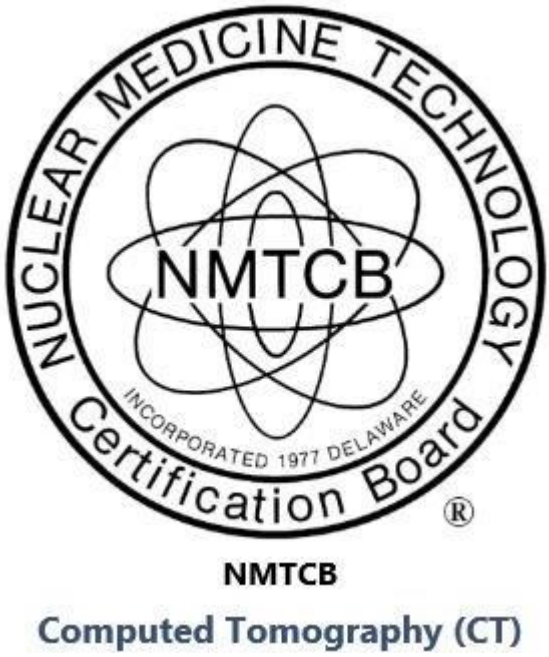
The Nuclear Medicine Technology Certification Board



Certified Computed Tomography

Job Analysis Report

July, 2020

Performed for:
The Nuclear Medicine Technology Certification Board

Prepared by:
Rachel Araujo, Manager, Assessment & Psychometric Services
Joy Wang, Ph.D., Manager of Psychometric Services
Schroeder Measurement Technologies LLC

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TABLE OF CONTENTS

Executive Summary

In November of 2019, the Nuclear Medicine Technology Certification Board (NMTCB), (The Board), undertook a full-scale Job Analysis (JA) study of the role of the Certified Computed Tomography (CT) technologist, creating a survey of the knowledge elements required of competent entry level practice. The results of this survey provide support for the relevance, validity, and legal defensibility of the CT credentialing program by establishing a correlation between what is done on-the-job and successful examination performance. In support of these efforts, the board contracted with Schroeder Measurement Technologies LLC (SMT), to develop and conduct an online survey describing a minimally-competent, entry level CT technologist.

The survey was developed beginning in September 2019 with the performance of a literature search of the role and a series of interviews of practicing CT technologists. The board assembled a Job Analysis Advisory Committee (the Committee) comprised of representatives from the board as well as other subject matter experts (SMEs). They represented diversity of practice, experience, geographic location, education, ethnic backgrounds, and high-level professional expertise. After a call for information was sent out (see Appendix A) the Job Analysis survey outline was developed.

The literature search findings were used to develop an exhaustive list of the skills required for competent practice. This list was presented to the SME Advisory Committee for review and approval at a two-day meeting in Georgia. A rating scale was adopted, providing a mechanism for measuring task criticality and frequency of practice. A demographic questionnaire was developed to gather confidential data describing the survey respondents, and the task list was converted into an online survey questionnaire. The survey was beta tested, and the first invitations to respondents were issued March 2020.

Over 97% of the respondents indicated that the survey either completely or adequately described the critical knowledge, skills, and abilities (KSAs) required for competent practice as a CT technologist. This supports a high degree of confidence that the survey depth was reflective of practice across geographic settings, and among various work-practice settings. The internal consistency of the survey ratings was evaluated using the Cronbach Alpha reliability estimate, calculated at 0.99. This statistic is bound between 0 and 1, with values closer to 1 indicating higher instrument reliability, and coefficients of 0.7 or higher deemed acceptable. The 0.99 calculation for this survey therefore indicates that the survey has very high internal consistency.

A second Advisory Committee meeting was held via webinar in July 2020, to consider and review the results of the survey analysis. The primary goal of this meeting was to establish task exclusion criteria to differentiate between the critical and non-critical tasks.

Once the outline was finalized the content area weightings for the seven main content areas were established. The final content outline was reviewed for syntax and readability, and adopted with recommended content area weighting. The final outline for the examination is found in Appendix I.

Introduction

Survey Overview: The Content Validation Model

The foundation of a valid, reliable, and legally defensible professional registration 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 registration examination 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 *Standards for Educational and Psychological Testing (American Educational Research Association, American Psychological Association, and the National Council on Measurement in Education)* 2014, state:

> Standard 11.3
> When test content is a primary source of validity evidence in support of the interpretation for the use of a test for employment decisions or credentialing, a close link between test content and the job or professional/occupational requirements should be demonstrated.
>
> Standard 11.13
> 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 and evidence should be provided to support a claim that the knowledge or skills being assessed are required for credential-worthy performance in that occupation and are consistent with the purpose for which the credentialing program was instituted.

Purpose of the Job Analysis Study

To support the Board's goal of maintaining a certification examination program that meets or exceeds international psychometric standards, a Job Analysis survey was launched in March 2020. This report reflects data compiled from the performance of this survey. The NMTCB enlisted the services of Schroeder Measurement Technologies, Inc. (SMT), a Prometric company, to establish and implement a survey instrument describing the knowledge, skills, and abilities (KSAs) required for competent, entry level practice as a CT technologist, practicing in a variety of settings in the U.S. Psychometric standards suggest that Job Analysis research, conducted in support of the development of content for certification, may be performed in a variety of ways. Professions with small numbers of practitioners find it practical to conduct focus-group reviews of the professional role. Professions with a large population of well-identified registrants, benefit from the range and focus provided by a large-scale survey model. The Advisory Committee felt that an adequate number of CTs would be willing to participate in an online survey. Therefore, the model adopted for this study was an online task survey querying relative importance and frequency data (*How critical is the task? Is the task performed?*), providing content validity support to the design of the NMTCB CT examination.

It is well recognized that as professions change over time, the exhaustive nature of the listing becomes critical: only by describing *all* of the tasks that CT technologists perform do we establish confidence that the survey adequately describes the role. In support of this task, psychometric staff and content area specialists must work together to create a profile of today's professional. In

support of this goal the Board recruited nine (9) subject matter experts (SMEs) to serve as a Job Analysis Advisory Committee (appendix A, Table A1) made up of working CT technologists. These experts made up a diverse group of CT technologists representing the various pathways to the profession, and diversity in areas of education, experience, practice settings, and geographical location reflective of practice today. The Advisory Committee members were asked to complete affidavits of nondisclosure, and to provide demographic information. The affidavits and demographic information are on file, but are not included in this report in deference to the sensitive nature of the data.

Survey Methodology

Content Review and Survey Design

In support of the development of the survey task listing, a full-scale literature search was performed, which included analysis of:

- The current Content Outline of the Certified CT technologist examination;
- A comprehensive literature search including:
  - Curricula of Nuclear Medicine Technology educational programs;
  - Periodicals;
  - Federal rules and regulations;
  - Standards and scopes of practice;
  - Approved texts and training materials from training programs, secondary educators, and continuing education providers; and,
  - Board policy statements, procedures, and rules.

The resulting draft task listing was used by SMT staff and the SME Advisory Committee to develop the Job Analysis survey outline, and accomplish the following survey support tasks:

- Provide background information about the profession;
- Review and approve the draft task list;
- Develop a rating scale;
- Develop a demographic questionnaire; and,
- Establish a sampling protocol.

The Job Analysis meeting, held November 16–17, 2019, in Atlanta, Ga., opened with the SME Advisory Committee members receiving and participating in training concerning the role of the Job Analysis in the certification cycle (see Appendix A, Table A-1 for introduction materials and meeting agenda), and discussion addressing the following concepts:

1. The Role of a Job Analysis in a Certification Program: The Committee was provided with an overview of the tasks that make up the full cycle of research, development, application, examination, psychometric review, and continuing education. Discussion centered on exactly how, why, and where the conduct of a Job Analysis fits into the cycle, and how a properly-executed and applied Job Analysis supports program content validity and legal defensibility.

2. *Entry Level, Minimal Competency:* In order to assess the meaningfulness of the task listing, and its inclusiveness of the knowledge, skills, and abilities (KSAs) describing competent practice, it was first necessary to fully develop the concept of the entry level, minimally-competent CT technologist. An important preamble to the discussion was an explanation that minimal competence does not mean low or poor levels of competence, but instead a high level of professionalism and skills representing the point of demarcation between the competent practitioner and those who are not. Likewise, entry level does not mean an entry level job, but the significant amount of training and practical experience that represents the competent CT practice.

To accomplish this task the Committee discussed the relationship among skills that are common among practice settings (e.g., inpatient facility, hospital outpatient, research, etc.). The Committee also discussed the fact that the CT certification represents a comprehensive body of skills that are expected to represent transferable competency among practice settings and locations.

3. *Computed Tomography Certification Eligibility:* Germaine to the formulation of the profile of the minimally-competent entry level candidate was a review of the eligibility requirements for the CT. The information below describes those requirements and the different pathways to practice.

I. A current active NMTCB, ARRT, or CAMRT nuclear medicine technology certification OR a current active CAMRT(RT), CAMRT(RTT), ARRT(R) or ARRT(T) certification.

II. A minimum of 300 total clinical hours in PET/CT, SPECT/CT and/or CT, with documented performance of a minimum of 10 different procedures for a total of 50 repetitions. The expectation of these diagnostic clinical hours is to include:
    - Medications and Contrast Agents
    - System Operations and Instrumentation
    - Data Acquisition and Post Processing
    - CT Image Quality and Quality Assurance
    - Procedures and Anatomy

III. The completion of a minimum of thirty-five (35) contact hours within the three years prior to application including a minimum of four (4) hours of each of the following categories:
    - Contrast administration
    - Cross-sectional anatomy
    - X-ray physics
    - CT radiation safety

List of Tasks and Knowledge, Skills, and Abilities (KSAs)

The Committee next reviewed the assembled KSA listing, identifying all knowledge elements associated with current practice. The Committee felt it was best to be as inclusive as possible of the range of practice, to enable the collection of responses across the importance and frequency scales.

Survey Rating Scales
The task listing was placed into a survey format that included a welcome and instructions. The survey also contained a demographic questionnaire and one survey query for each KSA that addressed both importance and frequency, along with instructions on how to rate tasks that were not performed (see Appendix B).

Demographic Questionnaire
After finalizing the content outline and survey questions, the Advisory Committee developed a list of demographic questions to pose to respondents in order to provide insight into respondent background information. There were also two prerequisite questions that determined respondent eligibility. Respondents had to answer yes to one of the two questions in order to be admitted into the survey:

1. Are you currently a certified or licensed Computed Tomography technologist?
2. Do you perform Computed Tomography procedures as part of your current job role?

The following demographic questions were approved for inclusion on the survey:

1. When did you attend a formal Computed Tomography training program?
2. What was the nature of the department where you trained in Computed Tomography?
3. What is your highest level of education?
4. How many years have you been practicing as a Computed Tomography technologist?
5. What primary certification do you hold?
6. Do you hold any additional certifications?
7. In what capacity are you employed as a Computed Tomography technologist?
8. What percentage of your time is spent performing Computed Tomography procedures?
9. What is your primary work setting?
10. Which of the following BEST describes the primary focus of your current practice?
11. In what geographic location do you practice?
12. How would you describe your primary practice setting location?

Post-Survey Questions
In addition to the demographic questions, which appeared at the beginning of the survey, there were also several post-survey questions included to gather additional information. The first post-survey question asked respondents to rate the adequacy of the scope of the survey. A second question offered respondents the opportunity to identify any tasks they believed were left off the survey. Finally, respondents were asked to indicate content area weighting for the five content areas within the KSA listing, providing information to be used to establish content area weightings within the final examination outline. The full text of the survey may be found in Appendix B.

Sampling Methodology
The board decided on administration of an online survey. Use of the internet to issue invitations and run the survey ensured that the entire population of known NMTCBs would receive invitations to participate.

Before the survey was posted and opened to general participation, a beta test was performed by members of the Committee who logged on and tested all aspects of the survey. Data collection results were confirmed and minor edits and changes were made to ensure that the survey was easy

to use, the language understandable, and all selection choices and text box collections were functioning properly. The survey was posted live on March 17 and ran through May 26. Low response rates were expected due to the COVID-19 pandemic so the Board opted to extend the timeframe of the survey. Reminder emails were sent frequently to encourage participation.

Data Collection and Analyses

After the close of the survey administration window, data were collected and calculations were performed using both R and Microsoft Excel® computer programs. This report and Appendices E, F, G, and H provide the following analyses:

- Survey adequacy and reliability statistics;
- Summary statistics of demographic results;
- Mean frequency and importance ratings in survey order by task;
- Mean frequency ratings of tasks/KSAs not performed;
- Mean importance ratings of the tasks/KSAs; and,
- Mean importance ratings by experience and practice specialty subgroups.

Survey Results

On July 9, 2020, another SME Advisory Committee meeting was held as a webinar with the objective of reviewing and analyzing the survey results. The Committee members were provided with summary demographic data, survey response data, and a list of tasks left off the survey for consideration prior to the meeting.

The meeting was accomplished via webinar using computer-screen shared projection and PowerPoint® displays. Committee member feedback and discussion supported the performance of the following tasks:

1. Review of the sampling methodology, response rate, adequacy and reliability;
2. Review of the demographic data;
3. Establish the profile of the "typical" NMTCB CT Job Analysis respondent;
4. Develop the task exclusion criteria for importance;
5. Develop the task exclusion criteria for frequency/not performed;
6. Review comments concerning tasks left off the survey;
7. Review the respondent subgroup analyses for experience, geographic region of practice, practice setting and region type;
8. Determine the appropriateness of the task for assessment (*Can the task be assessed on a multiple-choice examination?*);
9. Develop and approve the examination final content outline describing the KSAs required for competent practice as a CT technologist;
10. Establish the main content domain weightings;
11. Review the candidate eligibility and recertification requirements, linking those requirements to the Job Analysis results.
12. Establish future steps
    a. Review the test question banks for fit with the new content outline
    b. Write new questions to address new/updated content

The survey results are divided into the following three sections:

1. Survey adequacy and reliability information;
2. Demographic results; and,
3. Frequency, importance, and subgroup rating analyses.

Survey Adequacy and Reliability Information

Survey Adequacy

At the end of the survey, respondents were asked to rate the effectiveness of the survey in identifying essential task elements performed by a CT technologist. Approximately 97% of respondents (252) indicated that the survey either adequately or completely covered the essential tasks performed by a CT technologist (Figure 1).

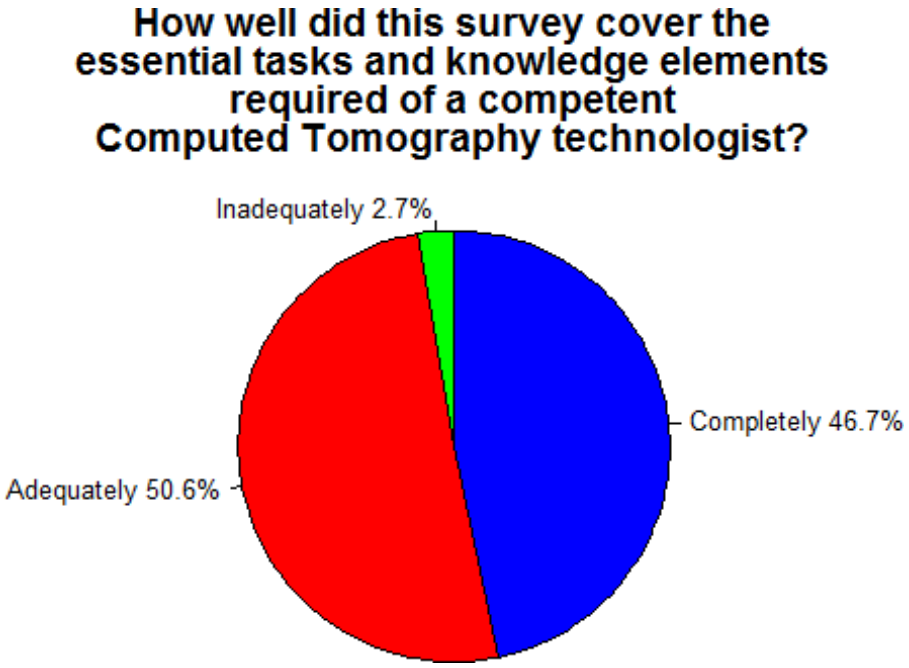


FIGURE 1. ***Survey adequacy.***

Response	Frequency	Percent
Inadequately	7	**2.7**
Adequately	131	**50.6**
Completely	121	**46.7**
Total	**259**	**100.0**

Missing Task Elements and KSAs

At the end of the survey, respondents were asked for feedback on tasks and knowledge elements they felt were missing in the survey. These free-text unedited responses may be found in Appendix C, Table C-1.

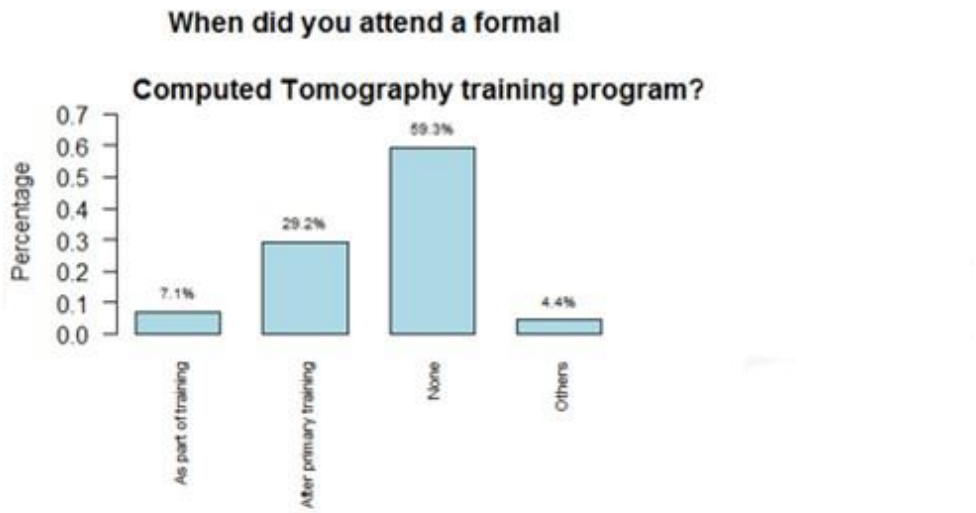
Reliability Estimate

The Cronbach's Alpha reliability estimate was calculated to evaluate the internal consistency of the importance ratings. This statistic is bound between 0 and 1, with higher values indicating higher reliability, meaning that ratings obtained from the survey are reliable and consistent. As a general rule, reliability estimates at or above 0.7 are considered acceptable. For this survey, Cronbach's Alpha was 0.99 for the importance ratings, indicating that the ratings obtained were highly reliable.

Demographic Results

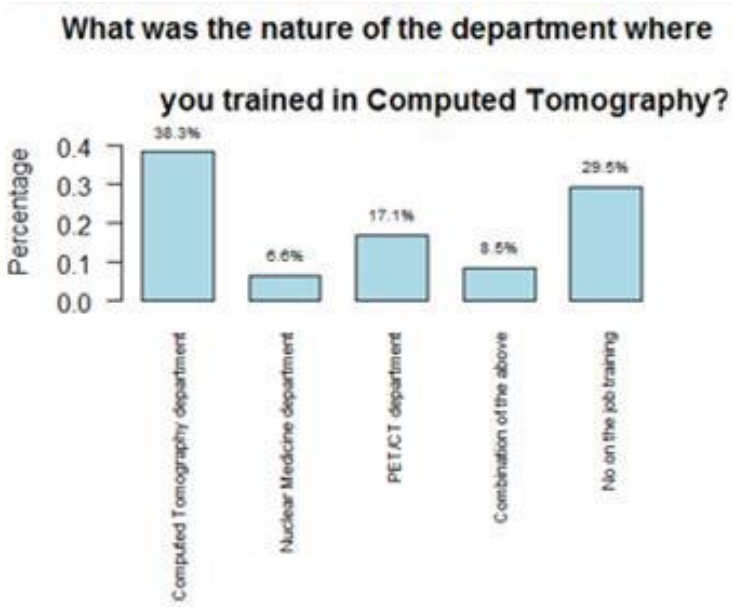
Under each question, graphics represent the results of survey participant answers to the survey questions.

Question 1. When did you attend a formal Computed Tomography training program?



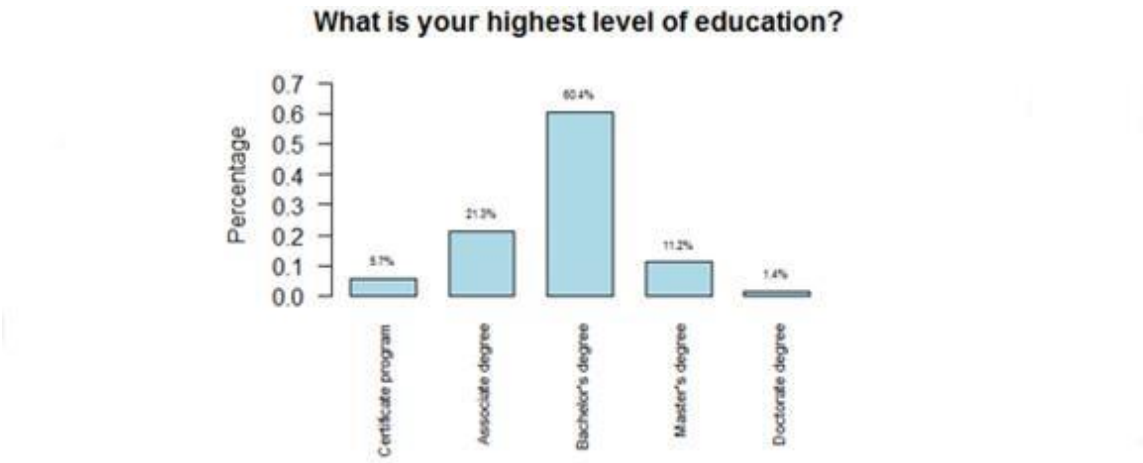
Response	Frequency	Percent
As part of training	26	7.1
After primary training	107	29.2
None	217	59.3
Others	16	4.4
Total	366	100.0

Question 2. What was the nature of the department where you trained in Computed Tomography?



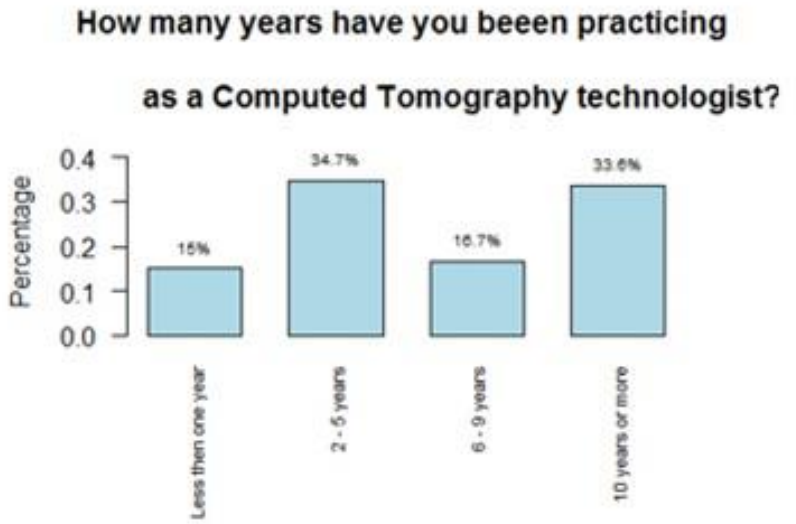
Response	Frequency	Percent
Dedicated Computed Tomography department	139	38.3
Nuclear Medicine department	24	6.6
PET/CT department	62	17.1
Radiation therapy department	0	0.0
Combination of the above	31	8.5
No on the job training	107	29.5
Total	363	100.0

Question 3. What is your highest level of education?



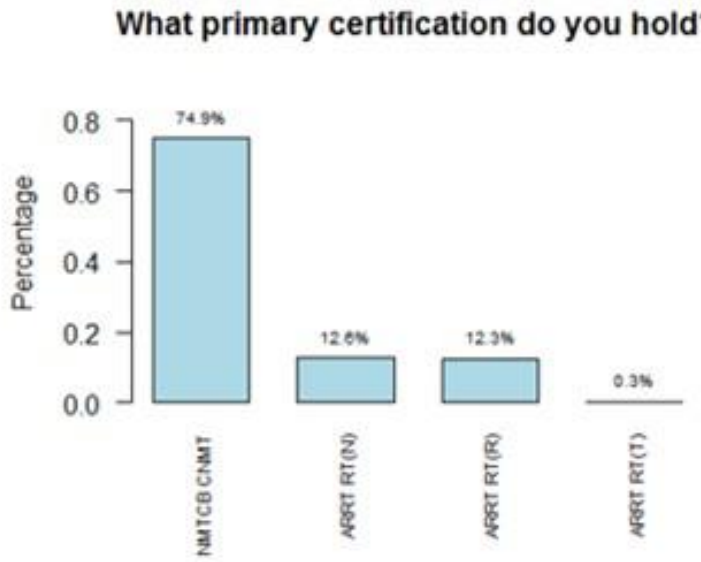
Response	Frequency	Percent
High school diploma or equivalent	0	0.0
Certificate program	21	5.7
Associate degree	78	21.3
Bachelor's degree	221	60.4
Master's degree	41	11.2
Doctorate degree	5	1.4
Total	366	100.0

Question 4. How many years have you been practicing as a Computed Tomography technologist?



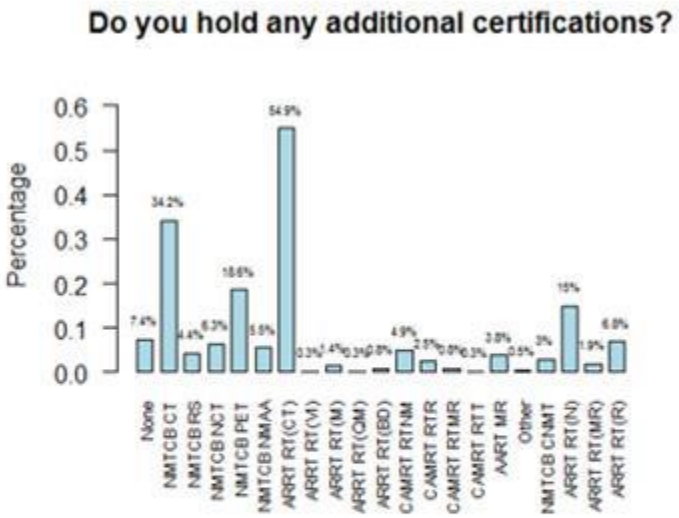
Response	Frequency	Percent
Less then one year	55	15.0
2 - 5 years	127	34.7
6 - 9 years	61	16.7
10 years or more	123	33.6
Total	366	100.0

Question 5. What primary certification do you hold?



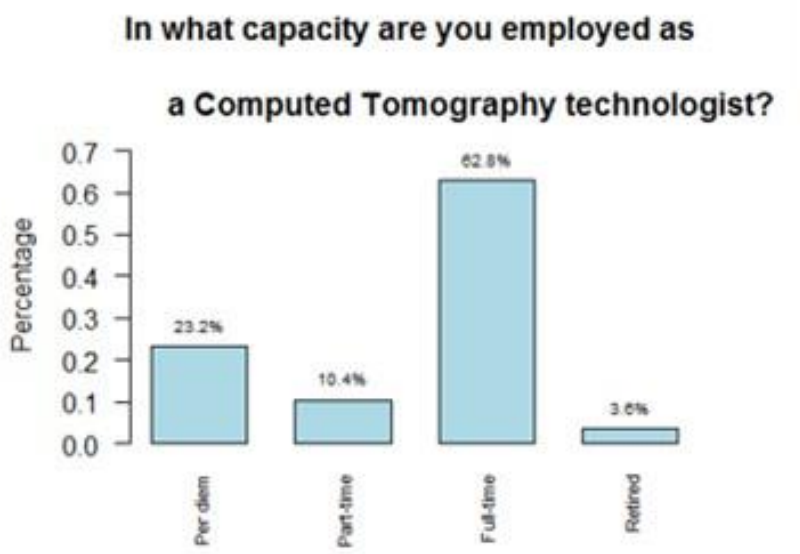
Response	Frequency	Percent
NMTCB CNMT	274	74.9
ARRT RT(N)	46	12.6
ARRT RT(R)	45	12.3
ARRT RT(MR)	0	0.0
ARRT RT(T)	1	0.3
ARRT RT(S)	0	0.0
Total	366	100.0

Question 6. Do you hold any additional certifications?



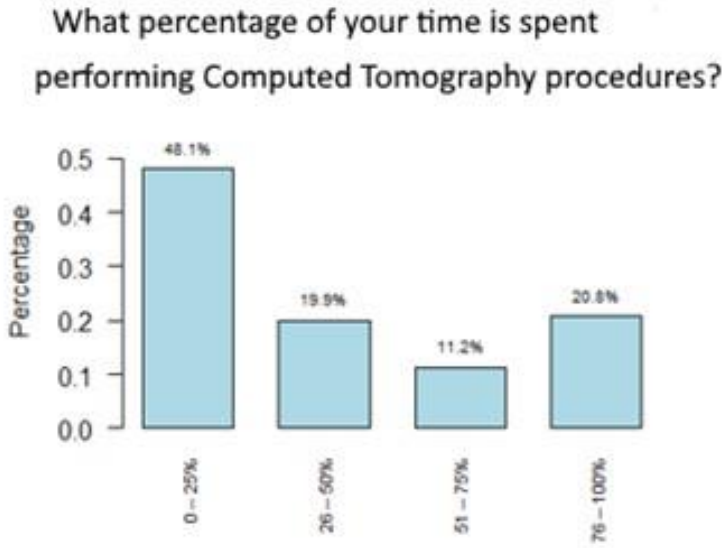
Response	Frequency	Percent
None	27	7.4
NMTCB CT	125	34.2
NMTCB RS	16	4.4
NMTCB NCT	23	6.3
NMTCB PET	68	18.6
NMTCB NMAA	20	5.5
ARRT RT(CT)	201	54.9
ARRT RT(CV)	0	0.0
ARRT RT(CI)	0	0.0
ARRT RT(VI)	1	0.3
ARRT RT(M)	5	1.4
ARRT RT(QM)	1	0.3
ARRT RT(BD)	3	0.8
ARRT RT(VS)	0	0.0
CAMRT RTNM	18	4.9
CAMRT RTR	9	2.5
CAMRT RTMR	3	0.8
CAMRT RTT	1	0.3
ARMRIT ARMRIT	0	0.0
AART MR	14	3.8
Other	2	0.5
NMTCB CNMT	11	3.0
ARRT RT(N)	55	15.0
ARRT RT(MR)	7	1.9
ARRT RT(R)	25	6.8
Total	366	100.0

Question 7. In what capacity are you employed as a Computed Tomography technologist?



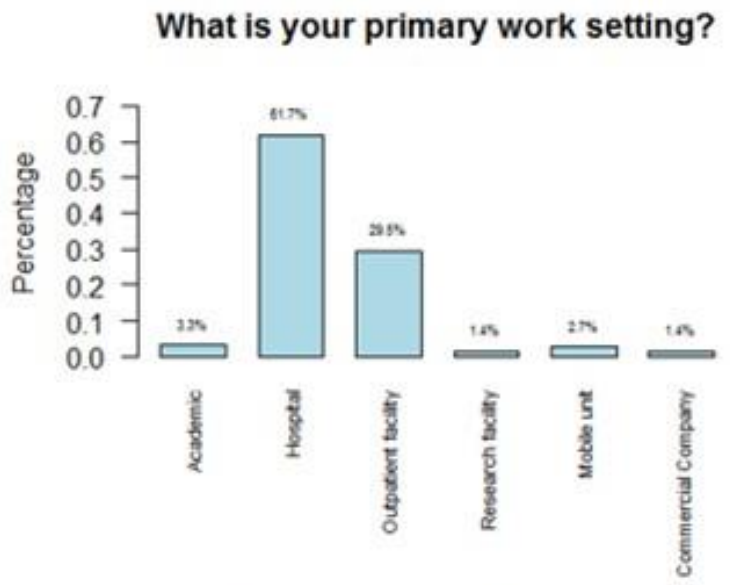
Response	Frequency	Percent
Per diem	85	23.2
Part-time	38	10.4
Full-time	230	62.8
Retired	13	3.6
Total	366	100.0

Question 8. What percentage of your time is spent performing Computed Tomography procedures?



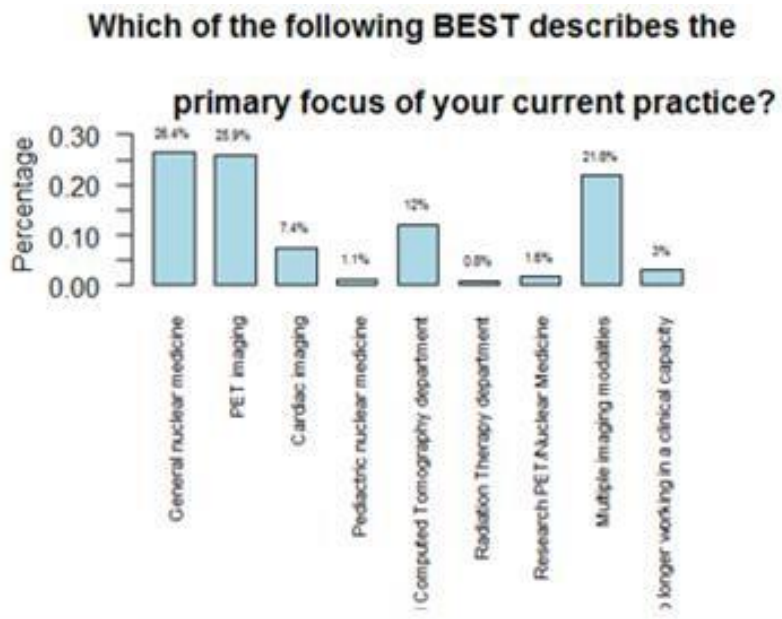
Response	Frequency	Percent
0 – 25%	176	48.1
26 – 50%	73	19.9
51 – 75%	41	11.2
76 – 100%	76	20.8
Total	366	100.0

Question 9. What is your primary work setting?



