started when the student pressed a "Begin Quiz" button.

Students were required to use the networked computers in the College computer lab to eliminate timing delays in presenting the images on-screen, as might be encountered with dial-up Internet connections. Netscape Navigator was the required Internet browser. These directives assured that the students' time performance was not affected by differences in computer capabilities or Internet connection speeds. Taking the quiz in the computer lab helped control distractions, and privatized each quiz session, since computer stations are separated by partitions. Students were allotted a two-week time frame to take the pre-test. All quizzes were, by design, completed before beginning instruction of ophthalmoscopy. The course management software enabled the instructor to limit availability of the online quiz by exact date and time.

A catalog of retinal photographs from every student in the entering class was printed for distribution to the students. To produce the booklets for distribution to the students, the pairs of images were arranged randomly on the page, keeping the right and left eye images from each student together. The images were reduced to allow five rows of four images on each page. This produced a booklet of 68 images, two images from each student, on four pages. 34 copies of the booklet were printed and each student received a copy of this catalog containing the unidentified paired retinal photographs of every student in his class at the start of the first ophthalmoscopy laboratory.

Ophthalmoscopy instructors were also given copies of the class catalogs, but these catalogs were keyed to identify the images by student name. This allowed instructors to quickly identify retinal variations that would be of interest to the group. Students were asked not only to evaluate basic fundus parameters of their classmates (disc features, C/D ratio, vessel patterns and features, general background pigmentation, etc.) but in so doing to examine their catalog of unidentified images, and find the matching image. If correct, the instructor could provide immediate verification and confirmation of the students' success. If incorrect, the instructor could suggest features to examine more closely that would help to rule out the image they were considering. The students liked this "detective work," and it motivated them to look carefully and critically for differences that would "make their case." Eventually, over several weeks, all images in the catalog were required to be identified and the catalog turned in for credit. Additional opportunity to practice this critical observation skill was provided through WebCT's image database tool. The collection of classmate images was also loaded into the WebCT course, where the students could view the images identified by name and continue matching to their print catalog outside of class time. This was particularly helpful in getting the students to see the fundi of students in the other section that they would not encounter during scheduled laboratory.

After ophthalmoscopy instruction with the new program was completed, the students were asked to take a post-test to evaluate their ability to identify fundus details. The post-test was constructed in a similar manner to the pre-test, with the exception that none of the images previously encountered in a quiz question, quiz booklet, or during instruction and practice were used for the post-test questions or booklets. Additional fundus images were collected from upperclassmen as needed. The post-test was administered with the same instructions and students were allowed the same 15 minutes to complete the 10-question quiz.

The control group consisted of students from the class entering in 1999 (then second year students) who had already completed ophthalmoscopy training the previous year using customary methods, and had no prior exposure to the quizzes. The control group was asked to volunteer for the study and was instructed in taking the quiz in a manner identical to the experimental groups. 15 students from that class completed both the pre-test and post-test quizzes, using the same materials and methods as the experimental groups. The same time interval between pre- and post-test quiz administrations was observed. This data would serve to evaluate whether any improvement in score between pre-test and post-test might simply be attributed to familiarity with taking the test.

Results

In order to make comparisons between the experimental and control groups, their quiz scores had to be analyzed to determine if they fit a normal distribution for each quiz administration. The Kolmogorov-Smirnov test was applied to determine normalcy. None of the quiz administrations fit a normal distribution for scores (Table 1), so inter-quiz comparisons were made using nonparametric tests.

Kolmogorov-Smirnov Test of Normalcy		
	Entering Class of	Sig.
First quiz	1999	0.022
	2000	0.000
	2001	0.000
Second quiz	1999	0.019
	2000	0.000
	2001	0.000
Third quiz	2000	0.000

Table 1 Results of the Kolmogorov-Smirnov test of normalcy applied to the distribution of scores for each quiz administered. A significance value (Sig.) less than 0.050 indicates that the distribution of the scores differs significantly from a normal distribution.

After completion of all quizzes, the students from the two classes that received ophthalmoscopy instruction using the new program (entering classes of 2000 and 2001) were considered experimental groups. The class of students that did not receive instruction via the new program (entering class of 1999) was labeled the control group.

Group		Semester 1 Quiz	Semester 2 Quiz	Semester 3 Quiz	Semester 4 Quiz
Entering Class of 1999 (Control)	Mean Score			85.88	84.66
	N			17	15
	Std. Deviation			11.75	20.30
Entering Class of 2000 (Experimental 1)	Mean Score	84.85	90.88	90.80	
	N	33	34	25	
	Std. Deviation	13.72	11.38	13.20	
Entering Class of 2001 (Experimental 2)	Mean Score	82.19	95.45		
	N	32	33		
	Std. Deviation	20.28	9.05		
Experimental Groups Combined	Mean Score	83.53	93.13	90.80	
	N	65	67	25	
	Std. Deviation	17.17	10.47	13.20	

Table 2 Statistics calculated for quiz scores, arranged by the semester of optometric education in which the student was enrolled when the quiz was administered. Ophthalmoscopy instruction was complete before the start of semester 2 for all groups.

Wilcoxon Signed Ranks Test for Entering Class of 1999 (Control Group)	
	First Quiz to Second Quiz
N	15
Z	-0.052
Asymp. Sig. (2-tailed)	0.959

Table 4 Results of the Wilcoxon Signed Ranks test comparing scores from quizzes administered to the entering class of 1999. Low significance values (Sig. < 0.050) indicate the quiz scores differ significantly. According to this test, the control group's scores from the first and second quizzes did not differ significantly.

Wilcoxon Signed Ranks Test for Entering Class of 2000 (Experimental Group 1)		
	First Quiz to Second Quiz	Second Quiz to Third Quiz
N	33	25
Z	-2.655	-0.466
Asymp. Sig. (2-tailed)	0.008	0.641

Table 5 Results of the Wilcoxon Signed Ranks test comparing scores from quizzes administered to the entering class of 2000. Low significance values (Sig. < 0.050) indicate the quiz scores differ significantly. According to this test, this experimental group's scores from the first and second quizzes differed significantly. However, scores from the third quiz did not differ significantly from the second quiz.

Wilcoxon Signed Ranks Test for Entering Class of 2001 (Experimental Group 2)	
	First Quiz to Second Quiz
N	32
Z	-3.424
Asymp. Sig. (2-tailed)	0.001

Table 6 Results of the Wilcoxon Signed Ranks test comparing scores from quizzes administered to the entering class of 2001. Low significance values (Sig. < 0.050) indicate the quiz scores differ significantly.

Wilcoxon Signed Ranks Test			
	Entering Class of 1999 (Control) First to Second Quiz	Entering Class of 2000 (Experimental 1) First to Second Quiz	Entering Class of 2001 (Experimental 2) First to Second Quiz
N	15	33	32
Z	-0.052	-2.665	-3.424
Asymp. Sig. (2-tailed)	0.959	0.008	0.001

Table 7 Results of the Wilcoxon Signed Ranks test comparing quiz scores for the experimental and control groups. Low significance values (Sig. < 0.050) indicate the quiz results differ significantly.

	Semester 3 Score
Mann-Whitney U	151.000
Wilcoxon W	304.000
Z	-1.661
Asymp. Sig. (2-tailed)	0.097

Table 8 Results of the Mann-Whitney test comparing control and experimental group scores for the quiz administered in the third semester of optometry school. Low significance values (Sig. < 0.050) indicate the quiz scores differ significantly.

Discussion

Ideally, the control and experimental groups would be comprised of students from one class, randomly assigned to each group. We avoided this segregation for several reasons. Due to small class size at the Michigan College of Optometry, a class divided randomly into two groups would leave a small number of students (N = 16 to 18) in each group. There also was no practical means of isolating the two groups for all laboratories, lectures and independent practice on ophthalmoscopy. A third issue was the possibility one group would be at a disadvantage. We hypothesized the new instruction process would be advantageous because new techniques were being added to the instruction process, but nothing was being removed from the existing process.

We did not want one group, likely the control group, to be disadvantaged, whether it be real or perceived, due to random assignment to the group.

This may leave our analysis of the program's impact vulnerable to skepticism due to lack of a true control group. However, comparisons of student performance were made with a previous class that was not instructed with the new program. As with any statistical analysis, more accurate results would be obtained from comparisons with a larger control group. Slightly less than half of the 1999 entering class participated in both the pre-test and the post-test quizzes. Because there was no means of requiring the students to take the quizzes, we had to rely on students from this class to participate voluntarily.

