

Question 1:

Which of the following types of skin and/or membrane is typically preferred in the Franz/Bronaugh cell chamber?

- Human skin

Explanation:

Typically, human skin is the preferred skin/membrane in the Franz/Bronaugh cell chamber because it gives the most appropriate data to reflect human in-vivo conditions. The second most preferred skin/membrane is animal skin. Although animal skin shares similar biological properties to in-vivo human skin, there are still differences in drug deposition and absorption between animal skin and human skin. When neither human skin nor animal skin is available, synthetic membranes are typically used. Synthetic membranes are recommended last because they are limited in their ability to emulate the biological properties and barrier functions of in-vivo human skin.

- Animal skin
- Artificial membrane
- All of the above are equally preferred

Question 2:

What is a unique advantage of isolated perfused skin models?

- Allows assessment of the bioavailability of any topical drug
- Takes into consideration the effects of microcirculation and metabolism, without systemic involvement

Explanation:

A unique advantage of isolated perfused skin models is that they are able to take into

consideration the effects of a circulatory system (microcirculation) and metabolism without systemic involvement. The first choice is wrong because there is no one standard technique by which the bioavailability of all topical drugs can be assessed; each topical drug must be assessed by considering the advantages and disadvantages of the technique being used, as well as considering the drug's clinical endpoint and/or site of action. The third choice is wrong because isolated perfused skin models do not rely on the skin blanching effects of topical drugs to measure their bioavailability; it is the vasoconstrictor assay that uses the blanching effects of topical drugs as a surrogate marker for bioavailability. The fourth choice is wrong because isolated perfused skin models do not use human skin.

- Allows the blanching effects of topical drugs to be used as a surrogate marker for bioavailability
- Uses human skin without requiring live human subjects

Question 3:

What causes the unique blanching effects of topical corticosteroids?

- Neurotoxins
- Lipophilicity
- Local vasoconstriction

Explanation:

Local vasoconstriction causes the unique blanching effects of topical corticosteroids. While the exact mechanism of local vasoconstriction by topical corticosteroids is not known, it has been postulated to involve 1) release of local norepinephrine by corticosteroids, 2) direct vasoconstriction of smooth muscle in blood vessels by corticosteroids, and/or 3) inhibition of local vasodilators such as histamine, bradykinin, and/or prostaglandins by corticosteroids. Choice 1 is wrong because topical corticosteroids are not neurotoxins nor do they have any relation to neurotoxins. Choice 2 is wrong because although topical corticosteroids are lipophilic molecules, their lipophilicity is not the reason they have blanching effects; many other topical drugs are lipophilic but do not cause blanching. Choice 4 is wrong because although topical

corticosteroids do occasionally have the issue of tachyphylaxis, where they lose their efficacy after repeated use, this does not explain their blanching effects; more specifically, topical steroids can cause blanching on first use and do not require repeated use to show blanching effects, which is a requirement, by definition, of tachyphylaxis.

- Tachyphylaxis

Question 4:

Why are tape-strips always weighed before and after application when they are used to determine the bioavailability of topical drugs?

- To increase the absorption of the topical drug
- To use the data in other experiments
- To standardize various tape-strip and stratum corneum variables

Explanation:

Tape-strips are always weighed before and after application to standardize tape-strip and stratum corneum variables. The variables standardized include differences in weights of each tape-strip and differences in the thickness of the stratum corneum at each skin test site. In the process of standardizing these variables, random error is minimized, and data can be gathered pertaining to the thickness of the stratum corneum, an important parameter in topical drug absorption. Choice 1 is wrong because although tape-stripping can increase the absorption of topical drugs by effectively removing the stratum corneum, that is not the reason tape-strips are always weighed before and after application; moreover, that is not the reason tape-strips are used in the tape-stripping technique. Choice 2 is wrong because tape-strips are not always weighed before and after application to use the data in other experiments; the collected data is first used in the original experiment, and then may be subsequently used in other experiments if desired, not vice-versa. Choice 4 is wrong because, as mentioned previously, there is a reason for always weighing tape-strips before and after application.

- No particular reason

Question 5:

If the test drug is lipophilic, what adjustment can be made to the microdialysis technique to improve outcomes?

- Add solvents to the solution to allow better solubility

Explanation:

If the test drug is lipophilic, solvents, such as polyethylene glycol, cyclodextrins, proteins, or lipids, can be added to the perfusate solution, typically isotonic saline or ringers solution, to allow better solubility. Increasing the solubility of the test drug or metabolite in the perfusate solution allows better diffusion between the interstitial fluid and perfusate, and provides a more accurate representation of the drug or metabolite concentration in the dermis or hypodermis. Choice 2 is wrong because increasing the flow rate will not allow enough time for adequate diffusion to take place between the interstitial fluid and the perfusate, which would falsely lower the recovery of the drug or metabolite in the perfusate and falsely suggest a lower drug or metabolite concentration in the dermis or hypodermis. Choice 3 is wrong because repeating the study multiple times would address random error, and the decreased solubility of a lipophilic drug in perfusate solution is not an issue of random error. Choice 4 is wrong because, as mentioned previously, adjustments can be made to improve outcomes.

- Increase the flow rate to 100-200 microL/min
- Repeat the study multiple times
- No adjustments can be made