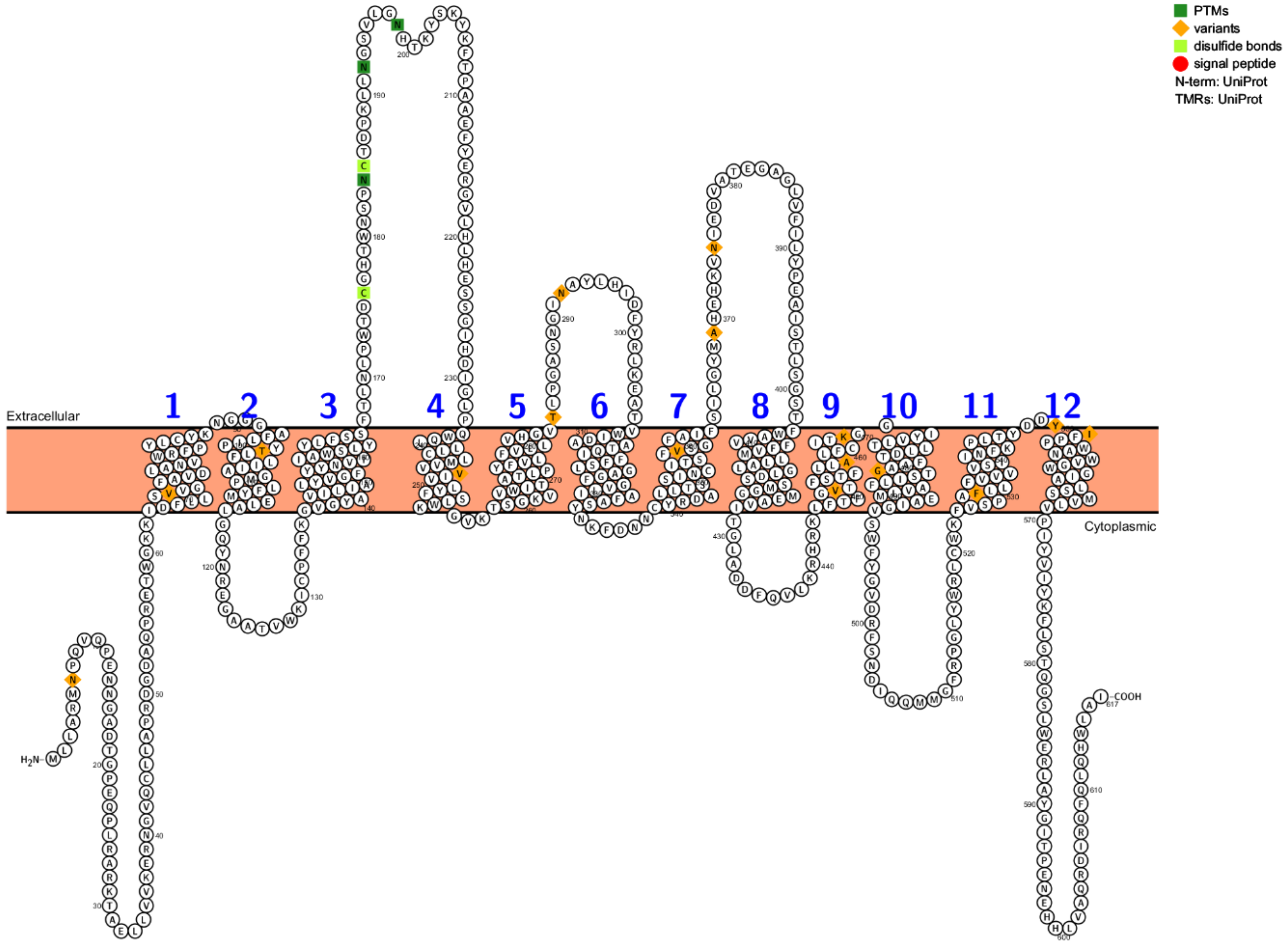
Monoamine transporter subfamily and vesicular amine transporters

