Addition of soluble fiber to standard purified diets is important for gut morphology and microbiome in mice

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Aim: Purified diets (PD) increase standardization and repeatability in rodent studies, but lead to differences in the phenotype of animals compared to grain-based “chow” diets. PD contain less fiber and are often devoid of soluble fiber, which can impact gut health. Thus, the aim of the present study was to modify the PD AIN93G by addition of soluble fiber, to promote more natural gut development as seen with chow diets.

Methods: One hundred twenty male C57BL/6J mice (from Charles River, Sulzfeld, Germany) were randomly assigned to one of five feeding groups, immediately after arrival (24 mice/group, 8 cages/group with 3 mice/cage). They were fed either a chow diet, AIN93G or one of three modified AIN93G with increased fiber content and different ratios of soluble fiber to cellulose for 12 weeks (70% soluble fiber: 30% cellulose [70S], 50% soluble fiber: 50% cellulose [50S] or 30% soluble fiber: 70% cellulose [30S]). As soluble fibers a mixture of inulin and pectin (50:50) was used. During the 12 weeks of intervention, body weight and food intake was assessed four times a week, and feces was collected during week 0, week 5 and week 10. After the intervention gut tissue was collected for histology (HE and AB stains) and gene expression analysis (qPCR). Furthermore, gut content was collected for analysis of microbiota (16s sequencing) and short-chain fatty acids (GC-FID).