

## Integrated metabolomics analysis reveals altered energy metabolism in adipose tissue of diabetic mice

Yi Ru, Li Xiang, Zongwei Cai\*

State key Laboratory of Environmental and Biological Analysis, Department of Chemistry, Hong Kong Baptist University, Hong Kong SAR, China

\*Corresponding author: Zongwei Cai, Email: zwcai@hkbu.edu.hk

### Introduction

Adipose tissue regulates many important physiological processes, and its dysfunction such as insulin resistance (IR) in type 2 diabetes is closely related to its disordered metabolic profile. However, the potential mechanism is still unclear. Therefore, non-targeted combined with targeted metabolomics based on ultra performance liquid chromatography coupled with mass spectrometry systems were used to assess the metabolic profile of subcutaneous adipose tissue between db/+ and db/db diabetic mice.

### Objectives

- ◆ To explore the changes in the metabolic profile of white adipose tissue in diabetic mice based on non-targeted combined targeted metabolomics
- ◆ Determination of the differences in energy metabolism pathways in white adipose tissue of diabetic mice

### Non-targeted metabolomics analysis

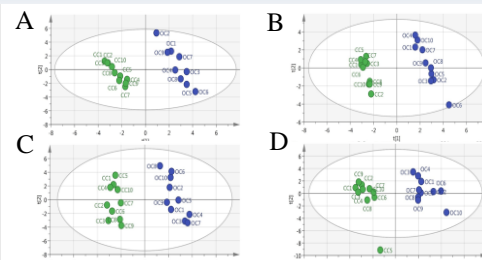


Fig. 1 Two-dimensional PLS-DA, ESI plots of metabolic profiles in db/db and db/m+ mice. Metabolomics analysis using reversed-phase column under ESI positive mode (A) and ESI negative mode (B). Metabolomics analysis using HILIC column under ESI positive mode (C) and ESI negative mode (D). Green dot represent db/m+ and blue dot represent db/db mice.

### Targeted determination of acylcarnitine

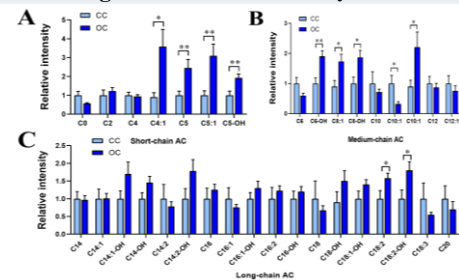


Fig. 2 Changes of acylcarnitines in response to diabetes. A: The changes of short chain acylcarnitines between db/db mice and db/m+ mice. B: The changes of medium chain acylcarnitines between db/db mice and db/m+ mice. C: The changes of long chain acylcarnitines between db/db mice and db/m+ mice.

### Targeted determination of free fatty acids, ketone body and TCA cycle metabolites

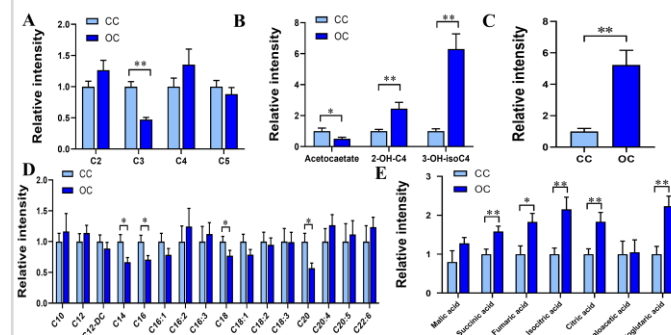


Fig. 3 Changes of free fatty acids, TCA cycle metabolites and its intermediates in response to diabetes. A: The changes of short chain free fatty acids between db/db mice and db/m+ mice. B: The changes of ketone bodies between db/db mice and db/m+ mice. C: The changes of glucose between db/db mice and db/m+ mice. D: The changes of long-chain free fatty acids between db/db mice and db/m+ mice. E: The changes of TCA cycle metabolites between db/db mice and db/m+ mice

### Conclusions

- ◆ We analyzed the metabolic profiles in subcutaneous adipose tissue of db/db diabetic mouse models by combining non-targeted and targeted metabolomics.
- ◆ The increased acylcarnitine and decreased fatty acids may indicate the disorder of lipid metabolism in adipose tissue under hyperglycemia.
- ◆ In addition, the increased TCA metabolites may indicate abnormal energy metabolism in adipose tissue of diabetic mice.
- ◆ These significantly changed differential metabolites may provide new insights and strategies for exploring the pathogenesis of obese diabetes.

### References

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