

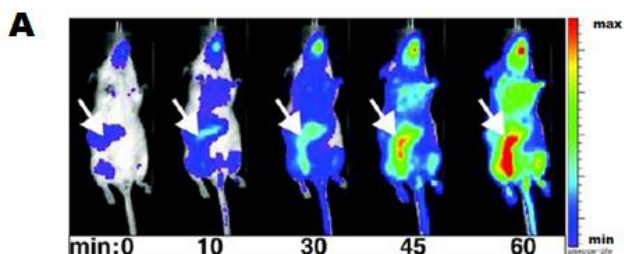
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## Free Fatty Acid Luciferin

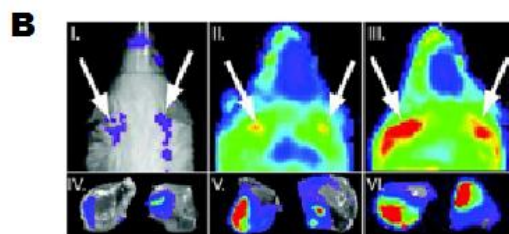
### Description:

Free fatty acids (FFAs) activate transcription factors and modulate signaling cascades. The uptake of lipids such as FFAs is altered under several physiological and pathological conditions, reflecting important underlying metabolic processes. FFA fluxes can be shifted by pharmacological interventions.

Free Fatty Acid Luciferin is a bioactivatable molecular imaging probe for the real-time bioluminescent imaging of fatty acids fluxes in cell culture and living animals. The probe includes luciferin molecule conjugated to a long-chain fatty acid *via* a cleavable disulfide bond that is stable in the extracellular environment but readily reduces intracellularly by glutathione after lipid uptake. This probe provides noninvasive, real-time, spatiotemporal and quantitative imaging of fatty acid uptake which opens a wide range of opportunities for establishing new drug screens as well as for investigations of fundamental biological processes involving FFA absorption and distribution in living animals.



(a) Uptake of FFA-SS-luc by the small intestine in FVB-luc<sup>+</sup> mice. Ventral luminescent/ photographic overlay sequence of animals following a gavage with 100  $\mu$ L FFA-SS-luc (20  $\mu$ M) in cremophor. Scale min:  $1.64 \times 10^5$  p/s and max:  $2.60 \times 10^6$  p/s (photons/second).



(b) Uptake of FFA-SS-luc following injection into FVB-luc<sup>+</sup> mice. Ventral luminescent/ photographic overlay of intact (I–III) and excised (IV–VI) brown adipose tissue 30 min after intraperitoneal injection of 100  $\mu$ L of a 0.1% (w/v) BSA PBS solution containing either 200  $\mu$ M FFA-S-luc (I/IV), FFA-SS-luc (II/V), or FFA-SS-luc with 1 mg/kg of the  $\beta$ -adrenergic agonist CL316243 (III/VI). I–III scale min:  $2.62 \times 10^5$  p/s and max:  $5.02 \times 10^6$  p/s. IV–VI scale min:  $1.85 \times 10^4$  p/s and max:  $8.34 \times 10^5$  p/s.

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# Free Fatty Acid Luciferin

## Features:

- Imaging of fatty acids uptake in cell culture and in living animals *in vivo*
- High sensitivity and signal to noise ratio
- Recommended imaging time is 10-60 min post injection of the probe
- Recommended doses are 20 $\mu$ M per mouse injected i.p., 40  $\mu$ M for oral gavage

## Applications:

- Intestinal fatty acid absorption
- Brown adipose tissue activation
- Hepatic free fatty acid uptake
- Trans-endothelial flux of fatty acids

## References:

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- 2) Jang C., Oh S. F., Wada S., Rowe G. C., Liu L., Chan M. C., Rhee J., Hoshino A., Kim B., Ibrahim A., Baca L. G., Kim E., Ghosh C.C., Parikh S. M., Jiang A., Chu Q., Forman D. E., Lecker S. H., Krishnaiah S., Rabinowitz J. D., Weljie A. M., Baur J. A., Kasper D. L., Arany Z. A branched-chain amino acid metabolite drives vascular fatty acid transport and causes insulin resistance. *Nat Med.*, 2016, 22(4), pp 421–426
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SwissLumix Sarl  
 EPFL Technology Park, Batiment C  
 Lausanne, Switzerland  
 T: +41 78 857 1660  
 www.swisslumix.com