Proceedings of the Nutrition Society (2021), **80 (OCE3)**, E153 doi:10.1017/S0029665121002767

Irish Section Conference, 22–24 June 2021, Nutrition, health and ageing — translating science into practice – Part A

Mycoprotein reduces endogenous glucose production when consumed with a mixed-meal tolerance test

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Postprandial glucose kinetics can be managed by altering dietary composition. The addition of soluble fibre to a meal can decrease the total rate of glucose appearance (RaT)[(1)], while insoluble fibre has been shown to increase the rate of glucose disappearance (RdT)[(2)]. Mycoprotein (MYC) is a high-fibre food (1/3 soluble and 2/3 insoluble) shown to reduce postprandial glucose and insulin concentrations in healthy participants[(3)], though the underlying glucose kinetics have not been explored. The present study took a dual stable isotope tracer approach to determine how MYC impacts glucose kinetics when ingested with a mixed-meal. We hypothesised that the previously observed reduction in glucose concentrations with MYC ingestion would be due to a lower RaT. This study also aimed to determine whether this effect was dose dependent.

In a double-blind, randomised, cross-over design, 12 healthy adults (M:F 6:6) attended 3 experimental test days, involving ingestion of a test drink, enriched with 100 mg [U-13C] glucose, containing 250 ml whole milk, 50 g glucose, and either 0 (CON), 20 (MYC20), or 40 g (MYC40) MYC. CON and MYC20 were matched for energy, protein (18 g), carbohydrate (75 g) and fat (12 g). An intravenous infusion of D-[6,6-2H2] glucose was used to determine glucose kinetics over 6 h. Time-course and AUCs of glucose, insulin, and rate of appearance of total (RaT), exogenous (RaEx), endogenous (EGP), and RdT, of glucose were assessed using two- and one-way ANOVAs, respectively.

Drink ingestion resulted in a rapid increase in blood glucose and serum insulin concentrations, peaking at 45 and 30 min, respectively; however there were no differences between the conditions ($P > 0.05$). Both RaT and RdT decreased in the MYC40 compared with CON during 0–120 min (-14 ± SEM 4% and -16 ± 5%, respectively) ($P < 0.05$). RaEx was not affected by MYC in the first 0–120 min, but during 240–360 min RaEx was 14 (± 10)% greater in MYC40 than CON. MYC20 and MYC40 suppressed EGP by 19 ± 7% and 14 ± 5% respectively, compared to CON between 0–120 min, and this effect continued into 120–240 min for MYC20 but not for MYC40.

The present study showed MYC ingestion reduced postprandial EGP, implying that MYC, (or a product of its metabolism) directly affects the liver, particularly given there was no difference between MYC and CON in circulating insulin concentration.

References

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