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The effect of whole-grain compared to refined wheat on the gut microbial composition and integrity in a colonic epithelial cell model following a 12-week energy-restricted dietary intervention in postmenopausal women

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Intake of whole-grain products are considered to decrease the risk of cardiovascular disease (CVD). This effect could potentially be linked to a prebiotic effect, hence positive modulation of the gut microbial composition or activity. Kristensen and coworkers recently conducted a study in postmenopausal women who were randomized to either whole-grain wheat (WW) (n=38) or refined wheat (RW) (n=34) consumption as part of an energy-restricted diet for 12-weeks following a 2-week run-in period with RW. Percentage fat mass as well as serum total and LDL cholesterol were found to differ between the two groups (Kristensen, et al, 2012). We used fecal samples from the same study to examine effects of WW and RW on the bacterial composition by quantitative PCR targeting the phylums *Bacteroidetes* and *Firmicutes*, and the genera *Bifidobacteria*, *Lactobacillus*, *Bacteroides*, and *Prevotella*, as well as the *Enterobacteriaceae* family. Potential bifidogenic effects were examined in depth by determining the levels of *B. bifidum*, *B. adolescentis*, *B. catenulatum*, and *B. longum*. The ratios of both *Bifidobacteria* and *Lactobacillus* increased following the WW intervention.

The composition of the gut microbiota may affect the intestinal integrity, which in this study was evaluated *in vitro* by determining transepithelial resistance (TER) across a Caco-2 cell monolayer. Fecal water collected after the run-in period and following the intervention period for 26 participants (WW; 15 participants, RW; 11 participants) were used to determine effects of WW, RW, and microbiota composition on TER. Preliminary results indicate that fecal water from WW and RW both before and after intervention in general had a positive effect on TER, however, there was no difference in TER between WW and RW. Correlations between microbial composition and effect on intestinal integrity indicated a negative correlation between *Bifidobacteria* and TER as well as a positive correlation between the *Firmicutes/Bacteroidetes* ratio and TER.