

Supplementary Information

Variations in *O*-glycosylation Patterns Influence Viral Pathogenicity, Infectivity, and Transmissibility in SARS-CoV-2 Variants

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Supplementary Table S4: List of *O*-glycopeptides on G446S mutation in Omicron.

Supplementary Figure S1

1	100
Alpha	MFVFLVLLPL VSSQCVNLT RTQLPPAYTN SFRGVVYPD KVRSSVLHS TQDLFLPFFS NVTWFHAI-- SGTNGTKRFD NPVLPFNDGV YFASTEKSNI
Beta	MFVFLVLLPL VSSQCVNFTT RTQLPPAYTN SFRGVVYPD KVRSSVLHS TQDLFLPFFS NVTWFHAIHV SGTNGTKRFA NPVLPFNDGV YFASTEKSNI
Gamma	MFVFLVLLPL VSSQCVNFTN RTQLPSAYTN SFRGVVYPD KVRSSVLHS TQDLFLPFFS NVTWFHAIHV SGTNGTKRFD NPVLPFNDGV YFASTEKSNI
Delta	MFVFLVLLPL VSSQCVNLRT RTQLPPAYTN SFRGVVYPD KVRSSVLHS TQDLFLPFFS NVTWFHAIHV SGTNGTKRFD NPVLPFNDGV YFASTEKSNI
Epsilon	MFVFLVLLPL VSSQCVNLT RTQLPPAYTN SFRGVVYPD KVRSSVLHS TQDLFLPFFS NVTWFHAIHV SGTNGTKRFD NPVLPFNDGV YFASTEKSNI
Kappa	MFVFLVLLPL VSSQCVNLT RTQLPPAYTN SFRGVVYPD KVRSSVLHS TQDLFLPFFS NVTWFHAIHV SGTNGTKRFD NPVLPFNDGV YFASTEKSNI
Iota	MFVFLVLLPL VSSQCVNLT RTQLPPAYTN SFRGVVYPD KVRSSVLHS TQDLFLPFFS NVTWFHAIHV SGTNGTKRFD NPVLPFNDGV YFASTEKSNI
Eta	MFVFLVLLPL VSSQCVNLT RTQLPPAYTN SFRGVVYPD KVRSSVLHS TQDLFLPFFS NVTWFHAIHV SGTNGTKRFD NPVLPFNDGV YFASTEKSNI
Lambda	MFVFLVLLPL VSSQCVNLT RTQLPPAYTN SFRGVVYPD KVRSSVLHS TQDLFLPFFS NVTWFHAIHV SGTNVIKRFD NPVLPFNDGV YFASTEKSNI
Mu	MFVFLVLLPL VSSQCVNLT RTQLPPAYTN SFRGVVYPD KVRSSVLHS TQDLFLPFFS NVTWFHAIHV SGTNGTKRFD NPVLPFNDGV YFASTEKSNI
Omicron	MFVFLVLLPL VSSQCVNLT RTQLPPAYTN SFRGVVYPD KVRSSVLHS TQDLFLPFFS NVTWFHAIHV SGTNGTKRFD NPVLPFNDGV YFASTEKSNI
101	200
Alpha	IRGWIFGTTL GSKTQSLIV NNATNVVIVK CEFQFCNDPF LGVYHKNNK SWMESEFRVY SSANNCTFEY VSQPFMLDLE GKQGNFKNLR EFVFNIDGY
Beta	IRGWIFGTTL GSKTQSLIV NNATNVVIVK CEFQFCNDPF LGVYHKNNK SWMESEFRVY SSANNCTFEY VSQPFMLDLE GKQGNFKNLR EFVFNIDGY
Gamma	IRGWIFGTTL GSKTQSLIV NNATNVVIVK CEFQFCNDPF LGVYHKNNK SWMESEFRVY SSANNCTFEY VSQPFMLDLE GKQGNFKNLS EFVFNIDGY
Delta	IRGWIFGTTL GSKTQSLIV NNATNVVIVK CEFQFCNDPF LGVYHKNNK SWMESG--VY SSANNCTFEY VSQPFMLDLE GKQGNFKNLR EFVFNIDGY
Epsilon	IRGWIFGTTL GSKTQSLIV NNATNVVIVK CEFQFCNDPF LGVYHKNNK SCMESEFRVY SSANNCTFEY VSQPFMLDLE GKQGNFKNLR EFVFNIDGY
Kappa	IRGWIFGTTL GSKTQSLIV NNATNVVIVK CEFQFCNDPF LGVYHKNNK SWMKSEFRVY SSANNCTFEY VSQPFMLDLE GKQGNFKNLR EFVFNIDGY
Iota	IRGWIFGTTL GSKTQSLIV NNATNVVIVK CEFQFCNDPF LGVYHKNNK SWMESEFRVY SSANNCTFEY VSQPFMLDLE GKQGNFKNLR EFVFNIDGY
Eta	IRGWIFGTTL GSKTQSLIV NNATNVVIVK CEFQFCNDPF LGVYHKNNK SWMESEFRVY SSANNCTFEY VSQPFMLDLE GKQGNFKNLR EFVFNIDGY
Lambda	IRGWIFGTTL GSKTQSLIV NNATNVVIVK CEFQFCNDPF LGVYHKNNK SWMESEFRVY SSANNCTFEY VSQPFMLDLE GKQGNFKNLR EFVFNIDGY
Mu	IRGWIFGTTL GSKTQSLIV NNATNVVIVK CEFQFCNDPF LGVYHKNNK SWMESEFRVY SSANNCTFEY VSQPFMLDLE GKQGNFKNLR EFVFNIDGY
Omicron	IRGWIFGTTL GSKTQSLIV NNATNVVIVK CEFQFCNDPF LDVYHKNNK SWMESEFRVY SSANNCTFEY VSQPFMLDLE GKQGNFKNLR EFVFNIDGY
201	300
Alpha	FKIYSKHTPI NLVRDLPOGF SALEPLVDLP IGINITRFQT LLALHRSYLT PGDSSSGWTA GAAAYVGYL QPRTFLLYN ENGTITDAVD CALDPLSETK
Beta	FKIYSKHTPI NLVRGLPOGF SALEPLVDLP IGINITRFQT L--HISYLT PGDSSSGWTA GAAAYVGYL QPRTFLLYN ENGTITDAVD CALDPLSETK
Gamma	FKIYSKHTPI NLVRDLPOGF SALEPLVDLP IGINITRFQT LLALHRSYLT PGDSSSGWTA GAAAYVGYL QPRTFLLYN ENGTITDAVD CALDPLSETK
Delta	FKIYSKHTPI NLVRDLPOGF SALEPLVDLP IGINITRFQT LLALHRSYLT PGDSSSGWTA GAAAYVGYL QPRTFLLYN ENGTITDAVD CALDPLSETK
