A Job Analysis
Of The
Practice of Retinal Angiography
In
North America

December, 2004

Table of Contents

Executive Summary

In June, 2004, the Ophthalmic Photographers' Society, Board of Certification (OPS BOC) set out to conduct a scientific research study to profile Retinal Angiographer practice in North America. The mechanism for this study was a full-scale Job Analysis survey. The results of the survey provided support of the relevance, validity, and legal defensibility of the OPS BOC Certification Examination by establishing a link between what Retinal Angiographers do on the job, and successful examination performance (e.g., competent practitioners pass the examination). In support of these efforts, the OPS BOC contracted with Schroeder Measurement Technologies, Inc. (SMT), to develop and conduct a survey describing the critical tasks required for competent, entry-level Retinal Angiographer practice.

The OPS BOC appointed an Advisory Committee to provide content-area expertise. The Committee was comprised of Certified Retinal Angiographers (CRAs) representative of the diversity of practice, experience, location, education, and ethnic backgrounds within North America. To inaugurate the study, a comprehensive literature search was initiated. Periodicals, federal and international rules and regulations, approved texts, OPS BOC policy and bylaws, and OPS BOC published research were all used to develop an exhaustive list of the skills required of competent practice. This list was presented to the Advisory Committee of Subject Matter Experts (SMEs) for review and approval and a rating scale was adopted providing a mechanism for measuring task importance and frequency of practice. Included in the survey was a demographic questionnaire designed to gather confidential data describing the survey respondents. The task list then converted into a paper-pencil survey questionnaire.

A draft version of the survey was sent to 30 volunteer CRA respondents. Minor edits were incorporated based upon respondent feedback, and the survey was finalized. More than 1,200 surveys were sent via US Mail to Retinal Angiographers and Ophthalmic Photography Professionals currently practicing in the United States, Canada and Mexico. A total of 324 surveys were successfully completed, resulting in a return rate of 27%. Reliability was estimated using a Kuder-Richardson formula 20 (KR20) with a value of 0.988, with a maximum theoretical value of 1 indicating perfect reliability. Intraclass Reliability was also calculated reflecting the inter-rater reliability of 0.989, again with 1 indicating maximum theoretical reliability. Statistical review of the total survey responses indicated a Standard Error—based upon the respondent sample size of 324—of .056. The statistics calculated from the survey were, therefore, associated with minimal error, indicating stability of the data and providing a reasonable degree of confidence in the survey results.

Over 98.8% of the respondents indicated that the survey either completely or adequately described the critical tasks required of competent entry-level Retinal Angiographer practice. This supports a high degree of confidence that the survey depth was reflective of practice across North America and among various work settings. As described above, reliability estimate calculations for both the instrument and the respondent group were very high, indicating that that if the same survey was used with a different respondent sampling drawn from the same population, the results would likely be very similar, further reinforcing confidence in the survey results.

A second Advisory Committee meeting of Subject Matter Experts (SMEs) was held October 21, 2004 in New Orleans, Louisiana to present, review and consider the results of the survey analysis. The primary goal of this meeting was to establish task exclusion criteria to differentiate between the important and non-important tasks. Of the original 222 tasks, 22 tasks were removed from the outline based upon statistically-based decision rules. The Committee review of the remaining 200 tasks confirmed that all were assessable and/or observable, and therefore appropriate for inclusion on the Certified Retinal Angiographer Examinations.

The final approved task listing was then translated into two Content Outlines, establishing the link between job performance of important tasks, and successful performance on the Certified Retinal Angiographer Multiple-Choice and Performance Examinations. Tasks were evaluated and decisions made concerning the optimal testing mode of the tasks, either via the Multiple Choice or Performance Examinations. The majority of tasks (198) were selected for inclusions on the Multiple Choice Examination; Twenty-seven (27) tasks were included on the Performance Examination, with 2 tasks exclusive to the Performance Examination and 173 tasks exclusive to the Written Examination.

Finally, the Advisory Committee was asked to consider the 13 content areas represented in the approved Content Outlines (Written and Performance). Discussion was held concerning the complexity of the tasks included in these content areas, importance ratings and time spent by Retinal Angiographers performing the tasks. Through this exercise, the Committee established content area weighting for the Written and Performance Examinations, with some minor organizational modifications of several content areas within the Multiple-Choice Examination. The Advisory Committee reached consensus on final content area distributions and weighting, as reflected in Appendices I and J.

Survey Overview: The Content Validation Model

The foundation of valid, reliable, and legally defensible professional certification program is the performance of a well-constructed Job Analysis study. The Job Analysis establishes the link between test scores and competency, supporting the inference that the scores achieved on the certification examinations are content valid, and therefore pass and fail decisions correlate to competent performance. When evidence of validity based on examination content is presented for a specific professional role, it is critical to consider the relative frequency, importance, and criticality of the elements. *The Joint Standards for Educational and Psychological Testing (AERA, APA, and NCME, 1999)* state:

> Standard 14.10
> When evidence of validity on test content is presented, the rationale for defining and describing a specific job content domain in a particular way (e.g., tasks, knowledge, skills, abilities or other personal characteristics) should be stated clearly.

> Standard 14.14
> The content domain to be covered by a credentialing test should be defined clearly and justified in terms of importance of the content for the credential-worthy performance in an occupation or profession. A rationale should be provided to support a claim that the knowledge or skills being assessed are required for credential-worthy performance in an occupation and are consistent with the purpose for which the licensing or certification program was instituted.

To support the OPS BOC goal of maintaining a Certification Examination program that meets or exceeds these Standards, a full-scale Job Analysis was conducted in June, 2004. The OPS BOC enlisted the services of Schroeder Measurement Technologies, Inc. (SMT), to establish and disseminate a survey instrument describing the tasks required for competent, entry-level practice in North America. A majority of Ophthalmic Photographers practicing Retinal Angiography in North America indicated a willingness to participate in a paper-pencil model survey, which was designed to query relative task importance and frequency data (*considering both the importance and frequency, how important is the task in relation to the effective and competent performance as an entry-level Retinal Angiographer?*). The survey also assessed whether or not a task was performed by Retinal Angiographers (*If you believe the task is not performed by entry-level Retinal Angiographers, please select the "Does Not Perform" rating.*)

The first phase of the Job Analysis focused on the review of the role of the Retinal Angiographers (RAs) in North America. A comprehensive approach was used to develop an exhaustive list of knowledge, skills, and abilities described in terms of tasks or behaviors to be evaluated by survey respondents. The role of the Retinal Angiographer has been significantly impacted by changes in technology over the past few years (e.g., the use of digital capture technology, Optical Coherence Tomography, and computer data management), making the exhaustive nature of the listing critical.

In support of the Job Analysis performance, OPS BOC identified a committee of Subject Matter Experts (SMEs) to act as an Advisory Committee to the SMT Psychometric Staff. SMT is grateful to the following professionals for their critical involvement in the Job Analysis process:

Timothy Bennett, CRA
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Audra Miller, CRA
San Francisco, CA

Linda G. Garnter, CRA, COT
St. Johns, IN

Brian Busse, CRA
Lafayette, IN

Joseph T. Schmidt, CRA
Salisbury, Maryland

Sandra E. Anderson, CRA
Franklin, PA

Terrance L. Tomer, FOPS, CRA
Wilmington, NC

Peter Hay, CRA
Manlius, NY

David T. Miller, CRA
Clayton, NC

Jacqueline Bureau, CRA
Montreal, Quebec

Lydia Dimmer, COT, CRA
Bothell, WA

Stephanie Burke, CRA
University Heights, OH

Paul R. Montague, CRA
Swisher, IA

Christye Sisson, CRA
Walworth, NY

Beth Ann Benetz, CRA
Cleveland, OH

Ken Timby, CRA
Three Rivers, MI

Ditte J. Hess, CRA
Miami Shores, FL

The Advisory Committee was first asked to evaluate which tasks should be included on the survey. The focus of the task listing review was to identify behaviors associated with current practice, eliminating tasks describing future professional issues that might not be readily measurable; likewise, arcane or obsolete content was identified and removed from the task listing.

After generation and approval of the task listing, it was framed in terms of observable/ measurable behaviors, and placed into a survey format that included an importance and frequency rating, and included a rating that the task was not performed. A demographic questionnaire was included requesting voluntary participation in order to establish a respondent profile. Respondents were also asked to rate the adequacy of the survey scope, to identify any tasks left off of the survey and were given the opportunity to make general comments. The OPS BOC offered respondents the opportunity to participate in a drawing for a monetary award to encourage survey response. Entry forms were collected from those respondents wishing to participate, which were turned over to the OPS for a drawing. No link was established between survey responses and those respondents choosing to participate in the drawing.

The survey was tested and a protocol was established for the sampling of the Retinal Angiographer Professional Community. As the size of the profession is somewhat limited, it was decided to survey all known Retinal Angiographers/Ophthalmic Photographers, which numbered in excess of 1,200 professionals. The response rate was a very respectable 27%, with 324 usable responses received - more than adequate to support the data results.

A second Advisory Committee meeting was held in October of 2004 with the objective of reviewing and analyzing the survey results. At this meeting task exclusion criteria were established allowing the differentiation between critical and non-critical tasks. Of the original 222 tasks, 22 tasks were removed from the outline; Twenty-one (21) tasks were removed because of statistically-based decision rules – tasks that were identified as *not critical* to competent practice. Nine (9) tasks were identified as *Not Performed* by Retinal Angiographers. Of those nine (9) tasks, only one (1) was uniquely identified for elimination based upon the *Not-Performed* statistically-based decision rules.

The final approved task listing was then translated into Examination Content Outlines, the blueprints used to develop the Certification Examinations. Adoption of the Outlines established the link between job performance of critical tasks, and successful performance on the Multiple-Choice and Performance Examinations. Tasks were evaluated and decisions made concerning the optimal testing mode (Multiple-Choice or Performance) for each task; Most tasks were identified to be measured on the Multiple-Choice Examination, a few highly critical tasks were identified to be measured on the Performance Examination as well, with two tasks exclusive to the Performance Examination.

Finally, the Advisory Committee was asked to consider the resulting content areas for each examination in order to establish content area weighting. The Committee took into consideration the importance ratings of the tasks, the percentage of survey respondents who did not perform the tasks, the time spent performing the tasks, and the complexity and the difficulty of the tasks within each content area. A comparison was performed reviewing the Content Outlines currently in place to the new proposed Content Outlines, and consensus was reached on content area weighting, as found in appendix J. The Committee noted that the changes to the outline of the Performance and Written Examinations had reduced the number of tasks in the Anatomy domain. Consensus was reached to reorganize Anatomy and Physiology by merging the tasks from both domains into a single content domain. This action is reflected in the final Content Outlines. In addition, a new domain, Optical Coherence Tomography (OCT) was added to the Written Examination Content Outline.

Survey Methodology

Content Review and Survey Development

In support of the development of the survey task listing, a comprehensive job-related search was performed including review of:

- Performance appraisals;
- Job descriptions from employers;
- Approved textbooks on the Subjects of Ophthalmic Photography and Retinal Angiography
- Laws and Regulations governing practice;
- OPS BOC By-Laws and Code of Ethics

The resulting draft task list was used by SMT Staff, the Advisory Committee, and OPS Staff and Volunteers to accomplish the following survey support tasks:

1. Provide background information about the profession;
2. Review and approve the draft task list;
3. Develop a rating scale;
4. Develop a demographic questionnaire;
5. Establish a sampling protocol.

Rating Scale

The following rating scale was established for the survey:

> *Considering both the importance and frequency, how important is the task in relation to the effective and competent performance as an **entry-level Retinal Angiographer**? If you believe the task is not performed by entry-level Retinal Angiographers, please select the "Does Not Perform" rating.*

> 0 = Does Not Perform
> 1 = Minimal Importance
> 2 = Below Average/Low Importance
> 3 = Average/Medium Importance
> 4 = Above Average/High Importance
> 5 = Of Critical/Extreme Importance

Demographic Questionnaire

In order to provide insight into respondent professional experience levels, education, practice settings, rural-vs-urban influences, gender, age and ethnicity, a detailed demographic questionnaire was included, gathering the following information:

1. Primary Employment Responsibility
2. Time spent performing Ophthalmic Photography
3. Years of Professional Experience
4. Primary Practice Setting
5. Age range
6. Geographic Practice Setting
7. Certification Credentials Held
8. Gender
9. Highest Level of Formal Education
10. Racial/Ethnic Background

The results provided a means of evaluating the representativeness and adequacy of the sample, as well as framing a rubric in which respondent sub-group data could be further evaluated. The Advisory Committee reviewed these data and determined that the sample was representative. Questions three (Years of Professional Experience), four (Primary Practice Setting) and six (Geographic Practice Setting) were identified as variables on which to conduct subgroup data analysis. A copy of the questionnaire can be found in Appendix A; the raw frequency data for the demographic questions are presented in Appendix B.

Sampling Methodology

In June, 2004 the assembled survey was tested by thirty (30) Certified Retinal Angiographers, including the members of the Advisory Committee. The test ensured that the instructions were clear and complete, and respondents were able to understand and successfully complete the survey. It was decided to attempt to survey the entire body of Retinal Angiographers/ Ophthalmic Photographers practicing in North America. The respondents were identified based upon participation in the Ophthalmic Photographers' Society, and calls for respondent volunteers in professional publications, and on-line forums. More than 1,200 surveys were mailed: A cover letter from the President of OPS BOC served as a preamble to the survey, encouraging participation, describing the process for completing the survey, and highlighting the critical nature of the respondent decisions and opinions. In addition respondents were offered the chance to participate in a drawing as a reward for completing the survey. Detailed survey completion instructions were included, emphasizing the concepts of entry-level practice and minimal competency. Respondents were provided with toll-free contact numbers which could be used to direct questions to BOC members and SMT Psychometric Staff.

By attempting to survey all known professionals within North America we established confidence that the survey was drawing upon a well-defined sample of practitioners, reflective of practice diversity. Special effort was made to encourage response from newly registered Retinal Angiographers, supporting the goal of gathering opinions from practitioners representing the broadest experience base. The OPS BOC survey showed a very respectable response rate of 27% for a non-solicited survey, reflective of the high level of professional commitment within

the field. Among the respondents—324 in all—there was a very high level of consistency, providing critical support of the meaningfulness of the survey results. A copy of the survey and supporting documents can be found in Appendix A.

Data Review

After the survey was administered, data was collected and transferred into SPSS©, computer-based statistical software. After establishing that the data met quality analysis requirements, the survey data was analyzed. The data were presented to the Advisory Committee for review and approval, and performance of the following tasks:

1. Review of the demographic data;
2. Develop the task exclusion criteria for importance;
3. Develop the task exclusion criteria for frequency/Not Performed;
4. Determine assessment mode (Multiple-Choice vs. Performance Examination formats);
5. Develop and approve final Content Outlines;
6. Establish Content Area weighting.

Return Rate

Surveys were sent via first-class US Mail to approximately 1,200 Retinal Angiographers/ Ophthalmic Photography professionals in North America, including all currently certified CRAs. A total of 324 surveys were successfully completed. This resulted in an overall return rate of approximately 27%. The Standard Error of Measurement for the survey, based on the sample size of 324, was calculated at .056. The confidence in the survey results and the statistics derived from the data were associated with limited error due to the stable sample size, the Standard Error of Measurement, and two reliability estimates.

Survey Adequacy

To determine how well the survey instrument performed, the following question was asked at the end of the survey:

How well, do you feel, this survey covered the tasks performed by the competent, entry-level Retinal Angiographer?

01 = Completely   02 = Adequately   03 = Inadequately

Of the 324 respondents, 10 did not answer this question. Approximately 1% (4) of respondents felt that the survey was inadequate in its coverage, supporting the conclusion that nearly all respondents believed the survey completely or adequately described the role. This data is outlined in Figure 1.

Survey Adequacy

Inadequately
1.3%

Adequately
50.0%

Completely
48.7%
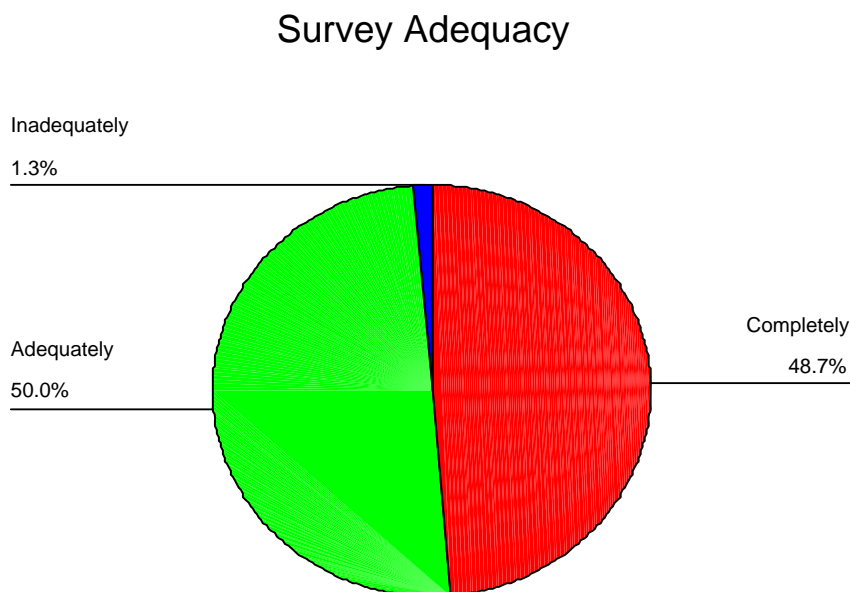
Figure 1

Scale and Respondent Reliability Estimates

Two reliability estimates were calculated to evaluate the amount of error associated with the survey as well as the agreement among the respondents. These calculations provide a measure of the instrument's consistency (KR20), and a measure of respondent (rater) consistency (Intraclass correlation). To evaluate the instrument, a statistic known as coefficient alpha (KR20) was calculated. These estimates are affected by the number of survey questions, the standard deviations among the tasks and the number of respondents. Higher values (e.g., greater than .90) reflect lower error, with a maximum theoretical value of 1.0. For this survey, the KR20 reliability estimate for the total survey was 0.988. The Intraclass, or Interrater Reliability, was 0.989 which suggests limited error and supports the hypothesis that the 324 respondents were rating in a consistent manner.

Summary Information of Respondent Group

The inclusion of a demographic data questionnaire provided a means of establishing a matrix with which the survey results could be further refined and interpreted. In addition to describing the respondent sample group, the demographic results were used to evaluate the generalizability of the results, for example, *was the task important across a variety of clinical settings, among Retinal Angiographers of differing experience levels, and across geographical locations?*

The typical respondent had a primary employment responsibility as a full-time, Ophthalmic Photographer working in private practice. The typical respondent was a Caucasian male in his late forties, living on the East Coast, with 16 or more years of experience, having earned the CRA credential and a Batchelor's Degree.

Raw frequency data for each demographic question can be found in Appendix B and Figures 2-10 and Tables 1-17 to follow.

Primary Employment Responsibility

In an effort to determine the primary responsibilities of the Retinal Angiographer, the question listed below was posed. Of the 324 respondents, 2 did not answer this question. Approximately 73% (235) of the respondents indicated ophthalmic photography as their primary responsibility. Figure 2 presents the data.

Which of the following best describes your primary employment responsibility?

01 = OPTHALMIC PHOTOGRAPHER
02 = OPTHALMIC TECHNICIAN
03 = MEDICAL PHOTOGRAPHER
04 = MANAGER
05 = EQUIPMENT VENDOR/ SERVICE TECHNICIAN
06 = INFORMATION TECHNOLOGY/SYSTEMS SPECIALIST
07 = ORTHOPTIST
08 = OPTOMETRIST
09 = NURSE
10 = PHYSICIAN
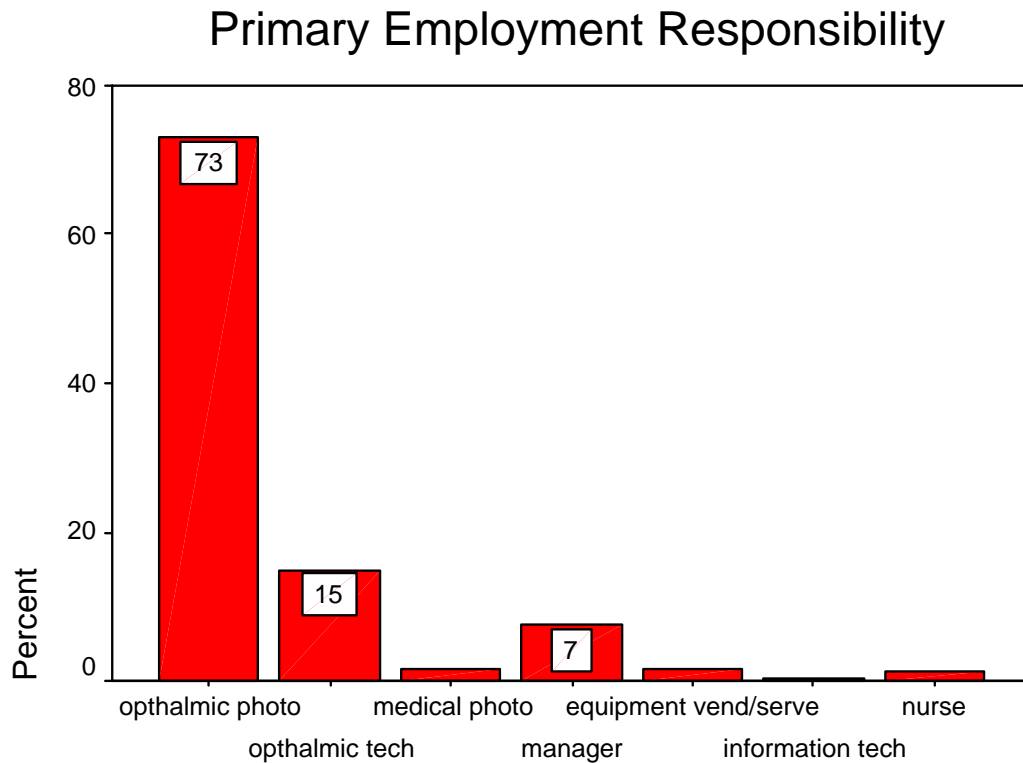
Figure 2

Time Spent on Ophthalmic Photography

To better understand the time devoted to ophthalmic photography within the profession, the question listed below was asked. Approximately 50% (162) of the population indicated spending 35 hours or more a week on ophthalmic photography-related tasks. Figure 3 presents the data.

How much time are you currently performing tasks related to ophthalmic photography?

01 = 35 HOURS OR MORE PER WEEK
02 = 24 - 34 HOURS PER WEEK
03 = 15 - 23 HOURS PER WEEK
04 = 10 - 14 HOURS PER WEEK
05 = 5 - 9 HOURS PER WEEK
06 = LESS THAN 5 HOURS PER WEEK
07 = NOT CURRENTLY PRACTICING OR RETIRED

Time on Ophthalmic Photo Tasks
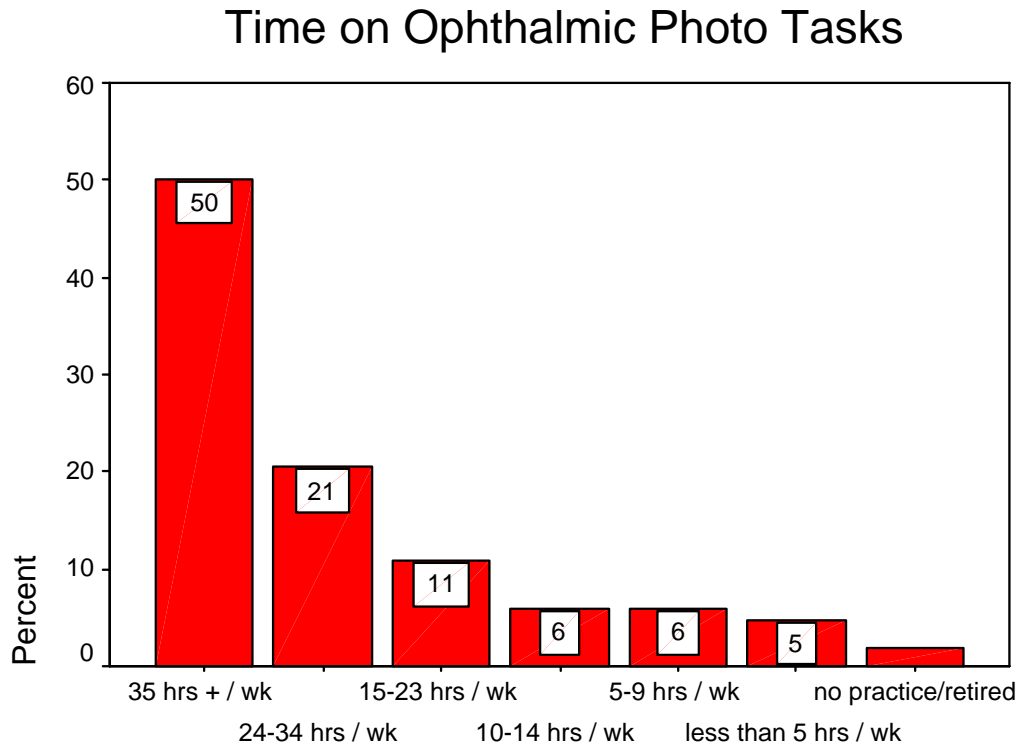
Figure 3

Years Experience

To better understand the level of ophthalmic photography experience of the respondents, the survey asked the question below. Of the 324 respondents, approximately 48% indicated having over sixteen years of experience: More than ninety percent (91%) had 4 years or more experience. Figure 4 presents the data.

Describe your years of professional experience in the field of ophthalmic photography:

01 = LESS THAN 2 YEARS
02 = 2 - 3 YEARS
03 = 4 - 6 YEARS
04 = 7 - 10 YEARS
05 = 11 - 15 YEARS
06 = 16 - 20 YEARS
07 = MORE THAN 20 YEARS

Years Experience
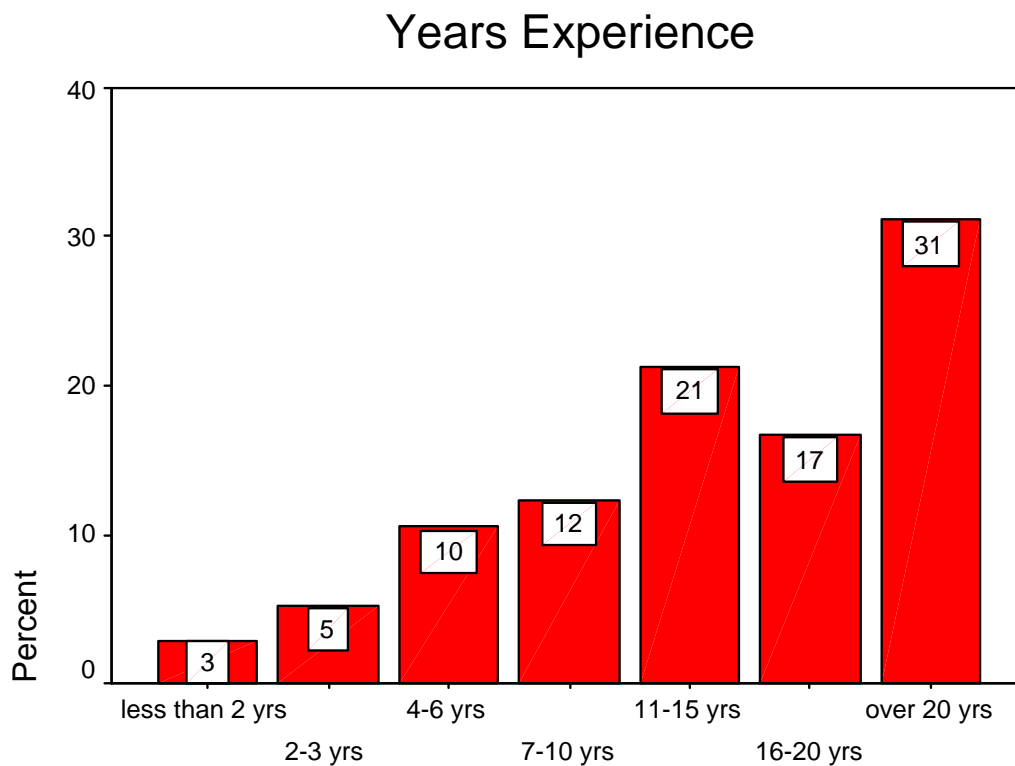
Figure 4

Practice Setting

To evaluate how well the sample represented the range of professional practice settings, the survey asked the question below. Of the 324 respondents, 28.7% (93) of the population practiced privately in a general capacity and 28.4% (92) worked in a private practice that performed retinal angiography exclusively. By combining University Hospital Setting respondents with respondents indicating they worked in a Hospital/Medical Facility, the data indicated that 36% of respondents practiced in a Medical Facility settings. Figure 5 presents the data. Detail provided by respondents indicating they practiced in an "*Other*" setting can be found in Table 1

Which of the following best describes your primary professional practice setting?

