ALT

PROVISIONAL ANSWER KEY (CBRT)

Name of The Post	**Professor, Radiotherapy, General State Service, Class-1**
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Instructions / સૂચના

Candidate must ensure compliance to the instructions mentioned below, else objections shall not be considered: -

(1) All the suggestion should be submitted Physically in prescribed format of suggestion sheet.

(2) Question wise suggestion to be submitted in the prescribed format of Suggestion Sheet published on the website.

(3) All suggestions are to be submitted with reference to the Master Question Paper with provisional answer key, published herewith on the website. Objections should be sent referring to the Question, Question No. & options of the Master Question Paper.

(4) Suggestions regarding question nos. and options other than provisional answer key (Master Question Paper) shall not be considered.

(5) Objections and answers suggested by the candidate should be in compliance with the responses given by him in his answer sheet /response sheet. Objections shall not be considered, in case, if responses given in the answer sheet /response sheet and submitted suggestions are differed. For the purpose, the candidate shall attach a copy of his answersheet/ Response sheet along with his application(s).

(6) Objection for each question shall be made on separate Suggestion sheet. Objection for more than one question in single Suggestion sheet shall not be considered & treated as cancelled.

ઉમેદવારે નીચેની સૂચનાઓનું પાલન કરવાની તકેદારી રાખવી, અન્યથા વાંધા-સૂચન અંગે કરેલ રજૂઆતો ધ્યાને લેવાશે નહીં

(1) ઉમેદવારે વાંધા-સૂચનો નિયત કરવામાં આવેલ વાંધા-સૂચન પત્રકથી રજૂ કરવાના રહેશે.

(2) ઉમેદવારે પ્રશ્નપ્રમાણે વાંધા-સૂચનો રજૂ કરવા વેબસાઈટ પર પ્રસિધ્ધ થયેલ નિયત વાંધા-સૂચન પત્રકના નમૂનાનો જ ઉપયોગ કરવો.

(3) ઉમેદવારે પોતાને પરીક્ષામાં મળેલ પ્રશ્નપુસ્તિકામાં છપાયેલ પ્રશ્નક્રમાંક મુજબ વાંધા-સૂચનો રજૂ ન કરતા તમામ વાંધા-સૂચનો વેબસાઈટ પર પ્રસિધ્ધ થયેલ પ્રોવિઝનલ આન્સર કી (માસ્ટર પ્રશ્નપત્ર)ના પ્રશ્ન ક્રમાંક મુજબ અને તે સંદર્ભમાં રજૂ કરવા.

(4) માસ્ટર પ્રશ્નપત્ર માં નિર્દિષ્ટ પ્રશ્ન અને વિકલ્પ સિવાયના વાંધા-સૂચન ધ્યાને લેવામાં આવશે નહીં.

(5) ઉમેદવારે જે પ્રશ્નના વિકલ્પ પર વાંધો રજૂ કરેલ છે અને વિકલ્પ રૂપે જે જવાબ સૂચવેલ છે એ જવાબ ઉમેદવારે પોતાની ઉત્તરવહીમાં આપેલ હોવો જોઈએ. ઉમેદવારે સૂચવેલ જવાબ અને ઉત્તરવહીનો જવાબ ભિન્ન હશે તો ઉમેદવારે રજૂ કરેલ વાંધા-સૂચન ધ્યાનમાં લેવાશે નહીં. આ હેતુ માટે, ઉમેદવારે પોતાની અરજી(ઓ) સાથે પોતાની જવાબવહીની એક નકલનું બિડાણ કરવાનું રહેશે.

(6) એક પ્રશ્ન માટે એક જ વાંધા-સૂચન પત્રક વાપરવું. એક જ વાંધા-સૂચન પત્રકમાં એકથી વધારે પ્રશ્નોની રજૂઆત કરેલ હશે તો તે અંગેના વાંધા-સૂચનો ધ્યાને લેવાશે નહીં.

001. **Which of the following 4 pathologic features does not determine glioma grading?**

(A) Necrosis **(B) Atypia**

(C) Endothelial proliferation **(D) Cell Differentiation**

002. **Which of the following nerve is responsible for otalgia in cancers of larynx/hypopharynx?**

(A) Auriculotemporal nerve **(B) Jacobson nerve**

(C) Arnold nerve **(D) Hypoglossal nerve**

003. **What factors protend to decrease the risk of development of ovarian cancers?**

(A) Nulliparity

(B) Advanced age at time of 1st child birth (>35 yrs)

(C) HRT

(D) Use of oral contraceptive pills.

004. **Involvement of para-aortic LNs in case of carcinoma cervix is considered as which of the following stage?**

(A) IIIC **(B) IVB**

(C) IVA **(D) IIIB**

005. **For patients undergoing surveillance for stage I Seminoma, where does most relapse occur?**

(A) Lungs **(B) Inguinal LNs**

(C) Para-aortic LNs **(D) Local**

006. **For a patient suspected to have HCC, when is biopsy not necessary to establish the diagnosis**

(A) A liver lesion is > 2cm, has classic appearance by 1 imaging modality (CT, US, MRI, Angiography) and is associated with AFP > 200 ng/ml

(B) Lesion is highly suspicious of malignancy at multiphase CT or MRI but does not meet imaging criteria for HCC

(C) Lesion meets imaging criteria for HCC but patient is not considered at high risk of HCC development

(D) Biopsy is always necessary

007. **Benign prostatic hypertrophy develops in which zone of prostate?**

(A) Peripheral zone **(B) Central zone**

(C) Transitional zone **(D) Anterior fibro-muscular stroma**

008. **What is the T staging if no H&N primary is found after workup?**

(A) T0 **(B) Tx**

(C) T1 **(D) Tis**

009. **The histopath report of a post op case of carcinoma lateral border of tongue was suggestive of squamous cell carcinoma, moderately differentiated, maximum size of tumor 4.4x2.6x3.5 cm, distance from closest margin was 3mm, depth of invasion 12mm, 4 out of 26 lymph nodes detected were positive for metastases (all Ipsilateral), all < 6cm, No ECE. What is the pathologic staging of disease?**

(A) pT3 pN2b Mx **(B) pT4a pN2b Mx**

(C) pT3 pN2c Mx **(D) pT4a pN2c Mx**

010. Deletion of 1p and 19q in oligodendroglioma is associated with:

(A) Better response to therapy but similar progression-free and overall survival

(B) Better response to therapy with improved progression-free but similar overall survival

(C) Similar response to therapy with improved progression-free and overall survival

(D) Better response to therapy with improved progression-free and overall survival

011. What molecular abnormality is NOT seen in small-cell lung cancer?

(A) MYC amplification

(B) EGFR expression

(C) TP53 mutation

(D) RB1 deletion

012. What is not true regarding Oncotype DX®?

(A) It is a 21-gene expression profiling assay

(B) It predicts a prognostic category (low vs. intermediate vs. high) in terms of distant metastasis-free survival (DMFS) and overall survival (OS)

(C) It requires fresh-frozen tissue and on-site processing

(D) Those patients with a high (≥31) Oncotype DX recurrence score derive the greatest benefit from chemotherapy.

013. Gastrointestinal tumors with which mutation respond best to imatinib?

(A) Exon 9

(B) Exon 11

(C) Exon 13

(D) Exon 17

014. According to the 8th edition of AJCC Cancer Staging Manual, a patient with Rectal cancer with no regional LN positive, but tumor deposits in subserosa and mesentery would be staged as:

(A) N1

(B) N2

(C) N3

(D) M1

015. In the surgical specimen of carcinoma breast patient, the pathologist encountered malignant cell clusters no larger than 0.2mm in regional LN(s). What would be the pathologic nodal staging?

(A) pN1mi

(B) pN0mi

(C) pN0(i+)

(D) pN0 (mol+)

016. All of the following contribute to suppression of cancer progression, EXCEPT:

(A) Autophagy

(B) Apoptosis

(C) Senescence

(D) Angiogenesis

017. The proteome is which of the following:

(A) The set of all expressed gene products at a given time

(B) The proteins expressed preferentially in malignant cells

(C) The set of all proteins potentially expressed by the genome

(D) The set of protonated peptides subject to matrix-assisted laser desorption ionization-time of flight analysis

018. **The presence of mutations in p53 has been associated with which of the following properties on cells:**

(A) Loss of the G2 checkpoint following treatment with DNA-damaging agents

(B) Enhanced capacity to undergo apoptosis following exposure to radiation

(C) Increased capacity for DNA amplification

(D) Both (A) and (C)

019. **The correct order of mitosis is:**

(A) Prometaphase, metaphase, anaphase, telophase, prophase

(B) Prometaphase, metaphase, prophase, anaphase, telophase

(C) Prophase, prometaphase, metaphase, anaphase, telophase

(D) Telophase, anaphase, prophase, metaphase, prometaphase

020. **Which of the following is necessary for the G1/S-phase transition?**

(A) Cyclin B-CDK1 complex accumulation

(B) Cyclins E and A accumulation

(C) Dephosphorylation of T14 and Y15

(D) CDK1 activation along with the binding of CDC20 to anaphase-promoting complex/ cyclosome (APC/C)

021. **All the following statements regarding the relationship between cigarette smoking and lung cancer are correct, EXCEPT:**

(A) The duration of smoking is the strongest determinant of lung cancer in smokers

(B) Smoking increases the risk of all histologic types of lung cancer

(C) The risk of developing lung cancer in ex-smokers drops to the level of never smokers two years after smoking cessation

(D) The risk of developing lung cancer increases with the number of cigarettes smoked.

