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IMPACT OF QUANTITY AND QUALITY OF DIETARY FIBRE ON THE GUT MICROBIOME IN MOUSE STUDIES

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Introduction: Dietary fibre (DF) is an essential part of the diet both in humans and rodents. The intestinal microbiota (IM) utilizes DF as substrate and degrades the large polysaccharides to short chain fatty acids and other end products which serve as important energy sources for intestinal epithelial cells and offer a health benefit to the host. Rodent diets in experimental studies therefore include DF, but mostly insoluble DF like cellulose, which cannot be fermented by the IM. This can have huge effects on the gut physiology, e.g. lead to reduced cecum volume and colon length, potentially affecting physiology of the animals and the study outcome. We therefore evaluated the impact of different quantities and qualities of DF on the fecal IM composition in the mouse model. **Methods:** 120 male C57BL/6(J) mice (aged 4 weeks) were divided in 5 groups receiving one of 5 diets ad libitum: SC (standard chow = control group), AG (AIN-93G purified rodent diet), A30, A50, A70 (AIN-derived purified diets with increased DF content and a ratio of soluble:insoluble DF 30:70, 50:50, 70:30, respectively). The IM composition was determined from fecal samples at week 0 and 5, and colon and cecum contents at week 12. Variable region V4 of the 16S rRNA gene was amplified and sequenced on an Illumina MiSeq platform. Sequence data were analysed using dada2, phyloseq and ALDEx2, and classified taxonomically using Silva v132. **Results:** Fecal IM composition shifted between week 1 and week 5 leading to significant differences between the dietary groups, which were also seen in cecum and colon samples at week 12. The AIN93G diet (AG) resulted in lower abundances of Muribaculaceae and *Bacteroides* in comparison to SC, while in contrast *Bifidobacterium* and *Faecalibaculum* were higher. The three groups A30, A50 and A70 displayed an intermediate composition between AG and SC showing a gradual difference related to the DF composition. Most notably, the abundances of *Akkermansia* and Prevotellaceae group NK3B31 increased with the fraction of soluble fibre, while Lachnospiraceae group NK4A136 decreased. **Conclusion:** Both quantity and quality of DF in diets used in the mouse study modulate the composition of the fecal IM. A purified diet with increased amounts of soluble DF results in a microbiota composition that closer reflects the

microbiota of mice on a standard chow diet, with a range of biological effects on host physiology.