NET= Norepinephrine transporter= SLC6A2, P23975, 617aa



🟩 PTMs
◆ variants
🟩 disulfide bonds
● signal peptide
N-term: UniProt
TMRs: UniProt
Extracellular
Cytoplasmic
1
2
3
4
5
6
7
8
9
10
11
12
H₂N
COOH

```
>sp|P23975|SC6A2_HUMAN Sodium-dependent noradrenaline transporter
MLLARMNPQVQPENNGADTGPEQPLRARKTAELLVVKERNGVQCLLAPRDGDAQPRETWG
KKIDFLLSVVGFAVDLANVWRFPYLCYKNGGGAFLIPYTLFLIIAGMPLFYMELALGQYN
REGAATVWKICPFFKGVGYAVILIALYVGFYYNVIIAWSLYYLFSSFTLNLPWTDCGHTW
NSPNCTDPKLLNGSVLGNHTKYSKYKFTPAAEFYERGVLHLHESSGIHDIGLPQWQLLLC
LMVVVIVLYFSLWKGVKTSGKVVWITATLPYFVLFVLLVHGVTLPGASNGINAYLHIDFY
RLKEATVWIDAATQIFFSLGAGFGVLIAFASYNKFDNNCYRDALLTSSINCITSFVSGFA
IFSILGYMAHEHKVNIEDVATEGAGLVFILYPEAISTLSGSTFWAVVFFVMLLALGLDSS
MGGMEAVITGLADDFQVLKRHRKLFTFGVTFSTFLLALFCITKGGIYVLTLLDTFAAGTS
ILFAVLMEAIGVSWFYGVDRFSNDIQQMMGFRPGLYWRLCWKFVSPAFLLFVVVVSIINF
KPLTYDDYIFPPWANWVGWGIALSSMVLVPIYVIYKFLSTQGSLWERLAYGITPENEHHL
VAQRDIRQFQLQHWLAI
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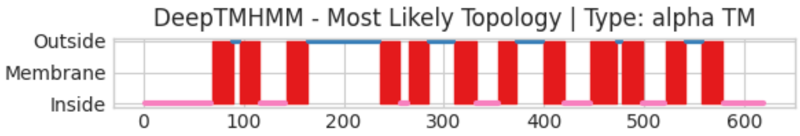
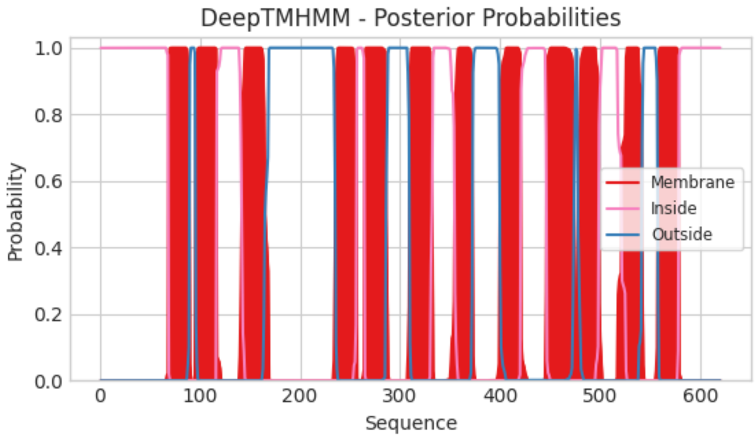
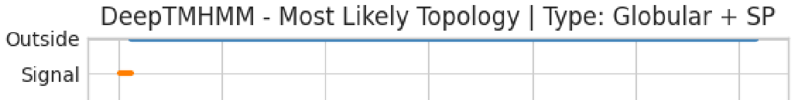
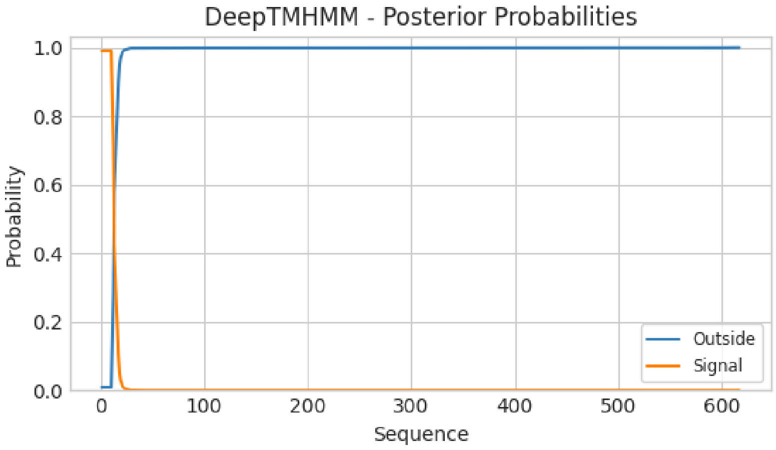




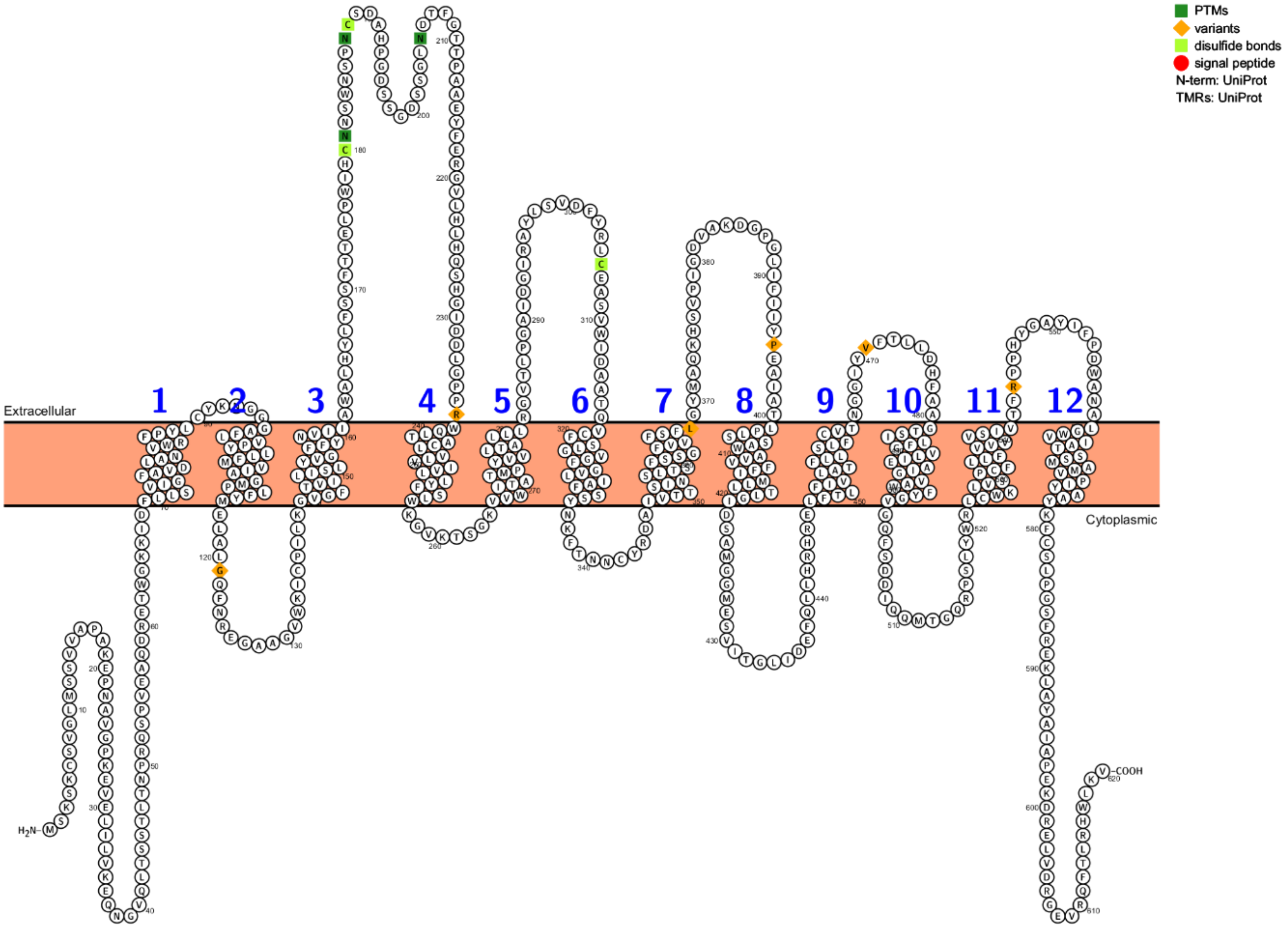
QTY variant, NET^{QTY} L-> Q; I, V -> T; F -> Y (=QTY code)

```
MLLARMNPQVQPENNGADTGPEQPLRARKTAELLVVKERNGVQCLLAPRDGDAQPRETWG
KKTDYQQSTTGYATDQANTWRYPYQCYKNGGGAYQTPYTQYQTTAGMPQYYMEQAQGQYN
REGAATVWKICPFFKGTGYATTQTAQYTGYYYNTTTAWSQYYQYSSFTLNLPWTDCGHTW
NSPNCTDPKLLNGSVLGNHTKYSKYKFTPAAEFYERGVLHLHESSGIHDIGLPQWQQQQC
QMTTTTTQYYSQWKGVKTSGKTTWTTATQPYYTQYTQQTHGTTLPGASNGINAYLHIDFY
RLKEATTWTDAATQTYYSQGAGYGTQTAYASYNKFDNNCYRDAQQTSSTNCTTSYTSGYA
TYSILGYMAHEHKVNIEDVATEGAGLVFILYPEAISTLSGSTYWATTYYTMQQAQGQDSS
MGGMEATTTGLADDFQVLKRHRKQYTYGTTYSTYQQAQYCTTKGGTYTQTQQDTYAAGTS
TQYATQMEATGTSWFYGVDRFSNDIQQMMGFRPGLYWRLCWKYTSPAYQQYTTTTSTTNY
KPQTYDDYTYPPWANWTGWGTAQSSMTQTPIYVIYKFLSTQGSLWERLAYGITPENEHHL
VAQRDIRQFQLQHWLAI
```





DAT= Dopamine transporter= SLC6A3, Q01959, 620aa


🟩 PTMs
◆ variants
🟩 disulfide bonds
● signal peptide
N-term: UniProt
TMRs: UniProt
Extracellular
Cytoplasmic
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10
11
12
H2N-
-COOH

