

## Permeability Determination by Means of the Single Pass and Recirculating Techniques

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### Abstract

This paper deals with the development of proper mathematical models for the calculation of the in vivo rat intestinal drug permeability resorting to two different kinds of experimental methods: the single pass and the recirculating perfusion techniques. In particular, in the single pass case, attention is focused on the effect of water exchange between the flowing solution and the intestinal wall, as this can sensibly affect the permeability determination. In both the single pass and the recirculating perfusion method, a complete radial mixing of the flowing solution is supposed to hold, so that drug concentration and solution velocity are radius independent. Nevertheless, they depend on the intestinal axial position. Accordingly, two distinct models are built up by resorting to microscopic mass balances. The reasonably good data fitting performed by the recirculating perfusion model ensures that the most important factors affecting the passive drug (Antipyrine) diffusion through a rat intestinal wall are properly accounted for. Moreover, the reliability of the developed models and the experimental tests is proved by the fact that the drug (Antipyrine) permeability determined by means of the two methods is statistically equal.

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