022. **Which of the following cancers is caused by smokeless tobacco use?**

(A) Cancer of the oral cavity **(B) Esophageal cancer**

(C) Pancreatic cancer **(D) All of the above**

023. **All of the following are true about prevalence and incidence, EXCEPT:**

(A) Prevalence is calculated by dividing the number of existing cases by the total population

(B) Cumulative incidence is the proportion of people who develop the disease during a specified period of time

(C) Prevalence is considered a more relevant measure of disease frequency for etiologic evaluation, and incidence reflects the public health burden of the disease

(D) The quality of incidence data varies substantially depending on the accuracy of the population numbers, the completeness of reporting the diagnosis, and the degree with which the diagnosis is pursued

024. **For all the following analytical studies, the individual is the unit of analysis, EXCEPT:**

(A) Ecological **(B) Cross-sectional**

(C) Cohort **(D) Case-control**

025. Which of the following has NOT been a target for the development of reactive T cells?

(A) Prostate-specific antigen (PSA)
(B) Carcinoembryonic antigen (CEA)
(C) p53
(D) Epidermal growth factor receptor (EGFR)

026. Which of the following patients would be the most appropriate candidate for high-dose methotrexate at standard doses?

(A) A patient with elevated bilirubin at 2.1 mg/dL
(B) A patient with a moderate size left pleural effusion
(C) A patient currently receiving amoxicillin for a dental abscess
(D) A 63-year-old patient with a serum creatinine of 2.3 mg/dL

027. What is false about the electron binding energy?

(A) The electron binding energy is determined by the Coulomb attraction between the nucleus (protons) and orbital electrons (e)
(B) The electron binding energy increases as Z increases
(C) The electron binding energy increases as the distance from the nucleus increases
(D) The binding energy of an electron is the minimum energy required to knock the electron out of the atom

028. What is the geometric penumbra (P) at the skin given the following data: source size = 2 cm, source to skin distance (SSD) = 100 cm, source to collimator distance (SCD) = 56 cm?

(A) 1.57 cm
(B) 0.78 cm
(C) 5.6 cm
(D) 0.39 cm

029. An electron beam will be used to treat a tumor whose most distal depth is 4.8 cm. Assume there are no critical structures beyond the tumor. What energy should be used for a 90% dose to the tumor?

(A) 6MeV
(B) 10MeV
(C) 14 MeV
(D) 16 MeV

030. One of the neutrons transforms into a proton and an electron to give an excessive amount of energy in its nucleus. This type of decay is called :

(A) Gamma emission
(B) β- decay
(C) β+ decay
(D) Electron capture phenomenon

031. Which of the following statements is false?

(A) The half-life of a radioisotope is the time interval required for the decay of its activity to half of its initial radioactivity.
(B) The activity of a radioisotope is the number of decays per second; its unit is the curie.
(C) The decay of a radioactive nucleus is not a spontaneous process but requires energy.
(D) Gamma decay is decay without any change in the form of the nucleus from an excited form to its basal state.

032. There is no transfer of energy to atoms in this event; thus, ionization does not occur. This type of photon-matter interaction is called :

(A) Coherent scattering
(B) Pair production
(C) Compton effect
(D) Photodisintegration

033. Which of the following photon-matter interactions causes the annihilation process and therefore can be evidence for the $E = mc^2$ formula?

(A) Coherent scattering
(B) Compton effect
(C) Pair production
(D) Photodisintegration

034. Which of the following subsites require elective nodal radiotherapy?

(A) T2N0M0 nasal cavity cancer
(B) T1N0M0 lower lip cancer
(C) T2N0M0 supraglottic cancer
(D) T3N0M0 paranasal sinus cancer

035. Which of the following is the most common salivary gland tumor?

(A) Warthin's tumor
(B) Pleomorphic adenoma
(C) Mucoepidermoid cancer
(D) Adenoid cystic cancer

036. Which of the following is not correct for esthesioneuroblastoma?

(A) It is a neurogenic tumor originating from the olfactory epithelium
(B) It can be seen at any age, but 2/3 of patients are between 10 and 34 years of age
(C) Most patients are in early stages at presentation
(D) It usually appears as a reddish mass

037. Which therapeutic agent is correctly matched with its molecular target?

(A) Gefitinib and ERBB1
(B) Trastuzumab and ERBB2
(C) Lapatinib and VEGFR2
(D) Rituximab and CD 20

038. The standard error of the mean provides a measure of the

(A) Spread of the data
(B) Centre of the data
(C) Bias of the sample mean
(D) Precision of the sample mean.

039. A group of 100 doctors took part in a study to assess the usefulness of their professional College's webite six months before and six months after the website was re-designed. On each occasion they were asked whether or not they would recommend the website to a colleague. Which statistical test should most appropriately be used to compare the doctors' view of the old and new website?

(A) Paired t-test
(B) McNemar's test
(C) Mann-Whiteny test
(D) Chi-squared test

040. Which observational study design is best suited to the study of the current health status of a population?

(A) Cohort study
(B) Case control study
(C) Cross-sectional study
(D) Repeated cross-sectional study

041. In the International Commission of Radiation Units (ICRU) Report 62, internal organ motion is separately accounted for by the

(A) Internal target volume
(B) Planning target volume
(C) Planning organ at risk volume
(D) Clinical target volume.

042. A 47-year-old asymptomatic female presents with a hyperdense locally advanced pancreatic mass found on a routine CT scan. An endoscopic ultrasound (EUS) guided core biopsy is completed. Pathology report notes well-differentiated, small round cells with a mitotic count of 2 mitoses/10 high-power fields, and Ki-67 5%. What grade tumor does she have?

(A) Grade 1
(B) Grade 2
(C) Grade 3
(D) Grade 4

043. A 65-year-old male was recently diagnosed with esophageal neuroendocrine carcinoma (NEC) with innumerable metastases to the liver and lymph nodes. The tumor is poorly differentiated with a Ki-67 of 70% and a mitotic rate of 20 mitoses/10 high-power fields. Which of the following treatment options would you consider in his management?

(A) Octreotide
(B) Sunitinib
(C) Cisplatin and etoposide
(D) Everolimus

044. Which of the following is not a laboratory feature of tumor lysis syndrome?

(A) Hyperkalemia
(B) Hyper-phosphetaemia
(C) Hyper-uricaemia
(D) Hyper-calcemia

045. A 66-year-old female patient with advanced renal cell carcinoma is being considered for immunotherapy after failing pazopanib and axitinib. Her tumor's PD-L1 expression is <1%. Which is the best option for therapy at this time?

(A) Everolimus
(B) Nivolumab
(C) Pembrolizumab
(D) Atezolizumab

046. A 35-year-old woman with a strong family history of breast cancer is referred to the cancer genetics clinic and is found to have a germline mutation in the BRCA2 gene. Compared to patients with germline BRCA1 mutations, this patient is at a decreased risk of developing what type of tumor?

(A) Thyroid cancer
(B) Pancreatic cancer
(C) Colorectal cancer
(D) Ovarian cancer

047. A 58-year-old woman has multiple liver lesions identified on CT scan of the chest, abdomen, and pelvis obtained during a routine workup for abdominal pain. There was no evidence of a primary tumor. A core biopsy of one of the liver lesions is performed, revealing a moderately differentiated adenocarcinoma with the following immunohistochemistry profile: CK 7 negative, CK 20 positive, CD X2 positive. Which of the following is the most likely primary site?

(A) Lung
(B) Colorectal
(C) Ovarian
(D) Gastric

048. A 42-year-old woman presents with a pelvic mass. Surgical staging demonstrates a 5 cm ovarian mass with capsular rupture and multiple peritoneal implants without evidence of invasion. She is optimally debulked with less than 1 cm of residual disease. Pathology demonstrates an epithelial serous ovarian tumor of low malignant potential. The patient recovers well from surgery and presents to discuss adjuvant treatment options. Which of the following is the best next step?

