



TITLE:

Drug Metabolizing Enzyme Activity in Human In Vitro Dermal and Airway Epithelial Tissue Models.

AUTHORS:

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ABSTRACT:

Purpose: Human dermal and airway epithelia contain xenobiotic metabolizing enzymes (XME) that can cause biotransformation of drugs resulting in altered drug activity or formation of toxic/mutagenic metabolites. The goal of the present work was to evaluate the expression of XMEs in highly differentiated in vitro models of human dermal (EpiDerm™) and airway (EpiAirway™) epithelia.

Methods: RT-PCR experiments were conducted to evaluate baseline and inducible expression of cytochrome P450 (CYP) isoforms in the epithelial cultures. CYP enzyme activity was confirmed by monitoring the metabolism of ethoxyresorufin, Glutathione S-transferase (GST) activity in the epithelial models was evaluated by measuring conjugation of glutathione with 1-chloro-2,4-dinitrobenzene, and UDP-Glucuronyltransferase activity was determined by 4-methylumbelliferone conjugation.

Results: EpiAirway cultures constitutively expressed CYP1A1 (weak), CYP1B1, CYP2A6, CYP2B6 (weak), CYP2C8 (weak), CYP2C19, CYP2D6, CYP2E1 and CYP3A5, while CYP3A4 and 3A7 were not detected. 3-Methylcholanthrene (3MC) strongly increased expression of CYP1A1 and slightly increased CYP2B6 and CYP2C8 expression in EpiAirway. In EpiDerm, CYP1B1, CYP2C19, CYP2D6, CYP3A4 (weak) and CYP3A5 were constitutively expressed. 3-Methylcholanthrene (3MC) strongly increased expression of CYP1A1 and CYP1B1 in EpiDerm. Enhanced metabolism of the CYP1A1 and CYP1B1 substrate ethoxyresorufin confirmed increased activity following treatment with 3MC. Thus CYP expression in EpiAirway and EpiDerm showed a high concordance with CYP expression reported for in vivo human airway and dermal epithelia. In addition, high baseline GST and UDP-glucuronyltransferase activity was present in both models but enzyme activity was not further enhanced by 3MC treatment.

Conclusions: The results demonstrate that the EpiDerm and EpiAirway in vitro human epithelial models possess in vivo-like XME activities and thus will be useful for evaluating metabolism of dermal applied or inhaled drugs.

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