Table S1A

Bacterial strains	**Description**
SM10λpir	thi thr leu tonA lacY supE recA : : RP4-2Tc : :Mu (λpirR6K)
C6706	Wild-type, El Tor biotype, Inaba serotype (Peru isolate, 1991)
C6706Δ*lacZ*	C6706, Δ*lacZ* (YangM et al., *PNAS*, **110**, 2348 (Feb, 2013))
C6706Δ*dncV*	C6706, Δ*dncV* (this study)
C6706Δ*V-cGAP1*	C6706, ΔVCA0681 (this study)
C6706Δ*V-cGAP2*	C6706, ΔVCA0210 (this study)
C6706Δ*V-cGAP3*	C6706, ΔVCA0931 (this study)
C6706Δ*V-cGAP1/2*	C6706, ΔVCA0681/ 0210 (this study)
C6706Δ*V-cGAP1/3*	C6706, ΔVCA0681/0931 (this study)
C6706Δ*V-cGAP1/2/3*	C6706, ΔVCA0681/0210/0931 (this study)

Table S1B

Gene name	Vector	Tag		Forward Primer (5'-3')	Reverse Primer (5'-3')	Length
Plasmids for Eukaryotic Screening System						
VC0179	pCMV14	F	NotI/XbaI	ACAGTGGCGGCCGCATGGTGAGAATGACTTGGAAC	AGTCTCTAGAGCCACTTACCATTGTGCTGC	FL
VCA0956	pCMV7.1	F	NotI/KpnI	ACAGTGGCGGCCGCGGTGATGACAACTGAAGATTTC	AGTCGGTACCTTAGAGCGGCATGACTCGATTGCG	FL
VC1710	pCMV14	F	NotI/XbaI	ACAGTGGCGGCCGCATGAGTGTGAATGTATCAACCG	AGTCTCTAGAACTCGCTAAATAAGCGAGCAG	FL
VC0137	pCMV14	F	NotI/XbaI	ACAGTGGCGGCCGCATGTTGGTTCGATGTTTATGGGC	AGTCTCTAGAAATTAATCGATTGATGTCCTGG	FL
VCA0101	pCMV14	F	NotI/XbaI	ACAGTGGCGGCCGCATGGCTAAGGAAAAGACTGTG	AGTCTCTAGATATTTTGCTTGTGGCAAAGTTTAATG	FL
VC1211	pCMV14	F	NotI/XbaI	ACAGTGGCGGCCGCATGTTGAGCCTCTTTAGCATGC	AGTCTCTAGATTGCGCCTCAACTGGGACTG	FL
VC1592	pCMV14	F	NotI/XbaI	ACAGTGGCGGCCGCATGAATCACATCCACCCCTAC	AGTCTCTAGATAACGCAGACATACGTGGAG	FL
VC1851	pCMV14	F	NotI/XbaI	ACAGTGGCGGCCGCATGTTGAAGTACTCGTATGTCGC	AGTCTCTAGAGGTTTGTACACCAAGAAGATCG	FL
VC2340	pCMV14	F	NotI/XbaI	ACAGTGGCGGCCGCATGCAGATGCAACCCAAAGTC	AGTCTCTAGAGTGGGTGATTCCCTGGTCCTTG	FL
VC1348	pCMV14	F	NotI/XbaI	ACAGTGGCGGCCGCATGGCAACCGCCAATATCGC	AGTCTCTAGAGCCTGACGCTTGTTGACCCAG	FL
VC0694	pCMV14	F	NotI/XbaI	ACAGTGGCGGCCGCATGGATCTCATCCTCTCATTAC	AGTCTCTAGAGTAAGTGCCTTGCTGTGGAATG	FL
VC1295	pCMV14	F	NotI/XbaI	ACAGTGGCGGCCGCATGTTGACCATTTGGGTTCTATCAC	AGTCTCTAGATGCGGCATCTTTAAAGTGTGCTG	FL
