Appendix B: Multiple Sequence Alignments used for analysis in Section 1.5 (Accession numbers follow)

1. **CFTR orthologs**

humanCFTR -----------------------mqrsplekasvvsklffswtrpilrkgyrqrlelsdi 37

MouseCFTR -----------------------mqksplekasfisklffswstailrkgyrqhlelsdi 37

ChickenCFTR -----------------------mqrsplekanifsklffrwtkpilkkgyrqrlelsdi 37

XenopusCFTR -----------------------mqktplekasifsqiffswtkpilwkgyrqrlelsdi 37

DogfishCFTR -----------------------mqrspiekanafsklffrwprpilkkgyrqklelsdi 37

LampreyCFTR mseappstagnrltapmsghnlkmqaspfekagifsriffrwprhvlrkgykhriersdi 60

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humanCFTR yqipsvdsadnlseklerewdrelas-kknpklinalrrcffwrfmfygiflylgevtka 96

MouseCFTR yqapsadsadhlseklerewdreqas-kknpqlihalrrcffwrflfygillylgevtka 96

ChickenCFTR yqipsadsadnlseklerewdrelatskkkpklinalrrcffwkfmfygillylgevtks 97

XenopusCFTR yqihpgdsadnlserlerewdrevatskknpklinalkrcffwkflfygillylgevtka 97

DogfishCFTR yqipssdsadelsemlerewdrelatskknpklvnalrrcffwrflfygillyfveftka 97

LampreyCFTR hrtpqqdqadtlserlerewdreisqsenrphlltairrcflwrfvglgvimllaeftkv 120

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humanCFTR vqplllgriiasydpdnkeersiaiylgiglcllfivrtlllhpaifglhhigmqmriam 156

MouseCFTR vqpvllgriiasydpenkversiaiylgiglcllfivrtlllhpaifglhrigmqmrtam 156

ChickenCFTR vqplllgriiasydpdnssersiayylgiglcllflvrtllihpsifglhhigmqirial 157

XenopusCFTR vqplllgriiasydrdnehersiayylaiglcllfvvrmlllhpaifglhhigmqmriam 157

DogfishCFTR vqplclgriiasynakntyereiayylalglcllfvvrtlflhpavfglqhlgmqmrial 157

LampreyCFTR vqpfflgqiiasfnpstvdv-qeplllalglsacfvvrtlllhpavfglqhlgmdvriat 179

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humanCFTR fsliykktlklssrvldkisigqlvsllsnnlnkfdeglalahfvwiaplqvallmgliw 216

MouseCFTR fsliykktlklssrvldkisigqlvsllsnnlnkfdeglalahfiwiaplqvtllmgllw 216

ChickenCFTR fsliykktlklsskvldkistgqlvsllsnnlnkfdeglalahfvwiaplqvallmgllw 217

XenopusCFTR fsliykktlklsskvldkistgqlvsllsnnlnkfdeglalahfvwiaplqvlllmgllw 217

DogfishCFTR fsliykkilkmssrvldkidtgqlvsllsnnlnkfdegvavahfvwiapvqvvllmgliw 217

LampreyCFTR fcliykkimklsssvldkitvgqlvsllsnnlnkfdesltqahfiwiapiqcvgllaflw 239

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humanCFTR ellqasafcglgflivlalfqaglgrmmmkyrdqragkiserlvitsemieniqsvkayc 276

MouseCFTR dllqfsafcglglliilvifqailgkmmvkyrdqraakinerlvitseiidniysvkayc 276

ChickenCFTR dmlqasafaglaflivmaffqawlgqmmmkyrdkragkinerlvitseiieniqsvkayc 277

XenopusCFTR dllqasafcglgfliilslfqarlgrmmmkykdkragkinerlvitsqiieniqsvkayc 277

DogfishCFTR neltefvfcglgflimlalfqawlgkkmmqyrdkragkinerlaitseiidniqsvkvyc 277

LampreyCFTR relgpfclvgfaillivtllqawlghkinsyrdkrggkinerialtsevlenieaikvhg 299

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humanCFTR weeamekmienlrqtelkltrkaayvryfnssafffsgffvvflsvlpyalikgiilrki 336

MouseCFTR wesamekmienlrevelkmtrkaaymrfftssafffsgffvvflsvlpytvingivlrki 336

ChickenCFTR wedamekmieslretelkltrkaayvryfnssafffsgffvvflavvpyavtkgiilrki 337

XenopusCFTR wenamekiietiretelkltrkaayvryfnssafffsgffvvflsivphllldgislrki 337

DogfishCFTR wedamekiiddirqvelkltrkvaycryfsssafffsgffvvflsvvpyafihtiklrri 337

LampreyCFTR weeamgklidelrkqelkltsrasysryfnsaafffsgvfvvfasilpyavyneltlrrv 359

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humanCFTR fttisfcivlrmavtrqfpwavqtwydslgainkiqdflqkqeyktleynltttevvmen 396

MouseCFTR fttisfcivlrmsvtrqfptavqiwydsfgmirkiqdflqkqeykvleynlmttgiimen 396

ChickenCFTR fttisfcivlrmtvtrqfpgsvqtwydsigainkiqdfllkeeykaleynltttgvevdk 397

XenopusCFTR fttisfsivlrmavtrqfpwavqtwydslgvinkiqeflqkeeyksleynltttevamen 397

DogfishCFTR fttisynivlrmtvtrqfpsaiqtwydslgairkiqdflhkdehktveynlttkevemvn 397

LampreyCFTR ltsvsffnvlrmaitrslpwslqmwvdatasirkiqdflllkeyrpldynlstteveivs 419

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humanCFTR vtafweegfgelfekakqnnnnrktsngddslffsnfsllgtpvlkdinfkiergqllav 456

MouseCFTR vtafweegfgellekvqqsngdrkhssdennvsfshlclvgnpvlkninlniekgemlai 456

ChickenCFTR vtafwdegigelfvkakqennnskapsndnnlffsnfplhaspvlqdinfkiekgellav 457

XenopusCFTR vsaswdegigeffekaklevnggnisnedpsaffsnfslhvapvlrninfkiekgqllai 457

DogfishCFTR vtaswdegigelfekvkqndserkmangddglffsnfslhvtpvlknisfklekgellai 457

LampreyCFTR itaswdqidgivpeqg------skvkngiinvaatdlpfyksyvlsdinfklnkgemliv 473

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humanCFTR agstgagktsllmvimgelepsegkikhsgrisfcsqfswimpgtikeniifgvsydeyr 516

MouseCFTR tgstgsgktsllmlilgeleasegiikhsgrvsfcsqfswimpgtikeniifgvsydeyr 516

ChickenCFTR sgstgsgktsllmlimgelepsegkikhsgrisfspqvswimpgtikeniifgvsydeyr 517

XenopusCFTR agstgagktsllmmimgelepsagkikhsgrisfspqvswimpgtikenivfgvsydqyr 517

DogfishCFTR agstgsgkssllmmimgelepsdgkikhsgrisyspqvpwimpgtikdniifglsydeyr 517

LampreyCFTR mgsfgsgkssllllmlgellpwdgrvrhsgrlsfssqqpwiinasvqenitlglhldkal 533

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humanCFTR yrsvikacqleediskfaekdnivlgeggitlsggqrarislaravykdadlylldspfg 576

MouseCFTR yksvvkacqlqqditkfaeqdntvlgeggvtlsggqrarislaravykdadlylldspfg 576

ChickenCFTR yksviqacqleedilkfpdkdytvlgeggiilsggqrarislaravykdadlylmdspfg 577

XenopusCFTR ylsvikacqleediskfpekdntvlgeggitlsggqrarislaravykdadlylldspfs 577

DogfishCFTR ytsvvnacqleeditvfpnkdktvlgdggitlsggqrarislaralykdadlylldspfs 577

LampreyCFTR lwqvlrscglqeeimnlpqkektligesgfnlsggqrarislaravyreadlylldspfs 593

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humanCFTR yldvltekeifescvcklmanktrilvtskmehlkkadkililhegssyfygtfselqnl 636