The volunteers in the control group were fairly representative of the entire class. Based on the class distribution by GPA, 40.0% (6/15) of the control group students were from the first quartile of their class, 13.3% (2/15) were from the second quartile, 33.3% (5/15) were from the third quartile, and 13.3% (5/15) were from the fourth quartile. The mean GPA of the control group was 3.45, with a standard deviation of 0.29. The overall GPA of their class was 3.40 with a standard deviation of 0.28. While we cannot necessarily conclude quiz performance by this small control group is representative of the whole class, we feel valid comparisons can be made between the control and experimental groups because the control group is a well-distributed sample population from the class of 1999.

The first comparison of quizzes addressed whether the students improved their detail observation skills as a result of instruction with the new program. Table 7 displays the results of the Wilcoxon Signed Ranks test used to determine whether the students improved in performance between quiz administrations. The two experimental groups, instructed using the new method, showed a significant improvement in scores upon taking the second quiz. This supports the hypothesis that the students improved in their ability to recognize detail between quizzes due to ophthalmoscopy instruction, but another explanation for the improvement could exist; the students may have simply improved in their ability to take the quiz due to familiarization with the quiz format. To reveal the true explanation for the improvement in the quiz scores, the control group's first and second quiz scores were analyzed.

For the experimental groups, ophthalmoscopy instruction was initiated and completed between the first and second quizzes. The control group had already completed ophthalmoscopy instruction via the original method when the first quiz was taken and quiz scores did not reflect a significant difference from the first quiz to the second quiz. Since scores did not improve significantly between the first and second quizzes for the control group, we concluded the process of taking the first quiz had little impact on performance on the second quiz. Similarly, we presumed the improvement in scores from the first quiz to the second quiz for the experimental groups was unlikely to result from experience with the quiz process and consequently resulted from the instruction process.

To determine the magnitude of the impact the new method of instruction had on improving detail recognition relative to the old method, we compared quiz performance by the first experimental group, instructed via the new program, to quiz performance by the control group, instructed via the original method. The comparison was made between quizzes administered at the same point in each group's optometric education, during the third semester. By the third semester, ophthalmoscopy instruction was complete for both groups. The data from this comparison is listed in Table 8. As Table 2 reveals, the mean score for the experimental group was nearly five percent higher than the mean score for the control group. However, this large difference was not considered statistically significant ($p = 0.097$) when the Mann-Whitney test was applied to the quiz scores (Table 8).

The third quiz administered to the entering class of 2000 (experimental group 1) was further used to see if detail recognition skills were retained. As shown in Table 5, scores on this third quiz did not differ significantly ($p = 0.641$) from scores on the second quiz, indicating the ability to recognize fundus details was retained over the eight month interval between the quizzes.

Laboratory instructor feedback was also evaluated. They agreed that the availability of the 'key' catalog enhanced their ability to instruct the students and made verifying student observations easier and more efficient. The increased efficiency resulted from the instructors' ability to examine the fundi of each student, through the use of the printed images, without having to duplicate the physical examination with instruments. The catalogs also allowed the students and instructors to simultaneously view the printed retinal images to identify and discuss critical details, which could then be found in vivo upon examination by the students. Because it improved the efficiency of instruction, the new program allowed the students to examine more eyes at each lab session, expanding their knowledge base of fundus variations. The faculty commented that students were inspired by the challenge of identifying all of the images in the catalog and could be found performing ophthalmoscopy before and after lab sessions.

According to analysis of the data collected, the students at the Michigan College of Optometry improved their ability to match printed and digital fundus photos based on recognizing details in the images, which we believe translates to an improvement in recognition of details on the fundus during ophthalmoscopy. Scores from objective quizzes indicate the students improved in their ability to accurately recognize fundus details as a result of ophthalmoscopy instruction. Subjective impressions of students' performance during laboratories also suggest they benefit from the new method of instruction. The program appears to be helping both the students and the instructors by improving the efficacy and efficiency of ophthalmoscopy instruction.

Fundus Match Pre-test

Name: Dr. Randy Vance (Preview)

Start time: March 17, 2003 18:00 | Time allowed: 15 minutes | Number of questions: 10

Finish Help

Time Remaining
14 : 46 (min:sec)

Question Status
Unanswered
Answered
Answer not saved

1 2 3 4 5
6 7 8 9 10

Question 1 (10 points)

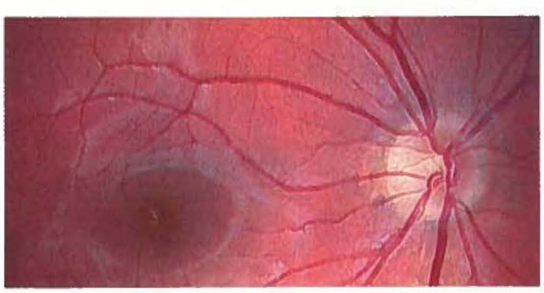
Which catalog image matches this? Type the catalog number in the answer space. Answer "0" if you do not see a matching image in the catalog.

Answer

Save answer

Question 2 (10 points)

Which catalog image matches this? Type the catalog number in the answer space. Answer "0" if you do not see a matching image in the catalog.



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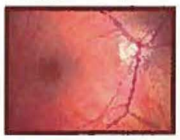 View Image	**Keywords:** Alicia
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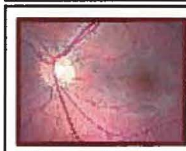 View Image	**Keywords:** Angela
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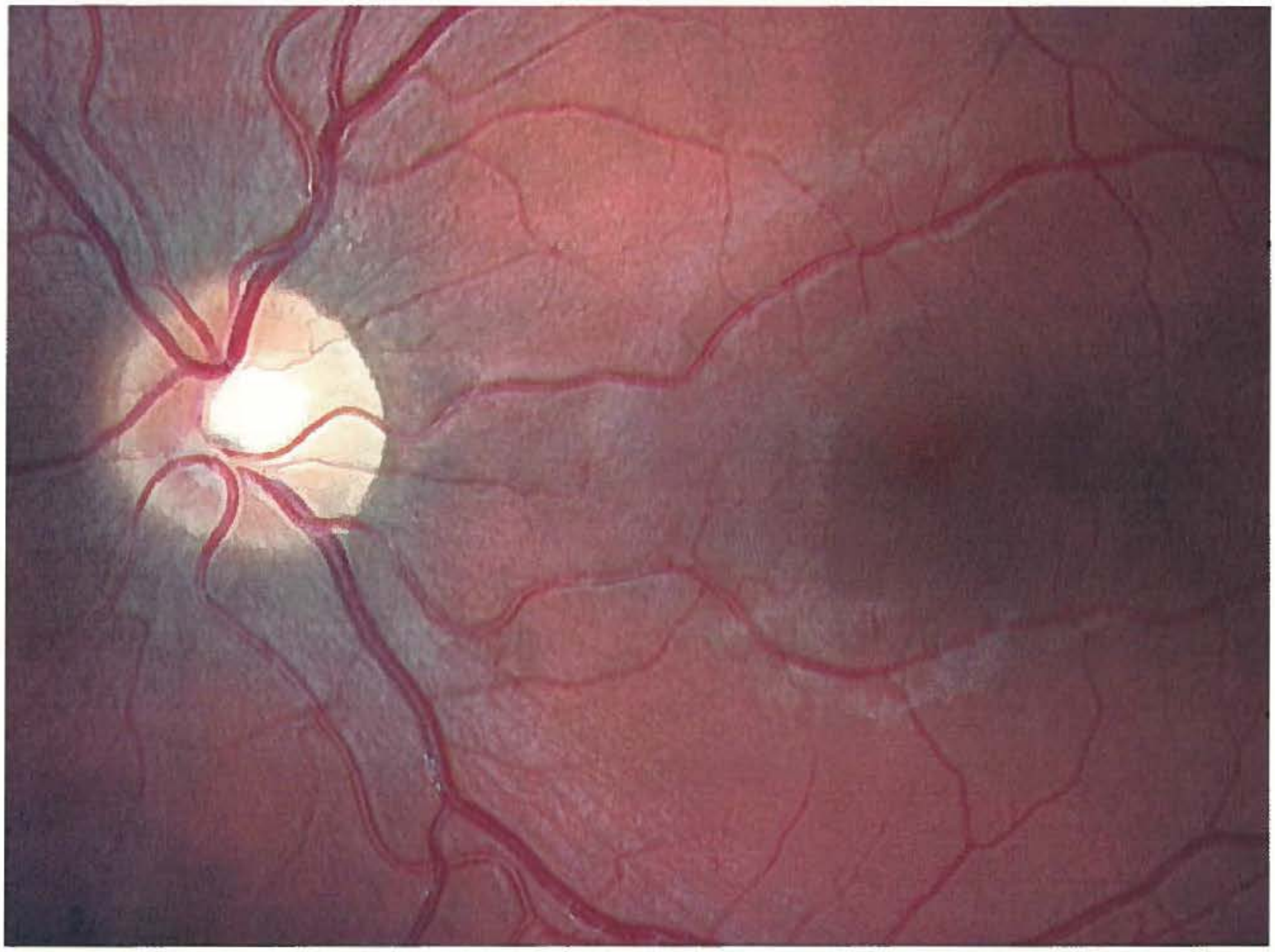