```
>sp|Q01959|SC6A3_HUMAN Sodium-dependent dopamine transporter
MSKSKCSVGLMSSVVAPAKEPNAVGPKEVELILVKEQNGVQLTSSTLTNPRQSPVEAQDR
ETWGKKIDFLLSVIGFAVDLANVWRFPYLCYKNGGGAFLVPYLLFMVIAGMPLFYMELAL
GQFNREGAAGVWKICPILKGVGFTVILISLYVGFFYNVIIAWALHYLFSSFTTELPWIHC
NNSWNSPNCSDAHPGDSSGDSSGLNDTFGTTPAAEYFERGVLHLHQSHGIDDLGPPRWQL
TACLVLVIVLLYFSLWKGVKTSGKVVWITATMPYVVLTALLLRGVTLPGAIDGIRAYLSV
DFYRLCEASVWIDAATQVCFSLGVGFGVLIAFSSYNKFTNNCYRDAIVTTSINSLTSFSS
GFVVFSFLGYMAQKHSVPIGDVAKDGPGLIFIIYPEAIATLPLSSAWAVVFFIMLLTLGI
DSAMGGMESVITGLIDEFQLLHRHRELFTLFIVLATFLLSLFCVTNGGIYVFTLLDHFAA
GTSILFGVLIEAIGVAWFYGVGQFSDDIQQMTGQRPSLYWRLCWKLVSPCFLLFVVVVSI
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RELVDRGEVRQFTLRHWLKV
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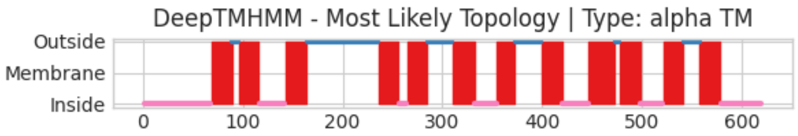
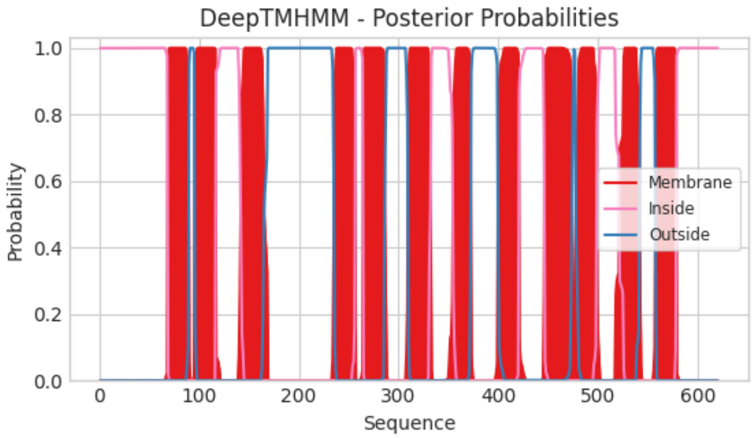
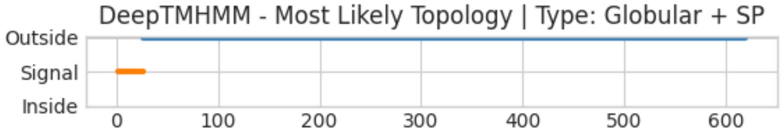
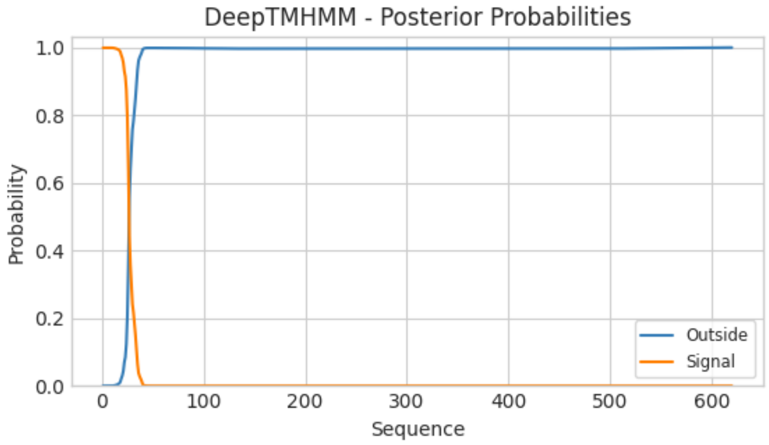




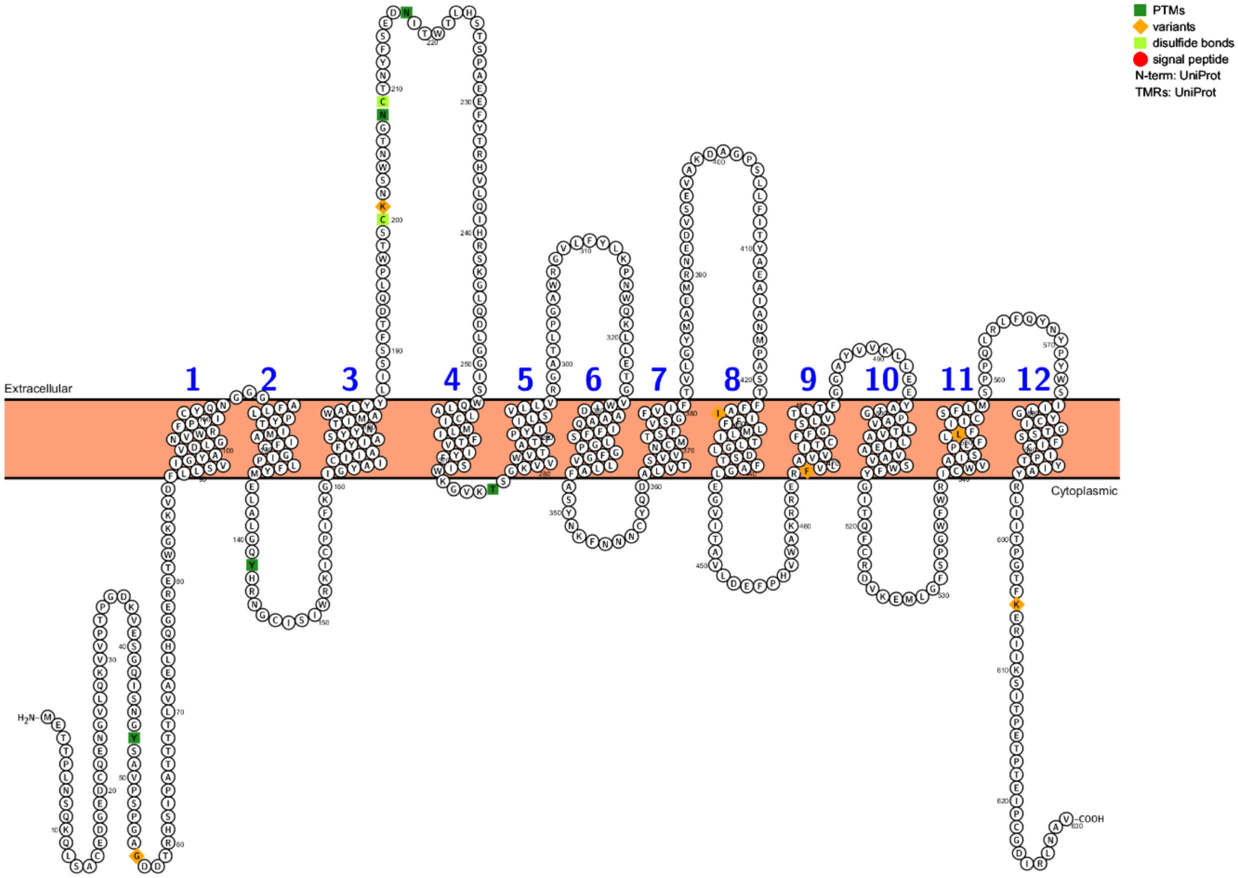
QTY variant, DAT^{QTY} L-> Q; I, V -> T; F -> Y (=QTY code)

MSKSKCSVGLMSSVVAPAKEPNAVGPKEVELILVKEQNGVQLTSSTLTNPRQSPVEAQDR
ETWGKKIDYQQSTTGYATDQANTWRYPYQCYKNGGGAYQTPYQQYMTTAGMPQYYMELAL
GQFNREGAAGVWKICPILKGTGYTTTQTSQYTGYYYNTTTAWALHYLFSSFTTELPWIHC
NNSWNSPNCSDAHPGDSSGDSSGLNDTFGTTPAAEYFERGVLHLHQSHGIDDLGPPRWQQ
TACQTQTTTQQYYSQWKGVKTSGKTTWTTATMPYTTQTAQQQRGVTLPGAIDGIRAYLSV
DFYRLCEASVWIDAATQTCYSQGTGYGTQTAYSSYNKFTNNCYRDATTTTSTNSQTSYSS
GYTTYSYQGYMAQKHSVPIGDVAKDGPGLIFIIYPEAIATQPQSSAWATTYYTMQQTQGT
DSAMGGMESVITGLIDEFQLLHRHREQYTQYTTQATYQQSQYCTTNGGIYVFTLLDHFAA
GTSTQYGTQTEATGTAWYYGTGQFSDDIQQMTGQRPSLYWRQCWKQTSPCYQQYTTTTST
TTFRPPHYGAYIFPDWANAQGWTTATSSMAMTPTYAAYKFCSLPGSFREKLAYAIAPEKD
RELVDRGEVRQFTLRHWLKV





SERT= Serotonin transporter= SLC6A4, P31645, 630aa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variants
disulfide bonds
signal peptide
N-term: UniProt
TMRs: UniProt
Extracellular
Cytoplasmic
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8
9
10
11
12
H2N-
-COOH