01 = HOSPITAL/ MEDICAL FACILITY
02 = UNIVERSITY HOSPITAL/MEDICAL FACILITY
03 = PRIVATE PRACTICE (GENERAL/MULTI-SPECIALTY)
04 = PRIVATE PRACTICE (RETINA ONLY)
05 = INDEPENDENT CONTRACTOR
06 = OTHER (DESCRIBE)

Practice Setting

univ hosp/med facil
25.0%

hosp/med facil
11.1%

other
3.1%

ind contractor
3.7%

priv pract(retina)
28.4%

priv pract(general)
28.7%
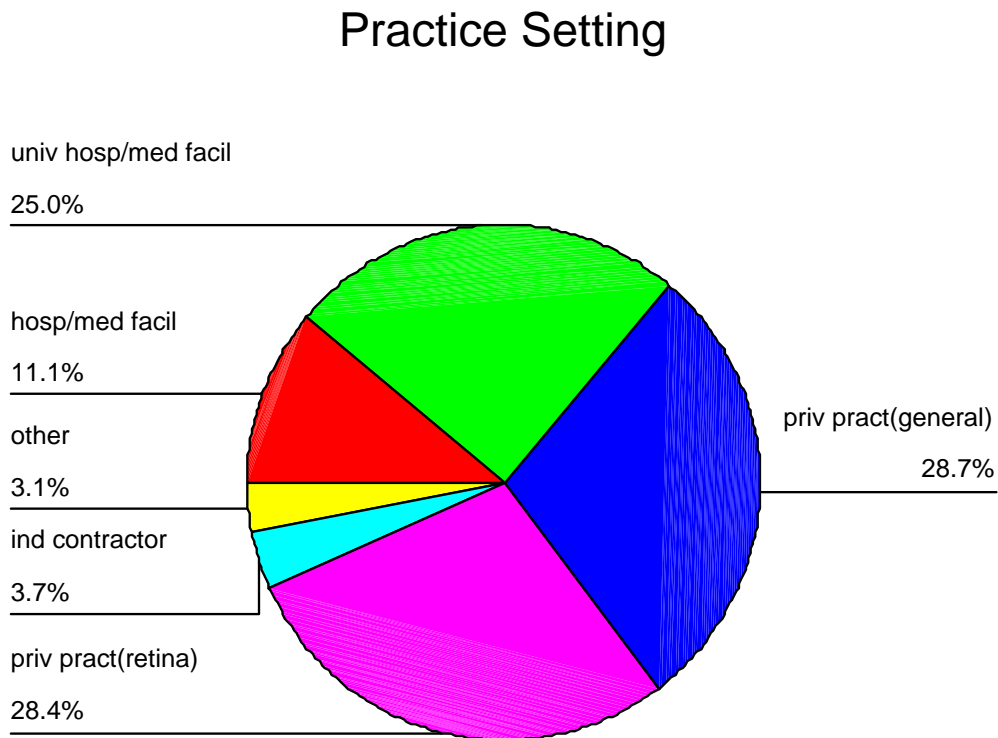
Figure 5

TABLE 1

Other Practice Settings
CLINICAL TRIALS SPONSER
DIGITAL IMAGING COMPANY
H M O
PRIVATE PRACTICE (GENERAL SETTING)
READING CENTER
REGIONAL TRAINER FOR ZEISS
VENDOR (x 3 Respondents)

Age Range

To evaluate how well the sample represented the population of professionals, the survey asked the respondents their age. Of the 324 respondents approximately 72% were between the ages of 35 and 54, with approximately 15% falling below the age of 35, and 13% age 55 or older. Figure 6 provides the breakdown of responses.

Please describe your age range:

01 = UNDER 25
02 = 26 - 34
03 = 35 - 44
04 = 45 - 54
05 = 55 - 64
06 = 65 OR OLDER

Age Range
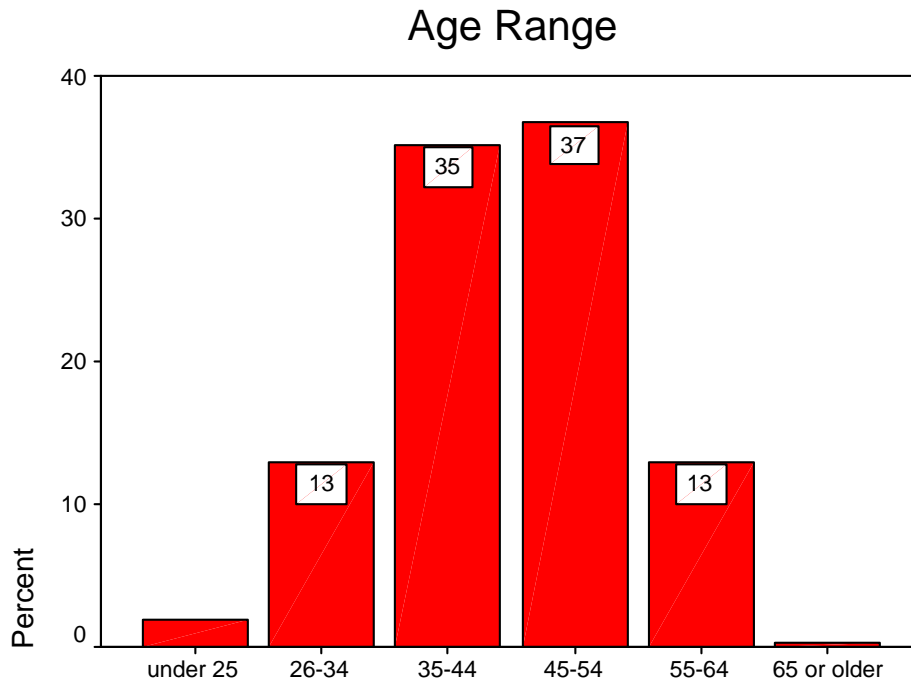
Figure 6

Geographic Region

To better understand where the respondents worked, the survey asked the question below about geographic regional setting. Of the 324 respondents, three did not answer this question. The Great Lakes/Midwest region was the most regularly indicated with 30.8% (99) of the sample; combining South East and North East indicates that approximately 45% of the respondents live along the eastern seaboard. Figure 7 presents the data. Table 2 represents the data from respondents who indicated their location as "*Other*."

Which of the following best describes the North American geographic region in which you practice?

01 = PACIFIC NORTHWEST
02 = WEST
03 = SOUTH WEST
04 = GREAT LAKES/MIDWEST
05 = SOUTHEAST
06 = NORTH EAST
07 = US ISLANDS OR TERRITORIES
08 = OTHER (DESCRIBE)

Geographic Region

southwest
8.1%

west
8.4%

pacific northwest
4.4%

other
2.8%

US islands/terr
.6%

northeast
24.3%

great lakes/midwest
30.8%
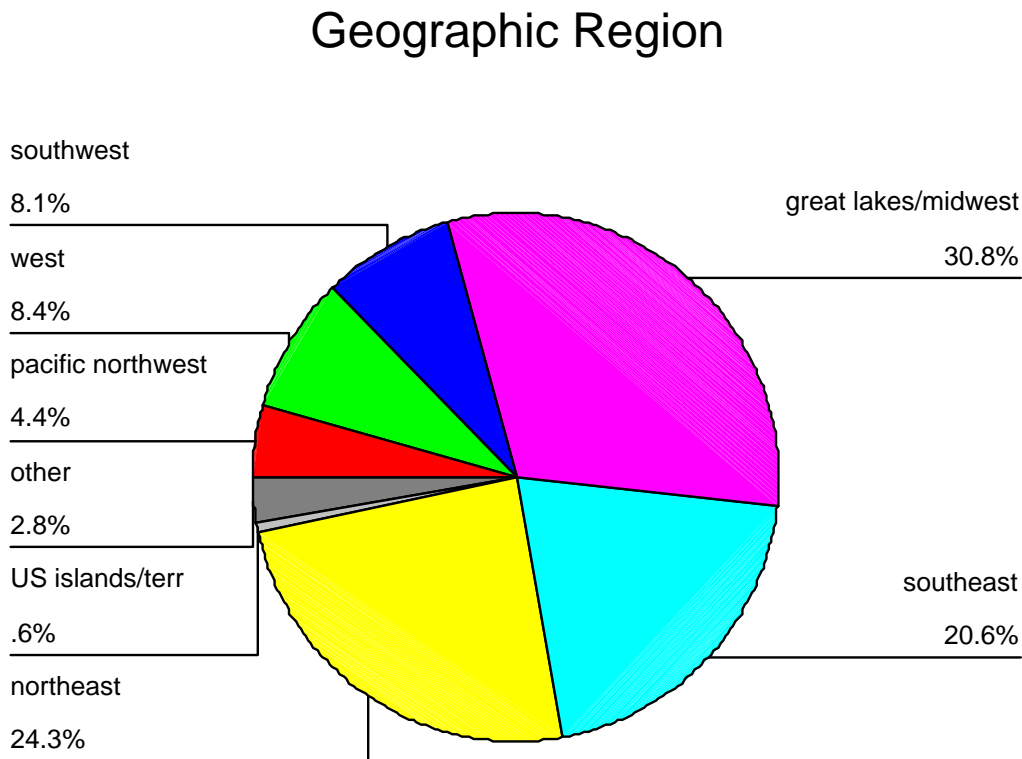
southeast
20.6%

Figure 7

TABLE 2

Other Geographic Region Responses
CANADA
EAST
EAST OF THE ROCKIES
HAWAII
MID-ATLANTIC
ONTARIO CANADA
SOUTH CENTRAL (x 2)
SOUTHEAST CANADA
WHOLE U S TERRITORY

Certifications

To profile the respondents' professional credentials, the survey asked the question below regarding certifications achieved. Respondents were asked to identify all credentials held; the *missing* value indicates the number (of the 324 respondents) who did not hold a given certificate. Tables 3-15 below present this data. Table 16 represents the data provided by respondents indicating a certification of "*Other.*"

Which of the following certification credentials do you hold? (Check all that apply.)

1. CRA
2. COA
3. COT
4. COMT
5. RBP
6. LPN
7. RN
8. ROUB
9. OD
10. DO
11. MD
12. OTHER

TABLE 3

Certifications

		CRA	COA	COT	COMT	RDB	LPN	RN	ROUB	OD	DO	MD	other
N	Yes	181	72	54	11	4	2	6	9	2	0	1	61
	Missing	143	252	270	313	320	322	318	315	322	324	323	263

TABLE 4

CRA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	181	55.9	100.0	100.0
Missing	System	143	44.1		
Total		324	100.0		

TABLE 5

COA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	72	22.2	100.0	100.0
Missing	System	252	77.8		
Total		324	100.0		

TABLE 6

COT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	54	16.7	100.0	100.0
Missing	System	270	83.3		
Total		324	100.0		

TABLE 7

COMT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	11	3.4	100.0	100.0
Missing	System	313	96.6		
Total		324	100.0		

TABLE 8

RDB

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	4	1.2	100.0	100.0
Missing	System	320	98.8		
Total		324	100.0		

TABLE 9

LPN

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	2	.6	100.0	100.0
Missing	System	322	99.4		
Total		324	100.0		

TABLE 10

RN

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	6	1.9	100.0	100.0
Missing	System	318	98.1		
Total		324	100.0		

TABLE 11

ROUB

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	9	2.8	100.0	100.0
Missing	System	315	97.2		
Total		324	100.0		

TABLE 12

OD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	2	.6	100.0	100.0
Missing	System	322	99.4		
Total		324	100.0		

TABLE 13

DO

		Frequency	Percent
Missing	System	324	100.0

TABLE 14

MD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	1	.3	100.0	100.0
Missing	System	323	99.7		
Total		324	100.0		

TABLE 15

other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	61	18.8	100.0	100.0
Missing	System	263	81.2		
Total		324	100.0		

TABLE 16

Other Certifications Held*	
A B D N C L E	EMT (x2)
A B O C N C L C	E M T-B
A T M C P	E M T-P
ABOGAC NCLE-AC PCLSA	FORMER C R A
B A (x 6)	INJECTION LICENSE
BFA (x 4)	M A (x3)
BS (x 4)	MEDICAL ASSISTANT
CCRC (x2)	NCCC
CERTIFIED DIABETES EDUCATOR	NONE (x 2)
CST (x5)	OHTS
CLDO	O.A
C L P	OR SCSUBI TECH
C M A	P.O.L.T
C O A-CANADA	PH D
C O E	PROF. PHOTO DEGREE (INDUSTRIAL
C P T (x2)	RDMS
C R A SOON	SURGICAL ASSISTING CERT OPTICO
C R N O	CERTIFIED OPTICIAN
CNA CPT CER & OSHA TRAINNER	

Note – of the 61 respondents indicating they held an "other" certificate 3 failed to indicate a specific credential.

Gender

Gender was the next question asked on the survey. Of the 324 respondents, 19 failed to answer this question.   Approximately 53% (163) of the respondents indicated that they were male. Figure 8 presents this data.

Please provide your gender:

01 = MALE
02 = FEMALE

Gender
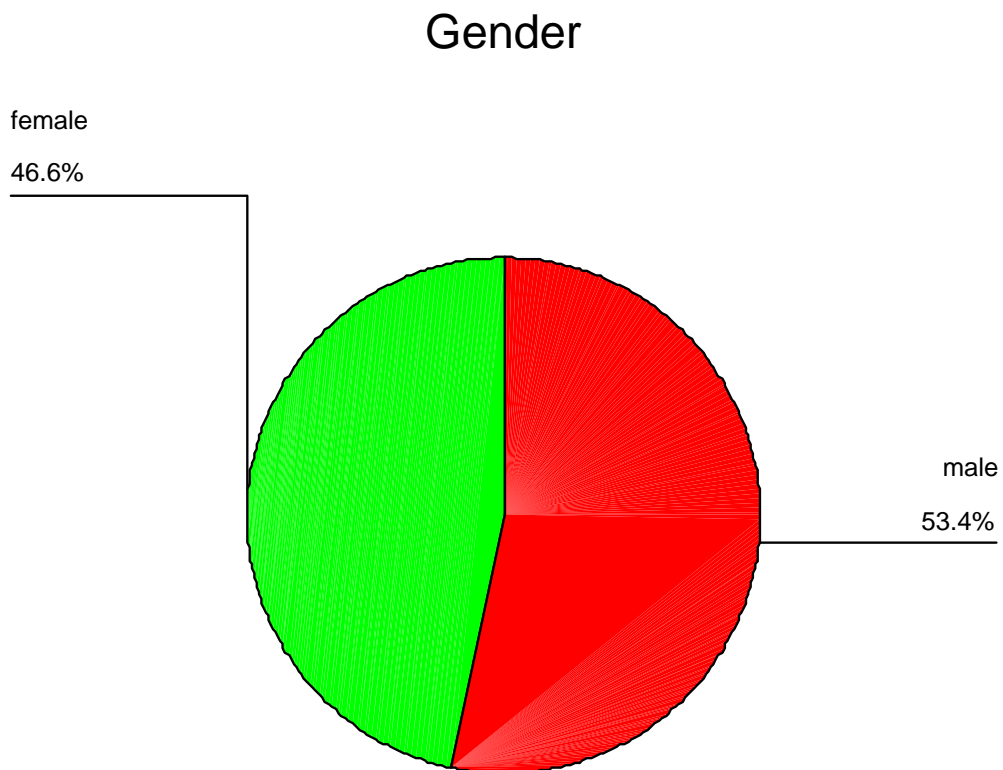
Figure 8

Formal Education

To better understand the educational background of the respondents, the question listed below was asked concerning formal education. Of the 324 respondents, approximately 38% (124) indicated they had achieved a 4-year college degree. Figure 9 presents the data.   Table 17 describes the data from respondent indicating their educational background as "*Other.*"

Which of the following describes your highest level of formal education?

01 = DID NOT COMPLETE HS
02 = HS GRADUATE OR EQUIVALENT
03 = SOME COLLEGE
04 = VOCATIONAL TECHNICAL CERTIFICATE
05 = COLLEGE DEGREE (2-YEAR)
06 = COLLEGE DEGREE (4-YEAR)
07 = MASTER'S DEGREE
08 = DOCTORATE (SUBJECT)
09 = OTHER (DESCRIBE)

Formal Education
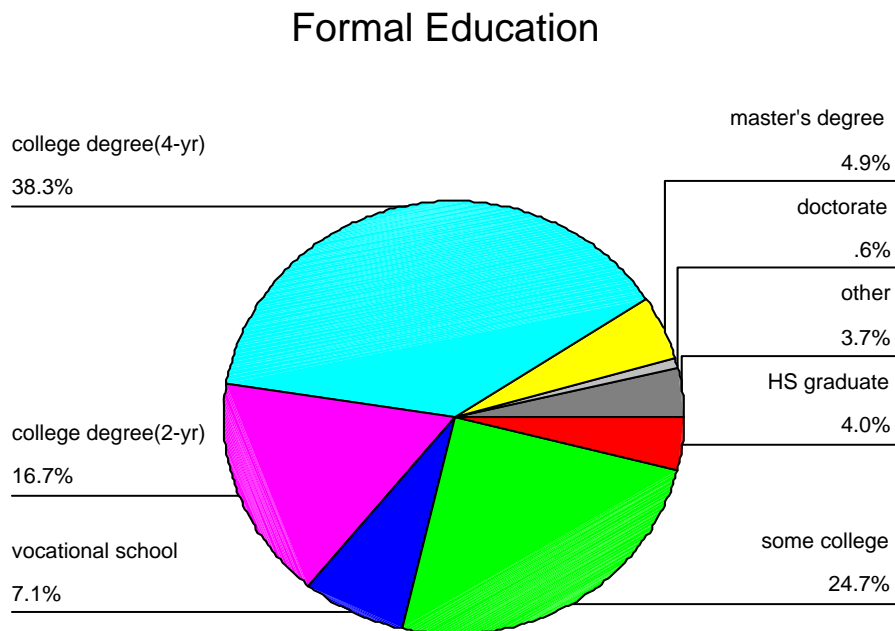
Figure 9

TABLE 17

Other Education Responses	
2 - 4 YEAR DEGREES (x 2)	DIPOLOMA SCHOOL NURSING PROGRA
2 MASTERS DEGREES	JCAHPO PROGRAM GRADUATE
3 YR NURSING (R N) DEGREE (x2)	M.S. OPHTHALMOLOGY
BACHELOR B S C	MILITARY TRAINING
COLLEGE DEGREE-3 YRS.	NAVY SCHOOL OF PHOTOGRAPHY
BIOENGINEERING	WORKING ON MBA HCM
	U S NAVY

Ethnicity

To better understand how well the survey represented the ethnicity of the population the following question was included. Of the 324 respondents, 2 did not answer this question. Approximately 89% of the respondents indicated they were Caucasian. Figure 10 presents this data.   There was no data associated with respondents indicating *"Other"* ethnicity.

 Please describe your racial/ethnic background?

01 = ABORIGINAL/FIRST NATIONS
02 = AFRICAN/BLACK
03 = CARIBBEAN
04 = CAUCASIAN/WHITE
05 = EUROPEAN
06 = HISPANIC
07 = EAST ASIAN
08 = SOUTH ASIAN
09 = WEST ASIAN
10 = OTHER (DESCRIBE)

Ethnicity

euopean
2.8%

hispanic
4.0%

east asian
3.1%

other
.3%

african/black
.9%

caribbean
.3%

caucasian/white
88.5%
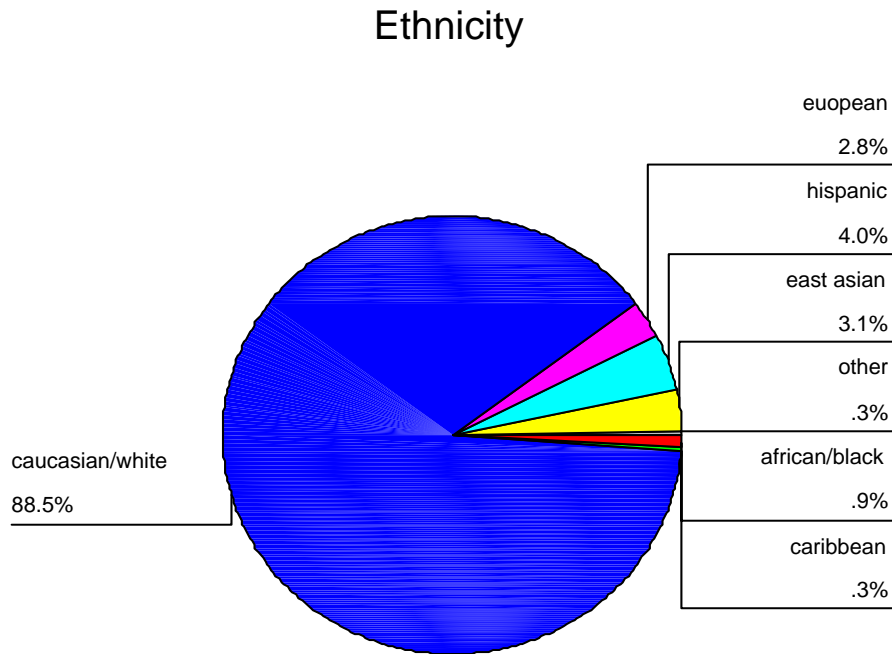
Figure 10

Frequency Output: Demographic Questionnaire

Tables 18-26 to follow describe the frequency output of the demographic and survey adequacy questions asked of respondents:

TABLE 18

Survey Coverage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	completely	153	47.2	48.7	48.7
	Adequately	157	48.5	50.0	98.7
	Inadequately	4	1.2	1.3	100.0
	Total	314	96.9	100.0	
Missing	System	10	3.1		
Total		324	100.0		

TABLE 19

Primary Employment Responsibility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	opthalmic photographer	235	72.5	73.0	73.0
	opthalmic technician	48	14.8	14.9	87.9
	medical photographer	5	1.5	1.6	89.4
	manager	24	7.4	7.5	96.9
	equipment vendor/service	5	1.5	1.6	98.4
	information technologist	1	.3	.3	98.8
	nurse	4	1.2	1.2	100.0
	Total	322	99.4	100.0	
Missing	System	2	.6		
Total		324	100.0		

TABLE 20

Time on Ophthalmic Photo Tasks

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	35 hrs +	161	49.7	50.2	50.2
	24-34 hrs	66	20.4	20.6	70.7
	15-23 hrs	35	10.8	10.9	81.6
	10-14 hrs	19	5.9	5.9	87.5
	5-9 hrs	19	5.9	5.9	93.5
	less than 5 hrs	15	4.6	4.7	98.1
	not practicing/retired	6	1.9	1.9	100.0
	Total	321	99.1	100.0	
Missing	System	3	.9		
Total		324	100.0		

TABLE 21

Years Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 2 yrs	9	2.8	2.8	2.8
	2-3 yrs	17	5.2	5.2	8.0
	4-6 yrs	34	10.5	10.5	18.5
	7-10 yrs	40	12.3	12.3	30.9
	11-15 yrs	69	21.3	21.3	52.2
	16-20 yrs	54	16.7	16.7	68.8
	over 20 yrs	101	31.2	31.2	100.0
	Total	324	100.0	100.0	

TABLE 22

Practice Setting

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	hospital/medical facility	36	11.1	11.1	11.1
	university hospital/medical facility	81	25.0	25.0	36.1
	private practice (general/multi-specialty)	93	28.7	28.7	64.8
	private practice (retina only)	92	28.4	28.4	93.2
	independent contractor	12	3.7	3.7	96.9
	other	10	3.1	3.1	100.0
	Total	324	100.0	100.0	

TABLE 23

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	163	50.3	53.4	53.4
	female	142	43.8	46.6	100.0
	Total	305	94.1	100.0	
Missing	System	19	5.9		
Total		324	100.0		

TABLE 24

Geographic Region

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	pacific north west	14	4.3	4.4	4.4
	west	27	8.3	8.4	12.8
	south west	26	8.0	8.1	20.9
	great lakes/midwest	99	30.6	30.8	51.7
	south east	66	20.4	20.6	72.3
	north east	78	24.1	24.3	96.6
	US islands/territories	2	.6	.6	97.2
	other	9	2.8	2.8	100.0
	Total	321	99.1	100.0	
Missing	System	3	.9		
Total		324	100.0		

TABLE 25

Formal Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	HS graduate or equivalent	13	4.0	4.0	4.0
	some college	80	24.7	24.7	28.7
	vocational technical certificate	23	7.1	7.1	35.8
	college degree (2-year)	54	16.7	16.7	52.5
	college degree (4-year)	124	38.3	38.3	90.7
	master's degree	16	4.9	4.9	95.7
	doctorate	2	.6	.6	96.3
	other	12	3.7	3.7	100.0
	Total	324	100.0	100.0	

TABLE 26

Ethnicity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	african/black	3	.9	.9	.9
	caribbean	1	.3	.3	1.2
	caucasian/white	285	88.0	88.5	89.8
	euopean	9	2.8	2.8	92.5
	hispanic	13	4.0	4.0	96.6
	east asian	10	3.1	3.1	99.7
	other	1	.3	.3	100.0
	Total	322	99.4	100.0	
Missing	System	2	.6		
Total		324	100.0		

Tasks Not Identified on the Survey

Respondents were given the opportunity to comment on the survey and identify any tasks that they felt may have been inadvertently excluded from the survey. These comments and identified tasks were reviewed and evaluated by the Committee. Consensus was established that none of the identified tasks should be added to the content outline, due to the fact that they were already covered in the task listing, related to technology that was not specific to the role of the RA, or were outside the scope of practice of the Retinal Angiographer. Table 27 outlines a synopsis of the responses.

TABLE 27

Tasks Not Identified on the Survey – Comments	
Thorough Survey/Great/Detailed x 5	Patient Work Up/Management x 3
Questions Concerning Definition of "Entry-Level" x 5	A-Scan/B-Scan x 4
Comments Concerning SLOS & OCT x 3	Use of Slit Lamp x 4
Management/Office/Clerical Tasks x5	Ultrasound x 2
Request for Salary Survey	Skilled with Many Cameras/Equipment x 3
Tasks related to Injection/BP & Pulse Monitoring x 7	Computer Related Tasks x 4
Focus on film related tasks (do not use digital) x 4	Maintenance x 2
Focus on digital related tasks (do not use film) x 5	Tasks Related to Multiple Practice Settings x 2
Photo Dynamic Therapy	Difficult to make judgments on tasks not performed x 2

Decision Criteria for Task Exclusion

Summary data was calculated for all tasks including performance frequency and mean importance data. Three additional analyses were calculated to evaluate demographic subgroup impact on tasks identified for exclusion from assessment. The analyses conducted were based upon the following variables:

1. Percentage of tasks identified as *not performed*;
2. Mean Importance calculation;
3. Subgroup Analysis of years experience;
4. Subgroup Analysis of practice setting;
5. Subgroup Analysis of geographic practice region.

Individual criteria analysis data for the five variables can be found in Appendices D, E, F, G, and H. A spreadsheet detailing the summary and individual analysis can be found in Appendix C.

Rule 1. Percentage of tasks identified as Not Performed

The first decision rule was made based on the percentage of respondents who indicated that they did not perform a task. To qualify for inclusion, the task had to have at least 76% of the respondent population indicating that the task **was performed**. Nine tasks were eliminated based on this decision criterion as outlined in Table 27. Of those 9 tasks, 8 were also identified for elimination based upon the importance rating criterion as described in Rule 2, and as highlighted on the table below. Appendix D presents a full listing of all of the survey tasks sorted in descending "Not Performed" percentage order.

