

Supplementary Table 3 – Taxonomic distribution of homologs to human GCD, IVD, ACAD10/11, VLCAD/ACAD9, and IBD. Taxa marked as in Table 2. The identification of a homolog is based on results of phylogenetic analyses (recovered in monophyletic clades as in Fig.1). Homologs from additional taxa were identified by applying strict rule of 45% or more identity to ACAD homologs identified in phylogenetic analyses.

Superkindom	Supergroup	Phylum/Class/other	Order	Species	GCD	IVD	ACAD 10/11	VLCAD/ACAD9	LCAD	IBD	
ARCHAEA	Crenarchaeota		Desulfurococcales	<i>Aeropyrum pernix K1*</i>							
			Thermoproteales	<i>Pyrobaculum aerophilum str. IM2*</i>							
	Euryarchaeota	Archaeoglobi		<i>Archaeoglobus fulgidus DSM 4304*</i>							
			Halobacteriales	<i>Haloarcula marismortui ATCC 43049*</i>							
			<i>Halobacterium sp. NRC-1*</i>								
			<i>Natronomonas pharaonis DSM 2160*</i>								
		Thermoplasmatales	<i>Picrophilus torridus DSM 9790*</i>								
		<i>Thermoplasma acidophilum DSM 1728*</i>									
EUBACTERIA	a-Proteobacteria	Caulobacteriales		<i>Caulobacter crescentus CB15*</i>							
				<i>Agrobacterium tumefaciens str. C58*</i>							
		Rhizobiales		<i>Aurantimonas sp. SI85-9A1</i>							
				<i>Bradyrhizobium japonicum USDA 110*</i>							
				<i>Brucella melitensis 16M*</i>							
				<i>Brucella suis 1330*</i>							
				<i>Mesorhizobium loti MAFF303099*</i>							
				<i>Nitrobacter hamburgensis X14*</i>							
				<i>Nitrobacter winogradskyi Nb-255*</i>							
				<i>Rhodopseudomonas palustris BisB5*</i>							
				<i>Sinorhizobium meliloti 1021*</i>							
				<i>Xanthobacter autotrophicus Py2*</i>							
		Rhodospirillales	<i>Magnetospirillum magnetotacticum MS-1</i>								
		<i>Acidiphilium cryptum JF-5*</i>									
	Rhodobacteriales	<i>Oceanicola batsensis HTCC2597</i>									
	b-Proteobacteria	Burkholderiales		<i>Burkholderia mallei ATCC 23344*</i>							
				<i>Burkholderia pseudomallei 1106a*</i>							
				<i>Burkholderia xenovorans LB400*</i>							
				<i>Polaromonas sp. JS666*</i>							
				<i>Ralstonia solanacearum GMI1000*</i>							
	Neisseriales	<i>Chromobacterium violaceum ATCC 12472*</i>									
	g-Proteobacteria	Alteromonadales		<i>Alteromonas macleodii 'Deep ecotype'</i>							
				<i>Idiomarina loihiensis L2TR*</i>							
				<i>Marinobacter aquaeolei VT8*</i>							
				<i>Pseudoalteromonas atlantica T6c*</i>							
				<i>Shewanella denitrificans OS217*</i>							
		Chromatiales	<i>Nitrococcus mobilis Nb-231</i>								
		Legionellales	<i>Legionella pneumophila subsp. pneumophila str. Philadelphia 1*</i>								
		Oceanospirillales	<i>Marinomonas sp. MED121</i>								
			<i>Oceanobacter sp. RED65</i>								
		Pseudomonadales		<i>Azotobacter vinelandii AvOP</i>							
			<i>Pseudomonas aeruginosa PAO1*</i>								
			<i>Pseudomonas fluorescens PFO-1*</i>								
			<i>Pseudomonas putida KT2440*</i>								
	Xanthomonadales	<i>Xanthomonas oryzae pv. oryzae MAFF 311018*</i>									
	d-Proteobacteria	Desulfobacteriales		<i>Desulfatibacillum alkenivorans AK-01</i>							
				<i>Geobacter metallireducens *</i>							
		Myxococcales		<i>Anaeromyxobacter dehalogenans 2CP-C*</i>							
				<i>Sorangium cellulosum 'So ce 56' *</i>							
		Syntrophobacteriales	<i>Syntrophus aciditrophicus SB*</i>								
		<i>Syntrophobacter fumaroxidans*</i>									
	Firmicutes	Bacillales		<i>Bacillus sp. SG-1</i>							
				<i>Bacillus cereus ATCC 10987*</i>							
			<i>Geobacillus kaustophilus*</i>								
			<i>Lysinibacillus sphaericus C3-41*</i>								
			<i>Oceanobacillus iheyensis*</i>								
Clostridiales		<i>Carboxydotherrnus hydrogeniformans Z-2901*</i>									
Lactobacillales		<i>Symbiobacterium thermophilum IAM 14863*</i>									

