2010 Exam Applicant's Handbook

PART I: GENERAL EXAM INFORMATION

PART II: ROUTE/ ELIGIBILITY INFORMATION

PART III: EXAM CONTENT INFORMATION

Note: This handbook describes the information required of each candidate for examination. The application, as well as additional information is located online at www.mdcb.org. **The Medical Dosimetrist Certification Board reserves the right to amend or modify the terms or conditions of testing and nothing contained in this Handbook shall be deemed a guarantee or warranty of any type or kind.**

It is the responsibility of the exam candidate to insure he/she is aware of the most current exam information in regard to exam administration, eligibility, application requirements and deadlines, and ethical standards of the MDCB. Candidates must meet the eligibility requirements in effect at the time of application.

Prometric, a testing company, administers the examination for The Medical Dosimetrist Certification Board.

The Handbook

This Handbook contains information about the administration of the Certification Examination for Medical Dosimetrists, and is divided into 3 parts: General Exam Information, Route/Eligibility Information, and Exam Content Information.

In the handbook, you will find valuable information about the logistics, content, eligibility, and required procedures for candidates interested in taking the examination. Refer to it for guidance and instructions. If you still have questions, visit www.mdcb.org. The MDCB will settle any disputes, which may arise, based on information in the Exam Applicant's Handbook and the information provided by Prometric.

The Application

The application and everything you need to complete it is located on line at **www.mdcb.org**. The application and all supporting documents received by the MDCB will be reviewed only by the Director of Certification and the MDCB Eligibility Committee and will remain confidential.

Objectives of Certification

Medical Dosimetry Certification represents a recognized standard of quality care and competence. Certification advances the field of medical dosimetry and protects and improves the safety and health of individuals requiring the services of a medical dosimetrist. Because the Medical Dosimetrist provides medical services of critical importance and participates in medical treatments provided to individuals facing life-threatening illnesses, it is of critical importance that the general public as well as other healthcare providers be able to recognize medical dosimetrists who have demonstrated minimal competence in the necessary subject areas. Certification is intended to elevate the field of medical dosimetry and to protect and improve the safety and health of individuals requiring the services of a medical dosimetrist. The objectives of certification can be further enumerated as follows:

First To elevate the standards and advance the cause of medical dosimetry by encouraging its study and improving its practice;

Second To determine the competence of medical dosimetrists and to conduct examinations to test the Qualifications of voluntary candidates;

Third To grant and issue certifications in the field of medical dosimetry to eligible voluntary applicants and to maintain a registry of holders of such certificates; and

Fourth To serve medical dosimetrists and the associated health care community by maintaining a Registry of Certified Medical Dosimetrists.

General Description of the Medical Dosimetrist

The medical dosimetrist is a member of the radiation oncology treatment planning team who is thoroughly familiar with the physical and geometric characteristics of radiation equipment and radioactive sources commonly employed, and has the training and expertise necessary to measure and generate radiation dose distributions and calculations.

Medical dosimetrists provide services and care to individuals facing serious and often life-threatening illness. Certification is intended to assist in elevating the quality of dosimetrists and in turn elevating the level of care and skill of the dosimetrist.

PART I: GENERAL EXAM INFORMATION

Application Procedure

The application is available on the MDCB Web site, www.mdcb.org. The completed application must be submitted with the correct fees, payable on-line. It is the applicant's responsibility to ensure his/her application is complete and accurate, including the submission of any attachments, if applicable.

The Medical Dosimetry Certification Board (MDCB) is the sole and only judge of each candidate's qualifications to sit for the MDCB Certification Exam. In consideration of individual exam candidate's application, the moral, ethical and professional standing will be reviewed and assessed by the board; the board may make inquiry of the persons named in the application form and of such persons as the Board deems appropriate with respect to moral, ethical and professional standing.

Re-Application Procedure

You can apply as a re-applicant if you meet one of the following criteria:

- If you have taken the exam in the past and failed no more than 3 times since 2006
- If you have been approved to sit for the exam but did not report to the testing site **IN THE LAST FIVE (5) YEARS**
- Or if you have had a lapse in CMD certification **IN THE LAST FIVE (5) YEARS**

If you are a re-applicant you only need to fill out the application and turn in the appropriate fees. You may be asked to include proof that you have taken or been deemed eligible to sit for the exam before. The MDCB reserves the right to request additional documentation if necessary.

