

**Fig. S1**

|                  |             |                     |             | 50         |            |             |            |             | 100         |            |
|------------------|-------------|---------------------|-------------|------------|------------|-------------|------------|-------------|-------------|------------|
| E._histolytica_1 | --MKKIFVIG  | ITGSICS <b>GKS</b>  | RLCKALQS-K  | GIKTIDSDTI | GHDVILQED- | VKKEIKESFG  | ---EEVFNE- | EGQVDRKRLS  | DVVFTNKKQL  | KKLNEIMWNS |
| E._histolytica_2 | ----MVFVIG  | ITGRICS <b>GKS</b>  | TLSKTLIK-R  | KIPVIDCDKL | GHELYQKGS  | VYNDFIKLFG  | ---KEVVG-  | DGSIDRKKLS  | ELVFSNPQNV  | KIISDLTWPA |
| Dictyostelium    | --MSKLIKIG  | LTGGIAS <b>GKS</b>  | TILGYLKE-M  | NIKCIDADKF | GHMVYQKGRP | SYNKIIQEFG  | ---QDIINQN | DQSIDRSKLG  | PIVFSDDLPM  | KQLTNIVWPE |
| Saccharomyces    | -----MLVVG  | LTGGIAC <b>GKS</b>  | TVSRRLRDKY  | KLPIVDADKI | ARQVVEPGQN | AYDQIVLYFK  | DKIPNLLE-  | DGHLNREALG  | KWVFSHKEDL  | QALNGITHPA |
| Homo*            | -----LYVIG  | LTGISGS <b>GKS</b>  | SIAQRLKG-L  | GAFVIDSDHL | GHRAYAPGGP | AYQPVEAFG   | ---TDILHK- | DGIINRKVLG  | SRVFGNKKQL  | KILTDMWPI  |