Epsilon	FKIYSKHTPI NLVRDLPOGF SALEPLVDLP IGINITRFQT LLALHRSYLT PGDSSSGWTA GAAAYVGYL QPRTFLLYN ENGTITDAVD CALDPLSETK
Kappa	FKIYSKHTPI NLVRDLPOGF SALEPLVDLP IGINITRFQT LLALHRSYLT PGDSSSGWTA GAAAYVGYL QPRTFLLYN ENGTITDAVD CALDPLSETK
Iota	FKIYSKHTPI NLVRDLPOGF SALEPLVDLP IGINITRFQT LLALHRSYLT PGSSSGWTA GAAAYVGYL QPRTFLLYN ENGTITDAVD CALDPLSETK
Eta	FKIYSKHTPI NLVRDLPOGF SALEPLVDLP IGINITRFQT LLALHRSYLT PGDSSSGWTA GAAAYVGYL QPRTFLLYN ENGTITDAVD CALDPLSETK
Lambda	FKIYSKHTPI NLVRDLPOGF SALEPLVDLP IGINITRFQT LLALHRSYLT PGSSSGWTA GAAAYVGYL QPRTFLLYN ENGTITDAVD CALDPLSETK
Mu	FKIYSKHTPI NLVRDLPOGF SALEPLVDLP IGINITRFQT LLALHRSYLT PGDSSSGWTA GAAAYVGYL QPRTFLLYN ENGTITDAVD CALDPLSETK
Omicron	FKIYSKHTPI NLVRDLPOGF SALEPLVDLP IGINITRFQT LLALHRSYLT PGDSSSGWTA GAAAYVGYL QPRTFLLYN ENGTITDAVD CALDPLSETK
301	400
Alpha	CTLKSFTVEK GIYQTSNFRV QPTESIVRFP NITNLCPFGE VFNATRFASV YAWNKRKISN CVADYSVLYN SASFSTFKCY GVSPTKLNDL CFTNVYADSE
Beta	CTLKSFTVEK GIYQTSNFRV QPTESIVRFP NITNLCPFGE VFNATRFASV YAWNKRKISN CVADYSVLYN SASFSTFKCY GVSPTKLNDL CFTNVYADSE
Gamma	CTLKSFTVEK GIYQTSNFRV QPTESIVRFP NITNLCPFGE VFNATRFASV YAWNKRKISN CVADYSVLYN SASFSTFKCY GVSPTKLNDL CFTNVYADSE
Delta	CTLKSFTVEK GIYQTSNFRV QPTESIVRFP NITNLCPFGE VFNATRFASV YAWNKRKISN CVADYSVLYN SASFSTFKCY GVSPTKLNDL CFTNVYADSE
Epsilon	CTLKSFTVEK GIYQTSNFRV QPTESIVRFP NITNLCPFGE VFNATRFASV YAWNKRKISN CVADYSVLYN SASFSTFKCY GVSPTKLNDL CFTNVYADSE
Kappa	CTLKSFTVEK GIYQTSNFRV QPTESIVRFP NITNLCPFGE VFNATRFASV YAWNKRKISN CVADYSVLYN SASFSTFKCY GVSPTKLNDL CFTNVYADSE
Iota	CTLKSFTVEK GIYQTSNFRV QPTESIVRFP NITNLCPFGE VFNATRFASV YAWNKRKISN CVADYSVLYN SASFSTFKCY GVSPTKLNDL CFTNVYADSE
Eta	CTLKSFTVEK GIYQTSNFRV QPTESIVRFP NITNLCPFGE VFNATRFASV YAWNKRKISN CVADYSVLYN SASFSTFKCY GVSPTKLNDL CFTNVYADSE
Lambda	CTLKSFTVEK GIYQTSNFRV QPTESIVRFP NITNLCPFGE VFNATRFASV YAWNKRKISN CVADYSVLYN SASFSTFKCY GVSPTKLNDL CFTNVYADSE
Mu	CTLKSFTVEK GIYQTSNFRV QPTESIVRFP NITNLCPFGE VFNATRFASV YAWNKRKISN CVADYSVLYN SASFSTFKCY GVSPTKLNDL CFTNVYADSE
Omicron	CTLKSFTVEK GIYQTSNFRV QPTESIVRFP NITNLCPFGE VFNATRFASV YAWNKRKISN CVADYSVLYN LAFSTFKCY GVSPTKLNDL CFTNVYADSE
401	500
Alpha	VIRGDEVROQ APGQTGKIAD YNYKLDDFT GCVIAWNSNN LDSKVGGNYN YLYRLFRKSN LKPFERDIST EIYQAGSTPC NGVEGFNCYF PLOSYGFQPT
Beta	VIRGDEVROQ APGQTGNIAID YNYKLDDFT GCVIAWNSNN LDSKVGGNYN YLYRLFRKSN LKPFERDIST EIYQAGSTPC NGVKGFNCYF PLOSYGFQPT
Gamma	VIRGDEVROQ APGQTGTIAD YNYKLDDFT GCVIAWNSNN LDSKVGGNYN YLYRLFRKSN LKPFERDIST EIYQAGSTPC NGVKGFNCYF PLOSYGFQPT
Delta	VIRGDEVROQ APGQTGKIAD YNYKLDDFT GCVIAWNSNN LDSKVGGNYN YLYRLFRKSN LKPFERDIST EIYQAGSKPC NGVEGFNCYF PLOSYGFQPT
Epsilon	VIRGDEVROQ APGQTGKIAD YNYKLDDFT GCVIAWNSNN LDSKVGGNYN YLYRLFRKSN LKPFERDIST EIYQAGSTPC NGVEGFNCYF PLOSYGFQPT
Kappa	VIRGDEVROQ APGQTGKIAD YNYKLDDFT GCVIAWNSNN LDSKVGGNYN YLYRLFRKSN LKPFERDIST EIYQAGSTPC NGVQGFNCYF PLOSYGFQPT
Iota	VIRGDEVROQ APGQTGKIAD YNYKLDDFT GCVIAWNSNN LDSKVGGNYN YLYRLFRKSN LKPFERDIST EIYQAGNTPC NGVKGFNCYF PLOSYGFQPT
Eta	VIRGDEVROQ APGQTGKIAD YNYKLDDFT GCVIAWNSNN LDSKVGGNYN YLYRLFRKSN LKPFERDIST EIYQAGSTPC NGVKGFNCYF PLOSYGFQPT
Lambda	VIRGDEVROQ APGQTGKIAD YNYKLDDFT GCVIAWNSNN LDSKVGGNYN YLYRLFRKSN LKPFERDIST EIYQAGSTPC NGVEGFNCYF PLOSYGFQPT
Mu	VIRGDEVROQ APGQTGKIAD YNYKLDDFT GCVIAWNSNN LDSKVGGNYN YLYRLFRKSN LKPFERDIST EIYQAGSTPC NGVKGFNCYF PLOSYGFQPT
Omicron	VIRGDEVROQ APGQTGNIAID YNYKLDDFT GCVIAWNSNK LDSKVSGNYN YLYRLFRKSN LKPFERDIST EIYQAGNKPC NGVAGFNICYF PLRSYSFRPT

