

Supplementary Materials

Table S1. qRT-PCR primer sequences.

Gene Name	Primer Sequence	Target Fragment (bp)
16S rRNA	GTGTAGCGGTGAAATGCG CGTTTACGGCGTGGACTA	136
atpE	TGGGTCTGGCGGCAATCG CAGCAGAGGAATCAGATCAGGTTG	98
MrcA	AACAAGATTACCGATACGCTGAAGG TCGCCGTCGCTTGCTGAG	94
lacZ	CAGCCGCTACAGCCAACAAC AGGAGTCGTCGCCACCAATC	119
atpD	AGGCGAGATCGGTGAAGAAGAG TTTCCAGCAGTTCCTGAGAGTTG	89
oppA	AACGAACCAACTTCCTTCCTGAAC GTTTCCGCCATAATGCTGTCAAAG	98
mrdA	GTCTGAAAGCGAACGAAACCTATAATG CGACAGCCACTTGCGGATTG	108
AmpG	GCCGCCAGACGCTTGAATATAC CCGCCGCCAGTGTCCAC	99
ompC	GGCGTTGGCGGTTCTATCAC GCAGCGGTGTTCTGAGCATC	95
ompF	TTGCTACCTATCGTAACTCCAACCTC CAACACCGTCGCCGTTAGAAC	117
acrA	GGCGAATGCTGCGGTAACCTG TCGGAGAGGTGACTTTGGTGTAAG	83

Table S2. Significant differentially expressed genes (DEGs) identified by RNA-seq in the resistant subpopulation of *E. coli* D2.

Gene_Id	Gene Name	Gene Description	Log2FC	Padjust
gene5453	ilvC	MULTISPECIES: ketol-acid reductoisomerase	7.227473047	1.25531588775 $\times 10^{-185}$
gene0421	tuf	MULTISPECIES: elongation factor Tu	4.331779442	4.04818128975 $\times 10^{-148}$
gene2462	cspA	MULTISPECIES: transcription antiterminator/RNA stability regulator CspE	7.223228929	1.65320910114 $\times 10^{-142}$
gene2516	gapA	glyceraldehyde-3-phosphate dehydrogenase	4.516903164	1.33988637681 $\times 10^{-137}$
gene5500	atpD	MULTISPECIES: F0F1 ATP synthase subunit beta	5.460522706	2.18915609 $\times 10^{-124}$
gene5350	typA	MULTISPECIES: ribosome-dependent GTPase TypA	3.471847526	9.65920020001 $\times 10^{-103}$
gene2626	lpp	MULTISPECIES: murein lipoprotein Lpp	4.3429608	4.07911710464 $\times 10^{-102}$
gene4303	lacZ	beta-galactosidase	6.526321976	4.27176061701 $\times 10^{-102}$
gene5221	rplJ	MULTISPECIES: 50S ribosomal protein L10	3.866493844	5.29851178043 $\times 10^{-101}$
gene0452	rplQ	MULTISPECIES: 50S ribosomal protein L17	4.137813306	1.51245547037