(A) Adjuvant intravenous carboplatin and paclitaxel for three to six cycles
(B) Intravenous paclitaxel on day 1, intraperitoneal cisplatin on day 2, and intraperitoneal paclitaxel on day 8 of a 21-day cycle for six cycles
(C) Observation
(D) Intravenous carboplatin and paclitaxel with Avastin every 3 weeks for six cycles followed by 6 months of Avastin maintenance therapy

049. It is recommended that human papillomavirus (HPV) vaccine series be administered to which of the following patient populations:

(A) Only males 9 to 21 years old
(B) Only females 9 to 26 years old
(C) Males 9 to 21 years old and females 9 to 26 years old
(D) It is not recommended as a routine vaccination for any patients

050. **75-year-old male is diagnosed with melanoma of the rectal mucosa following workup for hematochezia. Which of the following genes is most likely to be mutated in this tumor?**

(A) BRAF **(B) NRAS**

(C) c-KIT **(D) CDKN2A**

051. **A 55-year-old man presents with a firm, painless mass that has been enlarging on his left thigh. Biopsy reveals an undifferentiated pleomorphic sarcoma. Which of the following is the next step in management?**

(A) Doxorubicin and ifosfamide **(B) Surgical resection**

(C) Bone scan **(D) MRI of the left lower extremity and CT chest**

052. **What is the best description of the half life of a drug?**

(A) Dose/AUC **(B) 0.693/slope of elimination**

(C) Vd(I) x clearance **(D) GFR/renal blood flow**

053. **What change will most reduce the dose to an exposed individual from a point source of radioactivity?**

(A) Reduce the activity of source by half

(B) Reduce the time for which the individual is exposed

(C) Double the distance from the source

(D) Increase the thickness of the protective barrier between the source and the individual by 1.5 HVL.

054. **What is the extensive in-situ component?**

(A) 15% **(B) 25%**

(C) 30% **(D) 50%**

055. **Where is the neurovascular bundle located in relation to the prostate?**

(A) Anterolateral to the prostate **(B) Posterolateral to the prostate**

(C) Posterior to the prostate **(D) Inferior to the prostate**

056. **Which of the following is the new volume introduced in ICRU report 78?**

(A) ITV **(B) RVR**

(C) OAR **(D) IM**

057. **A 65-year-old man was referred to you after workup of anemia revealed an M protein of 5 g/dL with several lytic lesions on a skeletal survey. Bone marrow biopsy showed 35% clonal plasma cells, with fluorescence in situ hybridization (FISH) showing t(4;14) and deletion 13. He is working full time as a construction manager and runs about 5 miles per week. What is your treatment recommendation?**

(A) Bortezomib, lenalidomide, and dexamethasone (VRD), with stem cell collection after four cycles and plan for early autologous hematopoietic cell transplantation (HCT)

(B) Carfilzomib, pomalidomide, and dexamethasone (KPD), with stem cell collection after four cycles and plan for early autologous HCT

(C) VRD without stem cell collection

(D) Lenalidomide and dexamethasone (RD) with stem cell collection after four cycles and plan for early autologous HCT

058. A 20-year-old male undergoes biopsy of an enlarged left cervical lymph node and is diagnosed with classical Hodgkin lymphoma (cHL), nodular sclerosing subtype. PET/CT is performed, which shows fluorodeoxyglucose (FDG) uptake in the left cervical lymph node region, but no other areas of pathologic uptake. Complete blood count (CBC) and lactate dehydrogenase (LDH) is normal. The patient has no B symptoms. The patient is very hesitant about undergoing bone marrow biopsy as part of his staging workup. Which of these staging steps/results can best reassure his hematologist that a bone marrow biopsy is not essential?

(A) Normal CBC
(B) Normal lactate dehydrogenase (LDH)
(C) Lack of B symptoms
(D) PET/CT

059. A 66-year-old female is evaluated for palpable lymph nodes, which she noted in her axillary regions. She undergoes a CT scan of her chest, abdomen, and pelvis, which demonstrates axillary, retroperitoneal, and mesenteric lymphadenopathy. An excisional lymph node biopsy is performed of an axillary node. The flow cytometry is positive for CD20, CD5, surface immunoglobulin, and cyclin D1; and negative for CD10 and CD23. What is the associated chromosomal translocation with her lymphoma?

(A) t(14;18)
(B) t(11;18)
(C) t(11;14)
(D) t(9;14)

060. A healthy 13-year-old girl received a vaccine against human papilloma virus (HPV). This is an example of:

(A) Primary prevention
(B) Secondary prevention
(C) Tertiary prevention
(D) Case finding

061. For women who have had a hysterectomy, which one of the following is the most appropriate practice for screening for cervical cancer with PAP smears?

(A) PAP smears should be performed every 1 to 3 years indefinitely
(B) PAP smears should be performed every 1 to 3 years until age 65 years
(C) Women who have a history of cervical cancer can discontinue screening after a total abdominal hysterectomy
(D) Women who have had a total hysterectomy for benign conditions no longer need PAP smears.

062. Patient with a deficiency in UDP glucuronosyltransferase 1A1 (UGT1A1) have increased risk for toxicity from which chemotherapy drugs?

(A) Irinotecan
(B) 5-Fluorouracil
(C) Capecitabine
(D) Both (B) and (C)

063. Regarding percutaneous transhepatic biliary drainage, which is NOT true?

(A) Preprocedural antibiotics are required
(B) Drainage is usually via a two-staged procedure: external drainage then internal drainage.
(C) High biliary outputs warrant nutritional replenishment
(D) Liver function usually takes weeks to return to normal.

064. Which of the following is NOT true concerning a clinical trial?

(A) The sample size of a clinical trial is fixed and determined before the trial begins
(B) Clinical trials are prospectively planned experiments involving human subjects
(C) A well-chosen control group provides a baseline against which to measure effects of experimental treatment
(D) Clinical trials test a clearly stated hypothesis using a predefined analysis plan

065. An important assumption in the analysis of survival data is noninformative censoring. That is, censoring is not related to the outcome of interest. For a clinical trial with cancer-specific survival as the primary endpoint, which of the following patients is more likely to suffer from informative censoring?

(A) Alive at the time of study closeout

(B) Withdrawal from the trial because of disease progression

(C) Died of accident

(D) Moving out of the region

066. Your patient is a 35-year-old man with recently diagnosed medullary thyroid carcinoma. During his initial history and physical examination, the patient reports that numerous family members have been diagnosed with thyroid cancer and pheochromocytoma. Mutations of which of the following genes are most likely to be identified in this patient with genetic testing?

(A) RAS **(B)** RET

(C) PPAR-γ1 **(D)** BRAF

067. A 65-year-old man presented with dysphagia. His primary care physician ordered an upper endoscopy that revealed a mass at the distal esophagus and biopsy demonstrated adenocarcinoma. A CT scan showed multiple liver lesions, and these are 18F-fludeoxyglucose-avid on a follow-up PET scan. You order a biopsy of one of the liver lesions to confirm the metastatic disease. Which of the following tests should be added to the pathology assessment?

(A) ERCC1 expression level

(B) HER2 immunohistochemistry

(C) Epidermal growth factor receptor expression

(D) Vascular endothelial growth factor receptor assessment

068. A 68-year-old female was incidentally found to have 3 liver masses in both lobes with a maximum diameter of 2 cm on a CT scan for evaluation of a possible kidney stone. A repeat CT scan with liver protocol confirmed the finding and also reveals a 3.2-cm mass in the pancreatic body. Routine laboratory tests including liver function tests were normal. US-guided fine-needle aspiration and biopsy of the liver mass demonstrated a well-differentiated metastatic neuroendocrine tumor with 2 mitoses per 10 high-powered fields and 3% Ki67. Her performance status was 0 and she had no symptoms such as diarrhea or flushing; her initial pain symptoms resolved spontaneously. Which of the following would you recommend?

(A) Interventional radiology referral for liver chemoembolization

(B) Everolimus

(C) Streptozocin and doxorubicin

(D) Obtain a baseline chromogranin A level, then observe and repeat imaging in a few months

069. What is the most important lesion produced in chromosomal DNA by exposure to ionizing radiation?

(A) A break on one DNA strand ('single-strand break')

(B) Well-separated breaks on both DNA strands

(C) Breaks on both DNA strands which are opposite each other or separated by only a few bases ('double-strand break')

(D) Multiple breaks on the same DNA strand

070. Which of the following statements is false?

(A) Chromosomal aberrations can lead to cell killing, mutation or carcinogenesis

(B) The ring aberration and the dicentric aberration are chromatid aberrations that are lethal to the cell

(C) The anaphase bridge is a chromosomal aberration that is lethal to the cell

(D) Symmetric translocations and small deletions are chromosomal aberrations that are not lethal but they can cause malignancies

071. Direct action of radiation is the dominant process for:

(A) X-rays

(B) Neutrons and alpha particles

(C) Electrons

(D) Gamma rays

072. Total-body doses above 100 Gy (gamma rays), which cause death within 24 to 48 hours after exposure, are connected to:

(A) The cerebrovascular syndrome.

(B) The gastrointestinal syndrome.

(C) The hematopoietic syndrome.

