Phenotypic adaptation toward antiseptics and effects on biofilm formation capacity and antibiotic resistance in clinical isolates of early colonizers in dental plaque

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SUPPLEMENTARY INFORMATION

Supplementary Table S1: Primers used for the detection of antibiotic resistance genes (ARGs)

Target gene	Conferring resistance toward	Forward and reverse primers	Primer concentration	Tm [°C]	Reference
tetM	tetracyclines	tetM-f: AGTTTTAGCTCATGTTGATG tetM-r: TCCGACTATTTAGACGACGG	100nM 100nM	55	[1]
tetO	tetracyclines	tetO-f: GCGGAACATTGCATTTGAGGG tetO-r: CTCTATGGACAACCCGACAGAAG	100nM 100nM	53	[2]
tetW	tetracyclines	tetW-f: GAGAGCCTGCTATATGCCAGC tetW-f: GGGCGTATCCACAATGTTAAC	100nM 100nM	64	[3]
tetA-1	tetracyclines	tetA-1-f: GGCGGTCTTCTTCATCATGC tetA-1-r: CGGCAGGCAGAGCAAGTAGA	250nM 250nM	64	[4]
tetB-1	tetracyclines	tetB-1-f: CATTAATAGGCGCATCGCTG tetB-1-r: TGAAGGTCATCGATAGCAGG	250nM 250nM	64	[4]
tetC-1	tetracyclines	tetC-1-f: GCTGTAGGCATAGGCTTGGT tetC-1-r: GCCGGAAGCGAGAAGAATCA	250nM 250nM	65	[4]
tetD-1	tetracyclines	tetD-1-f: GCAAACCATTACGGCATTCT tetD-1-r: GATAAGCTGCGCGGTAAAAA	400nM 400nM	60	[5]
tetE-1	tetracyclines	tetE-1-f: TATTAACGGGCTGGCATTTC tetE-1-r: AGCTGTCAGGTGGGTCAAAC	400nM 400nM	60	[5]
bla_{TEM-1}	β-lactams	bla_{TEM-1}-f: CCAATGCTTAATCAGTGAGG bla_{TEM-1}-r: ATGAGTATTCAACATTTCCG	400nM 400nM	60	[5]
cfxA	cephamycins	cfxA-f: GCAAGTGCAGTTTAAGATT cfxA-f: GCTTTAGTTTGCATTTTCATC	200nM 200nM	58	[6]
$bla_{CTX-M-1}$	cephalosporins	CTX-M-f: CGCTTTGCGATGTGCAG CTX-M-f: ACCGCGATATCGTTGGT	100nM 100nM	56	[7]
bla_{CSP-1}	β-lactams	bla_{CSP-1}-f: TCAAATTTCACATTGCATTG bla_{CSP-1}-f: CAGTGTGGGATTATTATTTTCA	100nM 100nM	52	[8]
bla_{OXA-85}	β-lactams	bla_{OXA-85}-f: CCATATGTTATTATTTATGTTCTCGAT bla_{OXA-85}-f: GCGGATCCTTATTTTATAACATTTATATTTTTG	1µM 1µM	52	[9]
ampC	ampicillin	ampC-f: GTGACCAGATACTGGCCACA ampC-r: TTACTGTAGCGCCTCGAGGA	100nM 100nM	56	[10]
pbpX2	penams, cephamycins, cephalosporins	pbpX2-f: GTATATGACCGCGACCTTGG pbpX2-r: TTCTTGATGCTAGGCATTGC	200nM 200nM	54	[11]
ermA	erythromycin	ermA-f: CCCGAAAAATACGCAAAATTTCAT ermA-r: CCCTGTTTACCCATTTATAAACG	500nM 500nM	62	[12]
ermB	erythromycin	ermB-f: GAAAAGGTACTCAACCAAATA ermB-r: AGTAACGGTACTTAAATTGTTTAC	100nM 100nM	52	[13]
ermC	erythromycin	ermC-f: AATCGGCTCAGGAAAAGG ermC-r: ATCGTCAATTCCTGCATG	100nM 100nM	54	[14]
ermF	erythromycin	ermF-f: CCT TAT GGC ATT ACT TCC GA ermF-r: GGA CCT ACC TCA TAG ACA AG	200nM 200nM	57	[15]
MefI	macrolides	MefI-f: ATGGAAAAATACAACAATTGGAAA MefI-r: CCAGCTGCTGCGATAATTAA	100nM 100nM	52	[13]
mefAI	macrolides	mefAI-f: TGGTTCGGTGCTTACTATTGT mefAI-r: CCCCTATCAACATTCCAGA	100nM 100nM	52	[16]
mefAII	macrolides	mefAII-f: AGTATCATTAATCACTAGTGC mefAII-r: TTCTTCTGGTACTAAAAGTGG	100nM 100nM	53	[17]
patA	fluoroquinolones	patA-f: ATGTTGTCCTCGCAGCCTAT patA-r: ACGAACCGATGAACAAGAGG	100nM 100nM	47	[18]
patB	fluoroquinolones	patB-f: TTGCTGGTTCGGCTGTACTT patB-r: AACTGCTGTCATCTGGCCTT	100nM 100nM	47	[18]