VC2497	pCMV14	F	NotI/XbaI	ACAGTGGCGGCCGCATGGTGGCAAGCATTAAAATCACG	AGTCTCTAGACTCTTCGCTGTCAAAGAAGTATG	FL
VC1152	pCMV14	F	NotI/XbaI	ACAGTGGCGGCCGCTTGATCGTGTATTTTATGAGTC	AGTCTCTAGAGATGCCACTGGCACTGATCAC	FL
VC0653	pCMV7.1	F	NotI/SalI	ACAGTGGCGGCCGCGATGCCTGCTCAAACCTCATCTC	AGTCGTCGACTTAGAGGGATTTGCGATGGCGGC	FL
VCA0536	pCMV7.1	F	NotI/SalI	ACAGTGGCGGCCGCGATGGCGTGCGTCAAAAGTCTTAC	AGTCGTCGACTTAGTTAGCATTTGCTACCTTAG	FL
VCA1083	pCMV7.1	F	NotI/SalI	ACAGTGGCGGCCGCGTTGGGCAAACAGCAGTGGAAAAC	AGTCGTCGACTTACTTATCAACAATGAAGCC	FL
VC0398	pCMV14	F	NotI/XbaI	ACAGTGGCGGCCGCATGGTGGCACAAATGAGGTATACAC	AGTCTCTAGATTTGGTTCGCCATCGATTACG	FL
VC0515	pCMV7.1	F	NotI/SalI	ACAGTGGCGGCCGCGATGGATAGTTTCATAGCAAAAC	AGTCGTCGACCTATTTAACTTCTTTCATTAAAGTTC	FL
VCA0895	pCMV7.1	F	NotI/SalI	ACAGTGGCGGCCGCGTTGCAACCTAGCCAAGATGAAC	AGTCGTCGACCTAGTAATCTTCCCGTAAATACG	FL

VCA0802	pCMV7.1	F	NotI/SalI	ACAGTGGCGGCCGCGGTGACGACTTTGAATAAACTC	AGTCGTCGACTTATTTTTCCAATTCATAAC	FL
VC2600	pCMV7.1	F	NotI/SalI	ACAGTGGCGGCCGCGTTGCTGTCCAACCAATCCCATTTG	AGTCGTCGACTTAGCGCAAGAATTGCCGCATC	FL
VCA0510	pCMV14	F	NotI/BamHI	ACAGTGGCGGCCGCATGTTGACGCATTATCAAACTGAAATAG	AGTCGGATCCCTGAATATCTAACTTATTGAG	FL
VC1687	pCMV14	F	NotI/XbaI	AAAAAAGCGGCCGCATGATTTTAGTCGTTGGTCATAAAAAC	GTACTCTAGAAGCCAGTTCCGTTTGTAGCCA	FL
VC1081	pCMV14	F	EcoRI/XbaI	GTAAGAATTCATGACAGTAGAAGCGATGAAAG	GTAATCTAGAAGCTGGAAAAAATTGAGTTTCC	FL
VC1086	pCMV14	F	EcoRI/XbaI	GATTGAATTCATGCAAAGCAACCGTGAAATTC	GTTTTCTAGATGGAGATAGTTTGTTATGGAGATAG	FL
VC1652	pCMV7.1	F	NotI/SalI	ACAGTGGCGGCCGCGATGAAAATAATGATAGTAGAAGATG	AGTCGTCGACCTATTTTAATGTTACAAAACGCACC	FL
VC0658	pCMV14	F	NotI/XbaI	AAAAAAGCGGCCGCATGACCAAATTTCGCAAGATTC	GTTTTCTAGATTTTTGTAAACTGTTTGTCGCAAC	FL
VC1641	pCMV7.1	F	NotI/SalI	ACAGTGGCGGCCGCGATGCATATTATTCCTGTGGCG	AGTCGTCGACTCACGCTTCGCTGAACTCAGGATTG	FL
VC0072	pCMV14	F	NotI/XbaI	ACAGTGGCGGCCGCATGTTGGAGTCTGACTTGAGCCG	AGTCTCTAGACGCTTTCTCTTTGAGTTGCTC	FL
