Sex dimorphism affects gut microbiota-mediated effects on adipose tissue

Federica La Rosa[1], Maria Angela Guzzardi[1], Monica Barone[2], Daniele Panetta[1], Silvia Turroni[2], Mercedes Pardo-Tendero[1,3], Daniel Monleon[3], Patrizia Brigidi[2], Patricia Iozzo[1]

[1] Institute of Clinical Physiology (IFC-CNR)

[2] University of Bologna (Italy)

[3] University of Valencia (Spain)

Background:

The gut microbiota modulates body fat, glucose control and inflammation. We have shown sexspecific interactions during growth. In the JPI-HDHL-INTIMIC GUTMOM project, we aimed to examine sex-dimorphism in body weight and adipose tissue, as emerging in the long-term, in germfree mice compared to early-life recipients of faecal microbiota transplantation (FMT).

Methods and Results:

Germ-free (GF) mice were monitored until adulthood, and then studied with PET-CT imaging, ex vivo tissue histology, and fecal microbiota-metabolite characterization. At 1 month of age, a group received FMT from sex-matched child-donors. In general, female (vs male) mice ate less, weighed less, and had lower brown-fat volume, white-fat glucose uptake, and greater white-fat inflammation, caecum crypts number, and submucosa and muscularis externa thickness. In male mice, FMT (vs GF) increased food intake, but with lower fat accumulation and systemic inflammation. In females, FMT (vs GF) reduced glycemia, resistin, white fat-volume, radiodensity and glucose uptake, increasing caecum crypt length.

Conclusions and Significance:

The results support a potent sex-dimorphic role of the microbiota affecting the phenotype of recipients in a durable manner. FMT in mice seems metabolically protective.

Keywords:

faecal microbiota transplantation, humanized mice, sex dimorphism, white and brown adipose tissue, ceacum intestine

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Thematic Area:

- Frontiers in Microbiome Research
- Microbiome: from Research to Clinics

Infrastructures:

N.A.