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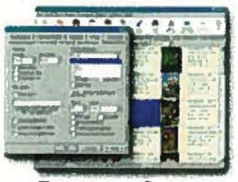

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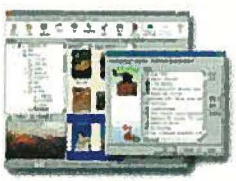

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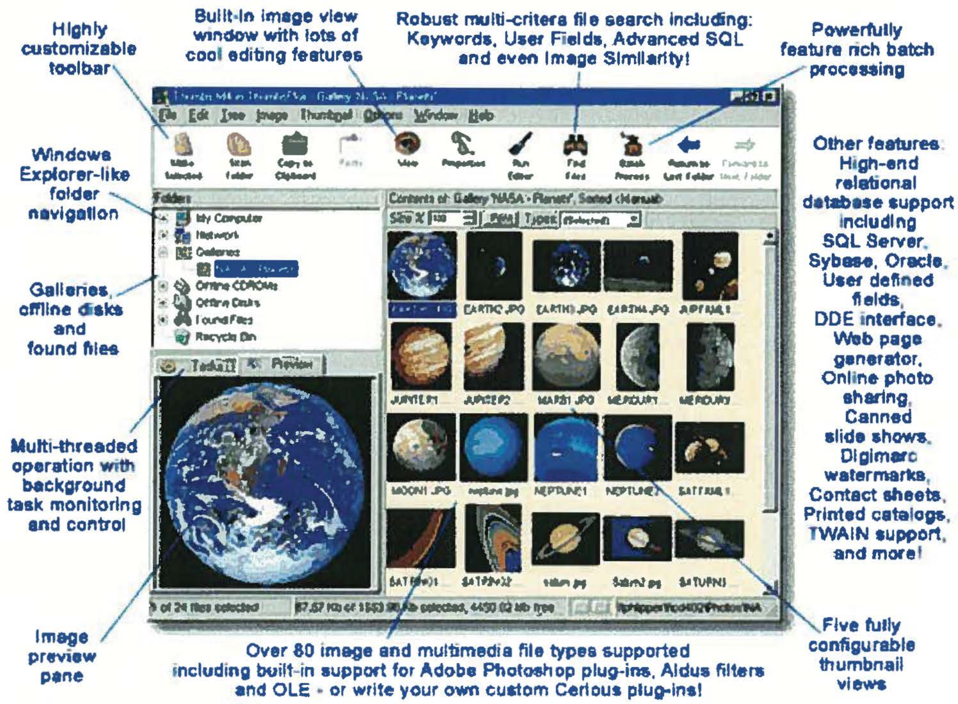

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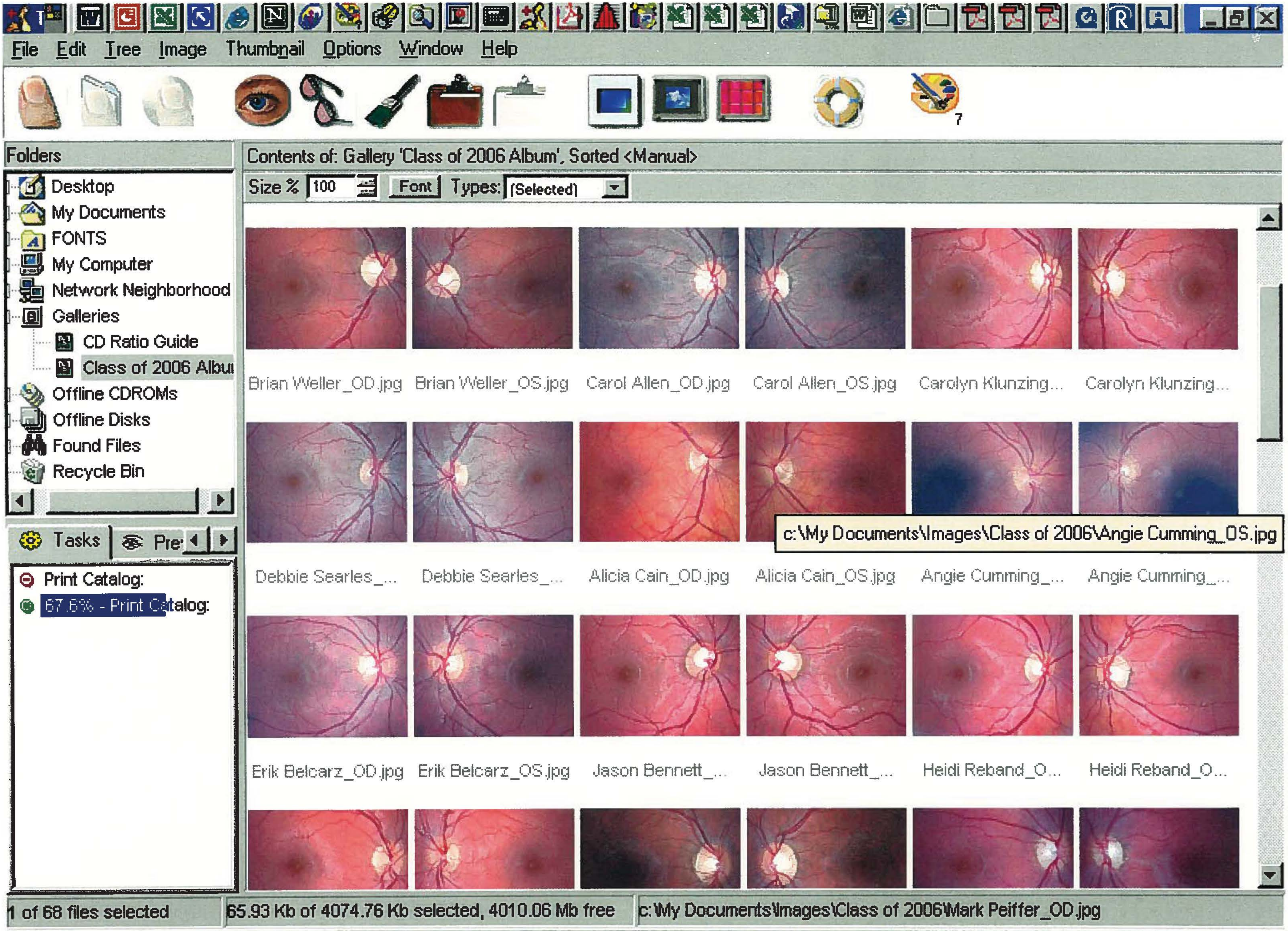

