Table 2. Distribution of *tet* resistance genes among Gram-negative bacteria Modified Oct. 10, 2020

Originally modified from MMBR 2001; 65:232-260 with permission from ASM Journals [n=84 genera]

Efflux				Ribosomal Protection and/or Efflux and/or Enzymatic			
One Gene n=12		Two or More Genes n=9		One Gene n=13		Two or More Genes n=50	
Aggregatibacter	*tet*(B)	*Bordetella*	*tet*(A)(C)(31)[p]	*Acidaminococcus*[b]	*tet*(W)	*Acinetobacter*	*tet*(A)(B)(C)(D)[ac](G)(H)(L)(M)(O)[ac](W)[ac](X)(Y)[z](39)
Agrobacterium	*tet*(30)	*Mannheimia*	*tet*(B)(G)(H)(L)	*Capnocytophaga*	*tet*(Q)	*Actinobacillus*[1]	*tet*(B)(H)(L)(O)
Alteromoas	*tet*(D)	*Moraxella*	*tet*(B)(H)	*Comamonas*	*tet*(X)[u]	*Aeromonas*	*tet*(A)(B)(C)(D)(E)(G)(H)(L)[ab](M)(O)[n](T)[n](Y)(31)(34)
Bibersteinia	*tet*(H)	*Ochrobactrum*	*tet*(A)(B)[v](G)(L)	*Delftia*	*tet*(X)[u]	*Anaerovibrio*[b]	*tet*(O)(Q)
Chlamydia	*tet*(C)	*Plesiomonas*	*tet*(A)(B)(D)	*Eikenella*	*tet*(M)	*Alcaligenes*	*tet*(A)(E)(M)[aa](30)[aa](39)[k](M)[aa]
Erwinia	*tet*(B)	*Burkholderia*	*tet*(D)[n](O)[n]	*Epilithonimonas*	*tet*(X)	*Bacteroides*[b]	*tet*(M)(Q)(W)(X)(36)
Gillamella	*tet*(H)	*Halomonas*	*tet*(C)(D)(G)	*Hafnia*	*tet*(M)[j]	*Brevundimonas*	*tet*(B)[n](D)[n](G)(O)[n](T)[n](W)[n](39)[k]
Francisella	*tet*(C)	*Variovorax*	*tet*(A)(L)	*Kingella*	*tet*(M)	*Burkholderia*	*tet*(D)[n](O)[n] **(50)[aj]**
Histophilus[e]	*tet*(H)	*Yersinia*	*tet*(B)(D)	*Legionella*	*tet*(56)	*Butyrivibrio*	*tet*(O)(W)
Laribacter	*tet*(A)			*Spingobacterium*	*tet*(X)[c]	*Campylobacter*	*tet*(O)(44)[o]
Treponema[a]	*tet*(B)			*Wautersiella*	*tet*(X)[z]	*Chryseobacterium*	*tet*(A)(D)[t](T)[t](W)[t]
Elizabethkingia	*tet*(W)			*Ralstonia*	*tet*(M)	*Citrobacter*	*tet*(A)(B)(C)(D)(E)(L)(M)(O)(S)(W)[j]
				Dialister	*tet*(M)	*Edwardsiella*	*tet*(A)(D)(M)
						Enterobacter	*tet*(A)(B)(C)(D)(E)(G)[j](L)(M)(39)[k](X)[u]
						Escherichia	*tet*(A)(B)(C)(D)(E)(G)(J)(L)(M)(W)[j](Y)(X)[u](32)
						Flavobacterium	*tet*(A)(E)(L)(M)
						Fusobacterium[b]	*tet*(G)(L)(M)(O)(Q)(W)
						Gallibacterium	*tet*(B)(H)(K)(L)(31)
						Haemophilus	*tet*(B)(K)(M)

Klebsiella *tet*(A)(B)(C)(D)(E)[aa](L)[ab](M)(S)(W)[j](X)[u]

Kurthia *tet*(L)(M)

Lawsonia[f] *tet*(M)(W)[r]

Megasphaera *tet*(O)(W)

Mitsuokella *tet*(Q)(W)

Morganella *tet*(A)[aa](D)(J)(L)(M)[aa]

Myroides *tet*(L)(X)[ab]

Neisseria *tet*(B)(M)(O)(Q)(W)

Pantoea *tet*(B)(M)

Pasteurella *tet*(B)(D)(H)(G)(L)(M)(O)[L]

Photobacterium *tet*(B)(D)(M)(Y)

Porphyromonas[b] *tet*(Q)(W)

Prevotella[b] *tet*(M)(Q)(W)

Proteus *tet*(A)(B)(C)(E)(H)(G)(L)(J)(M)[j](**X**)

Providencia *tet*(B)(E)(G)(H)(J)(M)[j](39)[k](57)[y]

Pseudoalteromonas *tet*(B)[t](M)[m]

Pseudomonas *tet*(A)(B)(C)(D)[n](E)(G)(K)(L)(M)(O)[n](T)[n](W)[n](X)(Y)(34)(39)[x](42)[h]

Psychrobacter *tet*(H)[i](M)[g](O)(39)[x]