				$\times 10^{-94}$
gene5324	fdoI	MULTISPECIES: formate dehydrogenase cytochrome b556 subunit	4.272909093	4.66207816163 $\times 10^{-93}$
gene5498	atpA	MULTISPECIES: F0F1 ATP synthase subunit alpha	4.974155775	1.14349523965 $\times 10^{-92}$
gene0420	fusA	MULTISPECIES: elongation factor G	3.868210409	5.44788631393 $\times 10^{-92}$
gene5501	atpC	MULTISPECIES: F0F1 ATP synthase subunit epsilon	4.92517531	3.61993548822 $\times 10^{-88}$
gene5499	atpG	MULTISPECIES: F0F1 ATP synthase subunit gamma	4.780798928	1.98569936529 $\times 10^{-86}$
gene0451	rpoA	MULTISPECIES: DNA-directed RNA polymerase subunit alpha	3.953593978	8.00974352837 $\times 10^{-85}$
gene5495	atpE	MULTISPECIES: F0F1 ATP synthase subunit C	5.323182278	2.12962269715 $\times 10^{-83}$
gene4304	lacY	MULTISPECIES: lactose permease	6.587166241	7.01172623589 $\times 10^{-80}$
gene5218	rpoC	DNA-directed RNA polymerase subunit beta'	4.315380575	4.31621557671 $\times 10^{-78}$
gene0450	rpsD	MULTISPECIES: 30S ribosomal protein S4	3.57055933	9.11578561092 $\times 10^{-77}$
gene0438	rplE	MULTISPECIES: 50S ribosomal protein L5	3.151378473	2.87021448774 $\times 10^{-76}$
gene4213	cyoB	MULTISPECIES: cytochrome o ubiquinol oxidase subunit I	3.426895939	1.52134987251 $\times 10^{-73}$
gene5219	rpoB	DNA-directed RNA polymerase beta chain	3.934552807	1.68942084398 $\times 10^{-71}$
gene1278	eno	MULTISPECIES: phosphopyruvate hydratase	3.691342789	2.09882620222 $\times 10^{-70}$
gene0441	rplF	MULTISPECIES: 50S ribosomal protein L6	2.960018773	4.5985458603 $\times 10^{-66}$
gene0524	rplM	MULTISPECIES: 50S ribosomal protein L13	3.644397977	1.59832917479 $\times 10^{-65}$
gene3692	rpsA	MULTISPECIES: 30S ribosomal protein S1	3.183848038	6.88214800972 $\times 10^{-65}$
gene3904	sucC	MULTISPECIES: ADP-forming succinate--CoA ligase subunit beta	4.630292871	7.98795734682 $\times 10^{-63}$
gene0442	rplR	MULTISPECIES: 50S ribosomal protein L18	3.145294046	2.78065313219 $\times 10^{-59}$
gene5220	rplL	MULTISPECIES: 50S ribosomal protein L7/L12	3.023589892	3.7371438267 $\times 10^{-54}$
gene1709	ptsH	MULTISPECIES: phosphocarrier protein Hpr	2.933039387	7.4789571847 $\times 10^{-54}$
gene1707	ptsI	phosphoenolpyruvate-protein phosphotransferase	2.848501496	4.25663130629 $\times 10^{-52}$
gene0525	rpsI	MULTISPECIES: 30S ribosomal protein S9	4.043839929	1.31801977353 $\times 10^{-50}$
gene4214	cyoC	MULTISPECIES: cytochrome o ubiquinol oxidase subunit III	3.416571331	2.23155062994 $\times 10^{-50}$
gene0703	rpoD	RNA polymerase sigma factor RpoD	2.29711722	1.33476984958 $\times 10^{-47}$

