**Figure S1.** Schematic depiction of IgG and N-glycan chains on fragment crystallizable (Fc) and fragment antigen-binding (Fab) regions of IgG. The dotted line indicates the conserved core heptasaccharide. The core fucose, terminal galactose and sialic acid, bisecting N-acetylglucosamine (GlcNAc) showed great heterogeneity.



**Figure S2.** Representative standard curves of double-antibody sandwich ELISA results for human IgG1 and IgG4. The standard curves were generated using the blank subtracted A490 values for each standard (on the x-axis) and the assigned concentration for each standard (ng/ml) (on the y-axis). The standard curve must meet the validation requirements. Figure S1A and S1B illustrate the typical standard curves for IgG1 and IgG4 respectively.

**Table S1. Concentrations of TgAb IgG1 and TgAb IgG4 in each sample**

|  |  |  |  |
| --- | --- | --- | --- |
| **Group** | **Patient number** | **Concentrations of IgG1 and IgG4 in TgAb IgG (μg/ml)** | |
| **IgG1** | **IgG4** |
| HT | 1 | 30.34 | 46.96 |
| 2 | 234.98 | 59.14 |
| 3 | 99.08 | 38.7 |
| 4 | 46.01 | 47.45 |
| 5 | 124.19 | 63.43 |
| 6 | 138.30 | 11.04 |
| 7 | 206.61 | 58.43 |
| 8 | 188.69 | 29.56 |
| 9 | 71.83 | 37.03 |
| 10 | 205.48 | 37.72 |
| 11 | 128.7 | 26.58 |
| 12 | 109.66 | 42.17 |
| 13 | 40.89 | 120.7 |
| 14 | 49.25 | 24.14 |
| 15 | 62.66 | 34.14 |
| 16 | 90.46 | 51.18 |
| GD | 1 | 22.38 | 69.14 |
| 2 | 22.72 | 64.63 |
| 3 | 29.76 | 123.48 |
| 4 | 13.39 | 27.94 |
| 5 | 36.64 | 65.9 |
| 6 | 73.5 | 34.06 |
| 7 | 36.92 | 28.93 |
| 8 | 40.99 | 51.32 |
| PTC | 1 | 60.06 | 50.9 |
| 2 | 45.22 | 36.68 |
| 3 | 41.96 | 70.97 |
| 4 | 27.19 | 65.97 |
| 5 | 38.58 | 25.62 |
| 6 | 62.97 | 60.48 |
| PTC-T | 1 | 95.32 | 34.84 |
| 2 | 100.36 | 44.32 |
| 3 | 164.11 | 157.36 |
| 4 | 46.25 | 19.53 |
| 5 | 701.6 | 20.2 |
| 6 | 111.16 | 22.68 |
| 7 | 234.47 | 108.50 |
| 8 | 1209.1 | 20.2 |
| 9 | 66.8 | 34.84 |

**Table S1. Concentrations of TgAb IgG1 and TgAb IgG4 in each sample.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Group** | **Patient number** | **Concentrations of IgG1 and IgG4 in TgAb IgG (μg/ml)** | |
| **IgG1** | **IgG4** |
| CON | 1 | 224.11 | 36.6 |
| 2 | 106.69 | 62.03 |
| 3 | 70.51 | 33.86 |
| 4 | 77.51 | 55.97 |
| 5 | 64.92 | 48.65 |
| 6 | 47.02 | 25.76 |
| 7 | 78.86 | 49.77 |
| 8 | 39.4 | 70.68 |
| 9 | 38.96 | 68.56 |
| 10 | 25.86 | 21.94 |

The concentrations of IgG1 and IgG4 in each sample were derived from standard curves generated using the IgG1 and IgG4 standards, respectively (Figure S1).

**Table S2. Abbreviations and carbohydrate-binding specificities of 56 lectins in the lectin microarray.**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Abbreviation** | **Full name** | **Preferred sugar specificity** |
| 1 | LTL | *Lotus tetragonolobus* lectin | αFuc |
| 2 | PSA | *Pisum sativum* agglutinin | αMan, αGlc |
| 3 | LCA | *Lens culinaris* agglutinin | α-D-mannose and α-D-glucose. |
| 4 | UEA I | *Ulex europaeus* agglutinin I | αFuc |
| 5 | AAL | *Aleuria aurantia* lectin | Fucα6GlcNAc |
| 6 | LAL | *Laburnum anagyroides* lectin (gold chain) | The best inhibitor among monosaccharides was alpha-Me-L-fucose |
| 7 | TL | *Tulipa* sp. lectin (Tulip) | N-acetylgalactosamine, galactose, fucose |
| 8 | MAA | *Maackia amurensis* lectin | Sialic acid α(2,3), galactose |
| 9 | SNA,EBL | *Sambucus* *nigra* lectin | Neu5Acα6Gal/GalNAc |
| 10 | SSA | *Salvia sclarea* | NeuAc |
| 11 | MAL II | *Maackia amurensis* lectin II | Neu5Acα3Galβ4GalNAc |
| 12 | SNA-I | *Sambucus nigra* agglutinin I (elderberry bark) | Alpha 2,6-linked sialic acid residues |
| 13 | NPL,NPA | *Narcissus pseudonarcissus* (daffodil) lectin | αMan |
| 14 | ConA | Con A lectin | αMan,αGlc |
| 15 | GNL | *Galanthus nivalis* (snowdrop) lectin | αMan |
| 16 | HHL,AL | *Hippeastrum* hybrid lectin | αMan |
| 17 | CALSEPA | *Calystegia sepium* lectin (hedge bindweed rhizomes) | Maltose=mannose>>glucose |
| 18 | AMA | *Arum maculatum* lectin (lords and ladies) | Man |
| 19 | MNA-M | *Moringa* M lectin (black elderberry) | Man |
| 20 | VFA | *Vicia fava* lectin (fava bean) | Man |
| 21 | VVA mannose | *Vicia villosa* lectin (hairy vetch, mannose specific) | Man |
| 22 | ASA | *Allium sativum* lectin (garlic) | Man |
| 23 | GSL II, BSL II | *Griffonia (Bandeiraea) simplicifolia* lectin II | α or β GlcNAc |
| 24 | LEL, TL | *Lycopersicon esculentum* lectin | (GlcNAc) 2-4 |