International Exam Applicant Policy

It is the responsibility of International applicants to submit all required documentation in English and to demonstrate "foreign equivalency" of all credentials submitted. Foreign equivalency documentation must be provided by an organization recognized by the MDCB: The Foundation for International Services, Inc. (FIS) OR International Education Research Foundation (IERF).

The application deadline for complete applications to be submitted and all eligibility requirements to be met is, February 1st of the exam year.

All documentation that is reviewed by the FIS or IERF must be evaluated on a "course-by-course" basis.

If you are living in the United States/Canada but have transcript/diploma documentation that was obtained from a foreign country, it will still need to be evaluated for US equivalency by the FIS or IERF.

Dates

The early deadline for exam applications is February 1st 2010. Applications submitted after February 1 will be subject to a $75 late fee.

The final deadline for exam applications is March 1st 2010. All applications that are incomplete after the March 1st 2010 will be deemed ineligible. **APPLICATIONS CANNOT BE SUBMITTED AFTER THE APPLICATION DEADLINE (March 1st)**

The deadline for International Exam applicants is February 1st, 2010 (Does not apply to Canadian Applicants)

The 2010 MDCB Exam will be administered on Sunday, June 13, 2010.

Fees

Payment must be made with the application on-line, by credit card in U.S dollars. Debit cards are not accepted.

Application Fee: $ 100
This non-refundable application fee is required of all candidates.

Exam Fee: $ 300
The exam fee must be submitted for each request to take the examination, including re-application.

Late Fee: $ 75
A late fee is required for applications submitted after the Regular Registration Deadline (February 1, 2010).

Refund Processing Fee: $100
An exam refund fee will be imposed for applicants who are approved to sit for but do not take the exam.

Communicating with the Testing Office

A candidate will receive acknowledgement of his/her application from the MDCB by e-mail, letter or postcard. After eligibility status has been determined, the candidate will be notified by e-mail. Eligible, registered candidates will be sent an admission ticket approximately three weeks prior to the test date. Candidates who do not have an admission ticket two or three weeks prior to the test date should contact Prometric for special instructions. Candidates who are unable to be present for the examination should notify the MDCB as soon as possible prior to the day of the test.

Test Center Information

Test Date Schedule

The complete schedule of the test, date and locations are given on the MDCB website. Specific examination times and addresses for each location are given on the admission ticket issued by Prometric.

Admission to Testing

Each candidate must present an admission ticket and two forms of identification in order to be admitted to the testing room. At least one form of identification must contain the candidate's photograph. In the case of a lost Admission Ticket, contact the MDCB for alternate authorization.

Acceptable forms of photo identification include:

- Driver's license
- Passport
- Military identification
- Employee identification card

Acceptable forms of non-photo identification include:

- Credit card
- Check cashing card

Test Center Location

The exam will be administered at the AAMD Conference site in Minneapolis, MN. In previous years, exam sites have included: Atlanta, GA: Raleigh, NC; Chicago, IL; Denver, CO; Hartford, CT; Houston, TX; Philadelphia, PA; Pittsburgh, PA; Sacramento, CA; St. Louis, MO; Tampa, FL; and Toronto, ON. International sites have included Seoul, South Korea and Hong Kong. A minimum of 10 candidates is required for test administration at international sites.

When sites have been confirmed, local addresses for testing center locations will be posted on the MDCB Web site, www.mdcb.org, Exam candidates will also receive notification via e-mail . The MDCB does not provide recommendations for hotels in testing cities. It is the exam candidate's responsibility to make his/her own hotel and travel arrangements for the exam.

Test Center Regulations

The following regulations will be observed at all test centers to insure uniform testing conditions.

