BiS200 Quiz#4 (2024-05-27) (Answer in English, Closed book, 15 minutes)

Fill-in-the-blank questions:

1. Unlike traditional vaccines, which primarily stimulate antibody production, cancer vaccines often involve introducing antigens associated with cancer cells to activate (cytotoxic T cells) directly.
2. Pharmacodynamics (PD) is concerned with the effects of a drug on the body (e.g. Dose–response relationships, Mode-of-Action). On the other hand, (Pharmacokinetics (PK)) is concerned with the effect of the body on the drug (e.g. Absorption, Distribution, Metabolism, Excretion)
3. In modern biomaterials, there are two common modes of failure. First, materials that contact blood can fail due to (formation of blood clots). Second, materials for non-blood-contact can fail due to (foreign body response).
4. When a (piezoelectric element) is placed under pressure, it generates an electric charge, serving as a good mechanical sensor.

Short-answer questions:

1. What is PLGA and how does it benefit drug delivery systems?
    1. Biodegradable and Biocompatible: PLGA safely degrades into natural metabolites and is well-tolerated by the body.
    2. Controlled Drug Release: Allows for precise control over the rate and duration of drug release.
    3. Versatile Formulations: Can be used in various forms like microspheres, nanoparticles, and implants.
2. What are the three majors components of tissue engineering?
    1. Cell source (Autologous cells, Stem cells (embryonic, adult, induced pluripotent stem cells), cell lines),
    2. Biomolecules (Growth factors, hormones, signaling molecules)
    3. Scaffolds (Materials providing correct mechanical, chemical, and biological signals to cells)
3. What are the key differences between accuracy and precision in the context of biosensors?
    1. Accuracy refers to how close the measurements from a biosensor are to the true or accepted value of the analyte being measured. It indicates the correctness of the sensor's readings.
    2. Precision, on the other hand, refers to the reproducibility or consistency of the measurements. It indicates how close the measurements are to each other when repeated under the same conditions.
4. What is a low-pass filter and how is it useful in EEG or ECG signal processing?
    1. A low-pass filter is a filter that allows signals with a frequency lower than a certain cutoff frequency to pass through and attenuates (reduces the amplitude of) signals with frequencies higher than the cutoff frequency. In EEG (electroencephalogram) or ECG (electrocardiogram) signal processing, low-pass filters are used to reduce high-frequency noise and artifacts that can interfere with the interpretation of the signals.