The low-grade intestinal inflammation potentiates sarcopenia in Old Adults that can be restrained by a probiotic: Streptococcus Thermophilus CNRZ160

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Background-Objectives

Aging is characterized, at the systemic level, by the development of low-grade inflammation, which has been identified as determinant sarcopenia by preventing post prandial muscle anabolism. The origin of this "inflammaging" is still not clearly defined. An increase in intestinal permeability, a microbiota dysbiosis and subsequent generation of a micro- and then generalized inflammation has been hypothesized. The objective of our study is to test in vivo during aging, if 1) a chronic low grade intestinal inflammation can lead to anabolic resistance and muscle loss and 2) if a bacterial strain presenting anti-inflammatory properties could prevent these adverse effects.

Methods

To generate low grade intestinal inflammation, elderly rats (18m) were treated with chronic adapted Dextran Sodium Sulfate (DSS) ingestion for 28 days with (CNRZ group) or without (DSS group) S. Thermophilus CNRZ160 (10^9 CFU / day) previously shown to present an anti-inflammatory potential in vitro. They were compared to pair fed control (PF). Body composition was measured in vivo by EchoMRI whereas muscle and colon weights and protein synthesis (using ^{13}C Valine) were at slaughter. Groups were compared using ANOVA and Fisher posthoc test ($p < 0.05$).

Results

Body weight, lean mass and to a lesser extend fat losses were significantly greater in DSS compared to PF controls (-110 vs -86g, -51 vs -36g and -65 vs -47g, respectively). Similarly, gastrocnemius and tibialis muscles were smaller by 12% and 10% vs PF respectively. In contrast, colon was increased by 13% with DSS. Our probiotic allowed: 1) to maintain normal colon weight (2.09 for CNRZ vs 2.14g for PF) by preventing increase in protein synthesis 2) to limit the loss of lean body mass (-36g for CNRZ vs -38g for PF), 3) to limit muscle loss via a maintenance of post prandial muscle protein synthesis.

Conclusion

In the elderly, the loss of lean and muscle mass associated with low-grade intestinal inflammation can be reduced by the ingestion of S. Thermophilus. Preliminary data in adult rats showed that CNRZ160 prevented TNFα and IL1β up-expression in DSS-treated adult colon by 78 and 92%. CNRZ160 could therefore be considered as an efficient probiotic to modulate muscle mass loss and limit sarcopenia during aging.