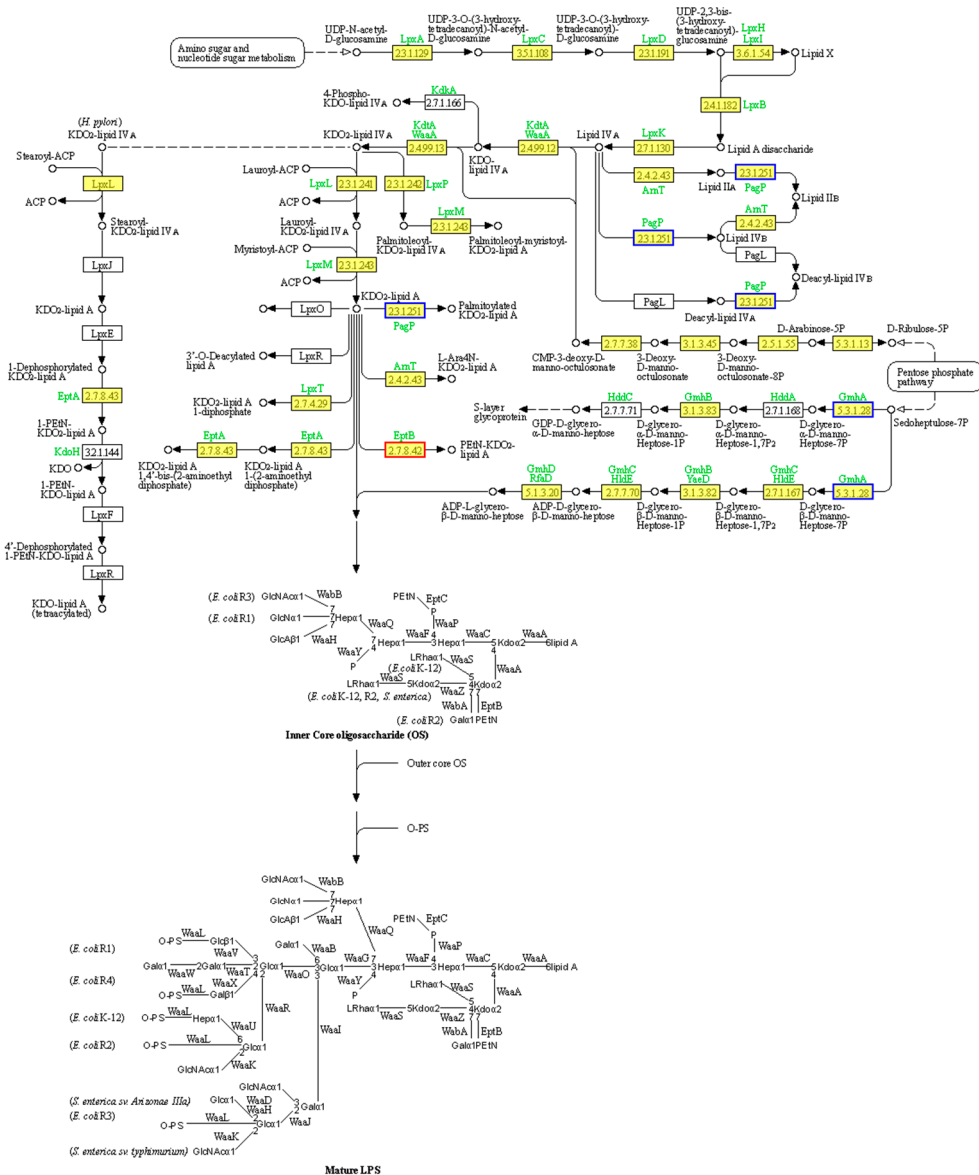
gene4577	rpsB	MULTISPECIES: 30S ribosomal protein S2	2.460773794	1.4319156318 × 10 ⁻⁴⁷
gene3381	rpmF	MULTISPECIES: 50S ribosomal protein L32	3.51910594	1.08551079514 × 10 ⁻⁴⁵
gene5205	hupA	MULTISPECIES: DNA-binding protein HU-alpha	3.821821406	1.60547898231 × 10 ⁻⁴⁵
gene5226	tuf	MULTISPECIES: elongation factor Tu	3.112671329	4.01469185922 × 10 ⁻⁴⁵
gene0449	rpsK	MULTISPECIES: 30S ribosomal protein S11	3.20442067	3.52086643976 × 10 ⁻⁴²
gene1941	nuoCD	MULTISPECIES: NADH-quinone oxidoreductase subunit C/D	3.699449695	1.35866027683 × 10 ⁻⁴¹
gene0419	rpsG	MULTISPECIES: 30S ribosomal protein S7	2.88631024	1.72967014654 × 10 ⁻⁴¹
gene0439	rpsN	MULTISPECIES: 30S ribosomal protein S14	3.048832041	2.29398700414 × 10 ⁻⁴¹
gene3908	sdhA	succinate dehydrogenase flavoprotein subunit	4.535203232	8.04922033036 × 10 ⁻⁴⁰
gene4900	valS	valyl-tRNA synthetase	2.460125161	1.20409795674 × 10 ⁻³⁹
gene0443	rpsE	MULTISPECIES: 30S ribosomal protein S5	2.770292259	6.45819866304 × 10 ⁻³⁸
gene0437	rplX	MULTISPECIES: 50S ribosomal protein L24	2.050877308	1.48857117355 × 10 ⁻³⁶
gene0418	rpsL	MULTISPECIES: 30S ribosomal protein S12	2.577376113	5.74168493238 × 10 ⁻³⁶
gene3906	sucA	2-oxoglutarate dehydrogenase E1 component	3.974919668	2.78675568612 × 10 ⁻³⁵
gene1441	rplS	MULTISPECIES: 50S ribosomal protein L19	2.257063786	2.24755882345 × 10 ⁻³⁴
gene1006	pgk	MULTISPECIES: phosphoglycerate kinase	2.849353909	4.0848857377 × 10 ⁻³⁴
gene5532	rnpA	MULTISPECIES: ribonuclease P protein component	3.119947768	8.35964762323 × 10 ⁻³⁴
gene0440	rpsH	MULTISPECIES: 30S ribosomal protein S8	2.481315547	1.25051263526 × 10 ⁻³²
gene4520	dnaQ	DNA polymerase III, epsilon subunit	4.127921498	2.64867035687 × 10 ⁻³²
gene5222	rplA	ribosomal protein L1	2.779024023	9.70779261198 × 10 ⁻³²
gene1950	nuoM	NADH-quinone oxidoreductase subunit M	3.397866406	2.98795067875E-31
gene0433	rplP	MULTISPECIES: 50S ribosomal protein L16	3.217069004	3.36740267635 × 10 ⁻³¹
gene0401	crp	MULTISPECIES: cAMP-activated global transcriptional regulator CRP	2.144305502	1.32732119961 × 10 ⁻³⁰
gene1946	nuoI	NADH-quinone oxidoreductase subunit NuoI	3.728034471	8.75284225677 × 10 ⁻³⁰
gene0431	rplV	MULTISPECIES: 50S ribosomal protein L22	3.014945458	3.95354210806 × 10 ⁻²⁹
gene1007	fbaA	MULTISPECIES: class II fructose-bisphosphate	2.172936795	1.15532500901