501 600

Alpha YGVGYQPYRV VVLSFELLHA PATVCGPKKS TNLVKNKCVN FNFNGLTGTG VLTESNKKFL PFQQFGRDID DTTDAVRDPQ TLEILDITPC SFGGVSVITP
Beta YGVGYQPYRV VVLSFELLHA PATVCGPKKS TNLVKNKCVN FNFNGLTGTG VLTESNKKFL PFQQFGRDIA DTTDAVRDPQ TLEILDITPC SFGGVSVITP Gamma
YGVGYQPYRV VVLSFELLHA PATVCGPKKS TNLVKNKCVN FNFNGLTGTG VLTESNKKFL PFQQFGRDIA DTTDAVRDPQ TLEILDITPC SFGGVSVITP Delta
NGVGYPYRV VVLSFELLHA PATVCGPKKS TNLVKNKCVN FNFNGLTGTG VLTESNKKFL PFQQFGRDIA DTTDAVRDPQ TLEILDITPC SFGGVSVITP Epsilon
NGVGYPYRV VVLSFELLHA PATVCGPKKS TNLVKNKCVN FNFNGLTGTG VLTESNKKFL PFQQFGRDIA DTTDAVRDPQ TLEILDITPC SFGGVSVITP Kappa
NGVGYPYRV VVLSFELLHA PATVCGPKKS TNLVKNKCVN FNFNGLTGTG VLTESNKKFL PFQQFGRDIA DTTDAVRDPQ TLEILDITPC SFGGVSVITP Iota
NGVGYPYRV VVLSFELLHA PATVCGPKKS TNLVKNKCVN FNFNGLTGTG VLTESNKKFL PFQQFGRDIA DTTDAVRDPQ TLEILDITPC SFGGVSVITP Eta
NGVGYPYRV VVLSFELLHA PATVCGPKKS TNLVKNKCVN FNFNGLTGTG VLTESNKKFL PFQQFGRDIA DTTDAVRDPQ TLEILDITPC SFGGVSVITP Lambda
Mu YGVGYQPYRV VVLSFELLHA PATVCGPKKS TNLVKNKCVN FNFNGLTGTG VLTESNKKFL PFQQFGRDIA DTTDAVRDPQ TLEILDITPC SFGGVSVITP Omicron
YGVGHQPYRV VVLSFELLHA PATVCGPKKS TNLVKNKCVN FNFNGLKGTG VLTESNKKFL PFQQFGRDIA DTTDAVRDPQ TLEILDITPC SFGGVSVITP