- Candidates should follow the instructions on the admission ticket and report for the exam on time. Proctors will NOT admit candidates who arrive after the reading of the examination instructions has begun.
- Candidates should bring several sharpened #2 pencils with them.
- Candidates are permitted to use silent, hand-held, solar or battery-operated calculators only.
- No beeper, recorder, camera, PDA, cellular phone, or any device that has the capability to record pictures, text, or sound can be brought to the examination.
- No reference materials are permitted.
- No test materials, documents, scratch paper, or memoranda of any kind may be taken from the test center.
- Visitors are not permitted in the test center. Candidates may be excused to use the restroom.
- Proctors are instructed to answer questions about testing procedures only. They will not respond to inquiries regarding test content.
- The exam reporting time is staggered so that everyone in the continental U.S. will be taking the exam at the same time. The exam reporting times are 12:15 PM ET, 11:15 AM CT, 10:15 AM MT and 9:15 AM PT.

Policies and Procedures

Non-Discrimination Policy

The Medical Dosimetrist Certification Board does not discriminate against any applicant for examination, certification or re-certification because of disability, race, color, religion, creed, age, gender, national origin, ancestry, or any other protected classification under state or federal law.

ADA Accommodations

Reasonable accommodations are provided to exam candidates with documented disabilities recognized under the Americans with Disabilities Act. Candidates who require testing accommodations under the ADA, must submit professional documentation of the disability with the exam application to assist in determining the necessary testing arrangements. Candidates will be notified before the scheduled testing date the result of the review. There is no additional charge for ADA accommodations.

Confidentiality and Conduct Agreement

When a candidate applies to take the examination, he or she is demonstrating his/her understanding of and agreement to conform to the level of professionalism and ethics expected by the Medical Dosimetrist Certification Board in relation to test taking. By making application to sit for the examination, candidates are acknowledging their understanding that the examination and its contents are proprietary and confidential. Candidates are prohibited from disclosing or reproducing any portion of the examination in any fashion or from recreating or attempting to recreate any portion of the examination or any test item for any reason. Candidates are prohibited from dissemination of any information concerning test content to any individual or any entity for any purpose whatsoever. Any conduct which the Medical Dosimetrist Certification Board reasonably believes to be designed or intended to breach test security or to disseminate examination content may result in the invalidation of test scores and may result in civil and/or criminal prosecution.

Any candidate's conduct during or following the examination which the Medical Dosimetrist Certification Board reasonably believes to be in violation of the foregoing conditions may result in score cancellation. Candidates agree and understand that test scores may be cancelled if there is reason to believe through proctor observations, statistical analysis and/or other evidence that any test score or scores may not be valid or that any candidate was engaged in collaborative, disruptive, or other unacceptable behavior during or after the administration of the examination.

Candidate Misconduct

The Medical Dosimetrist Certification Board administers an examination which serves an important public function, and no misconduct will be tolerated.

In an instance where the Medical Dosimetrist Certification Board believes individual candidate misconduct may have occurred, the candidate is notified and may be given an opportunity to provide additional information.

If, during the administration of an examination, a test administrator believes misconduct is taking place, certain options shall be available to the test administrator.

1. A test administrator may dismiss a candidate from the test and report that to The Medical Dosimetrist Certification Board, stating the reason that the action was taken.

2. A test administrator may choose not to dismiss a candidate from the test; however, under such circumstances, the test administrator will file an irregularity report with the Medical Dosimetrist Certification Board, describing his or her observations.

In either event, when a test administrator reports that a candidate may have committed misconduct during an examination, the candidate's test record is reviewed and the Medical

Dosimetrist Certification Board reserves the right thereafter to take appropriate action, including the cancellation and/or invalidation of the relevant test score.

The Medical Dosimetrist Certification Board has the unqualified right to question any test score the validity of which is in doubt because a score may have been obtained unfairly or because the Medical Dosimetrist Certification Board has reason to believe there has been a breach in test security. In the event that the Medical Dosimetrist Certification Board determines that a candidate's individual test results be withheld, or that a group of results will be withheld, the Board will notify the candidate or the group.

Upon written request or application in accordance with the appeal procedure, a candidate may request a hearing. The determination as to whether an appeal shall be granted is made by the Medical Dosimetrist Certification Board taking into consideration the circumstances of the invalidation decision.

