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Table of Contents:

| Table/Figure | Description |
|--------------|-------------|
| S2 | Figure S1: 2D Ligand-receptor interaction diagram of GlgEI V279S with: a) **11**, b) **12**, c) **13**. |
| S3 | Figure S2: The distance between Sco GlgEI V279S Glu 423 and compounds: a) **11**, b) **12**, c) **13**, in the Glide-docked models. |
| S4 | Table S1: XP Docking score, XP Glide score and bond interactions of compounds **11**, **12** and **13** with the amino acid residues of GlgEI V279S. |
| S5 | Table S2: Crystallographic Data Table of the Sco GlgE1-V279S/13 structure. |

**1H NMR (1,3,4/2)-1,2-Di-O-benzyl-4-C-([(benzyloxy)methyl]-4-O-acetyl-3-O-(2',3',4',6'-tetra-O-benzyl-α-D-glucopyranosyl)cyclohex-5-ene-1,2,3,4-tetrol (20)**

**13C NMR (1,3,4/2)-1,2-Di-O-benzyl-4-C-([(benzyloxy)methyl]-4-O-acetyl-3-O-(2',3',4',6'-tetra-O-benzyl-α-D-glucopyranosyl)cyclohex-5-ene-1,2,3,4-tetrol (20)**

**1H NMR (1,3,4/2)-1,2-Di-O-benzyl-4-C-[(benzyloxy)methyl]-3-O-(2',3',4',6'-tetra-O-benzyl-α-D-glucopyranosyl)cyclohex-4-ene-1,2,3,6-tetrol (21)**

**13C NMR (1,3,4/2)-1,2-Di-O-benzyl-4-C-[(benzyloxy)methyl]-3-O-(2',3',4',6'-tetra-O-benzyl-α-D-glucopyranosyl)cyclohex-4-ene-1,2,3,6-tetrol (21)**

**1H NMR 3,4-Di(benzyloxy)-6-((benzyloxy)methyl)-5-O-(2',3',4',6'-tetra-O-benzyl-α-D-glucopyranosyl)bicyclo[4.1.0]heptane-2-ol (22)**

**13C NMR 3,4-Di(benzyloxy)-6-((benzyloxy)methyl)-5-O-(2',3',4',6'-tetra-O-benzyl-α-D-glucopyranosyl)bicyclo[4.1.0]heptane-2-ol (22)**

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**13C NMR 3,4-Di(benzyloxy)-6-((benzyloxy)methyl)-5-O-(2',3',4',6'-tetra-O-benzyl-α-D-glucopyranosyl)bicyclo[4.1.0]heptane-2-ol (22)**

**1H NMR 2-(3,5-difluorophenoxy)-6-(hydroxymethyl)-5-O-(2',3',4',6'-tetra-ol-α-D-glucopyranosyl)bicyclo[4.1.0]heptane-3,4-diol (11)**

**13C NMR 2-(3,5-difluorophenoxy)-6-(hydroxymethyl)-5-O-(2',3',4',6'-tetra-ol-α-D-glucopyranosyl)bicyclo[4.1.0]heptane-3,4-diol (11)**

**1H NMR 4-methylthiophenyl 2,3,6-Tri-O-(4-bromobenzyl)-4-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-β-D-glucopyranoside (15')**

