

TABLE S1 Regulatory factors/conditions affecting expression of SPI1

Regulator	Description	Mechanism of action/comments	References
HilA	Transcriptional activator, OmpR/ToxR family	Direct activation of <i>prg/org</i> and <i>inv/spa</i> operons	(8; 23; 27; 56; 57)
HilD	AraC-like transcriptional activator	Direct activation of <i>hilA</i> , <i>hilD</i> , <i>hilC</i> , and <i>rtsA</i>	(29; 88)
HilC	AraC-like transcriptional activator	Direct activation of <i>hilA</i> , <i>hilD</i> , <i>hilC</i> , and <i>rtsA</i>	(28; 29; 46; 88)
RtsA	AraC-like transcriptional activator	Direct activation of <i>hilA</i> , <i>hilD</i> , <i>hilC</i> , and <i>rtsA</i>	(29; 30)
HilE		Repression of <i>hilA</i> by binding to and preventing HilD function	(11); Chubiz JE (unpublished)
FlhZ	Enhancer of class II flagellar genes expression	Activation of <i>hilA</i> via post-translational regulation of HilD	(20; 45; 54; 59; 85; 102)
EnvZ/OmpR	Two-component regulatory system; regulation of outer membrane porin genes, and virulence	Activation of <i>hilA</i> via HilD	(29; 58)
FadD	Acyl-CoA synthetase; degradation of long-chain fatty acids	Activation of <i>hilA</i> via an unknown mechanism	(59); Ellermeier JR (unpublished)
SirA	Transcriptional regulator; two-component regulatory system BarA/SirA; regulation of carbohydrate metabolism, motility, biofilm formation, and invasion	Activation of <i>hilA</i> via activation of <i>csrB/csrC</i> to block CsrA repression of <i>hilD</i>	(1; 29; 46; 52; 62; 99; 102); Ellermeier JR (unpublished)
Dam	DNA methylase	Activation of <i>hilA</i> via post-transcriptional regulation of <i>hilD</i>	(55)
Ack Pta	acetate kinase and phosphotransacetylase	Activation of <i>hilA</i> and <i>hilD</i> by formate via an unknown mechanism	(43)

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YfgL	Outer membrane lipoprotein; assembly of the outer membrane β -barrel proteins in complex with YaeT, YfiO, and NlpB	Activation of SPI1 genes via an unknown mechanism	(2; 37)
Trk (potassium)	Potassium transporter	Activation of SPI1 genes via an unknown mechanism	(94)
Fnr	Transcriptional regulator; cytoplasmic oxygen sensor	Repression of <i>hilA</i> via an unknown mechanism	(102); Ellermeier JR (unpublished)
PhoPQ (PhoQ24)	Two-component regulatory system; response to divalent cation limitation, pH and antimicrobial peptides	Repression of <i>hilA</i> , most likely direct	(9; 10; 14; 78; 111); Ellermeier JR (unpublished)
H-NS	Nucleoid protein	Direct repression of <i>hilA</i> , <i>hilC</i> , <i>hilD</i> and <i>rtsA</i>	(73; 74; 89)
Hha	Nucleoid protein	Direct repression of <i>hilA</i> , <i>hilC</i> , <i>hilD</i> and <i>rtsA</i>	(36; 73; 74; 102)
Fis	Nucleoid protein	Activation of SPI1 genes	(22; 48; 89; 110)}
HU	Nucleoid protein	Activation of SPI1 genes	(60; 89)
RfaH	Transcriptional anti-terminator; long operons for LPS core and O-antigen biosynthesis	Activation of SPI1 genes via an unknown mechanism	(60; 67)
Fur	Transcriptional regulator; response to iron	Activation of <i>hilA</i> via an unknown regulation of HilD; repression of H-NS; direct binding of Fur to <i>hilD</i> promoter	(32; 98; 101)
TdcA	Transcriptional regulator of <i>tdc</i> operon; transport and metabolism of L-	Activation of <i>fliZ</i> and SPI1 genes expression	(50)

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	threonine and L-serine		
FhDC	Transcriptional regulator; activation of class II flagellar genes	Activation of <i>hilA</i> via activation of <i>fliZ</i>	(20; 54)
DsbA	Periplasmic disulfide bond oxidase	Activation of <i>hilA</i> via activation of <i>FliZ</i> , including repression of <i>RcsCDB</i>	(31; 54)
RcsCDB	phosphorelay system: sensor <i>RcsC</i> , response regulator <i>RcsB</i> , and phosphotransfer protein <i>RcsD</i> ; regulation of capsule synthesis and biofilm formation	Repression of <i>hilA</i> via repression of <i>FliZ</i> and an independent unknown regulation of <i>HilD</i>	(54)
Lon	ATP-dependent protease	Repression of <i>hilA</i> via degradation of <i>HilD</i> , <i>HilC</i> , and <i>FliZ</i>	(16; 20; 95; 97)
ClpXP	ATP-dependent protease	Repression of SPI1 genes via <i>FliZ</i>	(47)
Formate	Short chain fatty acid	Activation of <i>hilA</i> and <i>hilD</i> (see Ack Pta)	(43)
Dimethyl sulfide/ DMSO		Repression of SPI1 genes via an unknown mechanism	(4)
Temperature		Activation of SPI1 genes when shifted from 25° to 37°C in H-NS-dependent manner	(75)
Butyrate	Short chain fatty acid	Repression of SPI1 genes via an unknown mechanism	(41)
ppGpp	Small signaling molecule; stringent response during starvation	Activation of <i>hilA</i> via an unknown mechanism	(79; 92; 93; 100);Ellermeier JR (unpublished)