Appeal Procedure for Individual Candidate Misconduct

1. If a candidate's scores are withheld or canceled due to specific individual misconduct, that candidate may, within 15 business days of the notification, submit a written request for a hearing. The purpose of the hearing will be to determine whether there exists sufficient evidence that the action taken by the Board was appropriate in light of the circumstances. The time, date and place of the hearing will be set by the Board.
2. The hearing will be conducted by at least three members of the Board to include the President.
3. At the hearing, the candidate may present such evidence as he or she deems proper and necessary. The candidate may be accompanied by legal counsel and witnesses of choice.
4. The Board may request the appearance of any witnesses as it deems necessary at the hearing.
5. At the end of the hearing, the three committee members from the Board will evaluate the evidence and reach a conclusion based upon sufficient, competent, and credible evidence.
6. The Board, at its sole discretion, may decide:
    a. that the candidate may retake the examination in question.
    b. that the candidate will not be permitted to retake the examination at any time. (In this case, the candidate may request reconsideration and reinstatement by the Board after one year).
    c. that the test results represent a reasonable assessment of the candidate's knowledge in the areas sampled, and the candidate's score(s) may be released.
    d. that some other action it deems appropriate should be taken.
7. The candidate will be advised in writing by the Board of its decision at least ten (10) business days prior to the next deadline to file a registration for retesting.
8. The Board reserves the right to notify a candidate's college of any of the actions or decisions described above.

Test Results

Approximately 7 weeks after the examination, scores are mailed out by Prometric. The exams are graded electronically and the collective data reviewed and analyzed by a Ph.D. psychometrician/statistician. Several quantitative indicators are used by the psychometrician to help determine the reliability and validity of the collective examination scores. Examples of these parameters include the r-biserial, p-values, and equator values. The r-biserial statistic compares the statistical relationship on each question for examinees who did well on a

question and then did well on the test; the p-value statistic analyzes the percentage of examinees who have traditionally gotten a question correct; and the equator values analyze statistical relationships between previous and current questions. These are only a small component of the overall values collectively psychometrically analyzed.

The MDCB exam is a pass/fail exam. Actual scores are not provided. Fail reports with detail will be provided, in order that candidates may assess their performance in each of the content areas. The results of the exam will remain confidential and are provided only to the exam candidate and the MDCB. Successful candidates will receive a wall certificate and earn the right to use the title "Certified Medical Dosimetrist".

If a candidate has not passed the exam and feels that his/her failed status is wrong he/she may request to have the exam hand scored by Prometric. Candidates will have to mail their request in writing to Prometric with a check for $25.00 made out to Prometric to the address below:

Prometric
Appeal Committee
1260 Energy Lane
St. Paul, MN 55108

Registry of Certified Medical Dosimetrists

All newly certified medical dosimetrists, who have completed and returned the required annual registration documentation with applicable fees, will be entered in the next edition of the Registry of Certified Medical Dosimetrists of the MDCB. They will receive a membership card (available for printing online) and be placed in the Online Membership Directory.

Retake Examinations (Re-Applications)

If the examination has been taken unsuccessfully, the candidate must reapply within five years, to be eligible as a re-applicant.
Of note: See the "3 attempt rule" information below.

Certificate Renewal

Once an individual becomes a CMD, the certificate is valid for one (1) year and must be renewed annually by paying dues. The Continuing Competence Documentation Program requires 50 hours of participation in approved educational activities in a 5-year cycle which must be recorded by each individual in their personal transcript on the MDCB Web site. Failure to complete continuing education requirements or pay annual dues as set forth by the MDCB will result in lapse of certification and will require re-taking the MDCB exam to reinstate certification.

Revocation of Certification

The MDCB has the right to revoke any certificate which it has administered in the event that the recipient engages in conduct which is a violation of the ethical standards of the MDCB. Additionally, fraud on the part of any candidate in the application process is grounds for denial or revocation of certificate. There is a review process for any candidate whose certificate has been revoked. Candidates who desire to appeal must do so in writing within 45 days of receiving notification of revocation of certificate.

Certification and Acceptance

This section applies to, but is not limited to test conditions, test security and test validity.

The Medical Dosimetrist Certification Board shall either retain or reserve the sole right to determine whether or not an examination is valid or invalid. The acceptance of a candidate's application to take the examination or the scoring thereof or the release of said test results to any party shall not act in any way to amend the right of the Medical Dosimetrist Certification Board to determine whether such examinations or the scores achieved thereon are valid or invalid in whole or in part. A determination that an examination and the scores achieved thereon are invalid may be made at any time by the Board. The Board also reserves the right to cancel any scores that may already have been reported when subsequent information raises doubt of reported score validity.