		aldolase		$\times 10^{-28}$
gene0435	rpsQ	MULTISPECIES: 30S ribosomal protein S17	2.880009161	$3.97744737531 \times 10^{-28}$
gene0446	secY	MULTISPECIES: preprotein translocase subunit SecY	2.356867803	$6.61073836794 \times 10^{-28}$
gene0430	rpsS	MULTISPECIES: 30S ribosomal protein S19	3.414081282	$2.56192607192 \times 10^{-27}$
gene1440	trmD	MULTISPECIES: tRNA (guanosine(37)-N1)-methyltransferase TrmD	2.471242102	$8.26679566651 \times 10^{-27}$
gene0429	rplB	ribosomal protein L2	3.417956932	$2.08525544919 \times 10^{-26}$
gene3903	sucD	MULTISPECIES: succinate--CoA ligase subunit alpha	3.893196051	$5.30960947389 \times 10^{-26}$
gene4764	ettA	MULTISPECIES: energy-dependent translational throttle protein EttA	2.137741649	$6.35731800862 \times 10^{-29}$
gene1949	nuoL	MULTISPECIES: NADH-quinone oxidoreductase subunit L	2.798412697	$1.8584412014 \times 10^{-23}$
gene0428	rplW	50S ribosomal protein L23	3.178525013	$1.18349561713 \times 10^{-22}$
gene0062	rpoZ	MULTISPECIES: DNA-directed RNA polymerase subunit omega	2.626660178	$1.37804285888 \times 10^{-22}$
gene0432	rpsC	MULTISPECIES: 30S ribosomal protein S3	2.551668126	$1.37804285888 \times 10^{-22}$
gene1929	pta	MULTISPECIES: phosphate acetyltransferase	2.398631569	$4.19040815291 \times 10^{-22}$
gene0447	rpmJ	MULTISPECIES: 50S ribosomal protein L36	3.739631167	$5.14192095846 \times 10^{-22}$
gene5496	atpF	F0F1 ATP synthase subunit B	2.410464611	$6.63432826519 \times 10^{-22}$
gene1836	insB	insertion element IS1 protein insB	11.90886704	$2.77662444484 \times 10^{-21}$
gene4561	dnaE	DNA polymerase III subunit alpha	2.459924456	$3.6441129141 \times 10^{-21}$
gene0434	rpmC	MULTISPECIES: 50S ribosomal protein L29	4.119737978	$1.46871803736 \times 10^{-20}$
gene5090	phnJ	MULTISPECIES: alpha-D-ribose 1-methylphosphonate 5-phosphate C-P-lyase PhnJ	2.194323167	$3.58026095948 \times 10^{-19}$
gene5038	groEL	chaperonin Cpn60	3.37745451	$9.68671395338 \times 10^{-19}$
gene4235	ribH	MULTISPECIES: 6,7-dimethyl-8-ribityllumazine synthase	2.375219866	$1.15312187355 \times 10^{-18}$
gene1942	nuoE	MULTISPECIES: NADH-quinone oxidoreductase subunit NuoE	2.682849593	$2.14343777835 \times 10^{-16}$
gene4970	rpsR	MULTISPECIES: 30S ribosomal protein S18	2.438245493	$2.8469474983 \times 10^{-16}$
gene4726	lspA	Lipoprotein signal peptidase	2.303079148	$1.19623566498 \times 10^{-15}$
gene0444	rpmD	MULTISPECIES: 50S ribosomal protein L30	3.495310872	$1.44067481979 \times 10^{-15}$
gene0586	infB	translation initiation factor IF-2	2.037760507	$3.13013293144 \times 10^{-15}$