VC1934	pCMV14	F	EcoRI/XbaI	GATCGAATTCATGGCAGATCAGCAGTATAGAAATC	GTTTTCTAGACTCATTAATTTGCGTGGATAAC	FL
VCA0165	pCMV14	F	NotI/XbaI	ACAGTGGCGGCCGCATGTTTCCTCGAACCCTACTC	AGTCTCTAGACATTTCTGCCTGTATGCAGTCG	FL
VCA0080	pCMV14	F	NotI/XbaI	AAAAAAGCGGCCGCATGACCAAGACTCAACTGATAAC	ATATTCTAGAGGCTACATTCGTTTCTTTTCTC	FL
VC2750	pCMV14	F	NotI/XbaI	AAAAAAGCGGCCGCATGAGATTAGAGAAGGGTATGCCT	ATATTCTAGAACTTTGCTTCATGTTAACCAG	FL
VCA0785	pCMV14	F	EcoRI/XbaI	GATTGAATTCATGGCACCGATCCTTTCACAC	GGGTTCTAGACAGAGCGTGGCTTTCGAGCTTG	FL
VCA0681	pCMV14	F	EcoRI/XbaI	GATCGAATTCATGAGATGGTCAGAAATAGGCTGC	GTTTTCTAGATTCGGTTGGGCTTTCCGCTATC	FL
VCA0681-M1	pCMV14	F	EcoRI/XbaI	GCGCTGGGTTTGATCGCTGCCTGTGGCGTGGCTCAG	CTGAGCCACGCCACAGGCAGCGATCAAACCCAGCGC	H74A/D75A
VCA0681-M1/WT	pCMV14	F	EcoRI/XbaI	GCGCTGGGTTTGATCCATGACTGTGGCGTGGCTCAG	CTGAGCCACGCCACAGTCATGGATCAAACCCAGCGC	A74H/A75D
VCA0681-M2	pCMV14	F	EcoRI/XbaI	CTGACAGGACTGGTTGCCGCTATCGGCAAGCTGCAC	GTGCAGCTTGCCGATAGCGGCAACCAGTCCTGTCAG	H288A/D289A
VCA0681-M2/WT	pCMV14	F	EcoRI/XbaI	CTGACAGGACTGGTTCACGATATCGGCAAGCTGCAC	GTGCAGCTTGCCGATATCGTGAACCAGTCCTGTCAG	A288H/A289D
VCA0210	pCMV14	F	NotI/XbaI	ACAGTGGCGGCCGCATGTTGAAGTGGTTTAAATATGGAG	AGTCTCTAGAGTCAGGCAGCGAAGCACGGATAG	FL
VCA0931	pCMV14	F	NotI/XbaI	ACAGTGGCGGCCGCATGAGTGTTGCACAAAATACC	AGTCTCTAGAGGTCTTATCTGAAGAGTGTGG	FL
Recombinant Proteins						

VC1710	pET21b	His	SalI/NotI	AGTCGTCGACATGAGTGTGAATGTATCAACCG	ACAGTGGCGGCCGCACTCGCTAAATAAGCGAGCAG	FL
VC2340	pET21b	His	SalI/NotI	AGTCGTCGACATGCAGATGCAACCCAAAGTC	ACAGTGGCGGCCGCGTGGGTGATTCCCTGGTCCTTG	FL
VC1348	pET21b	His	SalI/NotI	AGTCGTCGACATGGCAACCGCCAATATCGC	ACAGTGGCGGCCGCGCCTGACGCTTGTTGACCCAG	FL
VC1295	pET21b	His	SalI/NotI	AGTCGTCGACCGAATGATGAAAGAGATCCTC	ACAGTGGCGGCCGCTGCGGCATCTTTAAAGTGTGCTG	CT(226-458aa)
VC2497	pET21b	His	NdeI/XhoI	AGTCCATATGGTGGCAAGCATTAAAATCACG	AGTCCTCGAGCTCTTCGCTGTCAAAGAAGTATG	FL
VCA0895	pET21b	His	SalI/NotI	AGTCGTCGACAGTTATTACAGCTCTCAACAG	ACAGTGGCGGCCGCGTAATCTTCCCGTAAATACGC	CT(50-982aa)
