



## First Examination for the Fellowship in Clinical Oncology

### Sample Questions

#### **Cancer Biology**

Which therapeutic agent is correctly matched with its molecular target?

- (a) gefitinib and ERBB2
- (b) trastuzumab and ERBB1
- (c) lapatinib and VEGFR2
- (d) imatinib and proteasome
- \* (e) rituximab and CD20

Transcription factors

- (a) bind to the TATA box (sequence TATAAA).
- \* (b) contain DNA-binding domains.
- (c) identify the transcriptional start site.
- (d) invariably enhance target gene expression.
- (e) are confined to the nucleus.

#### **Clinical Pharmacology**

Docetaxel is used in the treatment of prostate cancer. Through which mechanism does it exert its anti-neoplastic effects?

- (a) reduction in microtubule formation
- (b) altered phosphorylation of BCL2
- (c) free radical formation
- \* (d) reduction in free tubulin
- (e) topoisomerase II inhibition

Which chemotherapy drug is not a substrate for p-glycoprotein efflux pumps associated with MDR-1 drug resistance?

- (a) doxorubicin
- (b) mitomycin C
- \* (c) capecitabine
- (d) etoposide
- (e) vinblastine

What is the best description of the half-life of a drug?

- (a) dose/AUC
- \* (b)  $0.693/\text{slope of elimination}$
- (c) infusion rate/plasma concentration
- (d)  $V_d(I) \times \text{clearance}$
- (e) GFR/renal blood flow

Although carboplatin causes thrombocytopenia, a platelet sparing effect has been observed when it is combined with which drug?

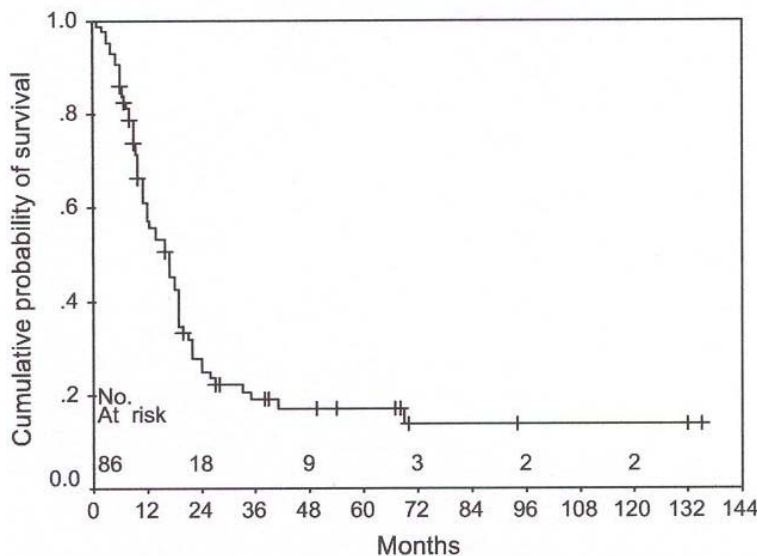
- \* (a) paclitaxel
- (b) etoposide
- (c) irinotecan
- (d) gemcitabine
- (e) pemetrexed

### **Medical Statistics**

The standard error of the mean provides a measure of the

- (a) spread of the data.
- (b) centre of the data.
- (c) Normality of the data.
- \* (d) precision of the sample mean.
- (e) bias of the sample mean.

An audit of post-operative radiotherapy after non-curative resection for cancer of the oesophagus was undertaken. The 86 patients received 45.0-50.4 Gy in 25 to 28 fractions. The median interval from time of surgery to the start of radiotherapy was 41 days. Overall survival was computed from the day of surgery using the Kaplan-Meier method as shown in the figure.



If two Kaplan-Meier curves were shown, with censored survival data, representing outcomes in two groups in a randomised controlled trial, what would be most appropriate to test the null hypothesis that there is no difference in the distribution of survival times between the two groups studied?

- (a) Student's t-test
- (b) Mann-Whitney U test
- \* (c) log-rank test
- (d) chi-squared test
- (e) McNemar's test

A group of 100 doctors took part in a study to assess the usefulness of their professional College's website six months before and six months after the website was redesigned. 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' views of the old and new websites?

- (a) paired t-test
- \* (b) McNemar's test
- (c) Mann-Whitney test
- (d) independent samples t-test
- (e) chi-squared test

Which feature best characterises cross-over designs?

- (a) Treatment is allocated according to patient choice.
- (b) They require half as many patients as compared with a parallel group trial.
- (c) They allow patients to switch treatments if side-effects are observed.
- (d) They require that a placebo treatment be included.
- \* (e) They use patients as their own controls.

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
- (e) none of the above

## **Physics**

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

- (a) reduce the activity of the source by half
- (b) reduce the time for which the individual is exposed by one-third
- \* (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
- (e) reduce the intensity of radiation transmitted by the protective barrier between the source and the individual by one half

In the Bohr atomic model, electrons are bound to the atomic nucleus and move in shells at fixed distances from the nucleus.

- (a) The L-shell is closest to the nucleus.
- \* (b) Tightly bound electrons are closer to the nucleus than loosely bound electrons.
- (c) Only four electrons are permitted in the innermost shell.
- (d) The energy of the electron in any given shell is independent of the atomic number.
- (e) Characteristic radiation is emitted when an electron in an inner shell jumps to fill a vacancy in an outer shell.

In the symbol below for a cobalt isotope, how many protons (p), neutrons (n) and electrons (e) are there?



- (a) p 33 n 27 e 33
- (b) p 60 n 33 e 60
- (c) p 27 n 60 e 27
- \* (d) p 27 n 33 e 27
- (e) none of the above

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

- \* (a) internal target volume
- (b) clinical target volume
- (c) planning target volume
- (d) planning organ at risk volume
- (e) treated volume

During quality control checks, it is discovered that the linear accelerator dose rate has decreased by 15%. This will lead to a change in the

- (a) monitor units to deliver 100 cGy at Dmax.
- (b) proportion of head scatter in the beam.
- \* (c) time to deliver treatment.
- (d) MLC interleaf leakage.
- (e) percentage depth dose at the skin surface.

Interlocks on linear accelerators will operate if the

- (a) set up lasers are incorrectly aligned.
- (b) beam dose rate fluctuates by  $\pm 10\%$ .
- \* (c) beam flatness fluctuates by  $\pm 5\%$ .
- (d) in vivo diodes are out of calibration.
- (e) portal imager is in the incorrect position.

## **Radiobiology**

Rejoining of ionising radiation induced DNA double strand breaks

- (a) involves mismatch repair.
- (b) involves base excision repair.
- (c) involves nucleotide excision repair.
- \* (d) involves DNA recombination.
- (e) can be measured using the alkaline comet assay.

What is the best representation of the  $\alpha/\beta$  ratios for skin erythema and skin fibrosis?

- |  | skin erythema | skin fibrosis |
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