DISCOVERY AND DEVELOPMENT OF NOVEL GLUCANOTRANSFERASES FOR HEALTHIER FOODS

Tim Börner, Nestlé Research Center, Lausanne, Switzerland
Tim.boerner@rdls.nestle.com
Joana Gangoit, Laboratory of Microbial Physiology, GBB, University of Groningen, Netherlands
Lisa Lamothe, Nestlé Research Center, Lausanne, Switzerland
Stéphane Duboux, Nestlé Research Center, Lausanne, Switzerland
S. van Leeuwen, Laboratory of Microbial Physiology, GBB, University of Groningen, Netherlands
Lubbert Dijkhuizen, Laboratory of Microbial Physiology, GBB, University of Groningen, Netherlands
Christina Vafiadi, Nestlé Research Center, Lausanne, Switzerland

Key Words: glucanotransferase, alpha-glucans, starch, in-process formation, digestibility.

Providing nutritious, healthy and sustainably produced food is one of the main objectives of food companies such as Nestlé. Slowly digestible carbohydrates and dietary fibers are considered beneficial for human health. The aim of this work was to expand the enzymatic toolbox and to develop enzyme processes that reduce the glycaemic index of starch-containing foods.

By mining the gene pool of the Nestlé culture collection (NCC) with more than 3000 food grade strains, we identified sequences for novel glucanotransferases (Gtf). Two enzymes belonging to the sub family GtfB of the glycosyl hydrolase family 70 (GH70) originating from *Lactobacillus reuteri* (NCC 2613) and *L. fermentum* (NCC 2970) as well as the GtfD enzymes from *Paenibacillus beijingenis* and *Azobacter chroococcum* (of non-NCC origin) were expressed and biochemically characterized. All four Gtf enzymes produce unique α-glucans with alternating α(1,4) and α(1,6) or α(1,4) and α(1,3) linkages of different molecular size. In vitro digestion and process development studies were performed using raw materials (e.g. wheat flour) to evaluate the impact on starch digestibility as well as the in-process modification of cereal products.