MouseCFTR yldvfteeqvfescvcklmanktrilvtskmehlrkadkililhqgssyfygtfselqsl 636

ChickenCFTR yldiftekeifescvcklmanktrilvtsklehlkiadkililhegscyfygtfselqgq 637

XenopusCFTR yldlftekeifescvcklmanktrilvtskveqlkkadkvlilhegscyfygtfseledq 637

DogfishCFTR hldvttekdifesclcklmvnktrilvtsklehlkkadkilllheghcyfygtfselqge 637

LampreyCFTR yldvstekqvfescidgflakktrilvtskvehlqradkvlilndgvvyfygtfpelqks 653

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humanCFTR qpdfssklmgcdsfdqfsaerrnsiltetlhrfsleg---dapvswtetkkqsfkqt-ge 692

MouseCFTR rpdfssklmgydtfdqfteerrssiltetlrrfsvdd---ss-apws-kpkqsfrqt-ge 690

ChickenCFTR rpdfsselmgfdsfdqfsaerrnsiitetlrrfsfeg---esmgsrnemkkqsfkqt-sd 693

XenopusCFTR rpefsshligfd---hfnaerrnsiitetlrrcsids---dpsavrnevknksfkqv-ad 690

DogfishCFTR kpdfssqllgsvhfdsfsaerrnsiltetfrrcsvssgdgaglgsysetrkasfkqpppe 697

LampreyCFTR kleilslilqaerfdscssdrrgsmitgvlrrgsthsgdvatppntasv-----aeppqg 708

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humanCFTR fgekrknsi-lnpinsirkfsivqktpl--qmngieeds--deplerrlslvpdseqgea 747

MouseCFTR vgekrknsi-lnsfssvrkisivqktpl--cidges-----ddlqekrlslvpdseqgea 742

ChickenCFTR fndkrknsiiinplnagrklsimqkngt--qvngledgh--idsperrislvpdleqgdv 749

XenopusCFTR ftekrkssi-inprkssrkfslmqksqp--qmsgieeedmpaeqgerklslvpeseqgea 747

DogfishCFTR fnekrksslivnpitsnkkfslvqtamsypqtngme--datsepgerhfslipenelgep 755

LampreyCFTR t---------qfpfq-aqrfsvvsagas---vvvaiptagphepedrrlslipdtedgkq 755

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humanCFTR ilprisvistgptlqarrrqsvlnlmth-svnqgqnihrkt-------tastrkvslapq 799

MouseCFTR alprsnmiatgptfpgrrrqsvldlmtftpn-sgssnlqrt-------rtsirkislvpq 794

ChickenCFTR glprsnmlnsdhmlqsrrrqsvlslmtgtsvnqgphvskkg-------stsfrkmsvvpq 802

XenopusCFTR slprsnflntgptfqgrrrqsvlnlmtrtsisqgsnafatr-------nasvrkmsvnsy 800

DogfishCFTR tkprsnifkselpfqahrrqsvlalmthssts--pnkihar-------rsavrkmsmlsq 806

LampreyCFTR llpaa---gagplhaskrrksvlhlmlgvsagyentrrmariqqhaphgdpfllpsvvpq 812

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humanCFTR anl--teldiysrrlsqetgleise-eineedlkecffddmesipavttwntylryitvh 856

MouseCFTR isl--nevdvysrrlsqdstlnite-eineedlkecflddvikippvttwntylryftlh 851

ChickenCFTR tnl-sseidiytrrlsrdsilditd-eineedlkecftddaesmgtvttwntyfryitih 860

XenopusCFTR sns-sfdldiynrrlsqdsilevse-eineedlkecflddtdsqsptttwntylrfltah 858

DogfishCFTR tnfasseidiysrrlsedgsfeise-eineedlkecfadeeeiqnvtttwstylryvttn 865

LampreyCFTR r----------pprksltsvaeesddvpeddnikdcfvdvdgeegelaswttyrryfgss 862

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humanCFTR kslifvliwclviflaevaaslvvlwllgntplq-dkg--nsth--srnnsyaviitsts 911

MouseCFTR kglllvliwcvlvflvevaaslfvlwllknnpvn-sgn--ngtk--isnssyvviitsts 906

ChickenCFTR kslifvlilcvtifllevaaslvlllflqkaaqi-nat--qpen--atsdnppviitdts 915

XenopusCFTR knfifilvfclviffvevaassawlwiikrnapainmtsnenvs--evsdtlsvivthts 916

DogfishCFTR rnlvfvlilclviflaevaaslaglwiisglaintgsqtndtstdlshlsvfskfitngs 925

LampreyCFTR tlfgivlclnlvlfaiqvmvygvglwnlrsqedrvnttrpen--------gtggvhsftd 914

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humanCFTR syyvfyiyvgvadtllamgffrglplvhtlitvskilhhkmlhsvlqapmstlntlkagg 971

MouseCFTR fyyifyiyvgvadtllalslfrglplvhtlitaskilhrkmlhsilhapmstisklkagg 966

ChickenCFTR syymiyiyvgiadtllamgifrglplvhtlitvsktlhqkmvhavlyapmstfnslkagg 975

XenopusCFTR fyyvfyiyvgvadsllalgifrglplvhslisvskvlhkkmlhailhapmstfntmragr 976

DogfishCFTR hyyifyiyvgladsflalgvirglplvhtlvtvskdlhkqmlhsvlqgpmtafnkmkagr 985

LampreyCFTR nyyyfyiyvgladsffvldpirglllihssirvsdtlsrgmlrailhapasfflekqpgy 974

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humanCFTR ilnrfskdiailddllpltifdfiqlllivigaiavvavlqpyifvatvpvivafimlra 1031

MouseCFTR ilnrfskdiailddflpltifdfiqlvfivigaiivvsalqpyiflatvpglvvfillra 1026

ChickenCFTR ilnrfskdtailddllpltvfdliqlilivigaitvvsilqpyiflasvpviaafivlra 1035

XenopusCFTR ilnrfskdtailddilplsifdltqlvlivigaitvvsllepyiflatvpvivafillrs 1036

DogfishCFTR ilnrfikdtaiiddmlpltvfdfvqlilivvgaicvvsvlqpytllaaipvavifimlra 1045

LampreyCFTR iinrfskdvaitddqlplaifdyfqlflivlgavtvvsamipwtmlvtlplgiscmvlrh 1034

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humanCFTR yflqtsqqlkqlesegrspifthlvtslkglwtlrafgrqpyfetlfhkalnlhtanwfl 1091

MouseCFTR yflhtaqqlkqlesegrspifthlvtslkglwtlrafrrqtyfetlfhkalnlhtanwfm 1086

ChickenCFTR yflhtsqqlkqlesearspifthlvtslkglwtlrafgrqpyfetlfhkalnlhtanwfl 1095

XenopusCFTR yflhtsqqlkqleskarspifahlitslkglwtlrafgrqpyfetlfhkalnlhtanwfl 1096

DogfishCFTR yflrtsqqlkqlesearspifshlitslrglwtvrafgrqsyfetlfhkalnlhtanwfl 1105

LampreyCFTR yflrtfrqlkqmeseaknpifahivatlkglwtirafsrddyfenifhqaldihtatwfl 1094

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humanCFTR ylstlrwfqmriemifviffiavtfisilttgegegrvgiiltlamnimstlqwavnssi 1151

MouseCFTR ylatlrwfqmridmifvlffivvtfisilttgegegtagiiltlamnimstlqwavnssi 1146

ChickenCFTR ylstlrwfqmriemifvvffsavafisiittgdgpgrvgiiltlamnimgtlqwavnssi 1155

XenopusCFTR ylstlrwfqmtiemifviffiavsfisiatsgageekvgivltlamnimntlqwavnasi 1156

DogfishCFTR ylstlrwfqmridivfvlffiavtfiaiathdvgegqvgiiltlamnitstlqwavnssi 1165

LampreyCFTR ylsalrwfqmridiiftlfitavtfisvgvkgysegsiaialtlamnimstfqwaintsi 1154

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humanCFTR dvdslmrsvsrvfkfidmptegkp-tkstkpykngqlskvmiienshvkkddiwpsggqm 1210

