

## Lesson 15 Study Guide

15. An approximate time and cost from 'Bench to Bedside' for the development of a new pharmaceutical product would be in the range of

- (A) 1-5 yrs and \$10 million
- (B) 12-15 yrs and over 1,000 million
- (C) 3-7 yrs and 100 million
- (D) 3-7 yrs and \$20 million
- (E) 1-5 yrs and \$500

16. It has been understood that some viruses can cause cancer. HPV stands for

- (A) High Purity Vaccine
- (B) Hallmark Pneumonia Vaccine
- (C) Henrietta's Park Virus
- (D) Human Papilloma Virus
- (E) Human Pancreatic Virus

17. Pandemic flu can teach us about the spread of disease. An influenza pandemic is a global outbreak of disease that occurs when a new influenza A virus appears or "emerges" in the human population, causes serious illness, and then spreads easily from person to person worldwide. Such a pandemic

- (A) May arise from sources outside of humans, such as wildlife
- (B) Arises spontaneously from environmental pollutants
- (C) is only a conjure of science fiction
- (D) Will never occur because of the precautions in place
- (E) proves that the theory of evolution is incorrect since viruses cannot evolve

18. The development of strategies to determine which proteins are involved in disease has led to new ways to treat disease. One major component involves the ability to clone DNA that will code for proteins which in interact or interfere with disease causing proteins. Recombinant DNA technology has been able to make what class of compounds as a new class of effective drugs?

- (A) Nucleotides
- (B) Vitamins
- (C) Antibodies
- (D) Cox 2 inhibitors
- (E) Homeopathic treatments

19. Drugs have been created to block diseases caused by over reactive immune responses, such as those involved with psoriasis or multiple sclerosis. Rheumatoid arthritis is

- (A) curable with the correct diet and vitamins
- (B) totally eradicated because of this therapy
- (C) an autoimmune disease treatable with this type of therapy
- (D) has been most effectively treated with homeopathic remedies
- (E) best treated early with surgery

20. Antibiotic resistant tuberculosis is on the rise world-wide. Which approach to research treatment development would not be the best choice?

- (A) develop a vaccine using recombinant DNA technologies
- (B) develop RNAi methods to target the tuberculosis bacteria
- (C) develop cheaper methods to make the antibiotic
- (D) develop early detection methods based on PCR
- (E) sequence the tuberculosis genome to look for new drug targets

21. The technology exists to study the interactions of all proteins in a cell. Proteomics:

- (A) The study of all the proteins produced by an organism and their interactions.
- (B) a hoax perpetrated by molecular biologists about alien proteins
- (C) One of the largest pharmaceutical biotechnology companies in the world
- (D) The exact measurement of protein structures using X-ray crystallography
- (E) The study of the ecology of the Protista by molecular biology

22. We are all different, to some extent. In fact we are all by far way more similar than we are different, but these small differences can be studied to determine such aspects as disease susceptibility and disease predisposition. Genetic predisposition to disease or drug response is the focus of what area of biotechnology?

- (A) Environmental Biotechnology
- (B) Genetic Forensics and Virology
- (C) Pharmacogenomics
- (D) Stem Cell Research
- (E) Human Cloning Research

23. The DNA sequence is now available for many organisms and has allowed comparisons to the relationships to all other organisms. This information has allowed vast insights into who we are, how we function and where we came from. What is a genome?

- (A) The genetics of humans
- (B) A genetic disease associated with small stature
- (C) All the DNA in any organism, including its genes.
- (D) The absence of genetic markers with some body cells
- (E) The study of the information in a single gene

**24. Alternative therapies, such as herbal medicines, DNA Activation, and homeopathy have all raised suspicion and scientific concerns because**

- (A) they are not regulated by the FDA**
- (B) they have not been rigorously tested in clinical trials**
- (C) they have active ingredient(s) or mode(s) of action have not been elucidated or determined in peer-reviewed scientific publications**
- (D) their results are highly variable**
- (E) all of answers are correct**

**25. We are genetically and environmentally unique. Doesn't it make sense then that therapeutics should be tailored to the individual? Personalized Medicine**

- (A) is based on individual genomes indicating appropriate drug prescriptions and diagnostics of disease susceptibilities.**
- (B) is what is in your medicine chest at home**
- (C) is an alternative therapy allowing patients their right of choice for their own treatment**
- (D) is part of the Obama Health Care Bill of 2010 requiring health care and pharmaceuticals for all people regardless of income.**
- (E) is individualized hands on health care required now for all end of life patients**

**26. Alternative Therapies including Herbal Medicine; Homeopathy; Chiropractic Medicine DNA Activation, Naturopathy; Osteopathy; Anthroposophical Medicine and Holistic Medicine often lack extensive evidence based studies for support raising questions about:**

- (A) Their Efficacy (do they actually work?)**
- (B) Reductionist thinking (i.e. this herb is for that disease)**
- (C) Their Absence of Science-based results**
- (D) Their Absence of Regulation and Accountability**
- (E) All of the factors shown apply to our questions about Alternative Therapies**

**27. What are the implications of gene cloning for the pharmaceutical industry?**

- (A) Technically a good idea but all candidates have failed in Phase III trials**
- (B) It might work but it will never gain public acceptance**
- (C) Drugs based on antibodies are now on the market made using this technology**
- (D) Technically a good idea but has yet to be proven**
- (E) none, it's the materials of science fiction and Hollywood movies**

