ivivc - A Tool for *in vitro-in vivo* Correlation Exploration with *R*

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Introduction *In vitro-in vivo* correlation (IVIVC) is defined as the correlation between *in vitro* drug dissolution and *in vivo* drug absorption. The main purpose of an IVIVC model is to utilize *in vitro* dissolution profiles as a surrogate for *in vivo* bioequivalence and to support biowaivers. In order to prove the validity of a new formulation, which is bioequivalent with a target formulation, a considerable amount of efforts is required to study bioequivalence/bioavailability. Thus, data analysis of IVIVC attracts attention from the pharmaceutical industry. The purpose of this study is to develop an IVIVC tool (*ivivc*) in R. **Methods** Development and validation are 2 critical stages in the evaluation of an IVIVC model. In the first stage, the development of level A IVIVC model is usually estimated by a two-stage process. (1) Deconvolution: the observed fraction of the drug absorbed is based on the Wagner-Nelson method. IV, IR or oral solution was attempted as the reference. Then, the pharmacokinetic parameters will be estimated using a nonlinear regression tool or be attempted from literatures reported previously. The IVIVC model is developed using the observed fraction of the drug absorbed and that of the drug dissolved. Based on the IVIVC model, the predicted fraction of the drug absorbed is calculated from the observed fraction of the drug dissolved. (2) Convolution: the predicted fraction of the drug absorbed is then convolved to the predicted plasma concentrations by using the convolution method. In the second stage, evaluating the predictability of a level A correlation focuses on estimating the percent prediction error (%PE) between the observed and predicted plasma concentration profiles, such as the difference in pharmacokinetic parameters (C_{max}, and the area under the curve from time zero to infinity, AUC_{∞}). **Results and Discussion** We call this tool as *ivivc*. It can be used to calculate the observed fraction of the drug absorbed in different pH media and formulations with multiple subjects at the same time. Based on the linear regression, the predicted fraction of the drug absorbed is calculated from the observed fraction of the drug dissolved. Furthermore, the percent prediction error (%PE) between the observed and predicted plasma concentration profiles, such as C_{max} and AUC_{∞} are also calculated. **Conclusion and Future Work** In this study, we have successfully created the package, *ivivc*. *ivivc* will be released to public soon. In the future, we will include more methods that have been published and frequently used to develop IVIVC.