IN VIVO TRACKING METABOLIC INSULIN WITH TWO-PHOTON FLUORESCENCE OF GOLD NANODOTS

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ABSTRACT—We successfully synthesized functional human insulin–Au nanodots (NDs)\textsuperscript{[1]} for the \textit{in vivo} imaging of insulin metabolism. The insulin–Au NDs have efficient red to near infrared fluorescence and deep tissue subcellular uptake of insulin–Au NDs can be clearly resolved through a least-invasive harmonic generation and two-photon fluorescence (TPF) microscope. By in vivo investigations on mice ear and ex vivo assays on human fat tissues, we demonstrated that cells which have rich insulin receptors present higher uptake of administrated insulin. Fascinatingly, the insulin–Au NDs can even penetrate into lipid droplets (LDs) of adipocytes. We found that enlarged adipocytes in type II diabetes mice \textsuperscript{[2]} appear higher adjacent/LD concentration contrast than small-sized ones in wild type mice by using this newly discovered metabolic phenomenon. The epicardial adipocytes samples of patients with diabetes and coronary artery disease (CAD) also show elevated adjacent/LD concentration contrast. Accordingly, insulin–Au nanodots supply a new approach to explore subcellular insulin metabolism in vivo or ex vivo with metabolic or cardiovascular diseases.