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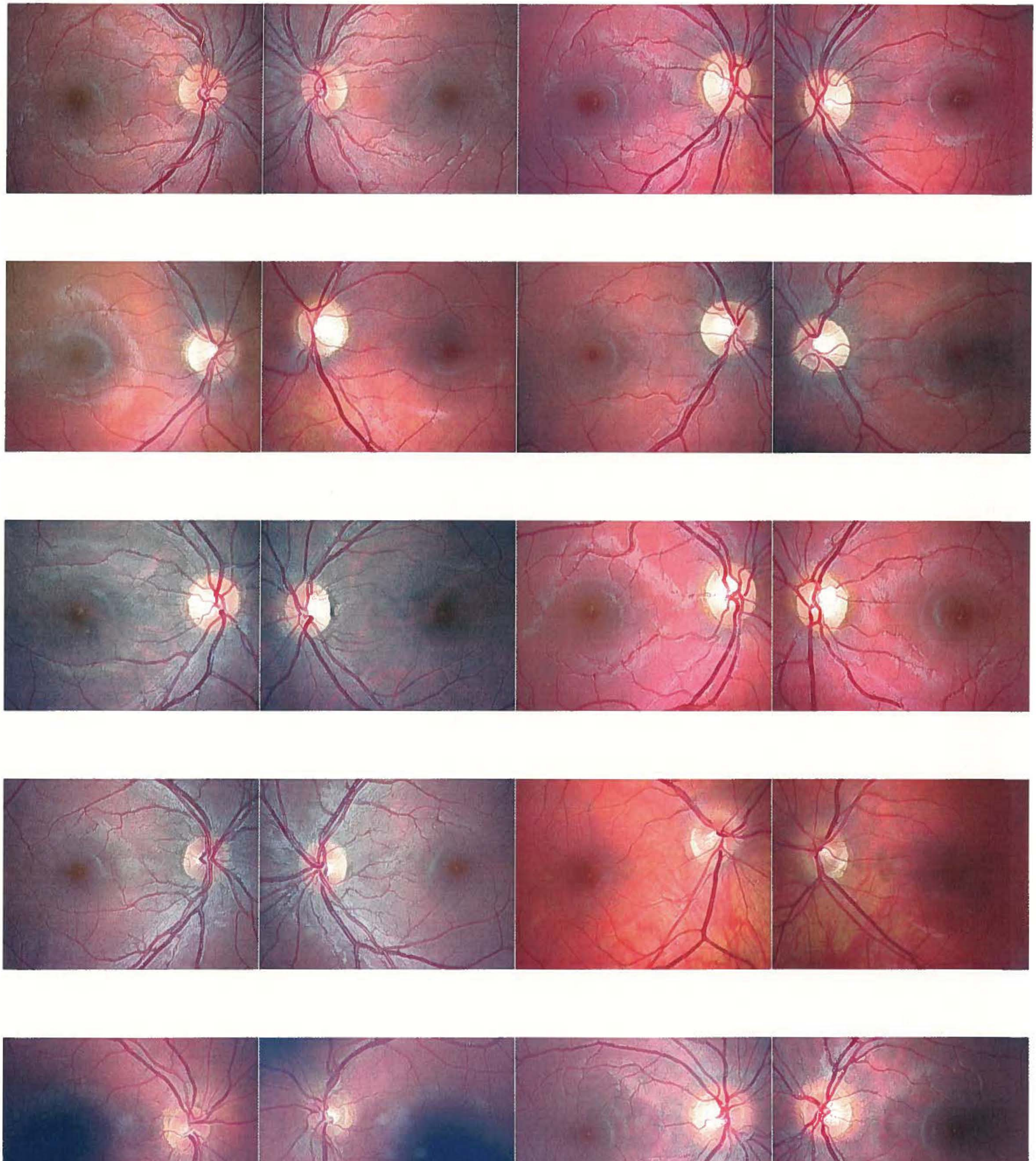

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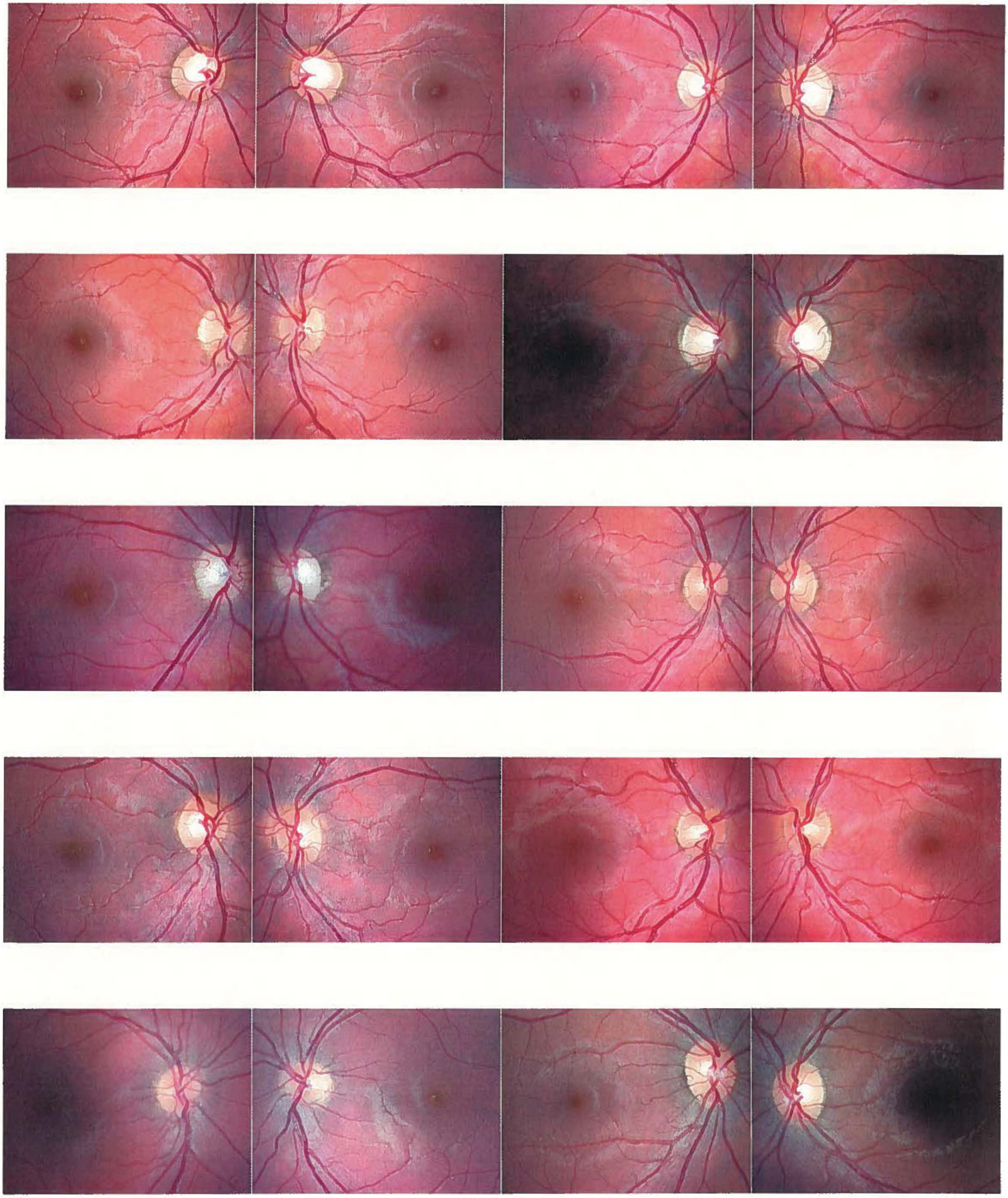

