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Novel optical real-time imaging tools reveal large effects of gut microbiota on lipid uptake in live animals

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Triglycerides (TG) are the main form of fat in the human diet, but increased consumption of TG may lead to the development of obesity and diseases such as type 2 diabetes, cardiac lipotoxicity, hepatic steatosis and cancer. Despite the important role of TG in human health and nutrition the role of this important metabolite still remains elusive due to the lack of real-time noninvasive imaging tools. To address this unmet need we developed a novel optical probe that is based on sensitive bioluminescent readout. This reagent allows quantification and imaging of TG uptake in live cells and living mice non-invasively in real time. Using this new reagent, we have investigated the role of gut microbiota on the rate/amount of absorption of TG in live mice.



Recent Publications:

1. Mezzanotte L, Root M, Karatas H, Goun EA and Löwik C W G M (2017) *In vivo* molecular bioluminescence imaging: new tools and applications. Trends in Biotechnology 35(7): 640-652.
2. Park H M, Russo K A, Karateev G, Park M, Dubikovskaya E, Kriegsfeld L J and Stahl A (2016) A system for *In vivo* imaging of hepatic free fatty acid uptake. Gastroenterology 152(1):78-81.
3. Tharp K M, Jha A K, Kraicz J, Yesian A, Karateev G, Sinisi R, Dubikovskaya E A, Healy K E and Stahl A (2015) Matrix-assisted transplantation of functional beige adipose tissue. Diabetes 64(11):3713-24.
4. Vorobyeva A G, Stanton M, Godinat A, Lund K B, Karateev G G, Francis K P, Allen E, Gelovani J G, McCormack E, Tangney M and Dubikovskaya E A (2015) Development of a bioluminescent nitroreductase probe for preclinical imaging. PLoS One 10(6): e0131037.
5. Geissbuehler S, Sharipov A, Godinat A, Bocchio NL, Sandoz PA, Huss A, Jensen NA, Jakobs S, Enderlein J, Gisou van der Goot F, Dubikovskaya EA, Lasser T and Leutenegger M (2014) Live-cell multiplane three-dimensional super-resolution optical fluctuation imaging. Nature Communications 5:5830

Biography

Elena A Goun has been appointed tenure track Assistant Professor of Bio-Organic Chemistry at the School of Basic Sciences (FSB). She received her MS degree from University of Central Florida under supervision of D Howard Miles in the field of Medicinal Chemistry of Natural Products. She then continued her PhD studies in the field of Medicinal Chemistry and Drug Delivery in the group of Professor Paul Wender at Stanford University. After graduation with a PhD degree in 2008, she did her Postdoctoral studies in the field of Chemical Biology at the group of Carolyn Bertozzi University of California at Berkeley. She is an Advocate of an Interdisciplinary Approach, Combining Synthetic Chemistry, Optical Imaging, and an understanding of cellular functions at molecular level to find solutions to fundamental problems in biology and medicine. She has developed several new non-invasive imaging techniques that allow studies of molecular signatures of cancer and metabolic diseases. She will perform her research work in the context of the new Chair in Biological Chemistry, at EPFL's Institute of Chemical Sciences and Engineering.

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