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>sp|P31645|SC6A4_HUMAN Sodium-dependent serotonin transporter
METTPLNSQKQLSACEDGEDCQENGVLQKVVPTPGDKVESGQISNGYSAVPSPGAGDDTR
HSIPATTTTLVAELHQGERETWGKKVDFLLSVIGYAVDLGNVWRFPYICYQNGGGAFLLP
YTIMAIFGGIPLFYMELALGQYHRNGCISIWRKICPIFKGIGYAICIIAFYIASYYNTIM
AWALYYLISSFTDQLPWTSCKNSWNTGNCTNYFSEDNITWTLHSTSPAEEFYTRHVLQIH
RSKGLQDLGGISWQLALCIMLIFTVIYFSIWKGVKTSGKVVWVTATFPYIILSVLLVRGA
TLPGAWRGVLFYLKPNWQKLLETGVWIDAAAQIFFSLGPGFGVLLAFASYNKFNNNCYQD
ALVTSVVNCMTSFVSGFVIFTVLGYMAEMRNEDVSEVAKDAGPSLLFITYAEAIANMPAS
TFFAIIFFLMLITLGLDSTFAGLEGVITAVLDEFPHVWAKRRERFVLAVVITCFFGSLVT
LTFGGAYVVKLLEEYATGPAVLTVALIEAVAVSWFYGITQFCRDVKEMLGFSPGWFWRIC
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PGTFKERIIKSITPETPTEIPCGDIRLNAV
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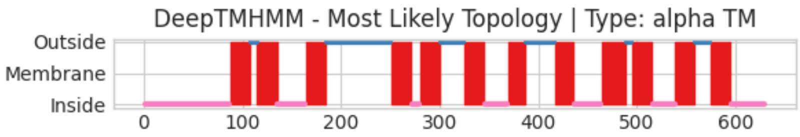
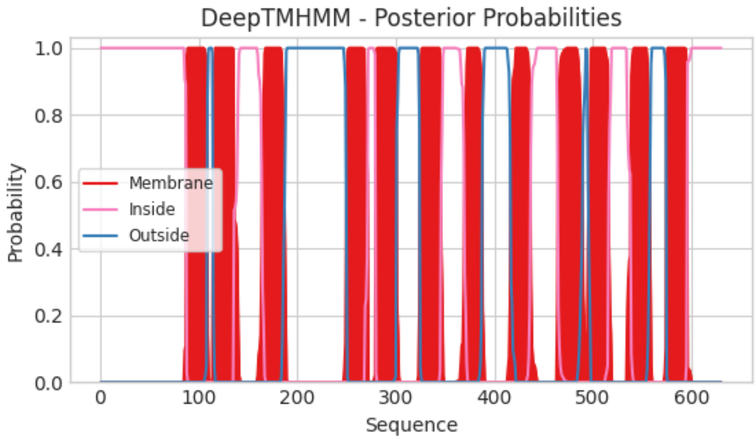
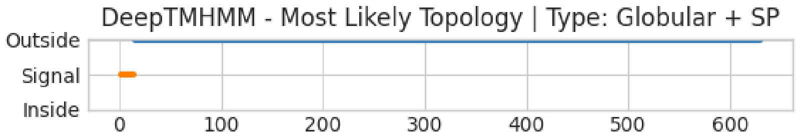
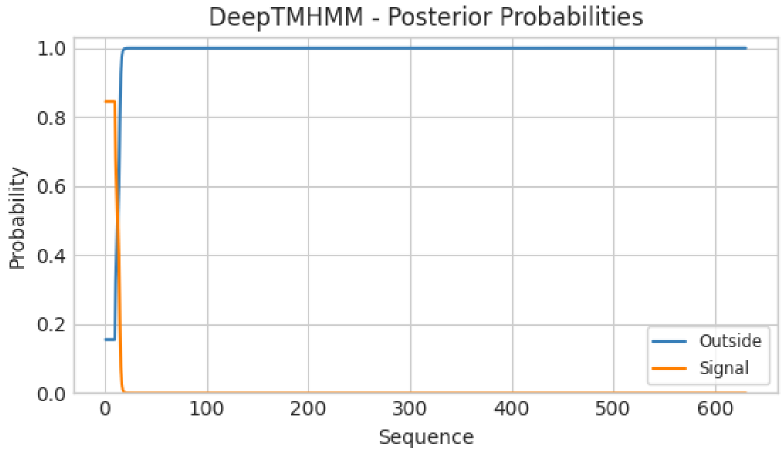




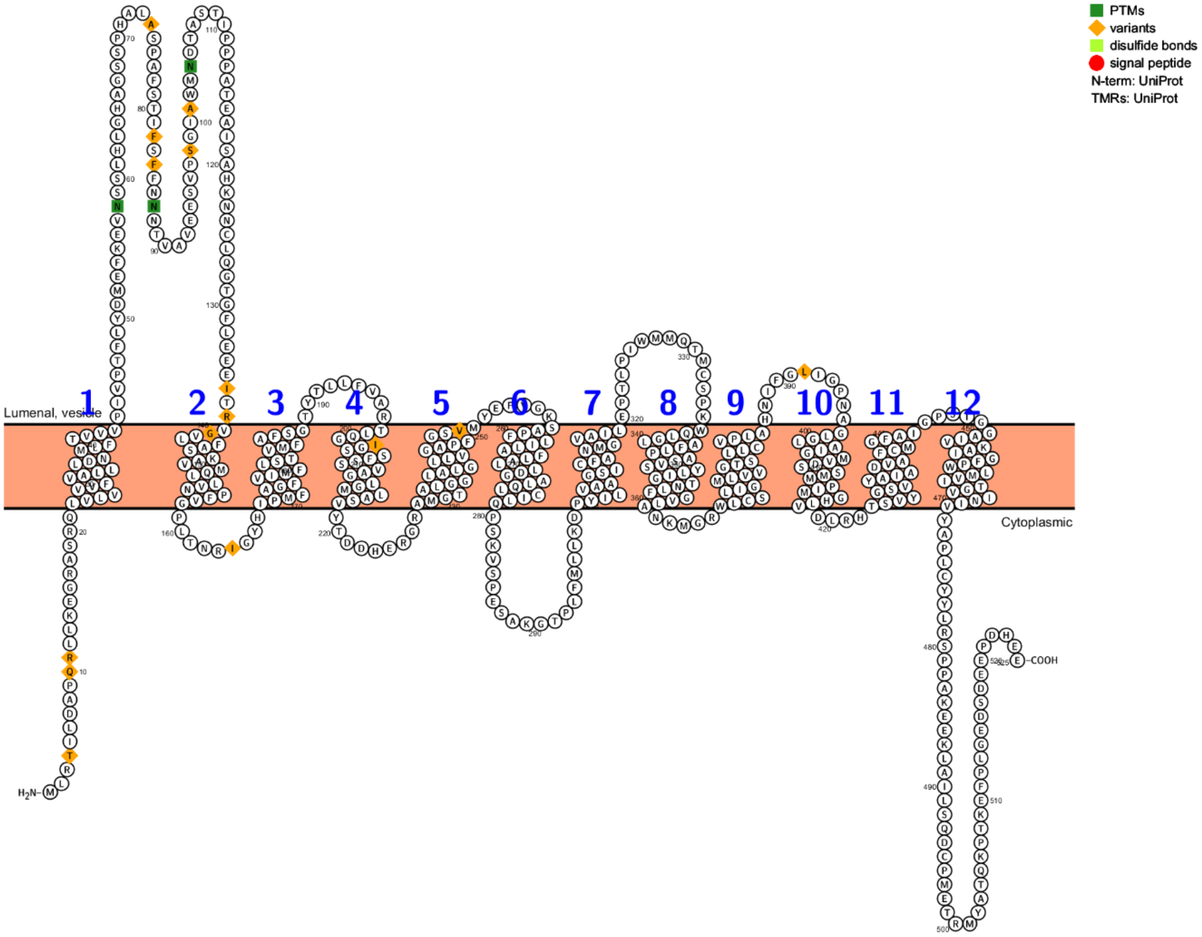
QTY variant, SERT^{QTY} L-> Q; I, V -> T; F -> Y (=QTY code)