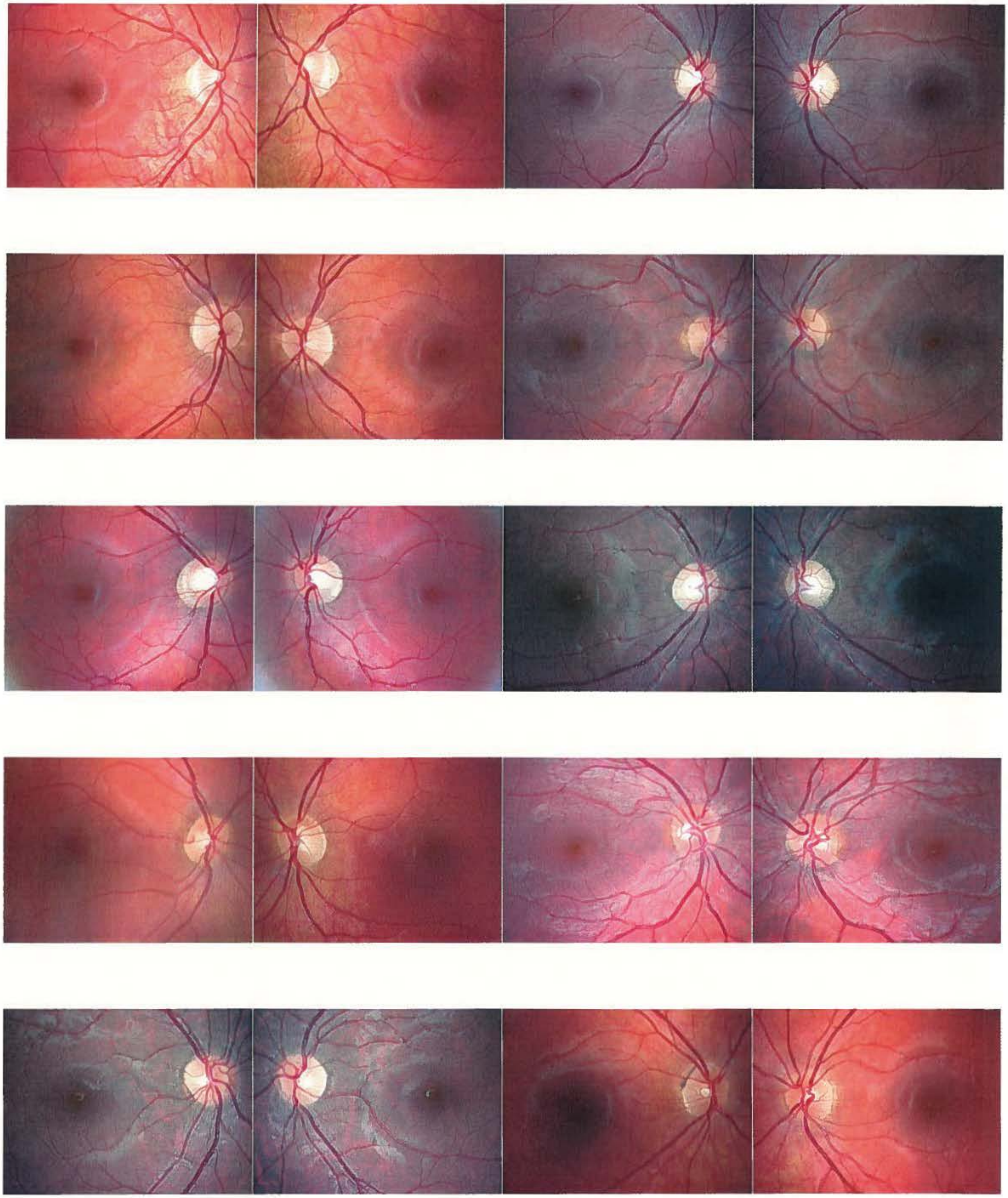

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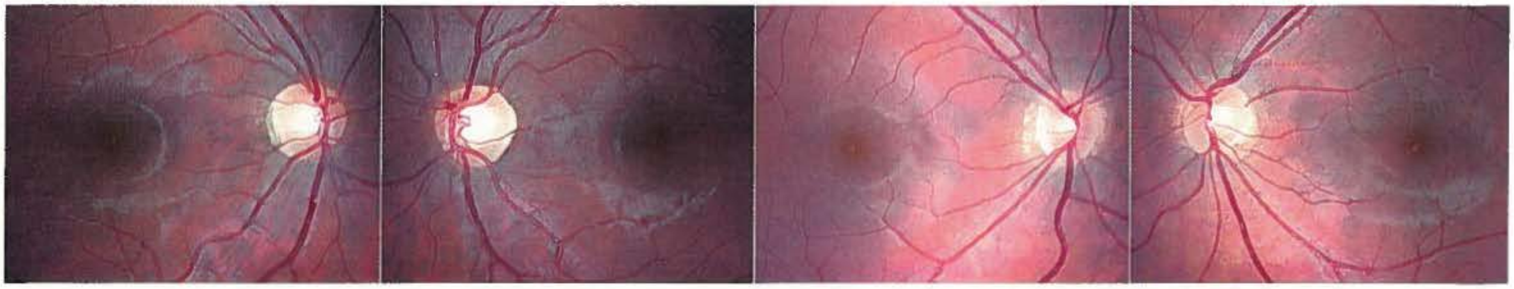

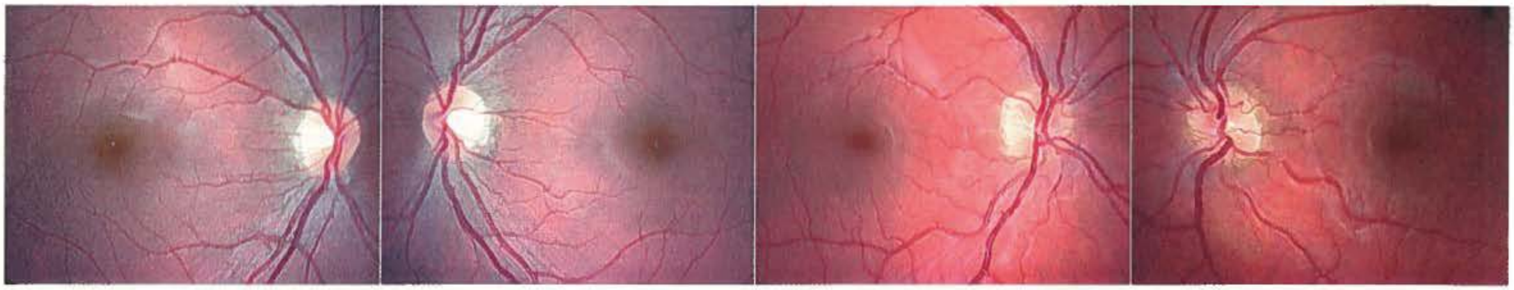

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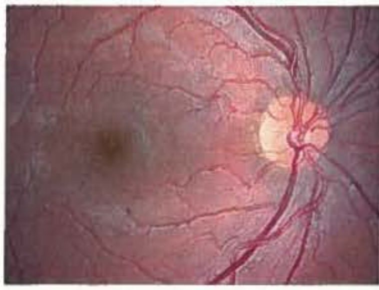
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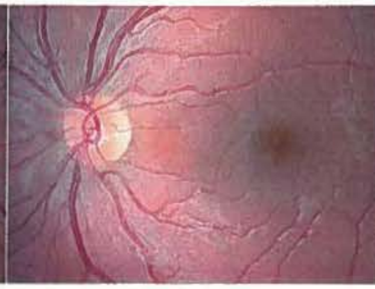
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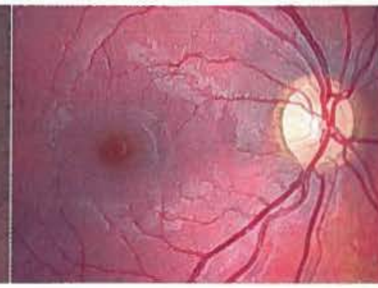
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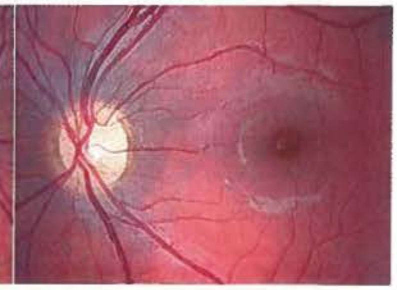
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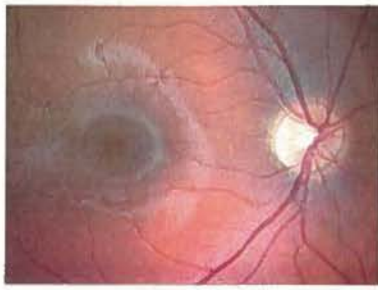
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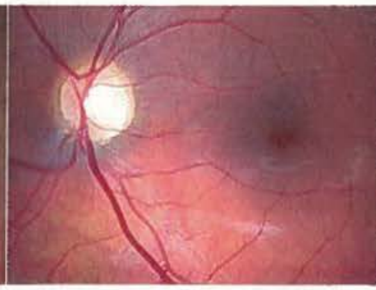
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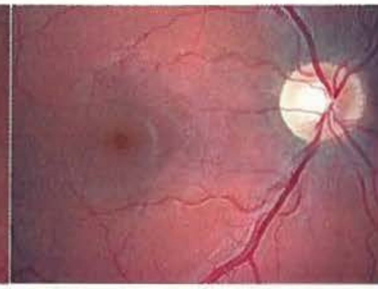
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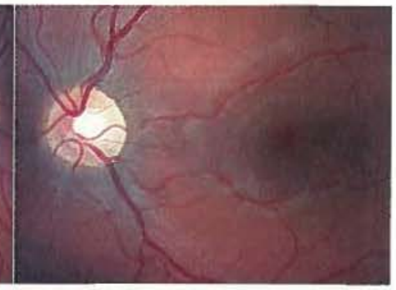
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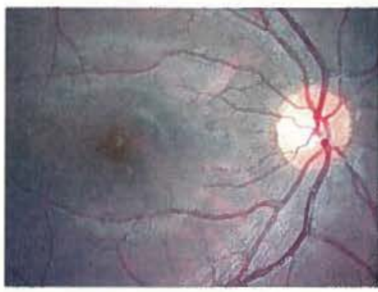
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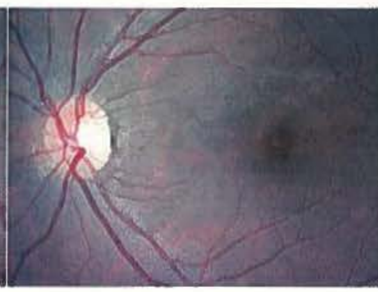
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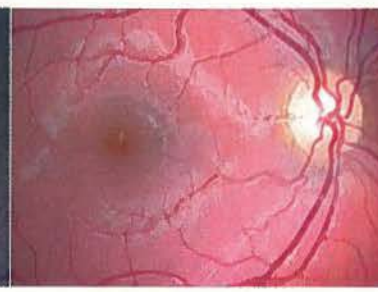
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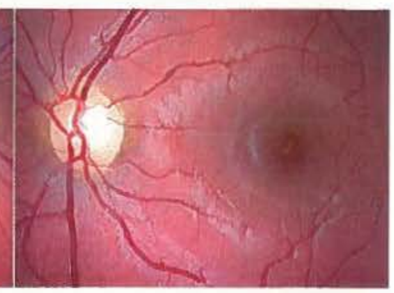
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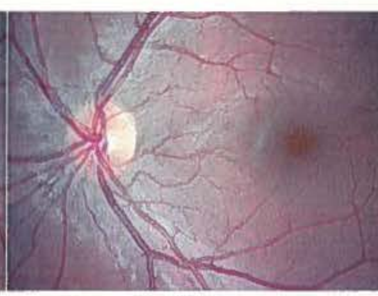
Debbie Searles_OD.jpg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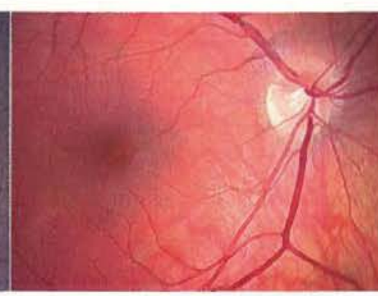
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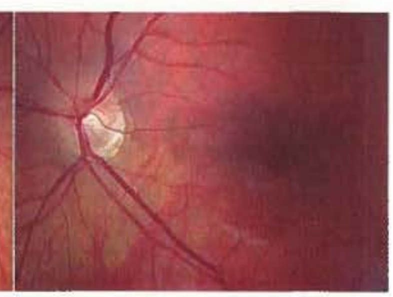
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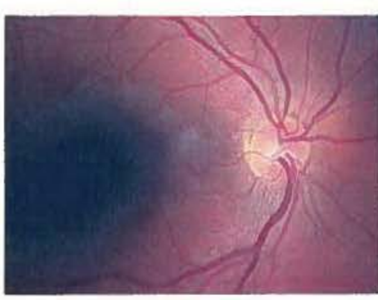
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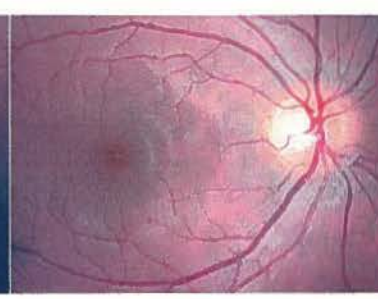
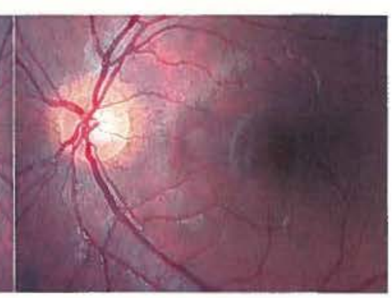
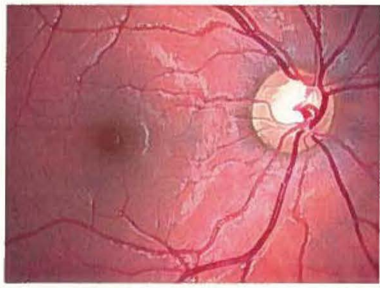
Angie Cumming_OS.jpg


