Changes in mouse gastrointestinal microbial ecology by the ingestion of kale

Poster #052

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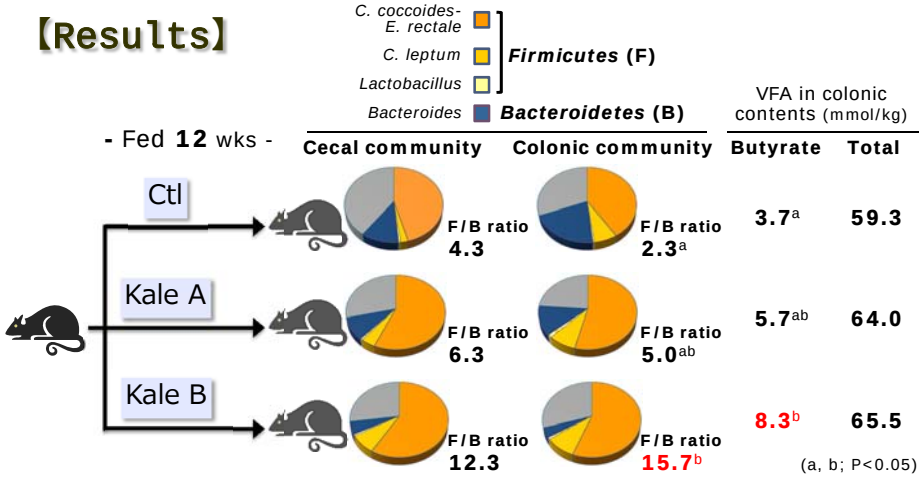
Kale (a cultivar of *Brassica oleracea*) has attracted a large attention because of its health-promoting effects, like anti-obesity. Considering the nutritional characteristics of kale, we hypothesized that the effect may be related to modulation of the gastrointestinal (GI) microbiota.

【Results】



	VFA in colonic contents (mmol/kg)	
	Butyrate	Total
Ctl	3.7[a]	59.3
Kale A	5.7[ab]	64.0
Kale B	8.3[b]	65.5

(a, b; P<0.05)

Experimental procedure

***Animals and groups:**
21 male C57BL/6 mice (5 wk-old, 7x3 groups)
(i) Control group (**Ctl**, Basal diet only)
(ii) Basal diet+Kale product A group (**Kale A**)
(iii) Basal diet+Kale product B group (**Kale B**)
--Individually housed in a SPF cage.

***Diets:**
--To make kale-incorporated feeds, basal diet and 0.1% of either of kale products were mixed, milled and repelletized.
--Feed and water were supplied for *ad libitum* intake.
--Feeding trial lasted 12 wks after 1 wk acclimatization.

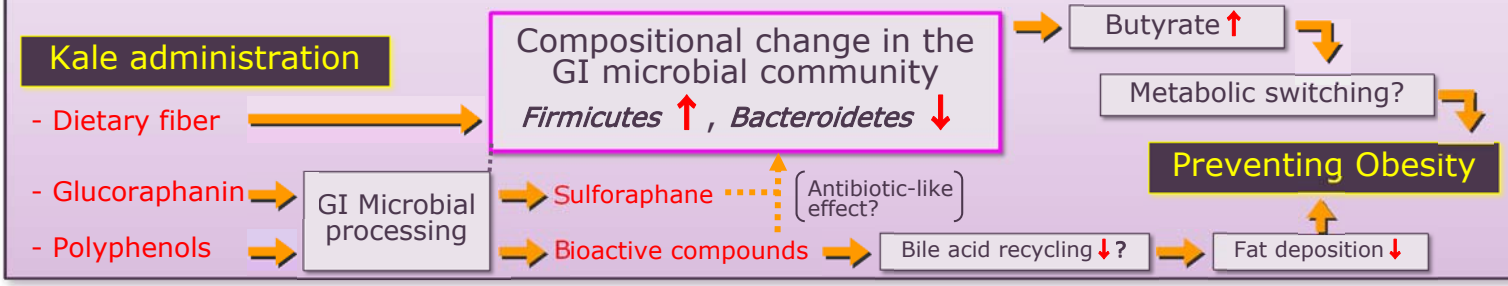
***Measurements:**
--Contents of the cecum and the colon sampled from sacrificed mice were processed for microbial composition analysis by sequence-specific SSU rRNA cleavage method (Uyeno et al., 2004) and short-chain fatty acid analysis by HPLC.

Bacteroides, *C. coccoides-E. rectale* group, and *C. leptum* subgroup constituted the major fraction of the bacterial community (59% – 74% of the total). In general, the microbiota in mice ingested kale had an elevated proportion of *Firmicutes* and a reduced population of *Bacteroidetes*. As a consequence, the ***Firmicutes*/*Bacteroidetes* ratio was higher in the kale B group** compared to the Ctl group. The compositional changes were similar to the intestinal flora observed in obese mice or in mice fed a high-calorie diet (Ley et al., 2005; Murphy et al., 2010), even though kale is recognized to have an inverse effect on the occurrence of obesity by its ingestion. To explain this, the increased F/B ratio may help promote adiposity or may alternatively represent a host-mediated adaptive response to optimize energy uptake and storage via **more butyrate production**, which leads to the regulation of host genes and the release of gut hormones controlling glucose- and lipid- metabolism (Cani & Delzenne, 2007; Diamant et al., 2011).

Conclusions

- The proportions of certain groups of cecal and colonic bacteria can respond to ingestion of kale.
- Such changes in the microbial ecology are presumably involved in the anti-obesity effect of kale, which are likely to induce topological changes in whole genetic functions of the gut microbiome, followed by stimulating energy harvest, storage and expenditure mechanism of the host.

Possible mechanism of kale administration for anti-obesity



【References】

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