| Drosophila_2     | -----MFIVA  | VTGGIAT <b>GKS</b>  | TISKVFER-Q  | GIPVIDADKI | AREIVEPGQP | CWRQIREVFG  | ---DEVLLP- | SKEINRAVLG  | KMIFEDKELR  | GKLNKITHPT |
| Arabidopsis      | -----MRIVG  | LTGGIAS <b>GKS</b>  | TVSNLFKA-S  | GIPVVDADV  | ARDVLKKGSG | GWKRVAFAFG  | ---EEILLP- | SGEVDPRKLG  | QIVFSSDSKR  | QLLNKLMAFY |
| Trypanosoma      | -----MLLVG  | LTGGIAC <b>GKS</b>  | TVSLLLKESH  | HIVVVDSDLV | VRELQRPFP  | CTRKIARRW-  | ---PNCVDPQ | SGEVNRAALG  | SIIFS DPSAR | RALARIMNFP |
| Emiliana         | -----MRIVG  | LTGGIAC <b>GKS</b>  | AVSTAAAS-W  | GLRVIDMDEI | ARRVCPLGP  | AYTDIVAAFG  | ---DGALLP- | SGELNRTEVG  | RIAFSDREKR  | RALNAATHRP |
| Hydrogenobacter  | -----MLKVG  | LTGNIGC <b>GKS</b>  | TVARMFME-L  | GAYTFDADI  | IRTFYQEKGE | VYRKVVEAFG  | ---EGILDK- | EGNIDRKCLA  | DLVFLDINKL  | RLLESITHKA |
| Hirschia         | -----MIILG  | LTGSIGM <b>GKS</b>  | TTANIFLD-A  | GIPVYDSDA  | VHALYQSGGK | AVDKLEDAF-  | ---PGVKNQ- | EGSIDRQKLS  | AYVLKDSAAM  | KKLEAIVHPL |
| Geobacter        | -----MRIIG  | LTGGIAS <b>GKS</b>  | TVTRILER-L  | GTAVIDADQL | AREAVVPFTA | GHRAIVETFG  | ---PAVLLP- | DGAIDRALG   | RIIFADPVAR  | GKLEAITHPA |