**28. Defective genes caused by mutations can lead to disease or disorders. The ability to replace defective genes in a patient, as a sort of genetic surgery, has not yet been effectively achieved is called**

- (A) Combinatorial chemistry**
- (B) Chiral chemistry**
- (C) Gene therapy**
- (D) Recombinant drug technology**
- (E) Alternative therapy**

29. Random mutations in a DNA sequence can cause variation in gene expression and then, indeed traits. For example a single base pair change from an A (adenosine) to a T (thymine) may have significant effects (or none at all). Single Nucleotide Polymorphisms (or SNPs) are

- (A) deletions of large segments of DNA
- (B) single base pair changes in DNA responsible for genetic variation
- (C) also collectively called 'junk' DNA
- (D) unimportant to the science of pharmacogenomics
- (E) nonexistent in humans but occur in other animals, such as the mouse

30. It is possible to recognize DNA mutations prior to birth, or even prior to conception in the parents. The ability to replace defective genes in a patient, as a sort of genetic surgery, has not yet been effectively achieved is called

- (A) Recombinant drug technology
- (B) Chiral chemistry
- (C) Combinatorial chemistry
- (D) Gene therapy
- (E) Alternative therapy

31. Biochips

- (A) are made from genetically modified potatoes cut very thin and deep fried
- (B) also called microarrays, are used for expression profiling which is the study of RNA patterns to elucidate various biological phenomenon
- (C) are biological constructed radio transmitters that can be inserted into people so that can be tracked by GPS
- (D) are a bionanotechnology approach to making self replicating nanobots that can be used for microsurgery in the body

32. The entire genomic sequences are now known for many species of bacteria, fungi, insects, plants and animals, including humans and chimpanzees. This vast amount of information has been published and is in the public domain. The genome databases aligned and the similarities and relations can be examined. Individual gene sequences can be searched to find striking similarities between species. These types of analyses have shown that humans are 98% similar in DNA sequence to the chimpanzee; 88% similar to mice and about 33% similar to the genes of a rice plant. This type of analysis is called:

- (A) Transgenic analysis
- (B) Comparative genomics
- (C) Mutational analysis
- (D) Functional genomics
- (E) DNA gold mining

**33. Genomics has provided us a wealth of information about how we are related to other organism and how we are anthropologically related to each other. How much do we as unrelated humans differ at the DNA level in terms of the number of base pair (bp) differences?**

- (A) 0 bp**
- (B) 1/10,000 bp**
- (C) 1/1000 bp**
- (D) 1/100 bp**
- (E) 2/3 bp**

**34. The greatest challenges faced by the pharmacogenomics is the systematic correlation between normal versus disease patterns of gene expression and variation of drug efficacy and metabolism in human populations. This can be accomplished using what biotechnology tools?**

- (A) Xenotransplantation**
- (B) Nanotechnology**
- (C) Phenotyping by genomics, transcriptomics and proteomics**
- (D) Human cloning procedures**
- (E) Psychotropic drugs**

**35. Anthropology is no longer the science of old bones and fossils only, but DNA evidence that has provided a much clearer picture of our ancestry. Human genomics now strongly shows that humans did not have a single ancestor, however, the 'Out of Africa' hypothesis for the origin of humans is now considered fact based on what evidence?**

- (A) RNA evidence through comparative transcriptomics**
- (B) new fossils uncovered in Australia**
- (C) DNA evidence through comparative genomics**
- (D) new mythologies handed down through the generations revealed by older tribal members**
- (E) it has been discounted by all of these approaches**

**36. Our environment is increasingly contaminated with toxic compounds. pesticides get a lot of press since Rachel Carson's publication "Silent Spring" in 1962 about the effects of DDT. Compounds once thought to be safe have been included in everything from cosmetics to plastics. Some are estrogen-like and are not removed from the water by standard treatments. The study of how genomes respond to environmental stressors or toxicants. Brings together genome-wide mRNA expression profiling with protein expression patterns to elucidate the role of gene-environment interactions is now called:**

- (A) comparative ecology**
- (B) toxicogenomics**
- (C) comparative genomics**
- (D) deep biology**
- (E) environmental chaos**

**37. A branch of biological science which deals with the study of methods for storing, retrieving and analyzing biological data, such as nucleic acid (DNA/RNA) and protein sequence, structure, function, pathways and genetic interactions. It generates new knowledge that is useful in such fields as drug design and development of new software tools to create that knowledge. This new field also deals with algorithms, databases and information systems, web technologies, artificial intelligence and soft computing, information and computation theory, structural biology, software engineering, data mining, image processing, modeling and simulation, discrete mathematics, control and system theory, circuit theory, and statistics is called:**

- (A) comparative ecology**
- (B) toxicogenomics**
- (C) comparative genomics**
- (D) deep biology**
- (E) bioinformatics**

**38. CRISPR is an acronym for**

- (A) a new vaccine to combat the spread of Zika**
- (B) a method used for targeted genome editing**
- (C) a container used in molecular biology labs**
- (D) a new health care law recently passed in Congress**
- (E) an advanced genome sequencing technology**