Question Paper

Exam Date & Time: 11-Jul-2023 (10:00 AM - 01:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

Computer Aided Drug Design [PCH-BP807ET-S3]

Marks: 75 **Duration: 180 mins.**

I Multiple Choice Questions (MCQs)

Answer all the questions. Section Duration: 30 mins

1) Which of the following is not a strategy in identifying a drug target? (1)

- Analysis of pathophysiology
- Analysis of mechanism of action of existing therapeutic drugs
- Analysis of SAR
- Trawling the genome

2) What are Disease genes? (1)

- Genes whose altered expression is thought to be involved in the development of the disease state
- Genes that encode functional proteins, whose activity is altered
- Genes, mutations of which cause or predispose to the development of human disease
- All of the above

3) Which of the following is not a "Rule of Five" (Ro5) for drug-likeness filter? (1)

- molecular weight less than 500 Da
- number of hydrogen bond donors equal or more than 5
- number of hydrogen bond acceptors less than 10
- calculated Log P less than 5.0

4) For selection of a 3D structure of a target protein for molecular docking studies what is preferred resolution? (1)

- Less than 3.0 Å
- More than 3.5 Å
- Less than 2.5 Å
- Less than 1 Å

5) What is scaffold hopping? (1)

screening in order to predict pharmacological profiles for lead structures in silico
identification of chemical features for a specific binding site
extracting common chemical features from set of active ligands
identification of novel scaffolds that have not been associated with the target of interest

6) De Novo Design can be used to (1)

generate ligand structures to virgin targets
generate ligand structures from molecular fragments bound into the site
generate alternative chemotypes to known active compounds
All of the above

7) Which of the following strategy is not a divide-and-conquer approach in De novo drug design? (1)

Ligand Growing
Ligand Morphing
Ligand Linking
Lattice based methods

8) AMBER is the force field used for the simulation for the following (1)

Proteins
Nucleic acids and Proteins
Carbohydrates
All of the above

9) Microarray provides massive amount of data about the following (1)

Gene activity in the presence of certain biological samples under specific conditions
Protein activity in the presence of certain biological samples under specific conditions
Protein activity in the absence of certain biological samples under specific conditions
Gene activity in the absence of certain biological samples under specific conditions

10) MM1 force field is applied only to (1)

Saccharides
Hydrocarbons
Nucleotides
Proteins

11) Molecular dynamics can be used to generate a variety of different conformations by 'heating' the molecule to (1)

500 K
600 K
700 K
900 K

12) Software used to study protein ligand docking is: (1)

- SPORE
- H++
- PHASE
- GOLD

13) Quantum mechanics describes molecules in terms of interactions among the following. (1)

- Nuclei and molecular geometry
- Electrons and Molecular geometry
- Nuclei and Electrons
- Nuclei, Electrons and Molecular geometry

14) The most common program for structure drawing is (1)

- CORINA
- Dragon
- UNIPROT
- FT map

15) Main advantage of using COMFA in drug discovery (1)

- Fast and inexpensive method
- Can predict the bioactivity of molecules without the need of experimental testing
- Can predict the toxicity of molecules
- Can predict the optimal condition for synthesising a molecule

16) COMSIA is based on the principle of (1)

- Molecular docking
- Molecular dynamic simulation
- QSAR
- 3D-QSAR

17) Silameprobamate is an example of bioisosteric replacement of (1)

- N for C
- Si for N
- Si for C
- S for N

18) =C=, =N= and =P= are examples of (1)

- Tetravalent classical isosters
- Tetravalent non-classical isosters
- Divalent classical isosters
- Divalent non-classical isosters

19) Following change are expected from Bioisosteric replacement (1)

- Structural changes
- Change in receptor interaction
- Change in Pharmacokinetic properties
- All the above

20) Which of the following is a characteristics of Lipophilic molecules (1)

They have high water solubility

They tend to be polar and dissociates into ions

They can diffuse across cell membranes

They do not interact with biological membrane

II Long Answers

Answer all the questions.

21)	Enlist the various methods used for lead discovery add a note on lead optimization	(5)
A)		
B)	Write a note on selection of 3D structure of a protein and site map analysis for molecular docking	(5)
22)	Write Hansch equation? What are the advantages of this equation in QSAR?	(4)
A)		
B)	With the help of a case study, explain the alteration of physicochemical properties by classical bioisosterism	(6)

III Short Answers

Answer all the questions.

23)	What is De novo drug design? Explain divide and conquer ligand build up strategies for in situ De novo drug design.	(5)
24)	Explain the fundamental steps in Pharmacophore modelling	(5)
25)	How is Bioinformatics useful in new drug discovery program. Define HTS and Combinatorial chemistry in new drug discovery	(5)
26)	Mention the software used in drug discovery program. Enlist various chemical databases. Mention their applications	(5)
27)	Explain the principles of quantum mechanics.What is energy minimisation? Define local and global energy minima	(5)
28)	Explain the principle of Molecular mechanics. What is Force field and Molecular dynamics ? Mention their relevance in molecular mechanics	(5)
29)	Enumerate the fundamental steps of the CoMFA methodology	(5)

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