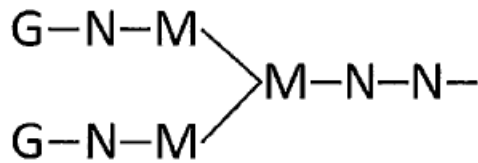


CLAIMS

[Claim 1] An anti-inflammatory afucosylated immunoglobulin preparation comprising a population of nonspecific human serum, wherein an IgG antibodies, comprising that is contained is made of a human serum IgG antibody in which the glycan illustrated below is bound to asparagine 297 (Asn297) of the Fc region of the IgG antibodies in the preparation, (here, G being galactose, N being N-acetylglucosamine, and M being mannose).

[Chem. 1]



wherein:

G is galactose,

N is N-acetylglucosamine, and

M is mannose.

[Claim 2] The anti-inflammatory afucosylated immunoglobulin preparation of claim 1, wherein the glycan as illustrated in claim 1 constitutes 95%-100% of all glycans bound to asparagine 297 (Asn297) of the Fc region of the IgG antibody preparation is used to prevent and/or treat an autoimmune disease.

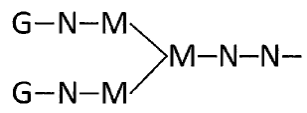
[Claim 3] The anti-inflammatory afucosylated immunoglobulin preparation of claim 12, wherein the glycan illustrated in claim 1 constitutes 98%-100% of all glycans bound to asparagine 297 (Asn297) of the Fc region of the IgG antibody autoimmune disease is any among Kawasaki disease, idiopathic thrombocytopenic purpura, Guillain-Barré syndrome, chronic inflammatory demyelinating polyneuropathy, autoimmune neutropenia, autoimmune hemolytic anemia, autoimmune acquired factor VIII deficiency, multiple sclerosis, myasthenia gravis, stiff-person syndrome, multifocal neuropathy, ANCA-associated vasculitis, chronic rheumatoid arthritis, systemic lupus erythematosus, pemphigus, bullous pemphigoid, Behçet's disease, ulcerative colitis, Crohn's disease, Reiter's syndrome, polymyositis, dermatomyositis, circumscribed scleroderma, systemic scleroderma, Sjögren syndrome, anti-glomerular basement membrane disease, primary sclerosing cholangitis, antiphospholipid antibody syndrome, toxic epidermal necrolysis, graft-versus-host disease, and sepsis.

[Claim 4] The anti-inflammatory afucosylated immunoglobulin preparation of claim 1, wherein the glycan illustrated in claim 1 constitutes 100% of all glycans bound to asparagine 297 (Asn297) of the Fc region of the IgG antibody.

[Claim 5] The anti-inflammatory afucosylated immunoglobulin preparation of any one of claims 1 to 4, wherein the preparation is an IVIG preparation.

[Claim 6] The anti-inflammatory afucosylated immunoglobulin preparation of any one of claims 1 to 5, further comprising a pharmaceutically acceptable carrier, excipient, or diluent.

[Claim 7] An anti-inflammatory afucosylated IVIG preparation comprising a population of nonspecific human serum IgG antibodies, wherein the glycan illustrated below constitutes 95%-100% of all glycans bound to asparagine 297 (Asn297) of the Fc region of the IgG antibodies in the preparation,



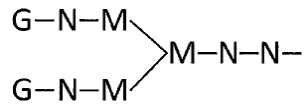
wherein:

G is galactose,

N is N-acetylglucosamine, and

M is mannose.

[Claim 8] An anti-inflammatory afucosylated immunoglobulin preparation comprising a population of nonspecific human serum IgG antibodies, wherein the glycan illustrated below constitutes majority of all glycans bound to asparagine 297 (Asn297) of the Fc region of the IgG antibodies in the preparation,



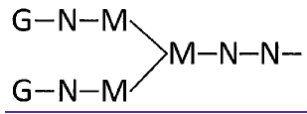
wherein:

G is galactose,

N is N-acetylglucosamine, and

M is mannose.

[Claim 9] An anti-inflammatory afucosylated immunoglobulin preparation comprising a population of nonspecific human serum IgG antibodies, wherein the preparation comprises the glycan illustrated below bound to asparagine 297 (Asn297) of the Fc region of the IgG antibodies in the preparation,



wherein:

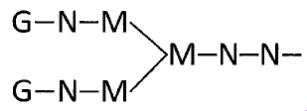
G is galactose,

N is N-acetylglucosamine, and

M is mannose,

wherein such glycan exists in the preparation enriched relative ratios among sixteen types of neutral glycans compared to the serum IgG antibodies in healthy subjects.

[Claim 10] An anti-inflammatory afucosylated immunoglobulin preparation, wherein the immunoglobulin comprises a Fc fragment, wherein the glycan illustrated below bound to asparagine 297 (Asn297) of the Fc region in the immunoglobulin preparation,



wherein:

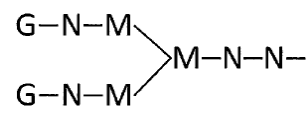
G is galactose

N is N-acetylglucosamine, and

M is mannose.

[Claim 11] Use of the anti-inflammatory afucosylated immunoglobulin preparation of any one of claims 1 to 10, in the manufacture of a medicament for treatment of an autoimmune disease.

[Claim 12] Use of an afucosylated immunoglobulin preparation comprising a population of nonspecific human serum IgG antibodies in the manufacture of a medicament for treating an autoimmune disease, wherein the glycan illustrated below is bound to asparagine 297 (Asn297) of the Fc region of the IgG antibodies



wherein:

G is galactose,

N is N-acetylglucosamine, and

M is mannose.

