

## DIABETES

# Gut microbiome influences exercise response

Lifestyle interventions, such as exercise, are known to be very effective at preventing type 2 diabetes mellitus. However, individuals respond very differently to lifestyle interventions, and the mechanisms underlying this heterogeneity are unclear. New research now suggests that the gut microbiota could be involved in the response to exercise.

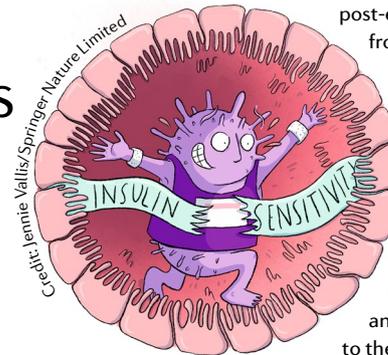
The researchers recruited 39 Chinese men with prediabetes and randomly assigned them to a 12-week, high-intensity exercise intervention or a sedentary control arm. Faecal samples were taken before and after the intervention. Participants in the exercise arm all experienced improvements in metabolic parameters (such as insulin sensitivity). However, a wide range in the degree of response was observed, with 14 men being

classified as responders and 6 as non-responders.

Next, shotgun metagenome sequencing was performed on the faecal samples. Exercise-induced alterations in the gut microbiome differed between responders and non-responders.

“In responders, the microbiome after exercise helps to break down amino acids that promote insulin resistance,” explain authors Michael Tse, Gianni Panagiotou and Aimin Xu. “But in non-responders, a different microbiome composition post-exercise leads to the breakdown of substances that promote insulin sensitivity.”

In addition, the researchers transplanted faecal microbiota from the human participants to obese mice. “When transplanting the participants’ gut microbiota into mice, blood sugar levels drop in animals that receive



“the microbiota and its metabolites serve as an important contributor to the metabolic benefits of exercise interventions



post-exercise microbiomes from responders,” report Tse, Panagiotou and Xu. No such changes were seen in the mice that received a transplant from non-responders.

“Our study suggests that the microbiota and its metabolites serve as an important contributor to the metabolic benefits of exercise interventions and also identifies maladaptation of gut microbiota as a ‘culprit’ for those individuals who do not respond to exercise intervention,” conclude Tse, Panagiotou and Xu. The researchers are now planning to expand their study by including different communities, male and female participants, participants from a wide range of ages and different forms of exercise.

*Claire Greenhill*

**ORIGINAL ARTICLE** Liu, Y. et al. Gut microbiome fermentation determines the efficacy of exercise for diabetes prevention. *Cell Metab.* <https://doi.org/10.1016/j.cmet.2019.11.001> (2019)