Unlike cases of individual candidate misconduct, occasionally testing irregularities occur that affect a group of test takers. Such problems include, without limitation, administrative errors, defective equipment or materials, improper access to test content and/or the unauthorized general availability of test content, as well as other disruptions of test administrations (e.g., natural disasters and other emergencies). When group testing irregularities occur, Prometric will conduct an investigation to provide information to the Board. Based on this information, the Board may direct Prometric either not to score the test or to cancel the test score. When it is appropriate to do so, the Board will arrange with Prometric to give affected test takers the opportunity to take the test again as soon as possible, without charge. Affected test takers will be notified of the reasons for the cancellation and their options for retaking the test. The appeal process does not apply to group testing irregularities.

Security

Anyone giving or receiving assistance of any kind from another candidate will be required to turn in his/her test materials and leave the test center. The candidate answer sheet will not be scored and the incident will be reported to the MDCB. Any candidate who either removes or attempts to remove test materials from the testing center will be prosecuted and forfeit all rights to take the examination again. The exam materials are copyrighted and any attempt to reproduce, publish, or post on the internet any of the exam materials is unlawful and is a violation of the" Ethical Standards of the Medical Dosimetrist Certification Board", which may result in revocation of certification.

Withdraw Policy

A candidate who has been deemed eligible to sit for the MDCB exam may withdraw at anytime up until the day of the exam. If candidate reports for the exam he/she can no longer withdraw. Candidate may decide to not show for the exam and will still receive a refund of $200, equivalent to the exam fee ($300) minus the exam refund fee ($100). If you intend to withdraw before the exam date you must e-mail your intent to withdraw to Melissa@cmehelp.com. Refunds for withdraws after acceptance to the exam will not be processed until after the exam date.

Three Attempt Rule

Starting in 2006, all exam candidates will be subject to a 3 attempt rule in which a candidate who has failed the exam on the third attempt will not be eligible for examination for two calendar years. After the two year waiting period the candidate may submit an application for examination. Applicant must show evidence of additional two years of clinical medical dosimetry experience, as well as a minimum of 12 continuing education hours (MDCB

approved) under this rule in order to submit an application for re-examination after three failed attempts.

Note: If a candidate applies but misses the exam (i.e. no-show) it will NOT be a strike counted against him/her under the three attempt rule.

Appeal to Denied Application Status

If a candidate has been denied he/she will be given one (1) appeal attempt. Candidate must provide documentation that supports his/her claim. The eligibility committee will then make a final decision. This decision is final and cannot be reversed. If candidate is still deemed ineligible he/she will have to reapply for the next year's exam.

PART II: ROUTE/ELIGIBILITY INFORMATION

Route 1

To apply under route 1; you must meet the following requirements:

Graduated from a JRCERT accredited program of at least 12 months. Also, before March 1st, 2010, an additional 6 months clinical medical dosimetry experience* must be completed under the direction of a certified medical dosimetrist or medical physicist or radiation oncologist.

OR

Graduated from a JRCERT accredited program of 18 months or greater before March 1st, 2010. This is equivalent to a total minimum of 12 months of education and 6 months of clinical medical dosimetry experience*.

When you are filling out the application online, further instructions will be provided. You will need to obtain signatures on some parts of the application – the online application will walk you through that process.

**Clinical medical dosimetry experience is defined as experience in a medical setting creating clinically deliverable treatment plans for radiation oncology patients under the direction of a radiation oncologist, physicist and or CMD. This does not include corporate/vendor experience. The clinical experience must NOT be concurrent with the dosimetry schooling. Clinical Medical Dosimetry Experience is full-time equivalent.*

A current listing of JRCERT accredited dosimetry programs can be found online at http://www.jrcert.org/index.html

Route 2

To apply under route 2; you must meet the following requirements:

Have a minimum of a Bachelors Degree (BS) in a related science. *Transcripts will be reviewed to ensure evidence of minimum course work in general or medical physics, physiology, anatomy, precalculus or calculus mathematics. Related science degrees may include but are not limited to chemistry, mathematics, biophysics, dosimetry, radiation therapy or radiologic science, etc.*

OR

Hold an active registration with the ARRT in radiation therapy or foreign equivalent.

