Molecular Techniques Past Paper

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We apologise if there is anymistake <3

- During cloning, the antibiotic resistance gene in plasmids helps in
- a.Integrating a DNA fragment of interest into a genome
- b.Multiply plasmid inside bacterial cells
- c.Maintain plasmids in an acceptable size
- d.Select the cells that contain a fragment of interest
- e.Integrate plasmids inside a genome
- Answer : D
- (هايالمعلومة ذكرها الدكتور مأمونمع طب020 والدكتورة ما اعتقد ذكرتها)

- Using PCR, detection of the SARS-CoV2 (the coronavirus) has a specificity of 100% due to
- a.The number of amplification cycles
- b.The RNA polymerase
- c.The polymerization temperature
- d.The primers used
- e.The means of detection of amplified fragments
- Answer : D

- CRISPR in the natural CRISPR-Cas9 system is
- a.A nuclease
- b.A genetic material within a bacterial genome
- c.Part of the human genome
- d.A DNA repair mechanism
- e.A bacteriophage DNA
- Answer : B

- Novel genes can be identified using
- a.Luciferase reporter assay
- b.RNA sequencing
- c.Cloning of genomic DNA
- d.Quantitative PCR
- e.PCR
- Answer : B

- A cDNA library may contain sequences that represent
- a.Coding and non-coding RNA
- b.Regulatory sequences
- c.Introns
- d.Promoters
- e.Transcriptional factor-binding sequences
- Answer : E (not sure)

- Co-immunoprecipitation helps in determining
- a.Protein localization inside cells
- b.protein function
- c.Protein sequence
- d.Proteins that form protein complexes
- e.Protein structure
- Answer : D

- In classic, old-fashioned, radioactive-based Sanger (first technique) DNA sequencing, a substrate does not allow the
- addition of another deoxyribonucleotide because
- a.It is a monophosphate
- b.It is a ribonucleoside
- c.It is missing a (-OH) group at carbon 2 of the sugar
- d.It needs to be activated
- e.It is missing a (-OH) group at carbon 3 of the sugar
- Answer : E

- You studied the promoter region of the gene Ahramerica using the luciferase reporter assay. Its length is
- 1000 bp (from -1000 to -1 bp, upstream to downstream). You deleted portions of it gradually and
- measured gene expression compared to a positive control that has 100% expression and negative
- control of 5% expression. (Full promoter = 85%; from -800 to -1 bp = 150%; from -600 to -1 bp = 67%;
- from -400 to -1 bp = 63%; from -200 to -1 = 80%; from -50 to -1 = 20%; from -50 to -1 = 7%). Based on
- the following results, this is NOT a correct interpretation:
- a.Region -400 to -200 bp contains a repressor region
- b. Region -600 to -400 contains a repressor region
- c.Region -1000 to -800 bp contains a repressor region
- d. Region -800 to -600 bp contains an activating region
- e.Region -200 to -50 bp contains an activating region

- Answer : B (400 from to 600 activator)

- Why specifically are human proteins expressed in yeast instead of bacteria
- a.Yeast cells grow faster than bacterial cells
- b.Larger vectors can be inserted into them
- c.Yeast cells are larger and can handle higher amounts of proteins than bacterial cells
- d.Proteins are folded and modified just like in human cells
- e.Yeast cells are affected by antibiotics like bacterial cells
- Answer : D (not sure eukaryotic)

- The type of DNA polymerase used in PCR is isolated from this bacterial species
- a.Metallophilic
- b.Extremophilic
- c.Halophilic
- d.Thermophilic
- e.Acidophilic
- Answer : D

- In PCR, the annealing temperature changes per reaction in order to
- a.Activate the deoxyribonucleotides
- b.Reach the optimal temperature for DNA denaturation depending on its size and GC content
- c.Activate the DNA polymerase enzyme
- d.Reach the optimal temperature of the DNA polymerase
- e.Allow for the best primer-binding condition
- Annswer : E

- Using radioactive-based DNA microarray, comparative expression cannot be done on the same slide (the
- solid platform) because
- a.Radioactivity has a low level of detection
- b.The amount of probes on the slide is very little to handle two samples
- c.There is a lower hybridization capability of glass slides
- d.Using two labeled samples means high radioactivity and this is unhealthy
- e.Radioactivity has no distinct color
- Answer : E (not sure)

