Claims

1. Cell to be stably cultured in a medium, which cell is adjusted for the production of oligosaccharides, the cell being transformed to comprise at least one nucleic acid sequence coding for an enzyme involved in oligosaccharide synthesis,

characterized in that

the cell in addition is transformed to comprise at least one nucleic acid sequence coding for a protein of the sugar efflux transporter family, a functional homolog or derivative thereof.

2. Cell according to claim 1, characterized in that the cell is selected from the group consisting of bacteria, fungi, animal and plant cells.

3. Cell according to claim 2, characterized in that the cell is an *Escherichia coli* cell.

4. Cell according to anyone of claims 1 to 3, characterized in that the enzyme is selected from the group comprising glycosyltransferase, Leloir type glycosyltransferase, non-Leloir glycosyltransferase, fucosyltransferase, sialyltransferase, galactosyltransferase, mannosyltransferase, *N*-Acetylglucosaminyltransferase, *N*-Acetylgalactosaminyltransferase.

5. Cell according to claim 4, characterized in that the enzyme is a fucosyltransferase.

6. Cell according to anyone of claims 1 to 5, characterized in that the sugar efflux transporter is SetA or a derivative thereof.

7. Cell according to anyone of claims 1 to 6, characterized in that it is further transformed to comprise at least one nucleic acid sequence coding for a protein facilitating or promoting the import of educts required for oligosaccharide synthesis.

8. Cell according to claim 7, characterized in that it is transformed to comprise at least one nucleic acid sequence coding for a protein selected from the group consisting of lactose transporter, fucose transporter, sialic acid transporter, galactose transporter, mannose transporter, *N*-acetylglucosamine transporter, *N*-acetylgalactosamine transporter, ABC-transporter, transporter for a nucleotide-activated sugar and transporter for a nucleobase, nucleoside or nucleotide.

9. Cell according to anyone of claims 1 to 8, characterized in that it is further transformed to comprise at least one nucleic acid sequence coding for a protein selected from the group consisting of nucleotidyltransferase, guanylyltransferase, uridylyltransferase, Fkp, L-fucose kinase, fucose-1-phosphate guanylyltransferase, CMP-sialic acid synthetase, galactose kinase, galactose-1-phosphate uridylyltransferase, glucose kinase, glucose-1-phosphate uridylyltransferase, mannose kinase, mannose-1-phosphate guanylyltransferase, GDP-4-keto-6-deoxy-D-mannose reductase, glucosamine kinase, glucosamine-phosphate acetyltransferase, N-acetyl-glucosamin-phosphate uridylyltransferase, UDP-N-acetylglucosamine 4-epimerase, UDP-N-acetyl-glucosamine 2-epimerase.

10. Cell according to anyone of claims 1 to 9, characterized in that it comprises a catabolic pathway for selected mono-, di- or oligosaccharides, which is at least partially inactivated, the mono-, di- or oligosaccharides being involved in and/or required for the synthesis of oligosaccharides.

11. Cell according to anyone of claims 1 to 10, characterized in that the oligosaccharides comprise at least three subunits and/or feature a molecular weight of at least about 480 g/mol.

12. Method for the production of oligosaccharides, comprising the steps of:

a) providing a cell according to anyone of claims 1 to 11,

b) culturing the cell in a medium under conditions permissive for the production of said oligosaccharides,

c) extracting said oligosaccharides from the culture medium.

13. Method according to claim 12, characterized in that step b) is performed using a continuous flow bioreactor.

14. Method according to claim 12 or 13, characterized in that, the medium in step b) comprises one or more substances selected from the group consisting of basic supplements for supporting cellular growth and propagation, selective agents, educts required for the synthesis of oligosaccharides, effectors of gene activity.

15. Method according to claim 14, characterized in that the educts are selected from the group consisting of arabinose, threose, erythrose, ribose, ribulose, xylose, glucose, D-2-deoxy-2-amino-glucose, N-acetylglucosamine, glucosamine, fructose, mannose, galactose, N-acetylgalactosamine, galactosamine, sorbose, fucose, N-acetylneuraminic acid, glycoside, non-natural sugar, nucleobase, nucleoside, nucleotide and any possible di- or polymer thereof.