MouseCFTR dtdslmrsvsrvfkfidiqteesmytqiikelpregssdvlviknehvkksdiwpsggem 1206

ChickenCFTR dvdslmrsvsrifkfidmpteem---ktikpqknnqfsdaliienrhvkdeknwpsggqm 1212

XenopusCFTR dvdslmrsvsrifrfidlpveeline---nknkeeqlsevliyendyvkktqvwpsggqm 1213

DogfishCFTR dvdglmrsvsrvfkyidippegsetk---nrhnannpsdvlvienkhlt--kewpsggqm 1220

LampreyCFTR evegmmrsterilrfmdipeessgfvvt--------------------ppppdwpsaghl 1194

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humanCFTR tvkdltakyteggnailenisfsispgqrvgllgrtgsgkstllsaflrllntegeiqid 1270

MouseCFTR vvkdltvkymddgnavlenisfsispgqrvgllgrtgsgkstllsaflrmlnikgdieid 1266

ChickenCFTR tvtdltaryteggtavlenisfsissgqtvgllgrtgsgkstllfaflrllntegdiqid 1272

XenopusCFTR tvknlsanyidggntvlenisfslspgqrvgllgrtgsgkstllsaflrllstqgdiqid 1273

DogfishCFTR mvnnltakytsdgravlqdlsfsvnagqrvgllgrtgagkstllsallrllstegeiqid 1280

LampreyCFTR evvnlsmrhsptapyvlqnisfnvqqgqkmailgrtgagkstllaclllqrdvegevrid 1254

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humanCFTR gvswdsitlqqwrkafgvipqkvfifsgtfrknldpyeqwsdqeiwkvadevglrsvieq 1330

MouseCFTR gvswnsvtlqewrkafgvitqkvfifsgtfrqnldpngkwkdeeiwkvadevglksvieq 1326

ChickenCFTR gvswntvslqqwrkafgvipqkvfifsgtfrknldpygqwndeeiwkvaeevglksvieq 1332

XenopusCFTR gvswqtiplqkwrkafgvipqkvfifsgsirknldpygkwsdeellkvteevglkliidq 1333

DogfishCFTR giswnsvslqkwrkafgvipqkvfvfsgtfrknldpyeqwsdeeiwkvteevglksmieq 1340

LampreyCFTR glsarnvapytwrsafqvitqkififtgtlrknldpygrcndeeiwkaidlaglrdvvea 1314

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humanCFTR fpgkldfvlvdggcvlshghkqlmclarsvlskakillldepsahldpvtyqiirrtlkq 1390

MouseCFTR fpgqlnftlvdggyvlshghkqlmclarsvlskakiilldepsahldpityqvirrvlkq 1386

ChickenCFTR fpgqldfvlvdggcvlshghkqlmclarsvlskakillldepsahldpitsqvirktlkh 1392

XenopusCFTR fpgqldfvlldggcvlshghkqlvclarsvlskakillldepsahldpitfqiirktlkh 1393

DogfishCFTR fpdklnfvlvdggyilsnghkqlmclarsilskakillldeptahldpvtfqiirktlkh 1400

LampreyCFTR lpggldvmlveggwvlsegqkqllslvrcllykarillldeptanldqitaqtmmriirk 1374

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humanCFTR afadctvilcehrieamlecqqflvieenkvrqydsiqkllnerslfrqaispsdrvklf 1450

MouseCFTR afagctvilcehrieamldcqrflvieesnvwqydslqallseksifqqaisssekmrff 1446

ChickenCFTR afadctvvlsehrleailecqrflviednkmrqyesiqkllseksslrqaishadrlkll 1452

XenopusCFTR afadctvilsehrleamlecqrflviedntvrqydsiqklvneksffkqaishsdrlklf 1453

DogfishCFTR tfsnctvilsehrveallecqqflviegcsvkqfdalqkllteaslfkqvfghldraklf 1460

LampreyCFTR efkdctilvsehriraiydcnqilvledgkvreygtaqvvfkksalfrefvpdtgsfrgh 1434

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humanCFTR ph--rnsskckskpqiaalkeet--eeevqdtrl 1480

MouseCFTR qg--rhsskhkprtqitalkeet--eeevqetrl 1476

ChickenCFTR pahrrnsskrkprpqicalqeet--eeevqetrl 1484

XenopusCFTR plhrrnsskrksrpqisalqeet--eeevqdtrl 1485

DogfishCFTR tahrrnsskrktrpkisalqeea--eedlqetrl 1492

LampreyCFTR pvr--ssmtlrhsikhislqeelaeddiiqetrl 1466

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1. **CFTR and ABCC4 homologs**

HumanCFTR -------mqrsplekasvvsklffswtrpilrkgyrqrlelsdiyqipsvdsadnlsekl 53

MouseCFTR -------mqksplekasfisklffswstailrkgyrqhlelsdiyqapsadsadhlsekl 53

ChickenCFTR -------mqrsplekanifsklffrwtkpilkkgyrqrlelsdiyqipsadsadnlsekl 53

HumanABCC4 mlpvyqevkpnplqdanlcsrvffwwlnplfkighkrrleeddmysvlpedrsqhlgeel 60

MouseABCC4 mlpvhtevkpnplqdanlcsrvffwwlnplfktghkrrleeddmfsvlpedrskhlgeel 60

RatABCC4 mlpvhtevkpnplqdanlcsrlffwwlnplfkaghkrrleeddmfsvlpedrskhlgeel 60

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HumanCFTR erewdrelas-k---knpklinalrrcffwrfmfygiflylgevtkavqplllgriia-- 107

MouseCFTR erewdreqas-k---knpqlihalrrcffwrflfygillylgevtkavqpvllgriia-- 107

ChickenCFTR erewdrelatsk---kkpklinalrrcffwkfmfygillylgevtksvqplllgriia-- 108

HumanABCC4 qgfwdkevlraendaqkpsltraiikcywksylvlgiftlieesakviqpiflgkiinyf 120

MouseABCC4 qrywdkellrakkdsrkpsltkaiikcywksylilgiftlieegtrvvqplflgkiieyf 120

RatABCC4 qgywdkevlrakkdarkpsltkaivkcywksylilgiftlieettrvvqpiflgkiidyf 120

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HumanCFTR -sydpdnkeersiaiylgiglcllfivrtlllhpaifglhhigmqmriamfsliykktlk 166

MouseCFTR -sydpenkversiaiylgiglcllfivrtlllhpaifglhrigmqmrtamfsliykktlk 166

ChickenCFTR -sydpdnssersiayylgiglcllflvrtllihpsifglhhigmqirialfsliykktlk 167

HumanABCC4 enydpmdsvalntayayatvltfctlilailhhlyfyhvqcagmrlrvamchmiyrkalr 180

MouseABCC4 ekydpddsvalhtaygyaavlsmctlilailhhlyfyhvqcagmrlrvamchmiyrkalr 180

RatABCC4 ekydsddsaalhtaygyaavlslctlilailhhlyfyhvqcagmrirvamchmiyrkalr 180

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HumanCFTR lssrvldkisigqlvsllsnnlnkfdeglalahfvwiaplqvallmgliwellqasafcg 226

MouseCFTR lssrvldkisigqlvsllsnnlnkfdeglalahfiwiaplqvtllmgllwdllqfsafcg 226

ChickenCFTR lsskvldkistgqlvsllsnnlnkfdeglalahfvwiaplqvallmgllwdmlqasafag 227

HumanABCC4 lsnmamgktttgqivnllsndvnkfdqvtvflhflwagplqaiavtallwmeigisclag 240

MouseABCC4 lsnsamgktttgqivnllsndvnkfdqvtiflhflwagplqaiavtvllwveigisclag 240

RatABCC4 lsnsamgktttgqivnllsndvnkfdqvtiflhflwagplqaigvtillwveigisclag 240

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HumanCFTR lgflivlalfqaglgrmmmkyrdqragkiserlvitsemieniqsvkaycweeamekmie 286