(D) The prodromal syndrome.

073. The most radiosensitive cells are:

(A) The bone-marrow cells.

(B) The mammary cells.

(C) The thyroid cells.

(D) The ataxia telangiectasia cells.

074. Stochastic effects of radiation:

(A) Include carcinogenesis

(B) Have a threshold of 50 mSv/year

(C) Have a dose-dependent severity

(D) Can be recognized as caused by radiation

075. What does a "cell survival curve" describe?

(A) The relationship between the radiation dose and the number of cells that have gone through one mitosis after irradiation

(B) The relationship between the radiation dose and the proportion of cells that remain clonogenic

(C) The relationship between the radiation dose and the number of cells that have not suffered the loss of a specific function

(D) The relationship between the radiation dose and the proportion of cells that canproduce DNA

076. Which subtype of rhabdomyosarcoma is characterized by "spindle-shaped rhabdomyoblasts, small round cells with hyperchromatic nuclei on a background of a myxoid stroma"?

(A) Botryoides

(B) Extraosseous Ewing's

(C) Alveolar

(D) Embryonal

077. Regarding radiation of parameningeal sites of rhabdomyosarcoma, which of the following is not true?

(A) Meningeal recurrence rates were improved with the use of whole-brain radiotherapy in IRS-II

(B) IRS-IV recommends a radiation CTV of gross tumor + 2 cm

(C) The reduction in treated radiotherapy volume from IRS-II to IRS-IV was associated with an increased risk of meningeal failure

(D) Radiotherapy starts at day 0 in patients with meningeal impingement

078. Beckwith-Wiedemann syndrome is most commonly associated with which of the following chromosomal abnormalities?

(A) WT1 **(B)** WT2

(C) FWT1 **(D)** FWT2

079. All are true regarding primary management of Wilms' tumor with surgery, except:

(A) Radical en bloc resection is the procedure of choice

(B) Preoperative chemotherapy can be used to shrink large or unresectable tumors

(C) Primary resection of tumor extension into the inferior vena cava is associated with increased morbidity

(D) Tumor spillage during surgery can increase the risk for local and abdominal recurrence

080. Which one of the following histologies of brain metastases is least likely to present as or become hemorrhagic?

(A) Breast infiltrating ductal carcinoma **(B)** Melanoma

(C) Renal cell carcinoma **(D)** Choriocarcinoma

081. Which of the following is true regarding RTOG 97-14, a phase III trial randomizing patients with bone metastases to either 8 Gy or 30 Gy?

(A) The retreatment rate was not different between the arms

(B) Late toxicity was increased in the 8 Gy arm

(C) Patients with breast, prostate, or non-small cell lung cancer were eligible for enrollment

(D) Patients with 1–3 sites of bony involvement and moderate/severe pain were eligible for enrollment

082. What is the second most common histology of cancers found in the vulva?

(A) Adenocarcinoma **(B)** Melanoma

(C) Sarcoma **(D)** Metastases

083. In the GOG 99 trial, the high-intermediate risk (HIR) was defined by all of the following EXCEPT:

(A) Age ≥70 with only one other risk factor **(B)** Any age but surgically inoperable

(C) Age ≥50 with two other risk factors **(D)** Any age with three risk factors

084. Which of the following has the worst prognosis?

(A) Villoglandular adenocarcinoma

(B) Secretory adenocarcinoma

(C) Endometrioid adenocarcinoma with squamous differentiation

(D) Uterine papillary serous adenocarcinoma (UPSC)

085. What is the half-life of PSA?

(A) 0.9 days **(B)** 1.6 days

(C) 2.2 days **(D)** 4.3 days

086. According to RTOG 05-29, what dose would be prescribed for a 3.0 cm anal canal primary and an involved inguinal lymph node measuring 3.5 cm?

(A) 54 Gy to the primary PTV and 54 Gy to the involved lymph node over 30 fractions

(B) 54 Gy to the primary PTV and 50.4 Gy to the involved lymph node over 30 fractions

(C) 50.4 Gy to the primary PTV and 50.4 Gy to the involved lymph node over 28 fractions

(D) 50.4 Gy to the primary PTV and 45 Gy to the involved lymph node over 28 fractions

087. The CROSS group/Dutch study (van Hagen et al.) randomized patients to surgery versus neoadjuvant chemoRT followed by surgery. The neoadjuvant chemotherapy and RT was:

(A) Cisplatin/5-FU and 50.4 Gy
(B) Carboplatin/paclitaxel and 50.4 Gy
(C) Cisplatin/5-FU and 41.4 Gy
(D) Carboplatin/paclitaxel and 41.4 Gy

088. In treating a resected head of pancreas tumor with postoperative radiation, which of the following does not need to be included in the radiation field?

(A) Splenic hilum
(B) Duodenal bed
(C) Porta hepatis
(D) Pancreaticoduodenal lymph nodes

089. The targets of temsirolimus and sunitinib are respectively:

(A) PDGFR and EGFR
(B) EGFR and PDGFR
(C) mTor and PDGFR
(D) PDGFR and mTor

090. Regarding prognosis of bladder transitional cell carcinoma, which of the following is true?

(A) Grade is the most important predictor of outcome for non-muscle-invasive tumors, while depth of invasion is the most important predictor of outcome for muscle-invasive tumors.
(B) Depth of invasion is the most important predictor of outcome for non-muscle- invasive tumors, while grade is the most important predictor of outcome for muscle-invasive tumors.
(C) Grade is the most important predictor of outcome for both non-muscleinvasive and muscle-invasive tumors.
(D) Depth of invasion is the most important predictor of outcome for both nonmuscle-invasive and muscle-invasive tumors.

091. What is the most common variant of basal cell carcinoma?

(A) Nodular
(B) Superficial
(C) Morpheaform
(D) Infiltrative

092. The addition of concurrent cetuximab to radiation offers which of the following benefits, based on the Bonner NEJM 2006 data:

(A) Local control but not overall survival benefit.
(B) Local control and progression-free survival but not overall survival benefit.
(C) Local control and progression-free survival but not overall survival benefit.
(D) There was no benefit.

093. Based on the MACH-NC meta-analysis, what are the hazard ratios (HR) for death compared to RT alone with concurrent chemoradiation and induction chemotherapy, then radiation, respectively?

(A) Concurrent HR 1.0; induction HR 1.0
(B) Concurrent HR 0.8; induction HR 0.6
(C) Concurrent HR 0.8; induction HR 1.0
(D) Concurrent HR 0.6; induction HR 0.8

094. To what dose should you limit the mandible to minimize the risk of osteoradionecrosis?

(A) 50 Gy
(B) 60 Gy
(C) 70 Gy
(D) 80 Gy

095. Approximately what percentage of local control is lost per week of interruptions or break in radiation for head and neck cancer?

(A) 2 %
(B) 5 %
(C) 10 %
(D) 15 %

096. **At which plasma EBV DNA concentration was overall survival and relapse-free survival found to be statistically decreased, as reported by Lin et al. in the New England Journal of Medicine?**

(A) 1,000 copies per millilitre **(B) 1,500 copies per millilitre**

(C) 2,000 copies per millilitre **(D) 2,500 copies per millilitre**

097. **For a left true vocal cord lesion involving 75 % of the TVC alone, what is the recommended treatment?**

(A) Laryngectomy

(B) Concurrent chemoRT to 70 Gy in 35 fractions

(C) RT alone to the primary and at risk nodes to 70 Gy in 35 fractions

(D) RT alone to the primary to 63 Gy in 28 fractions

098. **Which of the following is a common side effect of amifostine?**

(A) Anaphylaxis **(B) Fever**

(C) Hypotension **(D) Headache**

099. **A patient presents with a shock-like sensation in the extremities with neck flexion 4 months after receiving head and neck radiation. What is the most likely cause of his symptoms?**

(A) Brachial plexopathy **(B) Lhermitte's syndrome**

(C) Sciatica **(D) Guillain-Barre syndrome**

100. **What structure lies within Meckel's cave?**

(A) CN VII **(B) Carotid artery**

(C) CN V1 **(D) Trigeminal ganglion**

101. **Which of the following does not pass through the superior orbital fissure?**

(A) CN III **(B) CN IV**

(C) CN V1 **(D) CN V2**

102. **All of the following nerves innervate the tongue except:**

(A) Vagus **(B) Glossopharyngeal**

(C) Mandibular branch of the trigeminal **(D) Maxillary branch of the trigeminal**

103. **According to the AJCC 8th edition staging manual, what is the T stage when tumors invade the cribriform plate for carcinomas of the maxillary sinus and ethmoid sinus, respectively?**

(A) T3, T3 **(B) T3, T4a**

(C) T4a, T3 **(D) T4a, T4a**

104. **Which of the following is false regarding thyroid cancers?**

(A) Papillary and follicular carcinomas are more common in women than men.

