Claims

1. Method for the production of fucosylated oligosaccharides using a genetically modified prokaryotic host cell, the method comprising the steps of:

   - providing a prokaryotic host cell, which has been genetically modified, such, that at least

     (i) the activity of a fructose-6-phosphate-converting enzyme, which in the unmodified host cell has a regular level, is lowered or abolished, wherein said fructose-6-phosphate converting enzyme is selected from the group consisting of phosphofructokinase, glucose-6-phosphate isomerase, fructose-6-phosphate aldolase, a transketolase, or a transaldolase, and/or by increasing the activity of a fructose-1,6-bisphosphate phosphatase;

     (ii) at least one gene encoding an enzyme necessary for the *de novo* synthesis of GDP-fucose is overexpressed in the host cell, wherein the at least one gene encoding an enzyme necessary for the *de novo* synthesis of GDP-fucose is a gene encoding a ManA enzyme catalyzing the isomerization of fructose-6-phosphate to mannose-6-phosphate, a phosphomannomutase encoding gene, a mannose-1-phosphate guanosyltransferase encoding gene, a GDP-mannose-4,6-dehydratase encoding gene, or a GDP-L-fucose synthase encoding gene;

     (iii) an exogenous gene, encoding an alpha-1,2-fucosyltransferase and/or alpha-1,3-fucosyltransferase, is expressed in the host cell;

   - cultivating and/or growing said genetically modified host cell in a cultivation medium from a carbon and/or energy source that is selected from at least one of the following: glycerol, succinate, malate, pyruvate, lactate, ethanol, citrate; and

   - providing lactose to the cultivation medium; thereby producing the fucosylated oligosaccharide obtainable from the medium the host cell is cultivated in.

2. The method of claim 1, wherein the fucosylated oligosaccharide is selected from the group consisting of 2'-fucosyllactose, 3-fucosyllactose or difucosyllactose.

3. The method of claim 1 or 2, wherein the host cell is selected from the group consisting of bacterial host cells.

4. The method of any of claims 1 to 3, wherein the fructose-6-phosphate pool in the cell is increased by increasing the activity of a fructose-1,6-bisphosphate phosphatase.

5. The method of any of the preceding claims, wherein the gene encoding the phosphomannomutase is *manB,* the mannose-1-phosphate guanosyltransferase is *manC,* the GDP-mannose-4,6-dehydratase is *gmd,* and the GDP-L-fucose synthase is *wcaG.*

6. The method of any of the preceding claims, wherein the gene encoding at least one fucosyltransferase exhibits an alpha-1,2-fucosyltransferase and/or alpha-1,3 fucosyltransferase activity.

7. The method of claim 6, wherein the gene encoding an alpha-1,2-fucosyltransferase is selected from the group consisting of *wbgL* from *E. coli* 0126 or *fucT2* from *Helicobacter pylori.*

8. The method of claim 6, wherein the gene encoding an alpha-1,3-fucosyltransferase is selected from the group consisting of alpha-1,3-fucosyltransferase genes of the species *Akkermansia muciniphila, Bacteroides fragilis,Helicobacter pylori,* or *Helicobacter hepaticus.*

9. The method of any of the preceding claims, wherein the host cell is further genetically modified to express a gene encoding a protein which enables or facilitates the export of the desired fucosylated oligosaccharide into the culture medium.

10. The method of any of the preceding claims, wherein an endogenous or exogenous permease for the import of lactose is overexpressed.

11. The method of any of the preceding claims, wherein the genes the host cell is modified in or with are endogenous or exogenous genes.

12. The method of any of the preceding claims, wherein at least one of the genes the host cell is modified in or with is overexpressed upon endogenous or exogenous induction or in a constitutive manner.

13. The method of claim 9, wherein the gene encoding a protein which enables or facilitates the export of the desired fucosylated oligosaccharide is a sugar efflux transporter.

14. The method of any of claims 4 to 13, wherein the fructose-1,6-bisphosphate phosphatase is encoded by a gene which is a functional active variant of the fructose-1,6-bisphosphate phosphatase (*fbpase*) from *Pisum sativum.*

15. The method of any of claims 10 to 13, wherein the lactose permease is *E. coli* LacY.

16. The method of any of the preceding claims, wherein the providing of lactose is accomplished by adding lactose from the beginning of the cultivating in a concentration of at least 5mM.

17. The method of any of the preceding claims wherein providing of lactose is accomplished by adding lactose to the cultivation medium in a concentration, such, that throughout the production phase of the cultivation a lactose concentration of at least 5 mM is obtained.

18. The method of any of the preceding claims, wherein the host cells are cultivated for at least 60 hours.

19. The method of any of the preceding claims, wherein the exogenous genes are integrated into the genome of the host strain.