MouseCFTR lglliilvifqailgkmmvkyrdqraakinerlvitseiidniysvkaycwesamekmie 286

ChickenCFTR laflivmaffqawlgqmmmkyrdkragkinerlvitseiieniqsvkaycwedamekmie 287

HumanABCC4 mavliillplqscfgklfsslrsktatftdarirtmnevitgiriikmyaweksfsnlit 300

MouseABCC4 lavlvillplqscigklfsslrsktaaftdarirtmnevitgmriikmyaweksfadlia 300

RatABCC4 lailvillplqscigklfsslrsktaaftdarfrtmnevitgmriikmyaweksfadlit 300

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HumanCFTR nlrqtelkltrkaayvryfnssafffsgffvvflsvlpyalikgi-ilrkifttisfciv 345

MouseCFTR nlrevelkmtrkaaymrfftssafffsgffvvflsvlpytvingi-vlrkifttisfciv 345

ChickenCFTR slretelkltrkaayvryfnssafffsgffvvflavvpyavtkgi-ilrkifttisfciv 346

HumanABCC4 nlrkkeiskilrssclrgmnlasffsaskiivfvtfttyvllgsvitasrvfvavtlyga 360

MouseABCC4 nlrkkeiskilgssylrgmnmasffiankvilfvtftsyvllgneitashvfvamtlyga 360

RatABCC4 nlrkkeiskilgssylrgmnmasffiankvilfvtfttyvllgnkitsshvfvamtlyga 360

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HumanCFTR lrmavtrqfpwavqtwydslgainkiqdflqkqeyktleynltttev---vmenvtafwe 402

MouseCFTR lrmsvtrqfptavqiwydsfgmirkiqdflqkqeykvleynlmttgi---imenvtafwe 402

ChickenCFTR lrmtvtrqfpgsvqtwydsigainkiqdfllkeeykaleynltttgv---evdkvtafwd 403

HumanABCC4 vrltvtlffpsaiervseaivsirriqtfllldeisqrnrqlpsdgkkmvhvqdftafwd 420

MouseABCC4 vrltvtlffpsaiergseaivsirriknfllldelpqrkahvpsdgkaivhvqdftafwd 420

RatABCC4 vrltvtlffpsaiervseavvsvrriknfllldelperkaqepsdgkaivhvqdftafwd 420

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HumanCFTR egfgelfekakqnnnnrktsngddslffsnfsllgtpvlkdinfkiergqllavagstga 462

MouseCFTR egfgellekvqqsngdrkhssdennvsfshlclvgnpvlkninlniekgemlaitgstgs 462

ChickenCFTR egigelfvkakqennnskapsndnnlffsnfplhaspvlqdinfkiekgellavsgstgs 463

HumanABCC4 ka-------------------------------setptlqglsftvrpgellavvgpvga 449

MouseABCC4 ka-------------------------------ldsptlqglsfiarpgellavvgpvga 449

RatABCC4 ka-------------------------------ldtptlqglsftarpgellavvgpvga 449

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HumanCFTR gktsllmvimgelepsegkikhsgrisfcsqfswimpgtikeniifgvsydeyryrsvik 522

MouseCFTR gktsllmlilgeleasegiikhsgrvsfcsqfswimpgtikeniifgvsydeyryksvvk 522

ChickenCFTR gktsllmlimgelepsegkikhsgrisfspqvswimpgtikeniifgvsydeyryksviq 523

HumanABCC4 gkssllsavlgelapshglvsvhgriayvsqqpwvfsgtlrsnilfgkkyekeryekvik 509

MouseABCC4 gkssllsavlgelppasglvsvhgriayvsqqpwvfsgtvrsnilfgkkyekeryekvik 509

RatABCC4 gkssllsavlgelpptsglvsvhgriayvsqqpwvfsgtvrsnilfgrkyekeryekvik 509

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HumanCFTR acqleediskfaekdnivlgeggitlsggqrarislaravykdadlylldspfgyldvlt 582

MouseCFTR acqlqqditkfaeqdntvlgeggvtlsggqrarislaravykdadlylldspfgyldvft 582

ChickenCFTR acqleedilkfpdkdytvlgeggiilsggqrarislaravykdadlylmdspfgyldift 583

HumanABCC4 acalkkdlqlledgdltvigdrgttlsggqkarvnlaravyqdadiyllddplsavdaev 569

MouseABCC4 acalkkdlqlledgdltvigdrgatlsggqkarvnlaravyqdadiyllddplsavdaev 569

RatABCC4 acalkkdlqlledgdltvigdrgatlsggqkarvnlaravyqdadiyllddplsavdaev 569

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HumanCFTR ekeifescvcklmanktrilvtskmehlkkadkililhegssyfygtfselqnlqpdfss 642

MouseCFTR eeqvfescvcklmanktrilvtskmehlrkadkililhqgssyfygtfselqslrpdfss 642

ChickenCFTR ekeifescvcklmanktrilvtsklehlkiadkililhegscyfygtfselqgqrpdfss 643

HumanABCC4 srhlfelcicqilhekitilvthqlqylkaasqililkdgkmvqkgtyteflksgidfgs 629

MouseABCC4 gkhlfqlcicqalhekitilvthqlqylkaashililkdgemvqkgtyteflksgvdfgs 629

RatABCC4 gkhlfqlcicqtlhekitilvthqlqylkaashililkdgemvqkgtyteflksgvdfgs 629

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HumanCFTR klmgcdsfdqfsaerrnsiltetlhrfslegdapvswtetkkqsfkqtgefgekrknsi- 701

MouseCFTR klmgydtfdqfteerrssiltetlrrfsvddss-apws-kpkqsfrqtgevgekrknsi- 699

ChickenCFTR elmgfdsfdqfsaerrnsiitetlrrfsfegesmgsrnemkkqsfkqtsdfndkrknsii 703

HumanABCC4 llkkdnees----eqppvpgtptlrn----------------rtfsessvwsq------- 662

MouseABCC4 llkkeneea----epstapgtptlrk----------------rtfseasiwsq------- 662

RatABCC4 llkkeneea----epspvpgtptlrn----------------rtfseasiwsq------- 662

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HumanCFTR lnpinsirkfsivqktplqmngieedsdeplerrlslvpdseqgeailprisvistgptl 761

MouseCFTR lnsfssvrkisivqktplcidges---ddlqekrlslvpdseqgeaalprsnmiatgptf 756

ChickenCFTR inplnagrklsimqkngtqvngledghidsperrislvpdleqgdvglprsnmlnsdhml 763

HumanABCC4 ------------qssrpslkdgalesqd-------------------------------- 678

MouseABCC4 ------------qssrpslkdgapegqdae------------------------------ 680

RatABCC4 ------------qssrpslkdgvpdaqdae------------------------------ 680

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HumanCFTR qarrrqsvlnlmth-svnqgqnihrkttastrkvslapqanl-teldiysrrlsqetgle 819

MouseCFTR pgrrrqsvldlmtftpn-sgssnlqrtrtsirkislvpqisl-nevdvysrrlsqdstln 814

ChickenCFTR qsrrrqsvlslmtgtsvnqgphvskkgstsfrkmsvvpqtnlsseidiytrrlsrdsild 823

HumanABCC4 ------------------------------------------------------------ 678

MouseABCC4 ----------------------nt---------qavqpee-------------------- 689

RatABCC4 ----------------------nt---------qaaqpee-------------------- 689

HumanCFTR iseeineedlkecffddmesipavttwntylryitvhkslifvliwclviflaevaaslv 879

MouseCFTR iteeineedlkecflddvikippvttwntylryftlhkglllvliwcvlvflvevaaslf 874

ChickenCFTR itdeineedlkecftddaesmgtvttwntyfryitihkslifvlilcvtifllevaaslv 883

HumanABCC4 ------------------------------------------------------vayvlq 684

MouseABCC4 ------------------srsegrigfkayknyfsagaswffiiflvllnmvgqvfyvlq 731

RatABCC4 ------------------srsegrigfkayknyfsagaswffiiflvllnlmgqvfyvlq 731

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HumanCFTR vlwllgntplqdkgnsthsrnnsyaviitstssyyvfyiyvgvadtllamgffrglplvh 939