Data are from Bio-Technology Co., Ltd. (Guangzhou, China) (http://www.bc-bio.com/cn/).

**Table S2. Abbreviations and carbohydrate-binding specificities of 56 lectins in the lectin microarray.**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Abbreviation** | **Full name** | **Preferred sugar specificity** |
| 25 | STL, PL | *Solanum tuberosum* lectin | (GlcNAc) 2-4 |
| 26 | UDA | *Urtica dioica* lectin (stinging nettle) | GlcNAc |
| 27 | PWM,PWA | *Phytolacca americana* lectin (pokeweed) | GlcNAc (β1,4) GlcNAc oligomers & [Gal-(β1,4) GlcNAc]2 |
| 28 | WGA | *Triticum vulgare* lectin (wheat germ) | (GlcNAc-β-(1,4) GlcNAc)1-4>β GlcNAc>Neu5Ac |
| 29 | DSL | *Datura stramonium* lectin | (GlcNAc)2-4 |
| 30 | HPA | *Helix pomatia* lectin (snail) | GalNAc |
| 31 | VVL, VVA | *Vicia villosa* lectin | GalNAc |
| 32 | DBA | *Dolichos biflorus* agglutinin | αGalNAc |
| 33 | SBA | *Glycine max* lectin (soybean) | α and β N-acetylgalactosamine > α and β Galactose |
| 34 | PTL I,WBA I | *Psophocarpus tetragonolobus* lectin I | GalNAc, Gal |
| 35 | WFA,WFL | *Wisteria floribunda* lectin | GalNAc |
| 36 | CSA | *Cytisus sessilifolius* lectin (Portugal broom) | GalNAc |
| 37 | Black bean crude | *Phaseolus vulgaris* sp. lectin | GalNAc>lactose>melibiose, galactose, sialic acid |
| 38 | GSL-IA4 | Pure *Griffonia simplicifolia* lectin | α-GalNAc |
| 39 | IRA | *Iris* hybrid lectin (Dutch iris) | N-acetyl-D-galactosamine |
| 40 | IAA | *Iberis amara* lectin | GalNAc |
| 41 | HMA | *Homarus americanus* lectin (lobster) | αGalNAc, αFuc, Neu5Ac |
| 42 | GHA | *Glechoma hederacea* lectin (ground ivy) | Gal, methyl alpha-D-galactopyranoside, GalNAc |
| 43 | MNA-G | *Moringa* G lectin (black elderberry） | Gal |
| 44 | RCA I,RCA120 | *Ricinus communis* agglutinin I | Gal |
| 45 | GSL I-B4, BSL I-B4 | GSL I isolectin B4 | αGal |
| 46 | EEL | *Euonymus europaeus* lectin | Galα3Gal |
| 47 | PNA | *Arachis hypogaea* lectin (peanut) | Terminal beta galactose |

Data are from Bio-Technology Co., Ltd. (Guangzhou, China) (http://www.bc-bio.com/cn/).

**Table S2. Abbreviations and carbohydrate-binding specificities of 56 lectins in the lectin microarray.**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Abbreviation** | **Full name** | **Preferred sugar specificity** |
| 48 | BPL | *Bauhinia purpurea* lectin | Galβ3GalNAc |
| 49 | ABA | *Agaricus bisporus* lectin (mushroom) | Gal (β1,3)GalNAc |
| 50 | Jacalin, AIA | Jacalin | Galβ3GalNAc |
| 51 | ACL,ACA | *Amaranthus caudatus* lectin | Galβ3GalNAc |
| 52 | MPL | *Maclura pomifera* lectin | Galβ3GalNAc |
| 53 | PHA-L | *Phaseolus vulgaris* leucoagglutinin | Galβ4GlcNAcβ6(GlcNAcβ2Manα3)Manα3 |
| 54 | PHA-E | *Phaseolus vulgaris* erythroagglutinin | Galβ4GlcNAcβ2Manα6(GlcNAcβ4) (GlcNAcβ4Manα3) Manβ4 |
| 55 | ECL | *Erythrina crista-galli* lectin | Gal β(1,4)GlcNAc |
| 56 | MAL I | *Maackia amurensis* lectin I | Galβ4GlcNAc |

Data are from Bio-Technology Co., Ltd. (Guangzhou, China) (http://www.bc-bio.com/cn/).