**13C NMR 4-methylthiophenyl 2,3,6-Tri-O-(4-bromobenzyl)-4-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-β-D-glucopyranoside (15')**
| S22 | 1H NMR 2,3,6-Tri-O-(4-bromobenzyl)-4-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-α/β-D-glucopyranoside (16') |
| S23 | 13C NMR 2,3,6-Tri-O-(4-bromobenzyl)-4-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-α/β-D-glucopyranoside (16') |
| S24 | 1H NMR 3,4,7-Tri-O-(4-bromobenzyl)-5-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-D-gluchept-1-enitol (17') |
| S25 | 13C NMR 3,4,7-Tri-O-(4-bromobenzyl)-5-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-D-gluchept-1-enitol (17') |
| S26 | 1H NMR 3,4,7-Tri-O-(4-bromobenzyl)-5-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-D-gluchept-1-enone (18') |
| S27 | 13C NMR 3,4,7-Tri-O-(4-bromobenzyl)-5-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-D-gluchept-1-enone (18') |
| S28 | 1H NMR 3,4,9-Tri-O-(4-bromobenzyl)-5-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-D-gluco-octa-1,7-dienitol (19A') |
| S29 | 13C NMR 3,4,9-Tri-O-(4-bromobenzyl)-5-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-D-gluco-octa-1,7-dienitol (19A') |
| S30 | 1H NMR 3,4,9-Tri-O-(4-bromobenzyl)-5-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-L-ido-octa-1,7-dienitol (19B') |
| S31 | 1H NMR (1,3,4/2)-1,2-Di-O-(4-bromobenzyl)-4-C-[(4-bromobenzyl)oxy)methyl]-3-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)cyclohex-5-ene-1,2,3,4-tetrol (10') |
| S32 | 13C NMR (1,3,4/2)-1,2-Di-O-(4-bromobenzyl)-4-C-[(4-bromobenzyl)oxy)methyl]-3-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)cyclohex-5-ene-1,2,3,4-tetrol (10') |
| S33 | 1H NMR (1,3,4/2)-1,2-Di-O-(4-bromobenzyl)-4-C-[(4-bromobenzyl)oxy)methyl]-4-O-acetyl-3-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)cyclohex-5-ene-1,2,3,4-tetrol (20') |
| S34 | 13C NMR (1,3,4/2)-1,2-Di-O-(4-bromobenzyl)-4-C-[(4-bromobenzyl)oxy)methyl]-4-O-acetyl-3-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)cyclohex-5-ene-1,2,3,4-tetrol (20') |
| S35 | 1H NMR (1,3,4/2)-1,2-Di-O-(4-bromobenzyl)-4-C-[(4-bromobenzyl)oxy)methyl]-3-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)cyclohex-4-ene-1,2,3,6-tetrol (21') |
| Compound | NMR Data |
|----------|----------|
| $^{13}$C NMR (1,3,4/2)-1,2-Di-O-(4-bromobenzyl)-4-C-[(4-bromobenzyloxy)methyl]-3-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)cyclohex-4-ene-1,2,3,6-tetrol ($21'$) | S36 |
| $^1$H NMR 3,4-Di(4-bromobenzyloxy)-6-((4-bromobenzyloxy)methyl)-5-O-(2',3',4',6'-tetra-O-4-bromobenzyl-α-D-glucopyranosyl)- 2-(3,5-difluorophenoxy) ($23$) | S37 |
| $^{13}$C NMR 3,4-Di(4-bromobenzyloxy)-6-((4-bromobenzyloxy)methyl)-5-O-(2',3',4',6'-tetra-O-4-bromobenzyl-α-D-glucopyranosyl)- 2-(3,5-difluorophenoxy) ($23$) | S38 |