MouseCFTR vlwllknnpvnsgnngtkisnssyvviitstsfyyifyiyvgvadtllalslfrglplvh 934

ChickenCFTR lllflqkaaqinatqpenatsdnppviitdtssyymiyiyvgiadtllamgifrglplvh 943

HumanABCC4 dwwlsywankqsmlnvtvngg---gnvtekldlnwylgiysgltvatvlfgiarsllvfy 741

MouseABCC4 dwwlshwankqgalnntrnan---gnitetldlswylgiyagltavtvlfgiarsllvfy 788

RatABCC4 dwwlshwanrqgalndtknan---gnvtgtldlswylgiytgltavtvlfgiarsllvfy 788

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HumanCFTR tlitvskilhhkmlhsvlqapmstlntlkaggilnrfskdiailddllpltifdfiqlll 999

MouseCFTR tlitaskilhrkmlhsilhapmstisklkaggilnrfskdiailddflpltifdfiqlvf 994

ChickenCFTR tlitvsktlhqkmvhavlyapmstfnslkaggilnrfskdtailddllpltvfdliqlil 1003

HumanABCC4 vlvnssqtlhnkmfesilkapvlffdrnpigrilnrfskdighlddllpltfldfiqtll 801

MouseABCC4 ilvnasqtlhnrmfesilkapvlffdrnpigrilnrfskdighmddllpltfldfiqtll 848

RatABCC4 vlvnasqtlhnrmfesilkapvlffdrnpigrilnrfskdighmddllpltfldfiqtll 848

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HumanCFTR ivigaiavvavlqpyifvatvpvivafimlrayflqtsqqlkqlesegrspifthlvtsl 1059

MouseCFTR ivigaiivvsalqpyiflatvpglvvfillrayflhtaqqlkqlesegrspifthlvtsl 1054

ChickenCFTR ivigaitvvsilqpyiflasvpviaafivlrayflhtsqqlkqlesearspifthlvtsl 1063

HumanABCC4 qvvgvvsvavavipwiaiplvplgiififlrryfletsrdvkrlesttrspvfshlsssl 861

MouseABCC4 lvvsviavaaavipwiliplvplsvvflvlrryfletsrdvkrlesttrspvfshlsssl 908

RatABCC4 lvvsviavaaavipwiliplvplsiifvvlrryfletsrdvkrlesttrspvfshlsssl 908

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HumanCFTR kglwtlrafgrqpyfetlfhkalnlhtanwflylstlrwfqmriemifviffiavtfisi 1119

MouseCFTR kglwtlrafrrqtyfetlfhkalnlhtanwfmylatlrwfqmridmifvlffivvtfisi 1114

ChickenCFTR kglwtlrafgrqpyfetlfhkalnlhtanwflylstlrwfqmriemifvvffsavafisi 1123

HumanABCC4 qglwtiraykaeercqelfdahqdlhseawflflttsrwfavrldaicamfviivafgsl 921

MouseABCC4 qglwtiraykaeercqelfdahqdlhseawflflttsrwfavrldaicaifvivvafgsl 968

RatABCC4 qglwtiraykaeercqelfdahqdlhseawflflttsrwfavrldaicavfvivvafgsl 968

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HumanCFTR lttgege-grvgiiltlamnimstlqwavnssidvdslmrsvsrvfkfidmptegkp-tk 1177

MouseCFTR lttgege-gtagiiltlamnimstlqwavnssidtdslmrsvsrvfkfidiqteesmytq 1173

ChickenCFTR ittgdgp-grvgiiltlamnimgtlqwavnssidvdslmrsvsrifkfidmpteem---k 1179

HumanABCC4 ilaktldagqvglalsyaltlmgmfqwcvrqsaevenmmisvervieytdlekeapwey- 980

MouseABCC4 vlaktlnagqvglalsyaltlmgmfqwsvrqsaevenmmisvervieytdlekeapwec- 1027

RatABCC4 vlaktldagqvglalsysltlmgmfqwsvrqsaevenmmisvervieytdlekeapwec- 1027

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HumanCFTR stkpykngqlskvmiienshvkkddiwpsggqmtvkdltakyteggnailenisfsispg 1237

MouseCFTR iikelpregssdvlviknehvkksdiwpsggemvvkdltvkymddgnavlenisfsispg 1233

ChickenCFTR tikpqknnqfsdaliienrhvkdeknwpsggqmtvtdltaryteggtavlenisfsissg 1239

HumanABCC4 -------------------qkrpppawphegviifdnvnfmyspggplvlkhltaliksq 1021

MouseABCC4 -------------------kkrpppgwphegvivfdnvnftysldgplvlkhltaliksr 1068

RatABCC4 -------------------rkrpppgwphegvivfdnvnftysldgplvlkhltaliksr 1068

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HumanCFTR qrvgllgrtgsgkstllsaflrllntegeiqidgvswdsitlqqwrkafgvipqkvfifs 1297

MouseCFTR qrvgllgrtgsgkstllsaflrmlnikgdieidgvswnsvtlqewrkafgvitqkvfifs 1293

ChickenCFTR qtvgllgrtgsgkstllfaflrllntegdiqidgvswntvslqqwrkafgvipqkvfifs 1299

HumanABCC4 ekvgivgrtgagksslisalfrlsepegkiwidkiltteiglhdlrkkmsiipqepvlft 1081

MouseABCC4 ekvgivgrtgagksslisalfrlsepegkiwidkiltteiglhdlrkkmsiipqepvlft 1128

RatABCC4 ekvgivgrtgagksslisalfrlsepegkiwidkiltteiglhdlrkkmsiipqepvlft 1128

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HumanCFTR gtfrknldpyeqwsdqeiwkvadevglrsvieqfpgkldfvlvdggcvlshghkqlmcla 1357

MouseCFTR gtfrqnldpngkwkdeeiwkvadevglksvieqfpgqlnftlvdggyvlshghkqlmcla 1353

ChickenCFTR gtfrknldpygqwndeeiwkvaeevglksvieqfpgqldfvlvdggcvlshghkqlmcla 1359

HumanABCC4 gtmrknldpfnehtdeelwnalqevqlketiedlpgkmdtelaesgsnfsvgqrqlvcla 1141

MouseABCC4 gtmrknldpfnehtdeelwraleevqlkeaiedlpgkmdtelaesgsnfsvgqrqlvcla 1188

RatABCC4 gtmrknldpfnehsdeelwkaleevqlkeaiedlpgkmdtelaesgsnfsvgqrqlvcla 1188

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HumanCFTR rsvlskakillldepsahldpvtyqiirrtlkqafadctvilcehrieamlecqqflvie 1417

MouseCFTR rsvlskakiilldepsahldpityqvirrvlkqafagctvilcehrieamldcqrflvie 1413

ChickenCFTR rsvlskakillldepsahldpitsqvirktlkhafadctvvlsehrleailecqrflvie 1419

HumanABCC4 railrknqiliideatanvdprtdeliqkkirekfahctvltiahrlntiidsdkimvld 1201

MouseABCC4 railknnriliideatanvdprtdeliqqkirekfaqctvltiahrlntiidsdkimvld 1248

RatABCC4 railkknriliideatanvdprtdeliqqkirekfaqctvltiahrlntiidsdkimvld 1248

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HumanCFTR enkvrqydsiqkllnerslf-rqaisp---sdrvklfph--rnsskckskpqiaalke-- 1469

MouseCFTR esnvwqydslqallseksif-qqaiss---sekmrffqg--rhsskhkprtqitalke-- 1465

ChickenCFTR dnkmrqyesiqkllsekssl-rqaish---adrlkllpahrrnsskrkprpqicalqe-- 1473

HumanABCC4 sgrlkeydepyvllqnkeslfykmvqqlgkaeaaalteta-kqvyfkrnyphightdhmv 1260

MouseABCC4 sgrlkeydepyvllqnpeslfykmvqqlgkgeaaalteta-kqvyfrrnypditftspav 1307

RatABCC4 sgrlreydepyvllqnpeslfykmvqqlgkgeaaalteta-kqvyfrrnypdiafsspav 1307

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HumanCFTR -------eteeevqdtrl 1480