[Claim 13] The use of claim 12, wherein the glycan illustrated constitutes 95%-100% of all glycans bound to asparagine 297 (Asn297) of the Fc region of the IgG antibodies in the immunoglobulin preparation.

[Claim 14] The use of claim 12, wherein the glycan illustrated constitutes 98%-100% of all glycans bound to asparagine 297 (Asn297) of the Fc region of the IgG antibodies in the immunoglobulin preparation.

[Claim 15] The use of claim 12, wherein the glycan illustrated constitutes 100% of all glycans bound to asparagine 297 (Asn297) of the Fc region of the IgG antibodies in the immunoglobulin preparation.

[Claim 16] The use of any one of claims 12 to 15, wherein the immunoglobulin preparation is IVIG preparation.

[Claim 17] The use of any one of claims 12 to 16, wherein the autoimmune disease is rheumatoid arthritis.

[Claim 18] The use of any one of claims 12 to 16, wherein the autoimmune disease is idiopathic thrombocytopenic purpura.

[Claim 19] The use of any one of claims 12 to 16, wherein the autoimmune disease is chronic inflammatory demyelinating polyradiculoneuropathy.

[Claim 204] A method of producing an anti-inflammatory afucosylated immunoglobulin preparation, comprising:

a glycan removing step of using endoglycosidase S (Endo S) on a preparation of nonspecific ~~a~~-human serum IgG antibodies~~y~~ in order to cleave, at a chitobiose core, a glycan bound to an asparagine 297 (Asn297) residue of the Fc region and remove the glycan, excluding N-acetylglucosamine bound to the Asn297 residue and fucose bound to the N-acetylglucosamine;

a fucose removing step of using an α -L-fucosidase (AlfC) to remove the fucose bound to the N-acetylglucosamine; and

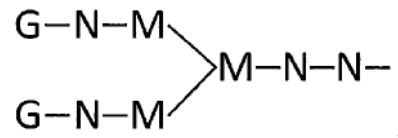
a transferring step of using a glycosynthase (Endo S D233Q) to transfer an oxazolinated glycan prepared from a galactosyl glycopeptide (GG-Ox) to the N-acetylglucosamine bound to the asparagine 297 (Asn297) residue of the Fc region of the nonspecific human serum IgG antibodies~~y~~.

[Claim 215] The method of claim 20~~producing an anti-inflammatory afucosylated immunoglobulin preparation of claim 4~~, wherein ~~in~~ the fucose removing step is performed overnight at 37°C.

[Claim 22] The method of claim 20 or 21, wherein the α -L-fucosidase (AlfC) is a 1,6- α -L-fucosidase.

[Claim 23] The method of claim 22, wherein the fucose removing step comprises incubating the Endo S treated preparation of nonspecific human serum IgG antibodies with the 1,6- α -L-fucosidase at pH 7.4.

[Claim 24] The method of any one of claims 20 to 23, wherein the transferring step is performed under a condition such that the glycan illustrated below constitutes 95-100% of all glycans bound to Asn297 of the Fc region of the IgG antibodies in the immunoglobulin preparation:



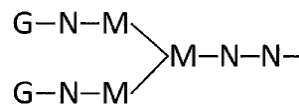
[Claim 25] The method of claim 24, wherein the glycan illustrated in claim 24 constitutes 98%-100% of all glycans bound to asparagine 297 (Asn297) of the Fc region of the IgG antibodies in the immunoglobulin preparation.

[Claim 26] The method of claim 24, wherein the glycan illustrated in claim 24 constitutes 100% of all glycans bound to asparagine 297 (Asn297) of the Fc region of the IgG antibodies in the immunoglobulin preparation.

[Claim 27] The method of any one of claims 20 to 26, wherein the immunoglobulin preparation is an IVIG preparation.

[Claim 28] The anti-inflammatory afucosylated immunoglobulin preparation of any one of claims 1 to 10, for use in the treatment of an autoimmune disease.

[Claim 29] An afucosylated immunoglobulin preparation comprising a population of nonspecific human serum IgG antibodies for use in the treatment of an autoimmune disease, wherein the glycan illustrated below is bound to asparagine 297 (Asn297) of the Fc region of the IgG antibodies



wherein:

G is galactose,

N is N-acetylglucosamine, and

M is mannose.

- [Claim 30] The compound for use of claim 29, wherein the glycan illustrated constitutes 95%-100% of all glycans bound to asparagine 297 (Asn297) of the Fc region of the IgG antibodies in the immunoglobulin preparation.
- [Claim 31] The compound for use of claim 29, wherein the glycan illustrated constitutes 98%-100% of all glycans bound to asparagine 297 (Asn297) of the Fc region of the IgG antibodies in the immunoglobulin preparation.
- [Claim 32] The compound for use of claim 29, wherein the glycan illustrated constitutes 100% of all glycans bound to asparagine 297 (Asn297) of the Fc region of the IgG antibodies in the immunoglobulin preparation.
- [Claim 33] The compound for use of any one of the claims 29 to 32, wherein the immunoglobulin preparation is IVIG preparation.
- [Claim 34] The compound for use of any one of claims 29 to 32, wherein the autoimmune disease is rheumatoid arthritis.
- [Claim 35] The compound for use of any one of claims 29 to 32, wherein the autoimmune disease is idiopathic thrombocytopenic purpura.
- [Claim 36] The compound for use of any one of claims 29 to 32, wherein the autoimmune disease is chronic inflammatory demyelinating polyradiculoneuropathy.