(B) Patients with papillary thyroid carcinoma tend to be older than those with follicular carcinoma.

(C) Medullary carcinoma is associated with the MEN-2 syndrome.

(D) Papillary thyroid carcinoma is associated with Cowden's syndrome.

105. What are the cranial, caudal, and posterior borders of level IIa in the neck?

(A) Caudal edge of lateral process of C2, caudal edge of hyoid bone, posterior border of the internal jugular vein

(B) Cranial edge of lateral process of C2, cranial edge of hyoid bone, anterior border of the internal jugular vein

(C) Caudal edge of lateral process of C1, caudal edge of hyoid bone, posterior border of the internal jugular vein

(D) Cranial edge of lateral process of C1, cranial edge of hyoid bone, posterior border of the internal jugular vein

106. What are the superior and posterior borders of an anterior T1 glottic larynx field, respectively?

(A) Top of the thyroid notch, bottom of the cricoid cartilage

(B) Bottom of the thyroid cartilage, bottom of the cricoid cartilage

(C) Top of the thyroid notch, anterior margin of the vertebral bodies

(D) Bottom of the thyroid notch, posterior margin of the vertebral bodies

107. All of the following are included in the radiation treatment volume of locally advanced T4 nasopharynx carcinoma except:

(A) Posterior two thirds of the maxillary sinus

(B) Sphenoid sinus

(C) Base of skull

(D) Posterior one third of the nasal cavity

108. What is the mechanism of Jacod's syndrome?

(A) Extension of tumor through foramen lacerum into the cavernous sinus

(B) Compression of the structures in the retropharyngeal space

(C) Obstruction of the Eustachian tube opening

(D) None of the above

109. Which of the following is not correct for Rando phantoms?

(A) They are models made up of tissue-equivalent material.

(B) They are used for determining the radiation absorption and reflection characteristics of the human body or a specific organ.

(C) The phantom is made of human tissue-equivalent materials to work with only for x-rays.

(D) The bones in the phantom are real human bones, and the same cavities are present as in the human body.

110. Where is the light emitted from TLDs after heating?

(A) Conduction band **(B)** Valance band

(C) Traps in a forbidden zone **(D)** Both (A) and (B)

111. Which of the following is not correct for isodose curves?

(A) Isodose curves are prepared by combining the points in the phantom or target tissue that receive the same dose.

(B) In a plot of isodose curves, the x-axis shows the depth below the surface of the skin, while the y-axis shows the range of the field.

(C) The curves are placed in percentage order and then used to create the dose distribution graphics for the target tissue and the energy of interest.

(D) By the use of the isodose curves during treatment planning, the dose distribution of the radiation delivered to the target tissue and neighboring structures can be seen from different angles.

112. Which of the following is correct for the tissue-air ratio?

(A) It increases as energy increases

(B) It decreases as the field size increases

(C) It includes primary radiation and scattered radiation

(D) It is independent of the SSD at high energies

113. Which of the following parameters is not used in the monitor unit (MU) calculation in the SAD technique?

(A) DD%

(B) S c (collimator scattering factor)

(C) SAD factor

(D) TMR

114. Which of the following is not correct for compensating filters?

(A) The dose distribution is not homogeneous if the surface of the patient is not flat.

(B) They are used for homogeneous dose distribution in the irradiated volume.

(C) They are made up of tissue-equivalent materials.

(D) They are put into the trays located in the head of the treatment machine.

115. Which of the following is the 80% isodose line for electrons?

(A) E/2

(B) E/3

(C) E/4

(D) E/5

116. Which of the following is correct for the KERMA and absorbed dose?

I. The maximum KERMA is on the surface.

II. KERMA increases with depth.

III. The absorbed dose increases until d max

IV. The absorbed dose decreases after d max

(A) I, II, III, and IV

(B) I, III, and IV

(C) I and III

(D) I and IV

117. Which of the following match-ups is not an advantage of radiation used in external radiotherapy?

(A) Photons-skin-sparing effect

(B) Electrons-limited penetration

(C) Protons-small penumbras

(D) Protons-no exit dose

118. Which of the following matches is not correct concerning the types of cellular damage due to radiation?

(A) Lethal damage-direct effect

(B) Sublethal damage-low LET radiation

(C) Potentially lethal damage-lethal under suboptimal conditions

(D) Lethal damage-double-stranded breakage

119. One hundred cells are seeded in a culture, and ten colonies are formed. If the colony number is 5 after a 4.5 Gy dose, what is the surviving fraction?

(A) 20 (B) 30

(C) 40 (D) 50

120. Which of the following statements is correctly related to radiation protection?

(A) Radiation personal-whole body dose 50 mSv/5-year

(B) Public-lens dose 150 mSv/year

(C) Public-whole body dose 5 mSv/5-year

(D) Fetal dose-1 mSv

121. Which of the following is not correctly related to free radicals?

(A) The half-life of free radicals is shorter than that of ion radicals.

(B) They can diffuse and thus their damage can go beyond the primary radiation pathway.

(C) They have important roles in the oxygen effect.

(D) They are the basis for an indirect effect, and their half-lives are measured in microseconds.

122. The occurrence of similar biological effects in cells that are not exposed to radiation but neighbor the cells exposed directly to radiation is called :

(A) Abscopal Effect (B) Radiation recall phenomenon

(C) Radiation hormesis (D) Bystander effect

123. What is the recommended CTV margin for low-grade glial tumors?

(A) 1 cm (B) 1.5 cm

(C) 2 cm (D) 2.5 cm

124. Which of the following factors is not a good prognostic sign in low-grade glial tumors?

(A) Young age (B) Oligodendroglial component

(C) Short symptom duration (D) Gross total resection

125. Which of the following is not correct for HL staging?

(A) Five or more visible splenic nodules on a cut section constitute extensive splenic involvement.

(B) Isolated extra lymphatic organ involvement with distant (nonregional) nodal involvement is classified as stage IV.

(C) Stage III(2) indicates the involvement of the pelvic and/or para-aortic nodes.

(D) Localized involvement of a single associated extra lymphatic organ or site and its regional lymph node is classified as stage I.

126. Which of the following is the primary target for radioimmunotherapy for NHLs?

(A) CD15 (B) CD20

(C) CD30 (D) CD45

127. Which of the following is a cutaneous T-cell lymphoma with very poor prognosis?

(A) Sezary syndrome (B) Pagetoid reticulosis

(C) Lymphomatoid papulosis (D) Mycosis fungoides

128. What is the optimal total radiation dose required for immunosuppression and tumoral cell eradication in fractionated TBI regimens?

(A) 2–4 Gy (B) 4–6 Gy

(C) 6–8 Gy (D) 8–12 Gy

129. **Which of the following STSs have a low potential for lymph node metastasis?**

(A) Clear cell sarcoma **(B) MFH**

(C) Epithelioid sarcoma **(D) Synovial sarcoma**

130. **Which of the following treatments is the optimal management strategy for inoperable stage III esophageal cancer?**

(A) Chemoradiotherapy with 5-FU + cisplatin, 50 Gy

(B) Chemotherapy with 5-FU + cisplatin

(C) Radiotherapy, 50 Gy, brachytherapy boost

(D) Chemoradiotherapy with cisplatin, 56 Gy

131. **Which of the following is considered a postoperative chemoradiotherapy indication in cervical cancer?**

(A) Positive surgical margin **(B) Tumor size >4 cm**

(C) Lymphovascular space invasion **(D) Deep stromal invasion**

132. **Which of the following is used in the Gleason score?**

(A) Major growth pattern-glandular differentiation

(B) Major growth pattern-nuclear atypia

(C) Glandular differentiation-nuclear atypia

(D) Glandular differentiation-necrosis

133. **Which of the following should be known to calculate lymph node metastasis risk according to Roach formulas?**

(A) T stage-PSA level **(B) T stage-Gleason score**

(C) PSA level-Gleason score **(D) PSA level-age-Gleason score**

134. **Which of the following is the optimal management of locally advanced prostate cancer?**

(A) Hormone therapy alone **(B) Short-term hormone therapy + IMRT**

(C) IMRT + long-term hormone therapy **(D) IMRT + brachytherapy**

135. **What is the currently recommended SBRT dose for peripheral NSCLC?**

(A) 30 Gy in 3 fractions **(B) 60 Gy in 5 fractions**

(C) 60 Gy in 3 fractions **(D) 60 Gy in 10 fractions**

136. **A 50-year-old man with a history of renal cell carcinoma, status postnephrectomy 3 years ago, presents with slurred speech and left-sided arm weakness. Imaging of the brain reveals a right parietal mass measuring 3 cm with surrounding edema. CT scan of the chest, abdomen, and pelvis shows postsurgical changes, with no other sites of disease. He is placed on steroids to decrease cerebral edema. Which of the following is the appropriate management of this patient?**

(A) Sorafenib therapy **(B) High-dose interleukin-2 therapy**

(C) Resection of the brain lesion **(D) Hospice**

137. **Which of the following describes the specific pathways for the repair of double-stranded DNA breaks?**

(A) The repair may be by homologous recombination (HR) or non-homologous end-joining (NHEJ) pathway

(B) The HR repair pathway functions by degrading the single strand at each side of the break and then annealing the two ends.