MouseCFTR -------eteeevqetrl 1476

ChickenCFTR -------eteeevqetrl 1484

HumanABCC4 tntsngqpstltifetal 1278

MouseABCC4 mntsngqpsaltifetal 1325

RatABCC4 mstsngqpsaltifetal 1325

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1. **CFTR, P-glycoportein (ABCB1) and ABCC4**

HumanCFTR -------mqrsplekasvvsklffswtrpilrkgyrqrlelsdiyqipsvdsadnlsekl 53

HumanP-gp -----------------------------------------------mdlegdrnggakk 13

HumanABCC4 mlpvyqevkpnplqdanlcsrvffwwlnplfkighkrrleeddmysvlpedrsqhlgeel 60

: . . :

HumanCFTR erewdrelas-k----knpkl--inalrrcffw--rfmfygiflylge-vtkavqplllg 103

HumanP-gp knffklnnksekdkkekkptvsvfsmfrysnwldklymvvgtlaaiihgaglplmmlvfg 73

HumanABCC4 qgfwdkevlr-aendaqkpsl--traiikcywk--sylvlgiftliee-sakviqpiflg 114

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HumanCFTR riiasydpdnk---e-----------------------ersiaiylgiglcllfivrtll 137

HumanP-gp emtdifanagnledlmsnitnrsdindtgffmnleedmtryayyysgigagvlv--aay- 130

HumanABCC4 kiinyfenydpmdsv-----------------------alntayayatvltfctlilail 151

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HumanCFTR lhpaifglh--higmqmriamfsliykktlklssrvldkisigqlvsllsnnlnkfdegl 195

HumanP-gp iqvsfwclaagrqihkirkqffhaimrqei----gwfdvhdvgelntrltddvskinevi 186

HumanABCC4 hhlyfyhvq--cagmrlrvamchmiyrkalrlsnmamgktttgqivnllsndvnkfdqvt 209

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HumanCFTR alahfvwiapl---qvallmg--liwe----llqasafcglgflivlalfqaglgrmmmk 246

HumanP-gp gdkigmffqsmatfftgfivgftrgwkltlvilaispvlg--------lsaavwakilss 238

HumanABCC4 vflhflwagpl---qaiavta--llwm----eigisclagmavliillplqscfgklfss 260

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HumanCFTR yrdqragkiserlvitsemieniqsvkaycwee-amekmienlrq---telkltrkaayv 302

HumanP-gp ftdkellayakagavaeevlaairtviafggqkkelerynknleeakrigikkaitanis 298

HumanABCC4 lrsktatftdarirtmnevitgiriikmyawek-sfsnlitnlrk---keiskilrsscl 316

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HumanCFTR ryfnssafffsgffvvflsvlpyalikgiil-rkifttisfcivlrmavtrqfpwavqtw 361

HumanP-gp igaa-flliyasyalafwygttlvlsgeysi-gqvlt-vffsvligafsvgqaspsieaf 355

HumanABCC4 rgmnlasffsaskiivfvtfttyvllgsvitasrvfvavtlygavrltvtlffpsaierv 376

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HumanCFTR ydslgainkiqdflqkqeyktleynlttte---vvmenvtafweegfgelfekakqnnnn 418

HumanP-gp anargaayeifkii--d--------------------------nkpsidsysksghkpdn 387

HumanABCC4 seaivsirriqtfllldeisqrnrqlpsdgkkmvhvqdftafwdk--------------- 421

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HumanCFTR rktsngddslffsnfsllgtpvlkdinfkiergqllavagstgagktsllmvimgeleps 478

HumanP-gp ikgnlefrnvhfsypsrkevkilkglnlkvqsgqtvalvgnsgcgksttvqlmqrlydpt 447

HumanABCC4 ----------------asetptlqglsftvrpgellavvgpvgagkssllsavlgelaps 465

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HumanCFTR egkikhsgr-------------isfcsqfswimpgtikeniifgvsyde-yryrsvikac 524

HumanP-gp egmvsvdgqdirtinvrflreiigvvsqepvlfattiaenirygrenvtmdeiekavkea 507

HumanABCC4 hglvsvhgr-------------iayvsqqpwvfsgtlrsnilfgkkyek-eryekvikac 511

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HumanCFTR qleediskfaekdnivlgeggitlsggqrarislaravykdadlylldspfgyldvltek 584

HumanP-gp naydfimklphkfdtlvgergaqlsggqkqriaiaralvrnpkillldeatsaldtesea 567

HumanABCC4 alkkdlqlledgdltvigdrgttlsggqkarvnlaravyqdadiyllddplsavdaevsr 571

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HumanCFTR eifescvcklmanktrilvtskmehlkkadkililhegssyfygtfselqnlqpdfsskl 644

HumanP-gp -vvqvaldkarkgrttiviahrlstvrnadviagfddgvivekgnhdelmkekgiyfklv 626

HumanABCC4 hlfelcicqilhekitilvthqlqylkaasqililkdgkmvqkgtyteflksgidfgsll 631

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HumanCFTR mgcdsfdqfsaerrnsiltetlhrfslegdapvswtetkkqsfkqtgefgekrknsilnp 704

HumanP-gp tmqtagneve----------------lenaa----------------------------- 641

HumanABCC4 kkdnee------------------------------------------------------ 637

HumanCFTR insirkfsivqktplqmngieedsdeplerrlslvpdseqgeailprisvistgptlqar 764

HumanP-gp ---------------------deskseid-alemssnds-------------rsslirkr 666

HumanABCC4 ----------------------seqppv-------p----------------gtptlrnr 652

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HumanCFTR rrqsvlnlmthsvnqgqnihrkttastrkvslapqanlteldiysrrlsqetgleiseei 824

HumanP-gp str-------rsv-------------------------rgsqaqdrklst---------- 684

HumanABCC4 tf------------------------------------sessvwsqqssr---------- 666

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HumanCFTR needlkecffddmesipavttwntylryitvhkslifvliwclviflaevaa-slvvlwl 883

HumanP-gp -----ke---aldesippvsfwrimklnlte-wpyfvvgvfcaiingglqpafaiifski 735

HumanABCC4 --pslkdgalesqdvayvlqdw--wlsywankqsml------------------------ 698

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HumanCFTR lgntplqdkgnsthsrnnsyaviitstssyyvfyiyvgvadtllamgffrglplvhtlit 943

HumanP-gp igvftriddpetkrqnsnlfsll----------flalgiis--fitfflqgftfgkagei 783

HumanABCC4 --nvtvngggnvtek-----------ldlnwylgiysgltvatvlfgiarsllvfyvlvn 745

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HumanCFTR vskilhhkmlhsvlqapmstlntl--kaggilnrfskdiailddllpltifdfiqllliv 1001

HumanP-gp ltkrlrymvfrsmlrqdvswfddpknttgalttrlandaaqvkgaigsrlavitqn-ian 842

HumanABCC4 ssqtlhnkmfesilkapvlffdrn--pigrilnrfskdighlddllpltfldfiqtllqv 803

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HumanCFTR igaiavvavlqpy----ifvatvpvivafimlrayf--lqtsqqlkqlesegrspifthl 1055

HumanP-gp lgtgiiisfiygwqltllllaivpiiaiagvvemkmlsgqalkdkkelegagk--iatea 900

HumanABCC4 vgvvsvavavipw----iaiplvplgiififlrryf--letsrdvkrlesttrspvfshl 857

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HumanCFTR vtslkglwtlrafgrqpyfetlfhkalnlhtanwflylstlrwfqmri----emifviff 1111

HumanP-gp ---ienfrtvvsltqeqkfehmyaqslqvpyrns---lrkahifgitfsftqammyfsya 954

HumanABCC4 ssslqglwtiraykaeercqelfdahqdlhseawflflttsrwfavrl----daicamfv 913

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HumanCFTR iavtfisil-ttgegegrvgiiltlamnimstlqwavnssidvdslmrsvsrvfkfidmp 1170

