Drug-drug and drug-food interactions of cytochrome P4503A4

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The adverse effects of drug-drug interactions are costly both in terms of human life and investment (withdrawal of drugs from the market). Inhibition of CYP-mediated (cytochrome P450) drug metabolism by a concomitantly administered second drug is one of the major causes of drug–drug interactions in humans and can lead to serious adverse reactions or toxic side effects. Although less publicised, drug-food interactions can also cause an increase or decrease in the oral drug bioavailability when co-administered, the most well known case being that of grapefruit juice and the short-acting calcium channel blocker, nifedipine.

One major limitation of these types of studies is the lack of fast and reliable tests for measuring such phenomena. Here we report the first in vitro characterisation of drug-drug and drug-food interactions of CYP enzymes using an electrochemical platform devised in our group. The use of in vitro data to predict the CYP inhibition by a co-administered drug/food is attractive because of the rapid and simple experimental procedures involved. In terms of drug-drug and drug-food interactions, data will be presented on CYP3A4 inhibition by both strong and weak inhibitors of this enzyme; ketoconazole (anti-fungal), cimetidine (histamine H₂-receptor antagonist), grapefruit juice, curcumin (curry spice turmeric) and resveratrol (red wine).