

ABCC subfamily (version 2019.4) in the IUPHAR/BPS Guide to Pharmacology Database

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Abstract

Subfamily ABCC contains thirteen members and nine of these transporters are referred to as the Multidrug Resistance Proteins (MRPs). The MRP proteins are found throughout nature and they mediate many important functions. They are known to be involved in ion transport, toxin secretion, and signal transduction [5].

Contents

This is a citation summary for ABCC subfamily in the [Guide to Pharmacology](#) database (GtoPdb). It exists purely as an adjunct to the database to facilitate the recognition of citations to and from the database by citation analyzers. Readers will almost certainly want to visit the relevant sections of the database which are given here under database links.

[GtoPdb](#) is an expert-driven guide to pharmacological targets and the substances that act on them. GtoPdb is a reference work which is most usefully represented as an on-line database. As in any publication this work should be appropriately cited, and the papers it cites should also be recognized. This document provides a citation for the relevant parts of the database, and also provides a reference list for the research cited by those parts.

Please note that the database version for the citations given in GtoPdb are to the most recent preceding version in which the family or its subfamilies and targets were substantially changed. The links below are to the current version. If you need to consult the cited version, rather than the most recent version, please contact the GtoPdb curators.

Database links

ABCC subfamily

<http://www.guidetopharmacology.org/GRAC/FamilyDisplayForward?familyId=153>

Transporters

[MRP1\(ABCC1\)](#)

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=779>

[MRP2, cMOAT\(ABCC2\)](#)

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=780>

[MRP3\(ABCC3\)](#)

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=781>

[MRP4\(ABCC4\)](#)

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=782>
MRP5(ABCC5)
<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=783>
MRP6(ABCC6)
<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=784>
SUR1(ATP-binding cassette, sub-family C (CFTR/MRP), member 8)
<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2594>
SUR2(ABCC9)
<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2746>
MRP7(ABCC10)
<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=785>
MRP8(ABCC11)
<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=786>
MRP9(ABCC12)
<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=787>

References

1. Aguilar-Bryan L, Clement JP, Gonzalez G, Kunjilwar K, Babenko A and Bryan J. (1998) Toward understanding the assembly and structure of KATP channels. *Physiol. Rev.* **78**: 227-45 [PMID:9457174]
2. Bakos E and Homolya L. (2007) Portrait of multifaceted transporter, the multidrug resistance-associated protein 1 (MRP1/ABCC1). *Pflugers Arch.* **453**: 621-41 [PMID:17187268]
3. Borst P, de Wolf C and van de Wetering K. (2007) Multidrug resistance-associated proteins 3, 4, and 5. *Pflugers Arch.* **453**: 661-73 [PMID:16586096]
4. Chen ZS, Kawabe T, Ono M, Aoki S, Sumizawa T, Furukawa T, Uchiumi T, Wada M, Kuwano M and Akiyama SI. (1999) Effect of multidrug resistance-reversing agents on transporting activity of human canalicular multispecific organic anion transporter. *Mol. Pharmacol.* **56**: 1219-28 [PMID:10570049]
5. Dean M, Hamon Y and Chimini G. (2001) The human ATP-binding cassette (ABC) transporter superfamily. *J. Lipid Res.* **42**: 1007-17 [PMID:11441126]
6. Inagaki N, Gonoi T, Clement 4th JP, Namba N, Inazawa J, Gonzalez G, Aguilar-Bryan L, Seino S and Bryan J. (1995) Reconstitution of IKATP: an inward rectifier subunit plus the sulfonylurea receptor. *Science* **270**: 1166-70 [PMID:7502040]
7. Isomoto S, Kondo C, Yamada M, Matsumoto S, Higashiguchi O, Horio Y, Matsuzawa Y and Kurachi Y. (1996) A novel sulfonylurea receptor forms with BIR (Kir6.2) a smooth muscle type ATP-sensitive K⁺ channel. *J. Biol. Chem.* **271**: 24321-4 [PMID:8798681]
8. Leier I, Jedlitschky G, Buchholz U, Cole SP, Deeley RG and Keppler D. (1994) The MRP gene encodes an ATP-dependent export pump for leukotriene C4 and structurally related conjugates. *J. Biol. Chem.* **269**: 27807-10 [PMID:7961706]
9. Miki T, Nagashima K and Seino S. (1999) The structure and function of the ATP-sensitive K⁺ channel in insulin-secreting pancreatic beta-cells. *J. Mol. Endocrinol.* **22**: 113-23 [PMID:10194514]
10. Priebe W, Krawczyk M, Kuo MT, Yamane Y, Savaraj N and Ishikawa T. (1998) Doxorubicin- and daunorubicin-glutathione conjugates, but not unconjugated drugs, competitively inhibit leukotriene C4 transport mediated by MRP/GS-X pump. *Biochem. Biophys. Res. Commun.* **247**: 859-63 [PMID:9647783]
11. Ramaen O, Leulliot N, Sizun C, Ulryck N, Pamlard O, Lallemand JY, Tilbeurgh Hv and Jacquet E. (2006) Structure of the human multidrug resistance protein 1 nucleotide binding domain 1 bound to Mg²⁺/ATP reveals a non-productive catalytic site. *J. Mol. Biol.* **359**: 940-9 [PMID:16697012]
12. Rehmann H. (2012) Epac2: a sulfonylurea receptor? *Biochem. Soc. Trans.* **40**: 6-10 [PMID:22260657]
13. Reid G, Wielinga P, Zelcer N, van der Heijden I, Kuil A, de Haas M, Wijnholds J and Borst P. (2003) The human multidrug resistance protein MRP4 functions as a prostaglandin efflux transporter and is inhibited by nonsteroidal antiinflammatory drugs. *Proc. Natl. Acad. Sci. U.S.A.* **100**: 9244-9 [PMID:12835412]
14. Sager G, Ørvoll EØ, Lysaa RA, Kufareva I, Abagyan R and Ravna AW. (2012) Novel cGMP efflux

- inhibitors identified by virtual ligand screening (VLS) and confirmed by experimental studies. *J. Med. Chem.* **55**: 3049-57 [[PMID:22380603](#)]
- 15. Suzuki H and Sugiyama Y. (1998) Excretion of GSSG and glutathione conjugates mediated by MRP1 and cMOAT/MRP2. *Semin. Liver Dis.* **18**: 359-76 [[PMID:9875554](#)]
 - 16. Wängler B, Beck C, Shiue CY, Schneider S, Schwanstecher C, Schwanstecher M, Feilen PJ, Alavi A, Rösch F and Schirrmacher R. (2004) Synthesis and in vitro evaluation of (S)-2-([¹¹C]methoxy)-4-[3-methyl-1-(2-piperidine-1-yl-phenyl)-butyl-carbamoyl]-benzoic acid ([¹¹C]methoxy-repaglinide): a potential beta-cell imaging agent. *Bioorg. Med. Chem. Lett.* **14**: 5205-9 [[PMID:15380228](#)]
 - 17. Zelcer N, Reid G, Wielinga P, Kuil A, van der Heijden I, Schuetz JD and Borst P. (2003) Steroid and bile acid conjugates are substrates of human multidrug-resistance protein (MRP) 4 (ATP-binding cassette C4). *Biochem. J.* **371**: 361-7 [[PMID:12523936](#)]
 - 18. Zhang X, Qiu Y, Li X, Bhattacharjee S, Woods M, Kraft P, Lundein SG and Sui Z. (2009) Discovery and structure-activity relationships of a novel series of benzopyran-based K(ATP) openers for urge urinary incontinence. *Bioorg. Med. Chem.* **17**: 855-66 [[PMID:19101153](#)]