



# Sexual Dimorphism in the Gut Microbiome: Microgenderome or Microsexome? Author's Reply

**TO THE EDITOR:** Basically I agree with the authors of “Sexual dimorphism in the gut microbiome: microgenderome or microsexome?”<sup>1</sup>, which is a letter to the editor regarding the review article.<sup>2</sup> Estrogen and androgens, the most widely known sex hormones, influence the gut microbiome, which in turn influences the metabolism of estrogen and androgens. These bidirectional interactions between the microbiota, hormones, immunity, and disease susceptibility has begun to be described as “microgenderome” mainly in human.<sup>3-6</sup> Beta-glucuronidase of the gut microbiome converts conjugated estrogens to their deconjugated forms and this active deconjugated estrogen enters the enterohepatic circulation and act on estrogen receptor  $\alpha$  and estrogen receptor  $\beta$  in the reproductive organs, muscle, nervous system, and vasculature; this applies to non-ovarian estrogen in men and postmenopausal women, but not ovarian estrogen in pre-menopausal women.<sup>3</sup> However, as sex refers to biological characteristics related to hormones and genetics, and gender refers to sociocultural attitudes, behaviors, and identities, the term “microgenderome” may not be entirely accurate.<sup>1,6</sup>

Actually some authors indicate that the effect of “gender” on the gut microbiome is very minor in comparison to “sex.”<sup>7</sup> However, it is true that the factors that influence the composition of the gut microbiome are diet, ethnicity, antibiotics, stress, psychological factors, maternal health during pregnancy, the method of birth (ie, vaginal birth versus cesarean section), environmental factors, and exercise, which are mainly related with “gender.” Considering national and international reports<sup>8,9</sup> that women tend to prefer fruits and vegetables more than men, the contribution of “gender” differences to the gut microbiome is definite. In addition, stress susceptibility in pregnant women impairs vaginal immune activity and reduces the number of *Lactobacillus*, a component of the vaginal flora. However, it is true that “gender” term was made when it became clear that sex was not able to explain the biological difference between males and females is not the same in variable ethnicities and countries. That’s why the meaning of “gender” could be vague

and inconsistent. Furthermore, the interrelationship of “sex” and “gender” is intimate that sometimes it is difficult to separate “gender” from “sex.” Taken together “micro-sex/genderome” may be better than either “microgenderome” or “microsexome.”

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