| $^1$H NMR 3,4-Di(4-(N-methyl, N-phenyl)benzyloxy)-6-((4-(N-methyl, N-phenyl)benzyloxy)methyl)-5-O-(2',3',4',6'-tetra-O-4-(N-methyl, N-phenyl)benzyl-α-D-glucopyranosyl)- 2-(3,5-difluorophenoxy) ($25$) | S39 |
| $^{13}$C NMR 3,4-Di(4-(N-methyl, N-phenyl)benzyloxy)-6-((4-(N-methyl, N-phenyl)benzyloxy)methyl)-5-O-(2',3',4',6'-tetra-O-4-(N-methyl, N-phenyl)benzyl-α-D-glucopyranosyl)- 2-(3,5-difluorophenoxy) ($25$) | S40 |
| $^1$H NMR 1-α-D-Glucopyranoside 4-(hydroxymethyl)-6- (4-(3,5 difluorophenoxy)) cyclohex-4-ene-2,3-triol ($12$) | S41 |
| $^{13}$C NMR 1-α-D-Glucopyranoside 4-(hydroxymethyl)-6- (4-(3,5 difluorophenoxy)) cyclohex-4-ene-2,3-triol ($12$) | S42 |
| $^1$H NMR (2R,3R,4S,5R,6S)-3,4,5-tris(benzyloxy)-2-((benzyloxy)methyl)-6-(((1R,5R,6S)-5,6-bis(benzyloxy)-2-((benzyloxy)methyl)-4-bromocyclohex-2-en-1-yl)oxy)tetrahydro-2H-pyran ($26a$) | S43 |
| $^{13}$C NMR (2R,3R,4S,5R,6S)-3,4,5-tris(benzyloxy)-2-((benzyloxy)methyl)-6-(((1R,5R,6S)-5,6-bis(benzyloxy)-2-((benzyloxy)methyl)-4-bromocyclohex-2-en-1-yl)oxy)tetrahydro-2H-pyran ($26a$) | S44 |
| $^1$H NMR (2R,3R,4S,5R,6S)-3,4,5-tris(benzyloxy)-2-((benzyloxy)methyl)-6-(((1R,5R,6S)-5,6-bis(benzyloxy)-2-((benzyloxy)methyl)-4-bromocyclohex-2-en-1-yl)oxy)tetrahydro-2H-pyran ($26b$) | S45 |
| $^{13}$C NMR (2R,3R,4S,5R,6S)-3,4,5-tris(benzyloxy)-2-((benzyloxy)methyl)-6-(((1R,5R,6S)-5,6-bis(benzyloxy)-2-((benzyloxy)methyl)-4-bromocyclohex-2-en-1-yl)oxy)tetrahydro-2H-pyran ($26b$) | S46 |
| $^1$H NMR (1S,4R,5S,6S)-5,6-bis(benzyloxy)-3-((benzyloxy)methyl)-N-cyclohexyl-4-(((2S,3R,4S,5R,6R)-3,4,5-tris(benzyloxy)-6-((benzyloxy)methyl)tetrahydro-2H-pyran-2-yl)oxy)cyclohex-2-en-1-amine ($27$) | S47 |
| Compound Description                                                                 | NMR                  |
|-------------------------------------------------------------------------------------|----------------------|
| $^{13}$C NMR (1S,4R,5S,6S)-5,6-bis(benzyloxy)-3-((benzyloxy)methyl)-N-cyclohexyl-4-  | S48                  |
| (((2S,3R,4S,5R,6R)-3,4,5-tris(benzyloxy)-6-((benzyloxy)methyl)tetrahydro-2H-pyran-2-  |                      |
| yl)oxy)cyclohex-2-en-1-amine (27)                                                   |                      |
| $^1$H NMR (2S,3R,4S,5S,6R)-2-(((1R,4S,5S,6R)-4-(cyclohexylamino)-5,6-dihydroxy-2-    | S49                  |
| (hydroxymethyl)cyclohex-2-en-1-yl)oxy)-6-(hydroxymethyl)tetrahydro-2H-pyran-3,4,5-triol | (13)                |
| $^{13}$C NMR (2S,3R,4S,5S,6R)-2-(((1R,4S,5S,6R)-4-(cyclohexylamino)-5,6-dihydroxy-2-    | S50                  |
| (hydroxymethyl)cyclohex-2-en-1-yl)oxy)-6-(hydroxymethyl)tetrahydro-2H-pyran-3,4,5-triol | (13)                |