AND

Completed at least 24 months clinical medical dosimetry experience* (before March 1st, 2010) under the direction of a certified medical dosimetrist or medical physicist or radiation oncologist. Applicants completing the application online will be provided with further instructions. Applicants will need to obtain signatures on certain parts of the application – the online application will guide you through the process.

**Clinical medical dosimetry experience is defined as experience in a medical setting creating clinically deliverable treatment plans for radiation oncology patients under the direction of a radiation oncologist, physicist and or CMD . This does not include corporate/vendor experience.*

AND

Completed 12 CE credits approved by the MDCB during your 24 months clinical experience. The proof of completion MUST display the MDCB course reference number.

Route 3

To apply under route 3; you must meet the following requirements:

Have a minimum of an Associates Degree (AAS or AS) or Have a Bachelors Degree (BA) in any subject (Arts, English etc.).

AND

Completed at least 36 months clinical medical dosimetry experience* (before March 1st, 2010) under the direction of a certified medical dosimetrist or medical physicist or radiation oncologist. Applicants completing the application online, will be provided with further instructions. Applicants will need to obtain signatures on certain parts of the application – the online application will guide you through the process.

**Clinical medical dosimetry experience is defined as experience in a medical setting creating clinically deliverable treatment plans for radiation oncology patients under the direction of a radiation oncologist, physicist and or CMD . This does not include corporate/vendor experience.*

AND

Completed 12 CE credits approved by the MDCB during your 36 months clinical experience. The proof of completion must display the MDCB course reference number.

Applicants completing the application online, will be provided with further instructions. Applicants will need to obtain signatures on certain parts of the application – the online application will guide you through the process.

Changes coming in 2013:

Effective for 2013 exam applications, Route 2 and 3 eligibility criteria will change and merge into a single eligibility route.

Route 2 candidates will be required to have:

A minimum of a Bachelors Degree in <u>any field</u> or hold an active registration with the ARRT in radiation therapy or foreign equivalent.

AND

Completed at least <u>36 months</u> clinical medical dosimetry experience* (before March 1st, 2013) under the direction of a certified medical dosimetrist or medical physicist or radiation oncologist.

AND

Completed 24 CE credits approved by the MDCB during your 36 months clinical experience. The proof of completion MUST display the MDCB course reference number.

Please note that currently there are no plans to change Route 1 eligibility in 2013.

PART III: EXAM CONTENT INFORMATION

The examination is administered in English only and will contain approximately 155 questions. The time allowed for completing the examination is three hours and fifty minutes.

MDCB Test Specification Matrix: Revised August 2009 based on the Medical Dosimetry Job Task Analysis	-
Content Outline Category	**% Weight**
I. RADIATION PHYSICS	**16%**
A. Radioactivity	
B. Production of x-rays	
C. Interaction of radiation with matter - photons and electrons, neutrons and protons	
D. Treatment machine characteristics (e.g., linear accelerator, cobalt 60, orthovoltage, superficial x-rays)	
E. Imaging modalities (e.g., MRI, PETs, CT, ultrasound, SPECT, KV, MV cone beam)	
F. Radiation measurement	
G. Radiation units (e.g., activity, exposure, absorbed dose, and dose equivalent)	
II. DOSE CALCULATION METHODS	**20%**
A. Applied mathematics (e.g., geometry, trigonometry)	
B. Basic external beam calculations (computer and manual) calculations (e.g., electron and photon beam)	
C. Effects of beam modifying devices (e.g., wedges, bolus, partial transmission blocks, compensators)	
D. Irregular field calculations	
E. Special calculations (e.g., off axis, gap calc, entrance/exit dose)	
F. Manual corrections for tissue inhomogeneities	
G. Dose normalization calculations (e.g., ICRU standards)	
III. TREATMENT PLANNING	**30%**
A. Isodose curve parameters	
B. Isodose distributions	
C. Electron beam dose distributions	
D. Site specific clinical oncology(e.g., disease anatomy, modes of spread, common treatment techniques, dose and fractionation schemes)	
E. Radiobiology [e.g., dose tolerances, hypofractionation, time dose fractionation (tdf) calculations, biologic modeling]	
F. Dose volume histogram (dvh) (e.g., differential, cumulative)	
G. IMRT, ARC therapy	
H. Cross-sectional anatomy	
I. Treatment machine limitations	
J. Special procedures (e.g., TBI, TSEI, IORT, SRS, SBRT)	
K. Algorithms (e.g., treatment planning software, calculation)	
IV. LOCALIZATION	**10%**
A. Acquisition of patient data	
B. Patient positioning	
C. Ancillary treatment devices (e.g., breast board, bite block)	
D. Treatment simulations (e.g., conventional simulations, CT simulations, PET-CT, 4D)	
E. Medical imaging with application to radiation oncology	
F. Digitally Reconstructed Radiograph (DRR/DCR)	
G. Image registration (image fusion)	