METTPLNSQKQLSACEDGEDCQENGVLQKVVPTPGDKVESGQISNGYSAVPSPGAGDDTR
HSIPATTTTLVAELHQGERETWGKKVDYQQSTTGYATDQGNTWRYPYTCYQNGGGAYQQP
YTTMATYGGTPQYYMELALGQYHRNGCISIWRKICPIFKGTGYATCTTAYYTASYYNTTM
AWAQYYLISSFTDQLPWTSCKNSWNTGNCTNYFSEDNITWTLHSTSPAEEFYTRHVLQIH
RSKGLQDLGGISWQQAQCTMQTYTTTYYSTWKGVKTSGKTTWTTATYPYTTQSTQQTRGA
TLPGAWRGVLFYLKPNWQKLLETGTWTDAAAQTYYSQGPGYGTQQAYASYNKFNNNCYQD
AQTTSTTNCMTSYTSGYTTYTVLGYMAEMRNEDVSEVAKDAGPSLLFITYAEAIANMPAS
TYYATTYYQMQTTQGQDSTYAGQEGVITAVLDEFPHVWAKRRERYTQATTTTCYYGSQTT
QTYGGAYVVKLLEEYATGPATQTTAQTEATATSWYYGITQFCRDVKEMLGFSPGWFWRTC
WTATSPQYQQYTTCSYQMSPPQLRLFQYNYPYWSTTQGYCTGTSSYTCTPTYTAYRLIIT
PGTFKERIIKSITPETPTEIPCGDIRLNAV





VMAT1= Vesicular monoamine transporter 1= SLC18A1, P54219, 525aa


PTMs
variants
disulfide bonds
signal peptide
N-term: UniProt
TMRs: UniProt
1
2
3
4
5
6
7
8
9
10
11
12
Lumenal, vesicle
Cytoplasmic
H2N-
-COOH

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>sp|P54219|VMAT1_HUMAN Chromaffin granule amine transporter
MLRTILDAPQRLLKEGRASRQLVLVVVFVALLLDNMLFTVVVPIVPTFLYDMEFKEVNSS
LHLGHAGSSPHALASPAFSTIFSFFNNNTVAVEESVPSGIAWMNDTASTIPPPATEAISA
HKNNCLQGTGFLEEEITRVGVLFASKAVMQLLVNPFVGPLTNRIGYHIPMFAGFVIMFLS
TVMFAFSGTYTLLFVARTLQGIGSSFSSVAGLGMLASVYTDDHERGRAMGTALGGLALGL
LVGAPFGSVMYEFVGKSAPFLILAFLALLDGALQLCILQPSKVSPESAKGTPLFMLLKDP
YILVAAGSICFANMGVAILEPTLPIWMMQTMCSPKWQLGLAFLPASVSYLIGTNLFGVLA
NKMGRWLCSLIGMLVVGTSLLCVPLAHNIFGLIGPNAGLGLAIGMVDSSMMPIMGHLVDL
RHTSVYGSVYAIADVAFCMGFAIGPSTGGAIVKAIGFPWLMVITGVINIVYAPLCYYLRS
PPAKEEKLAILSQDCPMETRMYATQKPTKEFPLGEDSDEEPDHEE
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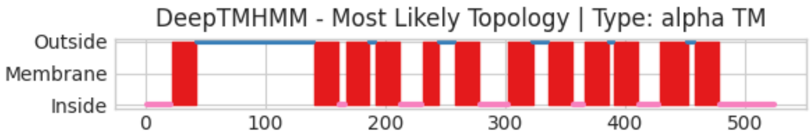

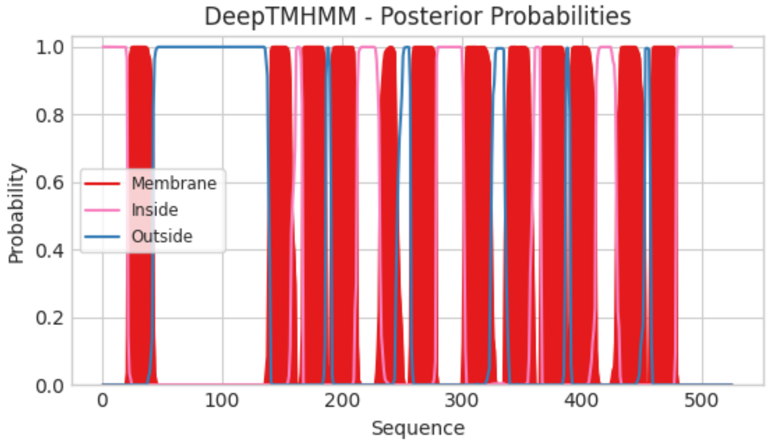

QTY variant, VMAT1^{QTY} L-> Q; I, V -> T; F -> Y (=QTY code)

```
MLRTILDAPQRLLKEGRASRQQTQTTTYTAQQQDNMQYTTTTPIVPTFLYDMEFKEVNSS
LHLGHAGSSPHALASPAFSTIFSFFNNNTVAVEESVPSGIAWMNDTASTIPPPATEAISA
HKNNCLQGTGFLEEEITRTGTQYASKATMQQQTNPYTGPLTNRIGYHTPMYAGYTTMYQS
TTMYAYSGTYTLLFVARTQQGTGSSYSSTAGQGMQASTYTDDHERGRAMGTAQGGQAQGQ
QTGAPYGSTMYEFVGKSAPYQTQAYQAQQDGAQQQCTQQPSKVSPESAKGTPLFMLLKDP
YTQTAAGSTCYANMGTATQEPTLPIWMMQTMCSPKWQQGQAYQPASTSYQTGTNQYGTQA
NKMGRWQCSQTGMQTTGTSQQCTPQAHNIFGLIGPNAGQGQATGMTDSSMMPTMGHQTDL
RHTSTYGSTYATADTAYCMGYATGPSTGGATTKATGYPWQMTTTGTTNTTYAPLCYYLRS
PPAKEEKLAILSQDCPMETRMYATQKPTKEFPLGEDSDEEPDHEE
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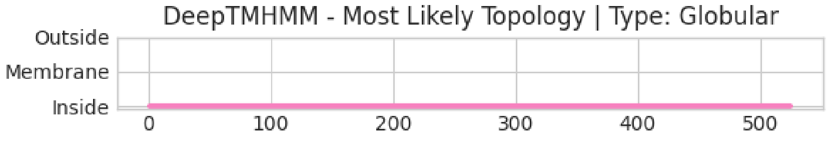
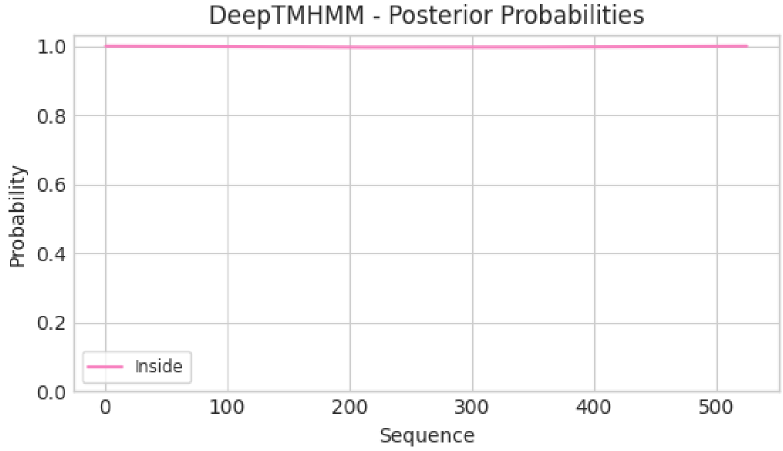
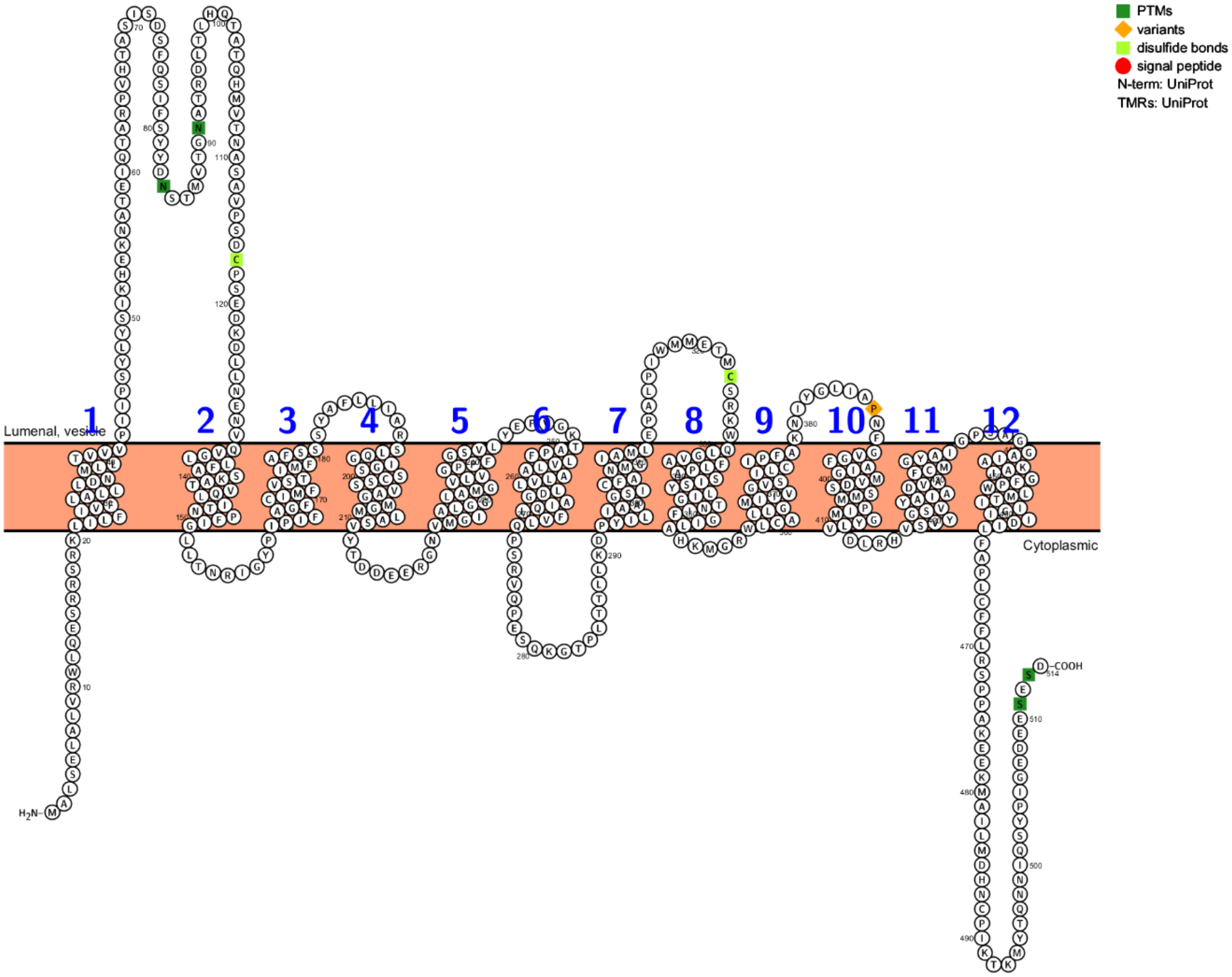




VMAT2= Vesicular monoamine transporter 2= SLC18A2, Q05940, 514aa


PTMs
variants
disulfide bonds
signal peptide
N-term: UniProt
TMRs: UniProt
1
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10
11
12
Lumenal, vesicle
Cytoplasmic
H2N-
-COOH

>sp|Q05940|VMAT2_HUMAN Synaptic vesicular amine transporter