References S51
Figure S1: 2D Ligand-receptor interaction diagram of Sco G1gEI V279S with a) 11 b) 12 c) 13
Figure S2: The distance between Sco GlgEI V279S Glu 423 and compounds: a) 11, b) 12, c) 13, in the Glide-docked models.
Table S1: XP Docking score, XP Glide score and bond interactions of compounds 11, 12 and 13 with the amino acid residues of GlgEI V279S

| Molecules | XP Docking Score | XP Glide Score | Amino acid residues | Bond interaction          |
|-----------|------------------|----------------|---------------------|---------------------------|
| 11        | -11.908          | -11.908        | GLN 324, LYS 534, TYR 535, LYS 264, ASP 359, SER 279, ASH 394, ASP 480, LYS 355 | Hydrogen bond, Hydrogen bond, Hydrogen bond, Hydrogen bond, Hydrogen bond, Hydrogen bond, Hydrogen bond, Hydrogen bond, Salt bridge |
| 12        | -11.375          | -11.375        | LYS 264, SER 279, ASP 359, TYR 535, LYS 534, ASH 394, ASP 480, LYS 355 | Hydrogen bond, Hydrogen bond, Hydrogen bond, Hydrogen bond, Hydrogen bond, Hydrogen bond, Salt bridge |
| 13        | -12.363          | -12.377        | SER 279, ASP 359, LYS 264, LYS 534, TYR 535, ARG 392, ASP 480, GLN 324, GLU 423 | Hydrogen bond, Hydrogen bond, Hydrogen bond, Hydrogen bond, Hydrogen bond, Hydrogen bond, Hydrogen bond, Salt bridge |

Compound 13 showed H-bond interaction from the hydroxyl groups to Ser 279, Asp 359, Lys 264, Lys 534, Tyr 535, Arg 392, Asp 480, Gln 324 amino acid residues. Despite these interactions, the cyclohexyl ring itself did not show any interaction to the protein in the Glide-Docked model. However, modification of the cyclohexylamine moiety is expected for additional interactions with the protein. In a previous work published by our group, Glu 423 was seen to interact with the nitrogen at the anomeric position (Si et al., 2021). In this docking study, Compound 11 (4.49 Å) and 12 (4.45 Å) did not record any Glu 423 interaction with the pseudoanomeric oxygen. Compound 13 pseudoanomeric nitrogen was found to interact with Glu 423 at a distance of 3.17 Å among other bond interaction at the anomeric position (Figure S2). Owing to the crucial role of Glu 423 in the catalytic steps and stabilization of the complex, interaction of Glu 423 at the anomeric position could also help in the search for GlgE inhibitor with better activity.
Table S2: Crystallographic Data Table of the Sco GlgE1-V279S/13 structure

| Data collection |  |
|-----------------|---|
| Wavelength (Å)  | 0.98 |
| Space group     | P 4 1 2 1 2 |
| Unit cell dimensions |  |
| a (Å)           | 112.438 |
| b (Å)           | 112.438 |
| c (Å)           | 310.411 |
| α              | 90°  |
| β              | 90°  |
| γ              | 90°  |
| Resolution (Å) | 49.4 - 2.64 |
| \( R_{\text{pim}} \) | 0.112 (0.856) |
| \( R_{\text{merge}} \) | 0.316 (2.483) |
| \( \text{CC}_{1/2} \) | 0.997 (0.791) |
| \( I/I_{\sigma} \) | 6.1 (0.69) |
| Completeness (%) | 96.28 (99.91) |