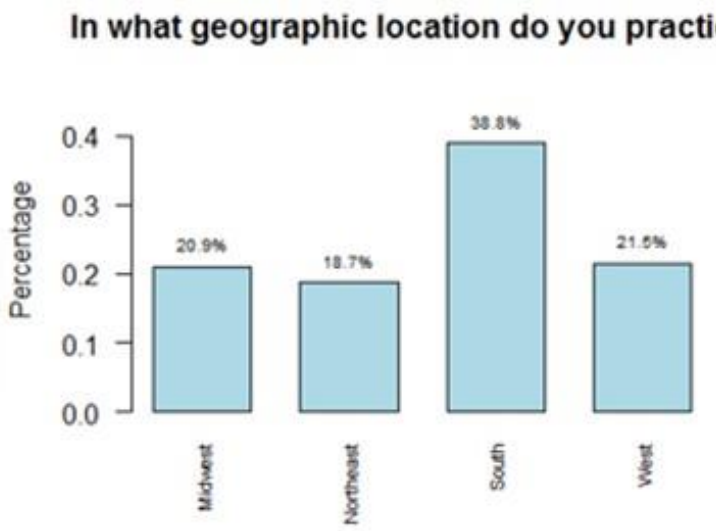
Response	Frequency	Percent
Academic	12	3.3
Hospital	226	61.7
Outpatient facility	108	29.5
Research facility	5	1.4
Mobile unit	10	2.7
Commercial Company	5	1.4
Total	366	100.0

Question 10. Which of the following BEST describes the primary focus of your current practice?



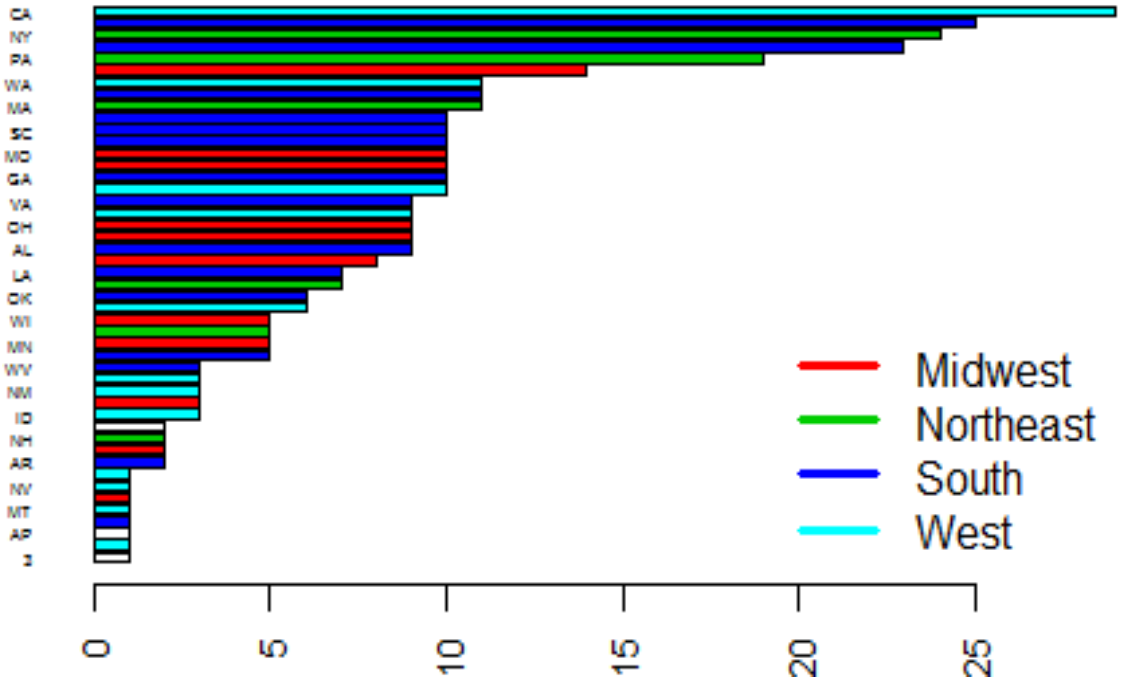
Response	Frequency	Percent
General nuclear medicine	97	26.4
PET imaging	95	25.9
Cardiac imaging	27	7.4
Pediactric nuclear medicine	4	1.1
Dedicated Computed Tomography department	44	12.0
Radiation Therapy department	3	0.8
Research PET/Nuclear Medicine	6	1.6
Multiple imaging modalities	80	21.8
No longer working in a clinical capacity	11	3.0
Total	367	100.0

Question 11. In what geographic location do you practice?



Response	Frequency	Percent
Midwest	76	20.9
Northeast	68	18.7
South	141	38.8
West	78	21.5
Total	363	100.0

In what geographic location do you practice?



Respondent Sample Characteristics
Evaluating the overall responses to the demographic questions provided some summary information about the respondents.

> *The typical respondent received no formal CT training, achieved a Bachelor's degree and was working full-time in a CT-related role as a staff technologist. The respondent primarily spends 25% or less of their time performing CT procedures, but is employed full time in a hospital setting.*

The Committee reviewed the data and was comfortable that the demographic results provided a picture of a typical respondent, while capturing the diversity of CT technologists practicing in the U.S. The Committee was in agreement that, based on the review of the data, no important population subgroups were underrepresented.

Survey Analysis Data Findings

Frequency and Importance Ratings
After answering the demographic questions, respondents were asked to provide a single rating indicating if they believed that CT technologists performed each task or KSA in their practice and how critical a given task was, if performed. If respondents believed the task was never performed they were asked to rate it a "0" (*Not Performed*). Respondents indicating the task was performed were asked to rate it on a 1–4 importance/criticality scale with "1" representing a task that was *Not Important*, "2" representing a task that was *Low Importance*, "3" representing a task that was deemed *Moderately Important*, "4" representing a task that was *Extremely Important*. Combining the frequency and importance decisions into one rating eliminated the possibility of arriving at dichotomous findings whereby a task could be rated as *Not Performed* by a significant portion of the respondents, while also being rated as being *Moderately Important* or *Extremely Important*.

Appendices E, F, and G provide data describing the number of respondents who provided a frequency rating for each task or KSA (n=367), the mean (average) frequency rating and associated standard error, and the percentage of respondents who indicated that the task is *Not Performed* by the entry level, minimally-competent CT technologist. Appendix E presents the tasks and KSAs in survey order, Appendix F presents the survey analysis of tasks sorted by highest and lowest *Not Performed* (Zero) weighting, and Appendix G presents an analysis of the survey results with the tasks sorted by lowest to highest mean importance rating. All three appendices include the number of respondents who provided an importance/performance, nonperformance rating for each task or KSA. Importance ratings were calculated using only the 1–4 ratings; All "0" (*Not Performed*) ratings for a given task were eliminated from the task criticality calculations as presented in Appendices E, F, and G.

Subgroup Analysis
In addition to importance ratings for the entire sample, averages were also calculated for subgroups of respondents who answered the demographic questions, allowing for statistical comparisons among subgroups. Analysis of Variance (ANOVA) was used to test for differences among the experience, geographic, and supervisor queries. ANOVA was conducted to compare the mean importance ratings to ensure that the overall importance ratings were not being swayed by

respondents of a particular experience level, geographic location, type of practice settings, or capacity as none of those are part of the description of minimal competency. Differences were flagged if a KSA had an ANOVA_P<=0.5, and at least one Cohn's D>0.8 resulting in 24 subdomains or KSAs being flagged and requiring review by the Committee.

Experience Subgroup Comparisons
Across the mean comparisons (158 subdomain or KSAs, 6 comparison groups), no KSAs were flagged as different in responses by the demographic question: "How many years have you been practicing as a Computed Tomography technologist?"" Appendix H, Table H-1 shows the ANOVA results for the subgroup analysis.

Capacity Subgroup Comparisons
Across the mean comparisons (158 subdomain or KSAs, 3 comparison groups), differences were flagged as significant at the p<0.01 level resulting in 24 subdomains or KSAs being flagged and requiring review by the Committee. Three KSAs were flagged as different in responses by the demographic question: "In what capacity are you employed as a Computed Tomography technologist?" The Committee reviewed the differences and decided not to make any changes to the KSAs. Appendix H, Table H-1 shows the ANOVA results for all tasks on the survey.

Work Setting Subgroup Comparisons
Across the mean comparisons (158 subdomains or KSAs, 3 comparison groups), differences were flagged as significant at the p<0.01 level resulting in 24 subdomains or KSAs being flagged and requiring review by the Committee. Three KSAs were flagged as different in responses by the demographic question: "What is your primary work setting?" The Committee reviewed the flagged KSA and decided not to edit or delete any of them based on the results, as the knowledge reporesented in each KSA was essential for a well-rounded, entry level professional. Appendix H, Table H-1 shows the ANOVA results for all tasks on the survey.

Focus Subgroup Comparisons
Across the mean comparisons (158 subdomains or KSAs, 3 comparison groups), differences were flagged as significant at the p<0.01 level resulting in 24 subdomains or KSAs being flagged and requiring review by the Committee. Nineteen KSAs were flagged as different in responses by the demographic question: "Which of the following BEST describes the primary focus of your current practice?" The Committee reviewed the flagged KSA and decided not to edit or delete any of them based on the results, as the knowledge reporesented in each KSA was essential for a well-rounded, entry level professional. Appendix H, Table H-1 shows the ANOVA results for all tasks on the survey.

Task Exclusion Analysis

Having completed the analysis of the subgroup response data, the Committee went on to review the total respondent group importance and frequency data, as presented in appendices E, F, and G, in order to determine whether findings warranted the elimination of any tasks or KSAs from the content outline.

Appendix E: Mean Importance

The highest mean importance rating was for task 4F (Verify physician orders), which received a 3.84 importance rating, *Extremely Important*. Appendix E shows importance ratings along with frequency ratings in survey order.

Appendix F: Frequency of Nonperformance

The task with the highest *Not Performed* rating task 6I4 (Recognize characteristics of special procedures: Cryogenic and Microwave Therapy), with 60.20% of respondents indicating they did not perform the task.

The committee reviewed all tasks rated as not performed by more than 25% of respondents, and felt that most tasks were important (based on criticality ratings). For most tasks the Committee reached consensus that the tasks should remain on the content outline or be removed from the content outline. Four tasks were eliminated based on nonperformance frequency.

- 6F7: Demonstrate fundamental parameters of abdomen CT: Enterography and virtual colonoscopy
- 6I3: Recognize characteristics of special procedures: Whole Body CT/Bone Survey
- 6I4: Recognize characteristics of special procedures: Cryogenic and Microwave Therapy
- 6I5: Recognize characteristics of special procedures: Fluoroscopy

Table 1 shows all tasks not performed by 25% or more respondents.

Appendix G: Tasks in Lowest to Highest Importance Rating Order

Appendix G outlines the KSAs sorted in order of least-to-most important.

TABLE 1. ***Tasks Performed by Fewer than 75% of Respondents***

Order	KSA	Percentage
135	6I4	39.8
66	5B4	46.9
136	6I5	46.9
134	6I3	47.5
133	6I2	57.8
119	6F7	59.4
132	6I1	59.9
67	5B5	60.4
128	6H1	61.7
103	6D10	63.1
109	6E2c	64.2
65	5B3	64.2
75	6A4	64.4
129	6H2	65.2
64	5B2	66.8
130	6H3	66.8
92	6C5	66.8
85	6B4	67.2
125	6G2	67.3
122	6F10	68.5
126	6G3	69.8
83	6B2	70.9
120	6F8	71.2
84	6B3	71.8
79	6A8	71.9
80	6A9	72.0
74	6A3	72.2
91	6C4	73.0
121	6F9	73.2
73	6A2	73.5

Final Content Outline Review and Approval

The Committee was then asked to review the final content outline, task-by-task to ensure that all tasks/KSAs met the following criteria:

1. Is this task important?
2. Is this task written clearly?
3. Is this task regularly performed by practitioners?
4. Is this task redundant or does it overlap other tasks?
5. Is the task's position on the outline clear and logical?
6. Is there a way to test/assess this task?

The Committee agreed to approve the new content outline as edited. Appendix I includes the full details of the final outline.

Examination Distribution and Content Area Weightings

Content Area Domain Weighting and Test Specifications

Once the outline was finalized, the Committee was asked to establish the weighting (emphasis) for each of the main content areas that would form the basis for the examination. At the end of the survey, respondents were asked to assign main content area weightings using a percentage assignment model, where all assignments had to total 100%. The Committee used this respondent data along with consideration of the number and importance of tasks in a given sub-content area, and the importance/difficulty of tasks within a given sub-content area, to reach consensus that the content area weighting for the examination be finalized as indicated in Table 2.

With the examination content area weighting of the examination established, the Committee recommended that assessment of competence could be made continuing the use of a 200-item 4-option linear multiple choice examination. The Committee further recommended that the examination include 175 scored items and 25 pretest items. SMT will analyze data and decide which items will count for the initial form.

The examination will be offered in English only and will be closed book. Passing candidates will receive notice of passing with a scaled score while failing candidates will receive notice of a scaled score and performance feedback.

Review of classical statistics will be used to ensure that questions are performing properly. The minimum passing score will be established on the first examination using a modified Angoff Method combined with a holistic scoring method, such as the Hofstee method, with IRT equating used to establish passing scores for subsequent examinations.

TABLE 2. ***Main Content Area Weighting Data and Decisions***

Domain	Respondent Average (%)	Weight based on # of KSAs (%)	2017 JA Result Weighting (%)
Domain I: System Operations and Instrumentation	11.7	8.4	14
Domain II: Data Acquisition and Post Processing	12.5	7.8	12
Domain III: Image Quality and Quality Assurance	13.4	11.1	13
Domain IV: Patient Management	12.8	5.2	6
Domain V: Medications and Contrast Agents	13.3	10.3	14
Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	22.9	50.8	25
Domain VII: Radiation Safety	13.5	6.4	16

Review NMTCB Eligibility Requirements and Recertification Requirements

Eligibility Requirement Link to the NMTCB Content Outline

The workshop facilitator then led the Committee through an exercise to establish a link between the NMTCB program eligibility requirements, the definition of entry level minimal competence, and the ability of candidates to learn the concepts being tested. This exercise is designed to ensure that eligibility requirements are strict enough to ensure that candidates meeting them will have had the opportunity to learn the tasks on the content outline. This ensures that eligibility requirements are neither too strict (acting as a barrier to practice) nor too lenient (where candidates meeting eligibility requirements are unlikely to earn the credential).

Conclusion

The final approved Job Analysis content was translated into the content outline of the NMTCB CT examination. The adopted content outline will serve as the blueprint for development of new NMTCB CT examinations. This information will be published and made available to educators, candidates, regulators, and the general public, establishing the openness and transparency of the NMTCB CT credentialing program. Adoption of this content outline, content area weighting, eligibility requirements, and recertification requirements thereby establishes the link between job performance of critical tasks, successful examination performance, and continued competence in the profession for credential holders.

Appendix A: NMTCB CT Job Analysis Committee, Instructions, and Agenda

Name	Practice Location
Christie Bowman	NC
Lance Burrell	UT
Tremaine Burton	UT
Melinda Castro	CA
Ada Courtney	SC
Jose Gonzalez	CA
Catherine Healy	SC
Edwin Keeler	SC
Joshua Reynolds	NY

TABLE A-1. ***Subject Matter Expert Job Analysis Participants***

Schroeder Measurement Technologies, Inc.
2492 Bayshore Blvd. Suite 201
Dunedin, Florida 34698

Email sent on Thursday, November 11th

Good evening NMTCB Subject Matter Experts!

Attached, please find a worksheet to kick off the practice analysis process.

Please indicate your evaluation of each knowledge, skill, or task.

If you feel the element on the content outline is relevant, important, and appropriate as written, please put an "x" in the first yellow column.
If you feel the elements on the content outline is relevant, important, but needs some clarification or editing, please put an "x" in the second yellow column and use the comment field to include your recommendations.
If you feel the element is no longer relevant, or should not be tested, please put an "x" in the third yellow column.

Here's where things get interesting. During preliminary research, I was hard pressed to find an item that was left off of this current content outline, however, a common theme I continued to run into was that practitioners wanted candidates to understand that they needed to know more than definitions, but had to make decisions and determinations in their roles. The issue is, the current content outline provides no real indication on what level of knowledge the candidates need to display regarding each elements. I would like to incorporate some behavioral verbs into the outline when appropriate to help with this. For example, instead of "Radiation Safety" we could say something along the lines of "Demonstrate compliance with radiation safety procedures." The verb "demonstrate" is a higher-lever application verb indicating that the candidate is expected to have a higher than base knowledge level grasp on Radiation safety.

What that means for now, is that I would like for each of you, as part of your review, is to think about what cognitive level would be appropriate for each element and indicate your preference in the comment section.

The categories are:
Knowledge/Comprehension – I expect the candidate remember previously learned information, recite facts, and demonstrate an understanding of those facts
Application/Analysis – I expect the candidate to apply knowledge to actual situations, break down objects or ideas into simpler parts, and find evidence to support decisions
Synthesis/Evaluation – I expect the candidate to compile component ideas into a new process, propose alternate solutions, and defend judgements based on evidence (critical thinking)

I have attached a behavioral verb list to assist you with this task.

We will be reviewing everyone's comments during our in person meeting in Atlanta.

Please complete your review and send your completed worksheets to me by close of business on Thursday, November 14th.

As always, if you have any questions or concerns, please do not hesitate to contact me.

Kind regards
-Rachel

Rachel Araujo-Newton
Manager: Assessment & Psychometric Services
Prometric, LLC
Schroeder Measurement Technologies, Inc.
25400 US Hwy 19 North, Suite 285
Clearwater, Florida 33763
(727) 738-8727, ext. 2136
www.smttest.com

Agenda (Provided at Workshop)

NMTCB Computed Tomography Job Analysis Workshop

November 16th and 17th

Atlanta, Georgia

The goal of the meeting is to review the knowledge, skills, and abilities (KSAs) required of a CT Technologist for use in the NMTCB CT Job Task Analysis survey.

Day 1: Saturday, Nov 16th
9:00 a.m. – 12:00pm • Overview of meeting goals and Introductions, • Discussion of security and confidentiality • Overview of Day 1 objectives • Job Analysis presentation • Discuss and edit KSA list
LUNCH: 12:00 p.m. – 1:00 p.m.
1:00 p.m. – 4:00 p.m. • Discuss and edit KSA list

Day 2: Sunday, Nov 17th
9:00 a.m. – 12:00 p.m. • Discuss and edit KSA list Domains
LUNCH: 12:00 p.m. – 1:00 p.m.
1:00 p.m. – 4:00 p.m. • Discuss new additions to the outline • Determine demographic questions • Determine scale ratings • Determine survey distribution and sampling plan • Discuss inclusion of incentives • Discuss next steps including beta review

Affidavit of Nondisclosure

I, (name) _____

(ADDRESS) _____

hereby swear and affirm that I shall not disclose or provide to anyone, directly or indirectly any information or documents to which I have been made privy during development and/or preparation of the Job Analysis Research Study supporting the Nuclear Medicine Technology Certification Board, Certified Computed Technologist Examination Program, rendered by the NMTCB with support from Schroeder Measurement Technologies, Inc.

It is understood that all documents or examination related materials, or confidential information received from the NMTCB or SMT are and shall remain the exclusive property of the NMTCB and that all documents or information shall be destroyed/deleted or promptly returned to the NMTCB upon completion of my service as a Subject Matter Expert during the Job Analysis Research Study.

I affirm that my participation in this Job Analysis does not present a conflict of interest. Should one arise, I will disclose any and all conflicts, potential conflicts, and/or perceived conflicts during my participation in the Job Analysis Research Study.

_____ _____

Signature Date

_____ _____

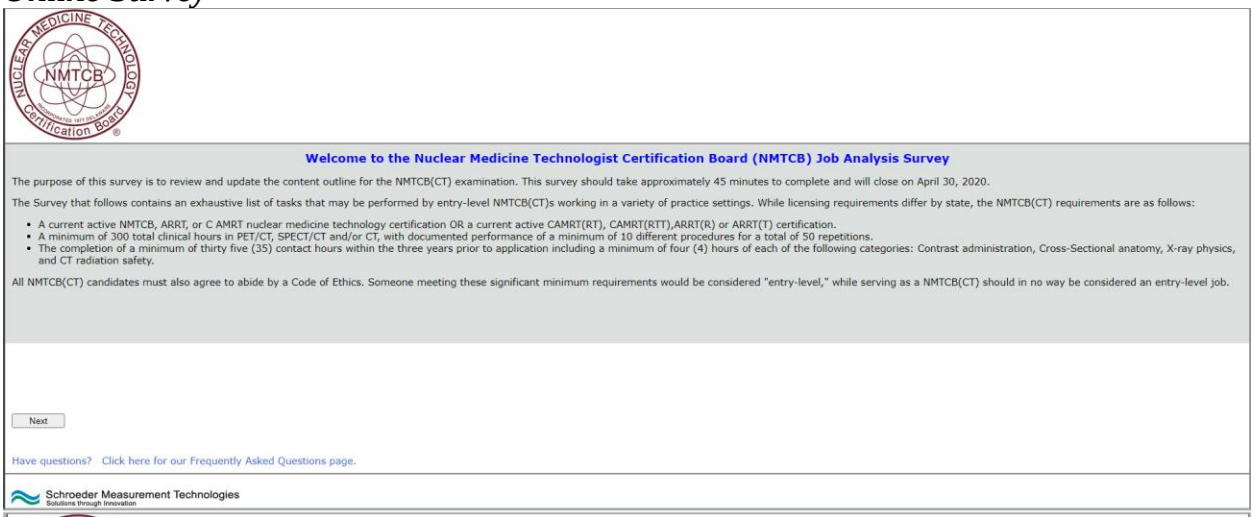
Witness Date

_____

Schroeder Measurement Technologies, Inc.

Appendix B: A Survey of the Role of the Nuclear Medical Technologist

Online Survey



Welcome to the Nuclear Medicine Technologist Certification Board (NMTCB) Job Analysis Survey

The purpose of this survey is to review and update the content outline for the NMTCB(CT) examination. This survey should take approximately 45 minutes to complete and will close on April 30, 2020.

The Survey that follows contains an exhaustive list of tasks that may be performed by entry-level NMTCB(CT)s working in a variety of practice settings. While licensing requirements differ by state, the NMTCB(CT) requirements are as follows:

- A current active NMTCB, ARRT, or C AMRT nuclear medicine technology certification OR a current active CAMRT(RT), CAMRT(RTT),ARRT(R) or ARRT(T) certification.
- A minimum of 300 total clinical hours in PET/CT, SPECT/CT and/or CT, with documented performance of a minimum of 10 different procedures for a total of 50 repetitions.
- The completion of a minimum of thirty five (35) contact hours within the three years prior to application including a minimum of four (4) hours of each of the following categories: Contrast administration, Cross-Sectional anatomy, X-ray physics, and CT radiation safety.

All NMTCB(CT) candidates must also agree to abide by a Code of Ethics. Someone meeting these significant minimum requirements would be considered "entry-level," while serving as a NMTCB(CT) should in no way be considered an entry-level job.

Next

Have questions? Click here for our Frequently Asked Questions page.

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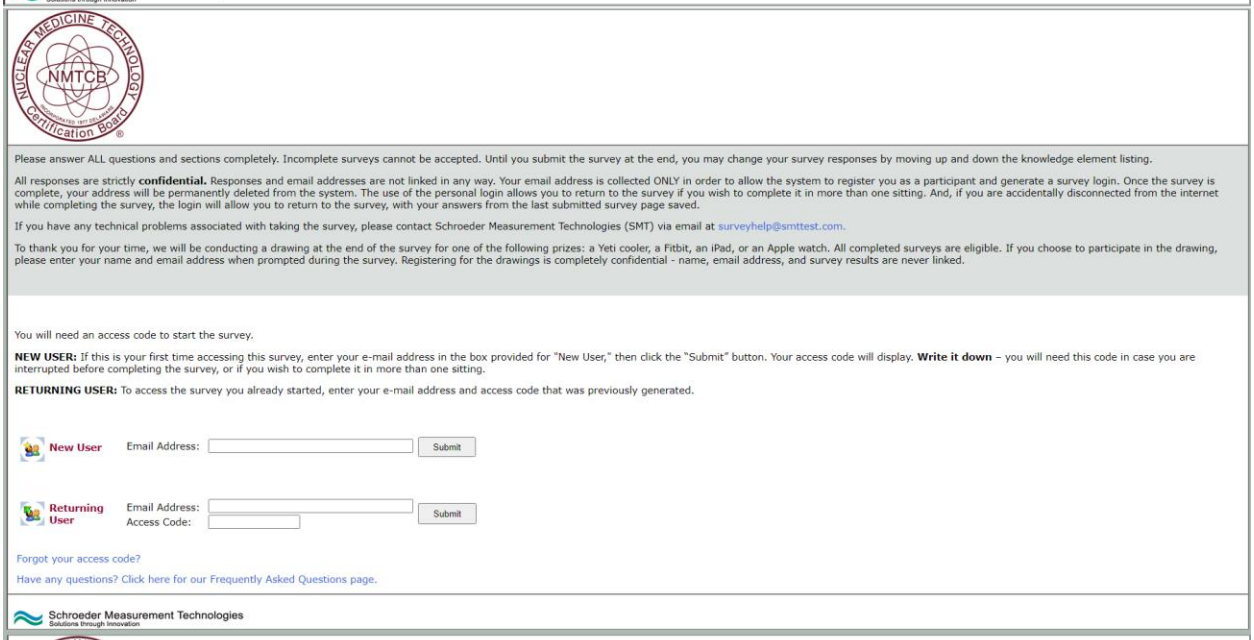

Please answer ALL questions and sections completely. Incomplete surveys cannot be accepted. Until you submit the survey at the end, you may change your survey responses by moving up and down the knowledge element listing.

All responses are strictly **confidential.** Responses and email addresses are not linked in any way. Your email address is collected ONLY in order to allow the system to register you as a participant and generate a survey login. Once the survey is complete, your address will be permanently deleted from the system. The use of the personal login allows you to return to the survey if you wish to complete it in more than one sitting. And, if you are accidentally disconnected from the internet while completing the survey, the login will allow you to return to the survey, with your answers from the last submitted survey page saved.

If you have any technical problems associated with taking the survey, please contact Schroeder Measurement Technologies (SMT) via email at surveyhelp@smttest.com.

To thank you for your time, we will be conducting a drawing at the end of the survey for one of the following prizes: a Yeti cooler, a Fitbit, an iPad, or an Apple watch. All completed surveys are eligible. If you choose to participate in the drawing, please enter your name and email address when prompted during the survey. Registering for the drawings is completely confidential - name, email address, and survey results are never linked.

You will need an access code to start the survey.

NEW USER: If this is your first time accessing this survey, enter your e-mail address in the box provided for "New User," then click the "Submit" button. Your access code will display. **Write it down** – you will need this code in case you are interrupted before completing the survey, or if you wish to complete it in more than one sitting.

RETURNING USER: To access the survey you already started, enter your e-mail address and access code that was previously generated.

New User Email Address: Submit

Returning User Email Address: Access Code: Submit

Forgot your access code?

Have any questions? Click here for our Frequently Asked Questions page.

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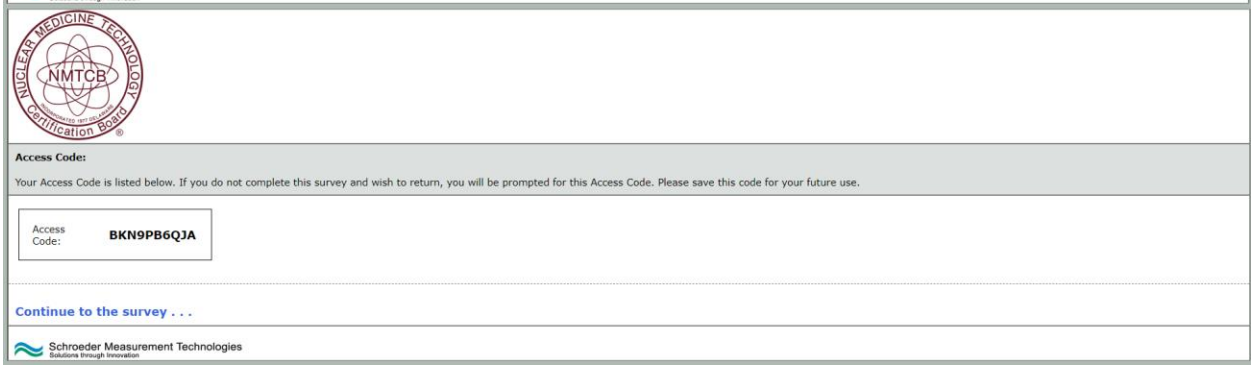

Access Code:

Your Access Code is listed below. If you do not complete this survey and wish to return, you will be prompted for this Access Code. Please save this code for your future use.

Access Code: **BKN9PB6QJA**

Continue to the survey . . .

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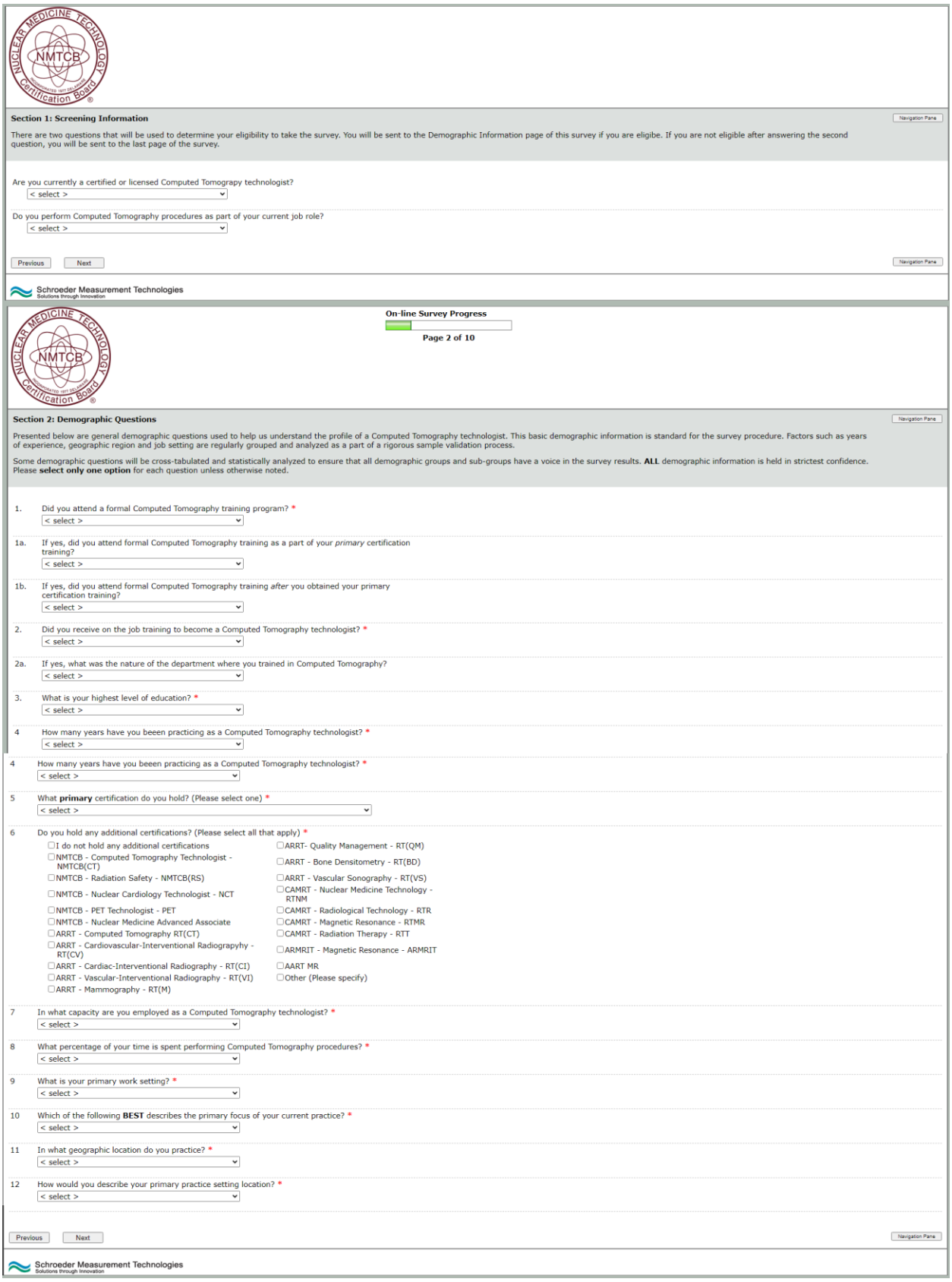

Section 1: Screening Information

Navigation Pane

There are two questions that will be used to determine your eligibility to take the survey. You will be sent to the Demographic Information page of this survey if you are eligibe. If you are not eligible after answering the second question, you will be sent to the last page of the survey.

Are you currently a certified or licensed Computed Tomograpy technologist?

< select >

Do you perform Computed Tomography procedures as part of your current job role?

< select >

Previous Next

Navigation Pane

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On-line Survey Progress

Page 2 of 10

Section 2: Demographic Questions

Navigation Pane

Presented below are general demographic questions used to help us understand the profile of a Computed Tomography technologist. This basic demographic information is standard for the survey procedure. Factors such as years of experience, geographic region and job setting are regularly grouped and analyzed as a part of a rigorous sample validation process.

Some demographic questions will be cross-tabulated and statistically analyzed to ensure that all demographic groups and sub-groups have a voice in the survey results. **ALL** demographic information is held in strictest confidence. Please **select only one option** for each question unless otherwise noted.

