



Title	Reply to the Letter : Increased bioavailability of plasma polyphenols via the intestinal fermentation of soybean fibers: a role for gut microbiome?
Author(s)	Trakooncharoenvit, Aphichat; Tanaka, Seiya; Mizuta, Erika; Hira, Tohru; Hara, Hiroshi
Citation	European Journal of Nutrition, 58(6), 2563-2563 https://doi.org/10.1007/s00394-019-02030-4
Issue Date	2019
Doc URL	http://hdl.handle.net/2115/85220
Rights	The final publication is available at link.springer.com
Type	article (author version)
File Information	Final manuscript.pdf



[Instructions for use](#)

1 **Reply to the Letter: Increased bioavailability of plasma polyphenols via the intestinal**
2 **fermentation of soybean fibers: a role for gut microbiome?**

3 Aphichat Trakooncharoenvit¹, Seiya Tanaka¹, Erika Mizuta¹, Tohru Hira^{1,2} and Hiroshi Hara^{1,2}

4 ¹ Graduate School of agriculture, Hokkaido University, Sapporo 060-8589, Japan

5 ² Research faculty of Agriculture, Hokkaido University, Sapporo 060-8589, Japan

6 Hiroshi Hara

7 E-mail: hara@chem.agr.hokudai.ac.jp

8 Firstly, we really thank you for your comments on our recent paper and suggested us with
9 many interesting references. At the first point, we also agreed that quercetin might act as molecular
10 ignition for gut microbiome to release such catabolites. From your suggestion and evidence,
11 quercetin degraded products related with formation of propionic and other organic acids [1]. We
12 agree with this suggestion, but we would like to add some opinion that quercetin catabolites are
13 not main portion of cecal organic acids when compare to organic acids produced from fermentation
14 of dietary fiber [2,3]. This statement is confirmed by our cecal organic acids result. Organic acids
15 concentration of Q group is lower than that of soybean fiber treated (QS) group especially on
16 propionic concentration [4] suggesting that mainly occurred of cecal organic acids caused by cecal
17 fermentation of dietary fibers, not quercetin degradation. However, we planned to perform another
18 experiment by feeding rat with normal diet or normal diet with soybean fiber or normal diet with
19 soybean fiber and quercetin. Results from this experiment might give us more evidences to fulfill
20 an explanation for the effect from this fiber on enhancement of quercetin bioavailability.

21 From your suggestion, gut microflora has important roles for quercetin metabolism and the
22 flavonol bioavailability in plasma. We hypothesized that cecal bacteria might be upregulated the
23 expression of several genes related to carbohydrate-metabolizing enzymes, resulted in using
24 dietary fibers as substrate during their growth [5-7]. Consequently, quercetin and its metabolites
25 escaped from bacteria degradation and elevated plasma concentrations.

26 As your suggested on analytical statistic method, Iglewicz and Hoaglin's robust test for
27 multiple outliers. We used this statistical method by follow the formulation from Iglewicz and
28 Hoaglin's handbook [8] on our data. The outlier was not observed in this calculation from our raw
29 data. So, we can confirm that our set of data can be used.

30

31 References

- 32 1. Kawabata K, Yoshioka Y, Terao J (2019) Role of Intestinal Microbiota in the
33 Bioavailability and Physiological Functions of Dietary Polyphenols. *Molecules*. 24(2): 370
- 34 2. Henningsson Å, Björck I, Nyman, M (2001) Short-chain fatty acid formation at
35 fermentation of indigestible carbohydrates. *Näringsforskning*, 45(1), 165-168.
- 36 3. Dhingra D, Michael M, Rajput H, Patil RT (2011) Dietary fibre in foods: A review. *J Food*
37 *Sci Technol* 49(3), 255-266.
- 38 4. Trakooncharoenvit A, Tanaka S, Mizuta E et al (2019) Water-soluble dietary fibers
39 enhance bioavailability of quercetin and a fiber derived from soybean is most effective
40 after long-term feeding in rats. *Eur J Nutr*.
- 41 5. Hervert-Hernández D, Goñi I (2011) Dietary polyphenols and human gut microbiota: a
42 review. *Food Rev Int* 27:154–169.
- 43 6. Palafox-Carlos H, Ayala-Zavala JF, González-Aguilar GA (2011) The role of dietary fiber
44 in the bioaccessibility and bioavailability of fruit and vegetable antioxidants. *J Food Sci*
45 15:76.
- 46 7. Flint HJ, Scott KP, Duncan SH et al (2012) Microbial degradation of complex
47 carbohydrates in the gut. *Gut Microbes* 3:289–306.
- 48 8. Boris Iglewicz and David Hoaglin (1993), "Volume 16: How to Detect and Handle
49 Outliers", The ASQC Basic References in Quality Control: Statistical Techniques, Edward
50 F. Mykytka, Ph.D., Editor.