H. IGRT (e.g., CBCT, ultrasound guidance, KV-KV, MV-MV, infrared, fluoroscopy, CT on rails, fiducials)	
I. Patient immobilization techniques	
V. BRACHYTHERAPY	**6%**
A. Radioactive source characteristics	
B. Dose distributions	
C. Source localization	
D. Dose calculations	
E. Applicators	
F. HDR, LDR, MDR, IORT, Balloon catheter brachytherapy, permanent seed implants	
G. Dose rate (ICRU 58, and applicable AAPM Task Group reports)	
VI. RADIATION PROTECTION	**5%**
A. Maximum permissible dose equivalent based on NCRP recommendations	
B. Radiation monitoring for personnel and patients including teletherapy and brachytherapy	
C. Time, distance, and shielding (e.g., ALARA)	
D. Brachytherapy source handling and storage	
E. Structural shielding design	
VII. QUALITY ASSURANCE (e.g., safety, calibration, parameters)	**5%**
A. Treatment and simulator equipment	
B. Treatment planning computer	
C. Clinical data (e.g., chart reviews, film reviews, plan checks)	
D. Brachytherapy	
E. Record and verify units	
F. Hounsfield units conversion to CT density table in treatment planning systems	
G. Measurement equipment	
VIII. PROFESSIONAL RESPONSIBILITIES	**2%**
A. MDCB Code of Ethics	
B. Standard Precautions	
C. Responsible fiscal practices (billing)	
D . Health insurance portability (referred to as HIPPA in the United States)	
IX. FUNDAMENTALS OF COMPUTERS	**6%**
A. Data importing and exporting (e.g., DICOM)	
B. Computer systems management (e.g., archiving and backup, routine maintenance)	
C. Basic computer terminology (e.g., CPUs, ROM, RAM, binary)	

Sample Questions

Type "A" Items. This section contains questions or incomplete statements followed by five options. Choose the best options in each case.

1. A cork or bite block should be placed in the patient's mouth to avoid unnecessary irradiation of the tongue and floor of mouth when simulating and treating the:
   A. Tonsillar area
   B. Maxillary Antrum
   C. Larynx
   D. Patorid
   E. Trachea

2. In a lateral radiograph of the pelvis, the prostate gland can generally be localized at the level of the:
   A. Roof of the acetabulum
   B. Sacral Promonotory
   C. Trochanteric area of the femur
   D. Pubic Symphysis
   E. Coccyx

3. The average life of a radioactive isotope with a half-life of 8 days would be:
   A. 4.0 days
   B. 5.5 days
   C. 8.0 days
   D. 11.5 days
   E. 16.0 days

Type "K" Items. In each question ONE or MORE of the options is/are correct.

Choose: A if (1), (2) and (3) are correct
B if (1) and (3) are correct
C if (2) and (4) are correct
D if only (4) is correct
E if all are correct

4. Film dosimetry may be used in a linear accelerator quality assurance program to check:
   1. Light and radiation field coincidence
   2. Dose constancy
   3. Field flatness and symmetry
   4. Relative output factors

Choose: A if (1), (2) and (3) are correct
B if (1) and (3) are correct
C if (2) and (4) are correct
D if only (4) is correct
E if all are correct

5. Penumbra width for a Cobalt-60 unit decreases with an increase in:
   1. Source Size
   2. Depth
   3. Source-skin distance
   4. Source-collimator distance

Choose: A if (1), (2) and (3) are correct
B if (1) and (3) are correct
C if (2) and (4) are correct
D if only (4) is correct
E if all are correct