1. Did you attend a formal Computed Tomography training program? *

< select >

1a. If yes, did you attend formal Computed Tomography training as a part of your *primary* certification training?

< select >

1b. If yes, did you attend formal Computed Tomography training *after* you obtained your primary certification training?

< select >

2. Did you receive on the job training to become a Computed Tomography technologist? *

< select >

2a. If yes, what was the nature of the department where you trained in Computed Tomography?

< select >

3. What is your highest level of education? *

< select >

4 How many years have you beeen practicing as a Computed Tomography technologist? *

< select >

4 How many years have you beeen practicing as a Computed Tomography technologist? *

< select >

5 What **primary** certification do you hold? (Please select one) *

< select >

6 Do you hold any additional certifications? (Please select all that apply) *

- ☐ I do not hold any additional certifications
- ☐ NMTCB - Computed Tomography Technologist - NMTCB(CT)
- ☐ NMTCB - Radiation Safety - NMTCB(RS)
- ☐ NMTCB - Nuclear Cardiology Technologist - NCT
- ☐ NMTCB - PET Technologist - PET
- ☐ NMTCB - Nuclear Medicine Advanced Associate
- ☐ ARRT - Computed Tomography RT(CT)
- ☐ ARRT - Cardiovascular-Interventional Radiograpyhy - RT(CV)
- ☐ ARRT - Cardiac-Interventional Radiography - RT(CI)
- ☐ ARRT - Vascular-Interventional Radiography - RT(VI)
- ☐ ARRT - Mammography - RT(M)
- ☐ ARRT- Quality Management - RT(QM)
- ☐ ARRT - Bone Densitometry - RT(BD)
- ☐ ARRT - Vascular Sonography - RT(VS)
- ☐ CAMRT - Nuclear Medicine Technology - RTNM
- ☐ CAMRT - Radiological Technology - RTR
- ☐ CAMRT - Magnetic Resonance - RTMR
- ☐ CAMRT - Radiation Therapy - RTT
- ☐ ARMRIT - Magnetic Resonance - ARMRIT
- ☐ AART MR
- ☐ Other (Please specify)

7 In what capacity are you employed as a Computed Tomography technologist? *

< select >

8 What percentage of your time is spent performing Computed Tomography procedures? *

< select >

9 What is your primary work setting? *

< select >

10 Which of the following **BEST** describes the primary focus of your current practice? *

< select >

11 In what geographic location do you practice? *

< select >

12 How would you describe your primary practice setting location? *

< select >

Previous Next

Navigation Pane

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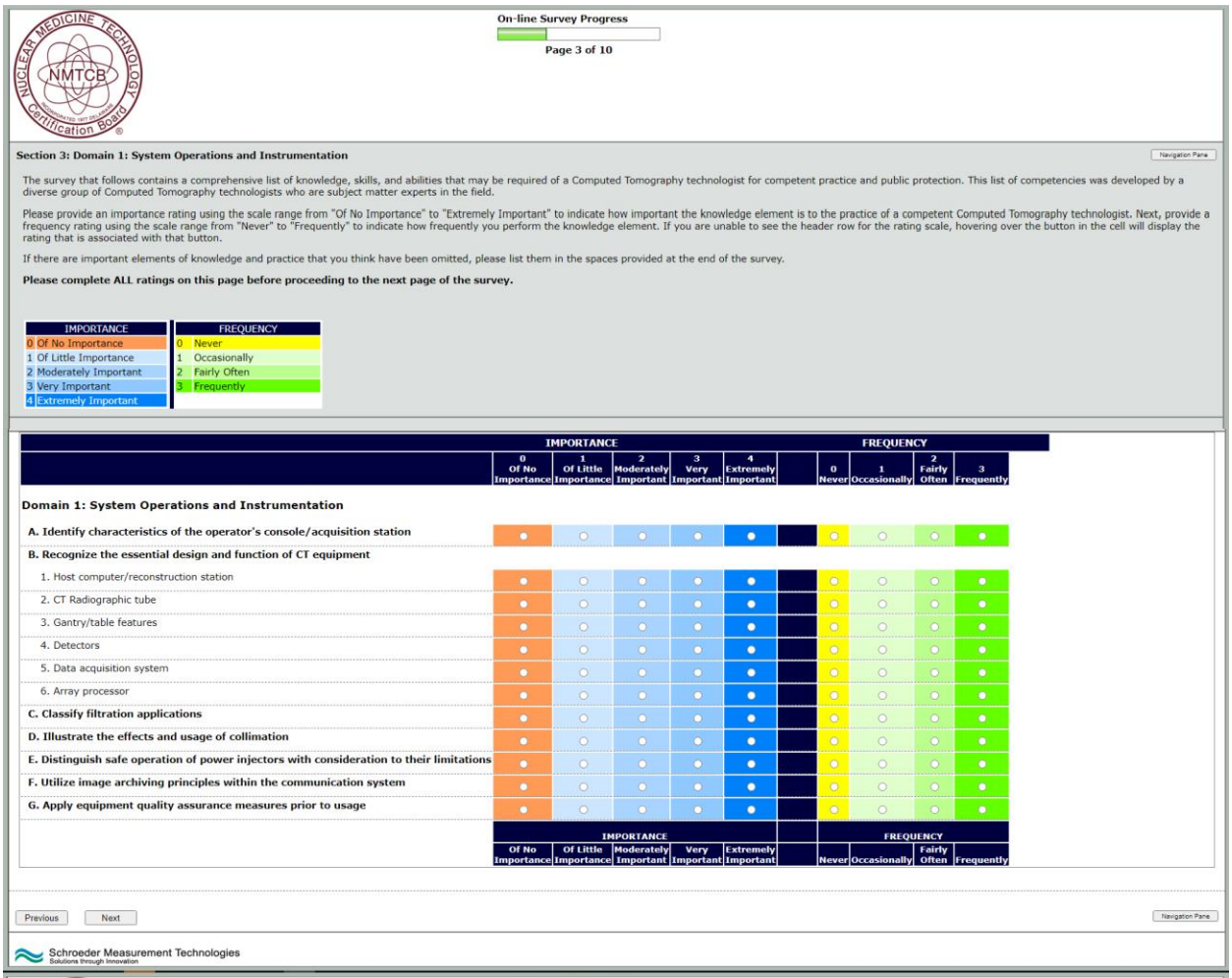

On-line Survey Progress

Page 3 of 10

Section 3: Domain 1: System Operations and Instrumentation

Navigation Pane

The survey that follows contains a comprehensive list of knowledge, skills, and abilities that may be required of a Computed Tomography technologist for competent practice and public protection. This list of competencies was developed by a diverse group of Computed Tomography technologists who are subject matter experts in the field.

Please provide an importance rating using the scale range from "Of No Importance" to "Extremely Important" to indicate how important the knowledge element is to the practice of a competent Computed Tomography technologist. Next, provide a frequency rating using the scale range from "Never" to "Frequently" to indicate how frequently you perform the knowledge element. If you are unable to see the header row for the rating scale, hovering over the button in the cell will display the rating that is associated with that button.

If there are important elements of knowledge and practice that you think have been omitted, please list them in the spaces provided at the end of the survey.

Please complete ALL ratings on this page before proceeding to the next page of the survey.

IMPORTANCE	FREQUENCY
0 Of No Importance	0 Never
1 Of Little Importance	1 Occasionally
2 Moderately Important	2 Fairly Often
3 Very Important	3 Frequently
4 Extremely Important	

	IMPORTANCE						FREQUENCY			
	0 Of No Importance	1 Of Little Importance	2 Moderately Important	3 Very Important	4 Extremely Important		0 Never	1 Occasionally	2 Fairly Often	3 Frequently
Domain 1: System Operations and Instrumentation										
A. Identify characteristics of the operator's console/acquisition station	○	○	○	○	●		○	○	○	●
B. Recognize the essential design and function of CT equipment										
1. Host computer/reconstruction station	○	○	○	○	●		○	○	○	●
2. CT Radiographic tube	○	○	○	○	●		○	○	○	●
3. Gantry/table features	○	○	○	○	●		○	○	○	●
4. Detectors	○	○	○	○	●		○	○	○	●
5. Data acquisition system	○	○	○	○	●		○	○	○	●
6. Array processor	○	○	○	○	●		○	○	○	●
C. Classify filtration applications	○	○	○	○	●		○	○	○	●
D. Illustrate the effects and usage of collimation	○	○	○	○	●		○	○	○	●
E. Distinguish safe operation of power injectors with consideration to their limitations	○	○	○	○	●		○	○	○	●
F. Utilize image archiving principles within the communication system	○	○	○	○	●		○	○	○	●
G. Apply equipment quality assurance measures prior to usage	○	○	○	○	●		○	○	○	●
	IMPORTANCE						FREQUENCY			
	Of No Importance	Of Little Importance	Moderately Important	Very Important	Extremely Important		Never	Occasionally	Fairly Often	Frequently

Previous Next

Navigation Pane

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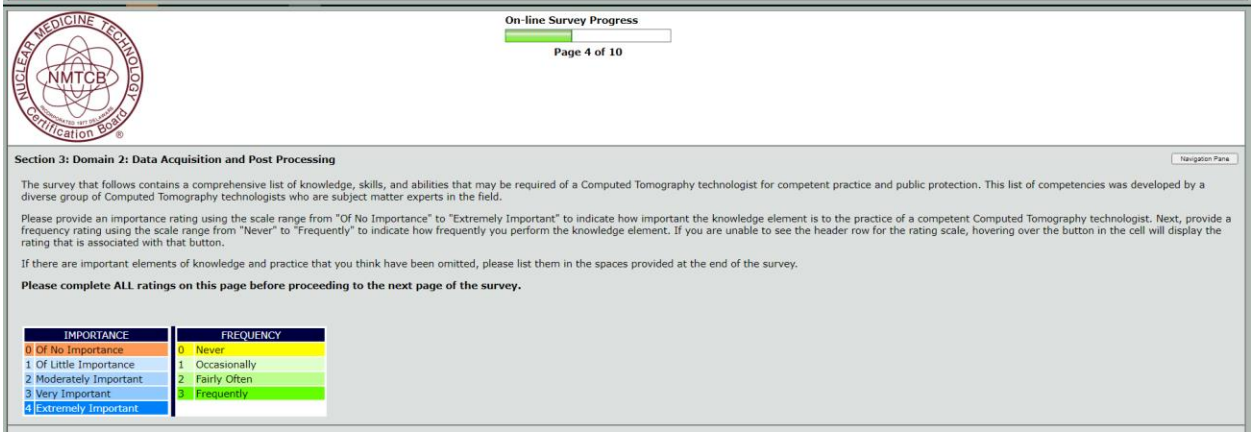


On-line Survey Progress

Page 4 of 10

Section 3: Domain 2: Data Acquisition and Post Processing

Navigation Pane

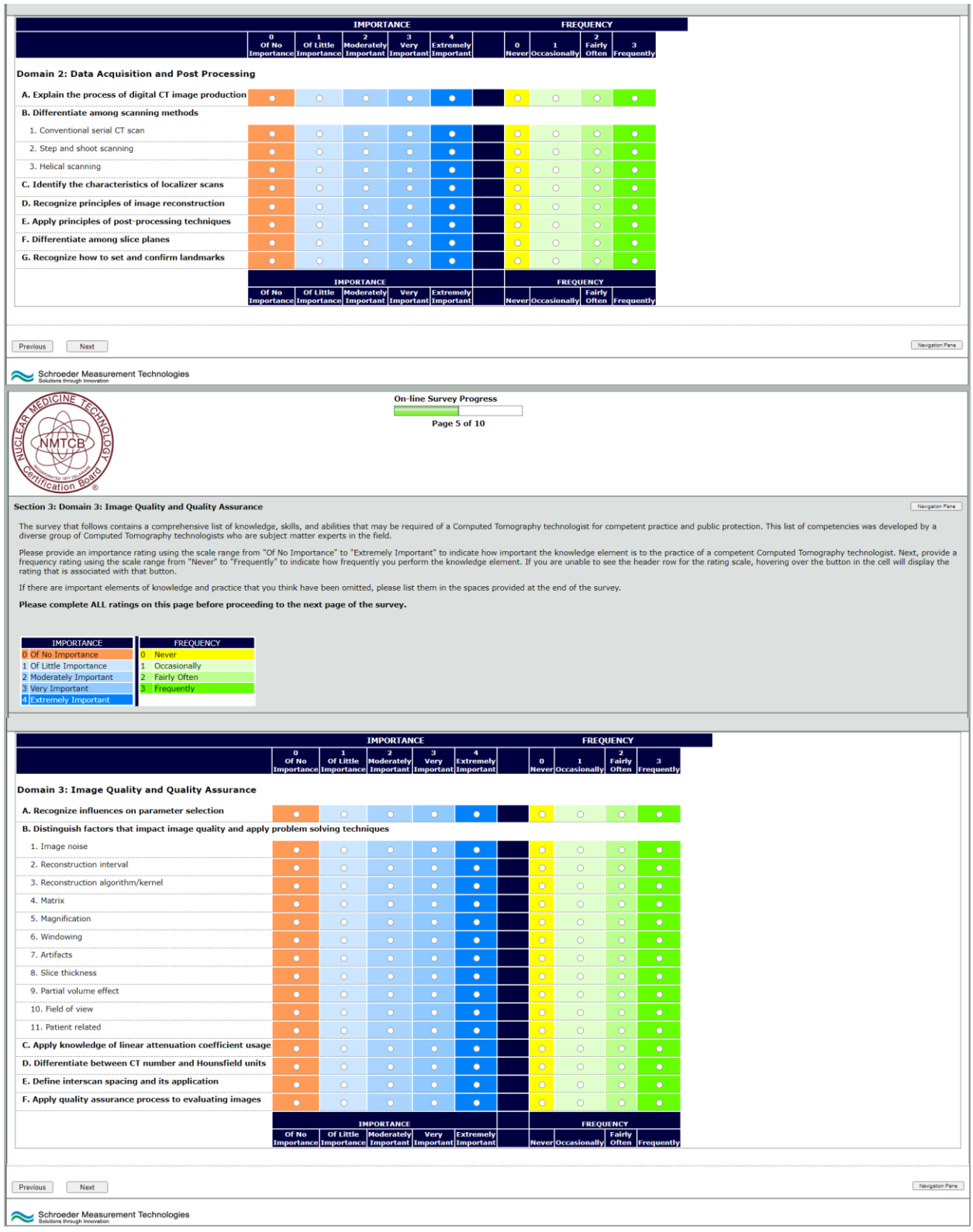
The survey that follows contains a comprehensive list of knowledge, skills, and abilities that may be required of a Computed Tomography technologist for competent practice and public protection. This list of competencies was developed by a diverse group of Computed Tomography technologists who are subject matter experts in the field.

Please provide an importance rating using the scale range from "Of No Importance" to "Extremely Important" to indicate how important the knowledge element is to the practice of a competent Computed Tomography technologist. Next, provide a frequency rating using the scale range from "Never" to "Frequently" to indicate how frequently you perform the knowledge element. If you are unable to see the header row for the rating scale, hovering over the button in the cell will display the rating that is associated with that button.

If there are important elements of knowledge and practice that you think have been omitted, please list them in the spaces provided at the end of the survey.

Please complete ALL ratings on this page before proceeding to the next page of the survey.

IMPORTANCE	FREQUENCY
0 Of No Importance	0 Never
1 Of Little Importance	1 Occasionally
2 Moderately Important	2 Fairly Often
3 Very Important	3 Frequently
4 Extremely Important	



	IMPORTANCE						FREQUENCY			
	0 Of No Importance	1 Of Little Importance	2 Moderately Important	3 Very Important	4 Extremely Important		0 Never	1 Occasionally	2 Fairly Often	3 Frequently
Domain 2: Data Acquisition and Post Processing										
A. Explain the process of digital CT image production	○	○	○	○	●		○	○	○	●
B. Differentiate among scanning methods										
1. Conventional serial CT scan	○	○	○	○	●		○	○	○	●
2. Step and shoot scanning	○	○	○	○	●		○	○	○	●
3. Helical scanning	○	○	○	○	●		○	○	○	●
C. Identify the characteristics of localizer scans	○	○	○	○	●		○	○	○	●
D. Recognize principles of image reconstruction	○	○	○	○	●		○	○	○	●
E. Apply principles of post-processing techniques	○	○	○	○	●		○	○	○	●
F. Differentiate among slice planes	○	○	○	○	●		○	○	○	●
G. Recognize how to set and confirm landmarks	○	○	○	○	●		○	○	○	●
	IMPORTANCE						FREQUENCY			
	Of No Importance	Of Little Importance	Moderately Important	Very Important	Extremely Important		Never	Occasionally	Fairly Often	Frequently

Previous Next Navigation Pane

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NUCLEAR MEDICINE TECHNOLOGY Certification Board NMTCB

On-line Survey Progress

Page 5 of 10

Section 3: Domain 3: Image Quality and Quality Assurance Navigation Pane

The survey that follows contains a comprehensive list of knowledge, skills, and abilities that may be required of a Computed Tomography technologist for competent practice and public protection. This list of competencies was developed by a diverse group of Computed Tomography technologists who are subject matter experts in the field.

Please provide an importance rating using the scale range from "Of No Importance" to "Extremely Important" to indicate how important the knowledge element is to the practice of a competent Computed Tomography technologist. Next, provide a frequency rating using the scale range from "Never" to "Frequently" to indicate how frequently you perform the knowledge element. If you are unable to see the header row for the rating scale, hovering over the button in the cell will display the rating that is associated with that button.

If there are important elements of knowledge and practice that you think have been omitted, please list them in the spaces provided at the end of the survey.

Please complete ALL ratings on this page before proceeding to the next page of the survey.

IMPORTANCE	FREQUENCY
0 Of No Importance	0 Never
1 Of Little Importance	1 Occasionally
2 Moderately Important	2 Fairly Often
3 Very Important	3 Frequently
4 Extremely Important	

	IMPORTANCE						FREQUENCY			
	0 Of No Importance	1 Of Little Importance	2 Moderately Important	3 Very Important	4 Extremely Important		0 Never	1 Occasionally	2 Fairly Often	3 Frequently
Domain 3: Image Quality and Quality Assurance										
A. Recognize influences on parameter selection	○	○	○	○	●		○	○	○	●
B. Distinguish factors that impact image quality and apply problem solving techniques										
1. Image noise	○	○	○	○	●		○	○	○	●
2. Reconstruction interval	○	○	○	○	●		○	○	○	●
3. Reconstruction algorithm/kernel	○	○	○	○	●		○	○	○	●
4. Matrix	○	○	○	○	●		○	○	○	●
5. Magnification	○	○	○	○	●		○	○	○	●
6. Windowing	○	○	○	○	●		○	○	○	●
7. Artifacts	○	○	○	○	●		○	○	○	●
8. Slice thickness	○	○	○	○	●		○	○	○	●
9. Partial volume effect	○	○	○	○	●		○	○	○	●
10. Field of view	○	○	○	○	●		○	○	○	●
11. Patient related	○	○	○	○	●		○	○	○	●
C. Apply knowledge of linear attenuation coefficient usage	○	○	○	○	●		○	○	○	●
D. Differentiate between CT number and Hounsfield units	○	○	○	○	●		○	○	○	●
E. Define interscan spacing and its application	○	○	○	○	●		○	○	○	●
F. Apply quality assurance process to evaluating images	○	○	○	○	●		○	○	○	●
	IMPORTANCE						FREQUENCY			
	Of No Importance	Of Little Importance	Moderately Important	Very Important	Extremely Important		Never	Occasionally	Fairly Often	Frequently

Previous Next Navigation Pane

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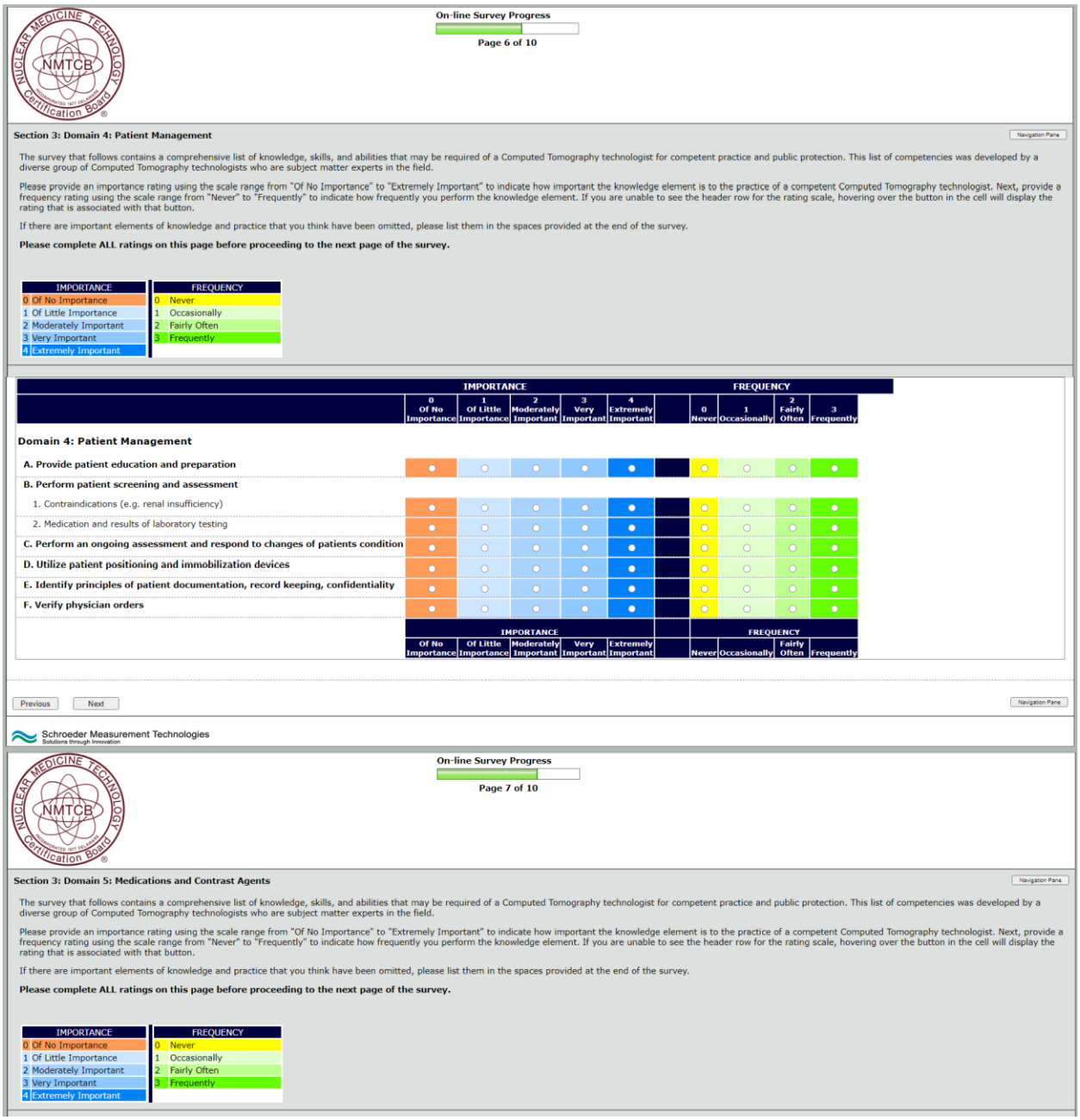

On-line Survey Progress

Page 6 of 10

Section 3: Domain 4: Patient Management

Navigation Pane

The survey that follows contains a comprehensive list of knowledge, skills, and abilities that may be required of a Computed Tomography technologist for competent practice and public protection. This list of competencies was developed by a diverse group of Computed Tomography technologists who are subject matter experts in the field.

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If there are important elements of knowledge and practice that you think have been omitted, please list them in the spaces provided at the end of the survey.

Please complete ALL ratings on this page before proceeding to the next page of the survey.

IMPORTANCE	FREQUENCY
0 Of No Importance	0 Never
1 Of Little Importance	1 Occasionally
2 Moderately Important	2 Fairly Often
3 Very Important	3 Frequently
4 Extremely Important	

	IMPORTANCE						FREQUENCY			
	0 Of No Importance	1 Of Little Importance	2 Moderately Important	3 Very Important	4 Extremely Important		0 Never	1 Occasionally	2 Fairly Often	3 Frequently
Domain 4: Patient Management										
A. Provide patient education and preparation	○	○	○	○	●		○	○	○	●
B. Perform patient screening and assessment										
1. Contraindications (e.g. renal insufficiency)	○	○	○	○	●		○	○	○	●
2. Medication and results of laboratory testing	○	○	○	○	●		○	○	○	●
C. Perform an ongoing assessment and respond to changes of patients condition	○	○	○	○	●		○	○	○	●
D. Utilize patient positioning and immobilization devices	○	○	○	○	●		○	○	○	●
E. Identify principles of patient documentation, record keeping, confidentiality	○	○	○	○	●		○	○	○	●
F. Verify physician orders	○	○	○	○	●		○	○	○	●
	IMPORTANCE						FREQUENCY			
	Of No Importance	Of Little Importance	Moderately Important	Very Important	Extremely Important		Never	Occasionally	Fairly Often	Frequently

Previous Next

Navigation Pane

Schroeder Measurement Technologies
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On-line Survey Progress

Page 7 of 10

Section 3: Domain 5: Medications and Contrast Agents

Navigation Pane

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Please provide an importance rating using the scale range from "Of No Importance" to "Extremely Important" to indicate how important the knowledge element is to the practice of a competent Computed Tomography technologist. Next, provide a frequency rating using the scale range from "Never" to "Frequently" to indicate how frequently you perform the knowledge element. If you are unable to see the header row for the rating scale, hovering over the button in the cell will display the rating that is associated with that button.

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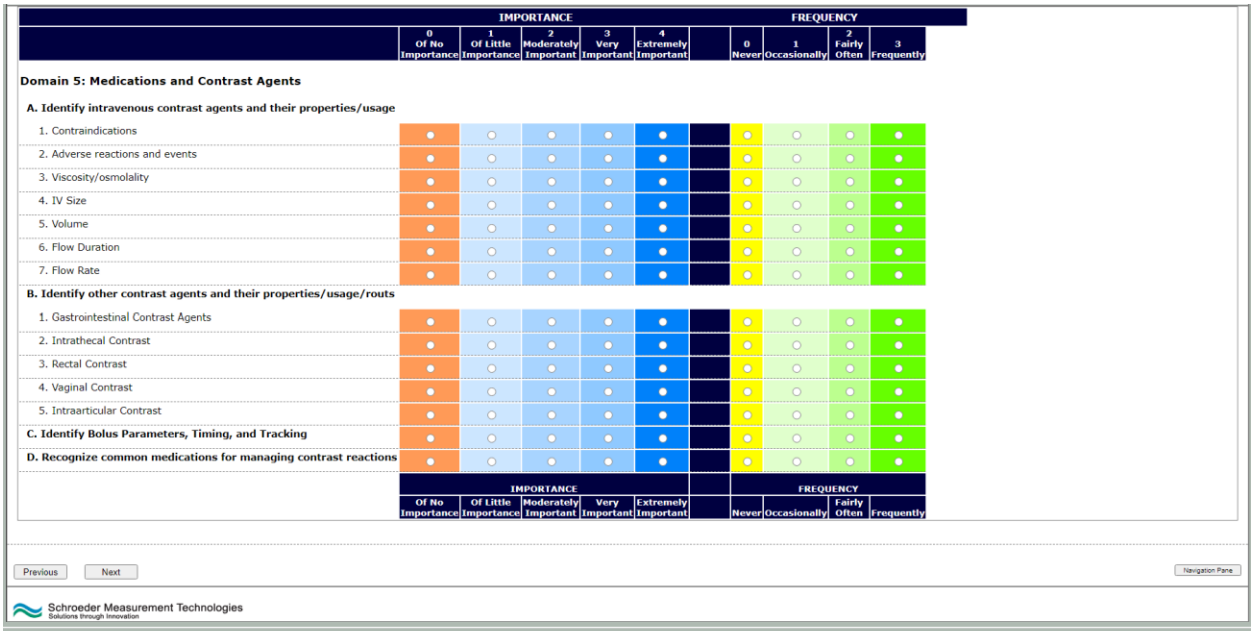
IMPORTANCE	FREQUENCY
0 Of No Importance	0 Never
1 Of Little Importance	1 Occasionally
2 Moderately Important	2 Fairly Often
3 Very Important	3 Frequently
4 Extremely Important	



	IMPORTANCE						FREQUENCY			
	0 Of No Importance	1 Of Little Importance	2 Moderately Important	3 Very Important	4 Extremely Important		0 Never	1 Occasionally	2 Fairly Often	3 Frequently
Domain 5: Medications and Contrast Agents										
A. Identify intravenous contrast agents and their properties/usage										
1. Contraindications	●	○	○	○	●		○	○	○	●
2. Adverse reactions and events	●	○	○	○	●		○	○	○	●
3. Viscosity/osmolality	●	○	○	○	●		○	○	○	●
4. IV Size	●	○	○	○	●		○	○	○	●
5. Volume	●	○	○	○	●		○	○	○	●
6. Flow Duration	●	○	○	○	●		○	○	○	●
7. Flow Rate	●	○	○	○	●		○	○	○	●
B. Identify other contrast agents and their properties/usage/routs										
1. Gastrointestinal Contrast Agents	●	○	○	○	●		○	○	○	●
2. Intrathecal Contrast	●	○	○	○	●		○	○	○	●
3. Rectal Contrast	●	○	○	○	●		○	○	○	●
4. Vaginal Contrast	●	○	○	○	●		○	○	○	●
5. Intraarticular Contrast	●	○	○	○	●		○	○	○	●
C. Identify Bolus Parameters, Timing, and Tracking	●	○	○	○	●		○	○	○	●
D. Recognize common medications for managing contrast reactions	●	○	○	○	●		○	○	○	●
	IMPORTANCE						FREQUENCY			
	Of No Importance	Of Little Importance	Moderately Important	Very Important	Extremely Important		Never	Occasionally	Fairly Often	Frequently

Previous Next Navigation Pane

Schroeder Measurement Technologies
Solutions through Innovation

On-line Survey Progress

Page 8 of 10

Section 3: Domain 6: CT Procedures: Anatomy, Elements, Indications, and Pathology Navigation Pane

The survey that follows contains a comprehensive list of knowledge, skills, and abilities that may be required of a Computed Tomography technologist for competent practice and public protection. This list of competencies was developed by a diverse group of Computed Tomography technologists who are subject matter experts in the field.