| Escherichia      | -----MRYIVA | LTGGIG <b>S</b> GKS | TVANAFAN-L  | GINVIDADII | ARQVVEPGAP | ALHAIA DHFG | ---ANMIAA- | DGTLRRLALR  | ERIFANPEEK  | NWLNDLLHPL |
| Chlamydia        | MSEKKVLMIG  | ITGGIAS <b>GKS</b>  | TVVAMIKE-A  | GYQVIDADQV | VHQLQEKGG  | LYEALKQA FG | ---NEILKE- | DGDLNRKKLS  | ELVFSNP SHM | ATSSAIQNQI |
| Eggerthella      | -----MAKRIF | ITGGIG <b>S</b> GKS | TLLDFLRS-Q  | GVAAVEADKV | GHEVLTFADT | -KAELA EKFG | ---NDIFDD- | EGNVVR SALA | AKAFVSPEMT  | ALLDSVTLKR |
| Dehalococcoides  | -----MKIVG  | ITGGIG <b>S</b> GKT | TVCRYLKE-L  | GVNIIDADEI | GHRVLQNKGI | -RTKITDVFG  | ---NEVMNP- | DGNINRKILG  | ELVFGYPERL  | ERLNKITHPL |
| Anabaena         | ---MKKHLIG  | LTGGIAT <b>GKS</b>  | TVANYLVTA Y | NLPMLDADVY | ARDAVSVGSP | IITQISQRYG  | ---KQILLP- | DGNLNRSQLG  | EIIFNQPEER  | HWVENLIHPY |
| Clostridium      | -----MLRIG  | LTGSIGC <b>GKS</b>  | SLSNILKK-Y  | NIPIIDADIK | GREIYEDKEL | -LKAIEDAFG  | ---NSVINK- | DGTLNRKNLG  | KIVFSDDDKL  | EKLNSLTHPV |
|                  |             | * ** **             |             | *          |            |             |            |             |             |            |