16. Method according to anyone of claims 12 to 15, characterized in that the oligosaccharides comprise at least three subunits and/or feature a molecular weight of at least about 480 g/mol.

17. Method according to claim 16, characterized in that the oligosaccharide is fucosyllactose.

Claims

1. Bacterial Cell to be stably cultured in a medium, which cell is adjusted for the production of fucosyllactose, the cell being transformed to comprise at least one nucleic acid sequence coding for an enzyme involved in oligosaccharide synthesis, wherein the enzyme is a fucosyltransferase,

   characterized in that

   the bacterial cell in addition is transformed to comprise at least one nucleic acid sequence coding for a protein of the Sugar Efflux Transporter (SET) family, which exports fucosyllactose from cytosol of said bacterial cell, or a functional homolog of the protein.

2. Thebacterial Cell according to claim 1, characterized in that the bacterial cell is an *Escherichia coli* cell.

3. Thebacterial Cell according to anyone of claims 1 or 2, characterized in that the Sugar Efflux Transporter is SetA .

4. Thebacterial Cell according to anyone of claims 1 to 3, characterized in that it is further transformed to comprise at least one nucleic acid sequence coding for a protein facilitating or promoting the import of educts required for oligosaccharide synthesis, wherein the protein is selected from the group consisting of lactose transporter, fucose transporter, sialic acid transporter, galactose transporter, mannose transporter, N-acetylglucosamine transporter, *N*- acetylgalactosamine transporter, ABC-transporter, transporter for a nucleotide- activated sugar and transporter for a nucleobase, nucleoside or nucleotide.

5. The bacterial Cell according to anyone of claims 1 to 64, characterized in that it is further transformed to comprise at least one nucleic acid sequence coding for a protein selected from the group consisting of nucleotidyltransferase, guanylyl transferase, uridylyl transferase, Fkp, L-fucose kinase, fucose-l- phosphate guanylyltransferase, CMP-sialic acid synthetase, galactose kinase, galactose-1-

phosphate uridylyl transferase, glucose kinase, glucose-1-phosphate uridylyltransferase, mannose kinase, mannose-1-phosphate guanylyltransferase, GDP-4-keto-6-deoxy-D-mannose reductase, glucosamine kinase, glucosa- mine-phosphate acetyltransferase, N-acetyl-glucosamin-phosphate uridylyltransferase, UDP-N-acetylglucosamine 4-epimerase, UDP-N-acetyl- glucosamine 2-epimerase.

6. The bacterial Cell according to anyone of claims 1 to 5, characterized in that the fucosyllactose comprises at least three subunits and/or feature a molecular weight of at least about 480 g/mol.

7. Method for the production of fucosyllactose, comprising the steps of:

a) providing a bacterial cell according to anyone of claims 1 to 6,

b) culturing the bacterial cell in a medium under conditions permissive for the production of said fucosyllactose,

c) extracting said fucosyllactose from the culture medium.

8. Method according to claim 7, characterized in that step b) is performed using a continuous flow bioreactor.

9. Method according to claim 7 or 8, characterized in that, the medium in step b) comprises educts required for the synthesis of oligosaccharides, wherein the educts are selected from the group consisting of arabinose, threose, erythrose, ribose, ribulose, xylose, glucose, D-2-deoxy-2-amino-glucose, N- acetylglucosamine, glucosamine, fructose, mannose, galactose, N- acetylgalactosamine, galactosamine, sorbose, fucose, lactose, N- acetylneuraminic acid, glycoside, non-natural sugar, nucleobase, nucleoside, nucleotide and any possible di- or polymer thereof.

10. Method according to anyone of claims 7 to 9, characterized in that the oligosaccharides comprise at least three subunits and/or feature a molecular weight of at least about 480 g/mol.