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IMPORTANCE	FREQUENCY
0 Of No Importance	0 Never
1 Of Little Importance	1 Occasionally
2 Moderately Important	2 Fairly Often
3 Very Important	3 Frequently
4 Extremely Important	

	IMPORTANCE						FREQUENCY			
	0 Of No Importance	1 Of Little Importance	2 Moderately Important	3 Very Important	4 Extremely Important		0 Never	1 Occasionally	2 Fairly Often	3 Frequently
Domain 6: CT Procedures: Anatomy, Elements, Indications, and Pathology										
A. Demonstrate fundamental parameters of head CT										
1. Routine Brain	●	○	○	○	●		○	○	○	●
2. Trauma	●	○	○	○	●		○	○	○	●
3. Internal Auditory Canals	●	○	○	○	●		○	○	○	●
4. Pituitary	●	○	○	○	●		○	○	○	●
5. Orbits	●	○	○	○	●		○	○	○	●
6. Sinuses	●	○	○	○	●		○	○	○	●
7. Maxillofacial	●	○	○	○	●		○	○	○	●
8. Temporomandibular Joint	●	○	○	○	●		○	○	○	●
9. Angiography-Circle of Willis	●	○	○	○	●		○	○	○	●
B. Demonstrate fundamental parameters of neck CT										
1. Routine Soft Tissue Neck	●	○	○	○	●		○	○	○	●
2. Trauma	●	○	○	○	●		○	○	○	●
3. Larynx	●	○	○	○	●		○	○	○	●
4. Parathyroid	●	○	○	○	●		○	○	○	●
5. Angiography-Carotids	●	○	○	○	●		○	○	○	●
C. Demonstrate fundamental parameters of spine CT										

	IMPORTANCE						FREQUENCY			
	Of No Importance	Of Little Importance	Moderately Important	Very Important	Extremely Important		Never	Occasionally	Fairly Often	Frequently
1. Cervical Spine	○	○	○	○	●		○	○	○	●
2. Thoracic Spine	○	○	○	○	●		○	○	○	●
3. Lumbosacral Spine	○	○	○	○	●		○	○	○	●
4. Trauma	○	○	○	○	●		○	○	○	●
5. Post-Myelography Spine	○	○	○	○	●		○	○	○	●
D. Demonstrate fundamental parameters of musculoskeletal CT										
1. Shoulder	○	○	○	○	●		○	○	○	●
2. Elbow	○	○	○	○	●		○	○	○	●
3. Wrist	○	○	○	○	●		○	○	○	●
4. Hand	○	○	○	○	●		○	○	○	●
5. Hips	○	○	○	○	●		○	○	○	●
6. Knee	○	○	○	○	●		○	○	○	●
7. Ankle	○	○	○	○	●		○	○	○	●
8. Foot	○	○	○	○	●		○	○	○	●
9. Long bones	○	○	○	○	●		○	○	○	●
10. Arthrogram	○	○	○	○	●		○	○	○	●
E. Demonstrate fundamental parameters of chest CT										
1. Routine chest	○	○	○	○	●		○	○	○	●
2. Lung										
a. High resolution	○	○	○	○	●		○	○	○	●
b. Low dose screening	○	○	○	○	●		○	○	○	●
c. Respiratory gating	○	○	○	○	●		○	○	○	●
3. Angiography-Thoracic Aorta	○	○	○	○	●		○	○	○	●
4. Angiography-Pulmonary Vessels/PE exam	○	○	○	○	●		○	○	○	●
	IMPORTANCE						FREQUENCY			
	Of No Importance	Of Little Importance	Moderately Important	Very Important	Extremely Important		Never	Occasionally	Fairly Often	Frequently
F. Demonstrate fundamental parameters of abdomen CT										
1. Routine Abdomen	○	○	○	○	●		○	○	○	●
2. Tri-Phase Liver	○	○	○	○	●		○	○	○	●
3. Pancreas	○	○	○	○	●		○	○	○	●
4. Kidneys	○	○	○	○	●		○	○	○	●
5. Renal Calculi	○	○	○	○	●		○	○	○	●
6. Adrenals	○	○	○	○	●		○	○	○	●
7. Enterography and virtual colonoscopy	○	○	○	○	●		○	○	○	●
8. Ureteral Calculi/Urogram	○	○	○	○	●		○	○	○	●
9. Angiography - abdomen	○	○	○	○	●		○	○	○	●
10. Trauma	○	○	○	○	●		○	○	○	●
G. Demonstrate fundamental parameters of pelvis CT										
1. Bladder	○	○	○	○	●		○	○	○	●
2. Trauma	○	○	○	○	●		○	○	○	●
3. Angiography-Run-offs	○	○	○	○	●		○	○	○	●
H. Demonstrate fundamental parameters of cardiac CT										
1. Angiography-Cardiac	○	○	○	○	●		○	○	○	●
2. Calcium scoring	○	○	○	○	●		○	○	○	●
3.Cardiac Gating	○	○	○	○	●		○	○	○	●
I. Recognize characteristics of special procedures										
1. Biopsy	○	○	○	○	●		○	○	○	●
2. Drainage	○	○	○	○	●		○	○	○	●
3. Whole Body CT/Bone Survey	○	○	○	○	●		○	○	○	●
4. Cryogenic and Microwave Therapy	○	○	○	○	●		○	○	○	●
5. Fluoroscopy	○	○	○	○	●		○	○	○	●
J. Recognize characteristics of PET/CT										
1. Anatomy	○	○	○	○	●		○	○	○	●
2. Physiology	○	○	○	○	●		○	○	○	●
3. Organ systems	○	○	○	○	●		○	○	○	●
4. Attenuation Correction	○	○	○	○	●		○	○	○	●
K. Recognize characteristics of SPECT/CT										
1. Anatomy	○	○	○	○	●		○	○	○	●
2. Physiology	○	○	○	○	●		○	○	○	●
3. Organ systems	○	○	○	○	●		○	○	○	●
4. Attenuation Correction	○	○	○	○	●		○	○	○	●
L. Recognize procedural differences for patient populations (e.g., pediatric, body habitus)	○	○	○	○	●		○	○	○	●
	IMPORTANCE						FREQUENCY			
	Of No Importance	Of Little Importance	Moderately Important	Very Important	Extremely Important		Never	Occasionally	Fairly Often	Frequently

Previous Next Navigation Pane

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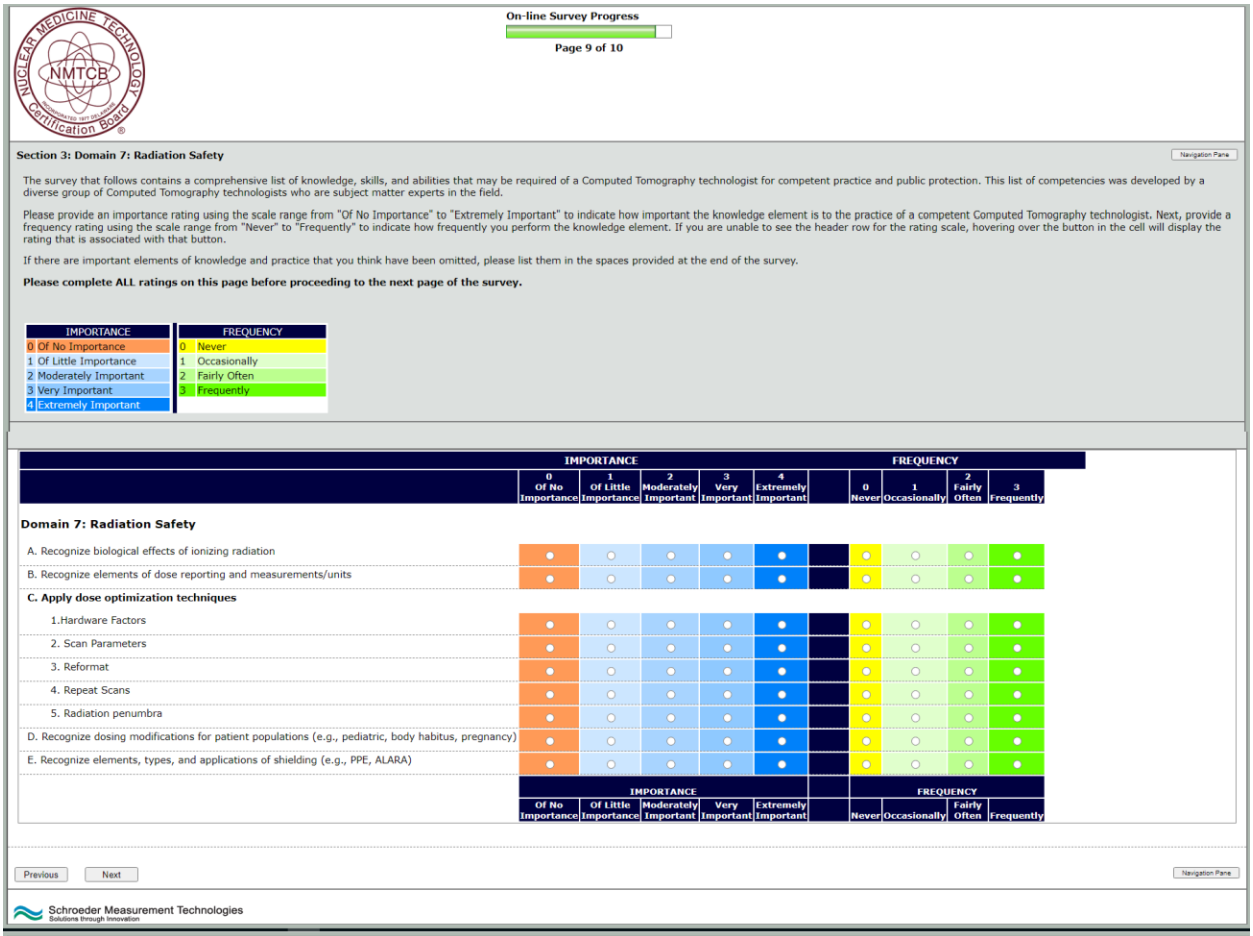

On-line Survey Progress

Page 9 of 10

Section 3: Domain 7: Radiation Safety

Navigation Pane

The survey that follows contains a comprehensive list of knowledge, skills, and abilities that may be required of a Computed Tomography technologist for competent practice and public protection. This list of competencies was developed by a diverse group of Computed Tomography technologists who are subject matter experts in the field.

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4 Extremely Important	

	IMPORTANCE						FREQUENCY			
	0 Of No Importance	1 Of Little Importance	2 Moderately Important	3 Very Important	4 Extremely Important		0 Never	1 Occasionally	2 Fairly Often	3 Frequently
Domain 7: Radiation Safety										
A. Recognize biological effects of ionizing radiation	○	○	○	○	●		○	○	○	●
B. Recognize elements of dose reporting and measurements/units	○	○	○	○	●		○	○	○	●
C. Apply dose optimization techniques										
1.Hardware Factors	○	○	○	○	●		○	○	○	●
2. Scan Parameters	○	○	○	○	●		○	○	○	●
3. Reformat	○	○	○	○	●		○	○	○	●
4. Repeat Scans	○	○	○	○	●		○	○	○	●
5. Radiation penumbra	○	○	○	○	●		○	○	○	●
D. Recognize dosing modifications for patient populations (e.g., pediatric, body habitus, pregnancy)	○	○	○	○	●		○	○	○	●
E. Recognize elements, types, and applications of shielding (e.g., PPE, ALARA)	○	○	○	○	●		○	○	○	●
	IMPORTANCE						FREQUENCY			
	Of No Importance	Of Little Importance	Moderately Important	Very Important	Extremely Important		Never	Occasionally	Fairly Often	Frequently

Previous Next

Navigation Pane

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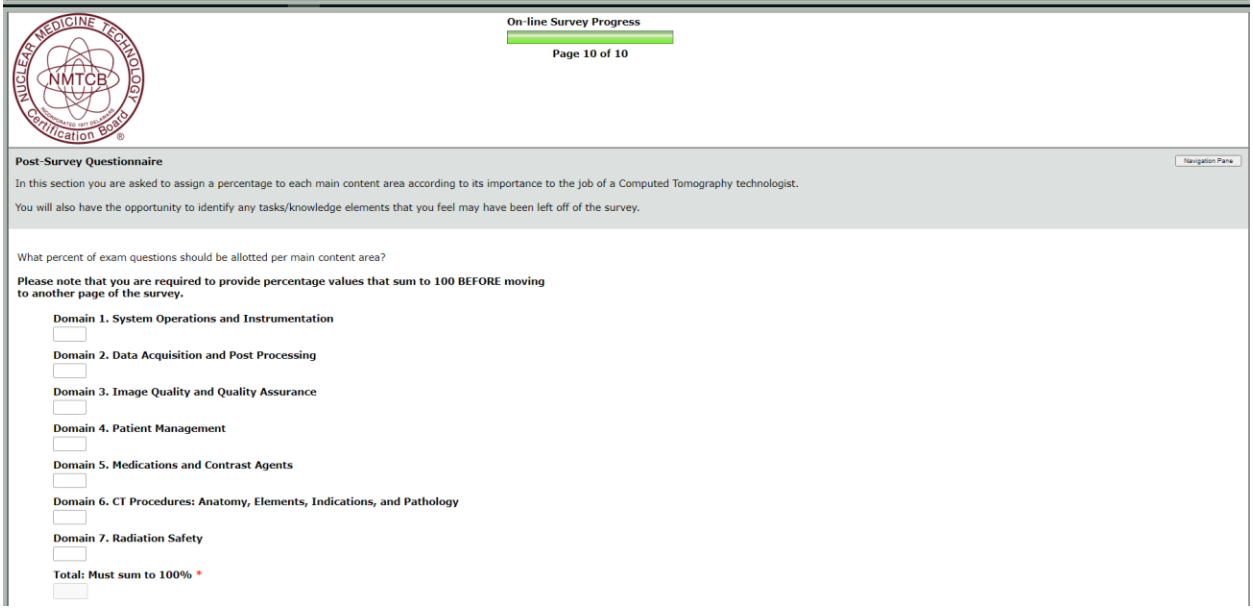


On-line Survey Progress

Page 10 of 10

Post-Survey Questionnaire

Navigation Pane

In this section you are asked to assign a percentage to each main content area according to its importance to the job of a Computed Tomography technologist.

You will also have the opportunity to identify any tasks/knowledge elements that you feel may have been left off of the survey.

What percent of exam questions should be allotted per main content area?

Please note that you are required to provide percentage values that sum to 100 BEFORE moving to another page of the survey.

Domain 1. System Operations and Instrumentation

Domain 2. Data Acquisition and Post Processing

Domain 3. Image Quality and Quality Assurance

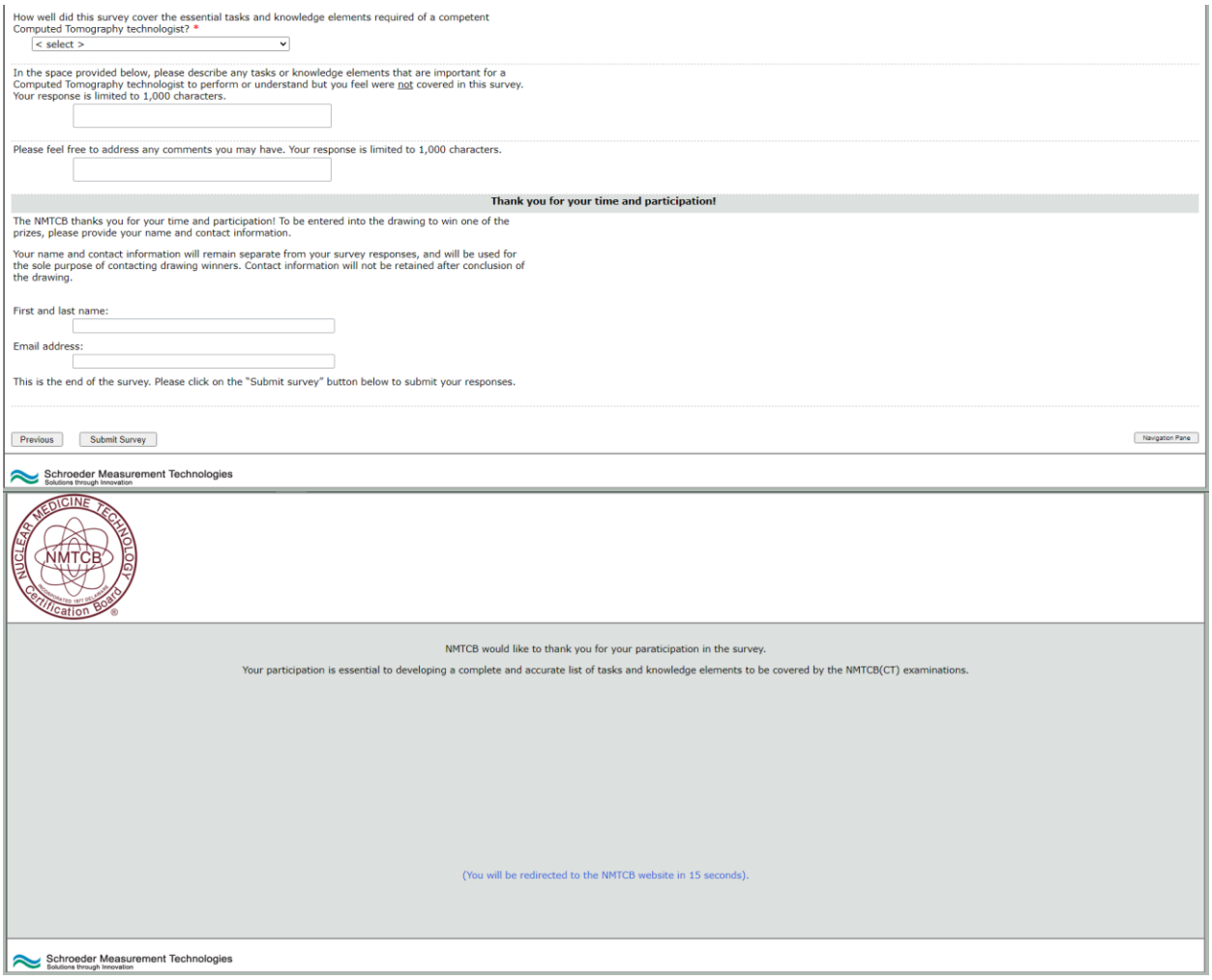
Domain 4. Patient Management

Domain 5. Medications and Contrast Agents

Domain 6. CT Procedures: Anatomy, Elements, Indications, and Pathology

Domain 7. Radiation Safety

Total: Must sum to 100% *


How well did this survey cover the essential tasks and knowledge elements required of a competent Computed Tomography technologist? *
< select >
In the space provided below, please describe any tasks or knowledge elements that are important for a Computed Tomography technologist to perform or understand but you feel were not covered in this survey. Your response is limited to 1,000 characters.
Please feel free to address any comments you may have. Your response is limited to 1,000 characters.
Thank you for your time and participation!
The NMTCB thanks you for your time and participation! To be entered into the drawing to win one of the prizes, please provide your name and contact information.
Your name and contact information will remain separate from your survey responses, and will be used for the sole purpose of contacting drawing winners. Contact information will not be retained after conclusion of the drawing.
First and last name:
Email address:
This is the end of the survey. Please click on the "Submit survey" button below to submit your responses.
Previous
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Navigation Pane
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NMTCB
Certification Board
NMTCB would like to thank you for your paraticipation in the survey.
Your participation is essential to developing a complete and accurate list of tasks and knowledge elements to be covered by the NMTCB(CT) examinations.
(You will be redirected to the NMTCB website in 15 seconds).
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Appendix C: Respondent-Identified Tasks left off of the Survey

TABLE C-1. ***Unedited Responses as Received: Tasks Left Off of the Survey***

Respondent Comment
I mostly perform PET/CT (some low dose chest) so the integration of PET with CT is needed
I think it is pretty well covered.
I would reconsider how the competencies with patients are completed. I do not like the time frame, and on top of it, a low repetition count. There are still employers who find the NMTCB CT exam as lenient. ARRT wants lots of exams and repetitions, a minimum of 25 exams and a total of 125 repetitions. Is sitting around a low census PET or SPECT CT scanner really going to do it? If your foot is already in the door for nuclear medicine, who care's. If you can't, this has been a shot in the foot
Understanding cross sectional anatomy
understanding contrast enhancement of anatomy at certain PSI and rates
VR vs 3D. Also separate work stations and when billable possibly. If done on scanner it's not a billable procedure. Correct level and window settings for abdomen, lung, bone etc set forth by the ACR.
Image registration between CT and Nuclear Medicine/PET
High and low values of kidney function. IV size for specific studies example angio studies vs routine studies and pediatric studies. Proper reconstruction techniques for extremity scans
Knowledge of indications/contraindications to contrast and how handle them.
I am not sure if there is a way to educate for this. But, it is important to find a balance between physician want and patient safety. Our first responsibility is to the patient. Dose risks, preganancy risks, contrast contra indications.
We use CT only on our PET patients that require a diagnostic CT of chest, abdomen and pelvis all others go directly to CT
Cover more topics related to SPECT/CT and PET/CT.
gage of needle in relation to particular ct exam
Ct is not done by any nuc med techs in my dept.
Pushing the button for PET/CT or SPECT/CT only
how to manage crisis situations, such as iv blowing, leaking, wrong agent administered, allergy etc.
You have to know your scanner. You are in charge.
A Virtual Video of performing CTs would be a great tool.
maybe the way power is supplied to the gantry. There are times when the big UPS trips and we need to know where/what it is and how to fix it.
Please stress the importance of a protecting your back, there are a lot of patient transfers of heavy patients and most techs eventually injure their backs.
Patient safety and the use of contrast material.
Technologists rights, responsibilities and professionalism
all tasks covered
I dont see any reason a Nuc Med tech cant cross train into CT. At least at our facility. I dont have a lot of new Xray students wanting to learn CT. The nuc Med techs at least know how to care for patients and are educated in radiation safety.
Hybrid technology to include PET/CT and PET/MR
Reducing artifacts

Respondent Comment
Infection Control - perhaps we should start building this into every aspect of health care since we may be dealing with outbreaks on a cyclical basis
Adverse events-reactions, extravastions and after care. Timing of contrast and why its important. Pro/con of shielding. Anatomical positioning of hand/wrist/feet can be tricky. Positioning for head CT and WHY its important. Cross sectional anatomy. Technique for scanning obese pts. Kv vs mAs and what they do
Nothing
creatinine and eGFR values
Cleaning of the area between patients. Importance of disinfecting scanner after use… Dont leave blood and fluids on scanner..Keep your area neat. Learn Spanish.. One needs a good mouse..a good chair or work stool. Ergonomics.. Psychology..A part of the job is selling the scan to patients..
Do not inject radioisotopes, you are not trained nor understand how to do so.
Acceptable to work as CT tech at my hospital is after passing ARRT/CT exam, and also a lot of clinical hours.
Patient care
it outlined everything that i can think of
Venipuncture and contrast administration
Survey could mention pediatric imaging.
N/a
Understanding “Exam Ordered vs Reason For Exam” OFTEN we receive the incorrect order or less optimal order for a particular diagnosis. Being able to catch the error and respectfully speak to a possible correction (w/o over stepping or insulting the ordering physician) is extremely important in my opinion.
everything was covered
Radiation therapy planning
I think a few nursing aspects can be added. I understand it might be pee hospital policy or protocol, but I techs should learn and understand certain things about medications, what we can stop running IV wise, learn more about disease processes so we are more competent are patients and what disease they may have.
IV skills are very important especially in an outpatient setting.
Covid-19 precautions
After 10+years of being a CT technologist, Im still learning new features and protocols and scanning techniques. Its an ever-expanding technology. I continually draw on past experiences and knowledge as well in order to image patients via CT in the most safe and optimum way. The time put in to learn CT is no less than we put in to learn nuclear medicine. I know… Ive done (& do) both.
Needed to cover a little more about contrast, but the survey coverage pretty much everything.

Appendix D: "Other" Responses for additional certifications, practice setting, and work setting

TABLE D-1. ***Unedited "Other" responses to "Do you hold any additional certifications?"***

Other Certifications	Frequency
CRA, ARRT (N)	1
NMTCB (N)	1
Total	**2**

TABLE D-2. ***Unedited "Other" responses to "What is your primary work setting?"***

Other Work Settings	Frequency
Cancer Center	1
Cardiologist practice	1
Clinic	2
Clinical Applications Specialist	2
CT and PET Applications Specialist for a Medical Imaging Vendor	1
Doctor's office	1
Manufacture/Education	1
Software applications nuclear medicine	1
Testing center	1
Vendor performing applications testing	1
Vendor Sales Consultant	1
Total	**13**

TABLE D-3. ***Unedited "Other" responses for "How would you describe your primary practice setting location?"***

Practice Setting Location	Frequency
Anywhere national	1
City	1
Military base	2
Mobile unit that travels to both urban and rural areas	1
Office in new jersey	1
Travel nationwide to Hospitals and Clinics	1
Total	**7**

Appendix E: Tasks in Survey Order with Frequency and Importance Data

Rating Scale
1 = Not Important
2 = Low Importance
3 = Moderate Importance
4 = Extremely Important

TABLE E-1. ***Tasks in Survey Order with Frequency and Importance Data***

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
1	I	Domain I: System Operations and Instrumentation			NA	NA
2	IA	Domain I: System Operations and Instrumentation	A. Identify characteristics of the operator's console/acquisition station		3.8%	3.29
3	IB	Domain I: System Operations and Instrumentation	B. Recognize the essential design and function of CT equipment		NA	NA
4	IB1	Domain I: System Operations and Instrumentation	B. Recognize the essential design and function of CT equipment	1. Host computer/reconstruction station	4.2%	3.317
5	IB2	Domain I: System Operations and Instrumentation	B. Recognize the essential design and function of CT equipment	2. CT Radiographic tube	9.8%	2.812
6	IB3	Domain I: System Operations and Instrumentation	B. Recognize the essential design and function of CT equipment	3. Gantry/table features	4.8%	3.396
7	IB4	Domain I: System Operations and Instrumentation	B. Recognize the essential design and function of CT equipment	4. Detectors	9.8%	2.902
8	IB5	Domain I: System Operations and Instrumentation	B. Recognize the essential design and function of CT equipment	5. Data acquisition system	6.9%	3.112

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
9	IB6	Domain I: System Operations and Instrumentation	B. Recognize the essential design and function of CT equipment	6. Array processor	17.0%	2.575
10	IC	Domain I: System Operations and Instrumentation	C. Classify filtration applications		11.0%	2.762
11	ID	Domain I: System Operations and Instrumentation	D. Illustrate the effects and usage of collimation		11.1%	2.786
12	IE	Domain I: System Operations and Instrumentation	E. Distinguish safe operation of power injectors with consideration to their limitations		13.8%	3.384
13	IF	Domain I: System Operations and Instrumentation	F. Utilize image archiving principles within the communication system		4.5%	3.166
14	IG	Domain I: System Operations and Instrumentation	G. Apply equipment quality assurance measures prior to usage		3.6%	3.575
15	II	Domain II: Data Acquisition and Post Processing			NA	NA
16	IIA	Domain II: Data Acquisition and Post Processing	A. Explain the process of digital CT image production		11.5%	2.817
17	IIB	Domain II: Data Acquisition and Post Processing	B. Differentiate among scanning methods		NA	NA

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
18	IIB1	Domain II: Data Acquisition and Post Processing	B. Differentiate among scanning methods	1. Conventional serial CT scan	13.2%	2.905
19	IIB2	Domain II: Data Acquisition and Post Processing	B. Differentiate among scanning methods	2. Step and shoot scanning	21.7%	2.703
20	IIB3	Domain II: Data Acquisition and Post Processing	B. Differentiate among scanning methods	3. Helical scanning	8.3%	3.343
21	IIC	Domain II: Data Acquisition and Post Processing	C. Identify the characteristics of localizer scans		6.3%	3.360
22	IID	Domain II: Data Acquisition and Post Processing	D. Recognize principles of image reconstruction		4.7%	3.397
23	IIE	Domain II: Data Acquisition and Post Processing	E. Apply principles of post-processing techniques		4.4%	3.470
24	IIF	Domain II: Data Acquisition and Post Processing	F. Differentiate among slice planes		6.1%	3.503
25	IIG	Domain II: Data Acquisition and Post Processing	G. Recognize how to set and confirm landmarks		5.0%	3.650
26	III	Domain III: Image Quality and Quality Assurance			NA	NA
27	IIIA	Domain III: Image Quality and Quality Assurance	A. Recognize influences on parameter selection		5.3%	3.403

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
28	IIIB	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques		NA	NA
29	IIIB1	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	1. Image noise	4.3%	3.363
30	IIIB2	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	2. Reconstruction interval	6.0%	3.262
31	IIIB3	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	3. Reconstruction algorithm/kernel	6.0%	3.121
32	IIIB4	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	4. Matrix	7.9%	2.953
33	IIIB5	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	5. Magnification	5.4%	3.044
34	IIIB6	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	6. Windowing	5.0%	3.417
35	IIIB7	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	7. Artifacts	3.6%	3.599

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
36	IIIB8	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	8. Slice thickness	5.0%	3.464
37	IIIB9	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	9. Partial volume effect	9.1%	3.081
38	IIIB10	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	10. Field of view	4.3%	3.515
39	IIIB11	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	11. Patient related	4.4%	3.544
40	IIIC	Domain III: Image Quality and Quality Assurance	C. Apply knowledge of linear attenuation coefficient usage		18.8%	2.505
41	IIID	Domain III: Image Quality and Quality Assurance	D. Differentiate between CT number and Hounsfield units		11.5%	2.959
42	IIIE	Domain III: Image Quality and Quality Assurance	E. Define interscan spacing and its application		18.3%	2.642

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
43	IIIF	Domain III: Image Quality and Quality Assurance	F. Apply quality assurance process to evaluating images		6.1%	3.355
44	IV	Domain IV: Patient Management			NA	NA
45	IVA	Domain IV: Patient Management	A. Provide patient education and preparation		2.2%	3.735
46	IVB	Domain IV: Patient Management	B. Perform patient screening and assessment		NA	NA
47	IVB1	Domain IV: Patient Management	B. Perform patient screening and assessment	1. Contraindications (e.g. renal insufficiency)	3.6%	3.772
48	IVB2	Domain IV: Patient Management	B. Perform patient screening and assessment	2. Medication and results of laboratory testing	3.6%	3.730
49	IVC	Domain IV: Patient Management	C. Perform an ongoing assessment and respond to changes of patients condition		1.8%	3.733
50	IVD	Domain IV: Patient Management	D. Utilize patient positioning and immobilization devices		2.2%	3.644

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
51	IVE	Domain IV: Patient Management	E. Identify principles of patient documentation, record keeping, confidentiality		2.2%	3.741
52	IVF	Domain IV: Patient Management	F. Verify physician orders		2.2%	3.840
53	V	Domain V: Medications and Contrast Agents			NA	NA
54	VA	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage		NA	NA
55	VA1	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	1. Contraindications	8.8%	3.769
56	VA2	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	2. Adverse reactions and events	9.2%	3.768
57	VA3	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	3. Viscosity/osmolality	12.8%	3.208
58	VA4	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	4. IV Size	8.1%	3.601
59	VA5	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	5. Volume	9.8%	3.529

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
60	VA6	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	6. Flow Duration	9.6%	3.479
61	VA7	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	7. Flow Rate	9.9%	3.617
62	VB	Domain V: Medications and Contrast Agents	B. Identify other contrast agents and their properties/usage/routs		NA	NA
63	VB1	Domain V: Medications and Contrast Agents	B. Identify other contrast agents and their properties/usage/routs	1. Gastrointestinal Contrast Agents	13.0%	3.339
64	VB2	Domain V: Medications and Contrast Agents	B. Identify other contrast agents and their properties/usage/routs	2. Intrathecal Contrast	33.2%	2.798
65	VB3	Domain V: Medications and Contrast Agents	B. Identify other contrast agents and their properties/usage/routs	3. Rectal Contrast	35.8%	2.694
66	VB4	Domain V: Medications and Contrast Agents	B. Identify other contrast agents and their properties/usage/routs	4. Vaginal Contrast	53.1%	2.406
67	VB5	Domain V: Medications and Contrast Agents	B. Identify other contrast agents and their properties/usage/routs	5. Intraarticular Contrast	39.6%	2.657
68	VC	Domain V: Medications and Contrast Agents	C. Identify Bolus Parameters, Timing, and Tracking		13.6%	3.537

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
69	VD	Domain V: Medications and Contrast Agents	D. Recognize common medications for managing contrast reactions		11.4%	3.601
70	VI	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology			NA	NA
71	VIA	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT		NA	NA
72	VIA1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	1. Routine Brain	15.5%	3.436
73	VIA2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	2. Trauma	26.5%	3.306
74	VIA3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	3. Internal Auditory Canals	27.8%	2.932
75	VIA4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	4. Pituitary	35.6%	2.742

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
76	VIA5	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	5. Orbits	21.5%	3.011
77	VIA6	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	6. Sinuses	20.2%	3.133
78	VIA7	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	7. Maxillofacial	20.0%	3.135
79	VIA8	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	8. Temporomandibular Joint	28.1%	2.868
80	VIA9	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	9. Angiography-Circle of Willis	28.0%	3.174
81	VIB	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	B. Demonstrate fundamental parameters of neck CT		NA	NA
82	VIB1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	B. Demonstrate fundamental parameters of neck CT	1. Routine Soft Tissue Neck	15.4%	3.398

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
83	VIB2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	B. Demonstrate fundamental parameters of neck CT	2. Trauma	29.1%	3.171
84	VIB3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	B. Demonstrate fundamental parameters of neck CT	3. Larynx	28.2%	2.762
85	VIB4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	B. Demonstrate fundamental parameters of neck CT	4. Parathyroid	32.8%	2.695
86	VIB5	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	B. Demonstrate fundamental parameters of neck CT	5. Angiography-Carotids	24.8%	3.215
87	VIC	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	C. Demonstrate fundamental parameters of spine CT		NA	NA
88	VIC1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	C. Demonstrate fundamental parameters of spine CT	1. Cervical Spine	17.4%	3.352
89	VIC2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	C. Demonstrate fundamental parameters of spine CT	2. Thoracic Spine	17.4%	3.218

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
90	VIC3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	C. Demonstrate fundamental parameters of spine CT	3. Lumbosacral Spine	16.9%	3.315
91	VIC4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	C. Demonstrate fundamental parameters of spine CT	4. Trauma	27.0%	3.282
92	VIC5	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	C. Demonstrate fundamental parameters of spine CT	5. Post-Myelography Spine	33.2%	2.860
93	VID	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT		NA	NA
94	VID1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	1. Shoulder	22.4%	2.966
95	VID2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	2. Elbow	23.6%	2.867
96	VID3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	3. Wrist	23.1%	2.882

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
97	VID4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	4. Hand	23.9%	2.863
98	VID5	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	5. Hips	21.1%	2.992
99	VID6	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	6. Knee	22.1%	2.992
100	VID7	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	7. Ankle	23.2%	2.935
101	VID8	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	8. Foot	22.6%	2.902
102	VID9	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	9. Long bones	24.2%	2.889
103	VID10	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	10. Arthrogram	36.9%	2.667

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
104	VIE	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	E. Demonstrate fundamental parameters of chest CT		NA	3.7
105	VIE1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	E. Demonstrate fundamental parameters of chest CT	1. Routine chest	10.2%	3.539
106	VIE2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	E. Demonstrate fundamental parameters of chest CT	2. Lung	NA	NA
107	VIE2a	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	E. Demonstrate fundamental parameters of chest CT	2. Lung a. High resolution	16.3%	3.294
108	VIE2b	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	E. Demonstrate fundamental parameters of chest CT	2. Lung b. Low dose screening	17.5%	3.226
109	VIE2c	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	E. Demonstrate fundamental parameters of chest CT	2. Lung c. Respiratory gating	35.8%	2.852
110	VIE3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	E. Demonstrate fundamental parameters of chest CT in conjunction with nuclear medicine procedures:	3. Angiography-Thoracic Aorta	23.8%	3.241

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
111	VIE4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	E. Demonstrate fundamental parameters of chest CT in conjunction with nuclear medicine procedures:	4. Angiography-Pulmonary Vessels/PE exam	20.7%	3.403
112	VIF	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT		NA	NA
113	VIF1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	1. Routine Abdomen	12.8%	3.498
114	VIF2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	2. Tri-Phase Liver	19.9%	3.225
115	VIF3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	3. Pancreas	21.8%	3.129
116	VIF4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	4. Kidneys	20.5%	3.245
117	VIF5	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	5. Renal Calculi	22.7%	3.199

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
118	VIF6	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	6. Adrenals	24.0%	3.045
119	VIF7	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	7. Enterography and virtual colonoscopy	40.6%	2.747
120	VIF8	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	8. Ureteral Calculi/Urogram	28.8%	2.974
121	VIF9	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	9. Angiography - abdomen	26.8%	3.192
122	VIF10	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	10. Trauma	31.5%	3.197
123	VIG	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	G. Demonstrate fundamental parameters of pelvis CT		NA	NA
124	VIG1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	G. Demonstrate fundamental parameters of pelvis CT	1. Bladder	24.0%	3.042