VCA0802	pET21b	His	SalI/NotI	AGTCGTCGACATGCATCGCCCAATGAACCCTGCA	ACAGTGGCGGCCGCTTTTTCCAATTCATAACTTTTTTG	CT(201-657aa)
VC1081	pET21b	His	SalI/NotI	AGTCGTCGACATGACAGTAGAAGCGATGAAAG	ACAGTGGCGGCCGCAGCTGGAAAAAATTGAGTTTCC	FL
VCA0681	pET21b	His	SalI/NotI	AGTCGTCGACATGAGATGGTCAGAAATAGGC	ACAGTGGCGGCCGCTTCGGTTGGGCTTTCCGCTATC	FL
VCA0681-M1	pET21b	His	SalI/NotI	GCGCTGGGTTTGATCGCTGCCTGTGGCGTGGCTCAG	CTGAGCCACGCCACAGGCAGCGATCAAACCCAGCGC	H74A/D75A
VCA0681-M1/WT	pET21b	His	SalI/NotI	GCGCTGGGTTTGATCCATGACTGTGGCGTGGCTCAG	CTGAGCCACGCCACAGTCATGGATCAAACCCAGCGC	A74H/A75D
VCA0681-M2	pET21b	His	SalI/NotI	CTGACAGGACTGGTTGCCGCTATCGGCAAGCTGCAC	GTGCAGCTTGCCGATAGCGGCAACCAGTCCTGTCAG	H288A/D289A
VCA0681-M2/WT	pET21b	His	SalI/NotI	CTGACAGGACTGGTTCACGATATCGGCAAGCTGCAC	GTGCAGCTTGCCGATATCGTGAACCAGTCCTGTCAG	A288H/A289D
0681-Y/A	pET21b	His	SalI/NotI	GTTTAGATGGTTCGGGTGCCCCAAGAGGACTCCAAG	CTTGGAGTCCTCTTGGGGCACCCGAACCATCTAAAC	Y350A
0681-HHE/AAA	pET21b	His	SalI/NotI	GAGTGGGCAGGAAACGCCGCTGCGCGTTTAGATGGTTC	GAACCATCTAAACGCGCAGCGGCGTTTCCTGCCCACTC	HHE/AAA
0681-GK/AA	pET21b	His	SalI/NotI	CTGGTTCACGATATCGCCGCGCTGCACACCCCAGAAG	CTTCTGGGGTGTGCAGCGCGGCGATATCGTGAACCAG	G291A/K292A
0681-DG/AA	pET21b	His	SalI/NotI	CACCATGAGCGTTTAGCTGCTTCGGGTTACCCAAGAG	CTCTTGGGTAACCCGAAGCAGCTAAACGCTCATGGTG	D346A/G347A
VCA0210	pET21b	His	SalI/NotI	AGTCGTCGACATGTTGAAGTGGTTTAAATATGGAG	ACAGTGGCGGCCGCGTCAGGCAGCGAAGCACGGATAG	FL
VCA0210M	pET21b	His	SalI/NotI	CAAAAATGCCTCACCTTTGGCTGCTGTTGGCAAAGTCGCC	GGCGACTTTGCCAACAGCAGCCAAAGGTGAGGCATTTTTG	H382A/D383A
VCA0931	pET21b	His	SalI/NotI	AGTCGTCGACATGAGTGTTGCACAAAATACC	ACAGTGGCGGCCGCGGTCTTATCTGAAGAGTGTGG	FL
VCA0931M	pET21b	His	SalI/NotI	CGTGCGGCACTGCTGGCTGCTATTGGTAAGCTTGGTG	CACCAAGCTTACCAATAGCAGCCAGCAGTGCCGCACG	H317A/D318A

DNA manipulations in *V. cholerea*						
VC0179	pBAD24		EcoRI/XbaI	GGAATTCGTGAGAATGACTTGGAAC	GCTCTAGATCAGCCACTTACCATTGT	FL