|                  |            |            |            |            |            |            |              |            |            |            |
|------------------|------------|------------|------------|------------|------------|------------|--------------|------------|------------|------------|
| E._histolytica_1 | IENKIKEQI- | ----QQLEI- | -QGE--KIVA | VEAALLIR-T | NWMSW-MDMI | WVTTVSPEIA | IARMTAGR-G   | MTREECINRM | KNQPSSREYA | RYADILFDTR |
| E._histolytica_2 | IYTLLQERI- | ----KVLEK- | -EGH--PIVG | VEAALLIR-A | NW-SI-VNVI | WETRIDEAET | IKRLKTRN-G   | LSEEQAKKRI | QSQPTQEEYD | NKSQVQINTM |
| Dictyostelium    | MKELILNEF- | ----KEIETT | CPND--KIVV | LEAAVLIE-A | GFNEM-VDLI | WVTQVPREVA | IERLKTRN-N   | LSEVDACKRI | DSQLTNEERE | KYANLVFKTN |
| Saccharomyces    | IRYAMFKEI- | ----GYYYL- | -KGY--RMCV | LDVPLLFE-G | NLDSI-CGVT | VSVICTQELQ | LERLMTRNPE   | LSEEDAKNRL | NSQMSTEERM | ARSDYILQNN |
| Homo             | IAKLAREEM- | ----DRAVA- | -EGK--RVCV | IDAAVLLE-A | GWQNL-VHEV | WTAVIPETEA | VRRIVERD-G   | LSEAAAQSRL | QSQMSGQQLV | EQSHVVLSTL |
| Drosophila_2     | IHRKIFWQV- | ----CKLLV- | -TGH--AWIV | LDLPLLFE-T | GVLMDFIHKI | VCVTCDSKQ  | LERLIARN-E   | LSESEARHRV | DSQMPLDKKC | EKSHFVIDNN |