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
125	VIG2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	G. Demonstrate fundamental parameters of pelvis CT	2. Trauma	32.7%	3.134
126	VIG3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	G. Demonstrate fundamental parameters of pelvis CT	3. Angiography-Run-offs	30.2%	3.084
127	VIH	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	H. Demonstrate fundamental parameters of cardiac CT		NA	NA
128	VIH1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	H. Demonstrate fundamental parameters of cardiac CT	1. Angiography-Cardiac	38.3%	3.019
129	VIH2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	H. Demonstrate fundamental parameters of cardiac CT	2. Calcium scoring	34.8%	2.962
130	VIH3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	H. Demonstrate fundamental parameters of cardiac CT	3.Cardiac Gating	33.2%	2.942
131	VII	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	I. Recognize characteristics of special procedures		NA	NA

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
132	VII1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	I. Recognize characteristics of special procedures	1. Biopsy	40.1%	2.802
133	VII2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	I. Recognize characteristics of special procedures	2. Drainage	42.2%	2.723
134	VII3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	I. Recognize characteristics of special procedures	3. Whole Body CT/Bone Survey	52.5%	2.392
135	VII4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	I. Recognize characteristics of special procedures	4. Cryogenic and Microwave Therapy	60.2%	2.115
136	VII5	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	I. Recognize characteristics of special procedures	5. Fluoroscopy	53.1%	2.308
137	VIJ	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	J. Recognize characteristics of PET/CT		NA	NA
138	VIJ1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	J. Recognize characteristics of PET/CT:	1. Anatomy	16.9%	3.458
139	VIJ2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	J. Recognize characteristics of PET/CT:	2. Physiology	17.2%	2.411

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
140	VIJ3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	J. Recognize characteristics of PET/CT:	3. Organ systems	17.3%	3.404
141	VIJ4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	J. Recognize characteristics of PET/CT:	4. Attenuation Correction	17.7%	3.365
142	VIK	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	K. Recognize characteristics of SPECT/CT		NA	NA
143	VIK1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	K. Recognize characteristics of SPECT/CT	1. Anatomy	21.6%	3.345
144	VIK2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	K. Recognize characteristics of SPECT/CT	2. Physiology	21.3%	3.287
145	VIK3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	K. Recognize characteristics of SPECT/CT	3. Organ systems	21.3%	3.258
146	VIK4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	K. Recognize characteristics of SPECT/CT	4. Attenuation Correction	22.0%	3.205
147	VIL	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	L. Recognize procedural differences for patient populations (e.g., pediatric, body habitus)		13.2%	3.485

Order	Element	Domain	Subdomain	KSA	Rate of Non-performance	Mean Importance
148	VII	Domain VII: Radiation Safety			NA	NA
149	VIIA	Domain VII: Radiation Safety	A. Recognize biological effects of ionizing radiation		4.0%	3.657
150	VIIB	Domain VII: Radiation Safety	B. Recognize elements of dose reporting and measurements/units		2.8%	3.683
151	VIIC	Domain VII: Radiation Safety	C. Apply dose optimization techniques		NA	NA
152	VIIC1	Domain VII: Radiation Safety	C. Apply dose optimization techniques	1.Hardware Factors	6.2%	3.489
153	VIIC2	Domain VII: Radiation Safety	C. Apply dose optimization techniques	2. Scan Parameters	4.7%	3.693
154	VIIC3	Domain VII: Radiation Safety	C. Apply dose optimization techniques	3. Reformat	5.9%	3.502
155	VIIC4	Domain VII: Radiation Safety	C. Apply dose optimization techniques	4. Repeat Scans	5.1%	3.581
156	VIIC5	Domain VII: Radiation Safety	C. Apply dose optimization techniques	5. Radiation penumbra	13.3%	3.196
157	VIID	Domain VII: Radiation Safety	D. Recognize dosing modifications for patient populations (e.g., pediatric, body habitus, pregnancy)		2.7%	3.740
158	VIIE	Domain VII: Radiation Safety	E. Recognize elements, types, and applications of shielding (e.g., PPE, ALARA)		3.1%	3.721

Appendix F: Tasks in Highest to Lowest Nonperformance Order

Rating Scale
1 = Not Important
2 = Low Importance
3 = Moderate Importance
4 = Extremely Important

TABLE F-1. ***Tasks in Highest to Lowest Nonperformance Order***

Order	Element	Domain	Subdomain	KSA	Percentage
135	VII4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	I. Recognize characteristics of special procedures	4. Cryogenic and Microwave Therapy	60.20%
66	VB4	Domain V: Medications and Contrast Agents	B. Identify other contrast agents and their properties/usage/routs	4. Vaginal Contrast	53.10%
136	VII5	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	I. Recognize characteristics of special procedures	5. Fluoroscopy	53.10%
134	VII3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	I. Recognize characteristics of special procedures	3. Whole Body CT/Bone Survey	52.50%

Order	Element	Domain	Subdomain	KSA	Percentage
133	VII2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	I. Recognize characteristics of special procedures	2. Drainage	42.20%
119	VIF7	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	7. Enterography and virtual colonoscopy	37.9%
132	VII1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	I. Recognize characteristics of special procedures	1. Biopsy	40.10%
67	VB5	Domain V: Medications and Contrast Agents	B. Identify other contrast agents and their properties/usage/routs	5. Intraarticular Contrast	39.60%
128	VIH1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	H. Demonstrate fundamental parameters of cardiac CT	1. Angiography-Cardiac	38.30%
103	VID10	Domain VI: CT Procedures: Anatomy,	D. Demonstrate fundamental parameters of musculoskeletal CT	10. Arthrogram	36.90%

Order	Element	Domain	Subdomain	KSA	Percentage
		Elements, Indications, and Pathology			
65	VB3	Domain V: Medications and Contrast Agents	B. Identify other contrast agents and their properties/usage/routs	3. Rectal Contrast	35.80%
109	VIE2c	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	E. Demonstrate fundamental parameters of chest CT	2. Lung c. Respiratory gating	35.80%
129	VIH2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	H. Demonstrate fundamental parameters of cardiac CT	2. Calcium scoring	34.80%
64	VB2	Domain V: Medications and Contrast Agents	B. Identify other contrast agents and their properties/usage/routs	2. Intrathecal Contrast	33.20%
92	VIC5	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	C. Demonstrate fundamental parameters of spine CT	5. Post-Myelography Spine	33.20%
130	VIH3	Domain VI: CT Procedures: Anatomy,	H. Demonstrate fundamental parameters of cardiac CT	3.Cardiac Gating	33.20%

Order	Element	Domain	Subdomain	KSA	Percentage
		Elements, Indications, and Pathology			
85	VIB4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	B. Demonstrate fundamental parameters of neck CT	4. Parathyroid	32.80%
125	VIG2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	G. Demonstrate fundamental parameters of pelvis CT	2. Trauma	32.70%
122	VIF10	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	10. Trauma	31.50%
126	VIG3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	G. Demonstrate fundamental parameters of pelvis CT	3. Angiography-Run-offs	30.20%
83	VIB2	Domain VI: CT Procedures: Anatomy, Elements,	B. Demonstrate fundamental parameters of neck CT	2. Trauma	29.10%

Order	Element	Domain	Subdomain	KSA	Percentage
		Indications, and Pathology			
120	VIF8	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	8. Ureteral Calculi/Urogram	28.80%
84	VIB3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	B. Demonstrate fundamental parameters of neck CT	3. Larynx	28.20%
79	VIA8	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	8. Temporomandibular Joint	28.10%
80	VIA9	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	9. Angiography-Circle of Willis	28.00%
74	VIA3	Domain VI: CT Procedures: Anatomy, Elements,	A. Demonstrate fundamental parameters of head CT	3. Internal Auditory Canals	27.80%

Order	Element	Domain	Subdomain	KSA	Percentage
		Indications, and Pathology			
91	VIC4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	C. Demonstrate fundamental parameters of spine CT	4. Trauma	27.00%
121	VIF9	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	9. Angiography - abdomen	26.80%
73	VIA2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	2. Trauma	26.50%
86	VIB5	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	B. Demonstrate fundamental parameters of neck CT	5. Angiography-Carotids	24.80%
102	VID9	Domain VI: CT Procedures: Anatomy,	D. Demonstrate fundamental parameters of musculoskeletal CT	9. Long bones	24.20%

Order	Element	Domain	Subdomain	KSA	Percentage
		Elements, Indications, and Pathology			
118	VIF6	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	6. Adrenals	24.00%
124	VIG1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	G. Demonstrate fundamental parameters of pelvis CT	1. Bladder	24.00%
97	VID4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	4. Hand	23.90%
110	VIE3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	E. Demonstrate fundamental parameters of chest CT in conjunction with nuclear medicine procedures:	3. Angiography-Thoracic Aorta	23.80%
95	VID2	Domain VI: CT Procedures: Anatomy, Elements,	D. Demonstrate fundamental parameters of musculoskeletal CT	2. Elbow	23.60%

Order	Element	Domain	Subdomain	KSA	Percentage
		Indications, and Pathology			
100	VID7	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	7. Ankle	23.20%
96	VID3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	3. Wrist	23.10%
117	VIF5	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	5. Renal Calculi	22.70%
101	VID8	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	8. Foot	22.60%
94	VID1	Domain VI: CT Procedures: Anatomy, Elements,	D. Demonstrate fundamental parameters of musculoskeletal CT	1. Shoulder	22.40%

Order	Element	Domain	Subdomain	KSA	Percentage
		Indications, and Pathology			
99	VID6	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	6. Knee	22.10%
146	VIK4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	K. Recognize characteristics of SPECT/CT	4. Attenuation Correction	22.00%
115	VIF3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	3. Pancreas	21.80%
19	IIB2	Domain II: Data Acquisition and Post Processing	B. Differentiate among scanning methods	2. Step and shoot scanning	21.70%
143	VIK1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	K. Recognize characteristics of SPECT/CT	1. Anatomy	21.60%

Order	Element	Domain	Subdomain	KSA	Percentage
76	VIA5	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	5. Orbits	21.50%
144	VIK2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	K. Recognize characteristics of SPECT/CT	2. Physiology	21.30%
145	VIK3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	K. Recognize characteristics of SPECT/CT	3. Organ systems	21.30%
98	VID5	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	5. Hips	21.10%
111	VIE4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	E. Demonstrate fundamental parameters of chest CT in conjunction with nuclear medicine procedures:	4. Angiography-Pulmonary Vessels/PE exam	20.70%

Order	Element	Domain	Subdomain	KSA	Percentage
116	VIF4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	4. Kidneys	20.50%
77	VIA6	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	6. Sinuses	20.20%
78	VIA7	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	7. Maxillofacial	20.00%
114	VIF2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	2. Tri-Phase Liver	19.90%
40	IIIC	Domain III: Image Quality and Quality Assurance	C. Apply knowledge of linear attenuation coefficient usage		18.80%
42	IIIE	Domain III: Image Quality and Quality Assurance	E. Define interscan spacing and its application		18.30%

Order	Element	Domain	Subdomain	KSA	Percentage
141	VIJ4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	J. Recognize characteristics of PET/CT:	4. Attenuation Correction	17.70%
108	VIE2b	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	E. Demonstrate fundamental parameters of chest CT	2. Lung b. Low dose screening	17.50%
88	VIC1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	C. Demonstrate fundamental parameters of spine CT	1. Cervical Spine	17.40%
89	VIC2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	C. Demonstrate fundamental parameters of spine CT	2. Thoracic Spine	17.40%
140	VIJ3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	J. Recognize characteristics of PET/CT:	3. Organ systems	17.30%

Order	Element	Domain	Subdomain	KSA	Percentage
139	VIJ2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	J. Recognize characteristics of PET/CT:	2. Physiology	17.20%
9	IB6	Domain I: System Operations and Instrumentation	B. Recognize the essential design and function of CT equipment	6. Array processor	23.7%
90	VIC3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	C. Demonstrate fundamental parameters of spine CT	3. Lumbosacral Spine	16.90%
138	VIJ1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	J. Recognize characteristics of PET/CT:	1. Anatomy	16.90%
107	VIE2a	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	E. Demonstrate fundamental parameters of chest CT	2. Lung a. High resolution	16.30%
72	VIA1	Domain VI: CT Procedures: Anatomy,	A. Demonstrate fundamental parameters of head CT	1. Routine Brain	15.50%

Order	Element	Domain	Subdomain	KSA	Percentage
		Elements, Indications, and Pathology			
82	VIB1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	B. Demonstrate fundamental parameters of neck CT	1. Routine Soft Tissue Neck	15.40%
12	IE	Domain I: System Operations and Instrumentation	E. Distinguish safe operation of power injectors with consideration to their limitations		13.80%
68	VC	Domain V: Medications and Contrast Agents	C. Identify Bolus Parameters, Timing, and Tracking		13.60%
156	VIIC5	Domain VII: Radiation Safety	C. Apply dose optimization techniques	5. Radiation penumbra	13.30%
18	IIB1	Domain II: Data Acquisition and Post Processing	B. Differentiate among scanning methods	1. Conventional serial CT scan	13.20%
147	VIL	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	L. Recognize procedural differences for patient populations (e.g., pediatric, body habitus)		13.20%

Order	Element	Domain	Subdomain	KSA	Percentage
63	VB1	Domain V: Medications and Contrast Agents	B. Identify other contrast agents and their properties/usage/routs	1. Gastrointestinal Contrast Agents	13.00%
57	VA3	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	3. Viscosity/osmolality	12.80%
113	VIF1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	1. Routine Abdomen	12.80%
16	IIA	Domain II: Data Acquisition and Post Processing	A. Explain the process of digital CT image production		11.50%
41	IIID	Domain III: Image Quality and Quality Assurance	D. Differentiate between CT number and Hounsfield units		11.50%
69	VD	Domain V: Medications and Contrast Agents	D. Recognize common medications for managing contrast reactions		11.40%
11	ID	Domain I: System Operations and Instrumentation	D. Illustrate the effects and usage of collimation		11.10%
10	IC	Domain I: System Operations and Instrumentation	C. Classify filtration applications		11.00%
105	VIE1	Domain VI: CT Procedures: Anatomy,	E. Demonstrate fundamental parameters of chest CT	1. Routine chest	10.20%

Order	Element	Domain	Subdomain	KSA	Percentage
		Elements, Indications, and Pathology			
61	VA7	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	7. Flow Rate	9.90%
5	IB2	Domain I: System Operations and Instrumentation	B. Recognize the essential design and function of CT equipment	2. CT Radiographic tube	9.80%
7	IB4	Domain I: System Operations and Instrumentation	B. Recognize the essential design and function of CT equipment	4. Detectors	9.80%
59	VA5	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	5. Volume	9.80%
60	VA6	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	6. Flow Duration	9.60%
56	VA2	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	2. Adverse reactions and events	9.20%
37	IIIB9	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	9. Partial volume effect	9.10%
55	VA1	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	1. Contraindications	8.80%

Order	Element	Domain	Subdomain	KSA	Percentage
20	IIB3	Domain II: Data Acquisition and Post Processing	B. Differentiate among scanning methods	3. Helical scanning	8.30%
58	VA4	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	4. IV Size	8.10%
32	IIIB4	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	4. Matrix	7.90%
8	IB5	Domain I: System Operations and Instrumentation	B. Recognize the essential design and function of CT equipment	5. Data acquisition system	6.90%
21	IIC	Domain II: Data Acquisition and Post Processing	C. Identify the characteristics of localizer scans		6.30%
152	VIIC1	Domain VII: Radiation Safety	C. Apply dose optimization techniques	1.Hardware Factors	6.20%
24	IIF	Domain II: Data Acquisition and Post Processing	F. Differentiate among slice planes		6.10%
43	IIIF	Domain III: Image Quality and Quality Assurance	F. Apply quality assurance process to evaluating images		6.10%
30	IIIB2	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	2. Reconstruction interval	6.00%

Order	Element	Domain	Subdomain	KSA	Percentage
31	IIIB3	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	3. Reconstruction algorithm/kernel	6.00%
154	VIIC3	Domain VII: Radiation Safety	C. Apply dose optimization techniques	3. Reformat	5.90%
33	IIIB5	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	5. Magnification	5.40%
27	IIIA	Domain III: Image Quality and Quality Assurance	A. Recognize influences on parameter selection		5.30%
155	VIIC4	Domain VII: Radiation Safety	C. Apply dose optimization techniques	4. Repeat Scans	5.10%
25	IIG	Domain II: Data Acquisition and Post Processing	G. Recognize how to set and confirm landmarks		5.00%
34	IIIB6	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	6. Windowing	5.00%
36	IIIB8	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	8. Slice thickness	5.00%
6	IB3	Domain I: System Operations and Instrumentation	B. Recognize the essential design and function of CT equipment	3. Gantry/table features	4.80%

Order	Element	Domain	Subdomain	KSA	Percentage
22	IID	Domain II: Data Acquisition and Post Processing	D. Recognize principles of image reconstruction		4.70%
153	VIIC2	Domain VII: Radiation Safety	C. Apply dose optimization techniques	2. Scan Parameters	4.70%
13	IF	Domain I: System Operations and Instrumentation	F. Utilize image archiving principles within the communication system		4.50%
23	IIE	Domain II: Data Acquisition and Post Processing	E. Apply principles of post-processing techniques		4.40%
39	IIIB11	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	11. Patient related	4.40%
29	IIIB1	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	1. Image noise	4.30%
38	IIIB10	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	10. Field of view	4.30%
4	IB1	Domain I: System Operations and Instrumentation	B. Recognize the essential design and function of CT equipment	1. Host computer/reconstruction station	4.20%

Order	Element	Domain	Subdomain	KSA	Percentage
149	VIIA	Domain VII: Radiation Safety	A. Recognize biological effects of ionizing radiation		4.00%
2	IA	Domain I: System Operations and Instrumentation	A. Identify characteristics of the operator's console/acquisition station		3.80%
14	IG	Domain I: System Operations and Instrumentation	G. Apply equipment quality assurance measures prior to usage		3.60%
35	IIIB7	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	7. Artifacts	3.60%
47	IVB1	Domain IV: Patient Management	B. Perform patient screening and assessment	1. Contraindications (e.g. renal insufficiency)	3.60%
48	IVB2	Domain IV: Patient Management	B. Perform patient screening and assessment	2. Medication and results of laboratory testing	3.60%
158	VIIE	Domain VII: Radiation Safety	E. Recognize elements, types, and applications of shielding (e.g., PPE, ALARA)		3.10%
150	VIIB	Domain VII: Radiation Safety	B. Recognize elements of dose reporting and measurements/units		2.80%

Order	Element	Domain	Subdomain	KSA	Percentage
157	VIID	Domain VII: Radiation Safety	D. Recognize dosing modifications for patient populations (e.g., pediatric, body habitus, pregnancy)		2.70%
45	IVA	Domain IV: Patient Management	A. Provide patient education and preparation		2.20%
50	IVD	Domain IV: Patient Management	D. Utilize patient positioning and immobilization devices		2.20%
51	IVE	Domain IV: Patient Management	E. Identify principles of patient documentation, record keeping, confidentiality		2.20%
52	IVF	Domain IV: Patient Management	F. Verify physician orders		2.20%
49	IVC	Domain IV: Patient Management	C. Perform an ongoing assessment and respond to changes of patients condition		1.80%

Appendix G: Tasks in Lowest to Highest Importance Order

Rating Scale
1 = Not Important
2 = Low Importance
3 = Moderate Importance
4 = Extremely Important

TABLE G-1. ***Tasks in Lowest to Highest Importance Rating Order***

Order	Element	Domain	Subdomain	KSA	Mean Importance
135	VII4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	I. Recognize characteristics of special procedures	4. Cryogenic and Microwave Therapy	2.115
136	VII5	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	I. Recognize characteristics of special procedures	5. Fluoroscopy	2.308
134	VII3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	I. Recognize characteristics of special procedures	3. Whole Body CT/Bone Survey	2.392
66	VB4	Domain V: Medications and Contrast Agents	B. Identify other contrast agents and their properties/usage/routs	4. Vaginal Contrast	2.406
139	VIJ2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	J. Recognize characteristics of PET/CT:	2. Physiology	2.411
40	IIIC	Domain III: Image Quality and Quality Assurance	C. Apply knowledge of linear attenuation coefficient usage		2.505

Order	Element	Domain	Subdomain	KSA	Mean Importance
9	IB6	Domain I: System Operations and Instrumentation	B. Recognize the essential design and function of CT equipment	6. Array processor	2.575
42	IIIE	Domain III: Image Quality and Quality Assurance	E. Define interscan spacing and its application		2.642
67	VB5	Domain V: Medications and Contrast Agents	B. Identify other contrast agents and their properties/usage/routs	5. Intraarticular Contrast	2.657
103	VID10	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	10. Arthrogram	2.667
65	VB3	Domain V: Medications and Contrast Agents	B. Identify other contrast agents and their properties/usage/routs	3. Rectal Contrast	2.694
85	VIB4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	B. Demonstrate fundamental parameters of neck CT	4. Parathyroid	2.695
19	IIB2	Domain II: Data Acquisition and Post Processing	B. Differentiate among scanning methods	2. Step and shoot scanning	2.703
133	VII2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	I. Recognize characteristics of special procedures	2. Drainage	2.723
75	VIA4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	4. Pituitary	2.742

Order	Element	Domain	Subdomain	KSA	Mean Importance
119	VIF7	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	7. Enterography and virtual colonoscopy	2.747
84	VIB3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	B. Demonstrate fundamental parameters of neck CT	3. Larynx	2.762
10	IC	Domain I: System Operations and Instrumentation	C. Classify filtration applications		2.762
11	ID	Domain I: System Operations and Instrumentation	D. Illustrate the effects and usage of collimation		2.786
64	VB2	Domain V: Medications and Contrast Agents	B. Identify other contrast agents and their properties/usage/routs	2. Intrathecal Contrast	2.798
132	VII1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	I. Recognize characteristics of special procedures	1. Biopsy	2.802
5	IB2	Domain I: System Operations and Instrumentation	B. Recognize the essential design and function of CT equipment	2. CT Radiographic tube	2.812
16	IIA	Domain II: Data Acquisition and Post Processing	A. Explain the process of digital CT image production		2.817
109	VIE2c	Domain VI: CT Procedures: Anatomy,	E. Demonstrate fundamental parameters of chest CT	2. Lung c. Respiratory gating	2.852

Order	Element	Domain	Subdomain	KSA	Mean Importance
		Elements, Indications, and Pathology			
92	VIC5	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	C. Demonstrate fundamental parameters of spine CT	5. Post-Myelography Spine	2.86
97	VID4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	4. Hand	2.863
95	VID2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	2. Elbow	2.867
79	VIA8	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	8. Temporomandibular Joint	2.868
96	VID3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	3. Wrist	2.882
102	VID9	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	9. Long bones	2.889
101	VID8	Domain VI: CT Procedures: Anatomy,	D. Demonstrate fundamental parameters of musculoskeletal CT	8. Foot	2.902

Order	Element	Domain	Subdomain	KSA	Mean Importance
		Elements, Indications, and Pathology			
7	IB4	Domain I: System Operations and Instrumentation	B. Recognize the essential design and function of CT equipment	4. Detectors	2.902
18	IIB1	Domain II: Data Acquisition and Post Processing	B. Differentiate among scanning methods	1. Conventional serial CT scan	2.905
74	VIA3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	3. Internal Auditory Canals	2.932
100	VID7	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	7. Ankle	2.935
130	VIH3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	H. Demonstrate fundamental parameters of cardiac CT	3.Cardiac Gating	2.942
32	IIIB4	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	4. Matrix	2.953
41	IIID	Domain III: Image Quality and Quality Assurance	D. Differentiate between CT number and Hounsfield units		2.959

Order	Element	Domain	Subdomain	KSA	Mean Importance
129	VIH2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	H. Demonstrate fundamental parameters of cardiac CT	2. Calcium scoring	2.962
94	VID1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	1. Shoulder	2.966
120	VIF8	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	8. Ureteral Calculi/Urogram	2.974
99	VID6	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	6. Knee	2.992
98	VID5	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	D. Demonstrate fundamental parameters of musculoskeletal CT	5. Hips	2.992
76	VIA5	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	5. Orbits	3.011
128	VIH1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	H. Demonstrate fundamental parameters of cardiac CT	1. Angiography-Cardiac	3.019

Order	Element	Domain	Subdomain	KSA	Mean Importance
124	VIG1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	G. Demonstrate fundamental parameters of pelvis CT	1. Bladder	3.042
33	IIIB5	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	5. Magnification	3.044
118	VIF6	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	6. Adrenals	3.045
37	IIIB9	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	9. Partial volume effect	3.081
126	VIG3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	G. Demonstrate fundamental parameters of pelvis CT	3. Angiography-Run-offs	3.084
8	IB5	Domain I: System Operations and Instrumentation	B. Recognize the essential design and function of CT equipment	5. Data acquisition system	3.112

Order	Element	Domain	Subdomain	KSA	Mean Importance
31	IIIB3	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	3. Reconstruction algorithm/kernel	3.121
115	VIF3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	3. Pancreas	3.129
77	VIA6	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	6. Sinuses	3.133
125	VIG2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	G. Demonstrate fundamental parameters of pelvis CT	2. Trauma	3.134
78	VIA7	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	7. Maxillofacial	3.135
13	IF	Domain I: System Operations and Instrumentation	F. Utilize image archiving principles within the communication system		3.166

Order	Element	Domain	Subdomain	KSA	Mean Importance
83	VIB2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	B. Demonstrate fundamental parameters of neck CT	2. Trauma	3.171
80	VIA9	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	9. Angiography-Circle of Willis	3.174
121	VIF9	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	9. Angiography - abdomen	3.192
156	VIIC5	Domain VII: Radiation Safety	C. Apply dose optimization techniques	5. Radiation penumbra	3.196
122	VIF10	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	10. Trauma	3.197
117	VIF5	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	5. Renal Calculi	3.199

Order	Element	Domain	Subdomain	KSA	Mean Importance
146	VIK4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	K. Recognize characteristics of SPECT/CT	4. Attenuation Correction	3.205
57	VA3	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	3. Viscosity/osmolality	3.208
86	VIB5	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	B. Demonstrate fundamental parameters of neck CT	5. Angiography-Carotids	3.215
89	VIC2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	C. Demonstrate fundamental parameters of spine CT	2. Thoracic Spine	3.218
114	VIF2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	2. Tri-Phase Liver	3.225

Order	Element	Domain	Subdomain	KSA	Mean Importance
108	VIE2b	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	E. Demonstrate fundamental parameters of chest CT	2. Lung b. Low dose screening	3.226
110	VIE3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	E. Demonstrate fundamental parameters of chest CT in conjunction with nuclear medicine procedures:	3. Angiography-Thoracic Aorta	3.241
116	VIF4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	4. Kidneys	3.245
145	VIK3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	K. Recognize characteristics of SPECT/CT	3. Organ systems	3.258
30	IIIB2	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	2. Reconstruction interval	3.262

Order	Element	Domain	Subdomain	KSA	Mean Importance
91	VIC4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	C. Demonstrate fundamental parameters of spine CT	4. Trauma	3.282
144	VIK2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	K. Recognize characteristics of SPECT/CT	2. Physiology	3.287
2	IA	Domain I: System Operations and Instrumentation	A. Identify characteristics of the operator's console/acquisition station		3.29
107	VIE2a	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	E. Demonstrate fundamental parameters of chest CT	2. Lung a. High resolution	3.294
73	VIA2	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	2. Trauma	3.306

Order	Element	Domain	Subdomain	KSA	Mean Importance
90	VIC3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	C. Demonstrate fundamental parameters of spine CT	3. Lumbosacral Spine	3.315
4	IB1	Domain I: System Operations and Instrumentation	B. Recognize the essential design and function of CT equipment	1. Host computer/reconstruction station	3.317
63	VB1	Domain V: Medications and Contrast Agents	B. Identify other contrast agents and their properties/usage/routs	1. Gastrointestinal Contrast Agents	3.339
20	IIB3	Domain II: Data Acquisition and Post Processing	B. Differentiate among scanning methods	3. Helical scanning	3.343
143	VIK1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	K. Recognize characteristics of SPECT/CT	1. Anatomy	3.345

Order	Element	Domain	Subdomain	KSA	Mean Importance
88	VIC1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	C. Demonstrate fundamental parameters of spine CT	1. Cervical Spine	3.352
43	IIIF	Domain III: Image Quality and Quality Assurance	F. Apply quality assurance process to evaluating images		3.355
21	IIC	Domain II: Data Acquisition and Post Processing	C. Identify the characteristics of localizer scans		3.36
29	IIIB1	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	1. Image noise	3.363
141	VIJ4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	J. Recognize characteristics of PET/CT:	4. Attenuation Correction	3.365

Order	Element	Domain	Subdomain	KSA	Mean Importance
12	IE	Domain I: System Operations and Instrumentation	E. Distinguish safe operation of power injectors with consideration to their limitations		3.384
6	IB3	Domain I: System Operations and Instrumentation	B. Recognize the essential design and function of CT equipment	3. Gantry/table features	3.396
22	IID	Domain II: Data Acquisition and Post Processing	D. Recognize principles of image reconstruction		3.397
82	VIB1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	B. Demonstrate fundamental parameters of neck CT	1. Routine Soft Tissue Neck	3.398
111	VIE4	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	E. Demonstrate fundamental parameters of chest CT in conjunction with nuclear medicine procedures:	4. Angiography-Pulmonary Vessels/PE exam	3.403

Order	Element	Domain	Subdomain	KSA	Mean Importance
27	IIIA	Domain III: Image Quality and Quality Assurance	A. Recognize influences on parameter selection		3.403
140	VIJ3	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	J. Recognize characteristics of PET/CT:	3. Organ systems	3.404
34	IIIB6	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	6. Windowing	3.417
72	VIA1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	A. Demonstrate fundamental parameters of head CT	1. Routine Brain	3.436
138	VIJ1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	J. Recognize characteristics of PET/CT:	1. Anatomy	3.458

Order	Element	Domain	Subdomain	KSA	Mean Importance
36	IIIB8	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	8. Slice thickness	3.464
23	IIE	Domain II: Data Acquisition and Post Processing	E. Apply principles of post-processing techniques		3.47
60	VA6	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	6. Flow Duration	3.479
147	VIL	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	L. Recognize procedural differences for patient populations (e.g., pediatric, body habitus)		3.485
152	VIIC1	Domain VII: Radiation Safety	C. Apply dose optimization techniques	1.Hardware Factors	3.489

Order	Element	Domain	Subdomain	KSA	Mean Importance
113	VIF1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	F. Demonstrate fundamental parameters of abdomen CT	1. Routine Abdomen	3.498
154	VIIC3	Domain VII: Radiation Safety	C. Apply dose optimization techniques	3. Reformat	3.502
24	IIF	Domain II: Data Acquisition and Post Processing	F. Differentiate among slice planes		3.503
38	IIIB10	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	10. Field of view	3.515
59	VA5	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	5. Volume	3.529

Order	Element	Domain	Subdomain	KSA	Mean Importance
68	VC	Domain V: Medications and Contrast Agents	C. Identify Bolus Parameters, Timing, and Tracking		3.537
105	VIE1	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	E. Demonstrate fundamental parameters of chest CT	1. Routine chest	3.539
39	IIIB11	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	11. Patient related	3.544
14	IG	Domain I: System Operations and Instrumentation	G. Apply equipment quality assurance measures prior to usage		3.575
155	VIIC4	Domain VII: Radiation Safety	C. Apply dose optimization techniques	4. Repeat Scans	3.581

Order	Element	Domain	Subdomain	KSA	Mean Importance
35	IIIB7	Domain III: Image Quality and Quality Assurance	B. Distinguish factors that impact image quality and apply problem solving techniques	7. Artifacts	3.599
69	VD	Domain V: Medications and Contrast Agents	D. Recognize common medications for managing contrast reactions		3.601
58	VA4	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	4. IV Size	3.601
61	VA7	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	7. Flow Rate	3.617
50	IVD	Domain IV: Patient Management	D. Utilize patient positioning and immobilization devices		3.644

Order	Element	Domain	Subdomain	KSA	Mean Importance
25	IIG	Domain II: Data Acquisition and Post Processing	G. Recognize how to set and confirm landmarks		3.65
149	VIIA	Domain VII: Radiation Safety	A. Recognize biological effects of ionizing radiation		3.657
150	VIIB	Domain VII: Radiation Safety	B. Recognize elements of dose reporting and measurements/units		3.683
153	VIIC2	Domain VII: Radiation Safety	C. Apply dose optimization techniques	2. Scan Parameters	3.693
104	VIE	Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology	E. Demonstrate fundamental parameters of chest CT		3.7

Order	Element	Domain	Subdomain	KSA	Mean Importance
158	VIIE	Domain VII: Radiation Safety	E. Recognize elements, types, and applications of shielding (e.g., PPE, ALARA)		3.721
48	IVB2	Domain IV: Patient Management	B. Perform patient screening and assessment	2. Medication and results of laboratory testing	3.73
49	IVC	Domain IV: Patient Management	C. Perform an ongoing assessment and respond to changes of patients condition		3.733
45	IVA	Domain IV: Patient Management	A. Provide patient education and preparation		3.735
157	VIID	Domain VII: Radiation Safety	D. Recognize dosing modifications for patient populations (e.g., pediatric, body habitus, pregnancy)		3.74

Order	Element	Domain	Subdomain	KSA	Mean Importance
51	IVE	Domain IV: Patient Management	E. Identify principles of patient documentation, record keeping, confidentiality		3.741
56	VA2	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	2. Adverse reactions and events	3.768
55	VA1	Domain V: Medications and Contrast Agents	A. Identify intravenous contrast agents and their properties/usage	1. Contraindications	3.769
47	IVB1	Domain IV: Patient Management	B. Perform patient screening and assessment	1. Contraindications (e.g. renal insufficiency)	3.772
52	IVF	Domain IV: Patient Management	F. Verify physician orders		3.84

Appendix H: Subgroup Analyses of Demographic Questions

TABLE H-1 ANOVA Subgroup Analysis by "How many years have you beeen practicing as a Computed Tomography technologist?"