> *Note – Tables that follow provide a truncated text descriptions along with associated task listing numbers (T#). The complete text of each task and its associated task number, as it appeared on the survey, may be found in Appendix A, **A Survey of the Role of Retinal Angiographers Practicing in North America.***

Table 27 Tasks Identified as Not Performed

Task #	Description	of respondents	SE	Mean	% Not Performed
T203	ICG angio	189	0.09	2.71	39.81%
T205	Utility and comprehend	189	0.09	2.99	39.23%
T201	Fundus	191	0.08	2.70	39.17%
T202	Fluorescein angio	191	0.09	2.81	39.17%
T206	Choroidal circulation	188	0.09	2.97	38.96%
T207	Retinal circulation	189	0.09	2.98	38.83%
T204	Affects of adjustment	194	0.09	3.05	38.41%
T77	Color film	239	0.08	2.81	26.01%
T79	Color film	242	0.08	2.83	24.84%

Rule 2. Mean Importance Rating

The second decision rule established that the mean importance rating must be greater than 3.00 to be included on the final Content Outlines. Relative to the rating scale used for the survey, this mean threshold can be interpreted as a task being assigned at minimum, an *Average or medium importance* rating.

Twenty-one tasks were identified for elimination based on this decision criterion. Of those 21 tasks, 8 were previously identified for elimination based upon Rule 1—"*Not Performed*" criterion—as highlighted on the table below. Appendix E provides a complete listing of tasks sorted by mean importance ratings.

Table 28 Tasks receiving mean importance ratings less than 3.0

Task		N	SE	Mean	Freq (not performed
T142	Catalogue	252	0.06	2.39	21.25%
T141	Spreadsheet	267	0.06	2.44	17.08%
T140	Relational data bases	265	0.06	2.55	17.70%
T201	Fundus Photography	191	0.08	2.70	39.17%
T203	ICG angio	189	0.09	2.71	39.81%
T81	Slide duplicator	253	0.08	2.73	21.67%
T111	CMOS chip	251	0.07	2.74	19.55%
T125	Calibrates CRT&LCD monitors	269	0.07	2.77	16.20%
T138	Presentation graphics	275	0.07	2.80	14.33%
T77	Color film	239	0.08	2.81	26.01%
T202	Fluorescein angio	191	0.09	2.81	39.17%
T79	Color film	242	0.08	2.83	24.84%
T127	Film scan	278	0.07	2.85	13.66%
T126	Flatbed scan	281	0.07	2.87	12.73%
T109	Monochrome	278	0.07	2.94	13.13%
T110	Color	278	0.07	2.94	13.13%
T124	film recorders	277	0.07	2.96	13.71%
T206	Choroidal circulation	188	0.09	2.97	38.96%
T80	Slide Imprinter/mounter	272	0.07	2.97	16.05%
T207	Retinal circulation	189	0.09	2.98	38.83%
T205	Utility and comprehend	189	0.09	2.99	39.23%

Rule 3. Mean Importance in relation to Years of Experience

To evaluate whether the practice tasks were viewed differently by practitioners of varying levels of experience, the data was evaluated in relation to respondent years of professional experience. The evaluation results support the content validation model claim that that Retinal Angiography practice is consistent regardless of years of experience. Using the same criteria from Rule 2 (task inclusion requirement of a mean rating of 3.0 or greater), data analysis was performed on four individual age groups as follows:

Years of Professional Experience Groupings

Group 1:   0 to 6
Group 2:   7 to 10
Group 3:   11 to 20
Group 4:   20 and Over

It was established that three out of the four groups must assign a task a mean importance rating of 3.0 or higher (showing agreement among the age ranges) in order to qualify for inclusion in the final content outline. Applying this criterion, agreement was perfect among all four age groupings: There were **no tasks** that were identified as not critical to three of the four age groups that had not been previously identified by the *mean importance* and *not performed* exclusion thresholds. Appendix F presents this data.

Rule 4. Mean Importance by Practice Setting

To assure that the role of the Retinal Angiographer was not viewed differently based upon where respondents worked, responses were analyzed by practice settings. The two practice settings identified in the demographic questionnaire as Hospital/Medical Facility and University Hospital/Medical Facility were combined to form the category of Hospital Facility (Group 1) for data analysis purposes. It was established that two of the three practice setting groups had to assign a mean importance rating of higher than 3.0 (showing agreement among practice settings) in order to qualify for inclusion in the final content outline.

Practice Setting Groupings:

Group 1:   Hospital Facility
Group 2:   Private Practice
Group 3:   Private Practice, Retinal Only

Applying this criterion, agreement was again so high among the groups, that **no tasks** were identified for exclusion that had not been eliminated based upon the Rules 1 and 2 (not performed and criticality). This analysis provided additional support to the content validation model: The tasks identified as critical to competent practice were common among all work settings. Appendix G presents this data.

Rule 5.   Mean Importance Rating in Relation to Geographic Practice Regions

To evaluate whether Retinal Angiographic practice differed across geographic regions, analysis of responses by region was conducted. The respondent groups were broken into three geographic areas, West, Midwest and East. Two of the three groups had to assign an importance rating of 3.0 or higher in order for a task to be included on the final content outline. Once again, there was no discernable difference among the responses from the three regional areas and **no tasks** were identified based upon this criterion that had not been previously identified by the *mean importance* and *not performed* exclusion thresholds. Appendix H presents this data.

Content Outlines

After applying the five exclusion rules above, 22 tasks were identified for removal from the task listing. The Advisory Committee was then asked to determine how the remaining 200 critical tasks should be assigned to the two examination content outlines: the Multiple-Choice Examination and the Clinical/Performance Examination. Each of the remaining 200 tasks was evaluated against the following four decision criteria:

1. Assess the task on the Multiple-Choice Examination only;

2. Assess the task on the Performance Examination only;

3. Assess the task on both the Multiple Choice and the Performance Examinations;

4. Do not assess on either Examination: The tasks cannot be reliably observed or measured.

All tasks were identified as being readily observed or measurable, and a careful evaluation of the resulting task outline was conducted. The Committee discussed at length the fact that numerous tasks relating to film development darkroom activities, such as the printing of film contact sheets and the use of slide duplicators — while still in use in some practice settings — involve the use of equipment that is gradually falling out of use, and subsequently is difficult to find and maintain for standardized performance testing purposes. Therefore, for tasks associated with these technologies, it was the Committee decision to, whenever feasible, test these concepts in a written examination format rather than as part of the Performance Examination. Subsequently, a shift can be noted between the division of tasks between the two examinations. The Multiple-Choice Examination now includes more tasks than was previously the case, as numerous tasks that were tested on the Performance Examination were identified for assessment on the Multiple-Choice Examination. It was also noted that numerous tasks associated with digital imaging, and a new technology, Optical Coherence Tomography (OCT), could most practically be tested in a written examination format.

With this philosophy established, each task was evaluated for placement on the Written Examination, Performance Examination or both. From this list, 198 tasks were included on the final content outline (examination specifications) for the Multiple-Choice Examination; 27 of these tasks are also identified for assessment on the Performance Examination. The Performance Examination includes those 27 tasks plus 2 additional tasks which are exclusive to the Performance Examination. In light of these shifts of focus between the two examination formats, the Committee moved to increase the length of the Written Examination from 150 to 175 items.

A final review of the content outlines highlighted the fact that within the Written Examination the number of tasks in the Anatomy domain was reduced. The Committee decided to reorganize Anatomy and Physiology – merging the tasks from both sub-content domains. The final Written Examination Content Outline reflects this decision. Appendix I provides complete content outline data.

Content Area Weighting

Once the final content outlines were established for the Written and Performance Examinations, the Committee was asked to set the weighting (emphasis) for each of the content areas. Variables such as the difficulty of tasks within content areas, the critical nature (deadly and dangerous) of content areas and the numbers of tasks identified were discussed. The content area weighting decisions are outlined in Appendix J.

Appendix A

A Survey of the Role
of the Entry-Level Retinal Angiographers
in North America

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July 5, 2004

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Dear Fellow Ophthalmic Photographer:

I am writing to you on behalf of the Ophthalmic Photographer's Society (OPS) Board of Certification, asking for your participation in a survey that is critical to the profession of Ophthalmic Photography. Ours is a profession both rich with tradition and strongly impacted by change. It is our intent in the conduction of this survey to assess how these changes in technology and job skill requirements have impacted the role of the Retinal Angiographer.

As you may know, the OPS/BOC provides the accredited credential for the Certified Retinal Angiographer (CRA). The legal defensibility of this program has as its cornerstone the clear delineation of the role of Retinal Angiographers; the CRA Program must reflect what Retinal Angiographers do on the job. It is our desire to hold up the CRA credential as a reflection of the new technological skills that are emerging today. To accomplish this we need your help in completing the survey.

The goal of this survey is to judge the criticality of an exhaustive set of tasks describing the role of today's Retinal Angiographers. If your professional responsibilities remove you from the daily observation of, or professional interaction with Retinal Angiographers, *please consider passing this survey on to a fellow professional that might be more closely affiliated with the role.* The success of the survey is dependant on the individual opinions of Ophthalmic Professionals relating to the role, as they see it practiced. The job of the Retinal Angiographer is diverse; practice settings, state and local government regulations, patient volume, education, equipment and training vary significantly among professionals. Yet we are confident that we can identify a core set of tasks describing competent practice. To best evaluate the impact of these practice variables we are asking you to complete a detailed, ANONYMOUS demographic questionnaire. The results will allow us to analyze the survey data in relation to the respondent group profile.

We appreciate the value of your time, and have attempted to make completing the survey as easy as possible. Enclosed please find detailed instructions, and a stamped, addressed, return envelope. To encourage your participation, the OPS/BOC is sponsoring a drawing for $200.00, which will be awarded to one lucky respondent. To participate in the drawing, simply follow the instructions on the enclosed entry sheet and return it with your survey. Schroeder Measurement Technologies will then forward the entries to the OPS membership office ensuring that your responses to the survey remain anonymous.

Again, please be assured that your individual responses will be completely confidential - only group results will be released. In our quickly changing profession, the speed at which we implement this data is critical, so we are asking that you complete and return the survey by September 13th, 2004. If you have any questions, please feel free to contact Schroeder Measurement Technologies, Inc at (800) 556-0484 ext 2109; please ask for Ann Marie.

Sincerely,

Terrance L. Tomer, CRA, FOPS
Chairman, Board of Certification

Member: National Organization For Competency Assurance

Survey Instructions

The purpose of this survey is to obtain *your opinion*, and the opinion of other Ophthalmic Photographers about the professional role of the minimally competent, entry-level Retinal Angiographer. This survey will provide analytical data defining what it is that Retinal Angiographers do on-the-job, which will in turn be used in support of the CRA Certification Program. The terms *"minimally competent"* and *"entry-level"* have very specific meanings for this survey.

Minimal Competency describes the Retinal Angiographer's ability to perform all tasks required to produce high-quality, diagnostic retinal angiography, while maintaining the health and safety of the patient and the photographer. It is a challenge to set a standard against which performance is to be measured, which is why we establish Minimal Competency. An example is to say **"*Minimally Competent Retinal Angiographers must administer CPR…any Retinal Angiographer who CAN NOT perform CPR is not Minimally Competent."*** While performing the task of, for example, open heart massage, might save the life of a dying patient, it is hardly a skill expected of Minimally Competent Angiographers. None of us like to think of fellow professionals performing tasks at a Minimally Competent level, but for the purpose of the survey we must define and use the concept of Minimal Competency as a positive one – describing Angiographers who just meet competency standards. Minimal Competency does not describe inferior performance, unacceptable practice or "easy" tasks. On the contrary, Minimally Competent Angiographers must demonstrate a broad range of highly technical, specialized Ophthalmic Photography skills.

Entry-Level describes Retinal Angiographers who *just* meet minimum training and experience requirements. Entry-Level does NOT describe Retinal Angiographers who are new to the job or those just embarking on training or educational programs. Entry-Level Retinal Angiographers may have received training through apprenticeship/mentoring, on-the-job training or education programs, or a combination of the three. Note, however, that they have COMPLETED this training. They are also expected to have applied this training on-the-job. Entry-Level describes Retinal Angiographers who have completed at least two-years as an Ophthalmic Photographer. Entry-Level Angiographers would not be expected to have the range of experience gained, for instance, after 5 or 10 years on the job. Entry-Level Retinal Angiographers are expected to demonstrate this experience and proficiency by assembling a portfolio of diagnostic-quality ophthalmic photography.

This survey attempts to provide an exhaustive list of the tasks that Entry-Level, Minimally Competent Retinal Angiographers perform. There is tremendous diversity in this profession, representing practice settings, technology breakthroughs, equipment availability and geographic settings: Some Retinal Angiographers specialize in the use of digital imaging equipment, other practices are film-based. You are asked to answer the survey according to how the tasks relate to your individual experience and your practice association with the role of Minimally Competent, Entry-Level Retinal Angiographers.

The tasks are organized into fourteen content areas: Anatomy, Physiology, Pathology, Patient Management, General Photography-Film, General Photography-Digital, Data and Image Management, Patient and Operator Safety, Fundus Photography, Fluorescein Angiography, Indocyanine Green (ICG) Angiography, Scanning Laser Ophthalmoscopy (SLO), Optical Coherence Tomography (OCT), and Pharmacology. You are asked to rate the criticality of each task within these content areas, as it relates to competent performance. You will also have the opportunity to identify tasks that are not performed by Minimally Competent, Entry-Level Retinal Angiographers.

The task list was assembled by an Advisory Panel representing the diversity of background, education, experience and practice setting in Ophthalmic Photography today. The Advisory Committee goal was to describe the full spectrum of tasks performed. However, if after completing the survey you feel that there were critical tasks that were not included, you will have an opportunity to identify these omissions.

Use of the Rating Scale

Keeping in mind the Minimally Competent, Entry-Level Retinal Angiographer, for each task, please provide a single rating response to the following question:

Considering both the *importance* and *frequency*, how important is the task to the effective and competent performance as an entry-level Retinal Angiographer? If you believe the task is not performed by entry-level Retinal Angiographers, please select the "Does Not Perform" rating.

0 = Does Not Perform: *Entry-level, minimally competent Retinal Angiographers do not perform this task.*

1 = Minimal importance: *Performance of this task is unimportant, unnecessary, or outside of the scope of practice – Retinal Angiographers are very rarely, if ever, asked to perform this task.*

2 = Below average or low importance: *Performance of this task is not critical to competent practice. Few, if any competent, entry-level Retinal Angiographers are able to perform this task. The task is rarely performed.*

3 = Average or medium importance: *Performance of this task is moderately important. Some competent, entry-level Retinal Angiographers are able to perform this task. This task is occasionally performed.*

4 = Above average or high importance: *Performance of this task is very important. Most competent, entry-level Retinal Angiographers perform this task frequently.*

5 = Extreme or critical importance: *Performance of this task is critical to competent performance. All competent, entry-level Retinal Angiographers must be able to perform this task routinely.*

The first page of the survey contains a detailed Demographic Questionnaire used to collect information describing the respondent group. A postage-paid return envelope is enclosed for your convenience: we apologize to anyone responding from outside the US, as we are unable to provide return postage.

If you have any questions or concerns about the survey or how to complete it please do not hesitate to contact Schroeder Measurement Services, Inc at (800)556-0484, Extension 2109, Monday-Friday, 8:30am–5:00pm, EST. We thank you most sincerely in advance for your participation in this important project.

Certified Retinal Angiographer ● Demographic Data Collection

Presented below are demographic questions related to the role of the Retinal Angiographer. All information is held in strictest confidence and is used only to establish a profile of the survey respondent group and provide a mechanism by which the survey data can be cross tabulated (e.g., by *years of experiences*, or *practice settings*). This data helps to define the role of the Retinal Angiographer through statistical analyses. Please select only one option for each question unless otherwise noted.

1. **Which of the following best describes your primary employment responsibility?**
    (choose **one** best response)
    ___Ophthalmic Photographer
    ___Ophthalmic Technician
    ___Medical Photographer
    ___Manager
    ___Equipment vendor/service technician
    ___Information Technology/System Specialist
    ___Orthoptist
    ___Optometrist
    ___Nurse
    ___Physician

2. **How much time are you currently performing tasks related to ophthalmic photography?**
    ___35 hours or more per week
    ___24-34 hours per week
    ___15-23 hours per week
    ___10-14 hours per week
    ___5-9 hours per week
    ___less than 5 hours per week
    ___not currently practicing or retired

3. **D**escribe your years of professional experience in the field of Ophthalmic Photography:
    ___Less than 2 years
    ___2-3 years
    ___4-6 years
    ___7-10 years
    ___11-15 years
    ___16-20 years
    ___More than 20 years

4. **Which of the following best describes your primary professional practice setting?**
    ___Hospital/Medical Facility
    ___University Hospital/Medical Facility
    ___Private Practice (general/multi-specialty)
    ___Private Practice (retina only)
    ___Independent Contractor
    ___Other (describe): _____

5. **Please describe your age range:**
    ___ Under 25   ___ 45-54
    ___ 26-34   ___ 55-64
    ___ 35-44   ___ 65 or older

6. **Which of the following best describes the North American geographic region in which you practice?**
    ___Pacific Northwest
    ___West
    ___South West
    ___Great Lakes/Midwest
    ___Southeast
    ___North East
    ___US Islands or territories
    ___Other: (describe)_____

7. **Which of the following Certification Credentials do you hold? (check all that apply)**
    ___CRA   ___RN
    ___COA   ___ROUB
    ___COT   ___OD
    ___COMT   ___DO
    ___RBP   ___MD
    ___LPN   ___Other (describe _____)

8. **Gender**:   ___ Male ___ Female

9. **Which of the following describes your highest level of formal education?**
    ___ Did not complete HS
    ___ HS graduate or equivalent
    ___ Some College
    ___ Vocational Technical Certificate
    ___ College Degree (2-year)
    ___ College Degree (4-year)
    ___ Master's Degree
    ___ Doctorate (subject) _____
    ___ Other (describe) _____

10. **Please describes your racial/ethnic background:**
    ___Aboriginal/First Nations
    ___African/Black
    ___ Caribbean
    ___ Caucasian/White
    ___ European
    ___ Hispanic (*Latin/South America*)
    ___ East Asian (*China, Vietnam, Thailand, Laos, Philippines, Japan, Korea*)
    ___ South Asian (*India, Pakistan, Bangladesh, Sri Lanka, Nepal, Burma*)
    ___ West Asian (*Armenia, Iran, Syria, Turkey, Jordan, Israel*)
    ___Other (describe) _____

Considering both the importance and frequency, how important is the task in relation to the effective and competent performance as an **entry-level Retinal Angiographer**? If you believe the task is not performed by entry-level Retinal Angiographers, please select the "Does Not Perform" rating.		
Of Critical/Extreme Importance		5
Above Average/High Importance		4
Average/Medium Importance		3
Below Average/Low Importance		2
Minimal Importance		1
Does Not Perform		0

I. Applies the Principles of the Anatomy of the Eye

A. Demonstrates an understanding of external ocular structures…………………… *T1* 0 1 2 3 4 5

B. Demonstrates an understanding of anterior and posterior segment structures……… *T2* 0 1 2 3 4 5

C. Demonstrates an understanding of anatomical landmarks and terminology………… *T3* 0 1 2 3 4 5

II. Practices the Principles of the Physiology of the Eye

A. Understands the physiology of ocular structures including:

　1 anterior structures: (cornea, anterior chamber, iris, lens)…………………… *T4* 0 1 2 3 4 5

　2 posterior structures:(vitreous, retina, pigment epithelium, choroid,optic nerve).. *T5* 0 1 2 3 4 5

B. Understands the circulation properties of the:

　1 iris………………………………………………………………………… *T6* 0 1 2 3 4 5

　2 retina……………………………………………………………………… *T7* 0 1 2 3 4 5

　3 optic nerve………………………………………………………………… *T8* 0 1 2 3 4 5

　4 choroid……………………………………………………………………… *T9* 0 1 2 3 4 5

III. Applies the Concepts of Pathology of the Eye

A. Recognize and identify the ocular manifestations and associated findings of:

　1 systemic diseases…………………………………………………………… *T10* 0 1 2 3 4 5

　2 vascular diseases …………………………………………………………… *T11* 0 1 2 3 4 5

　3 retinal diseases …………………………………………………………… *T12* 0 1 2 3 4 5

　4 optic nerve disorders………………………………………………………… *T13* 0 1 2 3 4 5

　5 inflammatory diseases ……………………………………………………… *T14* 0 1 2 3 4 5

　6 ocular trauma ……………………………………………………………… *T15* 0 1 2 3 4 5

　7 ocular tumors ……………………………………………………………… *T16* 0 1 2 3 4 5

B. Recognize and Identify the clinical findings relating to:

　1 diabetic retinopathy ……………………………………………………… *T17* 0 1 2 3 4 5

　2 hypertensive retinopathy…………………………………………………… *T18* 0 1 2 3 4 5

　3 macular degeneration ……………………………………………………… *T19* 0 1 2 3 4 5

　4 vascular occlusions ………………………………………………………… *T20* 0 1 2 3 4 5

　5 ocular histoplasmosis ……………………………………………………… *T21* 0 1 2 3 4 5

　6 central serous retinopathy ………………………………………………… *T22* 0 1 2 3 4 5

　7 toxoplasmosis ……………………………………………………………… *T23* 0 1 2 3 4 5

　8 cystoid macular edema …………………………………………………… *T24* 0 1 2 3 4 5

　9 macular hole ……………………………………………………………… *T25* 0 1 2 3 4 5

　10 angioid streaks …………………………………………………………… *T26* 0 1 2 3 4 5

　11 macroaneurysm …………………………………………………………… *T27* 0 1 2 3 4 5

　12 hereditary macular dystrophies ………………………………………… *T28* 0 1 2 3 4 5

　13 malignant melanoma ……………………………………………………… *T29* 0 1 2 3 4 5

　14 hemangioma ……………………………………………………………… *T30* 0 1 2 3 4 5

　15 retinoblastoma …………………………………………………………… *T31* 0 1 2 3 4 5

　16 choroidal nevus …………………………………………………………… *T32* 0 1 2 3 4 5

　17 optic atrophy ……………………………………………………………… *T33* 0 1 2 3 4 5

　18 optic neuritis ……………………………………………………………… *T34* 0 1 2 3 4 5

　19 glaucoma ………………………………………………………………… *T35* 0 1 2 3 4 5

　20 papilledema ……………………………………………………………… *T36* 0 1 2 3 4 5

　21 drusen …………………………………………………………………… *T37* 0 1 2 3 4 5

　22 uveitis …………………………………………………………………… *T38* 0 1 2 3 4 5

Considering both the importance and frequency, how important is the task in relation to the effective and competent performance as an **entry-level Retinal Angiographer**? If you believe the task is not performed by entry-level Retinal Angiographers, please select the "Does Not Perform" rating.	
Of Critical/Extreme Importance	5
Above Average/High Importance	4
Average/Medium Importance	3
Below Average/Low Importance	2
Minimal Importance	1
Does Not Perform	0

B. Recognize and Identify the clinical findings relating to: *(cont.)*

23 retinal detachment……………………………………………………… *T39*   0 1 2 3 4 5
24 retinopathy of prematurity……………………………………………… *T40*   0 1 2 3 4 5
25 sickle cell retinopathy…………………………………………………… *T41*   0 1 2 3 4 5
26 cytomegalovirus retinitis ……………………………………………… *T42*   0 1 2 3 4 5
27 anterior ischemic optic neuropathy …………………………………… *T43*   0 1 2 3 4 5
28 coloboma ………………………………………………………………… *T44*   0 1 2 3 4 5
29 Coats' disease ………………………………………………………… *T45*   0 1 2 3 4 5
30 epiretinal membrane…………………………………………………… *T46*   0 1 2 3 4 5
31 retinal toxicity…………………………………………………………… *T47*   0 1 2 3 4 5

IV. Patient Management

A. Performs a patient flashlight examination to determine:

   1 contraindications to dilation:

     a. narrow angles………………………………………………… *T48*   0 1 2 3 4 5
     b. contact lenses ……………………………………………… *T49*   0 1 2 3 4 5
     c. iris fixated/anterior chamber intraocular lens …………………… *T50*   0 1 2 3 4 5

   2 media conditions (e.g., scarring/cornea and lens) ………………… *T51*   0 1 2 3 4 5
   3 the presence of inflammation (e.g., infection) ……………………… *T52*   0 1 2 3 4 5

B. Informs patient of procedures to be performed, pharmacologic agents
  to be administered, expected outcomes and potential side effects …………… *T53*   0 1 2 3 4 5

C. Answers patient questions concerning the procedure …………………… *T54*   0 1 2 3 4 5

D. Elicits cooperation from uncooperative or physically disabled patients ………… *T55*   0 1 2 3 4 5

E. Provides for written informed consent for angiography ………………… *T56*   0 1 2 3 4 5

F. Establishes/reviews patient records including:

   1 medical/surgical history……………………………………………… *T57*   0 1 2 3 4 5
   2 allergies ……………………………………………………………… *T58*   0 1 2 3 4 5
   3 pregnancy …………………………………………………………… *T59*   0 1 2 3 4 5
   4 ocular history ………………………………………………………… *T60*   0 1 2 3 4 5
   5 photographic history ………………………………………………… *T61*   0 1 2 3 4 5

G. Administers prescribed drops

   1 verifies physician's order …………………………………………… *T62*   0 1 2 3 4 5
   2 maintains sterile technique …………………………………………… *T63*   0 1 2 3 4 5
   3 performs punctal occlusion …………………………………………… *T64*   0 1 2 3 4 5
   4 monitor and assess the effects of the drops ………………………… *T65*   0 1 2 3 4 5

H. Recognizes and respond to adverse reactions to prescribed drops …………… *T66*   0 1 2 3 4 5

V. General Photography - Film

A. Stocks and inventories the photographic suite supplies ………………… *T67*   0 1 2 3 4 5

B. Understands the function and properties of the following:

   1 Film types including:

     a 35mm black and white ………………………………………… *T68*   0 1 2 3 4 5
     b 35mm color transparency film ………………………………… *T69*   0 1 2 3 4 5

   2 Film properties including:

     a. ISO/film speed ………………………………………………… *T70*   0 1 2 3 4 5
     b. contrast ………………………………………………………… *T71*   0 1 2 3 4 5
     c. exposure ……………………………………………………… *T72*   0 1 2 3 4 5
     d. color balance ………………………………………………… *T73*   0 1 2 3 4 5

*Considering both the importance and frequency, how important is the task in relation to the effective and competent performance as an **entry-level Retinal Angiographer** ? If you believe the task is not performed by entry-level Retinal Angiographers, please select the "Does Not Perform" rating.*	*Of Critical/Extreme Importance*	5
	Above Average/High Importance	4
	Average/Medium Importance	3
	Below Average/Low Importance	2
	Minimal Importance	1
	Does Not Perform	0

V. General Photography - Film *(cont)*

C. Demonstrates the use of the following image output equipment and materials:

1 enlarger *T74* 0 1 2 3 4 5

2 contact printer *T75* 0 1 2 3 4 5

3 film processing equipment including:

a. manual processing equipment for:

1 black and white film *T76* 0 1 2 3 4 5

2 color film *T77* 0 1 2 3 4 5

b. automatic processing equipment for:

1 black and white film *T78* 0 1 2 3 4 5

2 color film *T79* 0 1 2 3 4 5

4 slide imprinter/mounter *T80* 0 1 2 3 4 5

5 slide duplicator *T81* 0 1 2 3 4 5

6 photographic papers *T82* 0 1 2 3 4 5

D. Demonstrates the ability to process black and white film:

1 load reels and tanks to process film using:

a. manual processing equipment *T83* 0 1 2 3 4 5

b. automatic processing equipment *T84* 0 1 2 3 4 5

2 select and use processing chemicals *T85* 0 1 2 3 4 5

3 coordinate chemical temperature, dilution and timing with film exposure.......... *T86* 0 1 2 3 4 5

4 monitor processed film for:

a. contrast *T87* 0 1 2 3 4 5

b. density *T88* 0 1 2 3 4 5

c. granularity *T89* 0 1 2 3 4 5

5 prepare film for filing/viewing *T90* 0 1 2 3 4 5

E. Demonstrates the ability to print black and white film:

1 use appropriate safe-light conditions.......................... *T91* 0 1 2 3 4 5