HumanP-gp gcfrfgaylvahklms-fedvllvfsavvfgama---------------vgqvssf---- 994

HumanABCC4 iivafgslilaktldagqvglalsyaltlmgmfqwcvrqsaevenmmisvervieytdle 973

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HumanCFTR tegkptkstkpykngqlskvmiiensh------vkkddiwpsggqmtvkdltakyteg-g 1223

HumanP-gp ---apdyakaki--saahiimiiektplidsysteglmpntlegnvtfgevvfnyptrpd 1049

HumanABCC4 keapwey-------------------q------krpppawphegviifdnvnfmyspg-g 1007

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HumanCFTR nailenisfsispgqrvgllgrtgsgkstllsaflrllnt-egeiqidgvswdsitlqqw 1282

HumanP-gp ipvlqglslevkkgqtlalvgssgcgkstvvqllerfydplagkvlldgkeikrlnvqwl 1109

HumanABCC4 plvlkhltaliksqekvgivgrtgagksslisalfrlsep-egkiwidkiltteiglhdl 1066

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HumanCFTR rkafgvipqkvfifsgtfrknldp---yeqwsdqeiwkvadevglrsvieqfpgkldfvl 1339

HumanP-gp rahlgivsqepilfdcsiaeniaygdnsrvvsqeeivraakeanihafieslpnkystkv 1169

HumanABCC4 rkkmsiipqepvlftgtmrknldp---fnehtdeelwnalqevqlketiedlpgkmdtel 1123

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HumanCFTR vdggcvlshghkqlmclarsvlskakillldepsahldpvtyqiirrtlkqafadctvil 1399

HumanP-gp gdkgtqlsggqkqriaiaralvrqphillldeatsaldtesekvvqealdkaregrtciv 1229

HumanABCC4 aesgsnfsvgqrqlvclarailrknqiliideatanvdprtdeliqkkirekfahctvlt 1183

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HumanCFTR cehrieamlecqqflvieenkvrqydsiqkllner-slfrqaispsdrvklfphrnssk- 1457

HumanP-gp iahrlstiqnadlivvfqngrvkehgthqqllaqkgiyfsmvsvqagtkrq--------- 1280

HumanABCC4 iahrlntiidsdkimvldsgrlkeydepyvllqnkeslfykmvqqlgkaeaaaltetakq 1243

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HumanCFTR ---ckskpqiaalkeetee--evq-------dtrl 1480

HumanP-gp ----------------------------------- 1280

HumanABCC4 vyfkrnyphightdhmvtntsngqpstltifetal 1278

1. ABCC4 aligned to ABCC5

HumanABCC4 ------------------------------------------------------------ 0

MouseABCC4 ------------------------------------------------------------ 0

humanABCC5 mkdidigkeyiipspgyrsvrertstsgthrdredskfrrtrplecqdaletaaraegls 60

MouseABCC5 mkdidmgkeyiipspgyrsdrdrsavpgqhrdpeeprfrrtrslecqdaletaarvegls 60

HumanABCC4 ---------------------------mlpvy-qevkpnplqdanlcsrvffwwlnplfk 32

MouseABCC4 ---------------------------mlpvh-tevkpnplqdanlcsrvffwwlnplfk 32

humanABCC5 ldasmhsqlrildeehpkgkyhhglsalkpirttskhqhpvdnaglfscmtfswlsslar 120

MouseABCC5 ldisvhshlqildeehskgkyhhglsvlkpfrtttkhqhpvdnaglfsymtfswlsplar 120

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HumanABCC4 ighkr-rleeddmysvlpedrsqhlgeelqgfwdkevlraendaqkpsltraiikcywks 91

MouseABCC4 tghkr-rleeddmfsvlpedrskhlgeelqrywdkellrakkdsrkpsltkaiikcywks 91

humanABCC5 vahkkgelsmedvwslskhessdvncrrlerlwqeelnevgpdaas--lr-rvvwifcrt 177

MouseABCC5 vvhkkgellmedvwplskyessdvnsrrlerlwqeelnevgpdaas--lr-rvvwifcrt 177

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HumanABCC4 ylvlgiftli-eesakviqpiflgk-iinyfenydpmdsvalntayayatvltfctlila 149

MouseABCC4 ylilgiftli-eegtrvvqplflgk-iieyfekydpddsvalhtaygyaavlsmctlila 149

humanABCC5 rlilsivclmitqlagfsgpafmvkhlleytqate--------snlqyslllvlglllte 229

MouseABCC5 rlilsivclmitqlagfsgpafvvkhlleytqate--------snlqyslllvlglllte 229

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HumanABCC4 ilh----hlyfyhvqcagmrlrvamchmiyrkalrlsnmamgktttgqivnllsndvnkf 205

MouseABCC4 ilh----hlyfyhvqcagmrlrvamchmiyrkalrlsnsamgktttgqivnllsndvnkf 205

humanABCC5 ivrswslaltwalnyrtgvrlrgailtmafkkilklkni--kekslgelinicsndgqrm 287

MouseABCC5 vvrswslaltwalnyrtgvrlrgailtmafkkilklkni--kekslgelinicsndgqrm 287

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HumanABCC4 dqvtvflhflwagplqaiavtallwmeigisclagmavliillplqscfgklfsslrskt 265

MouseABCC4 dqvtiflhflwagplqaiavtvllwveigisclaglavlvillplqscigklfsslrskt 265

humanABCC5 feaaavgsllaggpvvailgmiynviilgptgflgsavfilfypammfasrltayfrrkc 347

MouseABCC5 feaaavgsllaggpvvailgmiynviilgptgflgsavfilfypammfvsrltayfrrkc 347

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HumanABCC4 atftdarirtmnevitgiriikmyaweksfsnlitnlrkkeiskilrssclrgmnlasff 325

MouseABCC4 aaftdarirtmnevitgmriikmyaweksfadlianlrkkeiskilgssylrgmnmasff 325

humanABCC5 vaatdervqkmnevltyikfikmyawvkafsqsvqkireeerrilekagyfqsitvgvap 407

MouseABCC5 vaatddrvqkmnevltyikfikmyawvkafsqcvqkireeerrilekagyfqsitvgvap 407

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HumanABCC4 saskiivfvtfttyvllgsvitasrvfvavtlygavrltvtlffpsaiervseaivsirr 385

MouseABCC4 iankvilfvtftsyvllgneitashvfvamtlygavrltvtlffpsaiergseaivsirr 385

humanABCC5 ivvviasvvtfsvhmtlgfdltaaqaftvvtvfnsmtfalkv-tpfsvkslseasvavdr 466

MouseABCC5 ivvviasvvtfsvhmtlgfhltaaqaftvvtvfnsmtfalkv-tpfsvkslseasvavdr 466

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HumanABCC4 iqtfllldeisqrnrqlpsdgkkmvhvqdftafwdk------------------------ 421

MouseABCC4 iknfllldelpqrkahvpsdgkaivhvqdftafwdk------------------------ 421

humanABCC5 fkslflmeevhmiknkpa-sphikiemknatlawdsshssiqnspkltpkmkkdkrasrg 525

MouseABCC5 fkslflmeevhmiknkpa-sphikiemknatlawdsshssiqnspkltpkmkkdkratrg 525

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HumanABCC4 ----------------------------------------------asetptlqglsftv 435

MouseABCC4 ----------------------------------------------aldsptlqglsfia 435

humanABCC5 kkekvrqlqrtehqavlaeqkghllldsderpspeeeegkhihlghlrlqrtlhsidlei 585

MouseABCC5 kkeksrqlqhtehqavlaeqkghllldsderpspeeeegkqihtgslrlqrtlynidlei 585

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HumanABCC4 rpgellavvgpvgagkssllsavlgelapshglvsvhgriayvsqqpwvfsgtlrsnilf 495

MouseABCC4 rpgellavvgpvgagkssllsavlgelppasglvsvhgriayvsqqpwvfsgtvrsnilf 495

humanABCC5 qegklvgicgsvgsgktslisailgqmtllegsiaisgtfayvaqqawilnatlrdnilf 645

MouseABCC5 eegklvgicgsvgsgktslvsailgqmtllegsiavsgtfayvaqqawilnatlrdnilf 645

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HumanABCC4 gkkyekeryekvikacalkkdlqlledgdltvigdrgttlsggqkarvnlaravyqdadi 555

