

Summer Meeting, 28 June–1 July 2010, Nutrition and health: cell to community

## Physicochemical properties of oat beta-glucan influence its LDL cholesterol lowering effect in human subjects

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Daily consumption of 3 g oat  $\beta$ -glucan is considered sufficient to lower serum LDL cholesterol (LDL-C), but not all studies show an effect. The ability of oat  $\beta$ -glucan to reduce LDL-C is thought to depend on viscosity which is controlled by the molecular weight (MW) and the amount of oat  $\beta$ -glucan solubilized in the intestinal lumen (C), but this has not been demonstrated in human subjects.

Therefore, our two primary objectives were to determine if consuming 3 g high-MW oat- $\beta$ -glucan daily reduced LDL-C, and if LDL-C-lowering was related to  $\log(\text{MW} \times \text{C})$  of oat- $\beta$ -glucan. To address these objectives, we conducted a randomized, controlled, double-blind parallel design clinical trial in two contract-research-organisations and three university nutrition research centres in Canada, Australia and UK. A volunteer sample of healthy subjects with LDL-C  $\geq 3.0$  and  $\leq 5.0$  mmol/l ( $n$  786 screened,  $n$  400 ineligible,  $n$  19 refused,  $n$  367 randomized,  $n$  345 completed) were randomly assigned by the computer to receive one of five treatments. Subjects consumed cereal containing wheat fibre ( $n$  87) or a total of 3 g high-MW ( $n$  86), 4 g medium-MW ( $n$  67), 3 g medium-MW ( $n$  64) or 4 g low-MW ( $n$  63) oat  $\beta$ -glucan daily (OatWell<sup>®</sup>, divided doses, twice-daily) for 4 weeks. Using an intent-to-treat analysis, serum-LDL-C concentration after 4 weeks was compared between treatments after adjusting for baseline LDL-C.

After 4 weeks, LDL-C on 3 g high-MW oat  $\beta$ -glucan cereal was less than on wheat-fibre cereal by 0.21 mmol/l (95% CI;  $-0.11$ ,  $-0.30$ ,  $P = 0.0023$ ). By analysis of covariance  $\log(\text{MW} \times \text{C})$  was a significant determinant of week 4 LDL-C-cholesterol ( $P = 0.003$ ). The treatment effect was not significantly influenced by age, sex, study centre or baseline LDL-C.

It was concluded that consuming only 3 g high-MW oat  $\beta$ -glucan daily in a ready-to-eat cereal reduced LDL-C by 0.2 mmol/l; efficacy was reduced in cereals containing oat  $\beta$ -glucan with low MW. Thus, the physicochemical properties of oat  $\beta$ -glucan should be considered when assessing the cholesterol-lowering ability of oat-containing products.

The trial was registered at [www.clinicaltrials.gov](http://www.clinicaltrials.gov) NCT00981981.

Funding was provide by the Swedish Governmental Agency for Innovations Systems and CreaNutrition.