2 generate a contact print with:

a. an enlarger... *T92* 0 1 2 3 4 5

b. a contact printer... *T93* 0 1 2 3 4 5

3 generate a contact print:

a. on paper *T94* 0 1 2 3 4 5

b. on film *T95* 0 1 2 3 4 5

4 generate an enlargement on paper *T96* 0 1 2 3 4 5

F. Recognizes and corrects processing and printing artifacts *T97* 0 1 2 3 4 5

VI. General Photography - Digital

A. Demonstrate basic computer skills *T98* 0 1 2 3 4 5

B. Stock and inventory digital supplies *T99* 0 1 2 3 4 5

C. Understands the use of the following image acquisition equipment and properties:

1 Understands the function and components of the digital camera including:

a. still digital camera *T100* 0 1 2 3 4 5

b. digital video *T101* 0 1 2 3 4 5

c. CPU (central processing unit) *T102* 0 1 2 3 4 5

d. archiving devices and media *T103* 0 1 2 3 4 5

VI. General Photography - Digital *(cont)*

C. Understands the use of the following image acquisition equipment and properties *(cont)*:

2 Performs routine maintenance and equipment troubleshooting including:
- a. electronic components………………………………………………………… *T104* 0 1 2 3 4 5
- b. cleaning equipment including relay lenses………………………………… *T105* 0 1 2 3 4 5
- c. software maintenance ………………………………………………………… *T106* 0 1 2 3 4 5
- d. storage utilization……………………………………………………………… *T107* 0 1 2 3 4 5
- e. monitor calibration …………………………………………………………… *T108* 0 1 2 3 4 5

3 Understands the function and properties of the following technology:
- a. CCD chips (charged coupling device):
  - 1 monochrome ……………………………………………………………… *T109* 0 1 2 3 4 5
  - 2 color ………………………………………………………………………… *T110* 0 1 2 3 4 5
- b. CMOS chips (Complementary Metal Oxide Semiconductor)…………………… *T111* 0 1 2 3 4 5

4 Understands digital imaging properties including:
- a. resolution …………………………………………………………………… *T112* 0 1 2 3 4 5
- b. ISO rating/gain/noise ………………………………………………………… *T113* 0 1 2 3 4 5
- c. dynamic range………………………………………………………………… *T114* 0 1 2 3 4 5
- d. contrast ……………………………………………………………………… *T115* 0 1 2 3 4 5
- e. exposure control …………………………………………………………… *T116* 0 1 2 3 4 5
- f. color balance ………………………………………………………………… *T117* 0 1 2 3 4 5
- g. bit depth ……………………………………………………………………… *T118* 0 1 2 3 4 5
- h file formats …………………………………………………………………… *T119* 0 1 2 3 4 5

D. Understands the use of image overlays …………………………………………… *T120* 0 1 2 3 4 5

E. Understands the use of measurement utilities …………………………………… *T121* 0 1 2 3 4 5

F. Understands digital darkroom and printing ……………………………………… *T122* 0 1 2 3 4 5

G. Demonstrates the use of the following image output and materials:
- 1 printers and paper types ………………………………………………………… *T123* 0 1 2 3 4 5
- 2 film recorders …………………………………………………………………… *T124* 0 1 2 3 4 5

H. Calibrates CRT and LCD monitors ………………………………………………… *T125* 0 1 2 3 4 5

I. Understands and uses Image acquisition equipment including:
- 1 flatbed scanners ………………………………………………………………… *T126* 0 1 2 3 4 5
- 2 film scanners …………………………………………………………………… *T127* 0 1 2 3 4 5

J. Demonstrates image processing skills related to output:
- 1 proofsheet production …………………………………………………………… *T128* 0 1 2 3 4 5
- 2 file format/compression………………………………………………………… *T129* 0 1 2 3 4 5
- 3 resolution selection……………………………………………………………… *T130* 0 1 2 3 4 5
- 4 contrast enhancement …………………………………………………………… *T131* 0 1 2 3 4 5
- 5 sharpening ………………………………………………………………………… *T132* 0 1 2 3 4 5
- 6 brightness ………………………………………………………………………… *T133* 0 1 2 3 4 5
- 7 color balance ……………………………………………………………………… *T134* 0 1 2 3 4 5
- 8 resampling ………………………………………………………………………… *T135* 0 1 2 3 4 5
- 9 scaling ……………………………………………………………………………… *T136* 0 1 2 3 4 5

K. Recognizes sources and corrects conditions causing artifacts on digital images…... *T137* 0 1 2 3 4 5

Considering both the importance and frequency, how important is the task in relation to the effective and competent performance as an **entry-level Retinal Angiographer**? If you believe the task is not performed by entry-level Retinal Angiographers, please select the "Does Not Perform" rating.	Of Critical/Extreme Importance — 5 Above Average/High Importance — 4 Average/Medium Importance — 3 Below Average/Low Importance — 2 Minimal Importance — 1 Does Not Perform — 0

VII. Data and Image Management

A. Has a working knowledge of the following software applications:

    1 presentation graphics (e.g.: PowerPoint©, Corel Freelance©) *T138* 0 1 2 3 4 5

    2 photo editors (e.g.: Photoshop ©, Paint shop Pro ©) *T139* 0 1 2 3 4 5

    3 relational data bases (e.g.: Access ©, Filemaker Pro ©) *T140* 0 1 2 3 4 5

    4 spreadsheets (e.g.: Excel ©) *T141* 0 1 2 3 4 5

    5 cataloging (e.g.: ACDSee ©, Extensis Portfolio ©, Canto Cumulus ©)............ *T142* 0 1 2 3 4 5

B. Organizes archival system

    1 film *T143* 0 1 2 3 4 5

    2 digital *T144* 0 1 2 3 4 5

C. Coordinates network file transfers for archiving/patient data base systems *T145* 0 1 2 3 4 5

VIII. Patient/Operator Safety

A. Demonstrates proficiency in CPR *T146* 0 1 2 3 4 5

B. Adheres to Universal Precautions as defined by the Centers for Disease Control and Prevention (CDC) *T147* 0 1 2 3 4 5

C. Observes Occupational Safety and Health Administration (OSHA) and The National Institute for Occupational Safety and Health (NIOSH) regulations relating to ophthalmic photography *T148* 0 1 2 3 4 5

D. Understands HIPPA confidentially and privacy regulations relating to ophthalmic photography.. *T149* 0 1 2 3 4 5

IX. Fundus Photography

A. Performs routine maintenance and equipment troubleshooting including:

    1 replacing viewing bulbs and flash tubes *T150* 0 1 2 3 4 5

    2 replacing fuses *T151* 0 1 2 3 4 5

    3 cleaning equipment, including lenses *T152* 0 1 2 3 4 5

B. Demonstrates the techniques of image production:

    1 set reticle for accommodative correction... *T153* 0 1 2 3 4 5

    2 verify filter positions *T154* 0 1 2 3 4 5

    3 establish photographic plan *T155* 0 1 2 3 4 5

    4 adjust photographic plan during photography in response to unusual situations or findings.. *T156* 0 1 2 3 4 5

    5 set viewing angle.. *T157* 0 1 2 3 4 5

    6 set flash power *T158* 0 1 2 3 4 5

    7 set shutter/flash synchronization *T159* 0 1 2 3 4 5

    8 set viewing light *T160* 0 1 2 3 4 5

    9 position patient for photography *T161* 0 1 2 3 4 5

    10 establish fixation *T162* 0 1 2 3 4 5

    11 establish alignment and focus *T163* 0 1 2 3 4 5

    12 recognize the need for diopter compensation *T164* 0 1 2 3 4 5

    13 perform fundus photography:

        a. non-stereoscopic *T165* 0 1 2 3 4 5

        b. stereoscopic *T166* 0 1 2 3 4 5

        c. using astigmatic correction device *T167* 0 1 2 3 4 5

        d. monochromatic *T168* 0 1 2 3 4 5

    14 perform anterior segment photography with a fundus camera to document:

        a. media opacities *T169* 0 1 2 3 4 5

        b. gross anterior pathologies *T170* 0 1 2 3 4 5

X. Fluorescein Angiography

A. Performs Fluorescein Angiography including:

    1 make preparations for IV fluorescein injection *T171*   0 1 2 3 4 5

    2 perform red free photography:

        a. non-stereoscopic images *T172*   0 1 2 3 4 5

        b. stereoscopic images *T173*   0 1 2 3 4 5

    3 take a control photograph *T174*   0 1 2 3 4 5

    4 coordinate photographic sequence with the administration of dye *T175*   0 1 2 3 4 5

    5 acquire angiographic sequence of:

        a. non-stereoscopic images *T176*   0 1 2 3 4 5

        b. stereoscopic images *T177*   0 1 2 3 4 5

    6 monitor and assesses patient response to the procedure *T178*   0 1 2 3 4 5

    7 respond to any adverse reactions *T179*   0 1 2 3 4 5

B. Understands the theory of luminescence including:

    1 fluorescence *T180*   0 1 2 3 4 5

    2 pseudo and auto fluorescence *T181*   0 1 2 3 4 5

    3 excitation filters *T182*   0 1 2 3 4 5

    4 barrier filters *T183*   0 1 2 3 4 5

C. Uses monochromatic filters including:

    1 red-free *T184*   0 1 2 3 4 5

    2 green-free *T185*   0 1 2 3 4 5

D. Performs descriptive angiographic interpretation by recognizing:

    1 the phases of circulation including:

        a. early phase (filling phase)... *T186*   0 1 2 3 4 5

        b. mid phase *T187*   0 1 2 3 4 5

        c. late phase *T188*   0 1 2 3 4 5

    2 the mechanisms of hyperfluorescence including:

        a. transmission *T189*   0 1 2 3 4 5

        b. leakage *T190*   0 1 2 3 4 5

        c. staining/pooling *T191*   0 1 2 3 4 5

    3 the mechanisms of hypofluorescence including:

        a. blockage *T192*   0 1 2 3 4 5

        b. filling defects *T193*   0 1 2 3 4 5

    4 anatomical location of lesions *T194*   0 1 2 3 4 5

XI. Indocyanine Green (ICG) Angiography

A. Performs ICG Angiography *T195*   0 1 2 3 4 5

B. Uses exciter and barrier filters *T196*   0 1 2 3 4 5

C. Performs descriptive angiographic interpretation by recognizing:

    1 the phases of circulation *T197*   0 1 2 3 4 5

    2 the mechanisms of "hyperfluorescence" *T198*   0 1 2 3 4 5

    3 the mechanisms of "hypofluorescence" *T199*   0 1 2 3 4 5

    4 the anatomical location of lesions *T200*   0 1 2 3 4 5

*Considering both the importance and frequency, how important is the task in relation to the effective and competent performance as an **entry-level Retinal Angiographer**? If you believe the task is not performed by entry-level Retinal Angiographers, please select the "Does Not Perform" rating.*

Of Critical/Extreme Importance	5
Above Average/High Importance	4
Average/Medium Importance	3
Below Average/Low Importance	2
Minimal Importance	1
Does Not Perform	0

XII. Scanning Laser Ophthalmoscopy (SLO)

A. Performs SLO Imaging:

    1 fundus ……………………………………………………………………… *T201* 0 1 2 3 4 5

    2 fluorescein angiography …………………………………………………… *T202* 0 1 2 3 4 5

    3 ICG angiography …………………………………………………………… *T203* 0 1 2 3 4 5

B. Understands the affects of the adjustments of gain ……………………………… *T204* 0 1 2 3 4 5

C. Utilizes and comprehends appropriate filtration/wavelength …………………… *T205* 0 1 2 3 4 5

D. Understands the information gained by high rate image capture:

    1 in choroidal circulation patterns ………………………………………… *T206* 0 1 2 3 4 5

    2 in retinal circulation patterns …………………………………………… *T207* 0 1 2 3 4 5

XIII. Optical Coherence Tomography (OCT)

B. Performs OCT imaging:

    1 glaucoma ……………………………………………………………………… *T208* 0 1 2 3 4 5

    2 retinal ………………………………………………………………………… *T209* 0 1 2 3 4 5

C. Understands and applies scanning protocols ………………………………….. *T210* 0 1 2 3 4 5

D. Understands and selects analysis protocols ……………………………………... *T211* 0 1 2 3 4 5

XIV. Pharmacology

A. Understands and recognizes the properties and effects of pharmacologic agents used for ophthalmic photography:

    1 topically administered:

      a. miotics ……………………………………………………………… *T212* 0 1 2 3 4 5

      b. mydriatics …………………………………………………………… *T213* 0 1 2 3 4 5

      c. cycloplegics ………………………………………………………… *T214* 0 1 2 3 4 5

      d. anesthetics ………………………………………………………… *T215* 0 1 2 3 4 5

    2 intravenously administered:

      a. sodium fluorescein ………………………………………………… *T216* 0 1 2 3 4 5

      b. indocyanine green (ICG) …………………………………………… *T217* 0 1 2 3 4 5

    3 oral administration of sodium fluorescein ……………………………… *T218* 0 1 2 3 4 5

    4 significance of patient's age and weight ……………………………… *T219* 0 1 2 3 4 5

B. Understands and Recognizes contraindications and adverse reactions to

    1 topical agents ……………………………………………………………… *T220* 0 1 2 3 4 5

    2 intravenous agents (e.g. fluorescein, indocyanine green) ………………… *T221* 0 1 2 3 4 5

C. Monitors for potential contaminations ……………………………………….... *T222* 0 1 2 3 4 5

End of Task Listing

1 How well do you feel the survey covered the tasks performed by the competent, entry level Retinal Angiographer?

    Completely   1

    Adequately   2

    Inadequately   3

2 If you felt the survey inadequately described the role, please specify why:

_____

_____

3 Please list any additional tasks that you felt should have been included on the survey: _____

_____

_____

_____

_____

Appendix B

Raw Frequency Data
Demographic Variables

Frequency Output: Demographic Questionnaire

Survey Coverage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	completely	153	47.2	48.7	48.7
	Adequately	157	48.5	50.0	98.7
	Inadequately	4	1.2	1.3	100.0
	Total	314	96.9	100.0	
Missing	System	10	3.1		
Total		324	100.0		

Primary Employment Responsibility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	opthalmic photographer	235	72.5	73.0	73.0
	opthalmic technician	48	14.8	14.9	87.9
	medical photographer	5	1.5	1.6	89.4
	manager	24	7.4	7.5	96.9
	equipment vendor/service	5	1.5	1.6	98.4
	information technologist	1	.3	.3	98.8
	nurse	4	1.2	1.2	100.0
	Total	322	99.4	100.0	
Missing	System	2	.6		
Total		324	100.0		

Time on Ophthalmic Photo Tasks

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	35 hrs +	161	49.7	50.2	50.2
	24-34 hrs	66	20.4	20.6	70.7
	15-23 hrs	35	10.8	10.9	81.6
	10-14 hrs	19	5.9	5.9	87.5
	5-9 hrs	19	5.9	5.9	93.5
	less than 5 hrs	15	4.6	4.7	98.1
	not practicing/retired	6	1.9	1.9	100.0
	Total	321	99.1	100.0	
Missing	System	3	.9		
Total		324	100.0		

Years Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 2 yrs	9	2.8	2.8	2.8
	2-3 yrs	17	5.2	5.2	8.0
	4-6 yrs	34	10.5	10.5	18.5
	7-10 yrs	40	12.3	12.3	30.9
	11-15 yrs	69	21.3	21.3	52.2
	16-20 yrs	54	16.7	16.7	68.8
	over 20 yrs	101	31.2	31.2	100.0
	Total	324	100.0	100.0	

Practice Setting

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	hospital/medical facility	36	11.1	11.1	11.1
	university hospital/medical facility	81	25.0	25.0	36.1
	private practice (general/multi-specialty)	93	28.7	28.7	64.8
	private practice (retina only)	92	28.4	28.4	93.2
	independent contractor	12	3.7	3.7	96.9
	other	10	3.1	3.1	100.0
	Total	324	100.0	100.0	

Age Range

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	under 25	6	1.9	1.9	1.9
	26-34	42	13.0	13.0	14.8
	35-44	114	35.2	35.2	50.0
	45-54	119	36.7	36.7	86.7
	55-64	42	13.0	13.0	99.7
	65 or older	1	.3	.3	100.0
	Total	324	100.0	100.0	

Geographic Region

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	pacific north west	14	4.3	4.4	4.4
	west	27	8.3	8.4	12.8
	south west	26	8.0	8.1	20.9
	great lakes/midwest	99	30.6	30.8	51.7
	south east	66	20.4	20.6	72.3
	north east	78	24.1	24.3	96.6
	US islands/territories	2	.6	.6	97.2
	other	9	2.8	2.8	100.0
	Total	321	99.1	100.0	
Missing	System	3	.9		
Total		324	100.0		

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	163	50.3	53.4	53.4
	female	142	43.8	46.6	100.0
	Total	305	94.1	100.0	
Missing	System	19	5.9		
Total		324	100.0		

Formal Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	HS graduate or equivalent	13	4.0	4.0	4.0
	some college	80	24.7	24.7	28.7
	vocational technical certificate	23	7.1	7.1	35.8
	college degree (2-year)	54	16.7	16.7	52.5
	college degree (4-year)	124	38.3	38.3	90.7
	master's degree	16	4.9	4.9	95.7
	doctorate	2	.6	.6	96.3
	other	12	3.7	3.7	100.0
	Total	324	100.0	100.0	

Ethnicity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	african/black	3	.9	.9	.9
	caribbean	1	.3	.3	1.2
	caucasian/white	285	88.0	88.5	89.8
	euopean	9	2.8	2.8	92.5
	hispanic	13	4.0	4.0	96.6
	east asian	10	3.1	3.1	99.7
	other	1	.3	.3	100.0
	Total	322	99.4	100.0	
Missing	System	2	.6		
Total		324	100.0		

Appendix C

Survey Analysis of Tasks
Sorted by Task Number

Including Analysis of:

- Not Performed Rating
- Importance Rating

  Subgroup Analysis of Ratings by:

  - Geographic Location
  - Practice Settings
  - Professional Experience

- Examination Content Assignation Information (Written vs. Performance Examinations)

Task		N	SE	Mean	Freq	EXCLUSION CRITERIA						
						DNPfrm	Imprt	Exp	Ptc	Geo	Written	Practical
T1	Ext ocular struct	319	0.05	3.90	0.62%						x	
T2	Ant&post segment struct	319	0.05	4.28	0.62%						x	
T3	Anat landmarks&terms	322	0.04	4.51	0.00%						x	
T4	Ant struct	321	0.05	3.89	0.31%						x	
T5	Post struct	321	0.04	4.41	0.31%						x	
T6	Iris	310	0.07	3.34	4.02%						x	
T7	Retina	324	0.04	4.49	0.00%						x	
T8	Optic nerve	324	0.05	4.21	0.00%						x	
T9	choroid	324	0.05	4.30	0.00%						x	
T10	Systemic disease	316	0.05	3.56	1.86%						x	
T11	Vascular disease	318	0.05	3.72	1.24%						x	
T12	Retinal disease	322	0.05	4.14	0.00%						x	
T13	Optic nerve disorders	322	0.05	3.79	0.00%						x	
T14	Inflam disease	318	0.05	3.55	1.24%						x	
T15	Ocular trauma	316	0.05	3.47	1.86%						x	
T16	Ocular tumors	321	0.06	3.62	0.31%						x	
T17	Diabetic retinopathy	323	0.05	4.24	0.31%						x	
T18	Hypertensive retinopathy	320	0.05	4.02	0.93%						x	
T19	Macular degeneration	323	0.05	4.28	0.31%						x	
T20	Vascular occlusions	322	0.05	4.14	0.62%						x	
T21	Ocular histoplasmosis	322	0.05	3.83	0.62%						x	
T22	Central serous retinopathy	322	0.05	3.99	0.62%						x	
T23	Toxoplasmosis	320	0.05	3.77	1.23%						x	
T24	Cystoid Macular Edema	321	0.05	4.19	0.62%						x	
T25	Macular hole	322	0.05	4.02	0.62%						x	
T26	Angioid streaks	322	0.06	3.67	0.62%						x	
T27	Macroaneurysm	322	0.06	3.86	0.62%						x	
T28	Hereditary macular dystrophy	318	0.05	3.56	1.55%						x	
T29	Mal melanoma	320	0.05	3.76	0.62%						x	
T30	Hemangioma	319	0.05	3.54	1.54%						x	
T31	Retinoblastoma	316	0.06	3.50	1.56%						x	
T32	Choroidal nevus	321	0.05	3.96	0.62%						x	
T33	Optic atrophy	320	0.05	3.73	0.93%						x	
T34	Optic neuritis	321	0.06	3.72	0.93%						x	
T35	Glaucoma	317	0.06	3.79	1.55%						x	
T36	Papilledema	320	0.06	3.85	1.23%						x	
T37	Drusen	322	0.05	3.96	0.62%						x	
T38	Uveitis	314	0.05	3.57	1.88%						x	

Task		N	SE	Mean	Freq	DNPfrm	Imprt	Exp	Ptc	Geo	Written	Practical
						EXCLUSION CRITERIA						
T39	Retinal detachment	315	0.06	3.86	2.17%						x	
T40	Retinopathy of prematurity	305	0.06	3.19	5.28%						x	
T41	Sickle cell retinopathy	311	0.06	3.35	3.42%						x	
T42	Cytomegalovirus retinitis	312	0.06	3.48	3.11%						x	
T43	Ant ischemic optic neuropathy	312	0.06	3.37	2.80%						x	
T44	Coloboma	313	0.06	3.30	2.80%						x	
T45	Coats disease	314	0.06	3.35	2.18%						x	
T46	Epiretinal membrane	317	0.05	3.86	1.25%						x	
T47	Retinal toxicity	313	0.06	3.34	2.80%						x	
T48	Narrow angles	284	0.07	3.97	11.25%						x	
T49	Contact lenses	281	0.07	3.80	11.91%						x	
T50	Iris fixated	285	0.07	3.92	10.94%						x	
T51	Media conditions	292	0.06	3.80	8.46%						x	
T52	Presence of Inflammation	285	0.07	3.71	10.09%						x	
T53	Inform patient	313	0.04	4.48	1.88%						x	
T54	Answer patient questions	317	0.04	4.61	1.25%						x	
T55	Elicits cooperation	319	0.04	4.50	0.31%						X	
T56	Written informed consent	296	0.05	4.46	6.62%						X	
T57	Med/surg history	295	0.07	3.78	7.81%						X	
T58	Allergies	309	0.05	4.37	3.13%						X	
T59	Pregnancy	305	0.06	4.31	4.69%						X	
T60	Ocular history	302	0.06	3.97	5.63%						X	
T61	Photographic history	308	0.06	3.93	3.45%						X	
T62	Verifies physicians orders	304	0.05	4.40	5.30%							X
T63	Maintain sterile technique	307	0.05	4.52	4.36%						X	X
T64	Punctal occlusion	264	0.07	3.40	17.76%						X	
T65	Monitor and assess drops	297	0.06	3.96	6.60%						X	
T66	Recon and respond	307	0.06	4.26	4.36%						X	
T67	Stock and inventories	307	0.06	3.99	2.23%						X	
T68	35mm black and white	308	0.06	4.03	4.35%						X	
T69	35mm color transparency film	313	0.06	3.98	2.80%						X	
T70	ISO/film speed	313	0.06	4.00	2.80%						X	
T71	Contrast	312	0.06	3.93	3.11%						X	
T72	Exposure	313	0.06	4.05	2.80%						X	
T73	Color balance	311	0.06	3.86	3.42%						X	

Task		N	SE	Mean	Freq	EXCLUSION CRITERIA						
						DNPfrm	Imprt	Exp	Ptc	Geo	Written	Practical
T74	Enlarger	279	0.07	3.30	13.62%						X	
T75	Contact printer	282	0.07	3.38	12.69%						X	
T76	Black and white film	289	0.07	3.56	10.80%						X	X
T77	Color film	239	0.08	2.81	26.01%	(red)	(green)	3	3	3	OUT	OUT
T78	Black and white film	274	0.07	3.24	14.91%						X	
T79	Color film	242	0.08	2.83	24.84%	(red)	(green)	3	2	3	OUT	OUT
T80	Slide Imprinter/mounter	272	0.07	2.97	16.05%		(green)	2	2	2	OUT	OUT
T81	Slide duplicator	253	0.08	2.73	21.67%		(green)	4	3	3	OUT	OUT
T82	Photographic papers	272	0.07	3.17	15.53%						X	
T83	Manual processing equip	287	0.07	3.68	11.42%						X	X
T84	Auto process equip	274	0.07	3.36	15.43%						X	
T85	Process chems	286	0.07	3.68	11.46%						X	X
T86	Chem Temp	291	0.07	3.70	10.19%						X	X
T87	Contrast	289	0.07	3.61	10.80%						X	
T88	Density	289	0.07	3.60	10.80%						X	
T89	Granularity	291	0.07	3.51	10.19%						X	
T90	Prep film for filing	292	0.07	3.80	9.03%						X	
T91	Use Approp Conditions	285	0.08	3.64	11.76%						X	
T92	An enlarger	272	0.08	3.36	15.79%						X	
T93	A contact printer	278	0.07	3.36	14.20%						X	
T94	On paper	269	0.08	3.32	16.20%						X	
T95	On film	279	0.08	3.37	13.62%						X	
T96	Generate an enlargement	262	0.08	3.25	17.09%						X	
T97	Recon and correct	285	0.07	3.62	10.94%						X	
T98	Dem basic comp skill	318	0.05	4.10	1.24%						X	
T99	Stock and inventory supply	314	0.05	3.87	2.48%						X	
T100	Still digital cam	317	0.05	3.97	1.86%						X	
T101	Digital video	294	0.07	3.27	8.98%						X	
T102	CPU	309	0.06	3.65	4.04%						X	
T103	Archive device and media	314	0.05	4.01	2.48%						X	

Task		N	SE	Mean	Freq	EXCLUSION CRITERIA						
						DNPfrm	Imprt	Exp	Ptc	Geo	Written	Practical
T104	Electronic components	301	0.06	3.36	6.52%						X	
T105	Clean equip	297	0.06	3.52	7.76%						X	
T106	Software maintenance	295	0.06	3.38	8.67%						X	
T107	Storage utilization	305	0.06	3.58	5.57%						X	
T108	Monitor calibration	291	0.06	3.25	9.91%						X	
T109	Monochrome	278	0.07	2.94	13.13%			3	2	2	OUT	OUT
T110	Color	278	0.07	2.94	13.13%			3	2	2	OUT	OUT
T111	CMOS chip	251	0.07	2.74	19.55%			4	2	3	OUT	OUT
T112	Resolution	314	0.06	3.68	2.79%						X	
T113	ISO rating/gain/noise	312	0.06	3.62	3.41%						X	
T114	Dynamic range	308	0.06	3.40	4.35%						X	
T115	Contrast	315	0.06	3.73	2.48%						X	
T116	Exposure control	315	0.06	3.85	2.17%						X	
T117	Color balance	310	0.06	3.66	3.73%						X	
T118	Bit depth	296	0.06	3.29	8.36%						X	
T119	File formats	302	0.06	3.58	5.33%						X	
T120	Image overlay	304	0.06	3.18	5.30%						X	
T121	Measurement	305	0.06	3.40	4.69%						X	
T122	Digital Darkroom	299	0.06	3.65	5.38%						X	
T123	Print and paper types	313	0.06	3.58	3.10%						X	
T124	film recorders	277	0.07	2.96	13.71%			3	2	2	OUT	OUT
T125	Calibrates CRT&LCD monitors	269	0.07	2.77	16.20%			4	2	3	OUT	OUT
T126	Flatbed scan	281	0.07	2.87	12.73%			3	2	2	OUT	OUT
T127	Film scan	278	0.07	2.85	13.66%			3	2	2	OUT	OUT
T128	Proofsheet production	311	0.06	3.80	3.72%						X	
T129	File fmat/compress	308	0.06	3.57	4.35%						X	
T130	Resolution sel	308	0.06	3.66	4.05%						X	
T131	Contrast Enhance	315	0.06	3.79	2.48%						X	
T132	Sharpening	313	0.06	3.70	3.10%						X	
T133	Brightness	315	0.06	3.76	2.48%						X	
T134	Color balance	311	0.06	3.65	3.42%						X	
T135	Resampling	291	0.06	3.29	9.06%						X	
T136	Scaling	289	0.06	3.27	9.40%						X	
T137	Recon digital images	313	0.06	3.93	2.49%						X	