| Refinement |  |
| Total no. of reflections | 5272398 |
| No. of unique reflections | 51907 (5263) |
| \( R_{\text{work}}/R_{\text{free}} \) | 0.1926/0.2578 |
| No. of atoms |  |
| Protein | 10348 |
| Ligand/ion | 72 |
| Water | 253 |
| B-factors (Å²) |  |
| Protein | 57.79 |
| Ligand/ion | 70.03 |
| Water | 52.08 |
| R.m.s deviations |  |
| Bond length (Å) | 0.009 |
| Bond angels (°) | 1.16 |
| Ramachandran |  |
| Favored (%) | 97.45 |
| Outliers (%) | 0.00 |
$^1$H NMR (1,3,4/2)-1,2-Di-O-benzyl-4-C-[(benzyloxy)methyl]-4-O-acetyl-3-O-(2',3',4',6'-tetra-O-benzyl-\(\alpha\)-D-glucopyranosyl)cyclohex-5-ene-1,2,3,4-tetrol (20)
$^{13}$C NMR (1,3,4/2)-1,2-Di-O-benzyl-4-C-[(benzyloxy)methyl]-4-O-acetyl-3-O-(2',3',4',6'-tetra-O-benzyl-α-D-glucopyranosyl)cyclohex-5-ene-1,2,3,4-tetrol (20)
$^1$H NMR (1,3,4/2)-1,2-Di-O-benzyl-4-C-[(benzylxoy)methyl]-3-O-(2',3',4',6'-tetra-O-benzyl-\(\alpha\)-D-glucopyranosyl)cyclohex-4-ene-1,2,3,6-tetrol (21)
$^{13}$C NMR (1,3,4/2)-1,2-Di-O-benzyl-4-C-[(benzylxoy)methyl]-3-O-(2',3',4',6'-tetra-O-benzyl-\(\alpha\)-D-glucopyranosyl)cyclohex-4-ene-1,2,3,6-tetrol (21)
$^1$H NMR 3,4-Di(benzyloxy)-6-((benzyloxy)methyl)-5-O-(2',3',4',6'-tetra-O-benzyl-$\alpha$-D-glucopyranosyl)bicyclo[4.1.0]heptane-2-ol (22)
$^{13}$C NMR 3,4-Di(benzyloxy)-6-((benzyloxy)methyl)-5-O-(2',3',4',6'-tetra-O-benzyl-α-D-glucopyranosyl)bicyclo[4.1.0]heptane-2-ol (22)
$^1$H NMR 3,4-Di(benzyloxy)-6-((benzyloxy)methyl)-5-O-(2',3',4',6'-tetra-O-benzyl-α-D-glucopyranosyl)bicyclo[4.1.0]heptane-2-(3,5-difluorophenoxy) (24)
\[^{13}\text{C}\] NMR 3,4-Di(benzyloxy)-6-((benzyloxy)methyl)-5-O-(2',3',4',6'-tetra-O-benzyl-\(\alpha\)-D-glucopyranosyl)bicyclo[4.1.0]heptane-2-(3,5-difluorophenoxy) (24)
$^1$H NMR 2-(3,5-difluorophenoxy)-6-(hydroxymethyl)-5-O-(2',3',4',6'-tetra-ol-\(\alpha\)-D-glucopyranosyl) bicyclo[4.1.0]heptane-3,4-diol (11)
$^{13}$C NMR 2-(3,5-difluorophenoxy)-6-(hydroxymethyl)-5-O-(2',3',4',6'-tetra-ol-α-D-glucopyranosyl) bicyclo[4.1.0]heptane-3,4-diol (11)
\(^1\text{H NMR}\) 4-methylthiophenyl 2,3,6-Tri-O-(4-bromobenzyl)-4-O-(2',3',4',6'-tetra-O-(4-
bromobenzyl)-\(\alpha\)-D-glucopyranosyl)-\(\beta\)-D-glucopyranoside (15')

15': \(R = \text{PBB}\)
$^{13}$C NMR of 4-methylthiophenyl 2,3,6-Tri-O-(4-bromobenzyl)-4-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-β-D-glucopyranoside (15')

15': $R = \text{PBB}$
$^1$H NMR 2,3,6-Tri-O-(4-bromobenzyl)-4-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-α/β-D-glucopyranoside (16')

16': $R = \text{PBB}$
$^{13}$C NMR 2,3,6-Tri-O-(4-bromobenzyl)-4-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-α/β-D-glucopyranoside (16')

16' : $R = PBB$
$^1$H NMR 3,4,7-Tri-O-(4-bromobenzyl)-5-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-D-glucose-1-enitol (17')

$^{17'}: R = PBB$
$^{13}$C NMR 3,4,7-Tri-O-(4-bromobenzyl)-5-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-D-glucose-1-enitol (17')

17' : R = PBB
$^1$H NMR 3,4,7-Tri-O-(4-bromobenzyl)-5-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-D-gluchept-1-enone (18')

