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Non invasive point of care diagnostic tests for personalized therapy

Anil S Modak

Cambridge Isotopes Laboratories Inc., USA

Abstract

Phase I enzymatic reactions are primarily responsible for the metabolism of drugs mainly in the liver. These prodrugs are converted to their pharmacologically active in while others are detoxified.

Several polymorphic P 450 enzymes are responsible for the metabolism of widely used cardiovascular, cancer, psychiatric, antacid and analgesic drugs and we have now researched and developed rapid (< 1 h), non invasive breath tests that would enable physicians to personalize medications instead of the current paradigm of trial and error medication protocols.

The use of stable isotope labeled substrates (drugs) for non invasive, *in vivo*, rapid, phenotype breath tests using $^{13}CO_2$ as a biomarker is a novel and unique approach to provide the physicians diagnostic tools for the selection of individualized therapy at the optimal dose depending on the patients enzyme activity. These breath tests could also be used as companion diagnostic tests (CDx) to identify responders/nonresponders for novel drugs in clinical trials primarily metabolized by P 450 enzymes.

A number of breath tests with clinical applications will be presented

Ura-BT (DPD) for personalizing 5-FU therapy

Ptz-BT (CYP2C19) for personalizing Antiplatelet therapy (Clopidogrel, or Prasugrel/ Ticagrelor)

DM-BT (CYP2D6) for personalizing breast cancer endocrine therapy (Tamoxifen or Aromatase inhibitors)

LD-BT (DDC) for personalizing Carbidopa dose in Parkinsons disease patients

Sodium bicarbonate-BT for identifying hypercapnia and monitoring following therapy for COPD patients

Biography

Dr. Anil Modak, the Associate Director of Medical Products Research & Development at Cambridge Isotope Laboratories in Andover, MA, has been involved in the design and development of novel non invasive breath tests using stable isotope substrates for the diagnosis of disease states and evaluation of enzyme activity. He is the author of several recent patents and publications.

His previous experience includes working for Ribozyme Pharmaceuticals in Boulder, CO and Monsanto in St Louis, MO. His postdoctoral research was conducted at the University of Iowa and Kings College London.

He serves on the Editorial board of two journals *Journal of Breath Research. Volatiles for Medical Diagnoses* and *Journal of Pharmacogenomics & Pharmacoproteomics*. He is one of the founding members of the International Association for Breath Research. He has been awarded 15 patents and is an author of 34 papers in renowned international journals.

anilm2@isotope.com