Task		N	SE	Mean	Freq	EXCLUSION CRITERIA						
						DNPfrm	Imprt	Exp	Ptc	Geo	Written	Practical
T138	Present graphics	275	0.07	2.80	14.33%		(green)	3	2	2	OUT	OUT
T139	Photo edit	287	0.07	3.03	11.15%			2	2	2	X	
T140	Relation data bases	265	0.06	2.55	17.70%		(green)	4	3	3	OUT	OUT
T141	Spreadsheet	267	0.06	2.44	17.08%		(green)	4	3	3	OUT	OUT
T142	Catalogue	252	0.06	2.39	21.25%		(green)	4	3	3	OUT	OUT
T143	Film	293	0.07	3.52	9.01%						X	
T144	Digital	299	0.06	3.72	5.97%						X	
T145	Netwrk File trans	281	0.07	3.29	10.51%						X	
T146	CPR proficiency	319	0.04	4.55	1.24%						X	
T147	Universal precautions	320	0.04	4.61	0.93%						X	
T148	OSHA&NIOSH	319	0.04	4.58	1.24%						X	
T149	HIPPA	319	0.03	4.66	1.24%						X	
T150	Replace viewing bulbs	315	0.05	4.19	2.48%						X	
T151	Replace fuses	318	0.05	4.10	1.55%						X	
T152	Clean equip	320	0.05	4.33	0.93%						X	
T153	Set reticle	320	0.03	4.71	0.62%						X	X
T154	Verify filter position	318	0.03	4.68	1.24%						X	X
T155	Photo plan	321	0.04	4.56	0.62%						X	X
T156	Adjust photo plan	321	0.04	4.58	0.31%						X	X
T157	Set view angle	322	0.04	4.54	0.31%						X	X
T158	Set flash power	322	0.04	4.63	0.31%						X	X
T159	Set shutter / flash syncro	313	0.05	4.40	3.10%						X	
T160	Set view light	321	0.04	4.52	0.62%							X
T161	Position patient	322	0.03	4.65	0.00%						X	X
T162	Est fixation	322	0.04	4.63	0.00%						X	X
T163	Est align & focus	322	0.03	4.70	0.00%						X	X
T164	Diopter comp	319	0.04	4.55	0.31%						X	X
T165	Non-stereoscopic	320	0.04	4.55	0.62%						X	X
T166	Stereoscopic	318	0.04	4.46	1.24%						X	X
T167	Astigmatic correction	313	0.06	3.96	2.49%						X	
T168	Monochromatic	315	0.06	4.05	1.56%						X	X
T169	Media opacities	319	0.06	4.09	0.93%						X	X
T170	Gross ant pathologies	316	0.06	4.06	1.56%						X	X

Task		N	SE	Mean	Freq	DNPfrm	Imprt	Exp	Ptc	Geo	Written	Practical
						EXCLUSION CRITERIA						
T171	IV fluorescein inject	316	0.04	4.49	0.94%						X	
T172	Non-stereoscopic images	319	0.04	4.54	0.62%						X	X
T173	Stereoscopic images	313	0.05	4.38	2.19%						X	X
T174	Control photo	315	0.06	4.27	1.87%						X	X
T175	Coordinate admin of dye	319	0.03	4.70	0.00%						X	X
T176	Non-stereoscopic images	317	0.04	4.50	1.25%						X	X
T177	Stereoscopic images	315	0.05	4.33	1.87%						X	X
T178	Patient response	319	0.03	4.67	0.31%						X	
T179	Response to adverse react	316	0.03	4.77	0.32%						X	
T180	Fluorescence	321	0.04	4.41	0.00%						X	
T181	Pseudo/auto fluorescence	321	0.05	4.29	0.00%						X	
T182	Excitation filters	321	0.04	4.43	0.00%						X	
T183	Barrier filters	321	0.05	4.42	0.00%						X	
T184	Red free	321	0.05	4.39	0.00%						X	X
T185	Green free	307	0.06	3.88	4.06%						X	
T186	Early phase	318	0.05	4.42	0.93%						X	
T187	Mid phase	318	0.05	4.41	0.93%						X	
T188	Late phase	317	0.04	4.41	0.94%						X	
T189	Transmission	317	0.05	4.16	0.94%						X	
T190	Leakage	318	0.05	4.22	0.93%						X	
T191	Staining/pooling	317	0.05	4.20	1.25%						X	
T192	Blockage	315	0.05	4.17	1.56%						X	
T193	Filling defects	315	0.05	4.17	1.56%						X	
T194	Anatomical location	316	0.05	4.25	1.56%						X	
T195	Perform ICG	268	0.07	3.38	14.92%						X	
T196	Exciter and barrier	271	0.07	3.62	13.42%						X	
T197	Phase of circulation	272	0.07	3.53	13.65%						X	
T198	Hyperfluorescence	272	0.07	3.44	13.92%						X	
T199	Hypofluorescence	271	0.07	3.43	14.24%						X	
T200	Anatomical location	272	0.07	3.57	13.92%						X	

Task		N	SE	Mean	Freq	EXCLUSION CRITERIA						
						DNPfrm	Imprt	Exp	Ptc	Geo	Written	Practical
T201	Fundus	191	0.08	2.70	39.17%			4	3	3	OUT	OUT
T202	Fluorescein angio	191	0.09	2.81	39.17%			2	3	2	OUT	OUT
T203	ICG angio	189	0.09	2.71	39.81%			4	3	3	OUT	OUT
T204	Affects of adjustment	194	0.09	3.05	38.41%				2		OUT	OUT
T205	Utility and comprehend	189	0.09	2.99	39.23%			2			OUT	OUT
T206	Choroidal circulation	188	0.09	2.97	38.96%			2			OUT	OUT
T207	Retinal circulation	189	0.09	2.98	38.83%			2			OUT	OUT
T208	Glaucoma	265	0.07	3.26	17.70%						X	
T209	Retinal	276	0.07	3.64	14.02%						X	
T210	Scanning proto	275	0.07	3.61	14.06%						X	
T211	Analysis proto	274	0.07	3.60	14.11%						X	
T212	Miotics	315	0.06	3.93	2.48%						X	
T213	Mydratics	319	0.06	4.04	1.24%						X	
T214	Cycloplegics	318	0.06	4.01	1.55%						X	
T215	Anesthetics	316	0.06	4.01	2.17%						X	
T216	Sodium Fluorescein	315	0.04	4.49	2.48%						X	
T217	ICG	279	0.06	4.07	13.08%						X	
T218	Oral admin	296	0.07	3.79	8.07%						X	
T219	Patients age and weight	308	0.06	3.87	4.05%						X	
T220	Topical agents	317	0.05	4.34	1.55%						X	
T221	Intravenous Agents	320	0.04	4.64	0.31%						X	
T222	Potential Contamination	320	0.05	4.44	0.31%						X	

Appendix D

Tasks Sorted by
Not Performed
Zero Rating Percentages

Task		N	SE	Mean	Freq
T203	ICG angio	189	0.09	2.71	39.81%
T205	Utility and comprehend	189	0.09	2.99	39.23%
T201	Fundus	191	0.08	2.70	39.17%
T202	Fluorescein angio	191	0.09	2.81	39.17%
T206	Choroidal circulation	188	0.09	2.97	38.96%
T207	Retinal circulation	189	0.09	2.98	38.83%
T204	Affects of adjustment	194	0.09	3.05	38.41%
T77	Color film	239	0.08	2.81	26.01%
T79	Color film	242	0.08	2.83	24.84%
T81	Slide duplicator	253	0.08	2.73	21.67%
T142	Catalogue	252	0.06	2.39	21.25%
T111	CMOS chip	251	0.07	2.74	19.55%
T64	Punctal occlusion	264	0.07	3.40	17.76%
T140	Relation data bases	265	0.06	2.55	17.70%
T208	Glaucoma	265	0.07	3.26	17.70%
T96	Generate an enlargement	262	0.08	3.25	17.09%
T141	Spreadsheet	267	0.06	2.44	17.08%
T94	On paper	269	0.08	3.32	16.20%
T125	Calibrates CRT&LCD monitors	269	0.07	2.77	16.20%
T80	Slide Imprinter/mounter	272	0.07	2.97	16.05%
T92	An enlarger	272	0.08	3.36	15.79%
T82	Photographic papers	272	0.07	3.17	15.53%
T84	Auto process equip	274	0.07	3.36	15.43%
T195	Perform ICG	268	0.07	3.38	14.92%
T78	Black and white film	274	0.07	3.24	14.91%
T138	Present graphics	275	0.07	2.80	14.33%
T199	Hypofluorescence	271	0.07	3.43	14.24%
T93	A contact printer	278	0.07	3.36	14.20%
T211	Analysis proto	274	0.07	3.60	14.11%
T210	Scanning proto	275	0.07	3.61	14.06%
T209	Retinal	276	0.07	3.64	14.02%
T198	Hyperfluorescence	272	0.07	3.44	13.92%
T200	Anatomical location	272	0.07	3.57	13.92%
T124	film recorders	277	0.07	2.96	13.71%
T127	Film scan	278	0.07	2.85	13.66%

T197	Phase of circulation	272	0.07	3.53	13.65%
T74	Enlarger	279	0.07	3.30	13.62%
T95	On film	279	0.08	3.37	13.62%
T196	Exciter and barrier	271	0.07	3.62	13.42%
T109	Monochrome	278	0.07	2.94	13.13%
T110	Color	278	0.07	2.94	13.13%
T217	ICG	279	0.06	4.07	13.08%
T126	Flatbed scan	281	0.07	2.87	12.73%
T75	Contact printer	282	0.07	3.38	12.69%
T49	Contact lenses	281	0.07	3.80	11.91%
T91	Use Approp Conditions	285	0.08	3.64	11.76%
T85	Process chems	286	0.07	3.68	11.46%
T83	Manual processing equip	287	0.07	3.68	11.42%
T48	Narrow angles	284	0.07	3.97	11.25%
T139	Photo edit	287	0.07	3.03	11.15%
T50	Iris fixated	285	0.07	3.92	10.94%
T97	Recon and correct	285	0.07	3.62	10.94%
T76	Black and white film	289	0.07	3.56	10.80%
T87	Contrast	289	0.07	3.61	10.80%
T88	Density	289	0.07	3.60	10.80%
T145	Netwrk File trans	281	0.07	3.29	10.51%
T86	Chem Temp	291	0.07	3.70	10.19%
T89	Granularity	291	0.07	3.51	10.19%
T52	Presence of Inflammation	285	0.07	3.71	10.09%
T108	Monitor calibration	291	0.06	3.25	9.91%
T136	Scaling	289	0.06	3.27	9.40%
T135	Resampling	291	0.06	3.29	9.06%
T90	Prep film for filing	292	0.07	3.80	9.03%
T143	Film	293	0.07	3.52	9.01%
T101	Digital vid	294	0.07	3.27	8.98%
T106	Software maintenance	295	0.06	3.38	8.67%
T51	Media conditions	292	0.06	3.80	8.46%
T118	Bit depth	296	0.06	3.29	8.36%
T218	Oral admin	296	0.07	3.79	8.07%
T57	Med/surg history	295	0.07	3.78	7.81%
T105	Clean equip	297	0.06	3.52	7.76%
T56	Written informed consent	296	0.05	4.46	6.62%

T65	Monitor and assess drops	297	0.06	3.96	6.60%
T104	Electronic components	301	0.06	3.36	6.52%
T144	Digital	299	0.06	3.72	5.97%
T60	Ocular history	302	0.06	3.97	5.63%
T107	Storage utilization	305	0.06	3.58	5.57%
T122	Digital Darkroom	299	0.06	3.65	5.38%
T119	File formats	302	0.06	3.58	5.33%
T62	Verifies physicians orders	304	0.05	4.40	5.30%
T120	Image overlay	304	0.06	3.18	5.30%
T40	Retinopathy of prematurity	305	0.06	3.19	5.28%
T59	Pregnancy	305	0.06	4.31	4.69%
T121	Measurement	305	0.06	3.40	4.69%
T63	Maintain sterile technique	307	0.05	4.52	4.36%
T66	Recon and respond	307	0.06	4.26	4.36%
T68	35mm black and white	308	0.06	4.03	4.35%
T114	Dynamic range	308	0.06	3.40	4.35%
T129	File fmat/compress	308	0.06	3.57	4.35%
T185	Green free	307	0.06	3.88	4.06%
T130	Resolution sel	308	0.06	3.66	4.05%
T219	Patients age and weight	308	0.06	3.87	4.05%
T102	CPU	309	0.06	3.65	4.04%
T6	Iris	310	0.07	3.34	4.02%
T117	Color balance	310	0.06	3.66	3.73%
T128	Proofsheet production	311	0.06	3.80	3.72%
T61	Photographic history	308	0.06	3.93	3.45%
T41	Sickle cell retinopathy	311	0.06	3.35	3.42%
T73	Color balance	311	0.06	3.86	3.42%
T134	Color balance	311	0.06	3.65	3.42%
T113	ISO rating/gain/noise	312	0.06	3.62	3.41%
T58	Allergies	309	0.05	4.37	3.13%
T42	Cytomegalovirus retinitis	312	0.06	3.48	3.11%
T71	Contrast	312	0.06	3.93	3.11%
T123	Print and paper types	313	0.06	3.58	3.10%
T132	Sharpening	313	0.06	3.70	3.10%
T159	Set shutter / flash syncro	313	0.05	4.40	3.10%
T43	Ant ischemic optic neuropathy	312	0.06	3.37	2.80%
T44	Coloboma	313	0.06	3.30	2.80%

T47	Retinal toxicity	313	0.06	3.34	2.80%
T69	35mm color transparency film	313	0.06	3.98	2.80%
T70	ISO/film speed	313	0.06	4.00	2.80%
T72	Exposure	313	0.06	4.05	2.80%
T112	Resolution	314	0.06	3.68	2.79%
T137	Recon digital images	313	0.06	3.93	2.49%
T167	Astigmatic correction	313	0.06	3.96	2.49%
T99	Stock and inventory supply	314	0.05	3.87	2.48%
T103	Archive device and media	314	0.05	4.01	2.48%
T115	Contrast	315	0.06	3.73	2.48%
T131	Contrast Enhance	315	0.06	3.79	2.48%
T133	Brightness	315	0.06	3.76	2.48%
T150	Replace viewing bulbs	315	0.05	4.19	2.48%
T212	Miotics	315	0.06	3.93	2.48%
T216	Sodium Fluorescein	315	0.04	4.49	2.48%
T67	Stock and inventories	307	0.06	3.99	2.23%
T173	Stereoscopic images	313	0.05	4.38	2.19%
T45	Coats disease	314	0.06	3.35	2.18%
T39	Retinal detachment	315	0.06	3.86	2.17%
T116	Exposure control	315	0.06	3.85	2.17%
T215	Anesthetics	316	0.06	4.01	2.17%
T53	Inform patient	313	0.04	4.48	1.88%
T38	Uveitis	314	0.05	3.57	1.88%
T174	Control photo	315	0.06	4.27	1.87%
T177	Stereoscopic images	315	0.05	4.33	1.87%
T10	Systemic disease	316	0.05	3.56	1.86%
T15	Ocular trauma	316	0.05	3.47	1.86%
T100	Still digital cam	317	0.05	3.97	1.86%
T168	Monochromatic	315	0.06	4.05	1.56%
T192	Blockage	315	0.05	4.17	1.56%
T193	Filling defects	315	0.05	4.17	1.56%
T31	Retinoblastoma	316	0.06	3.50	1.56%
T170	Gross ant pathologies	316	0.06	4.06	1.56%
T194	Anatomical location	316	0.05	4.25	1.56%
T35	Glaucoma	317	0.06	3.79	1.55%
T220	Topical agents	317	0.05	4.34	1.55%
T28	Hereditary macular dystrophy	318	0.05	3.56	1.55%

T151	Replace fuses	318	0.05	4.10	1.55%
T214	Cycloplegics	318	0.06	4.01	1.55%
T30	Hemangioma	319	0.05	3.54	1.54%
T46	Epiretinal membrane	317	0.05	3.86	1.25%
T54	Answer patient questions	317	0.04	4.61	1.25%
T176	Non-stereoscopic images	317	0.04	4.50	1.25%
T191	Staining/pooling	317	0.05	4.20	1.25%
T11	Vascular disease	318	0.05	3.72	1.24%
T14	Inflam disease	318	0.05	3.55	1.24%
T98	Dem basic comp skill	318	0.05	4.10	1.24%
T154	Verify filter position	318	0.03	4.68	1.24%
T166	Stereoscopic	318	0.04	4.46	1.24%
T146	CPR proficiency	319	0.04	4.55	1.24%
T148	OSHA&NIOSH	319	0.04	4.58	1.24%
T149	HIPPA	319	0.03	4.66	1.24%
T213	Mydriatics	319	0.06	4.04	1.24%
T23	Toxoplasmosis	320	0.05	3.77	1.23%
T36	Papilledema	320	0.06	3.85	1.23%
T171	IV fluorescein inject	316	0.04	4.49	0.94%
T188	Late phase	317	0.04	4.41	0.94%
T189	Transmission	317	0.05	4.16	0.94%
T186	Early phase	318	0.05	4.42	0.93%
T187	Mid phase	318	0.05	4.41	0.93%
T190	Leakage	318	0.05	4.22	0.93%
T169	Media opacities	319	0.06	4.09	0.93%
T18	Hypertensive retinopathy	320	0.05	4.02	0.93%
T33	Optic atrophy	320	0.05	3.73	0.93%
T147	Universal precautions	320	0.04	4.61	0.93%
T152	Clean equip	320	0.05	4.33	0.93%
T34	Optic neuritis	321	0.06	3.72	0.93%
T1	Ext ocular struct	319	0.05	3.90	0.62%
T2	Ant&post segment struct	319	0.05	4.28	0.62%
T172	Non-stereoscopic images	319	0.04	4.54	0.62%
T29	Mal melanoma	320	0.05	3.76	0.62%
T153	Set reticle	320	0.03	4.71	0.62%
T165	Non-stereoscopic	320	0.04	4.55	0.62%
T24	Cystoid Macular Edema	321	0.05	4.19	0.62%

T32	Choroidal nevus	321	0.05	3.96	0.62%
T155	Photo plan	321	0.04	4.56	0.62%
T160	Set view light	321	0.04	4.52	0.62%
T20	Vascular occlusions	322	0.05	4.14	0.62%
T21	Ocular histoplasmosis	322	0.05	3.83	0.62%
T22	Central serous retinopathy	322	0.05	3.99	0.62%
T25	Macular hole	322	0.05	4.02	0.62%
T26	Angioid streaks	322	0.06	3.67	0.62%
T27	Macroaneurysm	322	0.06	3.86	0.62%
T37	Drusen	322	0.05	3.96	0.62%
T179	Response to adverse react	316	0.03	4.77	0.32%
T55	Elicits cooperation	319	0.04	4.50	0.31%
T164	Diopter comp	319	0.04	4.55	0.31%
T178	Patient response	319	0.03	4.67	0.31%
T221	Intravenous Agents	320	0.04	4.64	0.31%
T222	Potential Contamination	320	0.05	4.44	0.31%
T4	Ant struct	321	0.05	3.89	0.31%
T5	Post struct	321	0.04	4.41	0.31%
T16	Ocular tumors	321	0.06	3.62	0.31%
T156	Adjust photo plan	321	0.04	4.58	0.31%
T157	Set view angle	322	0.04	4.54	0.31%
T158	Set flash power	322	0.04	4.63	0.31%
T17	Diabetic retinopathy	323	0.05	4.24	0.31%
T19	Macular degeneration	323	0.05	4.28	0.31%
T3	Anat landmarks&terms	322	0.04	4.51	0.00%
T7	Retina	324	0.04	4.49	0.00%
T8	Optic nerve	324	0.05	4.21	0.00%
T9	choroid	324	0.05	4.30	0.00%
T12	Retinal disease	322	0.05	4.14	0.00%
T13	Optic nerve disorders	322	0.05	3.79	0.00%
T161	Position patient	322	0.03	4.65	0.00%
T162	Est fixation	322	0.04	4.63	0.00%
T163	Est align & focus	322	0.03	4.70	0.00%
T175	Coordinate admin of dye	319	0.03	4.70	0.00%
T180	Fluorescence	321	0.04	4.41	0.00%
T181	Pseudo/auto fluorescence	321	0.05	4.29	0.00%
T182	Excitation filters	321	0.04	4.43	0.00%
T183	Barrier filters	321	0.05	4.42	0.00%
T184	Red free	321	0.05	4.39	0.00%

Appendix E

Tasks Sorted
By
Mean Importance

Task		N	SE	Mean	Freq
T142	Catalogue	252	0.06	2.39	21.25%
T141	Spreadsheet	267	0.06	2.44	17.08%
T140	Relation data bases	265	0.06	2.55	17.70%
T201	Fundus	191	0.08	2.70	39.17%
T203	ICG angio	189	0.09	2.71	39.81%
T81	Slide duplicator	253	0.08	2.73	21.67%
T111	CMOS chip	251	0.07	2.74	19.55%
T125	Calibrates CRT&LCD monitors	269	0.07	2.77	16.20%
T138	Present graphics	275	0.07	2.80	14.33%
T77	Color film	239	0.08	2.81	26.01%
T202	Fluorescein angio	191	0.09	2.81	39.17%
T79	Color film	242	0.08	2.83	24.84%
T127	Film scan	278	0.07	2.85	13.66%
T126	Flatbed scan	281	0.07	2.87	12.73%
T109	Monochrome	278	0.07	2.94	13.13%
T110	Color	278	0.07	2.94	13.13%
T124	film recorders	277	0.07	2.96	13.71%
T206	Choroidal circulation	188	0.09	2.97	38.96%
T80	Slide Imprinter/mounter	272	0.07	2.97	16.05%
T207	Retinal circulation	189	0.09	2.98	38.83%
T205	Utility and comprehend	189	0.09	2.99	39.23%
T139	Photo edit	287	0.07	3.03	11.15%
T204	Affects of adjustment	194	0.09	3.05	38.41%
T82	Photographic papers	272	0.07	3.17	15.53%
T120	Image overlay	304	0.06	3.18	5.30%
T40	Retinopathy of prematurity	305	0.06	3.19	5.28%
T78	Black and white film	274	0.07	3.24	14.91%
T108	Monitor calibration	291	0.06	3.25	9.91%
T96	Generate an enlargement	262	0.08	3.25	17.09%
T208	Glaucoma	265	0.07	3.26	17.70%
T101	Digital video	294	0.07	3.27	8.98%
T136	Scaling	289	0.06	3.27	9.40%
T118	Bit depth	296	0.06	3.29	8.36%
T145	Netwrk File trans	281	0.07	3.29	10.51%
T135	Resampling	291	0.06	3.29	9.06%
T44	Coloboma	313	0.06	3.30	2.80%
T74	Enlarger	279	0.07	3.30	13.62%
T94	On paper	269	0.08	3.32	16.20%
T6	Iris	310	0.07	3.34	4.02%
T47	Retinal toxicity	313	0.06	3.34	2.80%
T45	Coats disease	314	0.06	3.35	2.18%

Task		N	SE	Mean	Freq
T41	Sickle cell retinopathy	311	0.06	3.35	3.42%
T104	Electronic components	301	0.06	3.36	6.52%
T93	A contact printer	278	0.07	3.36	14.20%
T92	An enlarger	272	0.08	3.36	15.79%
T84	Auto process equip	274	0.07	3.36	15.43%
T43	Ant ischemic optic neuropathy	312	0.06	3.37	2.80%
T95	On film	279	0.08	3.37	13.62%
T106	Software maintenance	295	0.06	3.38	8.67%
T195	Perform ICG	268	0.07	3.38	14.92%
T75	Contact printer	282	0.07	3.38	12.69%
T121	Measurement	305	0.06	3.40	4.69%
T64	Punctal occlusion	264	0.07	3.40	17.76%
T114	Dynamic range	308	0.06	3.40	4.35%
T199	Hypofluorescence	271	0.07	3.43	14.24%
T198	Hyperfluorescence	272	0.07	3.44	13.92%
T15	Ocular trauma	316	0.05	3.47	1.86%
T42	Cytomegalovirus retinitis	312	0.06	3.48	3.11%
T31	Retinoblastoma	316	0.06	3.50	1.56%
T89	Granularity	291	0.07	3.51	10.19%
T105	Clean equip	297	0.06	3.52	7.76%
T143	Film	293	0.07	3.52	9.01%
T197	Phase of circulation	272	0.07	3.53	13.65%
T30	Hemangioma	319	0.05	3.54	1.54%
T14	Inflam disease	318	0.05	3.55	1.24%
T10	Systemic disease	316	0.05	3.56	1.86%
T76	Black and white film	289	0.07	3.56	10.80%
T28	Hereditary macular dystrophy	318	0.05	3.56	1.55%
T200	Anatomical location	272	0.07	3.57	13.92%
T38	Uveitis	314	0.05	3.57	1.88%
T129	File fmat/compress	308	0.06	3.57	4.35%
T123	Print and paper types	313	0.06	3.58	3.10%
T107	Storage utilization	305	0.06	3.58	5.57%
T119	File formats	302	0.06	3.58	5.33%
T211	Analysis proto	274	0.07	3.60	14.11%
T88	Density	289	0.07	3.60	10.80%
T210	Scanning proto	275	0.07	3.61	14.06%
T87	Contrast	289	0.07	3.61	10.80%
T113	ISO rating/gain/noise	312	0.06	3.62	3.41%
T196	Exciter and barrier	271	0.07	3.62	13.42%
T97	Recon and correct	285	0.07	3.62	10.94%
T16	Ocular tumors	321	0.06	3.62	0.31%

Task		N	SE	Mean	Freq
T91	Use Approp Conditions	285	0.08	3.64	11.76%
T209	Retinal	276	0.07	3.64	14.02%
T122	Digital Darkroom	299	0.06	3.65	5.38%
T134	Color balance	311	0.06	3.65	3.42%
T102	CPU	309	0.06	3.65	4.04%
T117	Color balance	310	0.06	3.66	3.73%
T130	Resolution selection	308	0.06	3.66	4.05%
T26	Angioid streaks	322	0.06	3.67	0.62%
T83	Manual processing equip	287	0.07	3.68	11.42%
T112	Resolution	314	0.06	3.68	2.79%
T85	Process chems	286	0.07	3.68	11.46%
T132	Sharpening	313	0.06	3.70	3.10%
T86	Chem Temp	291	0.07	3.70	10.19%
T52	Presence of Inflammation	285	0.07	3.71	10.09%
T34	Optic neuritis	321	0.06	3.72	0.93%
T144	Digital	299	0.06	3.72	5.97%
T11	Vascular disease	318	0.05	3.72	1.24%
T115	Contrast	315	0.06	3.73	2.48%
T33	Optic atrophy	320	0.05	3.73	0.93%
T133	Brightness	315	0.06	3.76	2.48%
T29	Mal melanoma	320	0.05	3.76	0.62%
T23	Toxoplasmosis	320	0.05	3.77	1.23%
T57	Med/surg history	295	0.07	3.78	7.81%
T35	Glaucoma	317	0.06	3.79	1.55%
T131	Contrast Enhance	315	0.06	3.79	2.48%
T13	Optic nerve disorders	322	0.05	3.79	0.00%
T218	Oral admin	296	0.07	3.79	8.07%
T49	Contact lenses	281	0.07	3.80	11.91%
T128	Proofsheet production	311	0.06	3.80	3.72%
T51	Media conditions	292	0.06	3.80	8.46%
T90	Prep film for filing	292	0.07	3.80	9.03%
T21	Ocular histoplasmosis	322	0.05	3.83	0.62%
T36	Papilledema	320	0.06	3.85	1.23%
T116	Exposure control	315	0.06	3.85	2.17%
T27	Macroaneurysm	322	0.06	3.86	0.62%
T46	Epiretinal membrane	317	0.05	3.86	1.25%
T73	Color balance	311	0.06	3.86	3.42%
T39	Retinal detachment	315	0.06	3.86	2.17%
T219	Patients age and weight	308	0.06	3.87	4.05%
T99	Stock and inventory supply	314	0.05	3.87	2.48%
T185	Green free	307	0.06	3.88	4.06%