| Arabidopsis      | ISSGIFWEI- | ----LKQWA- | -SGA--KVIV | VDIPLLFE-V | KMDKW-TKPI | VVVVWSQETQ | LKRLMERD-G   | LSEEDARNRV | MAQMPLDSKR | SKADVVIDNN |
| Trypanosoma      | IFRATMKMVI | GLWWQSLRQQ | LRGQGPLLVV | LDVPLLYE-S | NIYTWLVDRV | VVWSCSEEQQ | VERMAKRN-G   | LTREQALQRI | NAQMPISEKC | KRADRVIHNE |
| Emiliana         | MLMQLLAEL- | ----AAALF- | -GGE--AAVL | IDAPLLFE-T | SLHWL-CCTT | LVVAA---TQ | LERLRARD-G   | FSAEEAEKRI | AAQMPLAEC  | ARADAVIDNE |
| Hydrogenobacter  | LYERLEEEF- | ----RRLP-- | -QD---AIAI | VEASLLVE-K | GTYNK-YDRL | IVVYAPYEV  | KERAIKS--G   | FSSEDFERRW | KNQMPPEEKL | KYADFVIDNS |
| Hirschia         | VFETRLKFL- | ----DEHKA- | -KGT--DIVV | FDIPLLFE-T | GSDAF-VDKI | LVVTAPAEIQ | KQRVLDRE-G   | MTEEFSAAIL | AKQMPDKQKR | ERADFIIDTS |
| Geobacter        | IAALAEQKL- | ----AELRR- | -RGE--RVA  | FYAPLLIE-A | GATGR-VDEI | WVYVDRETQ  | LARLTARD-G   | ITRHEAEQRL | AAQMPMEEKA | ARGAVVIDNR |
| Escherichia      | IQQETQHAI- | ----QQATS- | -----PYVL  | WVPLLVE-N  | SLYKK-ANRV | LVVDVSPETQ | LKRTMQRD-D   | VTREHVEQIL | AAQATREARL | AVADDVIDNN |
| Chlamydia        | IKEELAAER- | ----DQLA-- | -QSQ--TVIF | MDIPLLIE-L | GYQDW-FDAI | WLIVYVDAQ  | TQ LRLMARN-H | LREVDKAKRL | SSQLSIEEKR | PYASLVIDNS |