MouseABCC4 gkkyekeryekvikacalkkdlqlledgdltvigdrgatlsggqkarvnlaravyqdadi 555

humanABCC5 gkeydeerynsvlnscclrpdlailpssdlteigerganlsggqrqrislaralysdrsi 705

MouseABCC5 gkefdeerynsvlnscclrpdlailpnsdlteigerganlsggqrqrislaralysdrsi 705

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HumanABCC4 yllddplsavdaevsrhlfelcicqilhekitilvthqlqylkaasqililkdgkmvqkg 615

MouseABCC4 yllddplsavdaevgkhlfqlcicqalhekitilvthqlqylkaashililkdgemvqkg 615

humanABCC5 yilddplsaldahvgnhifnsairkhlksktvlfvthqlqylvdcdevifmkegciterg 765

MouseABCC5 yilddplsaldahvgnhifnsairkrlksktvlfvthqlqylvdcdevifmkegciterg 765

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HumanABCC4 tyteflksgidfgsllkkdneeseqppvpgtptlrnrtfsessvwsqqssrpslkdgale 675

MouseABCC4 tyteflksgvdfgsllkkeneeaepstapgtptlrkrtfseasiwsqqssrpslkdgape 675

humanABCC5 theelmnlngdyatifnnlllgetppvein-------skketsg-----sqkksqdkgpk 813

MouseABCC5 theelmnlngdyatifnnlllgetppvein-------skkeatg-----sq-ksqdkgpk 812

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HumanABCC4 sqd------------------------------------------------------vay 681

MouseABCC4 gqdaentqavqpe-------esrsegrigfkayknyfsagaswffiiflvllnmvgqvfy 728

humanABCC5 tgsvkkekavkpeegqlvqleekgqgsvpwsvygvyiqaaggplaflvimalfmlnvgst 873

MouseABCC5 pgsvkkekavkseegqlvqveekgqgsvpwsvywvyiqaaggplaflvimvlfmlnvgst 872

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HumanABCC4 vlqdwwlsywankqsmlnvtvngg-----gnvtekldlnwylgiysgltvatvlfgiars 736

MouseABCC4 vlqdwwlshwankqgalnntrnan-----gnitetldlswylgiyagltavtvlfgiars 783

humanABCC5 afstwwlsywikqgsgnttvtrgnetsvsdsmkdnphmqyyasiyalsmavmlilkairg 933

MouseABCC5 afstwwlsywikqgsgnstvyqgnrsfvsdsmkdnpfmqyyasiyalsmavmlilkairg 932

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HumanABCC4 llvfyvlvnssqtlhnkmfesilkapvlffdrnpigrilnrfskdighlddllpltfldf 796

MouseABCC4 llvfyilvnasqtlhnrmfesilkapvlffdrnpigrilnrfskdighmddllpltfldf 843

humanABCC5 vvfvkgtlrassrlhdelfrrilrspmkffdttptgrilnrfskdmdevdvrlpfqaemf 993

MouseABCC5 vvfvkgtlrassrlhdelfrrilrspmkffdttptgrilnrfskdmdevdvrlpfqaemf 992

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HumanABCC4 iqtllqvvgvvsvavavipwiaiplvplgiififlrryfletsrdvkrlesttrspvfsh 856

MouseABCC4 iqtlllvvsviavaaavipwiliplvplsvvflvlrryfletsrdvkrlesttrspvfsh 903

humanABCC5 iqnvilvffcvgmiagvfpwflvavgplvilfsvlhivsrvlirelkrldnitqspflsh 1053

MouseABCC5 iqnvilvffcvgmiagvfpwflvavgpllilfsllhivsrvlirelkrldnitqspflsh 1052

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HumanABCC4 lssslqglwtiraykaeercqelfdahqdlhseawflflttsrwfavrldaicamfviiv 916

MouseABCC4 lssslqglwtiraykaeercqelfdahqdlhseawflflttsrwfavrldaicaifvivv 963

humanABCC5 itssiqglatihaynkgqeflhryqellddnqapfflftcamrwlavrldlisialittt 1113

MouseABCC5 itssiqglatihaynkrqeflhryqellddnqapfflftcamrwlavrldlisialittt 1112

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HumanABCC4 afgslilaktldagqvglalsyaltlmgmfqwcvrqsaevenmmisvervieytdl-eke 975

MouseABCC4 afgslvlaktlnagqvglalsyaltlmgmfqwsvrqsaevenmmisvervieytdl-eke 1022

humanABCC5 glmivlmhgqippayaglaisyavqltglfqftvrlasetearftsverinhyiktlsle 1173

MouseABCC5 glmivlmhgqipsayaglaisyavqltglfqftvrlasetearftsverinhyiktlsle 1172

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HumanABCC4 apwe-yqkrpppawphegviifdnvnfmyspggplvlkhltaliksqekvgivgrtgagk 1034

MouseABCC4 apwe-ckkrpppgwphegvivfdnvnftysldgplvlkhltaliksrekvgivgrtgagk 1081

humanABCC5 apariknkapspdwpqegevtfenaemryrenlplvlkkvsftikpkekigivgrtgsgk 1233

MouseABCC5 apariknkapphdwpqegevtfenaemryrenlplvlkkvsftikpkekigivgrtgsgk 1232

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HumanABCC4 sslisalfrlsepe-gkiwidkiltteiglhdlrkkmsiipqepvlftgtmrknldpfne 1093

MouseABCC4 sslisalfrlsepe-gkiwidkiltteiglhdlrkkmsiipqepvlftgtmrknldpfne 1140

humanABCC5 sslgmalfrlvelsggcikidgvrisdigladlrsklsiipqepvlfsgtvrsnldpfnq 1293

MouseABCC5 sslgmalfrlvelsggcikidgirisdigladlrsklaiipqepvlfsgtvrsnldpfnq 1292

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HumanABCC4 htdeelwnalqevqlketiedlpgkmdtelaesgsnfsvgqrqlvclarailrknqilii 1153

MouseABCC4 htdeelwraleevqlkeaiedlpgkmdtelaesgsnfsvgqrqlvclarailknnrilii 1200

humanABCC5 ytedqiwdalerthmkeciaqlplklesevmengdnfsvgerqllciarallrhckilil 1353

MouseABCC5 ytedqiwdalerthmkeciaqlplklesevmengdnfsvgerqllciarallrhckilil 1352

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HumanABCC4 deatanvdprtdeliqkkirekfahctvltiahrlntiidsdkimvldsgrlkeydepyv 1213

MouseABCC4 deatanvdprtdeliqqkirekfaqctvltiahrlntiidsdkimvldsgrlkeydepyv 1260

humanABCC5 deataamdtetdlliqetireafadctmltiahrlhtvlgsdrimvlaqgqvvefdtpsv 1413

MouseABCC5 deataamdtetdlliqetireafadctmltiahrlhtvlgsdrimvlaqgqvvefdtpsv 1412

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HumanABCC4 llqnkeslfykmvqqlgkaeaaaltetakqvyfkrnyphightdhmvtntsngqpstlti 1273

MouseABCC4 llqnpeslfykmvqqlgkgeaaaltetakqvyfrrnypditftspavmntsngqpsalti 1320

humanABCC5 llsndssrfyamfaaaenkvavkg------------------------------------ 1437

MouseABCC5 llsndssrfyamfaaaenkvavkg------------------------------------ 1436

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HumanABCC4 fetal 1278

MouseABCC4 fetal 1325

humanABCC5 ----- 1437

MouseABCC5 ----- 1436

Human CFTR NP\_000483.3

Mouse CFTR AAR16297.1

Chicken CFTR ABK34432.1

Xenopus CFTR CAA46348.1

Dogfish CFTR AAA49616.1

Sea lamprey CFTR AKC42149.1

Human ABCC4 NP\_001288758.1

Mouse ABCC4 NP\_001157148.1

Rat ABCC4 NP\_596902.1

Human ABCC5 NP\_005679.2

Mouse ABCC5 NP\_038818.2

Human P-glycoprotein AAA59575.1