(C) The NHEJ pathway functions by replicating the missing genetic information from the homologous DNA template.

(D) NHEJ is a minor component of mechanism for repair of double-stranded DNA breaks in mammalian cells

138. **Which of the following best describes the concept of altered fractionation?**

(A) Accelerated fractionation does not reduce the overall treatment time

(B) Hyperfractionation refers to a radiotherapy schedule that uses multiple daily treatments more than 6 hours apart with reduced fraction size and increased number of fractions

(C) A Radiation Therapy Oncology Group (RTOG) 9003 randomized trial showed that standard fractionation treatment was superior to hyperfractionation and accelerated fractionation with concomitant boost used for advanced head and neck squamous cell carcinomas.

(D) Continuous hyperfractionated accelerated radiation therapy (CHART) gives a higher total dose than the standard fractionated treatment

139. **Which of the following is NOT true regarding charged particle beams?**

(A) Charged particle beam therapy include proton and carbon based therapy

(B) Protons have shown to confer a definite clinical benefit over photon based therapies for most clinical cancer applications

(C) Ability of charged particles to stop at a given depth gives it a potential advantage for treatment of tumors in close proximity to critical structures.

(D) Current challenges involved with the widespread use of charged particle therapy include cost involved with production and operation of such facility.

140. **Anticancer activity of bortezomib is due to the inhibition of:**

(A) Proteasome **(B) Bcl-2**

(C) Thymidylate synthase **(D) MDM2**

141. **The final stage of the programmed cell death pathway is mediated by:**

(A) Bcl-2 **(B) p53**

(C) Tumor necrosis factor **(D) Caspase cascade**

142. **Which of the following is NOT an immune-mediated adverse reaction of ipilimumab?**

(A) Enterocolitis **(B) Dermatitis**

(C) Hyperthyroidism **(D) Peripheral neuropathy**

143. **Which of the following is an appropriate strategy for optimizing high-dose methotrexate elimination?**

(A) Initiate leucovorin rescue immediately after completion of infusion of methotrexate

(B) Administer intravenous fluids prior to methotrexate infusion

(C) Ensure the patient is taking folic acid 1 mg by mouth daily

(D) Administer intravenous fluids with sodium bicarbonate for urine alkalinization

144. **Which of the following medications are necessary to help minimize hematologic toxicities with pemetrexed and pralatrexate?**

(A) Vitamin B6 and Vitamin B12 **(B) Folic acid and dexamethasone**

(C) Vitamin B12 and folic acid **(D) Folinic acid and Vitamin B6**

145. **Which of the following is NOT a proposed mechanism for cardiotoxicity from anthracyclines?**

(A) Enhanced catalysis of oxidation-reduction reactions

(B) Increased susceptibility to p-glycoprotein

(C) Generation of reactive oxygen species

(D) Peroxidation of myocardial lipids

146. **Which of the following may be classified as nonsmoker?**

(A) An 82-year-old man who smoked for 10 years and quit 50 years ago

(B) A 25-year-old woman who never smoked cigarettes.

(C) A 38-year-old man who smoked approximately 75 cigarettes in his lifetime.

(D) Both (B) and (C)

147. **Chemotherapy is usually well tolerated with concomitant highly active antiretroviral therapy (HAART) with which of the following exceptions:**

(A) Zidovudine, nucleotide reverse transcriptase inhibitor therapy

(B) Protease inhibitors

(C) Raltegravir, the new integrase inhibitor

(D) Fuzeon, the HIV entry inhibitor

148. **A 38-year-old man with HIV infection presents with a 3-month history of weight loss and night sweats. He is not on antiretroviral therapy and his last CD4 count 3 months ago was 300/mm3. On exam, he has multiple enlarged cervical lymph nodes. His hemoglobin is 10 g/dL, white blood cell count is 3.6 K/cumm, and platelet count is 190 K/cumm. Serum LDH is 300. Infectious workup is negative. CT of the neck and chest demonstrates diffuse cervical and mediastinal lymphadenopathy. You suspect lymphoma and arrange for an excisional biopsy of a neck lymph node. Which of the following lymphomas is a non-AIDS defining cancer?**

(A) Hodgkin disease **(B) DLBCL**

(C) Burkitt lymphoma **(D) Primary CNS lymphoma**

149. **Which of the following statements regarding rasburicase is FALSE?**

(A) Mechanism of action is inhibition of urate oxidase

(B) Should be avoided in patients with glucose 6-phosphate deficiency (G6PD)

(C) Antibodies against rasburicase or its epitopes may occur in up to 20% of cases

(D) None of the above; all answers are correct

150. **Which of the following provides oral equivalent doses to methadone 20 mg oral?**

(A) Hydromorphone 15 mg **(B) Oxycodone 30 mg**

(C) Propoxyphene 200 mg **(D) Codeine 300 mg**

151. **A 29-year-old recently married woman has a preconception counseling visit, and a speculum examination shows a 1-cm posterior cervical lesion with a friable surface. A biopsy showed invasive squamous cell carcinoma with no lymphovascular invasion (LVI). A PET-CT scan does not reveal any distant metastases, and pelvic MRI shows that the mass is confined to the cervix only. She would like to have children. The best next step in her treatment plan is:**

(A) A cone biopsy and if negative margins, no further Treatment

(B) Simple hysterectomy, pelvic lymph node dissection, and para-aortic lymph node sampling

(C) Simple trachelectomy

(D) Radical trachelectomy with pelvic lymph node dissection and possible para-aortic lymph node sampling

152. **What is the classic enhancement pattern of hepatocellular carcinoma (HCC) on cross-sectional imaging with a venous, arterial, and delayed phase?**

(A) Arterial: decreased, venous: increased, delayed: persistent washout

(B) Arterial: decreased, venous: increased, delayed: no change

(C) Arterial: increased, venous: decreased, delayed: persistent washout

(D) Arterial: increased, venous: increased, delayed: persistent washout

153. **A 72-year-old female presents for discussion of treatment options for her hepatocellular carcinoma (HCC). Her albumin is 3, bilirubin 2.5, and international normalized ratio (INR) 1.5. Her Eastern Cooperative Oncology Group (ECOG) score is 1. She has no ascites, but does have hepatic encephalopathy controlled with lactulose. Imaging is consistent with primary HCC with portal invasion. What is the most appropriate treatment recommendation?**

(A) Liver transplantation **(B) Local–regional therapy**

(C) Sorafenib **(D) Surgical resection**

154. **A 69-year-old male with hypertension develops hematuria. Cystoscopy shows a sessile bladder tumor and a palpable mass is detected on exam under anesthesia (EUA) after complete transurethral resection of bladder tumor (TURBT). Pathology shows a high-grade muscle-invasive urothelial carcinoma. CT scan shows some perivesical stranding but no lymphadenopathy. Which treatment option would you recommend?**

(A) TURBT followed by chemotherapy and radiation

(B) Neoadjuvant cisplatin-based chemotherapy followed by local therapy

(C) Cystoprostatectomy followed by adjuvant chemotherapy

(D) Chemoradiation

155. **A 63-year-old man presented to his primary care physician due to increasing difficulty with word finding. MRI brain was ordered and the patient was found to have a ring-enhancing mass in the right frontal lobe. He underwent subtotal resection of the tumor and recovered well following the surgery. Pathology demonstrated glioblastoma with methylguanine methyltransferase (MGMT) promoter methylation. Following surgery, the patient is advised to begin adjuvant radiation concurrent with temozolomide followed by six cycles of post-radiation temozolomide. Which of the following statements about this patient's recommended treatment strategy is true?**

(A) MGMT promoter hypermethylation predicts benefit from temozolomide therapy

(B) MGMT promoter hypermethylation portends a worse prognosis

(C) Consideration should be given to the addition of bevacizumab to planned treatment with temozolomide plus radiation.

