

Investigation of the Absorption Mechanism of Solubilized Curcumin Using Caco-2 Cell Monolayers

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Poor oral bioavailability of Curcumin hinders multitude health-promoting benefits, and hence, it is very essential to address the issues and enhance its oral bioavailability functional food research.

The major limitations for bioavailability of Curcumin are that its water insoluble nature and rapid metabolism. The water solubility of Curcumin is estimated to no more than 11 ng/mL. On the other hand, we have a very limited understanding about the absorption/permeation mechanism of solubilized Curcumin.

Caco-2 cell monolayers, in comparison, have been widely used to determine the permeation rate and to examine the permeation mechanisms of bioactive compounds. Caco-2 cell monolayers have been found to predict well the *in vivo* absorption.

Objective:

To investigate the absorption of solubilized Curcumin through permeation rate measurements using Caco-2 cell monolayers.

Study Design:

Permeation experiments was carried out by comparing the permeation rates of Curcumin in two opposite directions (A—B versus B—A) across the Caco-2 monolayers

Permeation experiments were performed at 21-29 days after plating

Results:

The data suggested that solubilized Curcumin permeated through Caco-2 cell monolayers fairly rapidly and the permeation mechanism was passive diffusion. Thus, it was suggested that solubilization may be the major hurdle for proper absorption and not the permeation/absorption after solubilisation

Improved oral bioavailability of Curcumin was witnessed in case of lipid-based formulations, as they were able to solubilize Curcumin after digestion and also increased the permeation of solubilized Curcumin, unlike aqueous-based formulations

Different solubilization agents affected the permeation rate of Curcumin and permeation rate also decreased due to strong binding between different solubilization agents and Curcumin

Discussion:

Overall, Caco-2 cell monolayer model demonstrated that solubilization is the main limiting factor for curcumin absorption and different solubilization agents affect the permeation rate.