| Eggerthella      | VYAESLRQL- | ----DNLA-- | -QTH--DFVA | LEMAILDGRD | DFYKN-ADV  | VAVTTPEVR  | IARLVGR--G   | LTEEDARNRL | KNQVPDSKRE | AIADVFTNN  |
| Dehalococcoides  | IEQAISLL-  | ----EEYRQ- | -KGI--KSV  | AEAPLLVE-A | GWLKL-VNEV | WLITAPKESI | FKRLHSRM-G   | LSREQAIARI | QSQATDNERL | KYASVVVNNN |
| Anabaena         | VRNCFTQAI- | ----NELSA- | -----NTLI  | LVIPLLFE-A | GLENL-VGEI | WVWSCSPQQQ | QQRLLIQRN-N  | LTNEQAVARI | SSQLSIAEKV | ARADVVDNS  |
| Clostridium      | IRRMINEDL- | ----DEYEK- | -RGE--KMAV | IDAALLLE-A | GFMSM-LDTI | IVVTCSEPVQ | LQRVILRD-N   | CSEEDAMGRI | KSQMPQEEKV | KYAEFVVDNS |

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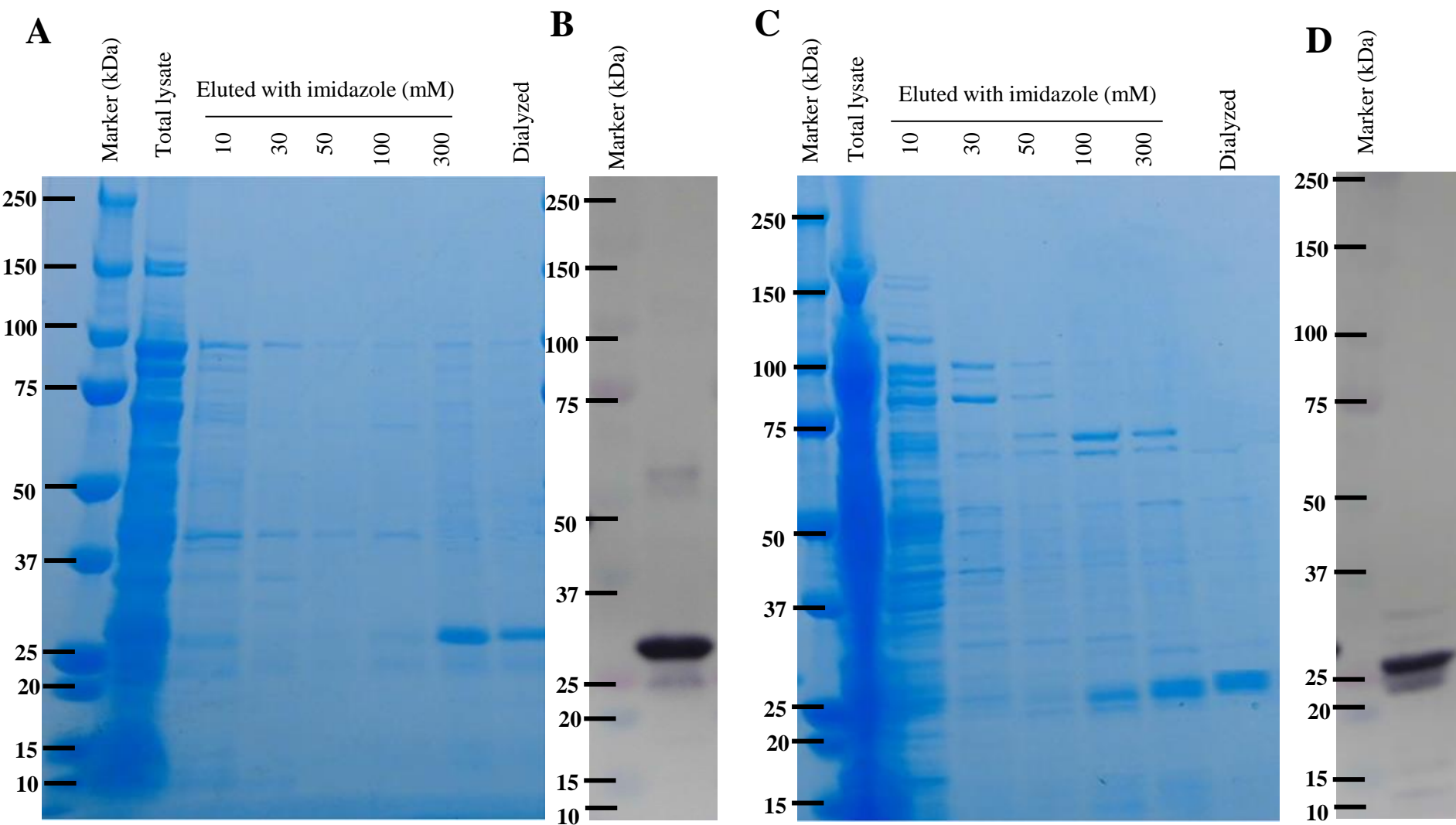
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|                  |            |            |             |            |            |          |
|------------------|------------|------------|-------------|------------|------------|----------|
| E._histolytica_1 | FNRGTLERIF | NREINAFLLD | FNENKF----  | -----      | -----      | -----    |
| E._histolytica_2 | GTIEETATLI | NKEVDKLLAQ | LKITLN----  | -----      | -----      | -----    |
