Supplementary Material

# Using endogenous glycogen as relaxation agent for imaging liver metabolism by MRI

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# Supplementary Material

*1. Oxygen saturation experiment*

To investigate the influence of oxygen saturation on the transverse relaxivity of glycogen, three different oxygen saturations have been selected in our study, nitrogen-saturated, oxygen-saturated, and blank one as a control. Since it's hard to adjust the oxygen saturation *in vivo*, we have done this experiment using blood *in vitro*. Fresh blood samples were obtained from rat hearts, and EDTA-K2 anticoagulant was added, with glycogen added to a final concentration of 5, 10, 20, and 25 mM. As shown in Table S1, the transverse relaxivities of oxygen-saturated and blank control groups are 0.1128 $mM^{-1}s^{-1}$ and 0.1117 $mM^{-1}s^{-1}$. However, under nitrogen-saturated conditions, the transverse relaxivity of blood was 0.0838 $mM^{-1}s^{-1}$.

**Table S1**: **Transverse relaxivity measured after $N_2$ or $O_2$ saturation of the blood at 37°C. Group 1: nitrogen-saturated. Group 2: oxygen-saturated. Group 3: blank control.**

| | Group 1 | Group 2 | Group 3 |
|---|---|---|---|
| $r_{2ex}$ ($mM^{-1}$ $s^{-1}$) | 0.0838 | 0.1128 | 0.1117 |

*2. Food intake experiment*

We explored the effect of insulin on liver glycogen metabolism in mice. After one night of diet control (1 g/mouse), mice were injected intraperitoneally with glucose solution (1.67 M, 100 μL). The saline solution with or without insulin was injected intraperitoneally after 30 minutes (bovine insulin from Macklin, 100 μL, 1 mg/mL). The $T_2$-weighted imaging was applied for two hours. Figure S1a shows the changes in the intensity of the liver $T_2$-weighted image signal after insulin injection and the changes in the control group in Figure S1b. From figure S1c, we can see that glycogen accumulation in the liver gradually increased after insulin injection. With the disappearance of the drug effect, the glycogen in the liver began to be progressively consumed.

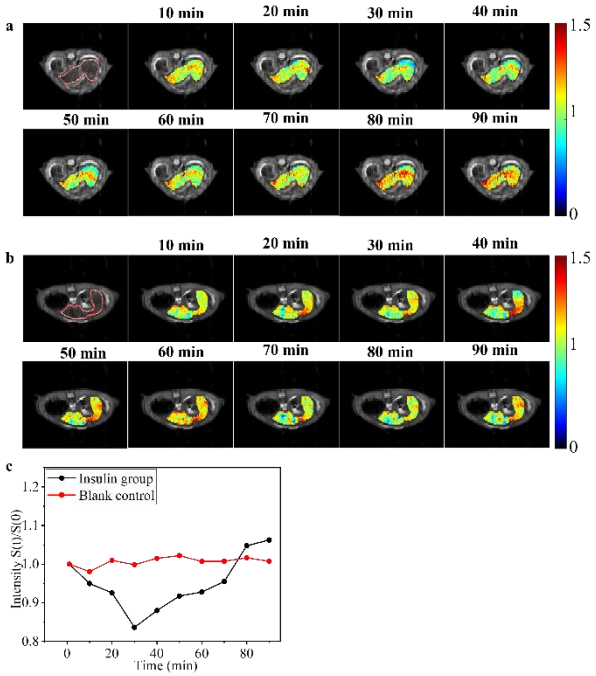


**Figure S1**. (**a**): i.p. injection with insulin solution; (**b**): i.p. injection with saline; (**c**): The signal intensity change curve between the experimental group and the blank control shows that after insulin injection, the signal of liver glycogen first decreased and then gradually increased.