```
MALSELALVRWLQESRRSRKLILFIVFLALLLDNMLLTVVVPIIPSYLYSIKHEKNATEI
QTARPVHTASISDSFQSIFSYYDNSTMVTGNATRDLTLHQTATQHMVTNASAVPSDCPSE
DKDLLNENVQVGLLFASKATVQLITNPFIGLLTNRIGYPIPIFAGFCIMFVSTIMFAFSS
SYAFLLIARSLQGIGSSCSSVAGMGMLASVYTDDEERGNVMGIALGGLAMGVLVGPPFGS
VLYEFVGKTAPFLVLAALVLLDGAIQLFVLQPSRVQPESQKGTPLTTLLKDPYILIAAGS
ICFANMGIAMLEPALPIWMMETMCSRKWQLGVAFLPASISYLIGTNIFGILAHKMGRWLC
ALLGMIIVGVSILCIPFAKNIYGLIAPNFGVGFAIGMVDSSMMPIMGYLVDLRHVSVYGS
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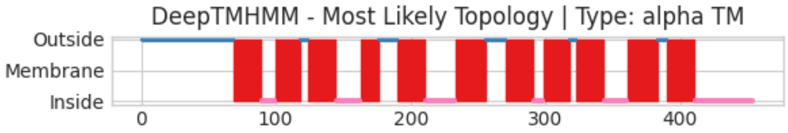
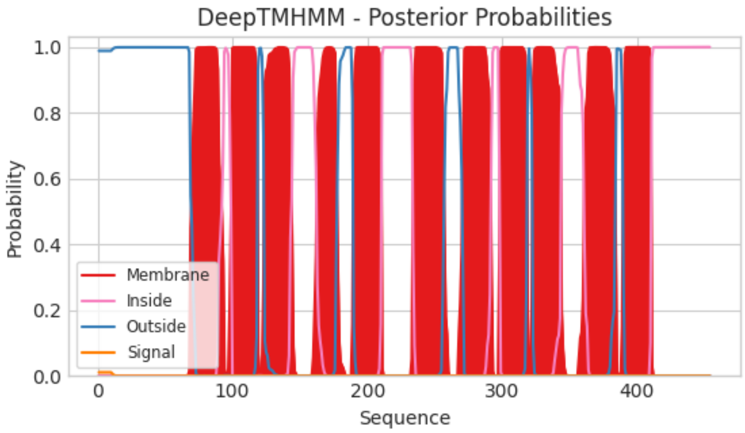


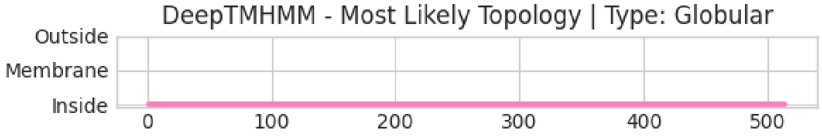
DeepTMHMM - Most Likely Topology | Type: alpha TM



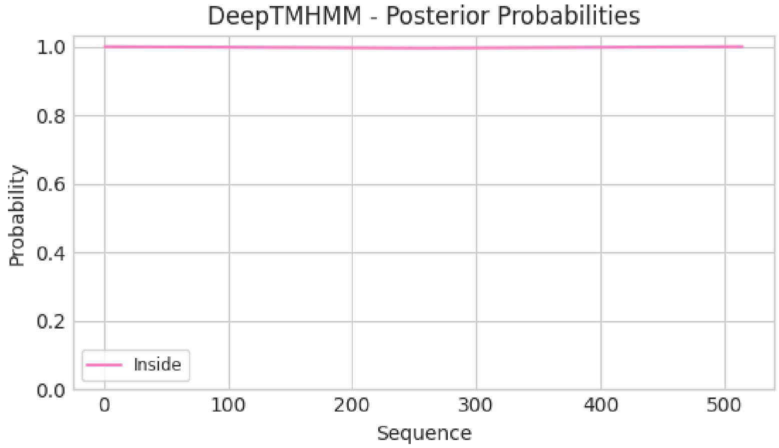
DeepTMHMM - Posterior Probabilities

QTY variant, VMAT2^{QTY} L-> Q; I, V -> T; F -> Y (=QTY code)

MALSELALVRWLQESRRSRKQTQYTTYQAQQQDNMQQTTTTPIIPSYLYSIKHEKNATEI
QTARPVHTASISDSFQSIFSYYDNSTMVTGNATRDLTLHQTATQHMVTNASAVPSDCPSE
DKDLLNENVQTGQQYASKATTQQTTNPYTGLLTNRIGYPTPTYAGYCTMYTSTTMYAYSS
SYAFLLIARSQQGTGSSCSSTAGMGMQASTYTDDEERGNTMGTAQGGQAMGTQTGPPYGS
TQYEFVGKTAPYQTQAAQTQQDGATQQYTQQPSRVQPESQKGTPLTTLLKDPYTQTAAGS
TCYANMGTAMQEPALPIWMMETMCSRKWQQGTAYQPASTSYQTGTNTYGTQAHKMGRWQC
AQQGMTTTGTSTQCTPYAKNIYGLIAPNFGTGYATGMTDSSMMPTMGYQTDLRHTSTYGS
TYATADTAYCMGYATGPSAGGATAKATGYPWQMTTTGTTDTQFAPLCFFLRSPPAKEEKM
AILMDHNCPIKTKMYTQNNIQSYPIGEDEESESD