gene0589	rpsO	MULTISPECIES: 30S ribosomal protein S15	2.009046886	4.46420181742 $\times 10^{-15}$
gene0427	rplD	MULTISPECIES: 50S ribosomal protein L4	2.712545465	6.24555206926 $\times 10^{-15}$
gene0075	rpmB	MULTISPECIES: 50S ribosomal protein L28	2.214368589	7.33331063716 $\times 10^{-15}$
gene4634	aceE	pyruvate dehydrogenase (acetyl-transferring), homodimeric type	3.609179128	7.55508464114 $\times 10^{-15}$
gene3907	sdhB	MULTISPECIES: succinate dehydrogenase iron-sulfur subunit SdhB	3.596279784	2.35108588685 $\times 10^{-14}$
gene4566	fabZ	(3R)-hydroxymyristoyl-ACP dehydratase	2.186430344	8.16821736247 $\times 10^{-14}$
gene1021	zapA	MULTISPECIES: cell division protein ZapA	3.823708044	8.1954390454 $\times 10^{-14}$
gene4808	hpaE	5-carboxymethyl-2-hydroxymuconate semialdehyde dehydrogenase	3.945763791	8.19935440857 $\times 10^{-14}$
gene3036	zntB	MULTISPECIES: zinc transporter ZntB	3.043378595	1.99371195492 $\times 10^{-13}$
gene0636	glxK	MULTISPECIES: glycerate 2-kinase	4.608021625	1.47623115119 $\times 10^{-12}$
gene0076	rpmG	MULTISPECIES: 50S ribosomal protein L33	2.320911154	3.34947012122 $\times 10^{-11}$
gene4632	pdhD	dihydrolipoamide dehydrogenase	2.096329671	4.37303748389 $\times 10^{-11}$
gene3905	sucB	MULTISPECIES: 2-oxoglutarate dehydrogenase complex dihydrolipoyllysine-residue succinyltransferase	2.07501262	1.00966030031 $\times 10^{-10}$
gene4969	rplI	MULTISPECIES: 50S ribosomal protein L9	2.081661702	1.61599390173 $\times 10^{-10}$
gene2217	insB	IS1 family transposase	8.734479877	3.40734657453 $\times 10^{-10}$
gene0426	rplC	MULTISPECIES: 50S ribosomal protein L3	2.295533808	8.82169531192 $\times 10^{-10}$
gene4720	carA	MULTISPECIES: glutamine-hydrolyzing carbamoyl-phosphate synthase small subunit	2.287354502	1.16287285112 $\times 10^{-8}$
gene5161	malF	maltose transporter membrane protein	3.030143237	1.74198012525 $\times 10^{-8}$
gene1672	eutM	ethanolamine utilization microcompartment protein EutM	3.95876457	0.000324647609 67
gene0290	livH	MULTISPECIES: high-affinity branched-chain amino acid ABC transporter permease LivH	3.322149495	0.000803529511 878
gene1680	eutB	ethanolamine ammonia-lyase, large subunit	2.544458009	0.003192436270 41
gene2148	gatY-kbaY	MULTISPECIES: tagatose-bisphosphate aldolase subunit GatY	2.847817862	0.035872779510 7