| Dictyostelium    | DDYEITKNKV | QNEINNLLNN | YNK-----    | -----      | -----      | -----    |
| Saccharomyces    | STLVDLYEQI | ESVVKKIQPS | KLRTVLEYFP  | PFGAVSASSI | VMSRLLMKKL | QNKKSSAV |
| Homo             | WEPHITQRQV | EKAWALLQKR | IPKTHQALD-  | -----      | -----      | -----    |
| Drosophila_2     | GSVEEAESSA | MSIYNLMRDS | KQHWLNRI SF | LGLFLIVGFT | IYMLLKVFNR | LPESWQM- |
| Arabidopsis      | GSLLDLHQFV | EKVLIEIRRP | LTWIEFWRSR  | QGAFSVLGSV | ILGLSVCKQL | KIGS---- |
| Trypanosoma      | ESLSELEHSV | ADTVAMMQQQ | SGGRVAFALS  | GALAVGVSLG | AVVVYCCLRI | VF-----  |
| Emiliana         | GTRDELAARA | ATILDAAGAI | AGQTP-----  | -----      | -----      | -----    |
| Hydrogenobacter  | GSLESTQKQV | KKVYRELLNL | VH-----     | -----      | -----      | -----    |
| Hirschia         | LGLDSAENKV | YQIIQSLIQL | NESED-----  | -----      | -----      | -----    |
| Geobacter        | GEPSELERQV | LMLWDRHCRA | GD-----     | -----      | -----      | -----    |
| Escherichia      | GAPDAIASDV | ARLHAHYLQL | ASQFVSQKEP  | -----      | -----      | -----    |
| Chlamydia        | GDMETLRKQV | HKALEQLSKP | Y-----      | -----      | -----      | -----    |