- You have studied the possible interaction between two proteins, dumbless and smartful. Dubmless has
- two domains X and Y. Smartful has two domains: A and B. You used the yeast two-hybrid system
- approach expressing different domain/protein combinations. You generated the following results
- (dumbless + smartful = blue colonies; A + X = blue colonies; A + Y = blue colonies; B + X = white colonies; B + Y = white colonies). What is your interpretation?
- a.Domain B interacts with both domains X and Y
- b.The two proteins do not really interact with each other
- c.Domain A interacts with both domains X and Y
- d.Domain B interacts with X but not Y
- e.Domain A interacts with X but not Y
- Answer :C (A binds with both , B no !!)

- This particular advantage of plasmids makes them favorable vectors for the production of large amounts of a recombinant human protein in bacteria
- a.They can be replicated in bacterial cells
- b.The promoter they contain is human
- c.They are small
- d.They are bacterial in nature
- e.They carry antibiotic-resistance genes
- Answer : A (we said that bacteria contains enzymes that break any external information , so we need vector = plasmid)

- It is difficult to use a restriction enzyme that cuts (shown as *) within one of these restriction sites for
- cloning purposes
- a.GCA*TGC
- b.GCGCGCG*C
- c.C*GCG
- d.*AAAATTTT
- e.AGC*T
- Answer : A (the sequence should be palindromic)

- Using fluorescent-based DNA sequencing, an insertion mutation in both alleles results in the following
- a.Insertion of a new peak and shift of all other peaks to the right
- b.The presence of an overlapping peak representing the site of insertion
- c.The disappearance of a peak representing the site of insertion
- d.Insertion of a new peak and change of color of all subsequent peaks
- e.Nothing happens
- Answer : A
- برضو هاي المعلومة انذكرت بمحاضرة الدكتور مأمون بالرسمة

- Using a fluorescent-based DNA microarray, a computer-generated yellow color means
- a.There is failed binding of cDNA to the attached probes
- b.There is an equal expression in both samples
- c.There is expression but no cDNA in the sample
- d.Expression is higher in one sample versus the other
- e.There is no expression in either sample
- Answer : B

- During gene editing by the CRISPR/Cas9 system, the insertion/deletion mutations (indels) are created by
- a.The non-homologous end joining DNA repair system
- b.The CRISPR part of the system
- c.The Cas9 part of the system
- d.The guide RNA (gRNA)
- e.Homology-directed DNA repair system
- Answer : A

- You have created both a genomic DNA library and a cDNA library from skin stem cells and from
- differentiated skin cells by fragmenting the DNA using the same restriction enzyme. What would you
- expect?
- a.The genomic libraries will be identical
- b.A cDNA library cannot be created from differentiated cells
- c.The cDNA libraries will be identical
- d.A genomic library cannot be created from stem cells
- e.All libraries will be identical to each other
- Answer : A (genome is identical with less selective with same plasmid , cDNA is more selective and each plasmid with specific gene)

- In next-generation sequencing, when the incorporated nucleotide is activated and lights up, the other
- unincorporated nucleotides do not light up because
- a.They cannot be activated
- b.They light up but at a different wavelength
- c.They are linked to the solid platform and cannot be activated
- d.They light up but faintly
- e.They are removed after the addition of the right one
- Answer : E (when computer detects the sequence of nucleotide , then the light is removed when adding other nucleotide)

- Earlier detection of amplified DNA by SYBR-green-based realtime PCR normally depends on
- a.The activity of the DNA polymerase enzyme
- b.The concentration of the substrates
- c.The optimal temperature of SYBR green detection
- d.The amount of SYBR green added at the start of the reaction
- e.The amount of starting material of DNA sample
- Answer : E

- What is the importance of the CRISPR part of the CRISPR/Cas9 system
- a.It cleaves bacteriophage DNA
- b.It contains molecular components of Cas9
- c.It activates the DNA repair system
- d.It activates Cas9 enzyme
- e.It prevents bacteriophage entry into the cells
- Answer : D (by gRNA)

It was a nice experience during these semesters (biochem & Metabolism) with you Friends , Thx all <3