

Understanding Health-Related Properties of Grapes by Pharmacokinetic Modelling of Intestinal Absorption

Authors : Sophie N. Selby-Pham, Yudie Wang, Louise Bennett

Abstract : Consumption of grapes promotes health and reduces the risk of chronic diseases due to the action of grape phytochemicals in regulation of Oxidative Stress and Inflammation (OSI). The bioefficacy of phytochemicals depends on their absorption in the human body. The time required for phytochemicals to achieve maximal plasma concentration (T_{max}) after oral intake reflects the time window of maximal bioefficacy of phytochemicals, with T_{max} dependent on physicochemical properties of phytochemicals. This research collated physicochemical properties of grape phytochemicals from white and red grapes to predict their T_{max} using pharmacokinetic modelling. The predicted values of T_{max} were then compared to the measured T_{max} collected from clinical studies to determine the accuracy of prediction. In both liquid and solid intake forms, white grapes exhibit a shorter T_{max} range (0.5-2.5 h) versus red grapes (1.5-5h). The prediction accuracy of T_{max} for grape phytochemicals was 33.3% total error of prediction compared to the mean, indicating high prediction accuracy. Pharmacokinetic modelling allows prediction of T_{max} without costly clinical trials, informing dosing frequency for sustained presence of phytochemicals in the body to optimize the health benefits of phytochemicals.

Keywords : absorption kinetics, phytochemical, phytochemical absorption prediction model, *Vitis vinifera*

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