601 685

Alpha GTNTSNQVAV LYQGVNCTEV PVAIHADQLT PTWRVYSTGS NVFQTRAGCL IGAEHVNNSY ECDIPIGAGI CASYQTQTNH HRRAR
Beta GTNTSNQVAV LYQGVNCTEV PVAIHADQLT PTWRVYSTGS NVFQTRAGCL IGAEHVNNSY ECDIPIGAGI CASYQTQTNH PRRAR
Gamma GTNTSNQVAV LYQGVNCTEV PVAIHADQLT PTWRVYSTGS NVFQTRAGCL IGAEHVNNSY ECDIPIGAGI CASYQTQTNH PRRAR
Delta GTNTSNQVAV LYQGVNCTEV PVAIHADQLT PTWRVYSTGS NVFQTRAGCL IGAEHVNNSY ECDIPIGAGI CASYQTQTNH HRRAR
Epsilon GTNTSNQVAV LYQGVNCTEV PVAIHADQLT PTWRVYSTGS NVFQTRAGCL IGAEHVNNSY ECDIPIGAGI CASYQTQTNH PRRAR
Kappa GTNTSNQVAV LYQGVNCTEV PVAIHADQLT PTWRVYSTGS NVFQTRAGCL IGAEHVNNSY ECDIPIGAGI CASYQTQTNH HRRAR
Iota GTNTSNQVAV LYQGVNCTEV PVAIHADQLT PTWRVYSTGS NVFQTRAGCL IGAEHVNNSY ECDIPIGAGI CASYQTQTNH PRRAR
Eta GTNTSNQVAV LYQGVNCTEV PVAIHADQLT PTWRVYSTGS NVFQTRAGCL IGAEHVNNSY ECDIPIGAGI CASYQTHTNH PRRAR
Lambda GTNTSNQVAV LYQGVNCTEV PVAIHADQLT PTWRVYSTGS NVFQTRAGCL IGAEHVNNSY ECDIPIGAGI CASYQTQTNH PRRAR
Mu GTNTSNQVAV LYQGVNCTEV PVAIHADQLT PTWRVYSTGS NVFQTRAGCL IGAEHVNNSY ECDIPIGAGI CASYQTQTNH HRRAR
Omicron GTNTSNQVAV LYQGVNCTEV PVAIHADQLT PTWRVYSTGS NVFQTRAGCL IGAEHVNNSY ECDIPIGAGI CASYQTQTKS HRRAR

The percentage coverage for each protein determined by Proteome Discoverer is as follows: Alpha 87%; Beta 97%; Gamma 87%; Delta 89%; Epsilon 87%; Kappa 84%; Iota 86%; Eta 70%, Lambda 88%; Mu 85%; and omicron 91%.

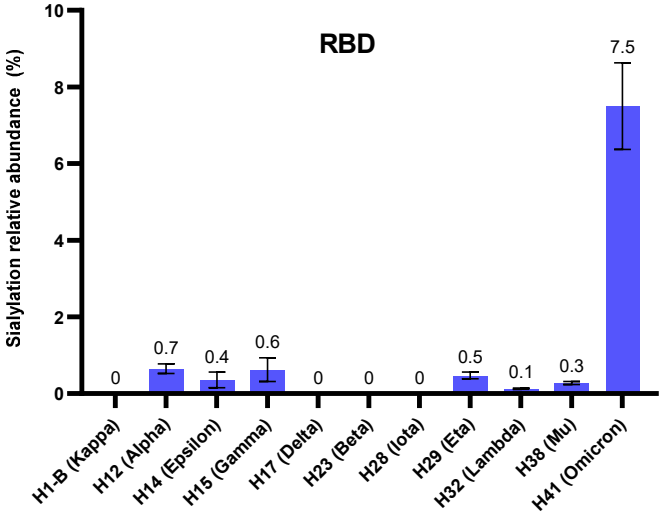
*Sections highlighted in yellow show the protein percent coverage

*Amino acid residues in red font are substituted

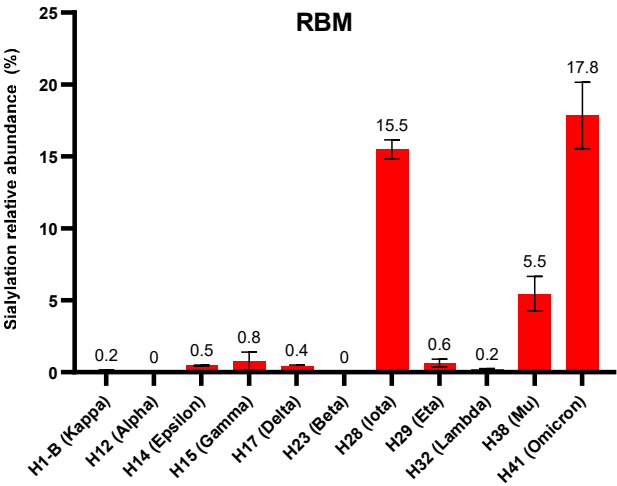
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* “↓” Indicates the point of insertion

