SUGAR TRANSPORTER ENGINEERING IN YEAST TO ENABLE SIMULTANEOUS CO-CONSUMPTION OF SUGARS PREVALENT IN CELLULOSIC HYDROLYSATES

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Yeast sugar transporters are highly optimized for glucose transport, thus inhibiting the co-transport of non-glucose sugars present in lignocellulosic biomass. Previously characterized *At*SWEET7p transporter represents an exemplary sugar transport platform that can be exploited for simultaneous co-fermentation of different sugars present in the culture. Here, we systematically replaced major hexose transporters in engineered Saccharomyces cerevisiae by *At*SWEET7. The resulting strain (NKSW7-1) gained the capacity to co-ferment glucose, xylose, mannose, and fructose in synthetic medium and sugars in bagasse hydrolysate and sugar cane juice. Notably, the replacement of native sugar transporters by kinetically inferior *At*SWEET7 led to reprogramming cellular metabolism by activating glucose-repressed genes in the presence of substantial amounts of glucose. Our continuous-culture experiments demonstrated the feasibility of *At*SWEET7 to disable glucose repression of hexose or/and pentose sugar uptake. *At*SWEET7p's broad transport nature could provide a platform to achieve co-consumption of all sugars, and its inferior kinetics could be addressed by the application of continuous fermentation conditions.

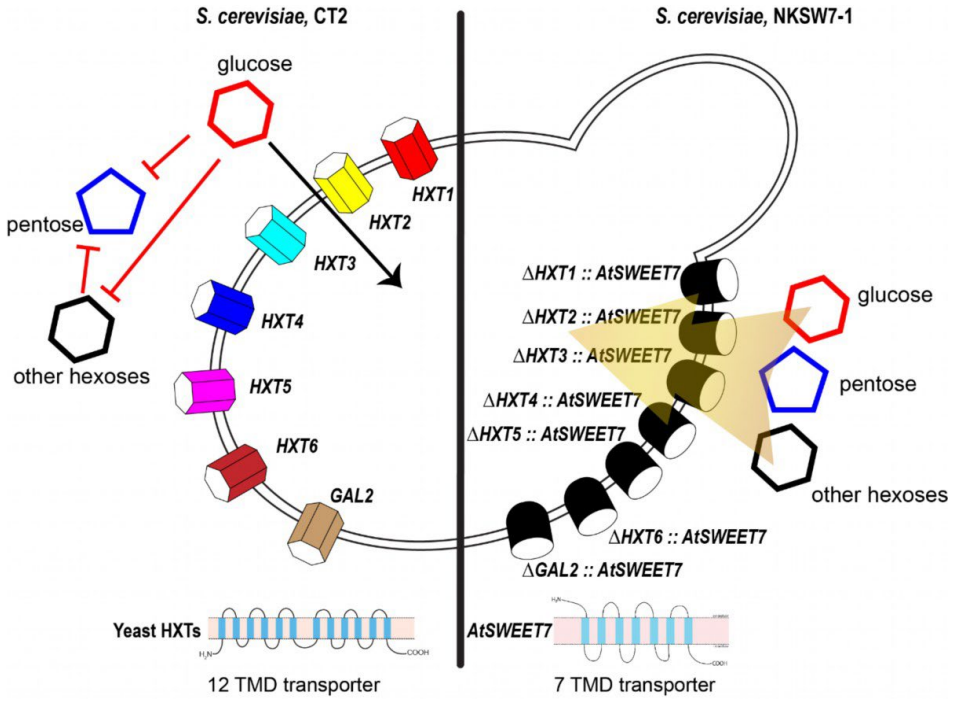

Figure 1 – Sugar transporter engineering for simultaneous co-utilization of mixed sugars by engineered yeast