6. Isodose charts for megavoltage beams:
   1. show a decrease in dose near the edges of the beam
   2. may be normalized at the point of maximum dose on the central axis or at a fixed distance along the central axis in the irradiated medium
   3. are measured by means of ion chambers, solid state detective, or radiographic film
   4. must be corrected for surface contour irregularities

Choose: A if (1), (2) and (3) are correct
B if (1) and (3) are correct
C if (2) and (4) are correct
D if only (4) is correct
E if all are correct

7. Parent and daughter radioactive isotopes are said to be in secular equilibrium when they:
   A. Are equal in atomic weight.
   B. Have the same half-life.
   C. Have a constant ratio of activity.
   D. Emit equivalent gamma energies
   E. Have the same average life.

8. The most important prognostic factor in breast cancer is the:
   A. Size of the tumor.
   B. Age of the patient.
   C. Status of the axillary nodes.
   D. Quadrant of origin within the breast.
   E. Menopausal status.

9. Dose volume histograms (DVH) are useful to:

   1. Provide a graphic display of dose to the target.
   2. Optimize the radiation treatment in a reasonable time.
   3. Give a good representation of the dose received by the normal structures.

4. Indicate precisely the extreme dose (hot spot) in the volume treated.

A. (1), (2), and (3) only are correct.
B. (1) and (3) only are correct.
C. (2) and (4) only are correct.
D. (4) only is correct.
E. All are correct

10. Disregarding the effects of tissue inhomogeneity can result in errors in delivered dose that are:
(1) Inversely dependent on photon energy.
(2) Directly dependent on the dimensions of the inhomogeneity.
(3) Dependent on the depth of the inhomogeneity.
(4) Insignificant at 4 MV

A. (1), (2), and (3) only are correct.
B. (1) and (3) only are correct.
C. (2) and (4) only are correct.
D. (4) only is correct.
E. All are correct

Recommended Review Material

Some test questions may be verified from the items below but other questions may be verified in materials not listed.

Books

Bentel, G.C., Nelson, C.E., & Noell, K.T. (1989) **Treatment Planning & Dose Calculation in Radiation Oncology**, 4th edition, New York: Pergamon Press.

Bentel, G.C. (1996) **Radiation Therapy Planning,** 2nd edition, New York: McGraw-Hill, Inc.

Coia, et al. (1995) **A Practical Guide to CT Simulation**, Advanced Medical Publishing.

Cox, Moss. (1989) **Moss' Radiation Oncology: Rationale, Technique and Results**, 9th edition, Mosby.

Dean, David K. (2000) **Cross Sectional Human Anatomy**, 1st edition, Lippincott, Williams and Wilkins.

DeVita, Hellman, Rosenberg. (2001) **Principles and Practices of Oncology**, 6th edition, Lippincott, Williams & Wilkins.

Hall, E. (2000) **Radiobiology for the Radiologist**, 5th edition, Lippincott, Williams & Wilkins.

Khan, F.M. (2003) **The Physics of Radiation Therapy**, 3rd edition, Baltimore: Lippincott, Williams & Wilkins.

Khan, F.M., Potish. (1998?) **Treatment Planning in Radiation Oncology**, Baltimore: Lippincott, Williams & Wilkins.

Levitt, S.H., & Tapley, N. (1992) **Technological Basis of Radiation Therapy: Practical Clinical Applications**, 2nd edition, Philadelphia: Lea and Febiger.

Perez, C.A. & Brady, L.W. (2004) **Principles and Practice of Radiation Oncology**, 4th edition, Philadelphia: J.B. Lippincott Company.

Williamson, et al (eds.). (1994) **Brachytherapy Physics: AAPM Summer School**, Medical Physics Publishing.

Other Resources:

Applicable ICRU, NCRP and AAPM Task Group Reports (United States Guidelines will be used)
Scope of Standards

MDCB Study Practice Tests

The MDCB does not endorse pass rates guaranteed by any Medical Dosimetry review course provider. Only the MDCB can warrant the validity of pass rates for the MDCB CMD exam.

Answers to Sample Questions

1. B
2. C
3. D
4. B
5. D
6. E
7. C
8. C
9. B
10. A

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