| Eggerthella      | GTIEDFENEI | ALWWESFKNE | AAK-----    | -----      | -----      | -----    |
| Dehalococcoides  | CRFEDLKACV | QLLAKERLEL | A-----      | -----      | -----      | -----    |
| Anabaena         | STLESLLQOI | DLVMKRVDTN | LI-----     | -----      | -----      | -----    |
| Clostridium      | GTLDQLAEEA | DELIRKLEEK | IEK-----    | -----      | -----      | -----    |

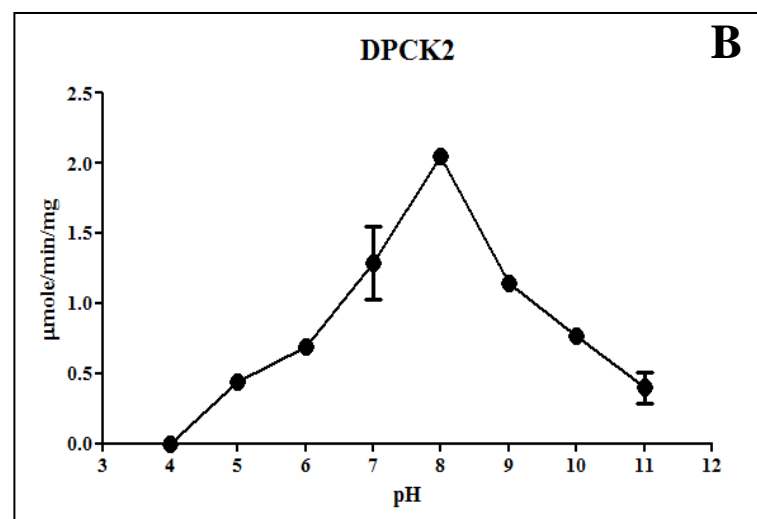
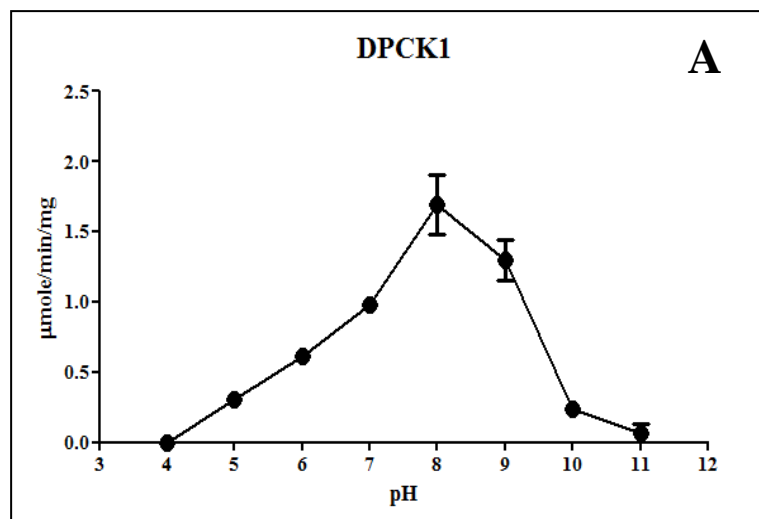
Fig. S2



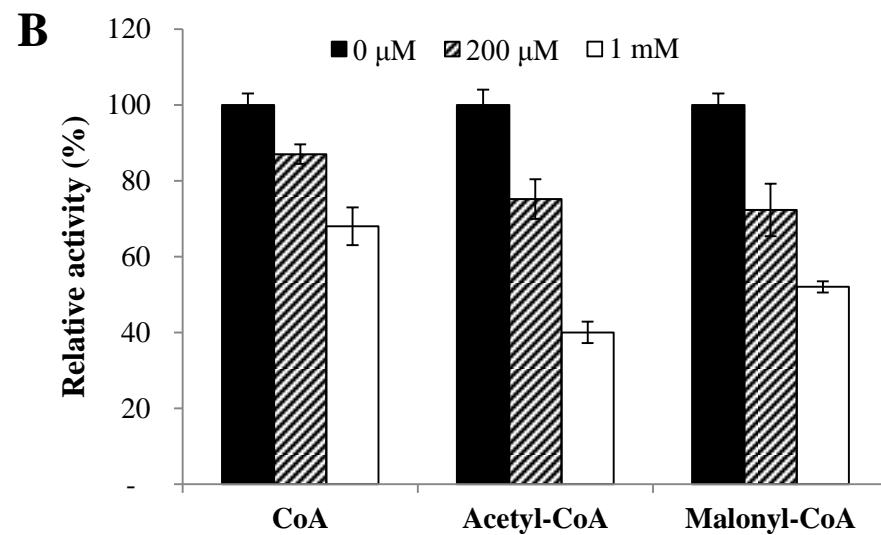
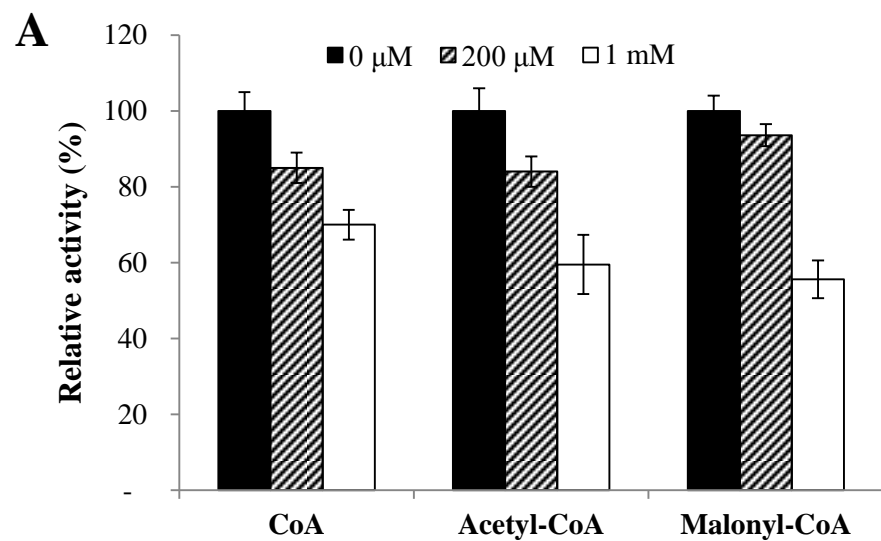
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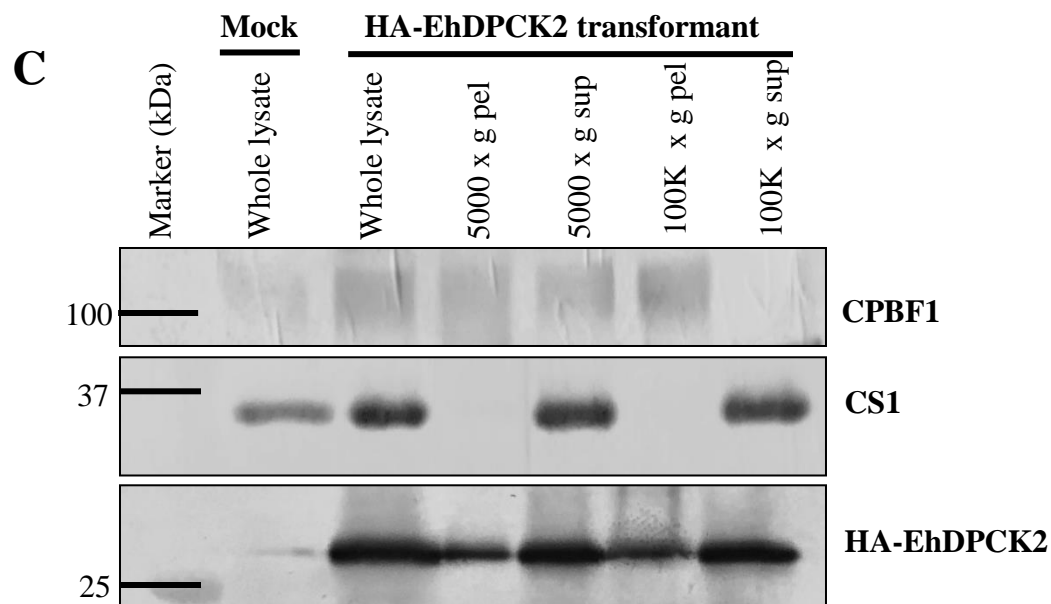
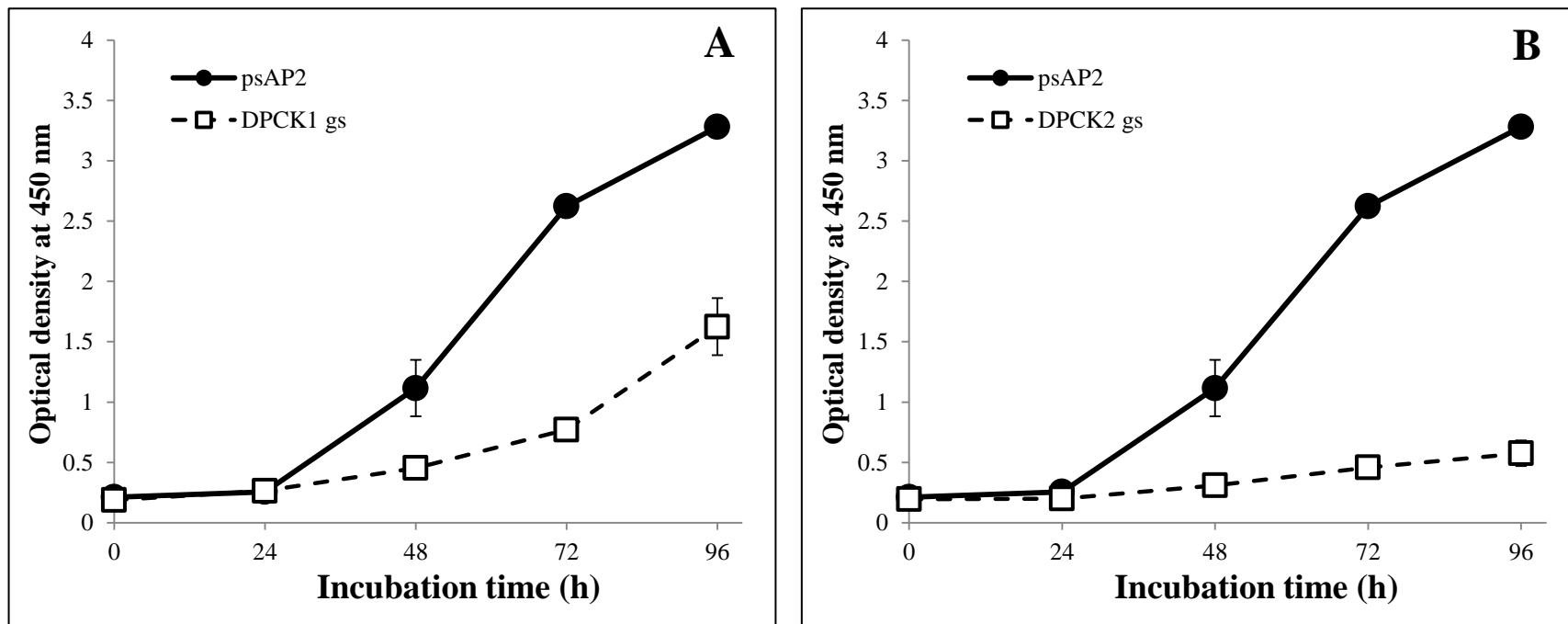
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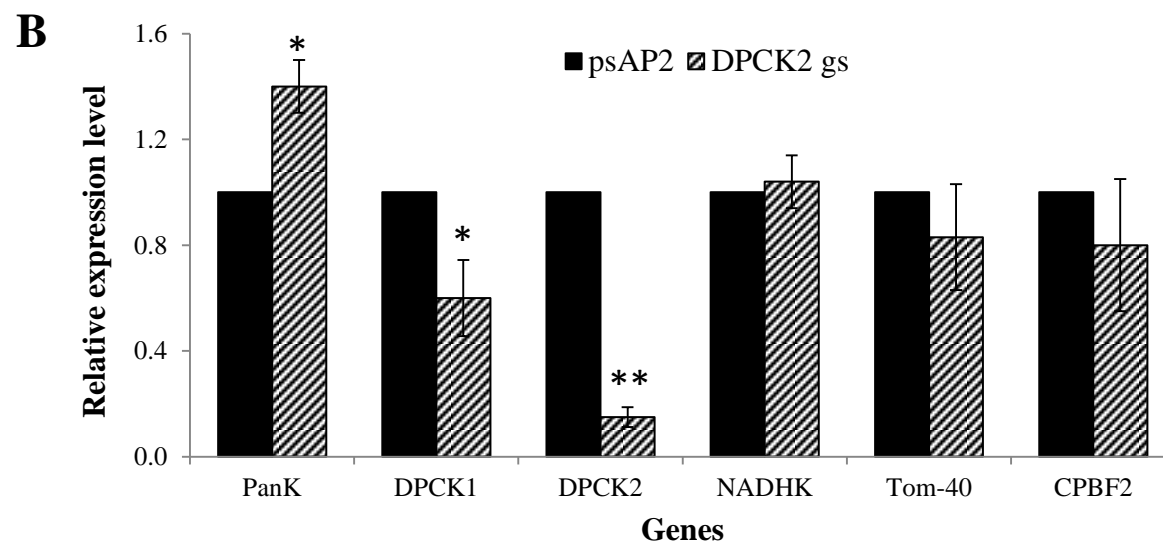
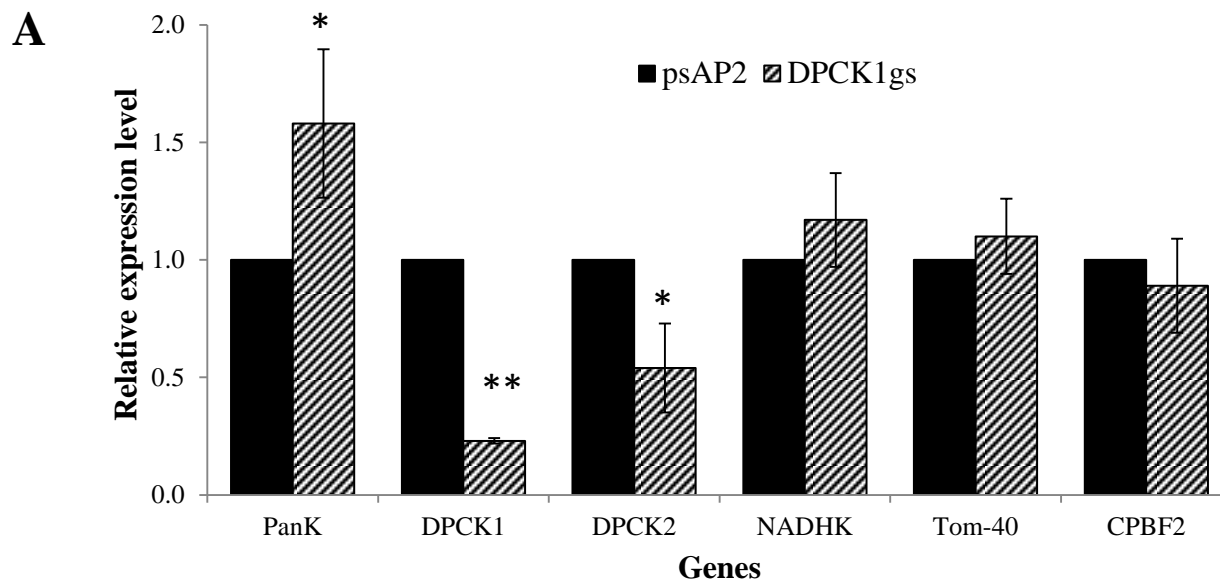
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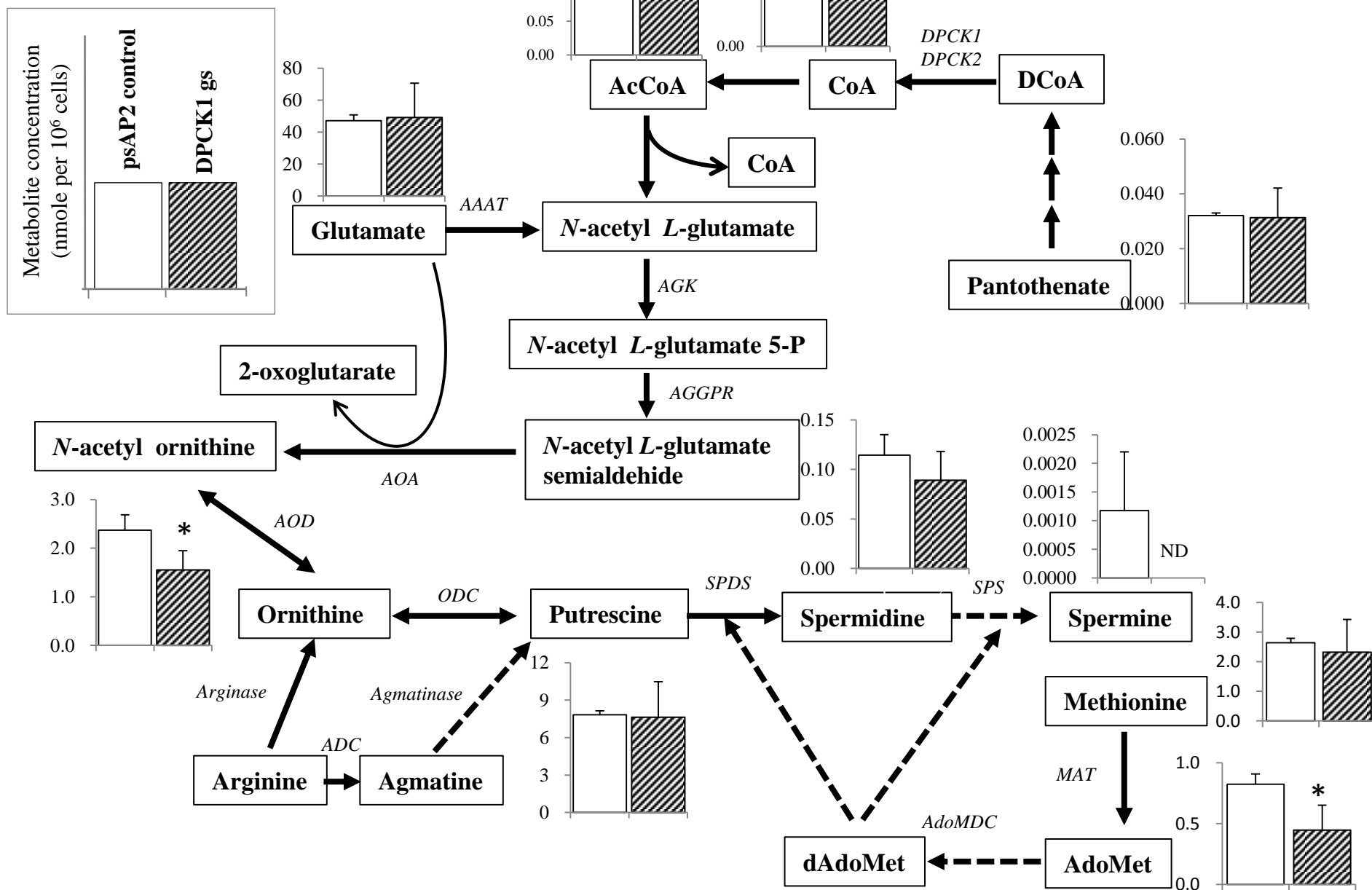
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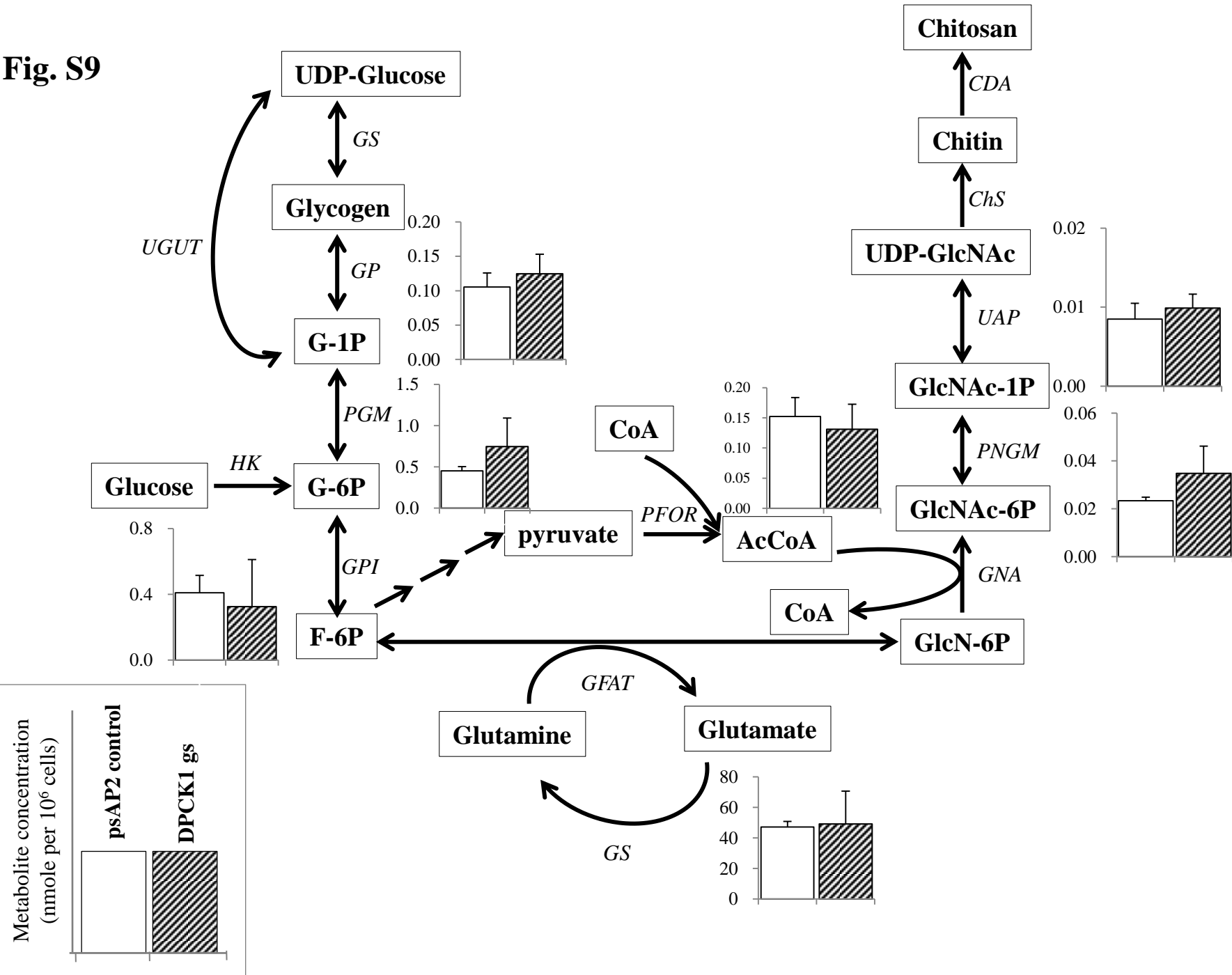
**Fig. S7**

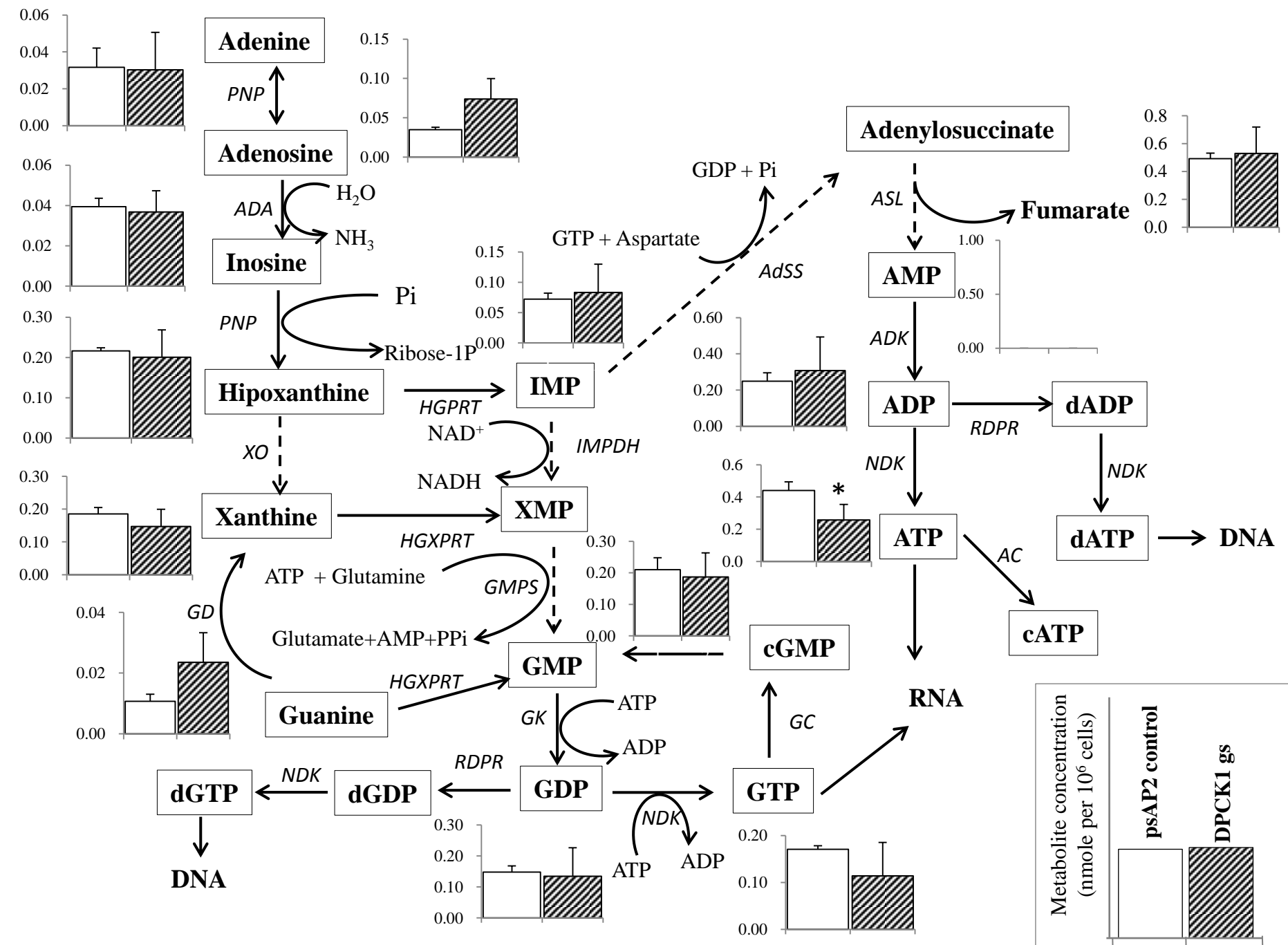


**Fig. S8**



**Fig. S9**



**Fig. S10**

**Fig. S11**

