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(54) Title: MOLECULAR FLUX RATES THROUGH CRITICAL PATHWAYS MEASURED BY STABLE ISOTOPE LABELING IN VIVO, AS BIOMARKERS OF DRUG ACTION AND DISEASE ACTIVITY

(57) Abstract: The methods described herein enable the evaluation of compounds on subjects to assess their therapeutic efficacy or toxic effects. The target of analysis is the underlying biochemical process or processes (i.e., metabolic process) thought to be involved in disease pathogenesis. Molecular flux rates within the one or more biochemical processes serve as biomarkers and are quantitated and compared with the molecular flux rates (i.e., biomarker) from control subjects (i.e., subjects not exposed to the compounds). Any change in the biomarker in the subject relative to the biomarker in the control subject provides the necessary information to evaluate therapeutic efficacy of an administered drug or a toxic effect and to develop the compound further if desired. In one aspect of the invention, stable isotope-labeled substrate molecules are administered to a subject and the label is incorporated into targeted molecules in a manner that reveals molecular flux rates through one or more metabolic pathways of interest. By this method, a comparison between subjects and control subjects reveals the effects of the chemical entity or entities on the biomarkers. This, in turn, allows for the identification of potential therapeutic uses or toxicities of the compound. Combinations of compounds can also be systematically evaluated for complementary, synergistic, or antagonistic actions on the metabolic pathways of interest, using the methods of the present invention as a strategy for identifying and confirming novel therapeutic or toxic combinations of compounds.



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