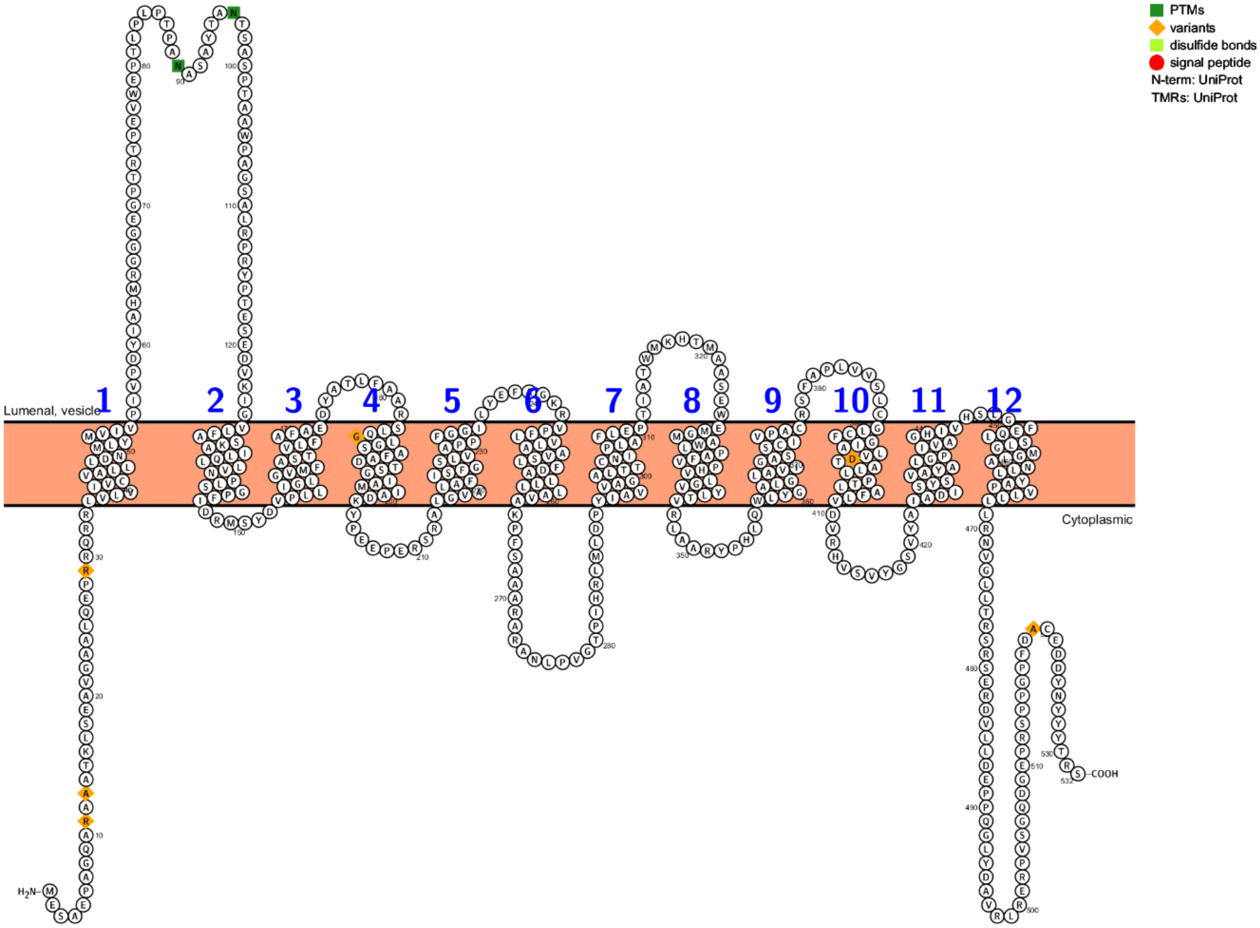


DeepTMHMM - Most Likely Topology | Type: Globular



DeepTMHMM - Posterior Probabilities

VAChT= Vesicular acetylcholine transporter= SLC18A3, Q16572, 532aa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◆ variants
🟩 disulfide bonds
● signal peptide
N-term: UniProt
TMRs: UniProt
Lumenal, vesicle
Cytoplasmic
1
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3
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H₂N-
-COOH

