OPTICAL IMAGING OF NUTRIENT FLUXES IN VIVO

Tech ID: 20882 / UC Case 2010-124-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,010,629	07/03/2018	2010-124

BRIEF DESCRIPTION

Obesity related disorders ranging form cancer to diabetes have seen an epidemic growth over the last decade. The molecular mechanisms connecting obesity to the particular diseases are poorly understood but frequently involve abnormal fluxes of metabolites, such as fatty acids into organs. Cellular fatty acid uptake plays an important role in many physiological and pathological processes including the development of diabetes and heart disease. For example, inappropriately high fatty acid uptake by the liver can cause hepatosteatosis and inappropriate uptake of fatty acids by the heart has been linked to cardiomyopathy. However, no current technology allows for the non-invasive monitoring of the in vivo uptake of key metabolites such as fatty acids on a cellular level.

Scientists at UC Berkeley developed a novel approach for in vivo optical imaging of fatty acids and potentially other important metabolites. The concept is based on conjugating a luciferin precursor via a reducible disulfide linker to a metabolizable substrate such as a long-chain fatty acid (FFA-luc). Upon uptake by cells via transporter mediated process, the luciferin precursor is released through reduction of the disulfide bond, which then undergoes an intramolecular rearrangement rendering it to become a substrate for the light generating enzyme firefly luciferase. Thus the generation of photons by luciferase is directly coupled to the rate of fatty acid (or another metabolite) uptake by cells or organs. Photon flux generated by FFA-luc uptake in turn can be detected by using non-invasive imaging technologies such as ultra-sensitive optical cameras or MRI, thus giving information about both the uptake rate and localization of uptake activity.

SUGGESTED USES

- Detect intestinal abnormalities
- Secondary screen for novel natural and synthetic anti-obesity drugs.
- Longitudinal imaging of cardiac substrate utilization changes as a primary or secondary result of drug administration
- Identification of natural or synthetic inhibitors of liver fatty acid uptake for the treatment of hepatosteatosis
- Characterization of compounds and conditions able to activate fatty acid utilization by brown adipose tissue to stimulate weight loss.

ADVANTAGES

- Real-time
- Non-invasive
- Non-toxic
- Highly specific and extended expression

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

▶ D-Amino Acid Derivative-Modified Peptidoglycan and Methods of Use Thereof

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OTHER INFORMATION

CATEGORIZED AS

» **Biotechnology**
» Bioinformatics
» Genomics
» Proteomics
» **Imaging**
» Medical
» Molecular
» **Research Tools**
» Expression System
» Reagents

RELATED CASES

2010-124-0

- Synthetic compound for quadricyclane labeling of multiple biomolecules without disrupting living systems
- Alkyne-Activated Fluorogenic Azide Probes
- Isotope Targeted Glycoproteomics For Nontemplated Glycan And Peptide Isoform Discovery

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