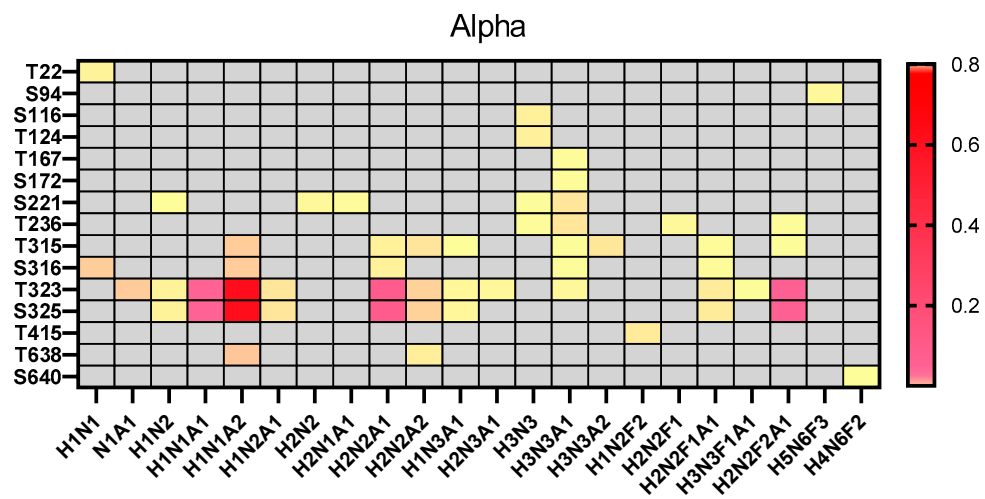
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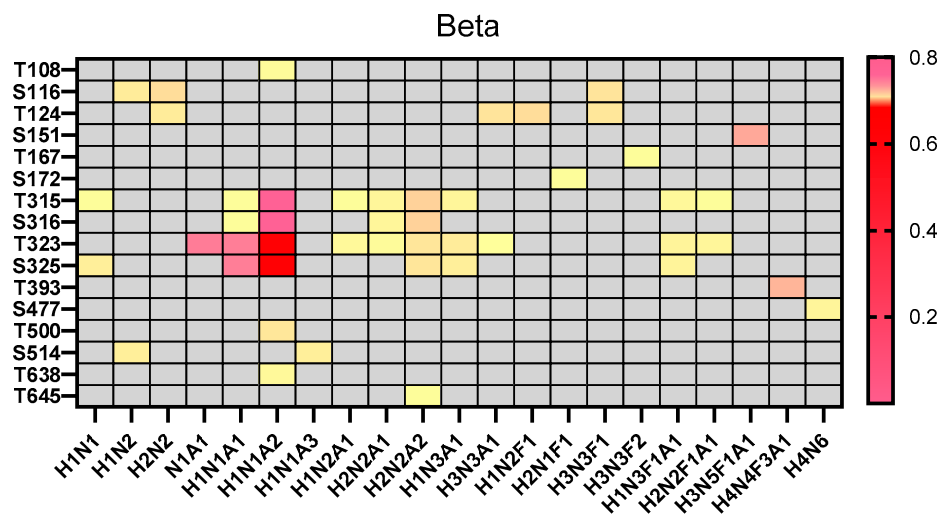
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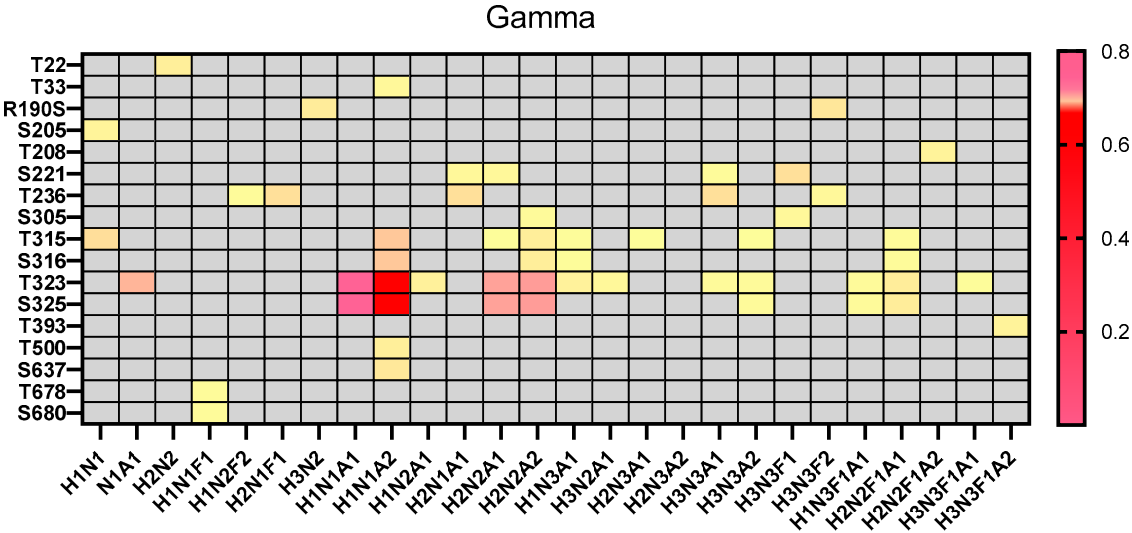
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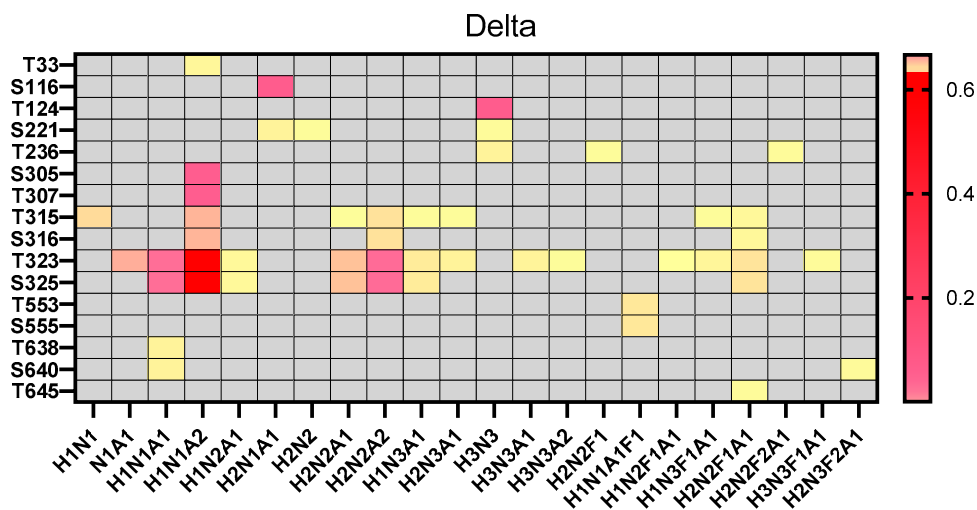
