CLAIMS

1. A method for producing an afucosylated protein in a host cell comprising introducing a nucleic acid encoding at least one modified enzyme of the fucosylation pathway to the host cell to produce the afucosylated protein, wherein the modified enzyme is derived from GDP-mannose 4,6-dehydratase (GMD) or α-1,6-fucosyltransferase (FUT8), the nucleic acid is selected from the group consisting of SEQ ID NOs: 3, 5, 7, 9, 11, 15, and any combination thereof, and the modified enzyme reduces or inhibits the activity of the wild-type enzyme, from which the modified enzyme is derived, in the host cell.

2. The method according to claim 1, wherein the modified enzyme inhibits or reduces fucosylation in the host cell.

3. The method according to claim 1, wherein the afucosylated protein that is produced in the host cell is an afucosylated antibody.

4. The method according to claim 3, wherein the afucosylated antibody is at least 90% afucosylated.

5. The method according to claim 3, wherein the afucosylated antibody has increased antibody-dependent cellular cytotoxicity (ADCC) activity compared to its fucosylated counterpart.

6. The method according to claim 3, wherein the complement dependent cytotoxicity

(CDC) activity of the afucosylated antibody is not reduced or suppressed compared to its fucosylated counterpart.

7. A method for producing a protein that is afucosylated in a host cell comprising transfecting a host cell with a first nucleic acid encoding a modified enzyme of the fucosylation pathway and a second nucleic acid encoding the protein to be produced, wherein the modified enzyme is derived from GDP-mannose 4,6-dehydratase (GMD) or α-1,6-fucosyltransferase (FUT8), the first nucleic acid is selected from the group consisting of SEQ ID NOs: 3, 5, 7, 9, 11, 15, and any combination thereof, and the modified enzyme reduces or inhibits the activity of the wild-type enzyme, from which the modified enzyme is derived, in the host cell.

8. The method according to claim 7, wherein the host cell is transfected with the first nucleic acid and the second nucleic acid at the same time.

9. The method according to claim 8, wherein the afucosylated protein that is produced is an antibody.

10. The method according to claim 7 comprising the steps of:

a) transfecting the host cell with the first nucleic acid encoding the modified enzyme;
b) selecting and isolating the host cell transfected with the first nucleic acid;
c) transfecting the host cell transfected with the first nucleic acid in step b) with the second nucleic acid encoding the protein to be produced;
d) expressing the protein to be produced in the host cell transfected with the first nucleic acid and the second nucleic acid.

11. The method according to claim 10, wherein the afucosylated protein that is produced is an antibody.

12. The method according to claim 7 comprising the steps of:

a) transfecting the host cell with the second nucleic acid encoding the protein to be produced;
b) selecting and isolating the host cell transfected with the second nucleic acid;

c) transfecting the host cell transfected with the second nucleic acid in step b) with the first nucleic acid encoding the modified enzyme;
d) selecting and isolating the host cell transfected with the second nucleic acid and the first nucleic acid;
e) expressing the protein to be produced in the host cell transfected with the second nucleic acid and the first nucleic acid.

13. The method according to claim 12, wherein the afucosylated protein that is produced is an antibody.