Erik Belcarz_OD.jpg


Erik Belcarz_OS.jpg

Class of 2006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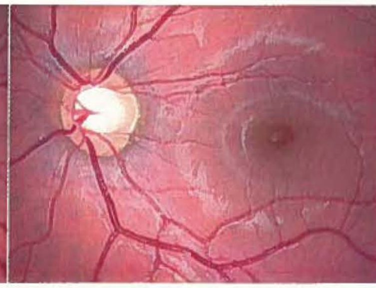
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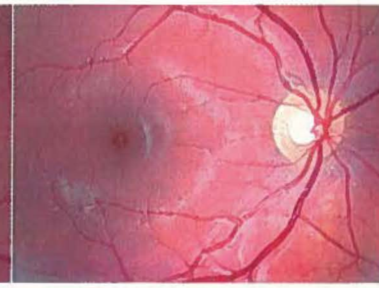
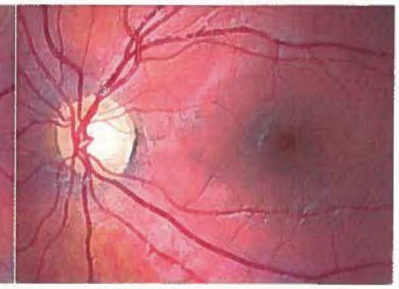

Heidi Reband_OD.jpg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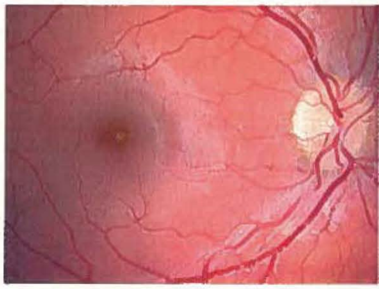
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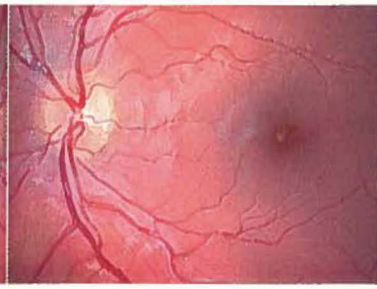
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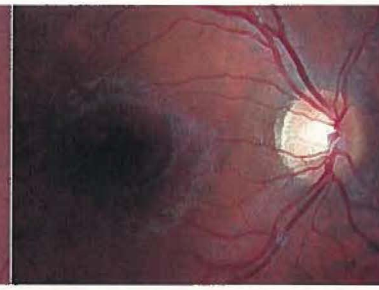
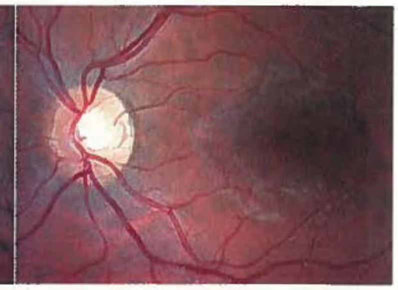