Rating Scale
1 = Not Important
2 = Low Importance
3 = Moderate Importance
4 = Extremely Important

Element	<1	2 - 5	6 - 9	>10	ANOVA_P	1 VS 2	1 VS 3	1 VS 4	2 VS 3	2 VS 4	3 VS 4
1A.A	3.08	3.52	3.59	3.59	0.00	0.30	0.30	0.37	0.06	0.05	0.01
1B1.A	2.96	3.33	3.49	3.38	0.02	0.22	0.30	0.27	0.11	0.03	0.09
1B2.A	2.66	2.74	3.05	2.85	0.18	0.04	0.18	0.10	0.18	0.05	0.11
1B3.A	3.09	3.39	3.42	3.52	0.01	0.18	0.18	0.29	0.02	0.08	0.08
1B4.A	2.75	2.88	3.02	2.95	0.22	0.08	0.13	0.12	0.08	0.04	0.04
1B5.A	2.87	3.15	3.24	3.13	0.24	0.16	0.19	0.15	0.05	0.01	0.06
1B6.A	2.42	2.54	2.78	2.57	0.39	0.07	0.16	0.08	0.12	0.01	0.11
1C.A	2.53	2.66	2.95	2.90	0.02	0.07	0.18	0.20	0.16	0.11	0.03
1D.A	2.65	2.66	2.98	2.88	0.08	0.00	0.15	0.12	0.18	0.10	0.05
1E.A	3.17	3.33	3.54	3.47	0.08	0.08	0.19	0.16	0.11	0.06	0.04
1F.A	2.79	3.18	3.38	3.24	0.02	0.22	0.32	0.27	0.13	0.03	0.09
1G.A	3.21	3.64	3.67	3.64	0.02	0.30	0.29	0.29	0.03	0.00	0.02
2A.A	2.71	2.89	2.98	2.72	0.71	0.10	0.13	0.00	0.06	0.08	0.16
2B1.A	2.63	2.95	3.15	2.88	0.37	0.18	0.24	0.13	0.11	0.03	0.14
2B2.A	2.33	2.70	2.98	2.75	0.08	0.19	0.27	0.21	0.14	0.02	0.12

2B3.A	2.98	3.28	3.50	3.48	0.00	0.18	0.27	0.32	0.14	0.11	0.01
2C.A	3.08	3.36	3.44	3.45	0.05	0.16	0.17	0.23	0.05	0.05	0.01
2D.A	3.04	3.42	3.45	3.50	0.01	0.25	0.25	0.31	0.02	0.05	0.04
2E.A	3.10	3.52	3.50	3.57	0.01	0.28	0.21	0.32	0.02	0.03	0.06
2F.A	3.24	3.53	3.59	3.54	0.12	0.19	0.19	0.20	0.05	0.01	0.04
2G.A	3.34	3.71	3.69	3.72	0.05	0.25	0.19	0.26	0.02	0.00	0.03
3A.A	3.00	3.37	3.52	3.58	0.00	0.24	0.27	0.40	0.11	0.14	0.05
3B1.A	3.11	3.30	3.46	3.51	0.01	0.12	0.20	0.29	0.11	0.14	0.04
3B2.A	2.96	3.07	3.41	3.53	0.00	0.07	0.25	0.40	0.21	0.29	0.10
3B3.A	2.83	2.94	3.24	3.38	0.00	0.07	0.21	0.35	0.19	0.24	0.09
3B4.A	2.72	2.81	3.14	3.11	0.01	0.05	0.20	0.23	0.19	0.15	0.02
3B5.A	2.81	2.94	3.27	3.15	0.02	0.08	0.23	0.21	0.20	0.11	0.08
3B6.A	3.09	3.40	3.48	3.57	0.00	0.21	0.23	0.34	0.07	0.12	0.08
3B7.A	3.23	3.64	3.69	3.69	0.01	0.29	0.30	0.33	0.04	0.04	0.00
3B8.A	3.15	3.34	3.60	3.68	0.00	0.12	0.28	0.39	0.18	0.24	0.08
3B9.A	2.83	2.97	3.26	3.23	0.01	0.08	0.21	0.24	0.17	0.14	0.02
3B10.A	3.13	3.53	3.68	3.63	0.00	0.28	0.32	0.35	0.12	0.07	0.04
3B11.A	3.17	3.55	3.74	3.63	0.00	0.26	0.40	0.33	0.16	0.06	0.11
3C.A	2.47	2.38	2.85	2.50	0.45	0.05	0.17	0.02	0.25	0.05	0.19
3D.A	2.74	2.97	2.96	3.05	0.15	0.13	0.10	0.18	0.01	0.04	0.05
3E.A	2.30	2.50	2.89	2.82	0.01	0.10	0.26	0.26	0.20	0.13	0.04
3F.A	3.07	3.31	3.62	3.41	0.05	0.14	0.31	0.21	0.19	0.05	0.13
4A.A	3.39	3.79	3.81	3.81	0.01	0.30	0.31	0.35	0.02	0.02	0.01
4B1.A	3.50	3.74	3.85	3.91	0.00	0.16	0.23	0.36	0.09	0.17	0.08
4B2.A	3.43	3.71	3.80	3.87	0.00	0.18	0.23	0.37	0.07	0.15	0.08

4C.A	3.40	3.76	3.89	3.79	0.01	0.27	0.41	0.32	0.13	0.02	0.12
4D.A	3.38	3.67	3.70	3.72	0.03	0.22	0.19	0.29	0.03	0.05	0.03
4E.A	3.43	3.75	3.85	3.84	0.00	0.24	0.32	0.34	0.11	0.09	0.02
4F.A	3.50	3.87	3.89	3.95	0.00	0.31	0.32	0.41	0.03	0.12	0.12
5A1.A	3.54	3.74	3.87	3.86	0.02	0.13	0.22	0.25	0.10	0.09	0.01
5A2.A	3.50	3.76	3.87	3.86	0.01	0.18	0.25	0.29	0.09	0.08	0.01
5A3.A	3.11	3.15	3.49	3.18	0.55	0.02	0.20	0.04	0.19	0.01	0.19
5A4.A	3.33	3.59	3.74	3.68	0.03	0.17	0.25	0.25	0.11	0.06	0.05
5A5.A	3.33	3.49	3.66	3.61	0.07	0.10	0.20	0.19	0.11	0.07	0.04
5A6.A	3.27	3.47	3.66	3.51	0.19	0.13	0.23	0.15	0.12	0.02	0.10
5A7.A	3.27	3.60	3.74	3.75	0.00	0.21	0.29	0.37	0.10	0.10	0.00
5B1.A	2.98	3.35	3.61	3.37	0.08	0.20	0.31	0.21	0.15	0.01	0.14
5B2.A	2.58	2.67	3.17	2.88	0.09	0.04	0.25	0.14	0.22	0.08	0.14
5B3.A	2.41	2.54	3.07	2.83	0.03	0.05	0.27	0.19	0.23	0.11	0.11
5B4.A	2.33	2.19	2.72	2.51	0.16	0.06	0.15	0.07	0.21	0.11	0.08
5B5.A	2.51	2.47	2.91	2.79	0.09	0.02	0.16	0.12	0.18	0.11	0.05
5C.A	3.27	3.44	3.76	3.66	0.02	0.09	0.25	0.23	0.17	0.11	0.07
5D.A	3.39	3.47	3.87	3.73	0.01	0.05	0.31	0.22	0.24	0.14	0.11
6A1.A	3.17	3.40	3.62	3.56	0.05	0.12	0.23	0.22	0.13	0.08	0.04
6A2.A	3.05	3.25	3.58	3.40	0.09	0.10	0.24	0.17	0.17	0.06	0.10
6A3.A	2.81	2.76	3.23	3.04	0.10	0.02	0.18	0.11	0.23	0.11	0.09
6A4.A	2.51	2.54	3.10	2.93	0.01	0.01	0.25	0.19	0.27	0.15	0.08
6A5.A	2.74	2.83	3.30	3.24	0.01	0.04	0.26	0.25	0.23	0.17	0.04
6A6.A	2.80	3.08	3.35	3.28	0.03	0.13	0.26	0.24	0.14	0.09	0.04
6A7.A	2.93	2.97	3.35	3.34	0.01	0.02	0.20	0.21	0.20	0.16	0.00

6A8.A	2.76	2.71	3.10	2.98	0.13	0.02	0.15	0.10	0.19	0.11	0.06
6A9.A	2.93	3.03	3.33	3.40	0.01	0.05	0.16	0.24	0.14	0.16	0.04
6B1.A	3.14	3.39	3.45	3.52	0.08	0.13	0.15	0.21	0.03	0.06	0.04
6B2.A	3.05	3.03	3.44	3.27	0.15	0.01	0.17	0.11	0.20	0.09	0.09
6B3.A	2.63	2.46	3.10	3.00	0.01	0.08	0.20	0.17	0.31	0.21	0.05
6B4.A	2.45	2.49	3.13	2.84	0.03	0.02	0.30	0.18	0.31	0.13	0.14
6B5.A	2.95	3.01	3.49	3.46	0.00	0.03	0.23	0.28	0.22	0.20	0.02
6C1.A	3.09	3.28	3.52	3.50	0.04	0.09	0.20	0.22	0.13	0.10	0.01
6C2.A	3.05	3.25	3.45	3.41	0.08	0.10	0.18	0.19	0.11	0.07	0.02
6C3.A	3.05	3.27	3.45	3.47	0.04	0.11	0.18	0.22	0.10	0.09	0.01
6C4.A	3.12	3.20	3.50	3.37	0.18	0.04	0.17	0.12	0.15	0.07	0.08
6C5.A	2.64	2.61	3.33	3.04	0.01	0.01	0.29	0.18	0.34	0.16	0.14
6D1.A	2.69	2.83	3.15	3.19	0.01	0.06	0.19	0.24	0.16	0.15	0.02
6D2.A	2.67	2.63	3.10	3.14	0.01	0.02	0.17	0.22	0.22	0.20	0.02
6D3.A	2.67	2.66	3.10	3.14	0.01	0.00	0.18	0.22	0.21	0.19	0.02
6D4.A	2.64	2.65	3.08	3.11	0.01	0.00	0.18	0.23	0.20	0.19	0.02
6D5.A	2.77	2.91	3.17	3.23	0.02	0.07	0.16	0.22	0.13	0.13	0.03
6D6.A	2.76	2.83	3.12	3.23	0.01	0.03	0.15	0.23	0.14	0.16	0.05
6D7.A	2.71	2.73	3.10	3.19	0.01	0.01	0.16	0.23	0.18	0.19	0.05
6D8.A	2.72	2.70	3.02	3.16	0.01	0.01	0.12	0.21	0.16	0.19	0.07
6D9.A	2.69	2.68	3.08	3.11	0.01	0.00	0.16	0.20	0.19	0.17	0.02
6D10.A	2.45	2.54	3.00	2.77	0.10	0.04	0.21	0.14	0.21	0.09	0.11
6E1.A	3.31	3.52	3.67	3.65	0.08	0.11	0.19	0.20	0.09	0.07	0.01
6E2a.A	3.12	3.16	3.59	3.40	0.06	0.02	0.25	0.16	0.22	0.11	0.11
6E2b.A	3.14	3.09	3.49	3.31	0.17	0.02	0.19	0.09	0.19	0.10	0.10

6E2c.A	2.71	2.69	3.22	2.92	0.18	0.01	0.21	0.09	0.23	0.08	0.14
6E3.A	3.00	3.07	3.41	3.48	0.01	0.03	0.17	0.26	0.17	0.19	0.04
6E4.A	3.14	3.27	3.51	3.64	0.01	0.06	0.15	0.28	0.12	0.17	0.08
6F1.A	3.34	3.50	3.54	3.58	0.23	0.09	0.10	0.14	0.02	0.04	0.03
6F2.A	3.05	3.03	3.44	3.45	0.01	0.01	0.19	0.22	0.19	0.18	0.01
6F3.A	2.98	2.87	3.41	3.38	0.01	0.05	0.21	0.22	0.25	0.21	0.02
6F4.A	3.07	3.06	3.44	3.46	0.02	0.00	0.16	0.21	0.18	0.18	0.02
6F5.A	3.05	3.00	3.36	3.44	0.01	0.02	0.14	0.20	0.17	0.18	0.05
6F6.A	2.93	2.80	3.38	3.24	0.02	0.06	0.21	0.15	0.28	0.18	0.08
6F7.A	2.79	2.52	3.08	2.84	0.28	0.11	0.12	0.02	0.25	0.12	0.11
6F8.A	2.91	2.81	3.21	3.10	0.15	0.04	0.13	0.09	0.19	0.11	0.06
6F9.A	3.00	3.09	3.46	3.31	0.09	0.04	0.20	0.15	0.18	0.09	0.09
6F10.A	3.07	3.06	3.36	3.36	0.09	0.00	0.12	0.14	0.14	0.12	0.00
6G1.A	2.93	2.83	3.21	3.28	0.02	0.04	0.12	0.18	0.18	0.19	0.04
6G2.A	3.05	3.01	3.28	3.28	0.16	0.02	0.09	0.11	0.12	0.10	0.00
6G3.A	3.02	2.95	3.25	3.22	0.18	0.03	0.09	0.09	0.14	0.11	0.01
6H1.A	3.02	2.76	3.30	3.20	0.10	0.11	0.11	0.08	0.23	0.16	0.05
6H2.A	2.86	2.77	3.20	3.14	0.07	0.04	0.14	0.13	0.19	0.14	0.03
6H3.A	2.80	2.77	3.27	3.07	0.10	0.01	0.19	0.12	0.22	0.11	0.10
6I1.A	2.77	2.69	3.13	2.83	0.50	0.03	0.14	0.02	0.20	0.05	0.14
6I2.A	2.75	2.59	3.00	2.76	0.58	0.07	0.09	0.00	0.18	0.06	0.11
6I3.A	2.32	2.38	2.72	2.32	0.93	0.02	0.15	0.00	0.14	0.02	0.16
6I4.A	2.21	2.02	2.54	1.97	0.62	0.08	0.12	0.10	0.22	0.02	0.24
6I5.A	2.37	2.23	2.67	2.19	0.73	0.05	0.10	0.07	0.18	0.01	0.19
6J1.A	3.31	3.49	3.62	3.43	0.75	0.10	0.15	0.06	0.07	0.03	0.10

6J2.A	3.30	3.44	3.62	3.35	0.96	0.07	0.15	0.02	0.10	0.04	0.14
6J3.A	3.26	3.44	3.62	3.35	0.83	0.09	0.18	0.04	0.10	0.04	0.14
6J4.A	3.24	3.36	3.46	3.39	0.51	0.06	0.10	0.08	0.05	0.01	0.04
6K1.A	3.18	3.50	3.44	3.23	0.64	0.16	0.11	0.02	0.04	0.12	0.10
6K2.A	3.09	3.47	3.46	3.11	0.48	0.19	0.15	0.01	0.01	0.15	0.16
6K3.A	3.07	3.43	3.42	3.10	0.55	0.18	0.14	0.01	0.01	0.14	0.15
6K4.A	3.07	3.35	3.23	3.10	0.62	0.13	0.06	0.01	0.06	0.10	0.06
7A.A	3.33	3.64	3.83	3.76	0.00	0.23	0.39	0.36	0.19	0.11	0.09
7B.A	3.40	3.66	3.83	3.79	0.00	0.20	0.34	0.31	0.17	0.11	0.05
7C1.A	3.34	3.39	3.62	3.61	0.04	0.03	0.16	0.19	0.15	0.13	0.02
7C2.A	3.40	3.61	3.75	3.75	0.02	0.14	0.21	0.26	0.11	0.10	0.00
7C3.A	3.20	3.46	3.56	3.67	0.00	0.15	0.20	0.34	0.07	0.14	0.10
7C4.A	3.35	3.54	3.80	3.64	0.05	0.13	0.34	0.19	0.21	0.06	0.13
7C5.A	2.95	3.21	3.33	3.24	0.24	0.14	0.18	0.16	0.06	0.01	0.05
7D.A	3.43	3.73	3.90	3.82	0.00	0.23	0.40	0.33	0.18	0.09	0.12
7E.A	3.42	3.75	3.88	3.76	0.03	0.25	0.38	0.27	0.13	0.01	0.14

TABLE H-2 ANOVA Subgroup Analysis by "In what capacity are you employed as a Computed Tomography technologist?"

Rating Scale
1 = Not Important
2 = Low Importance
3 = Moderate Importance
4 = Extremely Important

	Per diem	Part-time	Full-time	Retired	ANOVA_P	1 VS 2	1 VS 3	1 VS 4	2 VS 3	2 VS 4	3 VS 4
1A.A	3.40	3.61	3.51	3.18	0.67	0.13	0.09	0.17	0.09	0.31	0.29
1B1.A	3.27	3.43	3.34	2.92	0.96	0.10	0.05	0.23	0.09	0.33	0.30
1B2.A	2.80	2.73	2.84	2.77	0.77	0.04	0.02	0.02	0.08	0.02	0.05
1B3.A	3.29	3.38	3.46	3.00	0.35	0.06	0.13	0.19	0.08	0.23	0.33
1B4.A	2.85	2.78	2.97	2.54	0.54	0.04	0.08	0.20	0.15	0.14	0.31
1B5.A	3.15	3.11	3.12	2.92	0.67	0.02	0.02	0.14	0.01	0.11	0.13
1B6.A	2.68	2.43	2.56	2.46	0.46	0.13	0.07	0.13	0.09	0.01	0.06
1C.A	2.67	2.86	2.81	2.46	0.61	0.10	0.08	0.12	0.04	0.22	0.23
1D.A	2.89	2.54	2.81	2.38	0.47	0.18	0.05	0.33	0.19	0.08	0.30
1E.A	3.49	3.35	3.40	2.62	0.17	0.08	0.05	0.52	0.03	0.37	0.48
1F.A	3.04	3.38	3.22	2.62	0.63	0.20	0.12	0.28	0.15	0.52	0.46
1G.A	3.53	3.57	3.62	3.31	0.69	0.02	0.07	0.14	0.06	0.16	0.21
2A.A	2.82	2.82	2.82	2.70	0.90	0.00	0.00	0.08	0.00	0.07	0.08
2B1.A	3.04	2.89	2.88	2.60	0.22	0.08	0.09	0.27	0.00	0.16	0.18
2B2.A	2.72	2.80	2.72	2.10	0.56	0.04	0.00	0.39	0.06	0.41	0.43
2B3.A	3.42	3.35	3.35	2.64	0.22	0.04	0.04	0.46	0.00	0.39	0.45

2C.A	3.33	3.29	3.43	2.55	0.92	0.02	0.07	0.48	0.11	0.40	0.58
2D.A	3.36	3.46	3.43	2.82	0.89	0.07	0.06	0.33	0.02	0.38	0.40
2E.A	3.50	3.37	3.51	2.82	0.55	0.08	0.01	0.42	0.13	0.31	0.45
2F.A	3.54	3.44	3.54	2.82	0.43	0.07	0.00	0.46	0.09	0.36	0.48
2G.A	3.68	3.60	3.67	3.18	0.52	0.06	0.01	0.31	0.07	0.24	0.32
3A.A	3.43	3.47	3.42	2.62	0.36	0.03	0.01	0.48	0.05	0.48	0.50
3B1.A	3.31	3.30	3.43	2.70	0.88	0.01	0.09	0.38	0.12	0.35	0.48
3B2.A	3.25	3.12	3.33	2.60	0.99	0.08	0.06	0.41	0.18	0.31	0.50
3B3.A	3.03	2.85	3.23	2.50	0.33	0.10	0.14	0.33	0.31	0.20	0.50
3B4.A	3.03	2.82	2.98	2.40	0.48	0.12	0.03	0.40	0.12	0.23	0.39
3B5.A	3.05	3.00	3.08	2.40	0.72	0.03	0.03	0.41	0.07	0.36	0.46
3B6.A	3.48	3.52	3.41	2.80	0.16	0.03	0.05	0.43	0.11	0.45	0.41
3B7.A	3.57	3.67	3.63	3.00	0.72	0.07	0.06	0.35	0.04	0.41	0.40
3B8.A	3.46	3.48	3.51	2.60	0.48	0.02	0.04	0.53	0.03	0.54	0.60
3B9.A	3.17	2.97	3.11	2.30	0.30	0.11	0.04	0.53	0.11	0.37	0.53
3B10.A	3.52	3.61	3.55	2.80	0.42	0.06	0.02	0.44	0.06	0.47	0.48
3B11.A	3.59	3.62	3.55	3.10	0.28	0.02	0.04	0.30	0.09	0.31	0.28
3C.A	2.56	2.25	2.55	2.20	0.93	0.16	0.01	0.24	0.21	0.03	0.25
3D.A	2.97	3.06	2.97	2.30	0.47	0.05	0.00	0.43	0.07	0.43	0.46
3E.A	2.52	2.44	2.75	2.10	0.36	0.04	0.12	0.29	0.22	0.20	0.49
3F.A	3.35	3.45	3.37	2.90	0.64	0.06	0.01	0.26	0.07	0.31	0.29
4A.A	3.81	3.88	3.72	3.11	0.05	0.08	0.10	0.41	0.23	0.46	0.36
4B1.A	3.84	3.76	3.78	3.20	0.20	0.07	0.06	0.39	0.03	0.30	0.36
4B2.A	3.81	3.88	3.71	3.20	0.07	0.07	0.10	0.37	0.19	0.39	0.31
4C.A	3.75	3.91	3.73	3.10	0.17	0.18	0.02	0.40	0.25	0.51	0.40

4D.A	3.70	3.73	3.65	2.90	0.10	0.02	0.05	0.49	0.08	0.47	0.47
4E.A	3.78	3.88	3.75	3.00	0.08	0.11	0.04	0.47	0.21	0.53	0.46
4F.A	3.88	4.00	3.84	3.10	0.05	0.26	0.04	0.48	0.31	0.57	0.47
5A1.A	3.86	3.82	3.77	3.1	0.09	0.04	0.08	0.47	0.05	0.41	0.42
5A2.A	3.87	3.82	3.76	3.2	0.08	0.05	0.11	0.41	0.06	0.35	0.34
5A3.A	3.33	3.39	3.15	2.8	0.10	0.04	0.11	0.33	0.18	0.34	0.23
5A4.A	3.72	3.70	3.58	2.9	0.05	0.02	0.11	0.50	0.11	0.46	0.42
5A5.A	3.69	3.61	3.50	2.9	0.03	0.07	0.15	0.50	0.10	0.42	0.38
5A6.A	3.64	3.52	3.46	2.8	0.04	0.10	0.13	0.53	0.05	0.41	0.41
5A7.A	3.73	3.67	3.60	3.1	0.10	0.05	0.10	0.38	0.06	0.32	0.31
5B1.A	3.61	3.39	3.28	2.6	0.01	0.15	0.20	0.67	0.08	0.44	0.45
5B2.A	3.20	2.64	2.75	1.9	0.01	0.30	0.22	0.93	0.07	0.40	0.63
5B3.A	3.00	2.50	2.68	1.8	0.04	0.23	0.16	0.79	0.10	0.37	0.64
5B4.A	2.70	2.21	2.37	1.8	0.08	0.21	0.15	0.58	0.08	0.21	0.41
5B5.A	3.09	2.45	2.59	1.8	0.01	0.30	0.24	0.88	0.07	0.34	0.57
5C.A	3.78	3.67	3.46	3.0	0.01	0.10	0.20	0.47	0.16	0.37	0.27
5D.A	3.75	3.73	3.58	2.9	0.05	0.02	0.11	0.52	0.12	0.46	0.42
6A1.A	3.64	3.60	3.37	3.10	0.04	0.03	0.16	0.32	0.18	0.28	0.17
6A2.A	3.56	3.20	3.28	2.90	0.08	0.20	0.15	0.39	0.05	0.15	0.23
6A3.A	3.20	2.70	2.91	2.50	0.10	0.26	0.16	0.42	0.12	0.09	0.26
6A4.A	3.05	2.67	2.67	2.50	0.05	0.18	0.19	0.32	0.00	0.08	0.11
6A5.A	3.25	2.97	2.99	2.40	0.07	0.15	0.14	0.52	0.01	0.28	0.39
6A6.A	3.42	3.10	3.07	2.80	0.04	0.18	0.19	0.37	0.02	0.15	0.17
6A7.A	3.36	3.10	3.10	2.70	0.09	0.15	0.14	0.41	0.00	0.20	0.26
6A8.A	3.20	2.83	2.78	2.40	0.02	0.19	0.22	0.50	0.03	0.21	0.25

6A9.A	3.44	3.03	3.14	2.80	0.09	0.21	0.16	0.36	0.06	0.10	0.20
6B1.A	3.59	3.48	3.34	3.10	0.07	0.08	0.15	0.29	0.11	0.21	0.14
6B2.A	3.49	3.03	3.10	2.80	0.03	0.25	0.20	0.42	0.04	0.11	0.19
6B3.A	3.17	2.66	2.66	2.50	0.01	0.28	0.26	0.39	0.00	0.07	0.09
6B4.A	2.88	2.62	2.66	2.44	0.24	0.13	0.11	0.25	0.02	0.08	0.13
6B5.A	3.48	3.04	3.21	2.50	0.06	0.23	0.15	0.62	0.10	0.25	0.46
6C1.A	3.61	3.30	3.31	2.90	0.05	0.19	0.17	0.42	0.01	0.20	0.25
6C2.A	3.57	3.30	3.23	2.90	0.02	0.17	0.20	0.40	0.05	0.20	0.20
6C3.A	3.56	3.30	3.27	2.90	0.05	0.15	0.17	0.39	0.02	0.20	0.23
6C4.A	3.61	3.23	3.23	2.60	0.01	0.22	0.21	0.58	0.00	0.30	0.37
6C5.A	3.02	2.90	2.85	2.20	0.18	0.06	0.08	0.47	0.02	0.33	0.40
6D1.A	3.11	2.80	2.99	2.50	0.37	0.16	0.07	0.38	0.11	0.15	0.32
6D2.A	2.98	2.77	2.89	2.40	0.44	0.11	0.05	0.36	0.07	0.18	0.32
6D3.A	3.03	2.73	2.89	2.40	0.34	0.15	0.07	0.39	0.09	0.16	0.32
6D4.A	3.03	2.73	2.86	2.40	0.25	0.15	0.09	0.39	0.07	0.16	0.30
6D5.A	3.23	2.90	3.02	2.50	0.16	0.17	0.11	0.46	0.07	0.20	0.34
6D6.A	3.20	2.83	2.99	2.30	0.14	0.19	0.11	0.54	0.10	0.26	0.44
6D7.A	3.08	2.77	2.96	2.20	0.28	0.16	0.06	0.58	0.12	0.29	0.53
6D8.A	3.10	2.77	2.89	2.40	0.18	0.17	0.11	0.43	0.07	0.18	0.32
6D9.A	3.11	2.72	2.87	2.30	0.12	0.20	0.13	0.53	0.09	0.21	0.39
6D10.A	2.80	2.68	2.65	2.20	0.29	0.06	0.07	0.37	0.02	0.23	0.30
6E1.A	3.63	3.71	3.53	2.90	0.15	0.07	0.06	0.44	0.15	0.45	0.39
6E2a.A	3.49	3.50	3.22	2.90	0.04	0.01	0.16	0.36	0.21	0.34	0.20
6E2b.A	3.46	3.27	3.16	2.90	0.06	0.12	0.16	0.34	0.07	0.20	0.17
6E2c.A	3.05	2.90	2.78	2.70	0.17	0.07	0.13	0.18	0.07	0.09	0.04

6E3.A	3.43	3.17	3.23	2.70	0.15	0.14	0.11	0.46	0.04	0.24	0.35
6E4.A	3.57	3.27	3.41	3.00	0.27	0.17	0.09	0.34	0.09	0.13	0.25
6F1.A	3.62	3.73	3.47	2.67	0.05	0.08	0.10	0.58	0.22	0.62	0.50
6F2.A	3.43	3.30	3.19	2.56	0.06	0.07	0.13	0.55	0.07	0.40	0.42
6F3.A	3.33	3.10	3.11	2.44	0.10	0.12	0.12	0.56	0.01	0.35	0.44
6F4.A	3.49	3.23	3.21	2.56	0.04	0.15	0.16	0.60	0.02	0.36	0.43
6F5.A	3.41	3.23	3.17	2.44	0.07	0.10	0.13	0.62	0.04	0.42	0.48
6F6.A	3.28	2.97	3.02	2.33	0.08	0.17	0.14	0.61	0.03	0.32	0.46
6F7.A	3.10	2.73	2.67	2.00	0.01	0.17	0.21	0.72	0.03	0.37	0.47
6F8.A	3.31	2.93	2.90	2.33	0.02	0.19	0.21	0.65	0.02	0.30	0.40
6F9.A	3.41	3.17	3.16	2.67	0.10	0.13	0.13	0.45	0.00	0.25	0.31
6F10.A	3.50	3.07	3.18	2.33	0.03	0.23	0.17	0.65	0.06	0.34	0.48
6G1.A	3.25	3.17	3.01	2.22	0.05	0.05	0.13	0.71	0.10	0.51	0.56
6G2.A	3.42	3.03	3.12	2.22	0.04	0.21	0.16	0.67	0.05	0.37	0.51
6G3.A	3.36	2.83	3.09	2.33	0.11	0.26	0.14	0.63	0.14	0.22	0.48
6H1.A	3.27	2.83	3.01	2.44	0.15	0.21	0.13	0.43	0.10	0.17	0.31
6H2.A	3.18	2.70	2.97	2.56	0.27	0.23	0.11	0.32	0.15	0.06	0.22
6H3.A	3.03	2.67	3.00	2.56	0.81	0.17	0.02	0.24	0.19	0.05	0.23
6I1.A	3.13	2.50	2.80	1.89	0.06	0.29	0.16	0.73	0.16	0.29	0.56
6I2.A	3.02	2.43	2.73	1.89	0.10	0.26	0.13	0.65	0.16	0.25	0.52
6I3.A	2.73	2.23	2.34	1.89	0.06	0.22	0.17	0.50	0.06	0.17	0.29
6I4.A	2.38	1.90	2.08	1.56	0.13	0.21	0.14	0.52	0.10	0.17	0.36
6I5.A	2.55	2.20	2.28	1.44	0.12	0.14	0.11	0.65	0.04	0.34	0.54
6J1.A	3.61	3.69	3.41	2.56	0.04	0.05	0.11	0.61	0.21	0.70	0.52
6J2.A	3.57	3.69	3.36	2.44	0.03	0.08	0.12	0.68	0.25	0.80	0.58

6J3.A	3.56	3.62	3.36	2.56	0.05	0.04	0.11	0.58	0.21	0.64	0.49
6J4.A	3.52	3.39	3.34	2.67	0.12	0.08	0.10	0.50	0.04	0.40	0.41
6K1.A	3.53	3.31	3.33	2.44	0.09	0.12	0.11	0.68	0.02	0.47	0.59
6K2.A	3.54	3.23	3.26	2.33	0.04	0.16	0.15	0.76	0.01	0.47	0.62
6K3.A	3.48	3.20	3.23	2.44	0.08	0.14	0.12	0.65	0.02	0.39	0.52
6K4.A	3.50	2.97	3.18	2.56	0.07	0.26	0.16	0.57	0.12	0.20	0.39
6L.A	3.67	3.70	3.44	2.33	0.01	0.02	0.13	0.88	0.20	0.85	0.75
7A.A	3.72	3.69	3.69	2.7	0.07	0.03	0.03	0.66	0.00	0.62	0.66
7B.A	3.77	3.72	3.69	2.9	0.05	0.05	0.08	0.54	0.04	0.49	0.50
7C1.A	3.61	3.48	3.49	2.8	0.11	0.10	0.09	0.50	0.01	0.38	0.44
7C2.A	3.69	3.59	3.67	3.0	0.37	0.08	0.01	0.43	0.08	0.33	0.43
7C3.A	3.57	3.48	3.51	3.0	0.31	0.07	0.05	0.36	0.02	0.26	0.32
7C4.A	3.67	3.72	3.57	2.9	0.07	0.05	0.08	0.49	0.17	0.51	0.43
7C5.A	3.35	3.48	3.13	2.6	0.03	0.09	0.14	0.46	0.28	0.50	0.34
7D.A	3.80	3.90	3.74	2.9	0.03	0.10	0.07	0.58	0.25	0.64	0.55
7E.A	3.75	3.90	3.73	2.9	0.08	0.15	0.03	0.54	0.26	0.64	0.54

TABLE H-3 ANOVA Subgroup Analysis by "What is your primary work setting?"