18' : R = PBB
$^{13}$C NMR 3,4,7-Tri-O-(4-bromobenzyl)-5-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-D-gluchept-1-enone (18')

18’ : R = PBB
$^1$H NMR 3,4,9-Tri-O-(4-bromobenzyl)-5-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-gucopyranosyl)-D-gluco-octa-1,7-dienitol (19A')

19A': $R = \text{PBB}$
$^{13}$C NMR 3,4,9-Tri-O-(4-bromobenzyl)-5-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-D-gluco-octa-1,7-dienitol (19A')

19A': R = PBB
$^1$H NMR 3,4,9-Tri-O-(4-bromobenzyl)-5-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)-L-ido-octa-1,7-dienitol (19B’)

![Diagram of the molecule](image)

19B’ : R = PBB
\(^1\)H NMR (1,3,4/2)-1,2-Di-O-(4-bromobenzyl)-4-C-[(4-bromobenzyl)oxy]methyl]-3-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-\(\alpha\)-D-glucopyranosyl)cyclohex-5-ene-1,2,3,4-tetrol (10')

10': \(R = \text{PBB}\)
$^{13}$C NMR (1,3,4/2)-1,2-Di-O-(4-bromobenzyl)-4-C-[(4-bromobenzyloxy)methyl]-3-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl) cyclohex-5-ene-1,2,3,4-tetrol (10')

10' : $R = \text{PBB}$
$^1$H NMR (1,3,4/2)-1,2-Di-O-(4-bromobenzyl)-4-C-[(4-bromobenzyloxy)methyl]-4-O-acetyl-3-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)cyclohex-5-ene-1,2,3,4-tetrol (20')

20' : R = PBB
\(^{13}\)C NMR (1,3,4/2)-1,2-Di-O-(4-bromobenzyl)-4-C-[(4-bromobenzyloxy)methyl]-4-O-acetyl-3-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-\(\alpha\)-D-glucopyranosyl)cyclohex-5-ene-1,2,3,4-tetrol (20')

20' : R = PBB
**1H NMR** (1,3,4/2)-1,2-Di-O-(4-bromobenzyl)-4-C-[(4-bromobenzylxyloxy)methyl]-3-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-α-D-glucopyranosyl)cyclohex-4-ene-1,2,3,6-tetrol (21')

![Structural formula of 21']

21': R = PBB
$^{13}$C NMR (1,3,4/2)-1,2-Di-O-(4-bromobenzyl)-4-C-[(4-bromobenzyloxy)methyl]-3-O-(2',3',4',6'-tetra-O-(4-bromobenzyl)-$\alpha$-D-glucopyranosyl)cyclohex-4-ene-1,2,3,6-tetrol (21')
$^{1}H$ NMR 3,4-Di(4-bromobenzyloxy)-6-((4-bromobenzyloxy)methyl)-5-O-(2',3',4',6'-tetra-O-4-bromobenzyl-$\alpha$-D-glucopyranosyl)- 2-(3,5-difluorophenoxy) (23)
$^{13}$C NMR 3,4-Di(4-bromobenzyloxy)-6-((4-bromobenzyloxy)methyl)-5-O-(2',3',4',6'-tetra-O-4-bromobenzyl-$\alpha$-D-glucopyranosyl)- 2-(3,5-difluorophenoxy) (23)
$^1$H NMR 3,4-Di(4-(N-methyl, N-phenyl)benzyl-oxy)-6-((4-(N-methyl, N-phenyl)benzyl-oxy)methyl)-5-O-(2',3',4',6'-tetra-O-4-(N-methyl,N-phenyl)benzyl-α-D-glucopyranosyl)- 2-(3,5-difluorophenoxy) (25)