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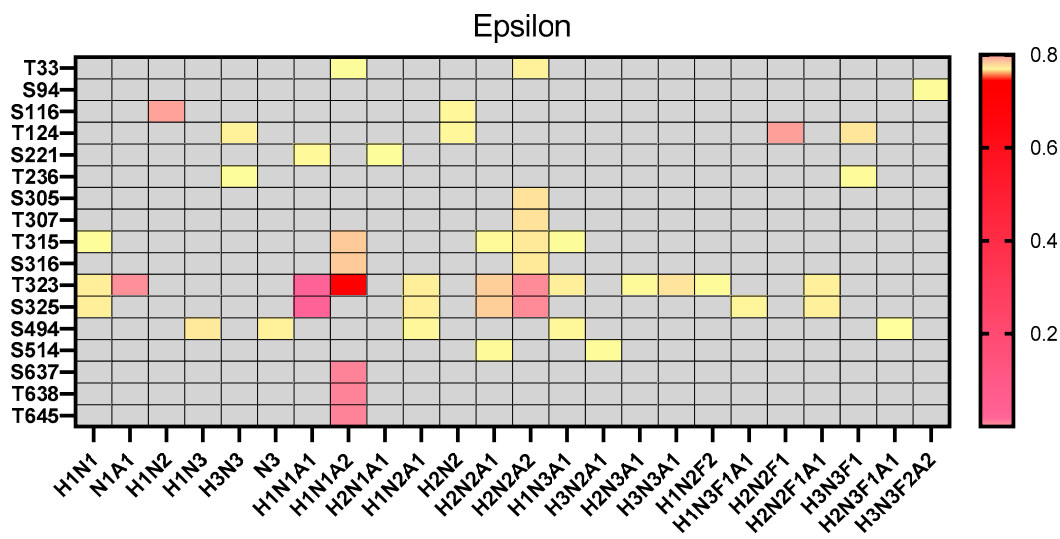
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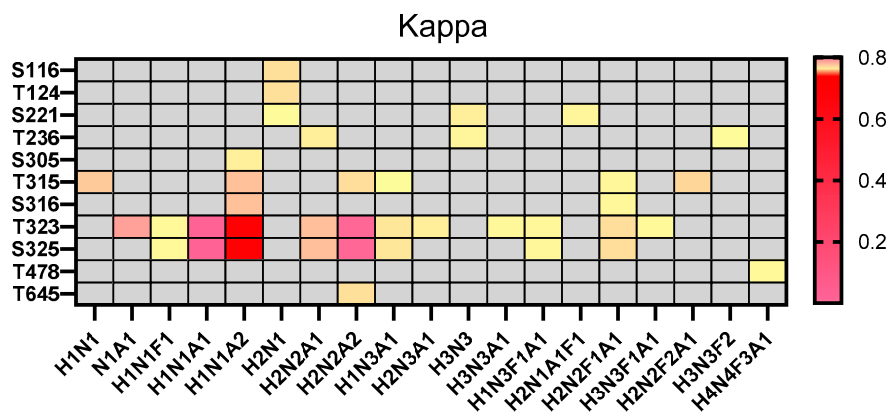
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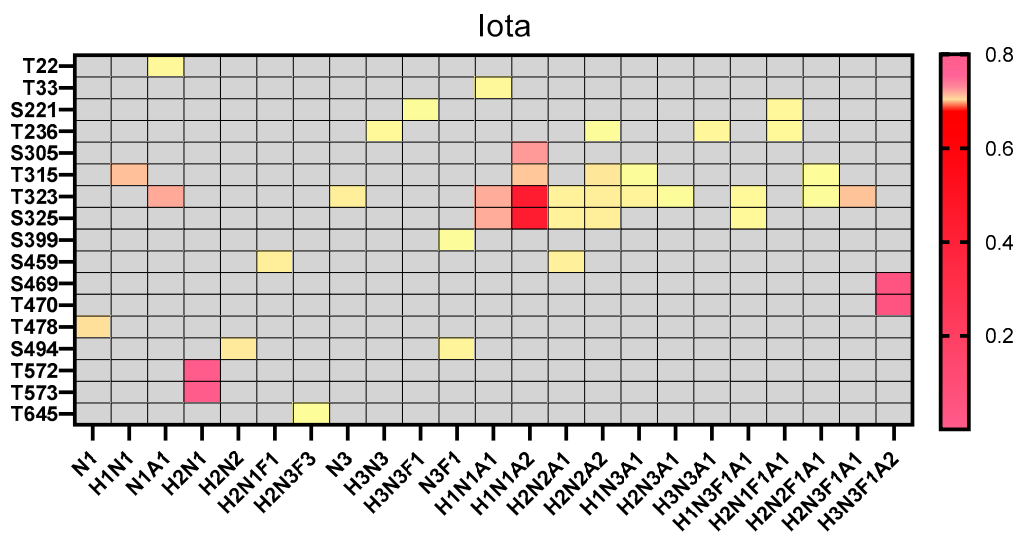
