CLAIMS

1. A genetically engineered microbial cell for the production of a carbohydrate of interest, wherein the microbial cell possesses an increased intracellular availability of at least one sugar phosphate as compared to the wild-type cell due to a decreased and/or diminished expression and/or activity of at least one protein leading to a consumption of said intracellular sugar phosphate within said engineered microorganism, comprises an enhanced synthesis of phosphoenolpyruvate than the wild-type cell by possessing an increased activity of phosphoenolpyruvate carboxykinase and/or phosphoenolpyruvate synthase, and produces the carbohydrate of interest when being cultivated in a culture medium comprising a mixed monosaccharide feedstock as main carbon and energy source, wherein said mixed monosaccharide feedstock consists of glucose and at least one additional monosaccharide selected from the group consisting of fructose and galactose.

2. The genetically engineered microbial cell according to claim 1, wherein the genetically engineered microbial cell further comprises an UDP-galactose biosynthesis pathway for intracellular formation of UDP-galactose.

3. The genetically engineered microbial cell according to claim 1 or 2, wherein the genetically engineered microbial cell further comprises a GDP-fucose biosynthesis pathway for intracellular formation of GDP-L-fucose.

4. The genetically engineered microbial cell according to any one of claims 1 to 3, wherein the genetically engineered microbial cell further comprises an UDP-N-acetylglucosamine biosynthesis pathway for intracellular formation of UDP-N-acetylglucosamine.

5. The genetically engineered microbial cell according to any one of claims 1 to 4, wherein the genetically engineered microbial cell further comprises an CMP-N-acetylneuraminic acid/CMP-sialic acid biosynthesis pathway for intracellular formation of CMP-N-acetylneuraminic acid.

6. The genetically engineered microbial cell according to any one of claims 1 to 5, wherein the genetically engineered microbial cell further comprises at least one glycosyltransferase.

~~7. The genetically engineered microbial cell according to any one of claims 1 to 6, wherein the genetically engineered microbial cell further comprises an enhanced synthesis of phosphoenolpyruvate.~~

~~8.~~7. The genetically engineered microbial cell according to any one of claims 1 to ~~7~~6, wherein the genetically engineered microbial cell further comprises at least one monosaccharide transporter for translocating a monosaccharide from the medium into the cytoplasm of the microbial cell.

~~9.~~8. The genetically engineered microbial cell according to any one of claims 1 to ~~8~~7, wherein the genetically engineered microbial cell further comprises a decreased or diminished expression of at least one gene encoding for a protein competing with the biosynthesis of the ~~desired~~ carbohydrate of interest and/or decreased or diminished activity of at least one protein competing with the biosynthesis of the carbohydrate of interest.

~~10.~~9. The genetically engineered microbial cell according to any one of claims 1 to ~~9~~8, wherein the protein leading to a consumption of said intracellular sugar phosphate within said engineered microorganism is selected from the group consisting of phosphofructokinase, glucose-6-phosphate isomerase, glucose-6-phosphate dehydrogenase, components of a phosphoenolpyruvate:sugar phosphotransferase system.

~~11.~~10. The genetically engineered microbial cell according to any one of claims 1 to ~~10~~9, wherein the genetically engineered microbial cell further comprises at least one exporter protein or permease exporting the carbohydrate of interest from the cell.

~~12.~~11. Use of a genetically engineered microbial cell according to any one of claims 1 to ~~11~~ 10 for the production of a carbohydrate of interest.

~~13.~~12. A method for the fermentative production of a carbohydrate of interest, the method comprising:

a) Providing a genetically engineered microorganism capable of producing a desired carbohydrate, wherein said microorganism is exhibiting an increased intracellular availability of at least one sugar phosphate as compared to the wild-type cell due to a decreased and/or diminished expression and/or activity of at least one protein leading to a consumption of said intracellular sugar phosphate within said engineered microorganism, and comprises an enhanced synthesis of phosphoenolpyruvate than the wild-type cell by possessing an increased activity of phosphoenolpyruvate carboxykinase or phosphoenolpyruvate synthase;
b) cultivating said genetically engineered microorganism in a culture medium permissive for the production of said desired carbohydrate, wherein the main carbon source is a monosaccharide mixture consisting of glucose and at least a second monosaccharide of the group of fructose and galactose; and
c) recovering said carbohydrate of interest.

~~14.~~13. The method according to claim ~~13~~12, wherein the carbohydrate of interest is selected from the group consisting of mannose, fucose, *N*-acetylglucosamine, *N*-acetylmannosamine, *N*-acetylneuraminic acid, lacto-*N*-biose, *N*-acetyl-lactosamine, 2'-fucosyllactose, 3-fucosyllactose, 2',3-difucosyllactose, blood group H antigen type I, blood group H antigen type II, blood group antigen Lewis^{a}, blood group antigen Lewis^{b}, blood group antigen Lewis^{x}, blood group antigen Lewis^{y}, blood group antigen Sialyl-Lewis^{x}, lacto-*N*-triose II, lacto-*N*-tetraose, lacto-*N*-*neo*tetraose, lacto-*N*-fucopentaose I, lacto-*N*-*neo*fuco-pentaose I, lacto-*N*-fucopentaose II, lacto-*N*-fucopentaose III, lacto-*N*-fuco-pentaose V, lacto-*N*-*neo*fucopentaose V, lacto-*N*-difucohexaose I, lacto-*N*-difucohexaose II, 6'-galactosyllactose, 3'-galactosyllactose, lacto-*N*-hexaose,

lacto-*N*-*neo*hexaose, *para*-lacto-*N*-hexaose, *para*-Lacto-*N*-*neo*hexaose, difucosyl-lacto-*N*-*neo*hexaose, 3'-sialyllactose, 6'-sialyllactose, 3'-sialyl-*N*-acetyllactosamine, 6'-sialyl-N-acetyllactosamine, lacto-*N*-sialylpentaose a, lacto-*N*-sialylpentaose b, lacto-*N*-sialylpentaose c, fucosyl-lacto-*N*-sialyl-pentaose a , fucosyl-lacto-*N*-sialylpentaose b, fucosyl-lacto-*N*-sialylpentaose c, disialyl-lacto-*N*-tetraose, disialyl-lacto-*N*-fucopentaose, 3-fucosyl-3'-sialyllactose, 3-fucosyl-6'-sialyllactose, lacto-*N*-*neo*difucohexaose I.

~~15.~~14. Use of a carbohydrate of interest being produced by a microbial cell according to any one of claims 1 to ~~11~~ 10 and/or a method according to any one of claims ~~13~~ 12 to ~~14~~ 13 for the manufacturing of a pharmaceutical and/or nutritional composition.