Task		N	SE	Mean	Freq
T4	Ant struct	321	0.05	3.89	0.31%
T1	Ext ocular struct	319	0.05	3.90	0.62%
T50	Iris fixated	285	0.07	3.92	10.94%
T61	Photographic history	308	0.06	3.93	3.45%
T137	Recon digital images	313	0.06	3.93	2.49%
T71	Contrast	312	0.06	3.93	3.11%
T212	Miotics	315	0.06	3.93	2.48%
T32	Choroidal nevus	321	0.05	3.96	0.62%
T37	Drusen	322	0.05	3.96	0.62%
T65	Monitor and assess drops	297	0.06	3.96	6.60%
T167	Astigmatic correction	313	0.06	3.96	2.49%
T48	Narrow angles	284	0.07	3.97	11.25%
T60	Ocular history	302	0.06	3.97	5.63%
T100	Still digital cam	317	0.05	3.97	1.86%
T69	35mm color transparency film	313	0.06	3.98	2.80%
T67	Stock and inventories	307	0.06	3.99	2.23%
T22	Central serous retinopathy	322	0.05	3.99	0.62%
T70	ISO/film speed	313	0.06	4.00	2.80%
T214	Cycloplegics	318	0.06	4.01	1.55%
T215	Anesthetics	316	0.06	4.01	2.17%
T103	Archive device and media	314	0.05	4.01	2.48%
T25	Macular hole	322	0.05	4.02	0.62%
T18	Hypertensive retinopathy	320	0.05	4.02	0.93%
T68	35mm black and white	308	0.06	4.03	4.35%
T213	Mydriatics	319	0.06	4.04	1.24%
T72	Exposure	313	0.06	4.05	2.80%
T168	Monochromatic	315	0.06	4.05	1.56%
T170	Gross ant pathologies	316	0.06	4.06	1.56%
T217	ICG	279	0.06	4.07	13.08%
T169	Media opacities	319	0.06	4.09	0.93%
T98	Dem basic comp skill	318	0.05	4.10	1.24%
T151	Replace fuses	318	0.05	4.10	1.55%
T20	Vascular occlusions	322	0.05	4.14	0.62%
T12	Retinal disease	322	0.05	4.14	0.00%
T189	Transmission	317	0.05	4.16	0.94%
T193	Filling defects	315	0.05	4.17	1.56%
T192	Blockage	315	0.05	4.17	1.56%
T150	Replace viewing bulbs	315	0.05	4.19	2.48%
T24	Cystoid Macular Edema	321	0.05	4.19	0.62%
T191	Staining/pooling	317	0.05	4.20	1.25%
T8	Optic nerve	324	0.05	4.21	0.00%

Task		N	SE	Mean	Freq
T190	Leakage	318	0.05	4.22	0.93%
T17	Diabetic retinopathy	323	0.05	4.24	0.31%
T194	Anatomical location	316	0.05	4.25	1.56%
T66	Recon and respond	307	0.06	4.26	4.36%
T174	Control photo	315	0.06	4.27	1.87%
T2	Ant&post segment struct	319	0.05	4.28	0.62%
T19	Macular degeneration	323	0.05	4.28	0.31%
T181	Pseudo/auto fluorescence	321	0.05	4.29	0.00%
T9	choroid	324	0.05	4.30	0.00%
T59	Pregnancy	305	0.06	4.31	4.69%
T152	Clean equip	320	0.05	4.33	0.93%
T177	Stereoscopic images	315	0.05	4.33	1.87%
T220	Topical agents	317	0.05	4.34	1.55%
T58	Allergies	309	0.05	4.37	3.13%
T173	Stereoscopic images	313	0.05	4.38	2.19%
T184	Red free	321	0.05	4.39	0.00%
T159	Set shutter / flash syncro	313	0.05	4.40	3.10%
T62	Verifies physicians orders	304	0.05	4.40	5.30%
T187	Mid phase	318	0.05	4.41	0.93%
T5	Post struct	321	0.04	4.41	0.31%
T180	Fluorescence	321	0.04	4.41	0.00%
T188	Late phase	317	0.04	4.41	0.94%
T183	Barrier filters	321	0.05	4.42	0.00%
T186	Early phase	318	0.05	4.42	0.93%
T182	Excitation filters	321	0.04	4.43	0.00%
T222	Potential Contamination	320	0.05	4.44	0.31%
T56	Written informed consent	296	0.05	4.46	6.62%
T166	Stereoscopic	318	0.04	4.46	1.24%
T53	Inform patient	313	0.04	4.48	1.88%
T171	IV fluorescein inject	316	0.04	4.49	0.94%
T7	Retina	324	0.04	4.49	0.00%
T216	Sodium Fluorescein	315	0.04	4.49	2.48%
T176	Non-stereoscopic images	317	0.04	4.50	1.25%
T55	Elicits cooperation	319	0.04	4.50	0.31%
T3	Anat landmarks&terms	322	0.04	4.51	0.00%
T160	Set view light	321	0.04	4.52	0.62%
T63	Maintain sterile technique	307	0.05	4.52	4.36%
T172	Non-stereoscopic images	319	0.04	4.54	0.62%
T157	Set view angle	322	0.04	4.54	0.31%
T146	CPR proficiency	319	0.04	4.55	1.24%
T165	Non-stereoscopic	320	0.04	4.55	0.62%

Task		N	SE	Mean	Freq
T164	Diopter comp	319	0.04	4.55	0.31%
T155	Photo plan	321	0.04	4.56	0.62%
T148	OSHA&NIOSH	319	0.04	4.58	1.24%
T156	Adjust photo plan	321	0.04	4.58	0.31%
T54	Answer patient questions	317	0.04	4.61	1.25%
T147	Universal precautions	320	0.04	4.61	0.93%
T158	Set flash power	322	0.04	4.63	0.31%
T162	Est fixation	322	0.04	4.63	0.00%
T221	Intravenous Agents	320	0.04	4.64	0.31%
T161	Position patient	322	0.03	4.65	0.00%
T149	HIPPA	319	0.03	4.66	1.24%
T178	Patient response	319	0.03	4.67	0.31%
T154	Verify filter position	318	0.03	4.68	1.24%
T175	Coordinate admin of dye	319	0.03	4.70	0.00%
T163	Est align & focus	322	0.03	4.70	0.00%
T153	Set reticle	320	0.03	4.71	0.62%
T179	Response to adverse react	316	0.03	4.77	0.32%

Appendix F

Subgroup Analysis
By
Years of Experience

Task		0 to 6		7 to 10		11 to 20		20 & over		3	←
		N	Mean	N	Mean	N	Mean	N	Mean		
T1	Ext ocular struct	58	3.91	40	3.93	121	3.91	100	3.86	0	*Column indicates # of groups with mean of 3.0*
T2	Ant&post segment struct	58	4.24	40	4.43	121	4.20	100	4.34	0	*or less. All tasks with values of 3 or 4 were*
T3	Anat landmarks&terms	59	4.44	40	4.65	123	4.45	100	4.56	0	*eliminated in previous exclusion rules of*
T4	Ant struct	59	4.02	40	4.03	121	3.89	101	3.77	0	*"importance" and "not performed."*
T5	Post struct	59	4.42	40	4.63	121	4.36	101	4.39	0	
T6	Iris	59	3.37	37	3.54	120	3.26	94	3.33	0	
T7	Retina	60	4.52	40	4.63	123	4.40	101	4.53	0	
T8	Optic nerve	60	4.27	40	4.13	123	4.11	101	4.33	0	
T9	choroid	60	4.27	40	4.35	123	4.24	101	4.36	0	
T10	Systemic disease	57	3.58	40	3.58	120	3.60	99	3.49	0	
T11	Vascular disease	58	3.71	40	3.73	120	3.72	100	3.74	0	
T12	Retinal disease	60	4.27	40	4.20	122	4.06	100	4.14	0	
T13	Optic nerve disorders	60	3.95	40	3.65	122	3.74	100	3.82	0	
T14	Inflam disease	58	3.62	40	3.58	120	3.55	100	3.49	0	
T15	Ocular trauma	59	3.44	39	3.56	120	3.46	98	3.46	0	
T16	Ocular tumors	60	3.60	40	3.53	121	3.69	100	3.60	0	
T17	Diabetic retinopathy	60	4.23	40	4.35	122	4.17	101	4.29	0	
T18	Hypertensive retinopathy	60	3.92	39	4.05	121	4.02	100	4.07	0	
T19	Macular degeneration	60	4.35	40	4.38	122	4.20	101	4.30	0	
T20	Vascular occlusions	60	4.13	40	4.20	122	4.07	100	4.20	0	
T21	Ocular histoplasmosis	60	3.67	40	3.80	122	3.84	100	3.91	0	
T22	Central serous retinopathy	60	3.98	40	4.00	122	3.94	100	4.06	0	
T23	Toxoplasmosis	59	3.66	40	3.75	122	3.77	99	3.83	0	
T24	Cystoid Macular Edema	59	4.19	40	4.25	122	4.13	100	4.25	0	
T25	Macular hole	60	4.12	40	4.05	122	3.98	100	3.99	0	
T26	Angioid streaks	60	3.63	40	3.70	122	3.63	100	3.73	0	
T27	Macroaneurysm	60	3.88	40	3.80	122	3.81	100	3.92	0	
T28	Hereditary macular dystrophy	60	3.63	40	3.55	120	3.54	98	3.55	0	
T29	Mal melanoma	58	3.72	40	3.78	122	3.72	100	3.81	0	
T30	Hemangioma	60	3.53	39	3.51	121	3.50	99	3.61	0	
T31	Retinoblastoma	60	3.50	38	3.53	119	3.50	99	3.48	0	
T32	Choroidal nevus	60	4.10	40	3.88	121	3.89	100	3.99	0	
T33	Optic atrophy	60	3.73	40	3.75	121	3.69	99	3.76	0	
T34	Optic neuritis	60	3.70	40	3.68	121	3.70	100	3.77	0	
T35	Glaucoma	59	3.73	39	3.56	120	3.75	99	3.96	0	
T36	Papilledema	60	3.82	39	3.69	121	3.79	100	4.01	0	
T37	Drusen	60	3.98	40	3.95	122	3.89	100	4.05	0	
T38	Uveitis	59	3.64	38	3.55	120	3.54	97	3.57	0	
T39	Retinal detachment	58	4.07	39	3.95	118	3.78	100	3.81	0	
T40	Retinopathy of prematurity	55	3.35	39	3.08	113	3.18	98	3.17	0	

T41	Sickle cell retinopathy	57	3.35	38	3.29	117	3.37	99	3.36	0
T42	Cytomegalovirus retinitis	55	3.42	40	3.35	118	3.47	99	3.60	0
T43	Ant ischemic optic neuropathy	57	3.21	40	3.35	117	3.41	98	3.43	0
T44	Coloboma	57	3.28	39	3.21	118	3.31	99	3.33	0
T45	Coats disease	57	3.25	39	3.26	119	3.35	99	3.43	0
T46	Epiretinal membrane	59	3.76	40	3.88	118	3.78	100	4.01	0
T47	Retinal toxicity	59	3.29	40	3.33	119	3.27	95	3.46	0
T48	Narrow angles	46	4.04	38	3.82	103	3.95	97	4.01	0
T49	Contact lenses	45	3.87	37	3.76	104	3.63	95	3.97	0
T50	Iris fixated	47	3.91	38	3.89	104	3.86	96	4.01	0
T51	Media conditions	48	3.65	39	4.13	107	3.73	98	3.83	0
T52	Presence of Inflammation	45	3.64	38	4.00	108	3.62	94	3.72	0
T53	Inform patient	53	4.53	40	4.65	121	4.47	99	4.39	0
T54	Answer patient questions	56	4.59	40	4.58	121	4.67	100	4.55	0
T55	Elicits cooperation	56	4.45	40	4.68	122	4.49	101	4.46	0
T56	Written informed consent	49	4.53	40	4.70	117	4.45	90	4.31	0
T57	Med/surg history	50	3.98	40	3.88	113	3.84	92	3.54	0
T58	Allergies	54	4.48	40	4.48	118	4.40	97	4.24	0
T59	Pregnancy	53	4.28	40	4.53	118	4.36	94	4.18	0
T60	Ocular history	53	3.85	40	4.23	114	4.08	95	3.81	0
T61	Photographic history	56	3.88	39	4.13	115	3.98	98	3.81	0
T62	Verifies physicians orders	50	4.32	40	4.50	115	4.38	99	4.42	0
T63	Maintain sterile technique	53	4.43	40	4.70	114	4.52	100	4.49	0
T64	Punctal occlusion	41	3.27	31	3.35	101	3.47	91	3.40	0
T65	Monitor and assess drops	46	3.91	39	4.00	115	3.92	97	4.02	0
T66	Recon and respond	52	4.19	40	4.05	117	4.32	98	4.32	0
T67	Stock and inventories	53	3.96	40	4.13	116	3.87	98	4.09	0
T68	35mm black and white	55	3.91	38	4.16	118	3.86	97	4.26	0
T69	35mm color transparency film	56	3.93	39	4.10	119	3.80	99	4.18	0
T70	ISO/film speed	57	3.91	39	3.97	119	3.92	98	4.17	0
T71	Contrast	56	3.84	38	4.00	119	3.88	99	4.02	0
T72	Exposure	56	3.91	39	4.03	119	4.00	99	4.19	0
T73	Color balance	56	3.73	38	4.00	119	3.79	98	3.97	0
T74	Enlarger	47	3.32	35	3.17	104	3.23	93	3.43	0
T75	Contact printer	46	3.43	35	3.40	107	3.29	94	3.45	0
T76	Black and white film	48	3.42	35	3.57	109	3.47	97	3.73	0
T77	Color film	35	3.14	27	2.37	91	2.89	86	2.72	0
T78	Black and white film	43	3.51	33	3.42	105	3.06	93	3.25	0
T79	Color film	37	3.30	28	2.61	92	2.85	85	2.67	0
T80	Slide Imprinter/mounter	43	3.07	33	3.00	105	2.96	91	2.93	0
T81	Slide duplicator	36	2.89	30	2.67	97	2.61	90	2.81	0
T82	Photographic papers	43	3.30	31	2.97	104	3.08	94	3.29	0
T83	Manual processing equip	48	3.44	35	4.03	108	3.61	96	3.75	0

T84	Auto process equip	43	3.51	34	3.68	103	3.25	94	3.30	0
T85	Process chems	47	3.62	34	3.85	110	3.57	95	3.78	0
T86	Chem Temp	49	3.61	36	3.75	110	3.62	96	3.83	0
T87	Contrast	49	3.37	36	3.75	108	3.49	96	3.81	0
T88	Density	49	3.35	36	3.67	108	3.49	96	3.82	0
T89	Granularity	50	3.34	36	3.56	109	3.37	96	3.73	0
T90	Prep film for filing	52	3.60	36	3.92	109	3.74	95	3.94	0
T91	Use Approp Conditions	49	3.53	36	3.64	105	3.60	95	3.74	0
T92	An enlarger	45	3.36	32	3.31	102	3.33	93	3.40	0
T93	A contact printer	44	3.39	34	3.29	105	3.36	95	3.36	0
T94	On paper	43	3.26	32	3.38	103	3.22	91	3.45	0
T95	On film	46	3.35	34	3.15	105	3.38	94	3.46	0
T96	Generate an enlargement	43	3.35	33	3.12	97	3.24	89	3.27	0
T97	Recon and correct	48	3.50	35	3.37	108	3.56	94	3.84	0
T98	Dem basic comp skill	59	4.20	39	4.23	119	4.01	101	4.11	0
T99	Stock and inventory supply	58	4.09	40	4.03	116	3.78	100	3.79	0
T100	Still digital cam	57	4.28	40	4.03	119	3.83	101	3.95	0
T101	Digital vid	54	3.31	36	3.36	107	3.29	97	3.20	0
T102	CPU	54	3.78	39	3.64	116	3.54	100	3.72	0
T103	Archive device and media	55	4.13	40	4.13	118	3.89	101	4.04	0
T104	Electronic components	53	3.53	39	3.56	113	3.19	96	3.36	0
T105	Clean equip	53	3.79	39	3.54	110	3.34	95	3.58	0
T106	Software maintenance	52	3.60	38	3.50	107	3.23	98	3.37	0
T107	Storage utilization	54	3.70	39	3.62	113	3.46	99	3.64	0
T108	Monitor calibration	50	3.44	39	3.21	105	3.16	97	3.27	0
T109	Monochrome	48	3.15	34	2.91	101	2.83	95	2.95	0
T110	Color	47	3.13	35	2.89	101	2.85	95	2.96	0
T111	CMOS chip	42	2.81	27	2.59	92	2.65	90	2.83	0
T112	Resolution	55	3.84	40	3.68	119	3.55	100	3.75	0
T113	ISO rating/gain/noise	56	3.71	39	3.62	118	3.55	99	3.64	0
T114	Dynamic range	53	3.45	40	3.33	118	3.32	97	3.51	0
T115	Contrast	56	3.77	40	3.80	119	3.64	100	3.78	0
T116	Exposure control	57	3.93	40	3.85	118	3.75	100	3.93	0
T117	Color balance	55	3.73	39	3.79	118	3.57	98	3.67	0
T118	Bit depth	50	3.38	38	3.26	113	3.18	95	3.38	0
T119	File formats	53	3.77	39	3.49	115	3.41	95	3.73	0
T120	Image overlay	56	3.13	38	3.21	113	3.06	97	3.35	0
T121	Measurement	54	3.30	39	3.59	113	3.37	99	3.40	0
T122	Digital Darkroom	52	3.75	38	3.87	114	3.51	95	3.66	0
T123	Print and paper types	55	3.71	39	3.64	118	3.43	101	3.64	0
T124	film recorders	47	2.83	36	2.92	101	2.83	93	3.18	0
T125	Calibrates CRT&LCD monitors	46	2.54	32	2.47	100	2.81	91	2.95	0
T126	Flatbed scan	51	2.94	35	2.80	102	2.69	93	3.06	0

T127	Film scan	50	2.88	33	2.73	102	2.69	93	3.04	0
T128	Proofsheet production	56	4.02	39	3.90	116	3.71	100	3.75	0
T129	File fmat/compress	54	3.81	38	3.29	118	3.48	98	3.66	0
T130	Resolution sel	55	3.76	39	3.67	116	3.61	98	3.66	0
T131	Contrast Enhance	56	3.93	40	3.83	119	3.67	100	3.84	0
T132	Sharpening	55	3.78	40	3.70	119	3.55	99	3.83	0
T133	Brightness	55	3.85	40	3.83	119	3.64	101	3.81	0
T134	Color balance	55	3.76	40	3.58	118	3.55	98	3.72	0
T135	Resampling	53	3.40	34	3.00	110	3.33	94	3.30	0
T136	Scaling	53	3.36	35	3.11	108	3.23	93	3.33	0
T137	Recon digital images	57	4.07	38	3.74	117	3.94	101	3.91	0
T138	Present graphics	51	2.90	33	2.55	102	2.65	89	3.00	0
T139	Photo edit	55	3.24	33	2.67	108	2.88	91	3.22	0
T140	Relation data bases	47	2.51	32	2.41	100	2.47	86	2.73	0
T141	Spreadsheet	49	2.49	33	2.12	98	2.35	87	2.63	0
T142	Catalogue	44	2.39	30	2.10	91	2.30	87	2.60	0
T143	Film	50	3.44	37	3.38	111	3.43	95	3.73	0
T144	Digital	51	3.94	38	3.68	112	3.63	98	3.73	0
T145	Netwrk File trans	49	3.55	36	3.33	106	3.12	90	3.33	0
T146	CPR proficiency	59	4.56	39	4.69	122	4.50	99	4.54	0
T147	Universal precautions	59	4.59	40	4.63	122	4.61	99	4.61	0
T148	OSHA&NIOSH	59	4.63	40	4.55	122	4.58	98	4.55	0
T149	HIPPA	59	4.71	40	4.68	122	4.61	98	4.68	0
T150	Replace viewing bulbs	57	4.05	37	3.95	121	4.26	100	4.28	0
T151	Replace fuses	59	4.07	38	3.84	121	4.13	100	4.19	0
T152	Clean equip	60	4.30	39	4.26	122	4.36	99	4.33	0
T153	Set reticle	59	4.66	39	4.64	122	4.71	100	4.75	0
T154	Verify filter position	59	4.66	38	4.58	122	4.70	99	4.71	0
T155	Photo plan	60	4.55	39	4.54	123	4.53	99	4.63	0
T156	Adjust photo plan	60	4.60	39	4.64	123	4.59	99	4.53	0
T157	Set view angle	60	4.57	39	4.62	123	4.48	100	4.57	0
T158	Set flash power	60	4.58	39	4.64	123	4.59	100	4.69	0
T159	Set shutter / flash syncro	58	4.45	38	4.39	118	4.40	99	4.37	0
T160	Set view light	60	4.48	38	4.42	123	4.50	100	4.59	0
T161	Position patient	60	4.63	39	4.62	123	4.62	100	4.72	0
T162	Est fixation	60	4.58	40	4.65	122	4.59	100	4.71	0
T163	Est align & focus	60	4.70	40	4.68	122	4.66	100	4.78	0
T164	Diopter comp	59	4.51	40	4.58	121	4.49	99	4.65	0
T165	Non-stereoscopic	60	4.60	39	4.56	122	4.49	99	4.59	0
T166	Stereoscopic	59	4.51	40	4.38	121	4.46	98	4.46	0
T167	Astigmatic correction	58	3.93	39	3.92	120	3.93	96	4.04	0
T168	Monochromatic	59	4.14	37	4.00	121	3.98	98	4.11	0
T169	Media opacities	60	4.00	38	4.32	122	4.09	99	4.07	0

T170	Gross ant pathologies	58	4.02	38	4.21	122	4.03	98	4.05	0
T171	IV fluorescein inject	59	4.59	39	4.67	120	4.43	98	4.43	0
T172	Non-stereoscopic images	60	4.57	39	4.54	120	4.49	100	4.58	0
T173	Stereoscopic images	57	4.42	39	4.23	117	4.34	100	4.45	0
T174	Control photo	60	4.32	38	4.34	119	4.23	98	4.27	0
T175	Coordinate admin of dye	59	4.73	39	4.69	121	4.69	100	4.69	0
T176	Non-stereoscopic images	60	4.55	38	4.58	120	4.42	99	4.53	0
T177	Stereoscopic images	58	4.33	39	4.23	118	4.34	100	4.37	0
T178	Patient response	59	4.69	40	4.75	120	4.63	100	4.68	0
T179	Response to adverse react	59	4.75	40	4.80	119	4.76	98	4.80	0
T180	Fluorescence	60	4.37	40	4.53	121	4.43	100	4.37	0
T181	Pseudo/auto fluorescence	60	4.22	40	4.35	121	4.34	100	4.24	0
T182	Excitation filters	60	4.35	40	4.45	121	4.43	100	4.47	0
T183	Barrier filters	60	4.30	40	4.45	121	4.43	100	4.46	0
T184	Red free	60	4.37	40	4.45	121	4.40	100	4.38	0
T185	Green free	55	3.85	38	4.13	115	3.83	99	3.86	0
T186	Early phase	60	4.48	40	4.63	119	4.36	99	4.36	0
T187	Mid phase	60	4.47	40	4.63	119	4.36	99	4.33	0
T188	Late phase	60	4.50	40	4.63	118	4.36	99	4.34	0
T189	Transmission	59	4.17	40	4.15	119	4.13	99	4.19	0
T190	Leakage	60	4.23	40	4.28	119	4.18	99	4.23	0
T191	Staining/pooling	60	4.22	40	4.23	118	4.17	99	4.20	0
T192	Blockage	57	4.25	40	4.18	119	4.13	99	4.17	0
T193	Filling defects	57	4.21	40	4.15	119	4.15	99	4.16	0
T194	Anatomical location	58	4.17	40	4.30	119	4.23	99	4.31	0
T195	Perform ICG	48	3.60	32	3.44	100	3.36	88	3.25	0
T196	Exciter and barrier	48	4.00	32	3.66	101	3.59	90	3.43	0
T197	Phase of circulation	49	3.92	32	3.59	100	3.51	91	3.33	0
T198	Hyperfluorescence	49	3.76	32	3.47	99	3.43	92	3.26	0
T199	Hypofluorescence	49	3.76	32	3.47	98	3.43	92	3.25	0
T200	Anatomical location	49	3.78	32	3.69	99	3.59	92	3.40	0
T201	Fundus	28	2.96	25	2.68	72	2.63	66	2.67	0
T202	Fluorescein angio	27	3.04	25	3.00	73	2.79	66	2.67	0
T203	ICG angio	26	2.96	25	2.96	73	2.71	65	2.52	0
T204	Affects of adjustment	28	3.46	26	3.35	74	3.03	66	2.77	0
T205	Utility and comprehend	28	3.43	25	3.20	73	2.92	63	2.81	0
T206	Choroidal circulation	28	3.43	24	3.25	74	2.86	62	2.79	0
T207	Retinal circulation	28	3.43	24	3.29	74	2.88	63	2.79	0
T208	Glaucoma	51	3.53	28	2.54	97	3.51	89	3.08	0
T209	Retinal	54	3.94	32	3.56	101	3.77	89	3.35	0
T210	Scanning proto	53	3.87	32	3.50	100	3.69	90	3.40	0
T211	Analysis proto	54	3.78	32	3.50	99	3.70	89	3.42	0
T212	Miotics	57	3.82	38	3.97	121	3.92	99	4.00	0

T213	Mydriatics	58	3.97	40	4.18	121	4.00	100	4.08	0
T214	Cycloplegics	58	3.93	40	4.08	121	3.98	99	4.06	0
T215	Anesthetics	56	3.91	40	4.18	121	3.98	99	4.04	0
T216	Sodium Fluorescein	57	4.46	39	4.67	120	4.47	99	4.47	0
T217	ICG	47	4.15	35	4.06	105	4.15	92	3.95	0
T218	Oral admin	52	3.67	37	3.95	110	3.84	97	3.75	0
T219	Patients age and weight	54	3.72	40	4.08	115	3.83	99	3.90	0
T220	Topical agents	57	4.16	40	4.48	120	4.33	100	4.41	0
T221	Intravenous Agents	58	4.59	40	4.75	121	4.64	101	4.63	0
T222	Potential Contamination	57	4.39	40	4.45	122	4.41	101	4.51	0

Appendix G

Subgroup Analysis
By
Practice Setting

Task		Hospital		Private Practice		Private Prac Ret Only		3	
		N	Mean	N	Mean	N	Mean		←
T1	Ext ocular struct	116	4.02	91	3.87	90	3.72	0	*Column indicates # of groups with mean of 3.0*
T2	Ant&post segment struct	116	4.27	91	4.25	90	4.24	0	*or less. All tasks with values of 3 or 4 were*
T3	Anat landmarks&terms	116	4.48	92	4.50	92	4.49	0	*eliminated in previous exclusion rules of*
T4	Ant struct	116	3.99	91	3.95	92	3.79	0	*"importance" and "not performed."*
T5	Post struct	116	4.38	91	4.37	92	4.45	0	
T6	Iris	113	3.32	90	3.40	85	3.36	0	
T7	Retina	117	4.43	93	4.42	92	4.54	0	
T8	Optic nerve	117	4.14	93	4.24	92	4.17	0	
T9	choroid	117	4.26	93	4.28	92	4.29	0	
T10	Systemic disease	114	3.52	91	3.54	89	3.56	0	
T11	Vascular disease	114	3.76	92	3.58	90	3.73	0	
T12	Retinal disease	115	4.21	93	4.02	92	4.05	0	
T13	Optic nerve disorders	115	3.90	93	3.81	92	3.57	0	
T14	Inflam disease	114	3.57	92	3.54	90	3.50	0	
T15	Ocular trauma	115	3.50	92	3.40	87	3.47	0	
T16	Ocular tumors	115	3.70	93	3.56	91	3.56	0	
T17	Diabetic retinopathy	116	4.26	93	4.19	92	4.17	0	
T18	Hypertensive retinopathy	116	3.97	92	3.96	90	4.06	0	
T19	Macular degeneration	116	4.28	93	4.23	92	4.26	0	
T20	Vascular occlusions	116	4.11	93	4.05	91	4.16	0	
T21	Ocular histoplasmosis	116	3.78	93	3.78	91	3.89	0	
T22	Central serous retinopathy	116	3.97	93	3.97	91	3.99	0	
T23	Toxoplasmosis	116	3.72	92	3.68	90	3.84	0	
T24	Cystoid Macular Edema	116	4.19	92	4.13	91	4.20	0	
T25	Macular hole	116	3.99	93	3.97	91	4.10	0	
T26	Angioid streaks	116	3.66	93	3.60	91	3.73	0	
T27	Macroaneurysm	116	3.83	93	3.73	91	3.95	0	
T28	Hereditary macular dystrophy	115	3.60	92	3.52	89	3.57	0	
T29	Mal melanoma	115	3.80	92	3.60	91	3.78	0	
T30	Hemangioma	115	3.55	93	3.45	89	3.62	0	
T31	Retinoblastoma	115	3.50	91	3.47	88	3.48	0	
T32	Choroidal nevus	116	3.97	93	3.89	90	3.96	0	
T33	Optic atrophy	115	3.70	93	3.70	90	3.69	0	
T34	Optic neuritis	116	3.66	92	3.72	91	3.71	0	
T35	Glaucoma	116	3.98	91	3.76	88	3.42	0	
T36	Papilledema	116	3.93	92	3.83	90	3.66	0	
T37	Drusen	116	3.97	93	3.84	91	3.96	0	
T38	Uveitis	113	3.65	91	3.45	89	3.58	0	
T39	Retinal detachment	115	3.92	91	3.67	87	3.98	0	
T40	Retinopathy of prematurity	113	3.20	86	3.17	84	3.26	0	