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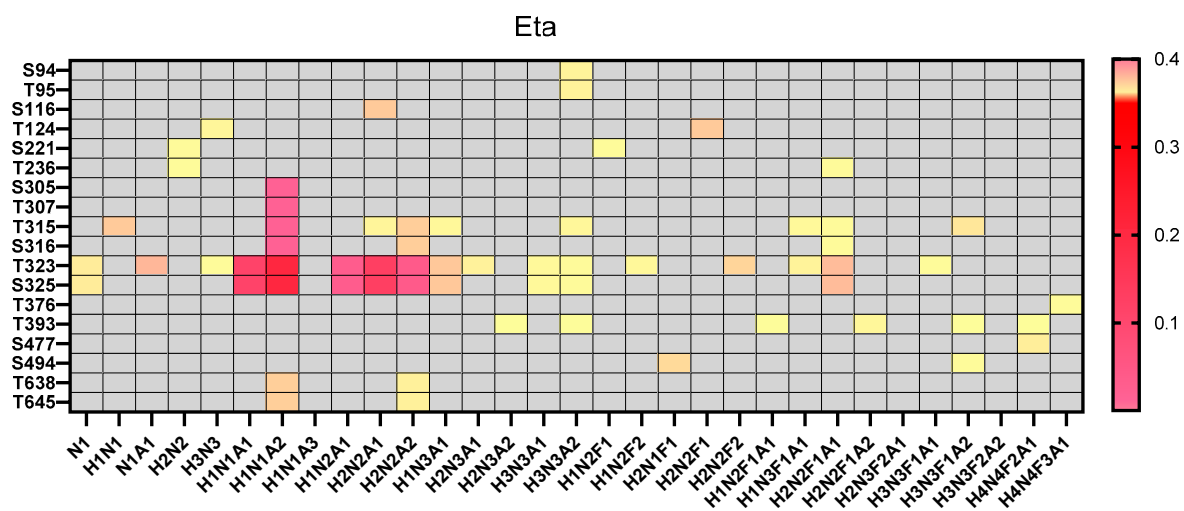
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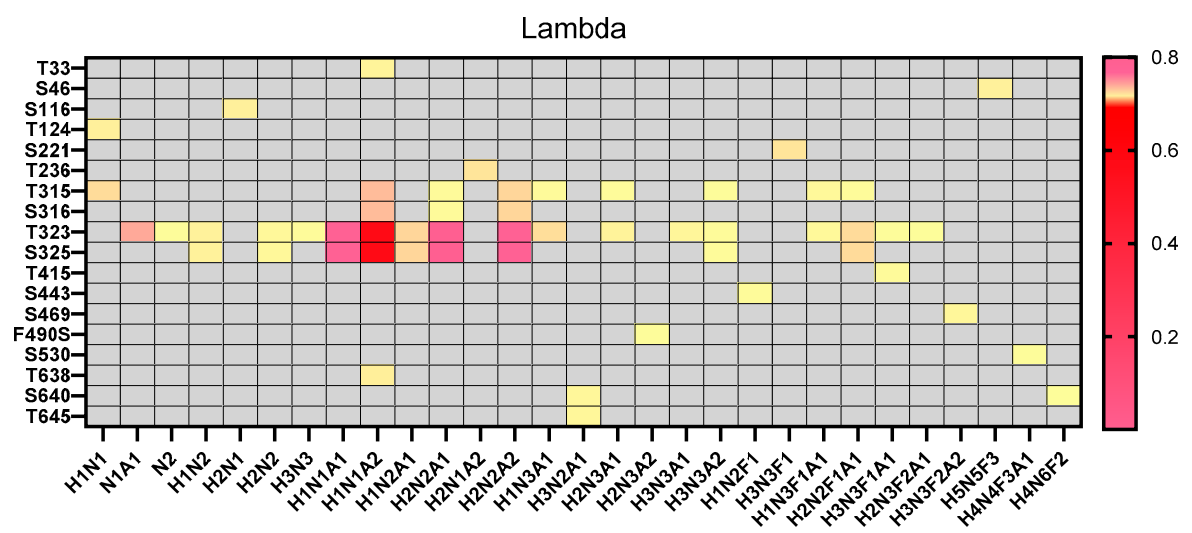
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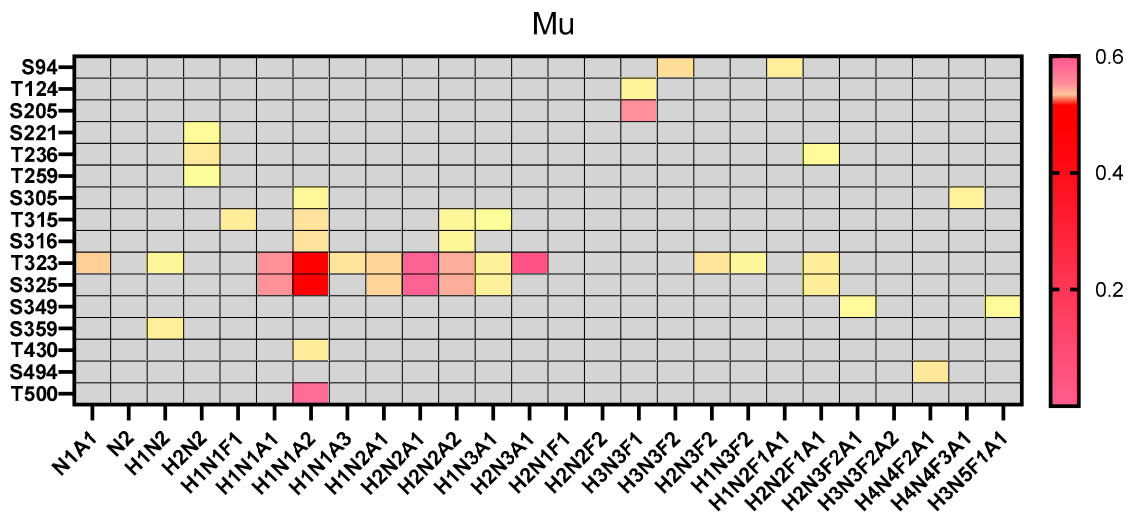