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FimZY	Transcriptional regulators; control of type 1 fimbriae gene expression	Repression of <i>hilA</i> via activation of <i>hilE</i>	(12; 87)
FimW	negative regulator of type 1 fimbriae	Activation of SPI1 genes via an unknown mechanism	(38)
Mlc	Transcriptional regulator; regulation of sugar uptake and metabolism	Repression of <i>hilA</i> via activation of <i>hilE</i>	(53)
CRP	cAMP-receptor protein	Activation of invasion via an unknown mechanism	(17)
CpxA	Sensor kinase, two-component regulatory system CpxRA; periplasmic stress response	Activation of <i>hilA</i> via an unknown mechanism, apparently independent of CpxR	(68)
Lrp	Transcriptional regulator	Overproduction of Lrp represses SPI1 genes via an unknown mechanism	(6)
PmrM	Part of the <i>pmrHFIJKLM</i> operon	Activation of <i>hilA</i> via an unknown mechanism	(61; 65; 102)
ApaH/YgdP	Dinucleoside polyphosphate hydrolases	Activation of invasion via an unknown mechanism	(44)
PreAB (QseBC)	Two-component regulatory system; regulation of motility and virulence in response to quorum-sensing and hormonal signals	Activation of SPI1 genes via an unknown mechanism	(64; 66)
LuxS	Autoinducer 2 synthase	Activation of <i>invF</i>	(19)
PhoBR	Two-component regulatory system; phosphate limitation	Repression of <i>hilA</i> via PhoBR	(59)

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SprB	Transcriptional regulator	Repression of <i>hilA</i> via repression of <i>hilD</i> transcription	(86)
RamA	AraC/XylS family transcriptional activator; regulation of multidrug resistance	Repression of SPI1 genes via an unknown mechanism	(7)
PPK	Polyphosphate kinase	Activation of invasion via an unknown mechanism	(49)
PNPase	Polynucleotide phosphorylase	Repression of SPI1 genes via an unknown mechanism	(21)
Hfq	RNA shaperone	Activation of SPI1 genes	(3; 90; 91)
SmpB	RNA-binding protein	Activation of SPI1 genes	(3)
IHF	Nucleoid protein	Activation of <i>hilA</i> ; counteraction of H-NS mediated silencing	(35; 83)
RNAseE	5'-end-dependent endoribonuclease; part of degradosome complex	Repression of SPI1 genes; exact mechanism unclear	(35)
Pag		Repression of SPI1 genes via an unknown mechanism	(35)
SirB		Activation of <i>hilA</i> ; exact mechanism unclear	(84)
Sig32	Sigma factor; heat shock response	Repression of <i>hilA</i> via degradation of HilD by Lon protease	(63)
TolC/AcrAB	Multidrug efflux pump	Activation of SPI1 genes via an unknown mechanism	(15; 103; 107)
AsmA	Outer membrane protein	Required for invasion; unknown mechanism	(80)
CorA	Mg ²⁺ channel	Activation of SPI1 genes via an unknown mechanism	(76; 77)

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PoxA	paralog of lysyl tRNA-synthetase	Repression of SPI1 genes via an unknown mechanism	(70)
YjeK	putative 2,3- β -lysine aminomutase	Repression of SPI1 genes via an unknown mechanism	(70)
Antimicrobial peptides		Repression of SPI1 genes via PhoPQ	(5)
Macrophages		Repression of SPI1 genes	(33; 96)
Epithelial cells		Activation of SPI1 genes	(42)
Bile	Role in lipid digestion	Repression of <i>hilA</i> via SirA	(81; 82)
Propanediol	Product of decomposition of rhamnose and fucose	Repression of <i>hilA</i> via an unknown mechanism	(69)
Microgravity	low-shear modeled microgravity	Repression of SPI1 genes	(109)
Lactobacillus supernatant; probiotics		Repression of SPI1 genes via an unknown mechanism	(25); (13)
Tetracycline		Activation of SPI1 genes	(108)
Nalidixic acid		Repression of SPI1 genes	(26)
Salicylidene acylhydrazides		Repression of SPI1 genes	(71)
Fluoroquinolone resistance		Repression of SPI1 genes	(34)