Rating Scale
1 = Not Important
2 = Low Importance
3 = Moderate Importance
4 = Extremely Important

	Academic	Hospital	Outpatient	Research	Mobile	Commercial	ANOVA_P	1 VS 2	1 VS 3	1 VS 4	1 VS 5	1 VS 6	2 VS 3	2 VS 4	2 VS 5	2 VS 6	3 VS 4	3 VS 5	3 VS 6	4 VS 5	4 VS 6	5 VS 6
1A.A	3.73	3.42	3.59	3.8	3.56	3.0	0.83	0.52	0.24	0.10	0.17	0.45	0.11	0.82	0.17	0.27	0.46	0.04	0.37	0.23	0.47	0.31
1B1.A	3.17	3.34	3.29	3.8	3.20	3.0	0.66	0.15	0.10	0.41	0.02	0.08	0.03	1.00	0.15	0.22	0.99	0.09	0.18	0.47	0.47	0.11
1B2.A	3.42	2.82	2.72	2.4	3.30	2.8	0.67	0.69	0.67	0.64	0.08	0.34	0.05	0.30	0.55	0.01	0.23	0.58	0.05	0.54	0.14	0.27
1B3.A	3.75	3.37	3.43	3.8	3.40	2.8	0.54	0.66	0.44	0.08	0.35	0.57	0.04	0.95	0.05	0.35	0.72	0.04	0.39	0.39	0.57	0.34
1B4.A	3.17	2.85	2.95	2.8	3.30	3.0	0.35	0.35	0.21	0.30	0.09	0.09	0.06	0.07	0.52	0.09	0.19	0.37	0.03	0.39	0.10	0.17
1B5.A	2.83	3.17	3.01	3.4	3.67	2.6	0.97	0.25	0.13	0.32	0.44	0.10	0.09	0.43	0.67	0.32	0.64	0.78	0.23	0.24	0.41	0.55
1B6.A	2.64	2.62	2.43	2.8	2.90	2.6	0.85	0.01	0.15	0.09	0.12	0.02	0.10	0.23	0.25	0.01	0.44	0.40	0.10	0.06	0.09	0.14
1C.A	3.17	2.76	2.73	3.4	2.80	2.5	0.73	0.49	0.43	0.23	0.25	0.38	0.01	1.14	0.05	0.15	1.02	0.06	0.14	0.45	0.49	0.16
1D.A	3.25	2.79	2.71	3.4	2.70	2.8	0.58	0.60	0.55	0.17	0.43	0.28	0.04	1.08	0.10	0.01	1.05	0.01	0.06	0.58	0.35	0.06
1E.A	3.83	3.38	3.45	4.0	2.20	3.0	0.04	0.69	0.42	0.45	1.03	0.52	0.04	0.55	0.77	0.24	0.52	0.80	0.28	1.22	0.65	0.32
1F.A	2.92	3.12	3.30	3.6	3.20	3.0	0.23	0.21	0.38	0.54	0.18	0.05	0.11	0.88	0.10	0.07	0.50	0.11	0.19	0.34	0.34	0.11
1G.A	3.83	3.53	3.66	4.0	3.80	2.8	0.99	0.57	0.29	0.45	0.04	0.63	0.09	0.55	0.52	0.45	0.47	0.25	0.53	0.50	0.75	0.60
2A.A	3.00	2.84	2.73	3.0	2.88	2.8	0.63	0.12	0.19	0.00	0.06	0.10	0.06	0.17	0.04	0.03	0.28	0.15	0.04	0.09	0.09	0.04
2B1.A	3.33	2.92	2.87	2.8	2.78	2.6	0.23	0.42	0.43	0.35	0.29	0.42	0.03	0.10	0.10	0.21	0.06	0.06	0.18	0.01	0.08	0.07
2B2.A	3.17	2.77	2.65	2.6	1.62	2.2	0.01	0.39	0.44	0.32	0.82	0.58	0.06	0.11	0.83	0.42	0.03	0.71	0.32	0.40	0.14	0.24
2B3.A	3.58	3.35	3.37	3.8	2.50	3.0	0.11	0.27	0.23	0.20	0.62	0.33	0.01	0.96	0.62	0.22	0.82	0.62	0.23	0.80	0.47	0.20
2C.A	3.42	3.36	3.33	3.8	3.67	2.8	0.89	0.07	0.09	0.35	0.20	0.34	0.02	0.93	0.51	0.35	0.86	0.47	0.33	0.17	0.57	0.51
2D.A	3.27	3.42	3.34	3.6	3.78	3.0	0.97	0.18	0.07	0.29	0.45	0.15	0.06	0.33	0.68	0.27	0.45	0.69	0.21	0.24	0.34	0.48
2E.A	3.42	3.44	3.56	3.2	3.67	3.0	0.83	0.03	0.16	0.18	0.20	0.24	0.08	0.31	0.40	0.28	0.45	0.17	0.36	0.48	0.10	0.40

2F.A	3.58	3.50	3.49	3.8	3.78	3.0	0.87	0.11	0.12	0.23	0.18	0.34	0.01	0.65	0.52	0.32	0.62	0.47	0.31	0.03	0.47	0.48
2G.A	3.82	3.62	3.71	3.8	3.78	3.0	0.72	0.37	0.19	0.03	0.05	0.51	0.06	0.39	0.30	0.40	0.19	0.12	0.45	0.03	0.47	0.48
3A.A	3.91	3.39	3.33	4.00	3.62	3.2	0.56	0.93	0.76	0.43	0.43	0.04	0.39	0.12	0.44	0.08	0.25	3A.A	3.91	3.39	3.33	4.00
3B1.A	3.58	3.39	3.28	4.00	3.50	3.0	0.40	0.27	0.36	0.07	0.34	0.07	0.15	0.25	0.26	0.18	0.27	3B1.A	3.58	3.39	3.28	4.00
3B2.A	3.45	3.25	3.27	3.33	3.33	3.0	0.77	0.27	0.22	0.09	0.26	0.02	0.10	0.16	0.06	0.17	0.18	3B2.A	3.45	3.25	3.27	3.33
3B3.A	3.33	3.16	3.02	3.67	3.11	3.0	0.44	0.20	0.32	0.14	0.19	0.08	0.04	0.10	0.07	0.01	0.05	3B3.A	3.33	3.16	3.02	3.67
3B4.A	3.25	2.95	2.89	3.67	3.11	2.8	0.81	0.35	0.36	0.09	0.27	0.03	0.17	0.10	0.21	0.06	0.17	3B4.A	3.25	2.95	2.89	3.67
3B5.A	3.25	3.06	3.01	3.33	3.00	2.6	0.34	0.23	0.25	0.16	0.39	0.03	0.05	0.30	0.01	0.27	0.19	3B5.A	3.25	3.06	3.01	3.33
3B6.A	3.58	3.41	3.41	4.00	3.38	3.0	0.48	0.27	0.23	0.19	0.36	0.00	0.04	0.26	0.04	0.26	0.19	3B6.A	3.58	3.41	3.41	4.00
3B7.A	3.58	3.60	3.62	4.00	3.78	2.8	0.53	0.03	0.05	0.22	0.50	0.01	0.35	0.54	0.27	0.55	0.63	3B7.A	3.58	3.60	3.62	4.00
3B8.A	3.58	3.46	3.47	3.67	3.44	3.2	0.65	0.20	0.15	0.12	0.23	0.01	0.02	0.16	0.03	0.17	0.13	3B8.A	3.58	3.46	3.47	3.67
3B9.A	3.17	3.03	3.11	3.67	3.44	3.0	0.37	0.16	0.06	0.21	0.10	0.04	0.51	0.02	0.39	0.07	0.25	3B9.A	3.17	3.03	3.11	3.67
3B10.A	3.42	3.55	3.49	4.00	3.67	3.0	0.64	0.18	0.09	0.20	0.25	0.04	0.16	0.35	0.23	0.31	0.38	3B10.A	3.42	3.55	3.49	4.00
3B11.A	3.50	3.55	3.55	3.67	3.67	3.2	0.86	0.07	0.07	0.13	0.17	0.00	0.15	0.22	0.15	0.22	0.26	3B11.A	3.50	3.55	3.55	3.67
3C.A	3.00	2.51	2.46	2.67	2.44	2.4	0.41	0.46	0.48	0.35	0.35	0.03	0.08	0.08	0.01	0.04	0.03	3C.A	3.00	2.51	2.46	2.67
3D.A	3.33	2.94	3.00	2.33	2.89	2.6	0.38	0.44	0.34	0.27	0.46	0.03	0.04	0.24	0.09	0.29	0.14	3D.A	3.33	2.94	3.00	2.33
3E.A	3.25	2.67	2.57	2.33	2.44	2.2	0.09	0.58	0.59	0.50	0.65	0.05	0.23	0.34	0.11	0.26	0.14	3E.A	3.25	2.67	2.57	2.33
3F.A	3.58	3.32	3.43	2.67	3.67	2.4	0.48	0.33	0.17	0.07	0.78	0.07	0.55	0.67	0.32	0.74	0.86	3F.A	3.58	3.32	3.43	2.67
4A.A	3.75	3.76	3.76	3.33	3.75	2.8	0.05	0.02	0.01	0.00	0.62	0.00	0.02	0.65	0.02	0.65	0.60	4A.A	3.75	3.76	3.76	3.33
4B1.A	3.92	3.75	3.85	4.00	3.44	3.2	0.20	0.33	0.13	0.36	0.44	0.08	0.24	0.34	0.32	0.41	0.10	4B1.A	3.92	3.75	3.85	4.00
4B2.A	3.92	3.71	3.76	4.00	3.75	3.2	0.45	0.39	0.28	0.28	0.44	0.04	0.07	0.32	0.03	0.35	0.32	4B2.A	3.92	3.71	3.76	4.00
4C.A	3.83	3.77	3.68	4.00	3.78	3.0	0.07	0.13	0.24	0.07	0.52	0.08	0.02	0.49	0.16	0.43	0.48	4C.A	3.83	3.77	3.68	4.00
4D.A	3.50	3.68	3.65	4.00	3.67	2.4	0.06	0.22	0.17	0.14	0.69	0.03	0.03	0.94	0.02	0.91	0.86	4D.A	3.50	3.68	3.65	4.00
4E.A	3.83	3.75	3.75	4.00	3.78	3.0	0.17	0.18	0.14	0.07	0.52	0.00	0.06	0.48	0.04	0.48	0.48	4E.A	3.83	3.75	3.75	4.00
4F.A	3.92	3.84	3.85	4.00	4.00	3.2	0.37	0.20	0.13	0.30	0.44	0.01	0.29	0.40	0.26	0.41	0.50	4F.A	3.92	3.84	3.85	4.00
5A1.A	3.75	3.76	3.83	4.00	3.67	3.2	0.52	0.02	0.14	0.09	0.33	0.05	0.13	0.35	0.22	0.39	0.26	5A1.A	3.75	3.76	3.83	4.00
5A2.A	3.75	3.76	3.83	4.00	3.67	3.2	0.51	0.01	0.11	0.07	0.32	0.05	0.13	0.35	0.22	0.39	0.26	5A2.A	3.75	3.76	3.83	4.00
5A3.A	3.42	3.19	3.24	3.67	3.00	3.0	0.65	0.25	0.18	0.27	0.24	0.03	0.18	0.12	0.22	0.15	0.00	5A3.A	3.42	3.19	3.24	3.67
5A4.A	3.67	3.62	3.63	3.67	3.33	3.0	0.16	0.07	0.05	0.26	0.40	0.01	0.32	0.39	0.32	0.40	0.18	5A4.A	3.67	3.62	3.63	3.67
5A5.A	3.58	3.55	3.54	3.67	3.33	3.0	0.25	0.04	0.05	0.17	0.33	0.00	0.24	0.35	0.22	0.34	0.18	5A5.A	3.58	3.55	3.54	3.67
5A6.A	3.58	3.47	3.52	3.67	3.33	3.0	0.44	0.14	0.08	0.19	0.34	0.03	0.16	0.30	0.20	0.33	0.18	5A6.A	3.58	3.47	3.52	3.67

5A7.A	3.58	3.63	3.64	3.67	3.56	3.0	0.35	0.06	0.07	0.02	0.34	0.01	0.08	0.40	0.09	0.41	0.29	5A7.A	3.58	3.63	3.64	3.67
5B1.A	3.50	3.35	3.36	3.67	2.89	3.0	0.28	0.16	0.14	0.40	0.28	0.01	0.47	0.22	0.46	0.23	0.06	5B1.A	3.50	3.35	3.36	3.67
5B2.A	2.58	2.84	2.82	3.67	2.22	2.6	0.57	0.21	0.17	0.16	0.01	0.01	0.41	0.17	0.38	0.15	0.16	5B2.A	2.58	2.84	2.82	3.67
5B3.A	2.58	2.71	2.75	3.00	2.11	2.6	0.61	0.10	0.12	0.22	0.01	0.02	0.43	0.08	0.43	0.11	0.22	5B3.A	2.58	2.71	2.75	3.00
5B4.A	2.36	2.36	2.53	2.67	2.00	2.4	0.90	0.01	0.12	0.16	0.02	0.07	0.26	0.03	0.36	0.09	0.18	5B4.A	2.36	2.36	2.53	2.67
5B5.A	2.42	2.69	2.69	3.33	1.89	2.4	0.44	0.23	0.20	0.26	0.01	0.00	0.57	0.21	0.53	0.20	0.23	5B5.A	2.42	2.69	2.69	3.33
5C.A	3.83	3.56	3.55	4.00	2.67	3.0	0.03	0.35	0.30	0.85	0.50	0.01	0.79	0.36	0.74	0.35	0.16	5C.A	3.83	3.56	3.55	4.00
5D.A	3.67	3.59	3.74	4.00	3.00	3.0	0.25	0.08	0.07	0.37	0.37	0.09	0.48	0.37	0.60	0.47	0.00	5D.A	3.67	3.59	3.74	4.00
6A1.A	3.17	3.51	3.45	3.00	3.00	3.00	0.28	0.26	0.20	0.08	0.08	0.03	0.45	0.29	0.38	0.25	0.00	6A1.A	3.17	3.51	3.45	3.00
6A2.A	3.17	3.46	3.15	3.00	2.86	3.00	0.08	0.22	0.01	0.14	0.08	0.15	0.46	0.26	0.21	0.08	0.06	6A2.A	3.17	3.46	3.15	3.00
6A3.A	2.75	2.99	2.90	2.67	2.57	2.75	0.45	0.19	0.10	0.09	0.00	0.04	0.34	0.15	0.25	0.09	0.08	6A3.A	2.75	2.99	2.90	2.67
6A4.A	2.50	2.81	2.70	2.67	2.57	2.75	0.74	0.24	0.13	0.04	0.13	0.05	0.19	0.04	0.09	0.03	0.08	6A4.A	2.50	2.81	2.70	2.67
6A5.A	2.92	3.06	3.04	2.67	2.57	2.75	0.42	0.11	0.08	0.16	0.08	0.01	0.39	0.18	0.35	0.17	0.08	6A5.A	2.92	3.06	3.04	2.67
6A6.A	3.08	3.19	3.15	2.67	2.57	2.75	0.21	0.08	0.04	0.24	0.17	0.02	0.50	0.27	0.44	0.24	0.08	6A6.A	3.08	3.19	3.15	2.67
6A7.A	3.00	3.20	3.16	2.67	2.57	2.75	0.25	0.15	0.11	0.21	0.13	0.02	0.50	0.27	0.45	0.24	0.08	6A7.A	3.00	3.20	3.16	2.67
6A8.A	2.50	2.90	2.90	2.67	2.57	2.75	0.90	0.31	0.28	0.04	0.13	0.00	0.26	0.09	0.25	0.09	0.08	6A8.A	2.50	2.90	2.90	2.67
6A9.A	3.17	3.26	3.10	2.67	2.86	3.00	0.24	0.07	0.04	0.14	0.08	0.08	0.31	0.15	0.17	0.06	0.06	6A9.A	3.17	3.26	3.10	2.67
6B1.A	3.18	3.44	3.45	2.67	3.14	2.75	0.34	0.19	0.19	0.02	0.21	0.01	0.25	0.41	0.25	0.42	0.18	6B1.A	3.18	3.44	3.45	2.67
6B2.A	3.09	3.33	2.99	2.67	2.57	2.75	0.03	0.18	0.07	0.23	0.17	0.16	0.49	0.35	0.25	0.14	0.07	6B2.A	3.09	3.33	2.99	2.67
6B3.A	2.64	2.76	2.83	2.67	2.43	2.75	0.92	0.09	0.12	0.08	0.05	0.03	0.23	0.01	0.26	0.05	0.13	6B3.A	2.64	2.76	2.83	2.67
6B4.A	2.27	2.70	2.77	2.67	2.57	2.75	0.66	0.29	0.31	0.12	0.22	0.03	0.08	0.03	0.12	0.01	0.07	6B4.A	2.27	2.70	2.77	2.67
6B5.A	3.09	3.32	3.15	2.67	2.57	2.75	0.08	0.18	0.04	0.23	0.17	0.08	0.48	0.35	0.36	0.24	0.07	6B5.A	3.09	3.32	3.15	2.67
6C1.A	3.17	3.48	3.26	3.33	2.57	2.75	0.04	0.25	0.06	0.27	0.21	0.12	0.59	0.44	0.43	0.30	0.07	6C1.A	3.17	3.48	3.26	3.33
6C2.A	3.17	3.41	3.21	3.33	2.57	2.75	0.05	0.19	0.03	0.27	0.21	0.10	0.54	0.40	0.40	0.27	0.07	6C2.A	3.17	3.41	3.21	3.33
6C3.A	3.17	3.44	3.23	3.33	2.57	2.75	0.04	0.22	0.05	0.27	0.21	0.11	0.56	0.41	0.41	0.29	0.07	6C3.A	3.17	3.44	3.23	3.33
6C4.A	3.17	3.43	3.12	3.33	2.57	2.75	0.03	0.21	0.03	0.27	0.21	0.15	0.56	0.41	0.34	0.22	0.07	6C4.A	3.17	3.43	3.12	3.33
6C5.A	2.67	2.88	2.89	3.33	2.57	2.75	0.94	0.16	0.15	0.04	0.04	0.00	0.20	0.08	0.20	0.08	0.07	6C5.A	2.67	2.88	2.89	3.33
6D1.A	2.67	3.07	2.91	3.00	2.29	2.75	0.25	0.34	0.18	0.19	0.04	0.07	0.54	0.19	0.41	0.10	0.18	6D1.A	2.67	3.07	2.91	3.00
6D2.A	2.58	2.93	2.88	3.00	2.29	2.75	0.56	0.29	0.21	0.15	0.09	0.02	0.44	0.11	0.39	0.08	0.18	6D2.A	2.58	2.93	2.88	3.00
6D3.A	2.58	2.94	2.90	3.00	2.29	2.75	0.59	0.29	0.23	0.15	0.09	0.01	0.45	0.11	0.40	0.09	0.18	6D3.A	2.58	2.94	2.90	3.00
6D4.A	2.58	2.91	2.88	3.00	2.29	2.75	0.60	0.27	0.21	0.15	0.09	0.01	0.43	0.10	0.39	0.07	0.18	6D4.A	2.58	2.91	2.88	3.00

6D5.A	2.75	3.14	2.95	3.00	2.29	2.75	0.15	0.32	0.14	0.22	0.00	0.09	0.59	0.24	0.44	0.12	0.18	6D5.A	2.75	3.14	2.95	3.00
6D6.A	2.83	3.07	2.95	3.00	2.29	2.75	0.23	0.19	0.08	0.26	0.04	0.06	0.54	0.19	0.43	0.12	0.18	6D6.A	2.83	3.07	2.95	3.00
6D7.A	2.67	3.01	2.91	3.00	2.29	2.75	0.38	0.29	0.18	0.19	0.04	0.04	0.50	0.15	0.41	0.10	0.18	6D7.A	2.67	3.01	2.91	3.00
6D8.A	2.75	2.95	2.89	3.00	2.29	2.75	0.41	0.17	0.10	0.22	0.00	0.03	0.46	0.12	0.40	0.08	0.18	6D8.A	2.75	2.95	2.89	3.00
6D9.A	2.75	2.91	2.93	3.00	2.29	2.75	0.59	0.13	0.12	0.22	0.00	0.01	0.43	0.09	0.42	0.10	0.18	6D9.A	2.75	2.91	2.93	3.00
6D10.A	2.33	2.64	2.80	3.00	2.29	2.75	0.60	0.23	0.31	0.02	0.21	0.07	0.24	0.07	0.33	0.03	0.18	6D10.A	2.33	2.64	2.80	3.00
6E1.A	3.33	3.56	3.63	3.67	3.14	2.75	0.38	0.18	0.23	0.09	0.29	0.04	0.36	0.49	0.41	0.53	0.18	6E1.A	3.33	3.56	3.63	3.67
6E2a.A	3.25	3.28	3.44	3.33	2.71	2.75	0.54	0.02	0.14	0.25	0.25	0.08	0.42	0.32	0.54	0.41	0.01	6E2a.A	3.25	3.28	3.44	3.33
6E2b.A	3.25	3.22	3.33	3.33	2.71	2.75	0.51	0.03	0.06	0.25	0.25	0.06	0.37	0.28	0.45	0.35	0.01	6E2b.A	3.25	3.22	3.33	3.33
6E2c.A	2.92	2.77	3.02	3.00	2.57	2.75	0.73	0.10	0.07	0.15	0.08	0.11	0.13	0.01	0.28	0.16	0.07	6E2c.A	2.92	2.77	3.02	3.00
6E3.A	3.08	3.31	3.24	3.33	2.57	2.75	0.22	0.18	0.11	0.24	0.17	0.03	0.47	0.33	0.42	0.29	0.07	6E3.A	3.08	3.31	3.24	3.33
6E4.A	3.25	3.52	3.34	3.33	2.57	2.75	0.04	0.21	0.06	0.30	0.25	0.09	0.61	0.46	0.48	0.35	0.07	6E4.A	3.25	3.52	3.34	3.33
6F1.A	3.36	3.58	3.46	3.33	3.14	2.75	0.10	0.17	0.07	0.10	0.30	0.07	0.37	0.50	0.26	0.43	0.18	6F1.A	3.36	3.58	3.46	3.33
6F2.A	3.36	3.24	3.28	3.33	2.57	2.75	0.25	0.09	0.06	0.33	0.30	0.02	0.43	0.29	0.45	0.32	0.07	6F2.A	3.36	3.24	3.28	3.33
6F3.A	3.20	3.12	3.22	3.33	2.57	2.75	0.52	0.06	0.02	0.25	0.21	0.05	0.35	0.22	0.41	0.28	0.07	6F3.A	3.20	3.12	3.22	3.33
6F4.A	3.09	3.29	3.29	3.33	2.57	2.75	0.29	0.15	0.15	0.23	0.17	0.00	0.46	0.32	0.45	0.32	0.07	6F4.A	3.09	3.29	3.29	3.33
6F5.A	3.09	3.27	3.17	3.33	2.57	2.75	0.20	0.13	0.05	0.22	0.16	0.05	0.45	0.31	0.37	0.25	0.07	6F5.A	3.09	3.27	3.17	3.33
6F6.A	2.64	3.04	3.18	3.33	2.57	2.75	0.91	0.31	0.40	0.03	0.06	0.07	0.30	0.17	0.38	0.26	0.07	6F6.A	2.64	3.04	3.18	3.33
6F7.A	2.45	2.76	2.80	3.00	2.43	2.50	0.92	0.23	0.23	0.01	0.02	0.02	0.23	0.17	0.24	0.19	0.03	6F7.A	2.45	2.76	2.80	3.00
6F8.A	2.73	3.03	2.98	3.33	2.43	2.75	0.54	0.21	0.16	0.12	0.01	0.02	0.41	0.17	0.35	0.13	0.13	6F8.A	2.73	3.03	2.98	3.33
6F9.A	3.18	3.27	3.13	3.33	2.57	2.75	0.14	0.07	0.03	0.26	0.21	0.07	0.45	0.31	0.35	0.23	0.07	6F9.A	3.18	3.27	3.13	3.33
6F10.A	3.18	3.34	3.04	3.33	2.57	2.75	0.05	0.12	0.10	0.26	0.21	0.14	0.49	0.35	0.29	0.17	0.07	6F10.A	3.18	3.34	3.04	3.33
6G1.A	2.64	3.10	3.09	3.00	2.43	2.75	0.51	0.39	0.33	0.10	0.06	0.01	0.46	0.21	0.43	0.20	0.13	6G1.A	2.64	3.10	3.09	3.00
6G2.A	3.09	3.27	2.98	3.33	2.57	3.00	0.13	0.14	0.08	0.23	0.04	0.13	0.45	0.15	0.25	0.01	0.16	6G2.A	3.09	3.27	2.98	3.33
6G3.A	2.45	3.21	3.04	2.67	2.57	3.00	0.47	0.66	0.42	0.06	0.27	0.08	0.41	0.12	0.28	0.02	0.16	6G3.A	2.45	3.21	3.04	2.67
6H1.A	3.18	2.98	3.15	3.00	2.57	3.00	0.89	0.14	0.02	0.25	0.08	0.07	0.26	0.01	0.35	0.08	0.16	6H1.A	3.18	2.98	3.15	3.00
6H2.A	3.27	2.92	3.10	2.67	2.43	3.00	0.74	0.26	0.12	0.37	0.13	0.08	0.33	0.05	0.44	0.06	0.22	6H2.A	3.27	2.92	3.10	2.67
6H3.A	3.09	2.88	3.10	3.00	2.57	3.00	0.86	0.15	0.01	0.22	0.04	0.09	0.20	0.07	0.32	0.06	0.16	6H3.A	3.09	2.88	3.10	3.00
6I1.A	2.50	2.89	2.69	3.33	2.57	3.00	0.76	0.31	0.13	0.03	0.24	0.08	0.20	0.06	0.07	0.17	0.16	6I1.A	2.50	2.89	2.69	3.33
6I2.A	2.45	2.80	2.65	2.67	2.57	3.00	0.88	0.27	0.13	0.05	0.27	0.06	0.14	0.12	0.05	0.19	0.16	6I2.A	2.45	2.80	2.65	2.67
6I3.A	2.27	2.31	2.53	2.67	2.86	2.75	0.15	0.03	0.17	0.28	0.24	0.09	0.44	0.26	0.24	0.13	0.05	6I3.A	2.27	2.31	2.53	2.67

6I4.A	1.82	2.05	2.25	2.00	2.29	2.50	0.23	0.19	0.29	0.23	0.37	0.08	0.16	0.30	0.02	0.16	0.09	6I4.A	1.82	2.05	2.25	2.00
6I5.A	2.45	2.24	2.35	3.00	2.43	2.75	0.44	0.17	0.07	0.01	0.15	0.04	0.13	0.30	0.05	0.23	0.13	6I5.A	2.45	2.24	2.35	3.00
6J1.A	3.45	3.44	3.52	3.33	3.43	3.00	0.82	0.01	0.07	0.02	0.24	0.04	0.01	0.25	0.08	0.30	0.19	6J1.A	3.45	3.44	3.52	3.33
6J2.A	3.45	3.38	3.48	3.67	3.43	3.00	1.00	0.07	0.02	0.02	0.24	0.05	0.04	0.22	0.04	0.27	0.19	6J2.A	3.45	3.38	3.48	3.67
6J3.A	3.45	3.38	3.46	3.33	3.43	3.00	0.89	0.08	0.01	0.02	0.24	0.04	0.04	0.22	0.03	0.26	0.19	6J3.A	3.45	3.38	3.46	3.33
6J4.A	3.55	3.31	3.47	3.33	3.43	3.00	0.92	0.24	0.07	0.07	0.29	0.08	0.11	0.17	0.03	0.27	0.19	6J4.A	3.55	3.31	3.47	3.33
6K1.A	3.45	3.37	3.31	3.33	3.29	3.00	0.51	0.09	0.13	0.10	0.24	0.03	0.07	0.21	0.02	0.18	0.12	6K1.A	3.45	3.37	3.31	3.33
6K2.A	3.45	3.30	3.24	3.67	3.29	3.00	0.65	0.16	0.18	0.10	0.24	0.02	0.01	0.17	0.03	0.14	0.12	6K2.A	3.45	3.30	3.24	3.67
6K3.A	3.45	3.29	3.18	3.33	3.29	3.00	0.51	0.17	0.23	0.10	0.24	0.05	0.00	0.16	0.08	0.10	0.12	6K3.A	3.45	3.29	3.18	3.33
6K4.A	3.40	3.22	3.15	3.33	3.29	3.00	0.67	0.18	0.21	0.07	0.21	0.03	0.05	0.13	0.10	0.08	0.12	6K4.A	3.40	3.22	3.15	3.33
6L.A	3.64	3.54	3.41	3.33	3.29	2.75	0.10	0.10	0.20	0.22	0.49	0.07	0.21	0.48	0.10	0.39	0.24	6L.A	3.64	3.54	3.41	3.33
7A.A	3.92	3.66	3.67	3.67	3.75	2.50	0.05	0.58	0.38	0.28	0.93	0.02	0.19	0.77	0.13	0.77	0.79	7A.A	3.92	3.66	3.67	3.67
7B.A	3.75	3.69	3.70	3.67	3.88	2.75	0.28	0.09	0.07	0.14	0.58	0.01	0.45	0.57	0.33	0.57	0.67	7B.A	3.75	3.69	3.70	3.67
7C1.A	3.50	3.47	3.59	3.33	3.12	3.00	0.45	0.03	0.08	0.20	0.26	0.08	0.31	0.27	0.41	0.34	0.06	7C1.A	3.50	3.47	3.59	3.33
7C2.A	3.75	3.62	3.70	3.33	3.75	2.67	0.49	0.18	0.06	0.00	NA	0.05	0.18	NA	0.07	NA	NA	7C2.A	3.75	3.62	3.70	3.33
7C3.A	3.75	3.46	3.61	3.33	3.38	2.75	0.42	0.40	0.16	0.27	0.58	0.10	0.07	0.43	0.20	0.52	0.29	7C3.A	3.75	3.46	3.61	3.33
7C4.A	3.58	3.60	3.58	3.33	3.62	3.00	0.38	0.02	0.00	0.03	0.31	0.02	0.03	0.35	0.06	0.33	0.33	7C4.A	3.58	3.60	3.58	3.33
7C5.A	3.50	3.20	3.22	3.33	2.75	2.50	0.13	0.30	0.25	0.39	0.59	0.01	0.31	0.46	0.32	0.47	0.11	7C5.A	3.50	3.20	3.22	3.33
7D.A	4.00	3.74	3.73	4.00	3.75	3.00	0.13	0.43	0.40	0.38	0.58	0.00	0.02	0.42	0.02	0.42	0.40	7D.A	4.00	3.74	3.73	4.00
7E.A	3.50	3.74	3.76	4.00	3.62	3.00	0.50	0.24	0.25	0.08	0.26	0.02	0.15	0.42	0.17	0.44	0.33	7E.A	3.50	3.74	3.76	4.00

TABLE H-4 ANOVA Subgroup Analysis by "In what geographic location do you practice?"