T41	Sickle cell retinopathy	114	3.41	90	3.22	85	3.41	0
T42	Cytomegalovirus retinitis	114	3.54	89	3.33	87	3.53	0
T43	Ant ischemic optic neuropathy	110	3.43	91	3.22	89	3.36	0
T44	Coloboma	114	3.34	91	3.21	86	3.36	0
T45	Coats disease	113	3.44	89	3.21	90	3.36	0
T46	Epiretinal membrane	115	3.87	90	3.67	90	3.97	0
T47	Retinal toxicity	112	3.39	90	3.19	89	3.44	0
T48	Narrow angles	102	3.87	80	4.10	81	3.95	0
T49	Contact lenses	102	3.84	80	3.74	78	3.79	0
T50	Iris fixated	103	3.82	80	4.05	81	3.91	0
T51	Media conditions	107	3.83	80	3.78	84	3.76	0
T52	Presence of Inflammation	104	3.76	77	3.69	83	3.64	0
T53	Inform patient	115	4.54	86	4.51	91	4.46	0
T54	Answer patient questions	116	4.66	87	4.56	92	4.61	0
T55	Elicits cooperation	117	4.49	88	4.42	92	4.60	0
T56	Written informed consent	97	4.41	87	4.44	91	4.58	0
T57	Med/surg history	100	3.54	85	4.01	88	3.78	0
T58	Allergies	110	4.27	87	4.48	90	4.36	0
T59	Pregnancy	107	4.19	86	4.47	90	4.33	0
T60	Ocular history	104	3.78	87	4.09	89	4.04	0
T61	Photographic history	110	3.95	88	4.00	88	3.82	0
T62	Verifies physicians orders	106	4.30	86	4.45	90	4.43	0
T63	Maintain sterile technique	110	4.50	85	4.47	90	4.57	0
T64	Punctal occlusion	89	3.37	75	3.48	80	3.34	0
T65	Monitor and assess drops	103	3.99	83	3.86	89	4.00	0
T66	Recon and respond	109	4.25	87	4.25	89	4.27	0
T67	Stock and inventories	109	4.01	87	3.79	90	4.10	0
T68	35mm black and white	113	4.12	86	3.71	87	4.15	0
T69	35mm color transparency film	115	4.06	88	3.67	88	4.08	0
T70	ISO/film speed	115	4.14	88	3.72	88	4.01	0
T71	Contrast	116	4.04	88	3.66	87	3.98	0
T72	Exposure	116	4.14	88	3.77	88	4.09	0
T73	Color balance	115	4.04	88	3.49	87	3.87	0
T74	Enlarger	101	3.33	79	3.10	78	3.53	0
T75	Contact printer	101	3.41	78	3.13	82	3.59	0
T76	Black and white film	103	3.67	82	3.17	83	3.76	0
T77	Color film	88	2.89	65	2.58	67	2.90	3
T78	Black and white film	100	3.30	77	2.96	78	3.44	1
T79	Color film	90	2.83	65	2.63	69	3.01	2
T80	Slide Imprinter/mounter	104	3.20	72	2.75	76	2.86	2
T81	Slide duplicator	98	2.91	68	2.60	68	2.59	3
T82	Photographic papers	102	3.19	75	3.03	76	3.30	0
T83	Manual processing equip	103	3.66	80	3.39	83	3.96	0

T84	Auto process equip	97	3.42	76	3.05	81	3.59	0
T85	Process chems	102	3.68	81	3.37	82	3.96	0
T86	Chem Temp	105	3.69	82	3.39	83	4.00	0
T87	Contrast	102	3.68	82	3.24	84	3.83	0
T88	Density	102	3.67	82	3.23	84	3.83	0
T89	Granularity	103	3.57	82	3.24	84	3.65	0
T90	Prep film for filing	104	3.83	84	3.51	84	4.05	0
T91	Use Approp Conditions	100	3.62	81	3.46	84	3.86	0
T92	An enlarger	97	3.42	74	3.23	80	3.44	0
T93	A contact printer	98	3.43	77	3.23	82	3.44	0
T94	On paper	96	3.40	74	3.20	78	3.37	0
T95	On film	99	3.34	77	3.14	83	3.63	0
T96	Generate an enlargement	94	3.43	73	3.08	75	3.24	0
T97	Recon and correct	103	3.64	78	3.38	82	3.74	0
T98	Dem basic comp skill	116	4.24	89	3.96	91	4.08	0
T99	Stock and inventory supply	113	3.98	88	3.70	91	3.86	0
T100	Still digital cam	116	4.09	88	3.77	91	4.07	0
T101	Digital video	108	3.43	83	3.13	81	3.33	0
T102	CPU	110	3.74	88	3.57	89	3.63	0
T103	Archive device and media	115	4.07	88	3.84	90	4.09	0
T104	Electronic components	109	3.43	85	3.26	86	3.41	0
T105	Clean equip	107	3.55	81	3.48	87	3.54	0
T106	Software maintenance	111	3.47	80	3.38	83	3.30	0
T107	Storage utilization	113	3.74	82	3.48	89	3.47	0
T108	Monitor calibration	106	3.35	79	3.30	85	3.15	0
T109	Monochrome	105	3.13	78	2.68	73	2.97	2
T110	Color	104	3.19	78	2.62	74	2.97	2
T111	CMOS chip	95	3.00	72	2.49	64	2.69	2
T112	Resolution	115	3.84	87	3.45	90	3.67	0
T113	ISO rating/gain/noise	115	3.80	88	3.31	88	3.70	0
T114	Dynamic range	113	3.61	87	3.14	87	3.38	0
T115	Contrast	115	3.83	88	3.50	90	3.77	0
T116	Exposure control	115	3.96	88	3.61	90	3.92	0
T117	Color balance	116	3.71	87	3.44	86	3.79	0
T118	Bit depth	110	3.52	82	3.12	83	3.22	0
T119	File formats	111	3.89	86	3.30	84	3.48	0
T120	Image overlay	112	3.30	84	3.02	87	3.20	0
T121	Measurement	112	3.48	85	3.13	87	3.49	0
T122	Digital Darkroom	112	3.77	79	3.32	87	3.78	0
T123	Print and paper types	115	3.77	86	3.28	90	3.62	0
T124	film recorders	103	3.10	75	2.79	79	2.94	2
T125	Calibrates CRT&LCD monitors	99	3.03	77	2.58	72	2.65	2
T126	Flatbed scan	114	3.36	72	2.56	74	2.55	2

T127	Film scan	110	3.31	74	2.49	73	2.58	2
T128	Proofsheet production	113	3.92	86	3.50	90	3.91	0
T129	File fmat/compress	112	3.79	87	3.24	87	3.60	0
T130	Resolution sel	115	3.81	84	3.36	89	3.69	0
T131	Contrast Enhance	114	3.96	88	3.43	91	3.84	0
T132	Sharpening	115	3.85	88	3.34	89	3.79	0
T133	Brightness	116	3.90	88	3.40	90	3.82	0
T134	Color balance	116	3.78	87	3.31	87	3.71	0
T135	Resampling	110	3.60	83	3.02	77	3.18	0
T136	Scaling	111	3.58	81	2.94	76	3.18	1
T137	Recon digital images	116	3.96	85	3.72	90	4.02	0
T138	Present graphics	109	3.17	76	2.46	70	2.61	2
T139	Photo edit	115	3.44	76	2.72	76	2.72	2
T140	Relation data bases	104	2.83	74	2.32	67	2.34	3
T141	Spreadsheet	105	2.60	74	2.30	68	2.32	3
T142	Catalogue	98	2.62	70	2.21	65	2.26	3
T143	Film	105	3.61	86	3.14	81	3.73	0
T144	Digital	111	3.82	81	3.37	85	3.88	0
T145	Netwrk File trans	99	3.31	80	3.16	81	3.40	0
T146	CPR proficiency	116	4.49	93	4.62	88	4.49	0
T147	Universal precautions	114	4.56	93	4.61	92	4.63	0
T148	OSHA&NIOSH	115	4.55	92	4.54	91	4.60	0
T149	HIPPA	115	4.64	93	4.60	89	4.74	0
T150	Replace viewing bulbs	113	4.13	90	4.02	90	4.42	0
T151	Replace fuses	114	4.04	90	4.00	92	4.32	0
T152	Clean equip	115	4.29	91	4.15	92	4.51	0
T153	Set reticle	114	4.68	93	4.55	91	4.86	0
T154	Verify filter position	114	4.64	91	4.49	91	4.87	0
T155	Photo plan	115	4.54	92	4.40	92	4.75	0
T156	Adjust photo plan	114	4.55	93	4.41	92	4.77	0
T157	Set view angle	115	4.50	93	4.34	92	4.75	0
T158	Set flash power	115	4.60	93	4.43	92	4.83	0
T159	Set shutter / flash syncro	113	4.33	89	4.33	90	4.59	0
T160	Set view light	115	4.52	93	4.37	91	4.69	0
T161	Position patient	116	4.63	93	4.48	91	4.82	0
T162	Est fixation	116	4.61	93	4.44	91	4.81	0
T163	Est align & focus	116	4.67	93	4.55	91	4.87	0
T164	Diopter comp	116	4.55	93	4.34	88	4.77	0
T165	Non-stereoscopic	114	4.58	92	4.35	92	4.70	0
T166	Stereoscopic	114	4.52	91	4.30	92	4.51	0
T167	Astigmatic correction	112	3.97	90	3.84	89	4.06	0
T168	Monochromatic	115	4.22	90	3.84	88	4.05	0
T169	Media opacities	115	4.25	91	3.89	91	4.09	0

T170	Gross ant pathologies	115	4.21	90	3.88	90	4.02	0
T171	IV fluorescein inject	111	4.46	91	4.40	92	4.65	0
T172	Non-stereoscopic images	115	4.57	90	4.46	92	4.60	0
T173	Stereoscopic images	116	4.47	88	4.25	88	4.39	0
T174	Control photo	115	4.29	89	4.19	89	4.33	0
T175	Coordinate admin of dye	115	4.70	91	4.57	91	4.82	0
T176	Non-stereoscopic images	114	4.51	90	4.34	91	4.57	0
T177	Stereoscopic images	115	4.44	89	4.13	90	4.37	0
T178	Patient response	115	4.66	90	4.60	92	4.78	0
T179	Response to adverse react	113	4.76	89	4.69	92	4.86	0
T180	Fluorescence	116	4.43	91	4.25	92	4.49	0
T181	Pseudo/auto fluorescence	116	4.25	91	4.20	92	4.34	0
T182	Excitation filters	116	4.39	91	4.32	92	4.50	0
T183	Barrier filters	116	4.36	91	4.31	92	4.50	0
T184	Red free	116	4.44	91	4.24	92	4.43	0
T185	Green free	113	3.99	89	3.84	84	3.83	0
T186	Early phase	115	4.43	90	4.28	91	4.47	0
T187	Mid phase	115	4.42	90	4.28	91	4.47	0
T188	Late phase	115	4.43	89	4.27	91	4.47	0
T189	Transmission	114	4.21	90	4.07	91	4.15	0
T190	Leakage	115	4.24	90	4.11	91	4.25	0
T191	Staining/pooling	115	4.23	90	4.08	90	4.24	0
T192	Blockage	113	4.20	90	4.08	90	4.22	0
T193	Filling defects	113	4.20	90	4.08	90	4.20	0
T194	Anatomical location	113	4.33	90	4.09	91	4.29	0
T195	Perform ICG	101	3.41	71	3.31	75	3.52	0
T196	Exciter and barrier	102	3.69	73	3.44	75	3.81	0
T197	Phase of circulation	101	3.53	74	3.45	76	3.70	0
T198	Hyperfluorescence	102	3.45	73	3.37	76	3.58	0
T199	Hypofluorescence	102	3.45	72	3.36	76	3.58	0
T200	Anatomical location	102	3.60	73	3.42	76	3.79	0
T201	Fundus	76	2.82	51	2.71	46	2.63	3
T202	Fluorescein angio	74	2.82	52	2.92	47	2.79	3
T203	ICG angio	74	2.77	51	2.73	46	2.72	3
T204	Affects of adjustment	77	3.22	52	2.96	47	2.98	2
T205	Utility and comprehend	76	3.18	50	2.82	46	3.02	1
T206	Choroidal circulation	76	3.08	50	2.90	44	3.02	1
T207	Retinal circulation	77	3.06	50	2.92	44	3.05	1
T208	Glaucoma	97	3.37	70	3.44	77	3.08	0
T209	Retinal	101	3.57	71	3.56	84	3.94	0
T210	Scanning proto	100	3.57	71	3.48	83	3.88	0
T211	Analysis proto	100	3.58	71	3.49	83	3.83	0
T212	Miotics	115	3.81	89	4.02	89	3.96	0

T213	Mydriatics	117	4.00	91	4.07	89	4.03	0
T214	Cycloplegics	117	3.95	90	4.06	89	4.00	0
T215	Anesthetics	116	3.95	89	4.04	89	4.03	0
T216	Sodium Fluorescein	114	4.46	88	4.35	91	4.59	0
T217	ICG	103	4.04	76	3.93	79	4.22	0
T218	Oral admin	109	3.88	80	3.64	86	3.84	0
T219	Patients age and weight	112	3.90	87	3.75	88	3.92	0
T220	Topical agents	114	4.34	90	4.29	91	4.32	0
T221	Intravenous Agents	116	4.64	91	4.52	91	4.73	0
T222	Potential Contamination	115	4.43	92	4.38	91	4.49	0

Appendix H

Subgroup Analysis by
Geographic Practice Regions

Task		West N	West Mean	Midwest N	Midwest Mean	East N	East Mean	3
T1	Ext ocular struct	66	3.64	99	3.95	140	4.01	0
T2	Ant&post segment struct	66	4.20	99	4.38	140	4.28	0
T3	Anat landmarks&terms	67	4.40	99	4.63	142	4.49	0
T4	Ant struct	66	3.79	98	4.06	143	3.87	0
T5	Post struct	66	4.42	98	4.50	143	4.38	0
T6	Iris	64	3.16	95	3.40	138	3.41	0
T7	Retina	67	4.52	99	4.52	144	4.49	0
T8	Optic nerve	67	4.13	99	4.27	144	4.22	0
T9	choroid	67	4.36	99	4.34	144	4.28	0
T10	Systemic disease	64	3.55	95	3.47	143	3.64	0
T11	Vascular disease	65	3.65	96	3.66	143	3.83	0
T12	Retinal disease	66	4.08	98	4.13	144	4.18	0
T13	Optic nerve disorders	66	3.68	98	3.87	144	3.82	0
T14	Inflam disease	65	3.51	96	3.59	143	3.57	0
T15	Ocular trauma	64	3.42	97	3.52	142	3.49	0
T16	Ocular tumors	66	3.48	98	3.66	143	3.69	0
T17	Diabetic retinopathy	66	4.30	99	4.21	144	4.25	0
T18	Hypertensive retinopathy	66	4.02	99	3.99	141	4.07	0
T19	Macular degeneration	66	4.33	99	4.27	144	4.29	0
T20	Vascular occlusions	66	4.15	99	4.08	143	4.20	0
T21	Ocular histoplasmosis	66	3.67	99	3.96	143	3.83	0
T22	Central serous retinopathy	66	3.95	99	3.97	143	4.05	0
T23	Toxoplasmosis	65	3.65	99	3.83	142	3.80	0
T24	Cystoid Macular Edema	66	4.24	99	4.14	142	4.24	0
T25	Macular hole	66	4.05	99	4.06	143	4.01	0
T26	Angioid streaks	66	3.52	99	3.76	143	3.71	0
T27	Macroaneurysm	66	3.79	99	3.85	143	3.90	0
T28	Hereditary macular dystrophy	65	3.40	99	3.60	140	3.64	0
T29	Mal melanoma	65	3.71	98	3.83	143	3.76	0
T30	Hemangioma	66	3.33	99	3.60	141	3.65	0
T31	Retinoblastoma	65	3.31	98	3.51	140	3.59	0
T32	Choroidal nevus	66	3.92	99	3.93	142	3.99	0
T33	Optic atrophy	66	3.59	99	3.77	141	3.78	0
T34	Optic neuritis	66	3.59	98	3.77	143	3.78	0
T35	Glaucoma	65	3.65	99	3.80	140	3.87	0

←

Column indicates # of groups with mean of 3.0 or less. All tasks with values of 3 or 4 were eliminated in previous exclusion rules of "importance" and "not performed."

T36	Papilledema	66	3.71	98	3.86	143	3.92	0
T37	Drusen	66	3.95	99	3.95	143	4.00	0
T38	Uveitis	64	3.47	99	3.61	138	3.64	0
T39	Retinal detachment	65	3.91	98	3.81	139	3.92	0
T40	Retinopathy of prematurity	62	3.15	98	3.22	133	3.25	0
T41	Sickle cell retinopathy	64	3.17	99	3.32	136	3.49	0
T42	Cytomegalovirus retinitis	63	3.41	99	3.44	137	3.59	0
T43	Ant ischemic optic neuropathy	66	3.21	98	3.36	135	3.49	0
T44	Coloboma	64	3.17	99	3.29	137	3.42	0
T45	Coats disease	65	3.32	99	3.34	138	3.38	0
T46	Epiretinal membrane	66	3.86	99	3.85	138	3.88	0
T47	Retinal toxicity	64	3.23	99	3.32	138	3.43	0
T48	Narrow angles	58	4.09	86	3.86	128	4.01	0
T49	Contact lenses	57	3.74	85	3.65	127	3.93	0
T50	Iris fixated	58	4.12	86	3.85	129	3.91	0
T51	Media conditions	60	3.70	91	3.75	129	3.86	0
T52	Presence of Inflammation	58	3.64	87	3.68	128	3.73	0
T53	Inform patient	65	4.49	97	4.52	138	4.43	0
T54	Answer patient questions	65	4.77	99	4.58	140	4.56	0
T55	Elicits cooperation	67	4.46	99	4.57	140	4.49	0
T56	Written informed consent	65	4.46	93	4.51	126	4.46	0
T57	Med/surg history	62	3.74	88	3.88	132	3.77	0
T58	Allergies	64	4.48	94	4.46	137	4.29	0
T59	Pregnancy	63	4.51	93	4.42	135	4.20	0
T60	Ocular history	63	4.03	92	4.00	134	3.96	0
T61	Photographic history	65	3.88	94	3.86	136	3.95	0
T62	Verifies physicians orders	67	4.43	92	4.43	132	4.36	0
T63	Maintain sterile technique	67	4.63	93	4.51	134	4.48	0
T64	Punctal occlusion	55	3.29	81	3.37	118	3.50	0
T65	Monitor and assess drops	65	3.94	92	4.10	128	3.84	0
T66	Recon and respond	66	4.38	93	4.38	135	4.11	0
T67	Stock and inventories	67	3.87	96	4.11	131	3.98	0
T68	35mm black and white	65	3.91	95	4.18	136	3.99	0
T69	35mm color transparency film	65	3.91	98	4.08	136	3.94	0
T70	ISO/film speed	64	3.94	98	4.06	137	4.02	0
T71	Contrast	65	3.89	96	4.02	137	3.91	0
T72	Exposure	65	4.06	97	4.12	137	4.02	0

T73	Color balance	65	3.69	95	4.01	137	3.85	0
T74	Enlarger	56	3.25	83	3.52	129	3.22	0
T75	Contact printer	56	3.38	87	3.64	129	3.22	0
T76	Black and white film	59	3.53	92	3.82	126	3.44	0
T77	Color film	51	2.65	73	2.77	106	2.92	3
T78	Black and white film	57	3.37	83	3.54	124	3.00	0
T79	Color film	56	2.70	71	2.82	107	2.91	3
T80	Slide Imprinter/mounter	60	2.90	83	3.00	120	2.98	2
T81	Slide duplicator	55	2.47	78	2.79	111	2.80	3
T82	Photographic papers	58	3.17	84	3.17	119	3.22	0
T83	Manual processing equip	60	3.72	90	3.90	125	3.55	0
T84	Auto process equip	56	3.39	88	3.57	120	3.21	0
T85	Process chems	59	3.71	92	3.89	124	3.54	0
T86	Chem Temp	61	3.66	93	3.99	125	3.57	0
T87	Contrast	61	3.54	92	3.91	124	3.45	0
T88	Density	61	3.54	92	3.90	124	3.45	0
T89	Granularity	62	3.44	93	3.73	124	3.41	0
T90	Prep film for filing	61	3.66	94	4.09	125	3.68	0
T91	Use Approp Conditions	59	3.73	93	3.84	123	3.50	0
T92	An enlarger	58	3.33	81	3.57	123	3.29	0
T93	A contact printer	56	3.25	88	3.61	124	3.27	0
T94	On paper	58	3.28	79	3.52	122	3.26	0
T95	On film	56	3.36	89	3.58	125	3.26	0
T96	Generate an enlargement	56	3.25	81	3.28	116	3.26	0
T97	Recon and correct	58	3.62	92	3.82	125	3.54	0
T98	Dem basic comp skill	67	4.07	97	4.01	141	4.16	0
T99	Stock and inventory supply	67	3.90	94	3.79	141	3.91	0
T100	Still digital cam	66	4.02	96	3.88	142	4.03	0
T101	Digital video	63	3.32	88	3.27	132	3.30	0
T102	CPU	65	3.71	91	3.48	140	3.74	0
T103	Archive device and media	66	3.97	93	3.87	142	4.08	0
T104	Electronic components	62	3.24	90	3.34	137	3.42	0
T105	Clean equip	59	3.54	89	3.52	136	3.54	0
T106	Software maintenance	61	3.26	87	3.31	134	3.49	0
T107	Storage utilization	63	3.51	91	3.56	138	3.63	0
T108	Monitor calibration	62	3.10	85	3.25	132	3.36	0
T109	Monochrome	58	2.67	83	2.82	126	3.18	2

T110	Color	58	2.69	82	2.84	126	3.17	2
T111	CMOS chip	51	2.59	74	2.61	114	2.96	3
T112	Resolution	65	3.72	95	3.58	141	3.75	0
T113	ISO rating/gain/noise	65	3.55	95	3.46	139	3.78	0
T114	Dynamic range	65	3.46	92	3.23	138	3.54	0
T115	Contrast	66	3.83	95	3.58	141	3.79	0
T116	Exposure control	66	3.97	96	3.74	140	3.91	0
T117	Color balance	65	3.66	92	3.55	140	3.75	0
T118	Bit depth	62	3.21	88	3.16	134	3.44	0
T119	File formats	62	3.58	90	3.44	137	3.69	0
T120	Image overlay	62	2.95	95	3.07	134	3.42	1
T121	Measurement	64	3.27	93	3.33	135	3.55	0
T122	Digital Darkroom	60	3.58	91	3.55	135	3.75	0
T123	Print and paper types	64	3.53	95	3.40	141	3.72	0
T124	film recorders	60	2.90	84	2.75	120	3.18	2
T125	Calibrates CRT&LCD monitors	54	2.72	81	2.58	124	2.94	3
T126	Flatbed scan	57	2.61	86	2.88	125	3.05	2
T127	Film scan	57	2.60	87	2.83	121	3.04	2
T128	Proofsheet production	65	3.78	95	3.73	138	3.88	0
T129	File fmat/compress	65	3.54	92	3.40	139	3.71	0
T130	Resolution sell	65	3.54	91	3.53	140	3.81	0
T131	Contrast Enhance	66	3.73	94	3.67	142	3.89	0
T132	Sharpening	65	3.71	94	3.57	141	3.82	0
T133	Brightness	65	3.74	94	3.65	143	3.85	0
T134	Color balance	63	3.57	93	3.52	142	3.80	0
T135	Resembling	60	3.18	88	3.08	132	3.53	0
T136	Scaling	58	3.21	88	3.09	132	3.47	0
T137	Recon digital images	65	4.00	95	3.92	140	3.93	0
T138	Present graphics	60	2.67	83	2.59	119	3.07	2
T139	Photo edit	61	2.80	84	2.96	128	3.27	2
T140	Relation data bases	59	2.49	75	2.33	119	2.80	3
T141	Spreadsheet	59	2.29	74	2.30	122	2.66	3
T142	Catalogue	55	2.27	70	2.29	115	2.57	3
T143	Film	63	3.49	85	3.62	132	3.52	0
T144	Digital	65	3.80	89	3.63	133	3.77	0
T145	Network File trans	62	3.18	82	3.24	125	3.37	0
T146	CPR proficiency	65	4.66	98	4.51	142	4.52	0

T147	Universal precautions	67	4.72	98	4.63	143	4.55	0
T148	OSHA&NIOSH	67	4.61	97	4.64	143	4.54	0
T149	HIPPA	67	4.79	97	4.67	142	4.61	0
T150	Replace viewing bulbs	64	4.23	98	4.27	139	4.17	0
T151	Replace fuses	65	4.22	99	4.18	140	4.05	0
T152	Clean equip	66	4.35	99	4.38	141	4.33	0
T153	Set reticle	67	4.78	98	4.71	141	4.67	0
T154	Verify filter position	66	4.74	98	4.67	140	4.66	0
T155	Photo plan	67	4.69	99	4.56	141	4.52	0
T156	Adjust photo plan	67	4.70	98	4.59	142	4.52	0
T157	Set view angle	67	4.55	99	4.56	142	4.52	0
T158	Set flash power	67	4.78	99	4.60	142	4.58	0
T159	Set shutter / flash syncro	63	4.38	97	4.36	139	4.42	0
T160	Set view light	66	4.55	99	4.51	142	4.51	0
T161	Position patient	67	4.72	98	4.67	143	4.62	0
T162	Est fixation	67	4.75	99	4.67	142	4.56	0
T163	Est align & focus	67	4.82	99	4.72	142	4.65	0
T164	Diopter comp	67	4.58	97	4.61	141	4.51	0
T165	Non-stereoscopic	67	4.69	97	4.56	142	4.51	0
T166	Stereoscopic	66	4.50	98	4.50	141	4.45	0
T167	Astigmatic correction	66	3.82	98	4.06	138	4.02	0
T168	Monochromatic	65	4.03	95	4.07	142	4.11	0
T169	Media opacities	67	4.13	97	4.11	141	4.11	0
T170	Gross ant pathologies	66	4.18	97	4.04	139	4.05	0
T171	IV fluorescein inject	66	4.61	99	4.53	138	4.43	0
T172	Non-stereoscopic images	67	4.72	97	4.51	141	4.50	0
T173	Stereoscopic images	65	4.48	96	4.38	138	4.35	0
T174	Control photo	66	4.24	98	4.19	137	4.35	0
T175	Coordinate admin of dye	66	4.76	99	4.67	140	4.71	0
T176	Non-stereoscopic images	66	4.61	97	4.42	140	4.51	0
T177	Stereoscopic images	67	4.37	97	4.37	137	4.31	0
T178	Patient response	67	4.72	98	4.69	140	4.66	0
T179	Response to adverse react	65	4.80	97	4.78	140	4.76	0
T180	Fluorescence	67	4.36	99	4.38	141	4.46	0
T181	Pseudo/auto fluorescence	67	4.30	99	4.23	141	4.33	0
T182	Excitation filters	67	4.42	99	4.41	141	4.45	0
T183	Barrier filters	67	4.42	99	4.38	141	4.44	0