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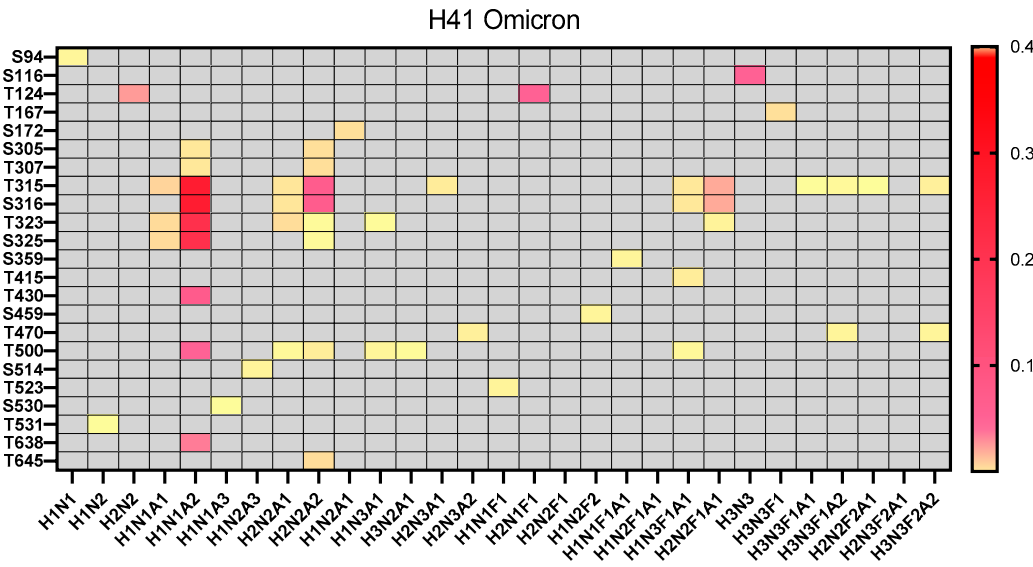
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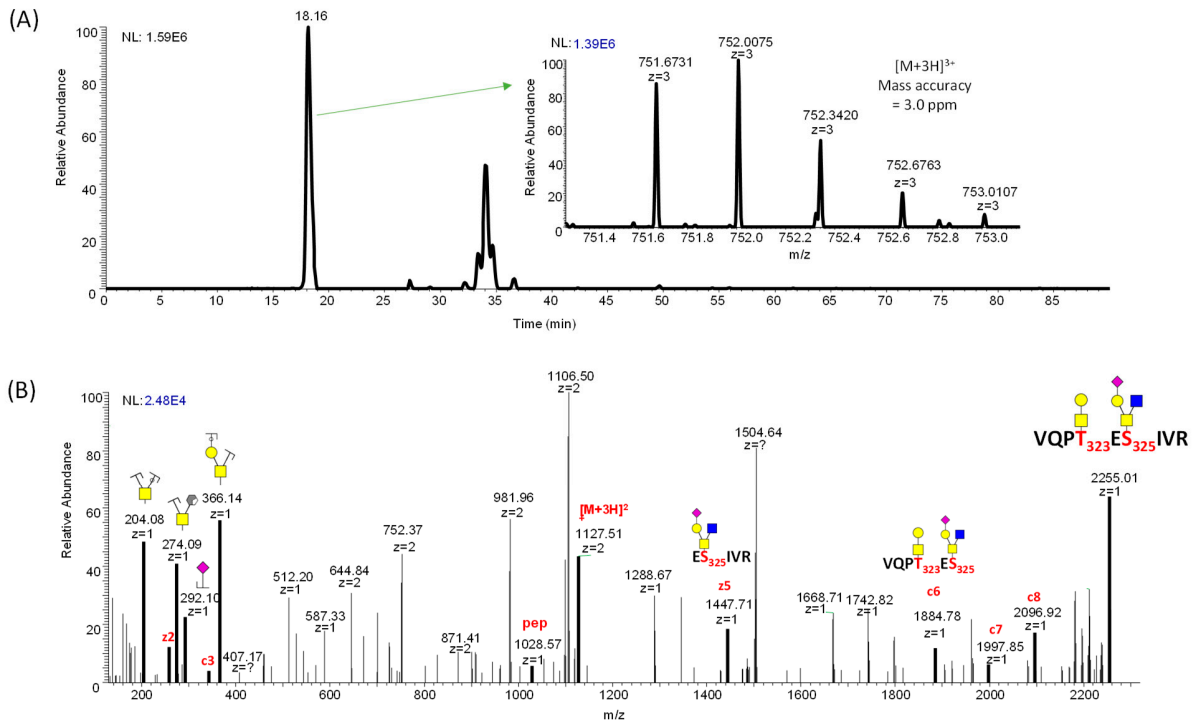
Supplementary Figure S13



Supplementary Figure S14



Supplementary Figure S15



Supplementary Figure S16