>sp|Q16572|VACHT_HUMAN Vesicular acetylcholine transporter

```
MESAEPAGQARAAATKLSEAVGAALQEPRRQRRLVLVIVCVALLLDNMLYMVIVPIVPDY
IAHMRGGGEGPTRTPEVWEPTLPLPTPANASAYTANTSASPTAAWPAGSALRPRYPTESE
DVKIGVLFASKAILQLLVNPLSGPFIDRMSYDVPLLIGLGVMFASTVLFAFAEDYATLFA
ARSLQGLGSAFADTSGIAMIADKYPEEPERSRALGVALAFISFGSLVAPPFGGILYEFAG
KRVPFLVLAAVSLFDALLLLAVAKPFSAAARARANLPVGTPIHRLMLDPYIAVVAGALTT
CNIPLAFLEPTIATWMKHTMAASEWEMGMAWLPAFVPHVLGVYLTVRLAARYPHLQWLYG
ALGLAVIGASSCIVPACRSFAPLVVSLCGLCFGIALVDTALLPTLAFLVDVRHVSVYGSV
YAIADISYSVAYALGPIVAGHIVHSLGFEQLSLGMGLANLLYAPVLLLLRNVGLLTRSRS
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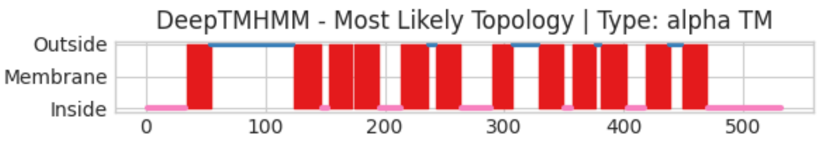

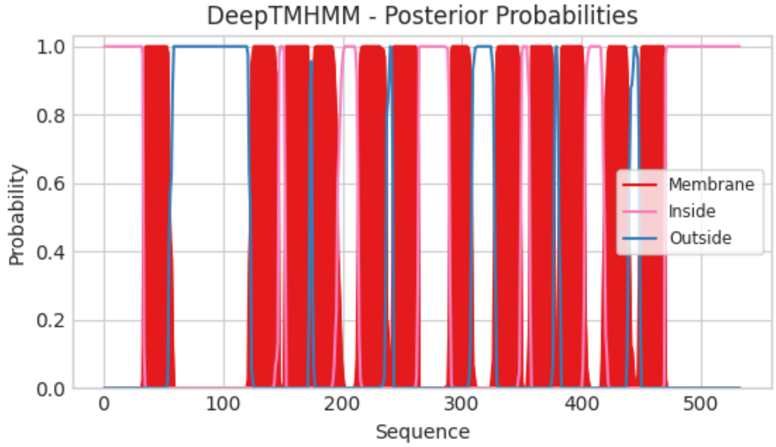

QTY variant, VAChT^{QTY} L-> Q; I, V -> T; F -> Y (=QTY code)

MESAEPAGQARAAATKLSEAVGAALQEPRRQRRQTQTTTCTAQQQDNMQYMTTTPIVPDY
IAHMRGGGEGPTRTPEVWEPTLPLPTPANASAYTANTSASPTAAWPAGSALRPRYPTESE
DVKIGTQYASKATQQQQTNPQSGPYTDRMSYDTPQQTGQGTMYASTTQYAYAEDYATLFA
ARSQQGQGSAYADTSGTAMTADKYPEEPERSRAQGTAQAYTSYGSQTAPPYGGTLYEFAG
KRTPYQTQAATSQYDAQQQQATAKPFSAAARARANLPVGTPIHRLMLDPYTATTAGAQTT
CNTPQAYQEPTIATWMKHTMAASEWEMGMAWQPAYTPHTQGTYQTTRLAARYPHLQWQYG
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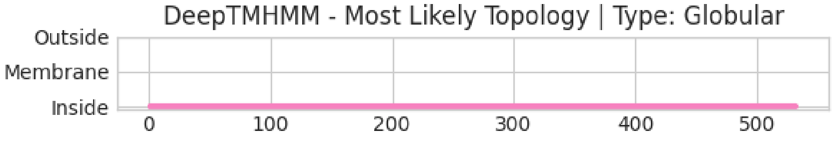
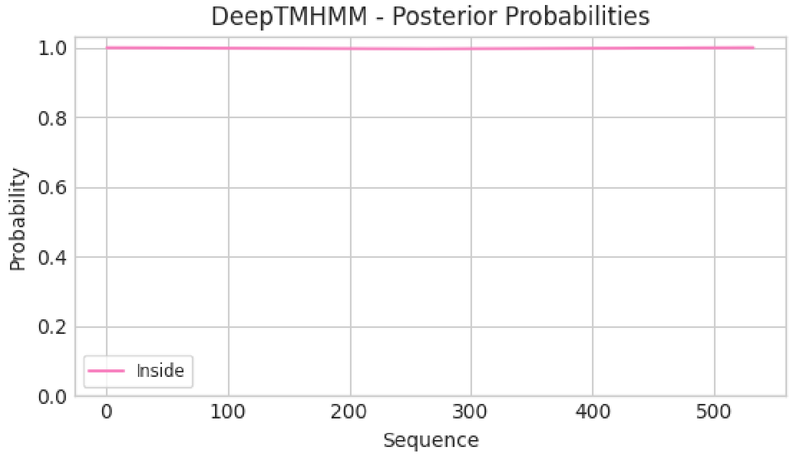
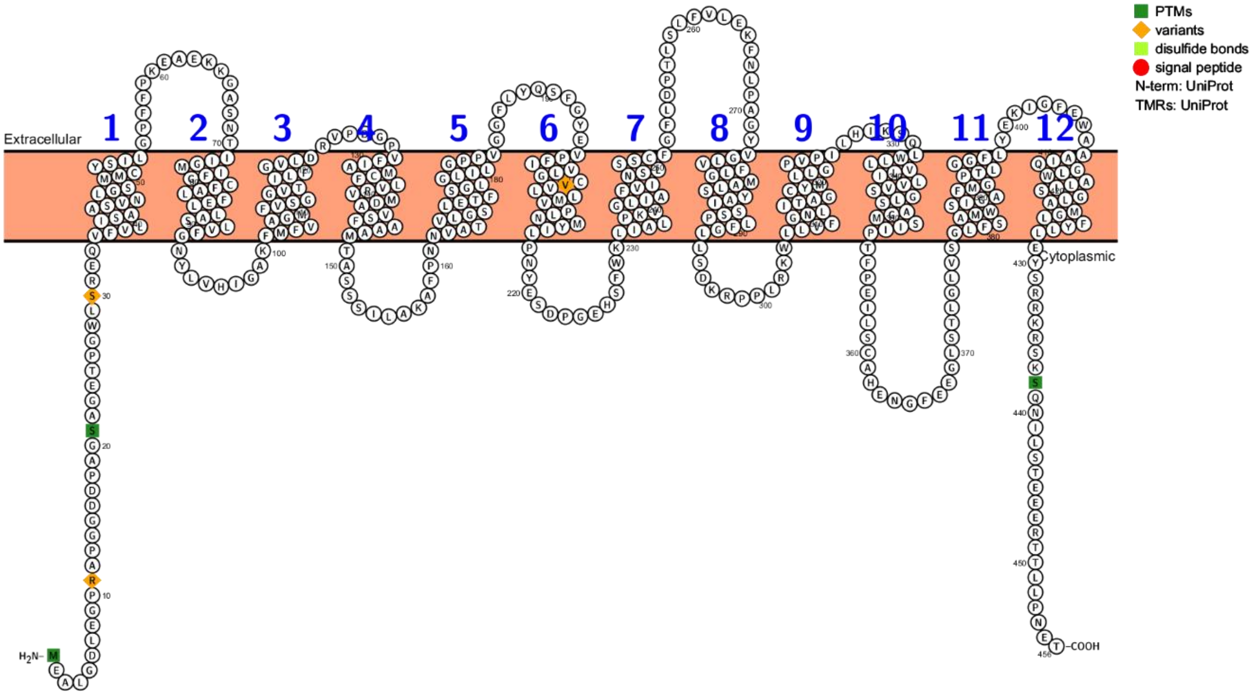




VPAT= Vesicular polyamine transporter= SLC18B1, Q6NT16, 456aa


🟩 PTMs
◆ variants
🟩 disulfide bonds
● signal peptide
N-term: UniProt
TMRs: UniProt
Extracellular
Cytoplasmic
1
2
3
4
5
6
7
8
9
10
11
12
H2N-
-COOH

>sp|Q6NT16|S18B1_HUMAN MFS-type transporter

```
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AFVINSLSSCFGFLDPTLSLFVLEKFNLPAGYVGLVFLGMALSYAISSPLFGLLSDKRPP
LRKWLLVFGNLITAGCYMLLGPVPILHIKSQLWLLVLILVVSGLSAGMSIIPTFPEILSC
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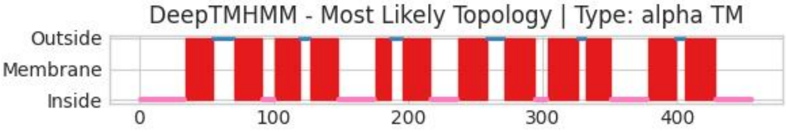
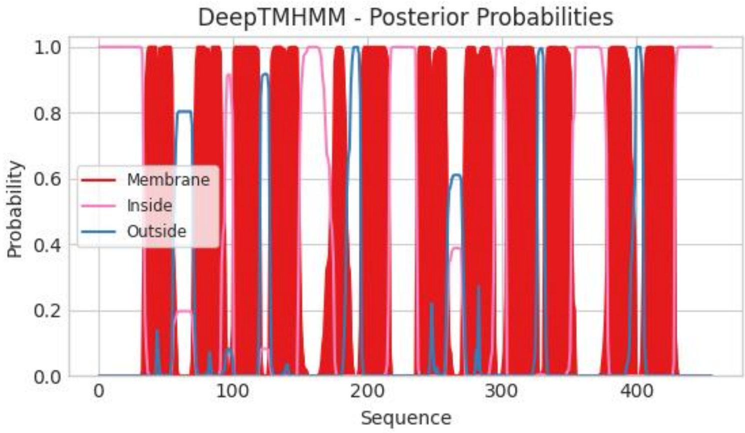
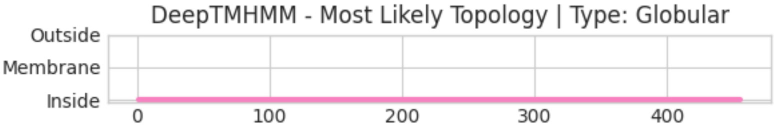
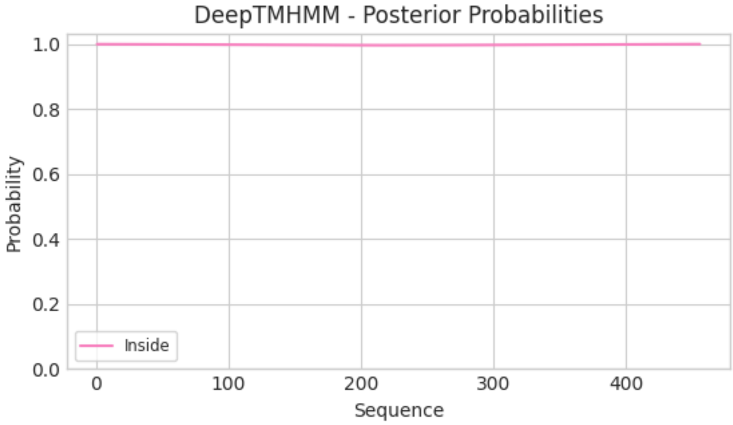




QTY variant, VPAT^{QTY} L-> Q; I, V -> T; F -> Y (=QTY code)

```
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