Rahnella *tet*(A)(L)(M)

Rhizobium[n] *tet*(A)[w](B)(D)(M)(O)(T)(W)[w]

Riemerella *tet*(A)(B)(M)(O)(Q)[ad](X)[s]

Roseobacter *tet*(B)(C)(E)(G)(X)[ai]

Salmonella *tet*(A)(B)(C)(D)(G)(L)(M)(X)(Y)

Selenomonas[b] *tet*(M)(Q)(W)

Serratia *tet*(A)(B)(C)(E)(M)(S)[**ab**](X)[w](34)(41)

Shewanella *tet*(B)[n](D)(G)(M)(O)[n](T)[n](W)[n]

Shigella *tet*(A)(B)(C)(D)(M)[j]

Stenotrophomonas *tet*(B)(H)[ae](M)[n](O)[n](T)[n](35)(39)[k]

Subdolgranulum[b] *tet*(Q)(W)

Veillonella[b] *tet*(A)(L)(M)(Q)(S)(W)

Vibrio *tet*(A)(B)(C)(D)(E)(G)(K)[t](L)(M)(X)(Y)(34)(35)

Carrying Mosaic genes[d] n=4

Campylobacter tet(O/32/O) [af]

Megasphaera tet(O/W), *tet*(O/W/O)[q]

Riemerella tet(O/W/32/O)[ad]

Blue: new since last update

Stanton & Humphrey, 2003, Appl Environ Microbiol, 69:3874 ; van Hoek *et al*., 2008 52:248; Dang *et al.*, Microb Ecol. 2007 doi:10.1007/s00248-007-9271-9; Akinbowale et al., J App Micro. 103:2016 ; Dang *et al.*, J App Micro 103:2580 ; Fan *et al.*, 2007 Mol Cell Probes 21:245 : Stine et al. 2007, Int J Antimicrob Agents 29 :348 ; Gordon et al., 2008 JAC, 62: 65-71; Lau et al., 2008, JAC 61:3

[1]*Actinobacillus actinomycetemcomitans* is now *Aggregatibacter actinomycetemcomitans*;

[a]*T. denticola* anaerobic but not all species in genus are anaerobes; [b]Anaerobic genus; [c] First aerobic species identified with *tet*(X);

[d] Mosaic ribosomal protection genes have been found in two anaerobic genera (*Clostridium*, *Lactobacillus* [Gram-positive] and *Megasphaera* [Gram-negative]) (Levy,*et al.*, 2005, AAC 43:1523); [e] formally *Haemophilus*; [f] oblicagtate intercelluarle bacteria from whole genome not clear if isolate is Tc[r]; [g] Rahman et al., JAC 62:627, 2008; [h]Brown et al AAC 52:4518, 2008; [i]Petrova Gorlenko, Mindlin, FEMS Micro Lett. 296:190, 2009; [j] Srinivasan et al., Microb Ecol 55:184, 2008; [k]Adelowo & Fagade. Let App Microbiol 2009, 48:167-172; [L]Millan et al., AAC 53:3399, 2009; [m]Nonaka et al, 2007, 4:355; [n] Popwska et al, AAC, 2012, 56:1434**; [o]** Abril, Broadard, Perreten. AAC, 2010, 54:3052; [p] Kadlec et al., ICAAC 2012 C1-679; [q] Stanton et al., 2004 Appl Environ Microb 70:3754-57; [r]GenBank YP_594556; [s]Chen et al. Avian Path. 39:333, 2010; [u] Leski et al., Intern J Antimcrob Agents 42:83, 2013; [v]Ghosh & LaPara, ISME 1:191, 2007; [w]Sullivan, Gentry, Karthikeyan. J App Micro. 115:774, 2013; [x] Roberts et al., J. Antimicrob. Chemother. 70:619,

2015; [y] Huang, Zhang, Wang, J Food Protect 78:1581, 2015 name changed to *tet*(57); [z] Kyselkova et al. Front Microbiol. 6:536, 2015 doi: 10.3389/fmicob.2015.00536; [aa]Adesoji et al., Annals of Clinical Microb & Antimicrob 14:35, 2015;[ab] Li et al., J. Food Sci 81:M1489, 2016; [ac] Gao et al, Water Reserach 2012; 46:235;[ac] Dang et al., Microb Ecol. 55:237, 2008; [ad] Zhu et al. Frontiers Microb 10.3390/fmicb.2018.00585, 2018; [ae] Zhao et al. Frontiers Microb 10.3389/fmicb.2018.00549, 2018;[af] Gene not shown to confer resistance Warburton, Amodeo, Roberts, JAC 2016 71:3333; [ah] Rocas, Siqueira Anaerobe 2012, 18:576;[ai] **Liu et al. JAC 2020 doi:10.1093/jac/dkaa037; [aj s]Schweizer, Pathogen & Microbiome Institute Northern Arizona University manuscript submitted**

Some groups have used alleles for *tet*(X). We do not recommend this because many of the alleles are 95-99% aa identical and the same genes has previously been listed as *tet*(X) in GenBank. So there are the same genes with two different names which is confusing. We would recommend that everyone uses just *tet*(X) and Tet(X) in the future.