(D) The addition of temozolomide to radiation following surgery does not improve overall survival

156. **A 47-year-old woman with a history of stage IVB oropharyngeal cancer (p16 positive) presents 2 years after completion of chemoradiation for evaluation of axillary fullness. Axillary exam demonstrates gross lymphadenopathy. Restaging CT chest/abdomen/pelvis demonstrates multiple chest nodules bilaterally as well as right axillary lymphadenopathy. She is extremely active with excellent performance status, working full time and taking care of her family. Which of the following would be the most appropriate recommendation for first-line therapy for this patient's metastatic disease?**

(A) Cisplatin + 5-FU continuous infusion + cetuximab

(B) Docetaxel + cisplatin + 5-FU continuous infusion

(C) Cisplatin + 5-FU continuous Infusion

(D) Carboplatin + paclitaxel

157. **What is Bowen's disease?**

(A) Preinvasive SCC **(B) Preinvasive BCC**

(C) Preinvasive melanoma **(D) Preinvasive Merkel cell cancer**

158. **Which of the following is correct for CTV determination in esophageal cancer?**

(A) Middle esophagus-upper mediastinal + celiac lymph node

(B) Cervical esophagus-upper mediastinal lymph node + supraclavicular lymph node

(C) Lower esophagus-celiac lymph node

(D) Cervical esophagus-upper mediastinal lymph node

159. **What is the drug of choice of radiation pneumonitis?**

(A) Glucocorticoids **(B) Amifostine**

(C) Pentoxifylline **(D) Captopril**

160. **What is cut off dimension of solitary pulmonary nodule (SPN):**

(A) < 3 mm **(B) < 3 cm**

(C) < 5 mm **(D) < 5 cm**

161. **What is the treatment of choice for Pancoast tumor**

(A) Induction chemotherapy followed by surgery

(B) Surgery followed by adjuvant chemoradiation

(C) Chemoradiation followed by surgery

(D) Radiation followed by sequential chemotherapy.

162. **Which of the following is not true regarding the immune checkpoint inhibitor durvalumab?**

(A) It leads to improvement in PFS when used in the adjuvant setting after concurrent chemo-radiation in stage III NSCLC patients

(B) It leads to a significant increase in toxicity as compared with the placebo.

(C) The improvement in survival endpoints is seen regardless of PD-L1 status

(D) In patients with EGFR mutation it is likely to be ineffective.

163. Based on the results of IMPRESS trial in NSCLC, which of the following is true?

(A) NSCLC with EGFR mutation was studied and after progression, on gefitinib, the trial arm that used gefitinib and chemotherapy combination showed similar PFS as the arm that used chemotherapy alone.

(B) NSCLC with EGFR mutation was studied and after progression, on gefitinib, the trial arm that used gefitinib and chemotherapy combination showed similar OS as the arm that used chemotherapy alone.

(C) NSCLC with EGFR mutation was studied and after progression on gefitinib, the trial arm that used gefitinib and chemotherapy combination showed lesser PFS as the arm that used chemotherapy alone.

(D) NSCLC with EGFR mutation was studied and after progression on gefitinib, the trial arm that used gefitinib and chemotherapy combination showed superior PFS but same OS as the arm that used chemotherapy alone.

164. In the ProtecT trial, which compared active monitoring, RP and EBRT for the treatment of clinically localized prostate, which of the following treatment strategy resulted in better survival outcome:

(A) RP **(B) AS**

(C) RT **(D) None of the above**

165. The MUNICON trial studied the role of molecular imaging, such as FDG-PET imaging, in esophagus cancer. Which of the following is not true about this trial:

(A) Patients who were given induction chemotherapy and were metabolic responders were immediately switched to surgery.

(B) Metabolic responders had a better event-free survival outcome compared with non-responders.

(C) surgery had improved recurrence-free survival and median survival times compared to the same group of patients who continued preoperative chemotherapy.

(D) Non-responders who went directly to This trial suggest the feasibility of using metabolic imaging as a treatment selection tool.

166. Olaparib was approved by FDA in:

(A) Germline BRCA-positive, HER2 negative metastatic breast cancer in patients who previously received chemotherapy in the neoadjuvant, adjuvant or metastatic settings.

(B) Germline BRCA-negative, HER2-negative metatatic breast cancer in patients who previously received chemotherapy in the neo-adjuvant, adjuvant or metastatic settings.

(C) Germline or somatic BRCA-positive, HER2-negative metatatic breast cancer in patients who previously received chemotherapy in the neo-adjuvant, adjuvant or metastatic settings.

(D) Germline BRCA-positive, HER2-negative metastatic breast cancer in patients who have never previously received chemotherapy in the neo-adjuvant, adjuvant or metastatic settings.

167. Which of the following is a 50-gene signature-based test in breast cancer:

(A) Oncotype Dx **(B) MammaPrint**

(C) Prosigna **(D) Coloprint**

168. **The Gail model used for calculation of a woman's risk of developing breast cancer is based on all of the following except:**

(A) Age at menarche

(B) Age at first live birth

(C) Number of previous breast biopsies

(D) The number of first and second-degree relatives with breast cancer.

169. **Which is the preferred management option for a case of DCIS?**

(A) Excision followed by RT

(B) Total mastectomy

(C) Excision followed by systemic chemo followed by RT

(D) Excision followed by hormonal therapy

170. **If a patient of breast cancer achieves pathological complete response (pCR) with neoadjuvant chemotherapy, it is considered a good prognostic sign and also a surrogate for DFS. Which of the following breast cancer patients are least likely to achieve a pathological complete response with neoadjuvant chemotherapy?**

(A) ER and/or PR positive and HER2 negative

(B) ER and/or PR positive and HER2 positive

(C) ER and/or PR negative and HER2 negative

(D) ER positive and PR negative and HER2 negative

171. **What is the dose of ado-trastuzumab emtansine (T-DM1)?**

(A) 3.6 mg/kg **(B) 1.6 mg/kg**

(C) 2.6 mg/kg **(D) 5.6 mg/kg**

172. **Which of the following immunotherapy molecules are approved in platinum-refractory, recurrent or metastatic head and neck cancer?**

(A) Pembrolizumab **(B) Nivolumab**

(C) Both (A) and (B) **(D) Neither (A) nor (B)**

173. **Surgery is the treatment of choice for stage II NSCLC. As an adjuvant therapy which of the following is recommended in completely resected stage II NSCLC?**

(A) Chemotherapy **(B) Radiotherapy**

(C) Chemoradiation **(D) None of the above**

174. **Which of the following statements is not true about inflammatory breast cancer?**

(A) It is a clinical diagnosis and dermal lymphatics invasion is not necessary for the diagnosis

(B) IBC are less likely to have hormone receptor positivity and more likely to be Triple-negative or HER2 over-expressing

(C) In patients who attain a pathological complete response (pCR) with neoadjuvant chemotherapy, breast-conserving therapy may be pursued.

(D) Surgery is contraindicated in IBC unless there is complete resolution of the inflammatory skin changes.

175. If a patient of metastatic breast cancer with bone mets and limited lung mets is started on tamoxifen and develops progression of lung mets and increase in bone pain, most appropriate next line of management will be:

(A) Wait and watch
(B) Shift to aromatase inhibitors
(C) Shift to fulvestrant
(D) Shift to systemic chemotherapy

176. Which of the following was not an arm of the NCIC HD6 trial for early-stagee, favorable Hodgkin lymphoma?

(A) Subtotal lymphoid irradiation alone
(B) ABVD × 2 cycles → PR → ABVD × 4 cycles
(C) ABVD × 2 cycles → CR → ABVD × 2 cycles
(D) ABVD × 2 cycles → PR → BEACOPPesc × 2 cycles

177. Solitary osseous plasmacytoma should be treated with which of the following doses?

(A) 8 Gy
(B) 30 Gy
(C) 40 Gy
(D) 50 Gy

178. Which of the following would exclude a diagnosis of POEMS syndrome?

(A) Polyneuropathy
(B) Serum M protein level of 4 g/dL
(C) Solitary osteosclerotic lesion
(D) Bone marrow with 5 % plasma cells

179. Primary first-line therapy for elderly (age > 60), good performance status patients with biopsy proven CNS diffuse large B-cell lymphoma should include:

(A) Steroids + whole brain radiation therapy to 30 Gy
(B) Steroids + systemic high-dose methotrexate + intrathecal methotrexate followed by whole brain radiation therapy to 30 Gy
(C) Steroids + systemic high-dose methotrexate + systemic cytarabine
(D) Steroids + intrathecal methotrexate + systemic cytarabine + whole brain radiation to 24 Gy with a boost to gross residual disease to 45 Gy

180. Local skin-directed therapies for stage IA (< 10 % of skin surface area involvement) cutaneous T-cell lymphoma (mycosis fungoides) appropriately include which of the following as first-line therapy?

(A) PUVA therapy
(B) UVB therapy
(C) Local RT
(D) Total skin electron beam therapy

181. Following all initial therapy for early-stage diffuse large B-cell lymphoma, restaging with PET/CT should be done at which interval to minimize the risks of false positives based on NCCN guidelines?

(A) 2 weeks
(B) 4 weeks
(C) 8 weeks
(D) 12 weeks

182. The Follicular Lymphoma International Prognostic Index (FLIPI) predicts progression-free survival based on all of the following except:

(A) Age ≥ 60
(B) Hemoglobin < 12 g/dL
(C) Number of nodal sites ≥ 5
(D) Ann Arbor Stage ≥ II

183. Regarding the NCI soft tissue sarcoma trial of amputation versus limb-sparing surgery + radiation, which of the following is not true?