Jason Baldwin _OD.jpg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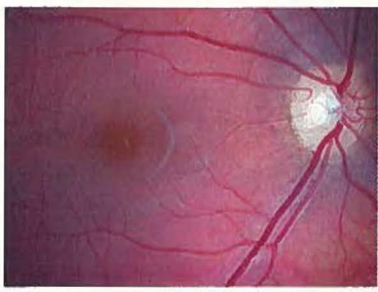
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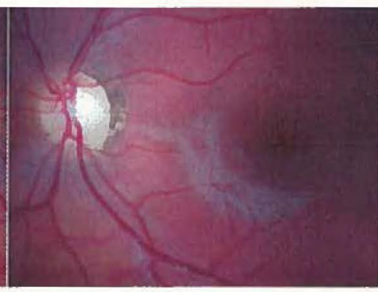
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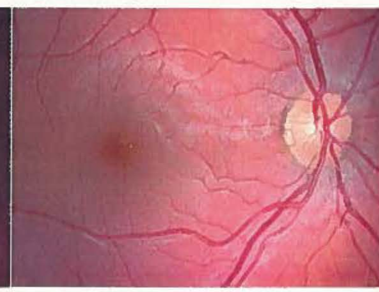
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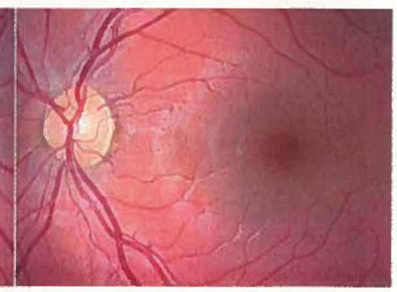
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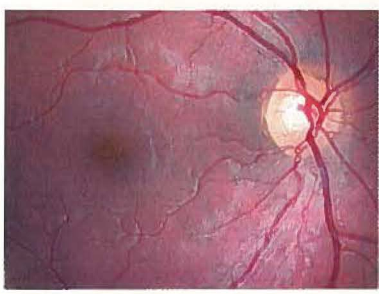
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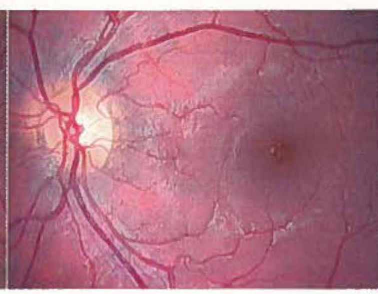
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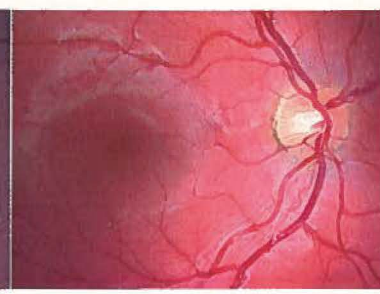
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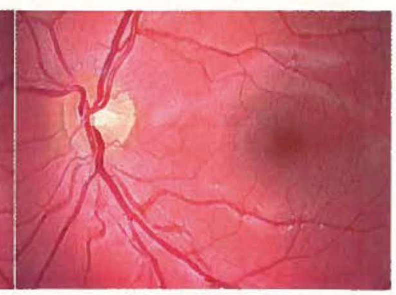
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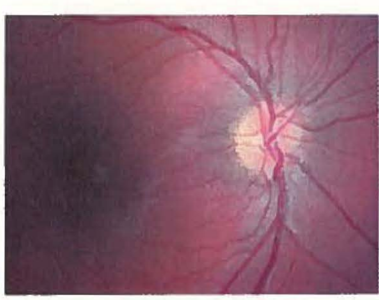
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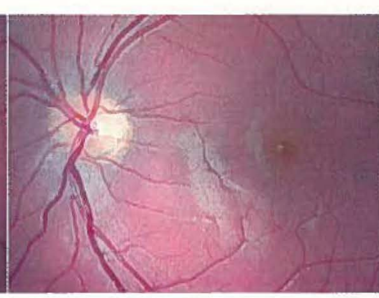
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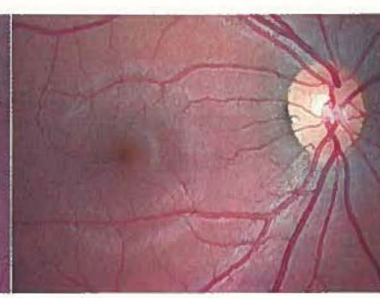
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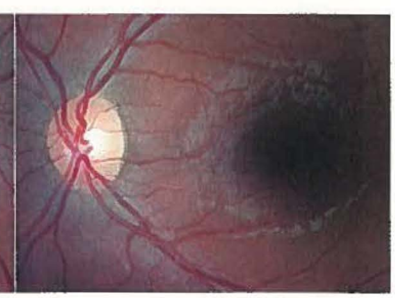
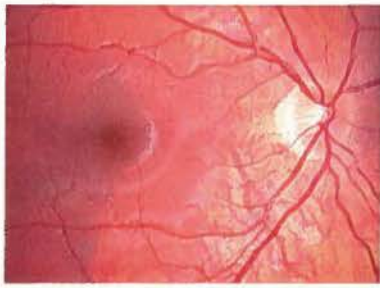

Josh Haney_OS.jpg

Class of 2006



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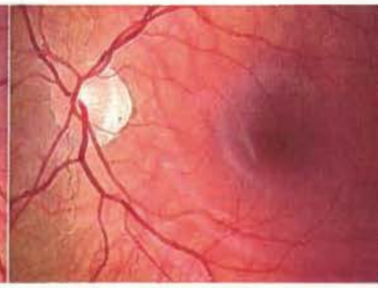

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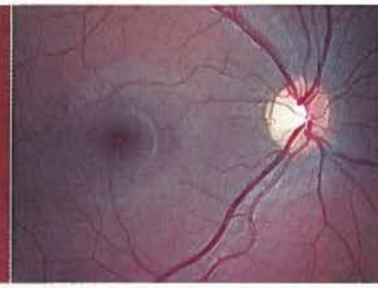

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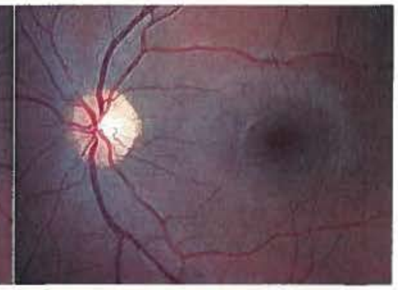

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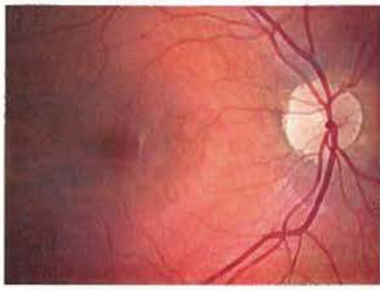

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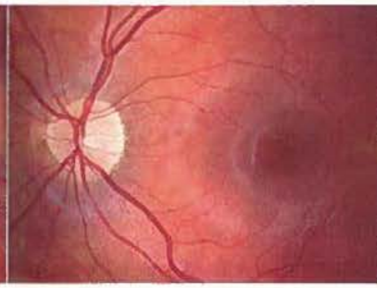

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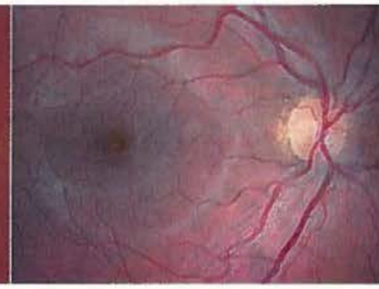

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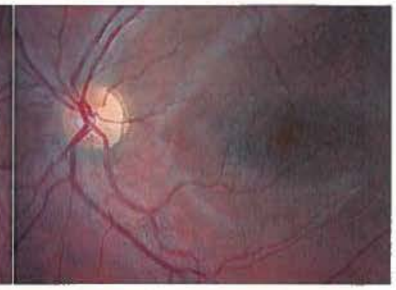

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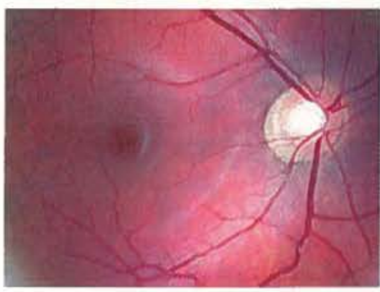

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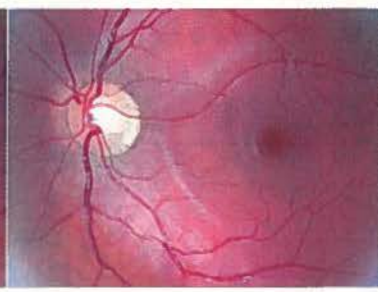

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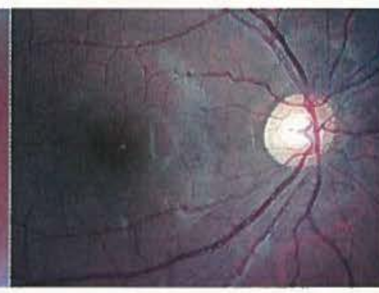
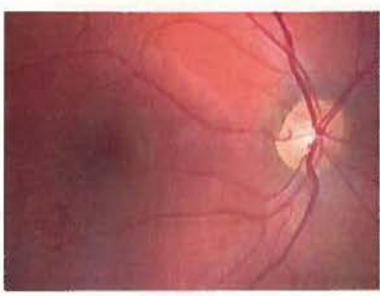


Rinka Patel_OD.jpg

Rinka Patel_OS.jpg



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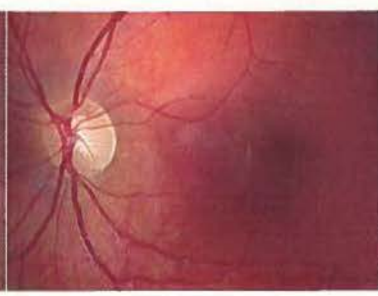

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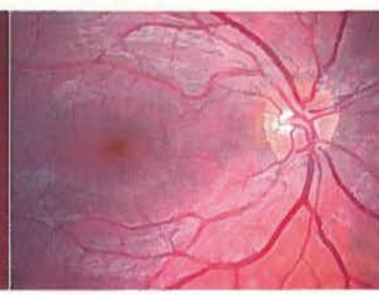

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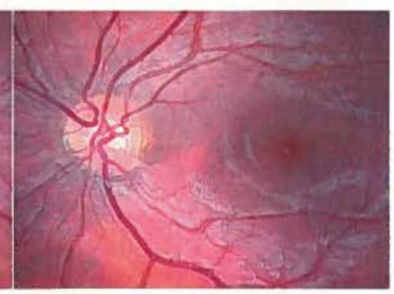

