

CLAIMS

- 1) A genetically modified cell capable of producing one or more Human Milk Oligosaccharides (HMOs), wherein said genetically modified cell comprises a heterologous nucleic acid sequence encoding a major facilitator superfamily (MFS) polypeptide shown in SEQ ID NO: 1, or a functional homologue thereof which amino acid sequence is more than 95.4 % identical to SEQ ID NO: 1.
- 2) A genetically modified cell according to claim 1, wherein said functional homologue is at least 96 % identical to SEQ ID NO: 1.
- 3) A genetically modified cell according to claim 1, wherein the cell further comprises a nucleic acid sequence comprising a regulatory element for the regulation of the expression of the heterologous nucleic acid sequence.
- 4) A genetically modified cell according to claim 3, wherein the regulatory element regulates the expression of the MFS polypeptide shown in SEQ ID NO: 1, or a functional homologue thereof which amino acid sequence is more than 95.4 % identical to SEQ ID NO: 1.
- 5) A genetically modified cell according to claim 3 or 4, wherein the regulatory element is selected from the group consisting of PglpF, PglpF_SD4 and PglpF_SD7.
- 6) A genetically modified cell according to any of the preceding claims, wherein the genetically modified cell is *Escherichia coli*.
- 7) A genetically modified cell according to any of the preceding claims, wherein the Human Milk Oligosaccharide is selected from the group consisting of 2'-fucosyllactose (2'-FL), 3-fucosyllactose (3-FL), difucosyllactose (DFL) and Lacto-N-tetraose (LNT).
- 8) A nucleic acid construct comprising a nucleic acid sequence encoding an MFS polypeptide according to SEQ ID NO: 1, or a functional homologue thereof, having more than 95.4 % sequence identity to SEQ ID NO: 1, wherein the nucleic acid sequence encoding the MFS polypeptide has at least 70 % sequence identity to SEQ ID NO: 2.
- 9) A nucleic acid construct according to claim 8, wherein the construct further comprises a nucleic acid sequence comprising a regulatory element.
- 10) A nucleic acid construct according to claim 9, wherein the regulatory element regulates the expression of the nucleic acid sequence having at least 70 % sequence identity to SEQ ID NO: 2.
- 11) A nucleic acid construct according to any of claims 9 - 10, wherein the regulatory element is selected from the group consisting of PglpF, PglpF_SD4 and PglpF_SD7.
- 12) A method for the biosynthetic production of one or more Human Milk Oligosaccharides (HMOs), the method comprising the steps of:

- (i) providing a genetically modified cell according to any of claims 1-7;
 - (ii) culturing the genetically modified cell according to (i) in a suitable cell culture medium to express said polypeptide capable of efflux sugar transportation and produce one or more Human Milk Oligosaccharides (HMOs) and;
 - 5 (iii) harvesting one or more HMOs produced in step (ii).
- 13) Use of a genetically modified cell according to any one of claims 1 to 7, or a nucleic acid construct according to any one of claims 8-11, for the biosynthetic production of one or more Human Milk Oligosaccharides (HMOs).
- 10 14) Use of a genetically modified cell, or a nucleic acid construct according to claim 13, for the biosynthetic production of the specific an HMO selected from the group consisting of 2'-FL, 3-FL, DFL and LNT.