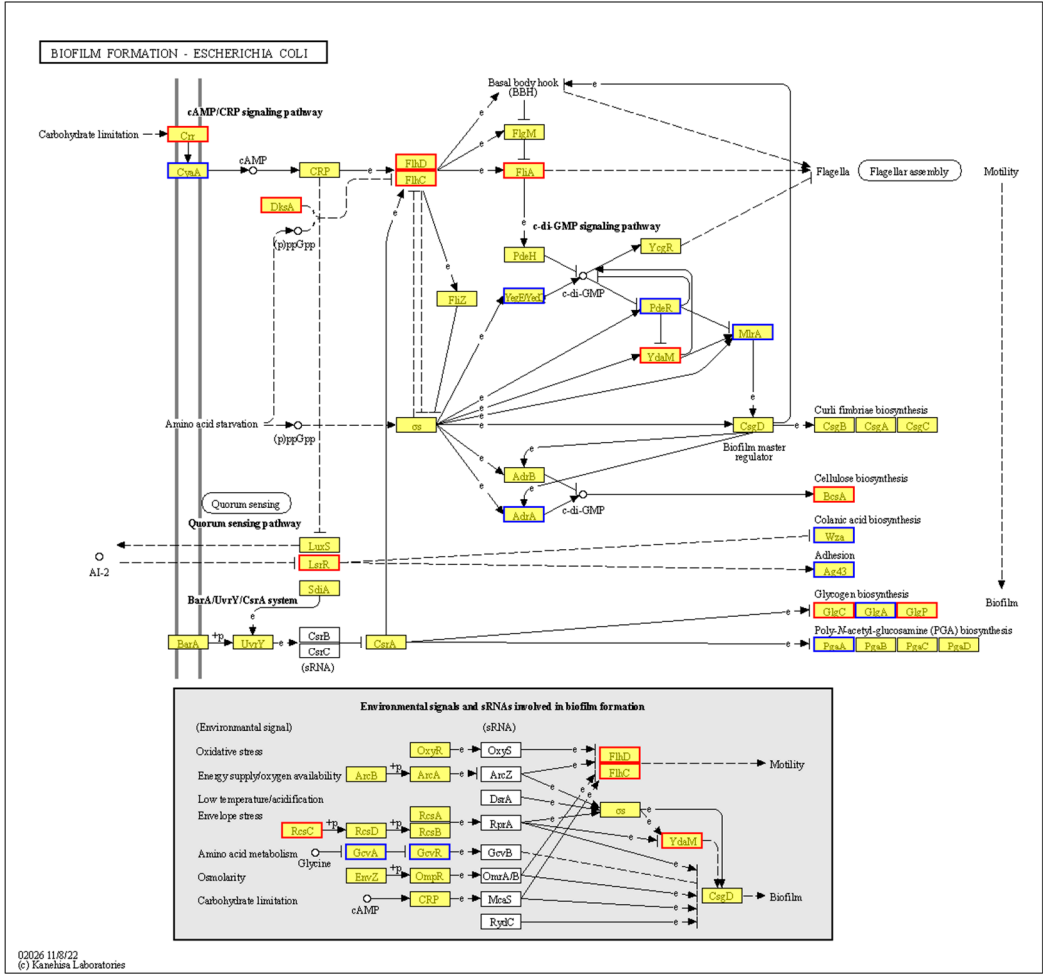
Note: Only genes meeting the threshold of $|\log_2FC| > 1$ and adjusted $p < 0.05$ are included. The full dataset is available upon request.

LIPOLYPSACCHARIDE BIOSYNTHESIS



00540 1/13/21
(c) Kanehisa Laboratories

(B)



(C)