VC0179	pBAD33		KpnI/PstI	GGGGTACCCGTGAGAATGACTTGGAAC	AACTGCAGATCAGCCACTTACCATTGT	FL
VCA0681	pMalc2x		NdeI/XbaI	GGAATTCCATATGAGATGGTCAGAAATAGG	GCTCTAGATTTATGCCCATTCGGTTG	FL
VCA0681-M1	pMalc2x		NdeI/XbaI	GGAATTCCATATGAGATGGTCAGAAATAGG	GCTCTAGATTTATGCCCATTCGGTTG	H74A/D75A
VCA0681-M2	pMalc2x		NdeI/XbaI	GGAATTCCATATGAGATGGTCAGAAATAGG	GCTCTAGATTTATGCCCATTCGGTTG	H288A/D289A
VCA0210	pMalc2x		NdeI/XbaI	GGAATAGCATATGAAGTGGTTTAAATATGGA	GCTCTAGATCCTAGTCAGGCAGCGAAG	FL
VCA0210	pMalc2x		NdeI/XbaI	GGAATAGCATATGAAGTGGTTTAAATATGGA	GCTCTAGATCCTAGTCAGGCAGCGAAG	H382A/D383A
VCA0931	pMalc2x		NdeI/XbaI	GCTCTAGATTGTTAGGTCTTATCTGAA	GGAATAGCATATGAGTGTTGCACAAAATA	FL
VCA0931	pMalc2x		NdeI/XbaI	GCTCTAGATTGTTAGGTCTTATCTGAA	GGAATAGCATATGAGTGTTGCACAAAATA	H317A/D318A
VC0179	pWM91		BamHI/XhoI	CGGGATCCAGTTTGAATGGCGGTGGT /CACTTTCAGCCTCACTCTCCTCTAAGATTT	GGAGAGTGAGGCTGAAAGTGAAGCAGGAAT /CCGCTCGAGATTTCCAACGTCTGGTCGC	Red labeled primers indicate the up and down flanking sequences for bridge PCR
VCA0681	pWM91		BamHI/XhoI	CGGGATCCGCGAAGATGCGGTACTGT /TGAGATGGTCCCGAATGGGCATAAAAAATC	GCCCATTCGGGACCATCTCATTGCTCATCC /CCGCTCGAGAGCGTAAGCCTGTGGGAA	
VCA0210	pWM91		BamHI/XhoI	CGGGATCCCAGTACGCGCATTTCTTC /CCTAGTCAGGACCACTTCAACCTTCTTTAG	TTGAAGTGGTCCTGACTAGGACAGCGACAA /CCGCTCGAGATCTGGAGCAGCAAGTCG	
VCA0931	pWM91		BamHI/XhoI	CGGGATCCACGCCAATCACACCATTCA /TGAGTGTTGCAGATAAGACCTAACAAGGC	GGTCTTATCTGCAACACTCATTATTTGGG /CCGCTCGAGTTTTGCCCAATCAGAGTAC	
VC0179-seq				CGGTAGGCAGTTAGCT	TAGTAGCCTTTGCGTC	
VCA0681-seq				GTCGTCTCAATTGGCT	TATTGTGCGATGGCTG	
VCA0210-seq				CCAGCCACACACATATTC	GATCACATTACCCCAAGC	
VCA0931-seq				GGACATCAATGCCACATC	TTTGCTTGAGCTGCGAGT	
quantitative real-time RT-PCR						
recA (Microbiology, 153, 2964 (Sep, 2007)				GTGCTGTGGATGTCATCGTTGTTG	CCACCACTTCTTCGCCTTCTTTGA	

VCA0681	GCAAGCGGTGGACAATTC	GTGGAGCGAAGAGGAGTG	
VCA0210	CGATGATGATGAGCAGATG	GTAACGCACCAAGTCTAAG	
VCA0931	GCCATTCTGCTTCGTCTAACTTAC	TGGTCATAGCGAGCGTGTTG	