T184	Red free	67	4.45	99	4.36	141	4.40	0
T185	Green free	65	3.80	91	3.84	138	3.96	0
T186	Early phase	67	4.45	98	4.41	139	4.40	0
T187	Mid phase	67	4.42	98	4.40	139	4.39	0
T188	Late phase	67	4.43	97	4.41	139	4.39	0
T189	Transmission	67	4.18	98	4.16	138	4.21	0
T190	Leakage	67	4.25	98	4.22	139	4.23	0
T191	Staining/pooling	67	4.24	98	4.18	138	4.22	0
T192	Blockage	67	4.19	96	4.17	139	4.22	0
T193	Filling defects	67	4.19	96	4.15	139	4.22	0
T194	Anatomical location	67	4.30	97	4.24	139	4.28	0
T195	Perform ICG	57	3.32	82	3.43	118	3.42	0
T196	Exciter and barrier	58	3.55	83	3.71	119	3.66	0
T197	Phase of circulation	60	3.57	83	3.54	118	3.57	0
T198	Hyperfluorescence	60	3.48	82	3.46	119	3.45	0
T199	Hypofluorescence	60	3.48	81	3.46	119	3.44	0
T200	Anatomical location	60	3.58	82	3.67	119	3.55	0
T201	Fundus	41	2.80	57	2.39	85	2.92	3
T202	Fluorescein angio	42	2.93	57	2.53	84	3.00	2
T203	ICG angio	41	2.93	58	2.48	82	2.84	3
T204	Affects of adjustment	42	3.21	59	2.80	85	3.24	1
T205	Utility and comprehend	42	3.21	58	2.78	81	3.14	1
T206	Choroidal circulation	42	3.19	57	2.81	80	3.10	1
T207	Retinal circulation	42	3.21	57	2.82	81	3.09	1
T208	Glaucoma	56	3.48	83	3.08	118	3.31	0
T209	Retinal	55	3.85	88	3.58	124	3.60	0
T210	Scanning proto	56	3.70	88	3.55	122	3.61	0
T211	Analysis proto	56	3.68	88	3.52	121	3.62	0
T212	Miotics	67	4.19	96	3.86	139	3.86	0
T213	Mydriatics	67	4.22	97	4.05	142	3.94	0
T214	Cycloplegics	66	4.20	97	4.02	142	3.91	0
T215	Anesthetics	66	4.26	96	3.97	141	3.91	0
T216	Sodium Fluorescein	64	4.61	98	4.52	139	4.44	0
T217	ICG	62	4.10	87	4.16	119	4.07	0
T218	Oral admin	64	4.02	94	3.85	127	3.69	0
T219	Patients age and weight	66	4.06	94	3.89	135	3.82	0
T220	Topical agents	66	4.56	98	4.27	142	4.27	0
T221	Intravenous Agents	67	4.73	99	4.64	141	4.62	0
T222	Potential Contamination	67	4.57	97	4.44	143	4.38	0

Appendix I

Testing Modality
Multiple-Choice Vs. Performance Results
&
Content Outlines

Multiple Choice Content Outline

I. Applies the Principles of the Anatomy and Physiology of the Eye - 10%
    A. Demonstrates an understanding of external ocular structures
    B. Demonstrates an understanding of anterior and posterior segment structures
        1 anterior structures: (cornea, anterior chamber, iris, lens)
        2 posterior structures:(vitreous, retina, pigment epithelium, choroid,optic nerve)
    C. Demonstrates an understanding of anatomical landmarks and terminology
    D Understands the circulation properties (iris, retina, optic nerve, choroid)

II. Applies the Concepts of Pathology of the Eye - 10%
    A. Recognize and identify the ocular manifestations and associated findings of:
        1 systemic diseases
        2 vascular diseases
        3 retinal diseases
        4 optic nerve disorders
        5 inflammatory diseases
        6 ocular trauma
        7 ocular tumors
    B. Recognize and Identify the clinical findings relating to:
        1 diabetic retinopathy
        2 hypertensive retinopathy
        3 macular degeneration
        4 vascular occlusions
        5 ocular histoplasmosis
        6 central serous retinopathy
        7 toxoplasmosis
        8 cystoid macular edema
        9 macular hole
        10 angioid streaks
        11 macroaneurysm
        12 hereditary macular dystrophies
        13 malignant melanoma
        14 hemangioma
        15 retinoblastoma
        16 choroidal nevus
        17 optic atrophy
        18 optic neuritis
        19 glaucoma
        20 papilledema
        21 drusen
        22 uveitis
        23 retinal detachment
        24 retinopathy of prematurity
        25 sickle cell retinopathy
        26 cytomegalovirus retinitis
        27 anterior ischemic optic neuropathy
        28 coloboma
        29 Coats' disease
        30 epiretinal membrane
        31 retinal toxicity

III. Patient Management - 8%

A. Performs a patient flashlight examination to determine:
   1 contraindications to dilation:
      a. narrow angles
      b. contact lenses
      c. iris fixated/anterior chamber intraocular lens
   2 media conditions (e.g., scarring/cornea and lens)
   3 the presence of inflammation (e.g., infection)
B. Informs patient of procedures to be performed, pharmacologic agents to be administered, expected outcomes and potential side effects
C. Answers patient questions concerning the procedure
D. Elicits cooperation from uncooperative or physically disabled patients
E. Provides for written informed consent for angiography
F. Establishes/reviews patient records including:
   1 medical/surgical history
   2 allergies
   3 pregnancy
   4 ocular history
   5 photographic history
G. Administers prescribed drops
   1 maintains sterile technique
   2 performs punctal occlusion
   3 monitor and assess the effects of the drops
H. Recognizes and respond to adverse reactions to prescribed drops

IV. General Photography - Film - 3%

A. Stocks and inventories the photographic suite supplies
B. Understands the function and properties of the following:
   1 Film types including:
      a 35mm black and white
      b 35mm color transparency film
   2 Film properties including:
      a. ISO/film speed
      b. contrast
      c. exposure
      d. color balance
C. Demonstrates the use of the following image output equipment and materials:
   1 enlarger
   2 contact printer
   3 film processing equipment for black and white film
   4 automatic processing equipment for black and white film
   5 photographic papers
D. Demonstrates the ability to process black and white film:
   1 load reels and tanks to process film using:
      a. manual processing equipment
      b. automatic processing equipment
   2 select and use processing chemicals
   3 coordinate chemical temperature, dilution and timing with film exposure
   4 monitor processed film for:

        a. contrast

        b. density

        c. granularity

    5 prepare film for filing/viewing

E. Demonstrates the ability to print black and white film:

    1 use appropriate safe-light conditions

    2 generate a contact print with:

        a. an enlarger

        b. a contact printer

    3 generate a contact print:

        a. on paper

        b. on film

    4 generate an enlargement on paper

F. Recognizes and corrects processing and printing artifacts

V. General Photography - Digital - 7%

A. Demonstrate basic computer skills

B. Stock and inventory digital supplies

C. Understands the use of the following image acquisition equipment and properties:

    1 Understands the function and components of the digital camera including:

        a. still digital camera

        b. digital video

        c. CPU (central processing unit)

        d. archiving devices and media

    2 Performs routine maintenance and equipment troubleshooting including:

        a. electronic components

        b. cleaning equipment including relay lenses

        c. software maintenance

        d. storage utilization

        e. monitor calibration

    3 Understands digital imaging properties including:

        a. resolution

        b. ISO rating/gain/noise

        c. dynamic range

        d. contrast

        e. exposure control

        f. color balance

        g. bit depth

        h file formats

D. Understands the use of image overlays

E. Understands the use of measurement utilities

F. Understands digital darkroom and printing

G. Demonstrates image processing skills related to output:
    1 proofsheet production
    2 file format/compression
    3 resolution selection
    4 contrast enhancement
    5 sharpening
    6 brightness
    7 color balance
    8 resampling
    9 scaling
H. Recognizes sources and corrects conditions causing artifacts on digital images

VI. Data and Image Management - 3%
A. Has a working knowledge of the photo editing software
B. Organizes archival systems for film and digital images
C. Coordinates network file transfers for archiving/patient data base systems

VII. Patient/Operator Safety - 2%
A. Demonstrates proficiency in CPR
B. Adheres to Universal Precautions as defined by the Centers for Disease Control and Prevention (CDC)
C. Observes Occupational Safety and Health Administration (OSHA) and The National Institute for Occupational Safety and Health (NIOSH) regulations relating to ophthalmic photography
D. Understands HIPPA confidentially and privacy regulations relating to ophthalmic photography

VIII. Fundus Photography - 22%
A. Performs routine maintenance and equipment troubleshooting including:
    1 replacing viewing bulbs and flash tubes
    2 replacing fuses
    3 cleaning equipment, including lenses
B. Demonstrates the techniques of image production:
    1 set reticle for accommodative correction
    2 verify filter positions
    3 establish photographic plan
    4 adjust photographic plan during photography in response to unusual situations or findings
    5 set viewing angle
    6 set flash power
    7 set shutter/flash synchronization
    8 position patient for photography
    9 establish fixation
    10 establish alignment and focus
    11 recognize the need for diopter compensation
    12 perform fundus photography:
        a. non-stereoscopic
        b. stereoscopic
        c. using astigmatic correction device
        d. monochromatic
    13 perform anterior segment photography with a fundus camera to document:
        a. media opacities

IX. Fluorescein Angiography - 22%
    A. Performs Fluorescein Angiography including:
        1 make preparations for IV fluorescein injection
        2 perform red free photography:
            a.   non-stereoscopic images
            b.   stereoscopic images
        3 take a control photograph
        4 coordinate photographic sequence with the administration of dye
        5 acquire angiographic sequence of:
            a. non-stereoscopic images
            b. stereoscopic images
        6 monitor and assesses patient response to the procedure
        7 respond to any adverse reactions
    B. Understands the theory of luminescence including:
        1 fluorescence
        2 pseudo and auto fluorescence
        3 excitation filters
        4 barrier filters
    C. Uses monochromatic filters including:
        1 red-free
        2 green-free
    D. Performs descriptive angiographic interpretation by recognizing:
        1 the phases of circulation including:
            a. early phase (filling phase)
            b. mid phase
             c. late phase
        2 the mechanisms of hyperfluorescence including:
            a. transmission
            b. leakage
            c. staining/pooling
        3 the mechanisms of hypofluorescence including:
            a. blockage
            b. filling defects
        4 anatomical location of lesions

X. Indocyanine Green (ICG) Angiography - 2%
    A. Performs ICG Angiography
    B. Uses exciter and barrier filters
    C. Performs descriptive angiographic interpretation by recognizing:
        1 the phases of circulation
        2 the mechanisms of "hyperfluorescence"
        3 the mechanisms of "hypofluorescence"
        4 the anatomical location of lesions

XI. Optical Coherence Tomography (OCT) - 3%
- A. Performs OCT imaging:
    - 1 glaucoma
    - 2 retinal
- B. Understands and applies scanning protocols
- C. Understands and selects analysis protocols

XII. Pharmacology - 8%
- A. Understands and recognizes the properties and effects of pharmacologic agents used for ophthalmic photography:
    - 1 topically administered:
        - a. miotics
        - b. mydriatics
        - c. cycloplegics
        - d. anesthetics
    - 2 intravenously administered:
        - a. sodium fluorescein
        - b. indocyanine green (ICG)
    - 3 oral administration of sodium fluorescein
    - 4 significance of patient's age and weight
- B. Understands and Recognizes contraindications and adverse reactions to:
    - 1 topical agents
    - 2 intravenous agents (e.g. fluorescein, indocyanine green)
- C. Monitors for potential contaminations

Practical Examination Content Outline

I. Patient Management - 5%
      A. Administers prescribed drops
      B. Verifies physician's orders
      C. Maintains sterile technique

II. General Photography - Film - 10%
      A. Demonstrates the use of manual film processing equipment for black and white film:
          1 load reels and tanks to process film
          2 select and use processing chemicals
          3 coordinate chemical temperature, dilution and timing with film exposure

VIII. Fundus Photography - 35%
      A. Demonstrates the techniques of image production:
          1 set reticle for accommodative correction
          2 verify filter positions
          3 establish photographic plan
          4 adjust photographic plan during photography in response to unusual
              situations or findings
          5 set viewing angle
          6 set flash power
          7 set viewing light
          8 position patient for photography
          9 establish fixation
          10 establish alignment and focus
          11 recognize the need for diopter compensation
          12 perform fundus photography:
              a.   non-stereoscopic
              b.   stereoscopic
              c.   monochromatic
          13 perform anterior segment photography with a fundus camera to document:
              a.   media opacities
              b.   gross anterior pathologies

IX. Fluorescein Angiography - 50%
      A. Performs Fluorescein Angiography including:
          2 perform red free photography:
              a.   non-stereoscopic images
              b.   stereoscopic images
          3 take a control photograph
          4 coordinate photographic sequence with the administration of dye
          5 acquire angiographic sequence of:
              a.   non-stereoscopic images
              b.   stereoscopic images
      B. Uses a red-free monochromatic filter

Appendix J

Final Content Outline Weighting
of the
Performance and Multiple-Choice Examinations

Comparative Job Analysis Results: Content Area Weighting

Written Examination

Content Area	Multiple-Choice		
	2001	2004	% change
Anatomy	5%	combined	
Physiology	10%	10%	-5%
Pathology	15%	10%	-5%
Patient Management	16%	8%	-8%
General Photography - Film	7%	3%	-4%
General Photography - Digital	7%	7%	-
Data and Image Management	-	3%	+3%
Patient/Operator Safety	2%	2%	-
Fundus Photography	15%	22%	+7%
Fluorescein Angiography	15%	22%	+7%
Indocyanine green (ICG) Angiography	-	2%	+2%
Optical Coherence Tomography (OCT)	-	3%	+3%
Pharmacology	8%	8%	-

Performance Examination

	2001	2004	% change
Patient Management	9%	5%	-4%
General Photography Skills (Film)	35%	10% (now General Photography Film)	-25%
Fundus Photography	34%	35%	+1%
Fluorescein Angiography	22%	50%	+28%

Addendum

Schroeder Measurement Technologies

April 13, 2005

Ophthalmic Photographer's Society
Certified Retinal Angiographer – Board of Certification
Beth Ann Benetz, MA, CRA – President
Members of the Board of Certification
University Hospitals of Cleveland
11100 Euclid Ave, Wearn Building, Room 633
Cleveland, OH 44106

Dear Beth Ann and Members of the Board:

This correspondence serves as an Addendum to the Ophthalmic Photographers' Society Board of Certification *Job Analysis of the Practice of Retinal Angiography in North America*, dated December, 2004. This Job Analysis was performed in support of the Certified Retinal Angiographer (CRA) Program.

A test development meeting for the CRA examination was held in Cleveland, Ohio, on March 19, 2005. Participants in this meeting included members of the Board of Certification and Subject Matter Experts recruited to represent the diversity of practice, gender, age, experience, and ethnicity among Certified Retinal Angiographers practicing in North America. Please see Appendix A for a complete listing of participants.

Through the process of developing tasks for the CRA Performance Examination, the SMEs identified that the Patient Management portion of the examination was most readily assessed using a written examination model. The tasks associated with Patient Management identified for inclusion on the Performance Examination, —Administering Prescribed Drops, Verifying Physician's Orders, and Maintaining Sterile Technique —were all dependant on the performance of a slit-lamp examination required to identify patients with narrow angles, for whom drop administration is contraindicated. The Committee reached consensus that performance of a slit-lamp examination was both technically impractical and difficult to assess objectively in a Performance Examination setting. Consensus was reached that these three tasks could be most effectively and practically assessed using the Written Examination. These three tasks and the related sub-tasks were already included in the Written Examination Content Outline.

Subsequently, these tasks were eliminated from the Performance Examination. Since all three tasks were represented on the Written Examination, no alteration to the Written Outline was required. The content area weighting of the Performance Examination was shifted slightly to reflect the elimination of these tasks, with distribution of the 5% weighting previously assigned to Patient Management distributed equally between Fundus Photography (3%) and Fluorescein

Angiography (2%). Please see Appendix B reflecting these changes to the Performance Examination.

This Addendum has been put into place prior to the release of the Job Analysis results to the general public. Therefore, no formal announcement is required: the Addendum should be reflected in the general notification to the public, and CRA Applicants in particular, in the Candidate Handbook and posted information concerning the CRA Examinations.

Please let me know if you have any questions or concerns.

Yours truly,

Kate Windom
Vice-President, Eastern Division

c.c.   Reed Castle, Ph.D., Director - Research and Development
          Schroeder Measurement Technologies, Inc.

/Attachments: Appendix A- SME Participant Listing
                        Appendix B- CRA Performance Examination Content Outline, revised
                              4/12/2005

/Sent via email

Appendix A

**Subject Matter Expert Participants: Examination Development Workshop
March 19, 2005, Cleveland, Ohio**

Ditte J. Hess, CRA   Miami, Florida
John DuBois, CRA   Cleveland, Ohio
Jacqui Bureau, CRA   Montreal, Quebec, Canada
Timothy Bennet, CRA,   Langhorne, Pennsylvania
Joseph Schmidt, CRA ,COA   Salisbury, Maryland
Stephen Travers, CRA   Fort Worth, Texas
Steph Burke, CRA   University Heights, OH
Lon Dowell, CRA   Dublin, California
Ellen Burnside, CRA   Cleveland, Ohio
Kevin Langton,   West Orange, New Jersey

Note: Affidavits of Non-Disclosure and Demographic profiles were completed by all participants and are available upon request.

Multiple Choice Content Outline

I. Applies the Principles of the Anatomy and Physiology of the Eye - 10%
    A. Demonstrates an understanding of external ocular structures
    B. Demonstrates an understanding of anterior and posterior segment structures
        1 anterior structures: (cornea, anterior chamber, iris, lens)
        2 posterior structures:(vitreous, retina, pigment epithelium, choroid,optic nerve)
    C. Demonstrates an understanding of anatomical landmarks and terminology
    D Understands the circulation properties (iris, retina, optic nerve, choroid)

II. Applies the Concepts of Pathology of the Eye - 10%
    A. Recognize and identify the ocular manifestations and associated findings of:
        1 systemic diseases
        2 vascular diseases
        3 retinal diseases
        4 optic nerve disorders
        5 inflammatory diseases
        6 ocular trauma
        7 ocular tumors
    B. Recognize and Identify the clinical findings relating to:
        1 diabetic retinopathy
        2 hypertensive retinopathy
        3 macular degeneration
        4 vascular occlusions
        5 ocular histoplasmosis
        6 central serous retinopathy
        7 toxoplasmosis
        8 cystoid macular edema
        9 macular hole
      10 angioid streaks
      11 macroaneurysm
      12 hereditary macular dystrophies
      13 malignant melanoma
      14 hemangioma
      15 retinoblastoma
      16 choroidal nevus
      17 optic atrophy
      18 optic neuritis
      19 glaucoma
      20 papilledema
      21 drusen
      22 uveitis
      23 retinal detachment
      24 retinopathy of prematurity
      25 sickle cell retinopathy
      26 cytomegalovirus retinitis
      27 anterior ischemic optic neuropathy
      28 coloboma
      29 Coats' disease
      30 epiretinal membrane
      31 retinal toxicity

III. Patient Management - 8%

A. Performs a patient flashlight examination to determine:
    1 contraindications to dilation:
        a.   narrow angles
        b.   contact lenses
        c.   iris fixated/anterior chamber intraocular lens
    2 media conditions (e.g., scarring/cornea and lens)
    3 the presence of inflammation (e.g., infection)

B. Informs patient of procedures to be performed, pharmacologic agents to be administered, expected outcomes and potential side effects

C. Answers patient questions concerning the procedure

D. Elicits cooperation from uncooperative or physically disabled patients

E. Provides for written informed consent for angiography

F. Establishes/reviews patient records including:
    1 medical/surgical history
    2 allergies
    3 pregnancy
    4 ocular history
    5 photographic history

G. Administers prescribed drops
    1 maintains sterile technique
    2 performs punctal occlusion
    3 monitor and assess the effects of the drops

H. Recognizes and respond to adverse reactions to prescribed drops

IV. General Photography - Film - 3%

A. Stocks and inventories the photographic suite supplies

B. Understands the function and properties of the following:
    1 Film types including:
      a   35mm black and white
      b   35mm color transparency film
    2 Film properties including:
      a.   ISO/film speed
      b.   contrast
      c.   exposure
      d.   color balance

C. Demonstrates the use of the following image output equipment and materials
    1 enlarger
    2 contact printer
    3 film processing equipment for black and white film
    4 automatic processing equipment for black and white film
    5 photographic papers

D. Demonstrates the ability to process black and white film:
    1 load reels and tanks to process film using:
      a.   manual processing equipment
      b.   automatic processing equipment
    2 select and use processing chemicals
    3 coordinate chemical temperature, dilution and timing with film exposure
    4 monitor processed film for:

a. contrast

　　　　b. density

　　　　c. granularity

　　5 prepare film for filing/viewing

　E. Demonstrates the ability to print black and white film:

　　1 use appropriate safe-light conditions

　　2 generate a contact print with:

　　　　a. an enlarger

　　　　b. a contact printer

　　3 generate a contact print:

　　　　a. on paper

　　　　b. on film

　　4 generate an enlargement on paper

　F. Recognizes and corrects processing and printing artifacts

V. General Photography - Digital - 7%

　A. Demonstrate basic computer skills

　B. Stock and inventory digital supplies

　C. Understands the use of the following image acquisition equipment and properties:

　　1 Understands the function and components of the digital camera including:

　　　　a. still digital camera

　　　　b. digital video

　　　　c. CPU (central processing unit)

　　　　d. archiving devices and media

　　2 Performs routine maintenance and equipment troubleshooting including:

　　　　a. electronic components

　　　　b. cleaning equipment including relay lenses

　　　　c. software maintenance

　　　　d. storage utilization

　　　　e. monitor calibration

　　3 Understands digital imaging properties including:

　　　　a. resolution

　　　　b. ISO rating/gain/noise

　　　　c. dynamic range

　　　　d. contrast

　　　　e. exposure control

　　　　f. color balance

　　　　g. bit depth

　　　　h file formats

　D. Understands the use of image overlays

　E. Understands the use of measurement utilities

　F. Understands digital darkroom and printing

G. Demonstrates image processing skills related to output:
    1 proofsheet production
    2 file format/compression
    3 resolution selection
    4 contrast enhancement
    5 sharpening
    6 brightness
    7 color balance
    8 resampling
    9 scaling
H. Recognizes sources and corrects conditions causing artifacts on digital images

VI. Data and Image Management - 3%
A. Has a working knowledge of the photo editing software
B. Organizes archival systems for film and digital images
C. Coordinates network file transfers for archiving/patient data base systems

VII. Patient/Operator Safety - 2%
A. Demonstrates proficiency in CPR
B. Adheres to Universal Precautions as defined by the Centers for Disease
    Control and Prevention (CDC)
C. Observes Occupational Safety and Health Administration (OSHA) and The National
    Institute for Occupational Safety and Health (NIOSH) regulations relating to
    ophthalmic photography
D. Understands HIPPA confidentially and privacy regulations relating to
    ophthalmic photography

VIII. Fundus Photography - 22%
A. Performs routine maintenance and equipment troubleshooting including:
    1 replacing viewing bulbs and flash tubes
    2 replacing fuses
    3 cleaning equipment, including lenses
B. Demonstrates the techniques of image production:
    1 set reticle for accommodative correction
    2 verify filter positions
    3 establish photographic plan
    4 adjust photographic plan during photography in response to unusual
        situations or findings
    5 set viewing angle
    6 set flash power
    7 set shutter/flash synchronization
    8 position patient for photography
    9 establish fixation
    10 establish alignment and focus
    11 recognize the need for diopter compensation
    12 perform fundus photography:
        a. non-stereoscopic
        b. stereoscopic
        c. using astigmatic correction device
        d. monochromatic
    13 perform anterior segment photography with a fundus camera to document:
        a. media opacities
        b. gross anterior pathologies

IX. Fluorescein Angiography - 22%
    A. Performs Fluorescein Angiography including:
        1 make preparations for IV fluorescein injection
        2 perform red free photography:
            a.   non-stereoscopic images
            b.   stereoscopic images
        3 take a control photograph
        4 coordinate photographic sequence with the administration of dye
        5 acquire angiographic sequence of:
            a.   non-stereoscopic images
            b.   stereoscopic images
        6 monitor and assesses patient response to the procedure
        7 respond to any adverse reactions
    B. Understands the theory of luminescence including:
        1 fluorescence
        2 pseudo and auto fluorescence
        3 excitation filters
        4 barrier filters
    C. Uses monochromatic filters including:
        1 red-free
        2 green-free
    D. Performs descriptive angiographic interpretation by recognizing:
        1 the phases of circulation including:
            a. early phase (filling phase)
            b. mid phase
            c. late phase
        2 the mechanisms of hyperfluorescence including:
            a. transmission
            b. leakage
            c. staining/pooling
        3 the mechanisms of hypofluorescence including:
            a. blockage
            b. filling defects
        4 anatomical location of lesions

X. Indocyanine Green (ICG) Angiography - 2%
    A. Performs ICG Angiography
    B. Uses exciter and barrier filters
    C. Performs descriptive angiographic interpretation by recognizing:
        1 the phases of circulation
        2 the mechanisms of "hyperfluorescence"
        3 the mechanisms of "hypofluorescence"
        4 the anatomical location of lesions

XI. Optical Coherence Tomography (OCT) - 3%
- A. Performs OCT imaging:
    - 1 glaucoma
    - 2 retinal
- B. Understands and applies scanning protocols
- C. Understands and selects analysis protocols

XII. Pharmacology - 8%
- A. Understands and recognizes the properties and effects of pharmacologic agents used for ophthalmic photography:
    - 1 topically administered:
        - a. miotics
        - b. mydriatics
        - c. cycloplegics
        - d. anesthetics
    - 2 intravenously administered:
        - a. sodium fluorescein
        - b. indocyanine green (ICG)
    - 3 oral administration of sodium fluorescein
    - 4 significance of patient's age and weight
- B. Understands and Recognizes contraindications and adverse reactions to:
    - 1 topical agents
    - 2 intravenous agents (e.g. fluorescein, indocyanine green)
- C. Monitors for potential contaminations

Practical Examination Content Outline
Revised April 12, 2005

I. General Photography - Film - 10%
- A. Demonstrates the use of manual film processing equipment for black and white film:
    - 1 load reels and tanks to process film
    - 2 select and use processing chemicals
    - 3 coordinate chemical temperature, dilution and timing with film exposure

II. Fundus Photography - 38%
- A. Demonstrates the techniques of image production:
    - 1 set reticle for accommodative correction
    - 2 verify filter positions
    - 3 establish photographic plan
    - 4 adjust photographic plan during photography in response to unusual situations or findings
    - 5 set viewing angle
    - 6 set flash power
    - 7 set viewing light
    - 8 position patient for photography
    - 9 establish fixation
    - 10 establish alignment and focus
    - 11 recognize the need for diopter compensation
    - 12 perform fundus photography:
        - a. non-stereoscopic
        - b. stereoscopic
        - c. monochromatic
    - 13 perform anterior segment photography with a fundus camera to document:
        - a. media opacities
        - b. gross anterior pathologies

III. Fluorescein Angiography - 52%
- A. Performs Fluorescein Angiography including:
    - 2 perform red free photography:
        - a. non-stereoscopic images
        - b. stereoscopic images
    - 3 take a control photograph
    - 4 coordinate photographic sequence with the administration of dye
    - 5 acquire angiographic sequence of:
        - a. non-stereoscopic images
        - b. stereoscopic images
- B. Uses a red-free monochromatic filter