Rating Scale
1 = Not Important
2 = Low Importance
3 = Moderate Importance
4 = Extremely Important

	Midwest	Northeast	South	West	ANOVA_P	1 VS 2	1 VS 3	1 VS 4	2 VS 3	2 VS 4	3 VS 4
1A.A	3.41	3.44	3.55	3.47	0.45	0.01	0.10	0.04	0.08	0.02	0.06
1B1.A	3.20	3.14	3.47	3.29	0.14	0.03	0.18	0.05	0.22	0.08	0.12
1B2.A	2.60	2.75	2.91	2.88	0.06	0.06	0.16	0.13	0.09	0.06	0.02
1B3.A	3.30	3.28	3.53	3.34	0.33	0.01	0.16	0.02	0.16	0.03	0.13
1B4.A	2.64	3.01	2.96	2.97	0.05	0.18	0.19	0.18	0.03	0.02	0.01
1B5.A	2.84	3.10	3.27	3.10	0.05	0.12	0.25	0.13	0.09	0.00	0.10
1B6.A	2.22	2.66	2.72	2.54	0.06	0.19	0.26	0.14	0.03	0.05	0.09
1C.A	2.49	2.70	3.00	2.68	0.07	0.09	0.27	0.09	0.17	0.01	0.17
1D.A	2.40	2.64	3.04	2.83	0.00	0.10	0.33	0.20	0.22	0.09	0.11
1E.A	3.30	3.03	3.53	3.57	0.02	0.11	0.12	0.13	0.27	0.25	0.03
1F.A	2.88	3.02	3.33	3.31	0.00	0.06	0.28	0.23	0.20	0.16	0.01
1G.A	3.45	3.47	3.64	3.69	0.03	0.01	0.14	0.15	0.13	0.14	0.04
2A.A	2.61	2.66	2.92	2.93	0.03	0.02	0.19	0.16	0.16	0.13	0.00
2B1.A	2.80	2.66	3.00	3.08	0.04	0.06	0.10	0.13	0.19	0.20	0.05
2B2.A	2.56	2.36	2.85	2.90	0.02	0.08	0.14	0.14	0.25	0.23	0.03
2B3.A	3.12	3.08	3.52	3.45	0.00	0.02	0.26	0.18	0.28	0.20	0.05
2C.A	3.15	3.20	3.46	3.49	0.01	0.02	0.19	0.18	0.17	0.17	0.02

2D.A	3.18	3.27	3.50	3.52	0.00	0.04	0.22	0.20	0.17	0.15	0.02
2E.A	3.27	3.32	3.59	3.56	0.01	0.02	0.23	0.17	0.21	0.15	0.03
2F.A	3.30	3.28	3.66	3.58	0.01	0.01	0.26	0.16	0.29	0.17	0.06
2G.A	3.55	3.45	3.76	3.70	0.05	0.05	0.17	0.10	0.26	0.16	0.06
3A.A	3.10	3.28	3.51	3.59	0.00	0.09	0.28	0.30	0.18	0.22	0.07
3B1.A	3.20	3.10	3.50	3.49	0.01	0.05	0.21	0.20	0.29	0.27	0.00
3B2.A	3.02	3.08	3.36	3.46	0.00	0.03	0.22	0.28	0.20	0.26	0.07
3B3.A	2.80	2.86	3.27	3.34	0.00	0.03	0.28	0.30	0.27	0.29	0.05
3B4.A	2.62	2.86	3.08	3.11	0.00	0.11	0.25	0.27	0.12	0.14	0.02
3B5.A	2.69	2.76	3.23	3.25	0.00	0.03	0.33	0.32	0.30	0.29	0.01
3B6.A	3.02	3.24	3.66	3.50	0.00	0.12	0.51	0.30	0.34	0.17	0.14
3B7.A	3.41	3.44	3.73	3.67	0.01	0.02	0.26	0.19	0.25	0.18	0.07
3B8.A	3.15	3.24	3.67	3.59	0.00	0.04	0.40	0.29	0.35	0.24	0.07
3B9.A	2.61	2.98	3.29	3.24	0.00	0.17	0.42	0.32	0.20	0.14	0.03
3B10.A	3.25	3.29	3.71	3.62	0.00	0.02	0.35	0.24	0.36	0.23	0.10
3B11.A	3.43	3.24	3.70	3.63	0.01	0.10	0.22	0.14	0.37	0.27	0.07
3C.A	2.10	2.44	2.70	2.60	0.00	0.14	0.31	0.23	0.15	0.08	0.06
3D.A	2.34	2.94	3.18	3.16	0.00	0.26	0.48	0.41	0.16	0.12	0.01
3E.A	2.16	2.47	2.83	2.87	0.00	0.13	0.33	0.30	0.20	0.19	0.02
3F.A	3.08	3.12	3.56	3.42	0.01	0.02	0.30	0.16	0.31	0.16	0.10
4A.A	3.68	3.41	3.83	3.90	0.00	0.16	0.16	0.23	0.35	0.40	0.09
4B1.A	3.72	3.37	3.91	3.92	0.00	0.18	0.20	0.20	0.42	0.41	0.02
4B2.A	3.68	3.35	3.87	3.84	0.01	0.17	0.20	0.12	0.41	0.33	0.05
4C.A	3.68	3.44	3.85	3.81	0.04	0.15	0.17	0.10	0.35	0.26	0.05
4D.A	3.51	3.47	3.74	3.76	0.01	0.02	0.20	0.19	0.24	0.23	0.03

4E.A	3.62	3.54	3.85	3.85	0.00	0.05	0.25	0.21	0.30	0.26	0.01
4F.A	3.77	3.65	3.91	3.94	0.01	0.07	0.18	0.19	0.26	0.27	0.04
5A1.A	3.67	3.40	3.91	3.93	0.00	0.13	0.23	0.24	0.38	0.38	0.03
5A2.A	3.68	3.44	3.91	3.89	0.01	0.12	0.22	0.17	0.35	0.31	0.03
5A3.A	3.08	3.08	3.28	3.30	0.15	0.00	0.12	0.10	0.12	0.10	0.01
5A4.A	3.52	3.25	3.73	3.76	0.01	0.13	0.17	0.16	0.34	0.31	0.03
5A5.A	3.38	3.25	3.66	3.68	0.01	0.06	0.21	0.18	0.28	0.25	0.02
5A6.A	3.30	3.20	3.64	3.60	0.01	0.05	0.24	0.17	0.29	0.22	0.03
5A7.A	3.46	3.29	3.73	3.85	0.00	0.08	0.21	0.32	0.30	0.39	0.12
5B1.A	3.22	3.20	3.46	3.38	0.20	0.01	0.14	0.07	0.16	0.08	0.05
5B2.A	2.68	2.76	2.89	2.80	0.48	0.03	0.10	0.04	0.07	0.01	0.04
5B3.A	2.67	2.56	2.81	2.64	0.77	0.04	0.06	0.01	0.12	0.03	0.08
5B4.A	2.22	2.44	2.43	2.49	0.32	0.08	0.09	0.09	0.00	0.02	0.03
5B5.A	2.57	2.59	2.70	2.70	0.50	0.01	0.05	0.05	0.05	0.04	0.00
5C.A	3.45	3.22	3.72	3.55	0.14	0.09	0.17	0.05	0.31	0.15	0.12
5D.A	3.43	3.19	3.83	3.72	0.00	0.10	0.30	0.15	0.43	0.27	0.10
6A1.A	3.14	3.04	3.70	3.62	0.00	0.04	0.34	0.24	0.40	0.30	0.06
6A2.A	3.07	2.98	3.60	3.32	0.03	0.03	0.29	0.10	0.34	0.14	0.16
6A3.A	2.75	2.62	3.03	3.23	0.01	0.05	0.14	0.20	0.20	0.25	0.10
6A4.A	2.66	2.50	2.80	2.96	0.12	0.06	0.06	0.12	0.14	0.18	0.08
6A5.A	2.87	2.66	3.14	3.25	0.03	0.08	0.13	0.16	0.24	0.26	0.06
6A6.A	2.91	2.77	3.33	3.36	0.01	0.05	0.22	0.20	0.30	0.27	0.02
6A7.A	2.88	2.79	3.36	3.36	0.00	0.03	0.25	0.21	0.30	0.26	0.00
6A8.A	2.71	2.50	2.99	3.11	0.02	0.08	0.13	0.16	0.24	0.25	0.06
6A9.A	2.96	2.67	3.44	3.34	0.01	0.10	0.25	0.15	0.40	0.27	0.06

6B1.A	3.15	2.94	3.65	3.58	0.00	0.08	0.31	0.23	0.43	0.34	0.05
6B2.A	2.84	2.83	3.48	3.22	0.01	0.00	0.33	0.15	0.35	0.16	0.15
6B3.A	2.56	2.53	2.90	2.93	0.05	0.01	0.16	0.15	0.18	0.16	0.01
6B4.A	2.53	2.48	2.82	2.85	0.09	0.02	0.13	0.12	0.16	0.14	0.02
6B5.A	3.02	2.85	3.44	3.33	0.03	0.06	0.22	0.13	0.30	0.20	0.06
6C1.A	3.11	2.88	3.66	3.46	0.00	0.09	0.32	0.16	0.45	0.27	0.13
6C2.A	3.04	2.83	3.60	3.41	0.00	0.08	0.32	0.17	0.43	0.27	0.12
6C3.A	3.09	2.85	3.62	3.43	0.00	0.09	0.30	0.16	0.43	0.26	0.12
6C4.A	2.96	2.94	3.62	3.30	0.01	0.01	0.35	0.14	0.38	0.15	0.19
6C5.A	2.55	2.60	3.05	3.11	0.01	0.02	0.21	0.22	0.21	0.22	0.03
6D1.A	2.77	2.52	3.26	3.04	0.02	0.09	0.25	0.11	0.37	0.21	0.12
6D2.A	2.64	2.46	3.12	3.02	0.01	0.06	0.23	0.15	0.32	0.23	0.05
6D3.A	2.64	2.43	3.17	3.00	0.01	0.07	0.25	0.14	0.36	0.23	0.09
6D4.A	2.62	2.41	3.14	2.98	0.01	0.07	0.25	0.14	0.36	0.23	0.08
6D5.A	2.84	2.53	3.38	3.02	0.03	0.11	0.28	0.07	0.43	0.20	0.20
6D6.A	2.71	2.54	3.33	3.04	0.01	0.06	0.31	0.13	0.40	0.21	0.16
6D7.A	2.71	2.50	3.23	2.98	0.02	0.07	0.26	0.11	0.37	0.20	0.13
6D8.A	2.66	2.48	3.20	2.95	0.02	0.06	0.27	0.11	0.37	0.19	0.14
6D9.A	2.65	2.47	3.15	2.96	0.02	0.07	0.25	0.12	0.34	0.20	0.10
6D10.A	2.38	2.39	2.82	2.91	0.01	0.01	0.19	0.21	0.19	0.21	0.04
6E1.A	3.24	3.22	3.78	3.74	0.00	0.01	0.35	0.27	0.38	0.30	0.04
6E2a.A	3.00	2.87	3.57	3.47	0.00	0.05	0.34	0.22	0.40	0.29	0.07
6E2b.A	2.95	2.94	3.42	3.42	0.00	0.00	0.25	0.22	0.25	0.23	0.00
6E2c.A	2.42	2.55	3.06	3.15	0.00	0.05	0.28	0.29	0.23	0.24	0.04
6E3.A	3.02	2.81	3.51	3.36	0.01	0.07	0.27	0.15	0.37	0.23	0.09

6E4.A	3.18	2.85	3.76	3.47	0.00	0.12	0.36	0.12	0.52	0.26	0.21
6F1.A	3.23	3.16	3.74	3.66	0.00	0.03	0.33	0.23	0.36	0.27	0.07
6F2.A	3.02	2.78	3.41	3.52	0.00	0.09	0.20	0.24	0.33	0.36	0.07
6F3.A	2.91	2.71	3.33	3.36	0.00	0.07	0.21	0.21	0.31	0.30	0.02
6F4.A	3.05	2.73	3.55	3.36	0.01	0.11	0.27	0.14	0.44	0.28	0.13
6F5.A	2.98	2.76	3.51	3.25	0.02	0.08	0.28	0.11	0.39	0.21	0.16
6F6.A	2.84	2.58	3.27	3.25	0.01	0.09	0.22	0.18	0.34	0.29	0.01
6F7.A	2.66	2.36	2.90	2.88	0.13	0.10	0.11	0.08	0.24	0.19	0.01
6F8.A	2.80	2.54	3.20	3.12	0.03	0.09	0.18	0.13	0.31	0.24	0.04
6F9.A	3.04	2.70	3.50	3.23	0.04	0.12	0.24	0.08	0.40	0.22	0.15
6F10.A	2.89	2.79	3.49	3.36	0.00	0.04	0.30	0.19	0.35	0.23	0.07
6G1.A	2.89	2.64	3.25	3.21	0.02	0.09	0.18	0.15	0.30	0.25	0.02
6G2.A	2.89	2.61	3.48	3.22	0.01	0.10	0.30	0.13	0.42	0.23	0.14
6G3.A	2.95	2.60	3.34	3.20	0.04	0.12	0.19	0.10	0.35	0.23	0.07
6H1.A	2.91	2.54	3.31	3.05	0.10	0.13	0.18	0.05	0.35	0.18	0.12
6H2.A	2.88	2.52	3.21	3.02	0.13	0.13	0.15	0.06	0.32	0.19	0.09
6H3.A	2.76	2.61	3.17	3.04	0.07	0.06	0.18	0.10	0.26	0.16	0.06
6I1.A	2.66	2.46	3.04	2.83	0.14	0.07	0.17	0.06	0.26	0.13	0.09
6I2.A	2.57	2.49	2.89	2.80	0.17	0.03	0.13	0.08	0.17	0.11	0.04
6I3.A	2.27	2.32	2.46	2.49	0.34	0.02	0.07	0.08	0.06	0.06	0.01
6I4.A	1.93	2.00	2.21	2.20	0.22	0.03	0.11	0.10	0.09	0.07	0.00
6I5.A	2.20	2.22	2.34	2.42	0.39	0.01	0.05	0.07	0.04	0.06	0.03
6J1.A	3.34	3.34	3.50	3.62	0.14	0.00	0.08	0.13	0.09	0.14	0.06
6J2.A	3.23	3.29	3.47	3.62	0.05	0.02	0.11	0.18	0.09	0.16	0.08
6J3.A	3.25	3.33	3.42	3.62	0.09	0.03	0.08	0.17	0.04	0.14	0.10

6J4.A	3.21	3.26	3.38	3.60	0.08	0.02	0.08	0.18	0.06	0.16	0.11
6K1.A	3.29	3.42	3.41	3.25	0.93	0.06	0.06	0.01	0.01	0.07	0.07
6K2.A	3.16	3.34	3.34	3.29	0.58	0.07	0.08	0.05	0.00	0.02	0.02
6K3.A	3.16	3.34	3.28	3.25	0.77	0.07	0.05	0.03	0.03	0.04	0.01
6K4.A	3.11	3.28	3.25	3.18	0.77	0.07	0.06	0.03	0.01	0.04	0.03
6L.A	3.39	3.35	3.67	3.36	0.61	0.02	0.16	0.01	0.21	0.00	0.18
7A.A	3.54	3.56	3.70	3.79	0.03	0.01	0.16	0.21	0.12	0.18	0.10
7B.A	3.49	3.50	3.79	3.84	0.00	0.00	0.29	0.32	0.26	0.29	0.06
7C1.A	3.16	3.31	3.64	3.68	0.00	0.06	0.34	0.32	0.24	0.24	0.04
7C2.A	3.36	3.45	3.75	3.86	0.00	0.04	0.29	0.38	0.24	0.33	0.12
7C3.A	3.15	3.33	3.61	3.79	0.00	0.08	0.32	0.46	0.20	0.34	0.17
7C4.A	3.40	3.29	3.70	3.77	0.00	0.05	0.23	0.26	0.30	0.33	0.06
7C5.A	2.80	2.96	3.42	3.36	0.00	0.06	0.36	0.26	0.29	0.20	0.04
7D.A	3.67	3.43	3.84	3.87	0.01	0.14	0.18	0.21	0.37	0.39	0.05
7E.A	3.65	3.46	3.85	3.75	0.07	0.11	0.20	0.07	0.36	0.21	0.13

TABLE H-5 ANOVA Subgroup Analysis by "Which of the following BEST describes the primary focus of your current practice?"

Rating Scale
1 = Not Important
2 = Low Importance
3 = Moderate Importance
4 = Extremely Important

Nuclear Medicine	Dedicated Computed Tomography department	Radiation Therapy department	Research PET/Nuclear Medicine	Multiple imaging modalities	ANOVA_P	1 VS 2	1 VS 4	1 VS 5	2 VS 4	2 VS 5	4 VS 5
1A.A	3.40	3.77	2.50	3.67	3.56	0.17	0.38	0.49	0.12	0.20	0.19
1B1.A	3.27	3.53	2.67	3.67	3.37	0.38	0.25	0.75	0.07	0.19	0.11
1B2.A	2.86	2.86	2.33	2.67	2.65	0.12	0.00	0.13	0.13	0.13	0.11
1B3.A	3.29	3.79	3.00	3.83	3.45	0.14	0.48	1.19	0.11	0.09	0.27
1B4.A	2.95	2.84	3.00	2.83	2.83	0.34	0.09	0.16	0.08	0.00	0.01
1B5.A	3.19	3.05	3.00	3.33	2.92	0.06	0.10	0.27	0.17	0.30	0.06
1B6.A	2.69	2.21	2.67	2.83	2.39	0.07	0.31	0.19	0.17	0.56	0.09
1C.A	2.69	2.69	2.67	3.33	2.90	0.13	0.00	1.12	0.11	0.65	0.10
1D.A	2.74	2.67	2.67	3.33	2.89	0.24	0.04	1.04	0.08	0.71	0.10
1E.A	3.16	3.86	2.67	4.00	3.71	0.00	0.45	0.65	0.29	0.34	0.14
1F.A	3.09	3.41	2.67	3.50	3.27	0.17	0.26	0.71	0.11	0.11	0.09
1G.A	3.57	3.43	3.00	4.00	3.66	0.34	0.13	0.52	0.07	0.70	0.17
2A.A	2.82	2.83	1.00	3.17	2.77	0.75	0.00	0.36	0.03	0.31	0.03
2B1.A	2.89	2.95	2.00	3.00	2.90	0.93	0.04	0.09	0.01	0.04	0.03

2B2.A	2.62	2.80	2.00	2.50	2.86	0.19	0.12	0.08	0.13	0.20	0.03
2B3.A	3.19	3.66	2.33	3.83	3.58	0.00	0.40	1.32	0.26	0.32	0.06
2C.A	3.21	3.71	3.50	3.83	3.58	0.00	0.43	1.29	0.25	0.21	0.10
2D.A	3.31	3.63	3.00	3.67	3.53	0.05	0.31	0.67	0.17	0.05	0.09
2E.A	3.39	3.71	2.33	3.33	3.65	0.05	0.30	0.08	0.19	0.46	0.06
2F.A	3.37	3.78	3.00	3.83	3.74	0.00	0.38	0.99	0.27	0.11	0.05
2G.A	3.57	3.80	3.00	3.83	3.81	0.02	0.24	0.59	0.20	0.05	0.01
3A.A	3.30	3.47	1.0	4.00	3.62	0.01	0.16	0.76	0.23	1.06	0.13
3B1.A	3.29	3.50	2.0	4.00	3.49	0.07	0.21	0.83	0.15	0.83	0.01
3B2.A	3.18	3.51	2.0	3.50	3.41	0.08	0.33	0.60	0.17	0.02	0.07
3B3.A	3.04	3.14	2.0	3.75	3.34	0.03	0.07	1.44	0.20	0.83	0.13
3B4.A	2.98	2.67	1.5	3.75	3.08	0.45	0.22	1.56	0.06	1.19	0.22
3B5.A	3.09	2.86	1.5	3.25	3.07	0.86	0.18	0.32	0.01	0.49	0.12
3B6.A	3.36	3.44	2.0	4.00	3.57	0.06	0.08	0.80	0.17	0.70	0.09
3B7.A	3.53	3.69	2.0	4.00	3.77	0.02	0.18	0.60	0.21	0.54	0.08
3B8.A	3.37	3.75	2.0	3.75	3.64	0.02	0.40	0.81	0.21	0.00	0.10
3B9.A	3.06	3.11	2.0	3.75	3.14	0.52	0.04	1.39	0.05	0.92	0.02
3B10.A	3.41	3.69	2.5	4.00	3.71	0.01	0.28	0.67	0.23	0.46	0.02
3B11.A	3.49	3.60	2.5	3.75	3.69	0.08	0.12	0.56	0.17	0.27	0.08
3C.A	2.50	2.06	1.5	2.75	2.71	0.20	0.31	0.22	0.12	0.56	0.34
3D.A	2.89	3.00	3.0	2.50	3.17	0.08	0.08	0.25	0.18	0.31	0.11
3E.A	2.56	2.66	2.0	2.75	2.86	0.08	0.06	0.11	0.16	0.05	0.10
3F.A	3.33	3.40	2.0	3.00	3.42	0.60	0.06	0.19	0.06	0.22	0.02
4A.A	3.72	3.75	2.5	3.5	3.83	0.37	0.03	0.26	0.11	0.27	0.08
4B1.A	3.73	3.89	2.0	4.0	3.89	0.14	0.18	0.35	0.14	0.28	0.00

4B2.A	3.70	3.78	2.0	4.0	3.85	0.19	0.09	0.38	0.13	0.46	0.07
4C.A	3.70	3.81	3.0	4.0	3.78	0.37	0.13	0.44	0.08	0.42	0.02
4D.A	3.59	3.81	4.0	4.0	3.74	0.10	0.27	0.57	0.14	0.49	0.06
4E.A	3.70	3.89	2.5	4.0	3.83	0.15	0.27	0.48	0.14	0.35	0.07
4F.A	3.82	3.89	2.5	4.0	3.92	0.25	0.11	0.32	0.12	0.35	0.04
5A1.A	3.69	3.94	2.5	4.00	3.92	0.04	0.24	0.36	0.18	0.24	0.03
5A2.A	3.69	3.97	2.5	4.00	3.92	0.04	0.28	0.37	0.19	0.17	0.08
5A3.A	3.19	3.14	2.0	3.50	3.29	0.50	0.04	0.55	0.06	0.46	0.09
5A4.A	3.51	3.81	2.0	3.75	3.80	0.02	0.27	0.50	0.21	0.12	0.01
5A5.A	3.42	3.75	2.0	3.75	3.74	0.02	0.29	0.66	0.22	0.00	0.01
5A6.A	3.41	3.53	2.0	3.75	3.69	0.04	0.10	0.69	0.19	0.33	0.13
5A7.A	3.52	3.89	2.0	3.75	3.78	0.04	0.33	0.48	0.19	0.30	0.11
5B1.A	3.26	3.61	2.0	3.75	3.38	0.44	0.26	0.94	0.07	0.25	0.15
5B2.A	2.73	3.00	2.0	3.50	2.83	0.55	0.16	1.27	0.05	0.55	0.08
5B3.A	2.61	3.06	2.0	3.00	2.69	0.70	0.26	0.50	0.04	0.06	0.17
5B4.A	2.45	2.14	2.0	2.75	2.37	0.77	0.16	0.34	0.03	0.52	0.09
5B5.A	2.62	2.86	2.0	3.25	2.62	0.95	0.13	0.71	0.00	0.34	0.10
5C.A	3.37	3.83	2.0	4.00	3.81	0.00	0.31	0.52	0.25	0.38	0.02
5D.A	3.47	3.83	3.0	4.00	3.80	0.02	0.27	0.46	0.20	0.34	0.03
6A1.A	3.22	3.86	2.5	3.25	3.76	0.00	0.40	0.03	0.29	0.71	0.09
6A2.A	3.09	3.89	2.0	3.25	3.54	0.02	0.48	0.18	0.22	0.74	0.24
6A3.A	2.82	3.17	2.0	2.75	3.08	0.22	0.22	0.08	0.12	0.43	0.05
6A4.A	2.69	2.69	2.0	2.75	2.87	0.38	0.00	0.06	0.08	0.06	0.09
6A5.A	2.88	3.29	2.0	2.75	3.21	0.11	0.25	0.15	0.16	0.56	0.04
6A6.A	2.99	3.34	2.0	2.75	3.38	0.05	0.23	0.27	0.19	0.62	0.02

6A7.A	2.99	3.49	2.0	2.75	3.33	0.09	0.32	0.27	0.17	0.80	0.09
6A8.A	2.84	2.77	2.0	2.75	3.00	0.43	0.04	0.10	0.08	0.02	0.11
6A9.A	2.95	3.83	2.0	2.75	3.38	0.05	0.50	0.23	0.20	1.25	0.29
6B1.A	3.22	3.82	2.0	3.00	3.65	0.02	0.40	0.21	0.24	0.81	0.15
6B2.A	2.97	3.68	2.0	2.75	3.41	0.03	0.45	0.24	0.21	1.00	0.14
6B3.A	2.71	2.73	2.0	2.75	2.89	0.38	0.01	0.05	0.08	0.02	0.07
6B4.A	2.65	2.76	2.0	2.75	2.75	0.64	0.07	0.12	0.05	0.01	0.00
6B5.A	3.02	3.88	2.0	2.75	3.38	0.10	0.51	0.30	0.17	1.32	0.34
6C1.A	3.12	3.89	2.0	3.25	3.65	0.00	0.47	0.23	0.27	1.37	0.20
6C2.A	3.07	3.66	2.0	3.25	3.63	0.00	0.37	0.32	0.28	0.75	0.01
6C3.A	3.11	3.69	2.0	3.25	3.63	0.00	0.37	0.25	0.27	0.81	0.03
6C4.A	3.07	3.83	2.0	3.25	3.51	0.03	0.46	0.32	0.21	1.09	0.20
6C5.A	2.66	3.11	2.0	3.25	3.22	0.00	0.26	1.05	0.26	0.15	0.05
6D1.A	2.76	3.42	2.0	3.00	3.25	0.01	0.41	0.30	0.23	0.50	0.10
6D2.A	2.70	3.21	2.0	3.00	3.13	0.03	0.30	0.39	0.20	0.22	0.04
6D3.A	2.70	3.30	2.0	3.00	3.13	0.04	0.37	0.38	0.20	0.34	0.09
6D4.A	2.69	3.21	2.0	3.00	3.11	0.04	0.31	0.39	0.19	0.23	0.05
6D5.A	2.85	3.44	2.0	3.00	3.29	0.03	0.38	0.19	0.21	0.51	0.09
6D6.A	2.81	3.44	2.0	3.00	3.24	0.03	0.40	0.24	0.20	0.53	0.11
6D7.A	2.74	3.44	2.0	3.00	3.17	0.03	0.44	0.33	0.21	0.53	0.15
6D8.A	2.70	3.38	2.0	3.00	3.16	0.02	0.43	0.39	0.22	0.46	0.12
6D9.A	2.72	3.25	2.0	3.00	3.13	0.04	0.33	0.36	0.19	0.28	0.07
6D10.A	2.56	2.70	2.0	3.00	2.89	0.11	0.08	0.56	0.15	0.27	0.08
6E1.A	3.36	3.91	2.5	3.75	3.79	0.01	0.38	0.72	0.24	0.36	0.14
6E2a.A	3.21	3.29	2.5	3.25	3.52	0.06	0.05	0.08	0.17	0.05	0.14

6E2b.A	3.14	3.20	2.5	3.25	3.44	0.09	0.04	0.21	0.16	0.06	0.14
6E2c.A	2.84	2.46	2.5	3.00	3.08	0.21	0.20	0.20	0.11	0.45	0.26
6E3.A	3.00	3.83	2.5	3.25	3.52	0.01	0.49	0.45	0.25	1.21	0.23
6E4.A	3.17	3.94	2.5	3.50	3.67	0.01	0.51	0.54	0.24	0.86	0.25
6F1.A	3.32	3.88	2.0	3.50	3.78	0.01	0.38	0.30	0.26	0.72	0.11
6F2.A	3.03	3.41	2.0	3.50	3.62	0.00	0.25	0.78	0.29	0.14	0.14
6F3.A	2.95	3.32	2.0	3.33	3.48	0.00	0.24	NA	0.26	NA	0.09
6F4.A	3.04	3.52	2.0	3.25	3.65	0.00	0.31	0.38	0.30	0.43	0.09
6F5.A	2.97	3.62	2.5	3.50	3.54	0.00	0.41	0.86	0.27	0.18	0.05
6F6.A	2.90	3.24	2.0	3.25	3.33	0.02	0.21	0.62	0.21	0.02	0.05
6F7.A	2.65	2.94	2.0	2.75	2.90	0.25	0.17	0.11	0.11	0.18	0.02
6F8.A	2.83	3.29	2.0	3.00	3.21	0.07	0.28	0.22	0.17	0.33	0.04
6F9.A	2.94	3.79	2.0	3.25	3.49	0.01	0.49	0.54	0.26	1.12	0.22
6F10.A	2.96	3.82	2.5	3.25	3.43	0.02	0.50	0.50	0.21	1.07	0.24
6G1.A	2.89	3.32	2.0	3.00	3.29	0.05	0.28	0.14	0.19	0.38	0.02
6G2.A	2.91	3.68	2.0	3.25	3.38	0.03	0.46	0.58	0.21	0.66	0.15
6G3.A	2.89	3.76	2.0	2.75	3.27	0.09	0.50	0.15	0.17	1.17	0.29
6H1.A	2.88	3.26	2.0	3.25	3.16	0.19	0.22	0.41	0.12	0.01	0.05
6H2.A	2.81	3.09	2.0	3.00	3.25	0.03	0.16	0.18	0.20	0.07	0.07
6H3.A	2.78	3.15	2.0	3.25	3.18	0.05	0.21	0.53	0.18	0.10	0.01
6I1.A	2.66	3.15	2.0	3.25	2.95	0.17	0.27	0.65	0.13	0.10	0.08
6I2.A	2.59	3.15	2.0	2.75	2.84	0.29	0.31	0.14	0.11	0.31	0.13
6I3.A	2.46	2.03	2.0	2.50	2.39	0.79	0.21	0.04	0.03	0.36	0.14
6I4.A	2.17	2.18	2.0	1.75	1.98	0.37	0.01	0.27	0.08	0.26	0.08
6I5.A	2.30	2.47	2.0	2.75	2.23	0.80	0.09	0.50	0.03	0.23	0.09

6J1.A	3.53	3.00	2.0	3.50	3.61	0.64	0.31	0.05	0.05	0.44	0.30
6J2.A	3.52	2.82	2.0	3.75	3.51	1.00	0.40	0.45	0.01	0.73	0.32
6J3.A	3.50	2.88	2.0	3.50	3.49	0.96	0.36	0.01	0.01	0.52	0.29
6J4.A	3.50	2.76	2.0	3.50	3.41	0.66	0.41	0.01	0.05	0.58	0.29
6K1.A	3.45	2.97	2.0	3.50	3.33	0.55	0.27	0.10	0.06	0.45	0.15
6K2.A	3.43	2.82	2.0	3.75	3.23	0.34	0.33	0.62	0.11	0.70	0.16
6K3.A	3.40	2.79	2.0	3.50	3.18	0.28	0.33	0.18	0.12	0.55	0.15
6K4.A	3.35	2.74	2.0	3.50	3.11	0.26	0.33	0.25	0.12	0.59	0.15
6L.A	3.53	3.29	2.0	3.50	3.55	0.95	0.15	0.05	0.01	0.21	0.12
7A.A	3.71	3.59	2	3.75	3.66	0.53	0.15	0.09	0.05	0.30	0.06
7B.A	3.71	3.64	2	3.75	3.72	0.99	0.09	0.09	0.01	0.21	0.08
7C1.A	3.46	3.56	2	3.50	3.61	0.34	0.09	0.06	0.10	0.10	0.03
7C2.A	3.56	3.88	2	3.50	3.78	0.11	0.30	0.11	0.17	0.72	0.10
7C3.A	3.44	3.65	2	3.50	3.64	0.18	0.18	0.10	0.14	0.25	0.01
7C4.A	3.55	3.82	2	3.50	3.61	0.81	0.27	0.09	0.04	0.60	0.18
7C5.A	3.24	3.06	2	3.50	3.20	0.81	0.13	0.46	0.03	0.52	0.08
7D.A	3.76	3.76	2	4.00	3.74	0.76	0.01	0.41	0.02	0.48	0.02
7E.A	3.72	3.71	2	4.00	3.79	0.54	0.02	0.43	0.06	0.57	0.07

Appendix I: Final Content Outline with Weighting

NMTCB Computed Technologist Certification Board Examination Content Outline

I. Domain I: System Operations and Instrumentation (14%)

A. Identify Characteristics of the operator's console/acquisition station
B. Recognize the essential design and function of CT equipment
    1. Host computer/reconstruction station
    2. CT Radiographic tube
    3. Gantry/table features
    4. Detectors
    5. Data acquisition system
    6. Array processor
C. Classify filtration applications
D. Illustrate the effects and usage of collimation
E. Distinguish safe operation of power injectors with consideration to their limitations
F. Utilize image archiving principles within the communication system
G. Apply equipment quality assurance measures prior to usage

II. Domain II: Data Acquisition and Post Processing (12%)

A. Explain the process of digital CT image production
B. Differentiate among scanning methods
    1. Conventional serial CT scan
    2. Step and shoot scanning
    3. Shielding (shielding equations)
C. Identify the characteristics of localizer scans
D. Recognize principles of image reconstruction
E. Apply principles of post-processing techniques
F. Differentiate among slice plans
G. Recognize how to set and confirm landmarks

III. Domain III: Image Quality and Quality Assurance (13%)

A. Recognize influences on parameter selection
B. Distinguish factors that impact image quality and apply problem solving techniques
    1. Image noise
    2. Reconstruction interval
    3. Reconstruction algorithm/kernel
    4. Matrix
    5. Magnification
    6. Windowing
    7. Artifacts
    8. Slice thickness
    9. Partial volume effect
    10. Field of view
    11. Patient related

C. Apply knowledge of linear attenuation coefficient usage
D. Differentiate between CT number and Hounsfield units
E. Define interscan spacing and its application
F. Apply quality assurance process to evaluating images

IV. Domain IV: Patient Management (6%)

A. Provide patient education and preparation
B. Perform patient screening and assessment
    1. Contraindications (e.g., renal insufficiency)
    2. Medication and results of laboratory testing
C. Perform an ongoing assessment and respond to changes in the patient's condition
D. Utilize patient positioning and immobilization devices
E. Identify principles of patient documentation, record keeping, and confidentiality
F. Verify physician orders

V. Domain V: Medications and Contrast Agents (14%)

A. Identify intravenous contrast agents and their properties/usage
    1. Contraindications
    2. Adverse reactions and events
    3. Viscosity/osmolality
    4. IV sise
    5. Volume
    6. Flow duration
    7. Flow rate
B. Identify other contrast agents and their properties/usage/routs
    1. Gastrointestinal contrast agents
    2. Intrathecal contrast
    3. Rectal contrast
    4. Vaginal contrast
    5. Intraarticular contrast
C. Identify bolus parameters, timing, and tracking
D. Recognize common medications for managing contrast reactions

VI. Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology (25%)

A. Demonstrate fundamental parameters of head CT
    1. Routine brain
    2. Trauma
    3. Internal auditory canals
    4. Pituitary
    5. Orbits
    6. Sinuses
    7. Maxillofacial
    8. Temporomandibular joint
    9. Angiography-Circle of Willis
B. Demonstrate fundamental parameters of neck CT
    1. Routine soft tissue neck
    2. Trauma

3. Larynx
4. Parathyroid
5. Angiography-Carotids

C. Demonstrate fundamental parameters of spine CT
   1. Cervical spine
   2. Thoracic spine
   3. Lumbosacral spine
   4. Trauma
   5. Post-Myelography spine

D. Demonstrate fundamental parameters of musculoskeletal CT
   1. Shoulder
   2. Elbow
   3. Wrist
   4. Hand
   5. Hips
   6. Knee
   7. Ankle
   8. Foot
   9. Long bones
   10. Arthrogram

E. Demonstrate fundamental parameters of chest CT
   1. Routine chest
   2. Lung
      a. High resolution
      b. Low dose screening
      c. Respiratory gating
   3. Angiography-Thoracic aorta
   4. Angiography-Pulmonary vessels/PE exam

F. Demonstrate fundamental parameters of abdomen CT
   1. Routine abdomen
   2. Tri-phase liver
   3. Pancreas
   4. Kidneys
   5. Renal calculi
   6. Adrenals
   7. Ureteral calculi/urogram
   8. Angiography – abdomen
   9. Trauma

G. Demonstrate fundamental parameters of pelvis CT
   1. Bladder
   2. Trauma
   3. Angiography – run-offs

H. Demonstrate fundamental parameters of cardiac CT
   1. Angiography – cardiac
   2. Calcium scoring
   3. Cardiac gating

I. Recognize characteristics of special procedures
    1. Biopsy
    2. Drainage
J. Recognize characteristics of PET/CT
    1. Anatomy
    2. Physiology
    3. Organ systems
    4. Attenuation correction
K. Recognize characteristics of SPECT/CT
    1. Anatomy
    2. Physiology
    3. Organ systems
    4. Attenuation correction
L. Recognize procedural differences for patient populations (e.g., pediatric, body habitus)

VII. Domain VII: Radiation Safety (16%)

A. Recognize biological effects of ionizing radiation
B. Recognize elements of dose reporting and measurements/units
C. Apply dose optimization techniques
    1. Hardware factors
    2. Scan parameters
    3. Reformat
    4. Repeat scans
    5. Radiation penumbra
D. Recognize dosing modifications for patient populations (e.g., pediatric, body habitus, pregnancy)
E. Recognize elements, types, and applications of shielding (e.g., PPE, ALARA)

NMTCB CT Examination Domain Weighting

Domain I: System Operations and Instrumentation - 14% or 28 items
Domain II: Data Acquisition and Post Processing – 12% or 24 items
Domain III: Image Quality and Quality Assurance – 13% or 26 items
Domain IV: Patient Management – 6% or 12 items
Domain V: Medications and Contrast Agents – 14% or 28 items
Domain VI: CT Procedures: Anatomy, Elements, Indications, and Pathology – 25% or 50 items
Domain VII: Radiation Safety – 16% or 32 items