

LETTER TO THE EDITOR

TRANSPORT OF GLUCOSE IN ISOLATED GOAT ILEUM PREPARATION :
AN ALTERNATIVE RESEARCH TOOL FOR ABSORPTION STUDY

Sir,

(Received on March 20, 2008)

Isolated preparation are commonly used to study the effect of drugs on specific type of receptor, for bioassay of drug, for characterization of specific type of receptor or its subtypes, for pharmacokinetic study, to determine concentration response curve of agonist, to study the antagonism of drug and in new drug discovery (1). The Committee for the purpose of control and supervision of experimental animals (CPCSEA) has instructed universities and institutions to reduce the use of laboratory animals for teaching and experimental purpose. There are extensively use of the laboratory animals eg. rat, mice, guinea pig, frogs for performing the absorption/transport study of drug (2, 3). There is a requirement of permission from CPCSEA for performing these experiments on laboratory animals. So this has driven us to conduct alternative isolated tissue (goat ileum) experiment.

Absorption is a process by which a drug enters body fluids. Absorption of drugs involves their passage across cell membranes. Biological membrane consists of lipids and proteins. They are highly selective permeable barrier. Membrane lipids are relatively small molecules. They have both hydrophilic and hydrophobic moiety. Protein serves as a pumps, gates, receptor, energy transducer and enzymes (4).

Ones the drug is formulated in a suitable dosage form, there is need to perform its absorption study and for that there requiring large numbers of laboratory animals and there is need to scarifies the laboratory animal for performing *in vitro* absorption study. However, the goat ileum is a tissue that is easily available from slaughter house and animal need not to be sacrificed for the experimental purpose.

Present investigation sought to examine the suitability of the easily available and economical goat ileum as an alternative research tool from laboratory animals for absorption study of various pharmaceutical preparations.

The fresh ileums of healthy, black, male goat were obtained from a slaughterhouse in Ringer solution. The tissues were transported under ice to the laboratory. The intestinal contents were removed by washing with ringer solution and the mesenteric residues were dissected out.

About 4–5 cm of goat ileum was mounted in an Student Organ Bath containing Ringer solution. Tissue were maintain at $30\pm 1^{\circ}\text{C}$, aerated with air and resting load of 1 g. 1% glucose solution was prepared and inserted in ileum of goat by using syringe (4).

In the present study we focus our attention on just opposite to the everted sac technique (5). In present study, intestine is not everted. One end of intestine tied with silk thread and then 1% glucose solution is directly inserted into the intestine using syringe and then another end tied with silk thread tightly so the glucose solution remained in the inner side of intestine containing mucosal layer (donor environment). The tissue was mounted in the inner organ bath (receiver environment) containing Ringer's solution (sodium chloride 9.5 gm, potassium chloride 0.2 g, Magnesium chloride 0.2 g, Sodium bicarbonate 0.2 g, Distilled water up to 1000 ml.) as shown in Fig. 1. In order to assure cell survivality, both the donor and receiver environment are supplied by an oxygen feed with help of aerator (4) (Fig. 2).

Immediate after placing the intestine bag containing glucose solution the initial zero reading was taken and after ward sample was withdrawn in interval of 30 min from receiver environment in a fix (1 ml) volume and same volume was replaced with ringer solution to maintain the constant volume of ringer solution in inner organ bath.

Fig. 1: Goat ileum mounted in a student organ bath containing ringer solution.

Fig. 2: The intestinal mucosa and inner organ bath supplied with aerator.

The concentration of glucose which transported to the inner organ bath was estimated by using glucose estimation kit [Life-live Laboratories (P) Ltd. Hyderabad] by GOD-POD method.

Drugs are transported across cell membrane by various mechanisms eg. Passive transport (simple diffusion and filtration) and specialized transport (active transport, facilitated diffusion and pinocytosis) (4). The results of our experiment demonstrated that glucose was transported from intestinal mucosa of goat by active transport against concentration gradient (Fig. 3).

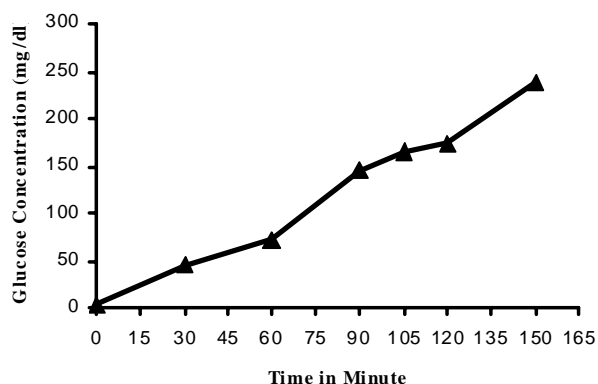


Fig. 3: Transport of glicose from intestinal mucosa of goat to inner organ bath (▲).

However, the model has the limitation that the ileum preparation has to be brought from the slaughter house for the study, resulting in the lack of uniformity of basal condition.

To conclude, goat ileum preparation can

be used to study the absorption parameter of drug. The advantage of this methodology and preparation are that it is easy to perform and economical, stability of preparation is high, and importantly, ethically substitutive.

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