(A) There was no difference in local control between arms.

(B) Most recurrences in the limb-sparing arm were isolated local failures.

(C) There was no difference in disease-free survival between the arms.

(D) There was no difference in overall survival between the arms.

184. A 71-year-old otherwise healthy female presents with postmenopausal bleeding. An endometrial biopsy demonstrates adenocarcinoma. Surgical staging including total abdominal hysterectomy, bilateral salpingo-oophorectomy, and lymphadenectomy was performed. Pathology demonstrates a 2.3 cm grade 1 endometrioid adenocarcinoma invading 1.2 cm into a 2 cm myometrium with positive lymphovascular invasion. The disease was confined to the uterus without cervical involvement. What is the next step in treatment?

(A) Observation

(B) Adjuvant radiation therapy

(C) Adjuvant platinum-based chemotherapy followed by radiation therapy

(D) Adjuvant concurrent chemoradiation

185. By the D'Amico criteria, all of the following are considered an intermediate-risk disease for localized prostate cancer patients except?

(A) Stage T2b

(B) Gleason 7

(C) Pre-Tx PSA 10.1–20 ng/mL

(D) Stage T2c

186. Which of the following is not a high-risk feature for primary tumors in squamous cell cancer?

(A) >2 mm thickness

(B) Perineural invasion

(C) Clark level IV

(D) Nasal location

187. All of the following statements regarding carcinoid tumors of the lung are true except:

(A) This is not the most common site of carcinoid tumors

(B) The majority of these tumors are associated with carcinoid syndrome at presentation.

(C) The majority of these tumors are typical rather than atypical carcinoid tumors.

(D) In the lung, carcinoid tumors are primarily endobronchial, rather than parenchymal.

188. A 55-year-old female with diabetes presented with a 4-month-history of epigastric pain. Physical examination demonstrated epigastric tenderness on palpation. A CT scan showed 4.5 × 5.2 cm mass in the pancreatic neck/proximal body, which encases the common bile duct, proximal superior mesenteric artery (>180°) and superior mesenteric vein. The pancreatic duct is dilated to 6 mm and the common bile duct is dilated to 10 mm. An endoscopic ultrasound confirmed the pancreatic mass and biopsy was positive for adenocarcinoma. CA 19–9 was 51 U/mL. Her pain is improved with morphine sulfate. She has an excellent performance status. What would be the next appropriate step?

(A) Pancreatoduodenectomy

(B) Up-front concurrent chemoradiation

(C) Chemotherapy such as FOLFIRINOX or gemcitabine/nab-paclitaxel

(D) Radiotherapy

189. **A 21-year-old male is diagnosed with stage IIC seminoma. Post-orchiectomy, he was treated with bleomycin, etoposide, and cisplatin × 3 cycles. After completion of adjuvant chemotherapy, the tumor markers are now normal but restaging CT scans reveal a 2-cm mass in the retroperitoneum. Which is the best next step of management?**

(A) Surgical resection **(B) Radiation therapy**

(C) PET CT **(D) Surveillance**

190. **A 69-year-old man with a past medical history of hypertension presents to his primary care physician with 3 months of fatigue and painless gross hematuria. A CT scan with intravenous contrast reveals a 12-cm mass in the superior pole of the right kidney. There is no radiographic evidence of metastatic disease at the time. He undergoes a right partial nephrectomy with pathology revealing high-grade clear cell carcinoma. He recovers from surgery, and 6 months later, is found to have scattered 1- to 2-cm lung nodules bilaterally on CT imaging. A lung nodule is biopsied and this confirms metastatic clear cell carcinoma. He is then initiated on sunitinib 50 mg by mouth daily for 4 weeks of 6-week cycles. CT scan 3 months after treatment initiation shows disease response. At his return visit, he endorses grade 2 fatigue. He also endorses a 15-lb weight gain, generalized muscle weakness, and cold sensitivity. Routine lab evaluation reveals a normal complete blood count, kidney, and liver function. Which is the following is the most appropriate next step?**

(A) Stop sunitinib and start pazopanib

(B) Stop sunitinib and start everolimus

(C) Continue sunitinib and evaluate thyroid function

(D) Continue sunitinib and perform a stress echocardiogram

191. **A 24-year-old man presents with right thigh pain × 4 weeks. He can ambulate without difficulty. Physical examination is notable only for a firm right thigh mass that is only mildly tender to palpation. MRI of the right lower extremity reveals an 8.1 × 5.3 × 3.4 cm mass at the midshaft of the femur. Biopsy of the mass demonstrated a small round blue cell tumor. Immunohistochemical stains were positive for CD99 and negative for desmin, myogenin, and the cytokeratins. Molecular testing reveals a translocation between chromosomes 11 and 22. What additional workup should be performed?**

(A) No additional workup is needed **(B) Bone scan and CT chest**

(C) CT of the chest, abdomen, and pelvis **(D) Sentinel lymph node biopsy and bone scan**

192. **A 25-year-old man presents with a 4-cm painless lump in his left groin that has been slowly growing over the course of several months. A core biopsy demonstrates adenocarcinoma. Among the following serum biomarkers, which one is the most selective in pointing to a specific tumor type:**

(A) Carcinoembryonic antigen

(B) CA125

(C) Beta human chorionic gonadotropin (βhCG)

(D) CA19–9

193. You have been treating a 50-year-old man for stage IV gastroesophageal junction adenocarcinoma with cisplatin and 5-fluorouracil. HER2 immunohistochemistry on the tumor was 2+ and fluorescent in situ hybridization was negative. After the third cycle of chemotherapy, a CT scan revealed progression of disease. His blood pressure is 160/90 mmHg. Pulse is 100. Hemoglobin is 10.8 g/dL and platelet count is 90,000/μL. Performance status is Eastern Cooperative Oncology Group 2. Which of the following would be a relative contraindication to using ramucirumab?

(A) Hypertension
(B) Thrombocytopenia
(C) Anemia
(D) Asthma

194. A 33-year-man presented with intermittent palpitation, flushing, headache, and hypertension. Workup showed a 3-cm right adrenal mass. He was very anxious and would like to have it resected as soon as possible. He was referred to a general surgeon. What preoperative evaluation would be most relevant for this patient given his symptoms

(A) Complete blood count and liver function test
(B) Transthoracic echocardiogram
(C) Plasma metanephrine
(D) Chromogranin and 5-HIAA

195. Mr. D.P. is a 66-year-old male recently diagnosed with metastatic prostate cancer (mPC) when he presented with a prostate-specific antigen (PSA) of 120 ng/mL. He was found with bone metastasis and enlarged pelvic lymph nodes. A bone marrow biopsy confirmed mPC. Mr. D.P. was started on bicalutamide and 2 weeks later received a leuprolide injection. His PSA levels are decreasing and he is asymptomatic. Which of the following best describes the plan of care for this patient?

(A) The patient should have continuous androgen deprivation therapy (ADT) until disease progression.
(B) The patient can consider intermittent ADT because it is equally effective to continuous ADT
(C) The patient can start abiraterone and prednisone for hormone-sensitive prostate cancer
(D) Immunotherapy with sipuleucel-T improves survival in hormone-sensitive prostate cancer

196. A 58-year-old man is diagnosed with a glioblastoma of the left occipital lobe. He undergoes gross total resection. Molecular studies demonstrate that the tumor is O-methylguanine methyltransferase unmethylated. His performance status is 90%. He has a right visual field defect. What would be the recommended treatment for this patient?

(A) Radiation with concomitant temozolomide followed by adjuvant temozolomide (Stupp regimen)
(B) Radiation alone
(C) Radiation plus temozolomide plus bevacizumab
(D) Hypofractionated radiotherapy plus temozolomide

197. A 50-year-old woman is diagnosed with an ulcerated melanoma arising on the right arm. She underwent wide local excision and sentinel lymph node biopsy, which was remarkable for 2 positive lymph nodes. A CT scan of the chest, abdomen, and pelvis showed no evidence of metastases. Which one of the following studies should be ordered at this time?

(A) PET/CT scan
(B) Ultrasound of right axillary lymph node basin
(C) MRI of the brain
(D) CT scan of the head with contrast

198. **In the CALGB 9781 trial (Tepper et al.) in which patients were randomized to surgery alone versus neoadjuvant chemoRT followed by surgery, what was the reported 5-year overall survival benefit seen with the addition of neoadjuvant therapy?**

(A) 12 % **(B) 18 %**

(C) 23 % **(D) 30 %**

199. **Which of the following is not a component of Child-Pugh scoring?**

(A) Encephalopathy **(B) Serum alkaline phosphatase**

(C) Albumin **(D) Prothrombin time**

200. **Which of the following would be the preferred treatment option for a stage III/Iva unresectable thymoma?**

(A) Preoperative chemotherapy, then surgery

(B) Preoperative chemoradiation, then surgery

(C) Definitive chemoradiation

(D) Hospice