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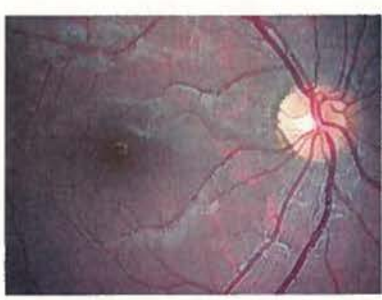

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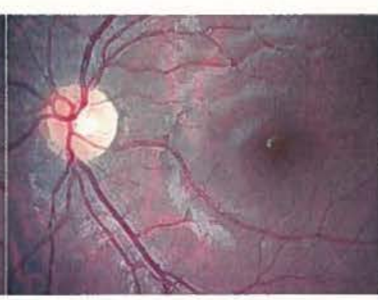

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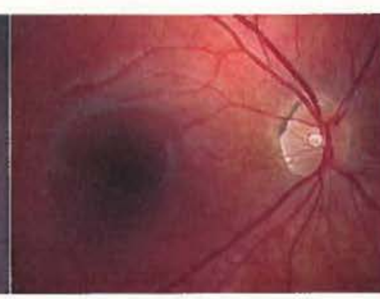
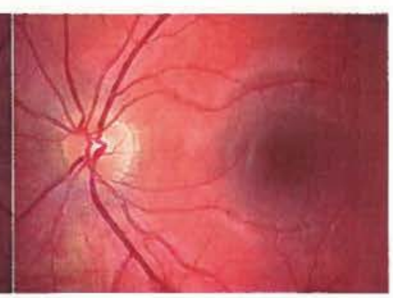
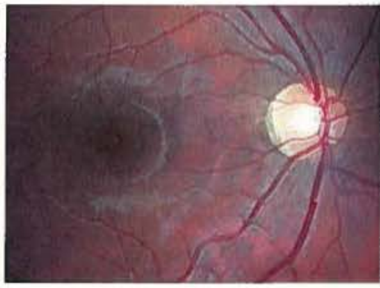


Ashley Burzynski_OD.jpg



Ashley Burzynski_OS.jpg

Class of 2006



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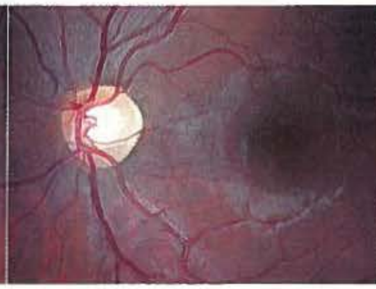
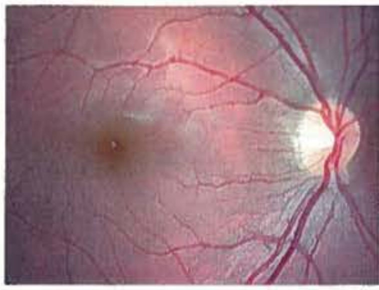


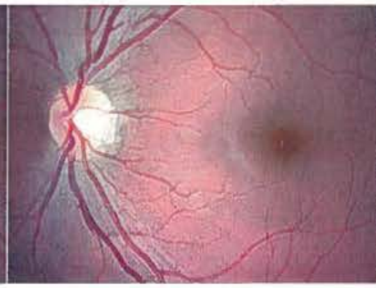
Roxanna Potter_OS.jpg

Angela Sanders_OD.jpg

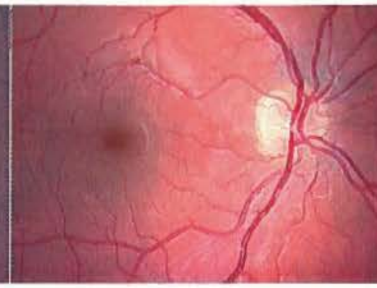
Angela Sanders_OS.jpg



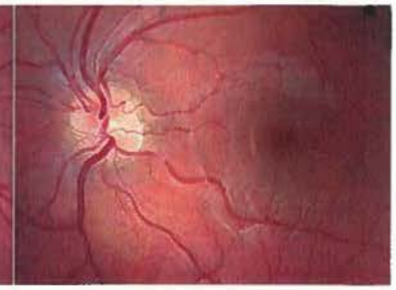
Sara Camburn_OD.jpg



Sara Camburn_OS.jpg



Derek Hamilton_OD.jpg



Derek Hamilton_OS.jpg

TO: Whom It May Concern

FROM: Thomas R. Colladay, Ph.D., Associate Dean
Student Academic Affairs
Ferris State University, Michigan College of Optometry

RE: Profile of 1999 Entering Class

DATE: September 20, 1999

First Year Class Profile

Class Size = 32

Demographic Profile

Age
- a. Range .... 20 - 37
- b. Mean 23
- c. Median............................. 22
- d. Mode 22

Sex
- a. Male 15 (47%)
- b. Female 17 (53%)

Race
- a. Non-Minority...................... 29
- b. Minority............................... 3

Academic Profile

OAT Examination (200 to 400)
- a. High Mean 360
- b. Low Mean 280
- c. Overall Mean 321
- d. Mean OAT scores by examination category:

AVG <u>321</u>, QR <u>310</u>, RC <u>325</u>, PHY <u>319</u>,

BIO <u>315</u>, GCHM <u>320</u>, OCHM <u>330</u>, SCI <u>322</u>

Grade Point Averages

a. Pre-Optometry GPA
1. High........................... 3.97
2. Low........................... 3.06
3. Mean.......................... 3.44

-over-

TO: Whom It May Concern

FROM: Thomas R. Colladay, Ph.D., Associate Dean
Student Academic Affairs
Ferris State University, Michigan College of Optometry

RE: Profile of 2000 Entering Class

DATE: September 19, 2000

First Year Class Profile

Class Size = 34

Demographic Profile

Age
- a. Range .... 20 - 33
- b. Mean 22
- c. Median................................ 24
- d. Mode 21

Sex
- a. Male 13 (38%)
- b. Female 21 (62%)

Race
- a. Non-Minority 30
- b. Minority................................. 4

Academic Profile

OAT Examination (200 to 400)
- a. High Mean 370
- b. Low Mean 270
- c. Overall Mean 319
- d. Mean OAT scores by examination category:

AVG 319, QR 316, RC 335, PHY 306,

BIO 309, GCHM 322, OCHM 323, SCI 319

Grade Point Averages

a. Pre-Optometry GPA
1. High 4.00
2. Low 2.83
3. Mean 3.38

-over-

TO: Whom It May Concern

FROM: Thomas R. Colladay, Ph.D., Associate Dean
Student Academic Affairs
Ferris State University, Michigan College of Optometry

RE: Profile of 2001 Entering Class

DATE: September 14, 2001

First Year Class Profile

Class Size = 34

Demographic Profile

Age
- a. Range .... 20 - 48
- b. Mean 23
- c. Median................................ 21
- d. Mode.................................. 21

Sex
- a. Male 8 (24%)
- b. Female 26 (76%)

Race
- a. Non-Minority...................... 29
- b. Minority................................ 5

Academic Profile

OAT Examination (200 to 400)
- a. High Mean........................ 360
- b. Low Mean 270
- c. Overall Mean 306
- d. Mean OAT scores by examination category:

AVG <u>306,</u> QR <u>296,</u> RC <u>323,</u> PHY <u>295,</u>

BIO <u>301,</u> GCHM <u>310,</u> OCHM <u>323,</u> SCI <u>311</u>

Grade Point Averages

a. Pre-Optometry GPA
1. High........................... 3.98
2. Low............................ 2.81
3. Mean........................... 3.35

-over-

TO: Whom It May Concern

FROM: Thomas R. Colladay, Ph.D., Associate Dean
Student Academic Affairs
Ferris State University, Michigan College of Optometry

RE: Profile of 2002 Entering Class

DATE: October 15, 2002

First Year Class Profile

Class Size = 34

Demographic Profile

Age

a. Range .... 20 - 31
b. Mean 23
c. Median................................ 21
d. Mode.................................. 21

Sex

a. Male 14 (41%)
b. Female..................... 20 (59%)

Race

a. Non-Minority...................... 29
b. Minority................................ 5

Academic Profile

OAT Examination (200 to 400)

a. High Mean........................ 370
b. Low Mean 280
c. Overall Mean 320
d. Mean OAT scores by examination category:

AVG 320, QR 314, RC 333, PHY 312,

BIO 306, GCHM 316, OCHM 338, SCI 323

Grade Point Averages

a. Pre-Optometry GPA
   1. High........................... 3.95
   2. Low............................ 2.76
   3. Mean.......................... 3.43

-over-