25 : $R_1$ = (4-N-methyl, N-phenylamino) benzyl, $R_2$ = 3,5-difluorophenyl
$^{13}$C NMR  
3,4-Di(4-(N-methyl, N-phenyl)benzyloxy)-6-((4-(N-methyl, N-phenyl)benzyloxy)methyl)-5-O-(2',3',4',6'-tetra-O-4-(N-methyl, N-phenyl)benzyl-α-D-glucopyranosyl)- 2-(3,5-difluorophenoxy) (25)

$\mathbf{25}: R_1 = (4-N\text{-methyl, } N\text{-phenylamino})$ 
$R_2 = 3,5\text{-difluorophenyl}$
$^1$H NMR 1-α-D-Glucopyranoside 4-(hydroxymethyl)-6- (4-(3,5 difluorophenoxy)) cyclohex-4-ene-2,3-triol (12)
$^{13}$C NMR 1-$\alpha$-D-Glucopyranoside 4-(hydroxymethyl)-6- (4-(3,5 difluorophenoxy))
cyclohex-4-ene-2,3-triol (12)
$^1$H NMR (2R,3R,4S,5R,6S)-3,4,5-tris(benzyloxy)-2-((benzyloxy)methyl)-6-(((1R,5R,6S)-5,6-bis(benzyloxy)-2-((benzyloxy)methyl)-4-bromocyclohex-2-en-1-yl)oxy)tetrahydro-2H-pyran (26a)
$^{13}$C NMR (2R,3R,4S,5R,6S)-3,4,5-tris(benzyloxy)-2-((benzyloxy)methyl)-6-((1R,5R,6S)-5,6-bis(benzyloxy)-2-((benzyloxy)methyl)-4-bromocyclohex-2-en-1-yl)oxy)tetrahydro-2H-pyran (26a)
$^1$H NMR (2R,3R,4S,5R,6S)-3,4,5-tris(benzyloxy)-2-((benzyloxy)methyl)-6-(((1R,5R,6S)-5,6-bis(benzyloxy)-2-((benzyloxy)methyl)-4-bromocyclohex-2-en-1-yl)oxy)tetrahydro-2H-pyran (26b)
$^{13}$C NMR (2R,3R,4S,5R,6S)-3,4,5-tris(benzyloxy)-2-((benzyloxy)methyl)-6-((1R,5R,6S)-5,6-bis(benzyloxy)-2-((benzyloxy)methyl)-4-bromocyclohex-2-en-1-yl)oxy)tetrahydro-2H-pyran (26b)
\[^{1}\text{H}\text{ NMR}\] (1S,4R,5S,6S)-5,6-bis(benzyloxy)-3-((benzyloxy)methyl)-N-cyclohexyl-4-(((2S,3R,4S,5R,6R)-3,4,5-tris(benzyloxy)-6-((benzyloxy)methyl)tetrahydro-2H-pyran-2-yl)oxy)cyclohex-2-en-1-amine (27)
\[ ^{13}C \text{NMR} \quad (1S,4R,5S,6S)-5,6-\text{bis(benzyloxy)}-3-((\text{benzyloxy})\text{methyl})-N-\text{cyclohexyl-}
\]
\[4-(((2S,3R,4S,5R,6R)-3,4,5-\text{tris(benzyloxy)}-6-((\text{benzyloxy})\text{methyl})\text{tetrahydro-2H-pyran-2-}
\]
\[\text{yl} \text{oxy})\text{cyclohex-2-en-1-amine (27)} \]
$^1$H NMR  
(2S,3R,4S,5S,6R)-2-(((1R,4S,5S,6R)-4-(cyclohexylamino)-5,6-dihydroxy-2-(hydroxymethyl)cyclohex-2-en-1-yl)oxy)-6-(hydroxymethyl)tetrahydro-2H-pyran-3,4,5-triol (13)
$^{13}$C NMR (2S,3R,4S,5S,6R)-2-(((1R,4S,5S,6R)-4-(cyclohexylamino)-5,6-dihydroxy-2-(hydroxymethyl)cyclohex-2-en-1-yl)oxy)-6-(hydroxymethyl)tetrahydro-2H-pyran-3,4,5-triol (13)
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