Resource Reviews

Intestinal Absorption

Resource Summary

An interactive computer-simulation of experiments which may be performed on one of the classical in vitro preparations - the isolated, everted intestinal sac of the rat. The program simulates experiments designed to demonstrate by investigation the important characteristics of the transport of two important nutrients - hexoses and amino acids, in the small intestine.

Review

Summary

Intestinal absorption is an alternative method to the classic everted intestinal sac of the rat to demonstrate the mechanism of intestinal transport of hexoses and amino acids. This program is easy to install, and runs and navigates very well. Teacher input is necessary as the program does not provide some information for data calculation and representation. This program allows users to perform a large number of experiments, and it replaces the use of animals and significantly reduces the time needed to perform experiments of this kind. Nevertheless, the visual appearance is not attractive enough and the experiments look very repetitive.

Comparison of the alternative resource with real animal model in the laboratory

The resource is suitable for the total replacement of an animal practice of the everted intestinal sacs if the objective of the practice is to obtain enough data to perform the calculation of kinetic parameters of the intestinal transport of hexoses and amino acid and to understand the mechanism. If, on the other hand, the objectives of the laboratory class are to improve the students´ practical skills then this program is not suitable to replace the real animal model in the laboratory. The program does not prepare the student for later studies with animals because the methodological aspects are not clear enough. It is impossible to learn experimental skills because the real methodology is not presented; these aspects are very schematic. It would be necessary to include video images of the real preparation of the everted sacs.

The program offers a solution to difficulties in running the animal practices for economic reasons and especially time reduction, since the real preparation needs considerable skills and a long time would be need to obtain the same number of data.

There is a lack of graphic representation of results and explanation of how to perfom the calculations and the representations. There would have to be a previous class to introduce these aspects.

Using the alternative resource

The program is easy to install and runs and navigates very well. The program has a few basic controls such as a “go” button and arrows which allows users to navigate the three section of the program: introduction, methods and experiments.

The work of the student with the program is very repetitive. The program is old and contemporany computer resources would allow the progran to be greatly improved. For example the calculation and representation of the kinetics could be shown graphically.

Contribution of the alternative to the 3Rs

The program has the potential to reduce the use of animals, because you can obtain a lot of data to performe calculations but these data could also be supplied on a sheet. The program presents some aspects of the real methodology employed in the physiological laboratory to demonstrate intestinal absorption, but it lacks real images on how to perform the experiments (i.e. how to open an incision on the rat, extract the intestine, cut it into pieces, evert the segment and fill it with the solution).

The improvement of the program (i.e. real video images) would be the best contribution to the reduction and the replacement of laboratory animals.

Applicability in teaching situation

The resource is suitable for undergraduate students at University (years 1 & 2) but students first need to be given the basic knowledge in class, and then they can use the program independently. Students need to know the principles of scintillation counting and the potential difference, and basic concepts of kinetics before using the program alone. The student’s manual supports the understanding of the intestinal transport process but it is not enough for students without teacher assistance.

Visual appearance

The screen design is appropiate but it does not look real and it has no relation with the situation in the laboratory. The images do give a clear idea of the appearance of the sac or how the operations are performed. The resources do not invite students to try out other features or complete extra assignments. The program is not attractive enough to students, compared to other programs in different fields.

Service provided by the supplier

No information on how to solve problems related to the program is provided by the supplier.

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