vanA	vancomycin	vanA-f: GGGAAAACGACAATTGC vanA-r: GTACAATGCGGCCGTTA	200nM 200nM	54	[19]
vanB	vancomycin	vanB-f: ATGGGAAGCCGATAGTC vanB-r: GATTTCGTTCCTCGACC	200nM 200nM	54	[19]
vanC1	vancomycin	vanC1-f: GGTATCAAGGAAACCTC vanC1-r: CTTCCGCCATCATAGCT	500nM 500nM	50	[1]
vanC2/3	vancomycin	vanC2/3-f: CTCCTACGATTCTCTTG vanC2/3-r: CGAGCAAGACCTTTAAG	500nM 500nM	50	[1]
vanD	vancomycin	vanD-f: TGTGGGATGCGATATTTCAA vanD-r: TGCAGCCAAGTATCCGGTAA	320nM 320nM	54	[20]
vanE	vancomycin	vanD-f: TGTGGGATGCGATATTTCAA vanD-r: TGCAGCCAAGTATCCGGTAA	500nM 500nM	52	[21]
mcr-1	colistin	Mcr1-f: AGTCCGTTTGTTCTTGTGGC Mcr1-r: AGATCCTTGGTCTCGGCTTG	100nM 100nM	58	[22]
lsaC	lincosamides, streptogramines, pleuromutilines	IsaC-f: GGCTATGTAAAACCTGTATTTG IsaC-r: ACTGACAATTTTTCTTCCGT	100nM 100nM	53	[23]
aph(3")-Ib	amino-glycosides	aph(3")-Ib-f: CTTGGTGATAACGGCAATTC aph(3")-Ib-r: CCAATCGCAGATAGAAGGC	400nM 400nM	52	[24]
int-II integrase		int-II-f: GCGTGATTGTATCTCACT int-II-r: GACGCTCCTGTTGCTTCT	250nM 250nM	50	[25]
xis-II excisionase		xis-II-f: AAGCAGACTGACATTCCTA xis-II-r: GCGTCCAATGTATCTATAA	250nM 250nM	50	[25]
Universal bacterial PCR as positive control (27f_YM-1492R)		27f-YM: AGAGTTTGATYMTGGCTCAG 1492r-long: TACGGYTACCTTGTTACGACTT	300nM 300nM	55	[26]

Supplementary Table S2: Detailed results from MIC passaging for all investigated clinical isolates

No.	Genus	Species	CHX						CPC					
			P1 MIC	P10 MIC	Factor to P1	Reevaluation MIC	Factor to P1	Factor to P10	P1 MIC	P10 MIC	Factor to P1	Reevaluation MIC	Factor to P1	Factor to P10
1	*Streptococcus*	*anginosus*	8	16	2	*	0	0	2	1	0.5	*	-	-
2	*Streptococcus*	*anginosus*	4	16	4	8	2	0.5	1	1	1	*	-	-
3	*Streptococcus*	*anginosus*	8	16	2	*	0	0	2	2	1	*	-	-
4	*Streptococcus*	*anginosus*	8	8	1	*	0	0	2	2	1	*	-	-
5	*Streptococcus*	*anginosus*	8	16	2	*	0	0	4	2	0.5	*	-	-
6	*Streptococcus*	*anginosus*	8	32	4	16	2	0.5	4	2	0.5	*	-	-
7	*Streptococcus*	*anginosus*	8	16	2	*	0	0	4	2	0.5	*	-	-
8	*Streptococcus*	*anginosus*	8	16	2	*	0	0	1	2	2	*	-	-
9	*Streptococcus*	*anginosus*	8	16	2	*	0	0	4	2	0.5	*	-	-
10	*Streptococcus*	*anginosus*	2	8	4	16	8	2	2	2	1	*	-	-
11	*Streptococcus*	*anginosus*	4	16	4	16	4	1	2	2	1	*	-	-
12	*Streptococcus*	*constellatus*	4	4	1	*	0	0	1	2	2	*	-	-
13	*Streptococcus*	*oralis*	2	8	4	32	16	4	1	1	1	*	-	-
14	*Streptococcus*	*oralis*	4	16	4	32	8	2	4	2	0.5	*	-	-
15	*Streptococcus*	*oralis*	4	16	4	16	4	1	1	1	1	*	-	-
16	*Streptococcus*	*oralis*	4	16	4	16	4	1	1	1	1	*	-	-
17	*Streptococcus*	*oralis*	8	16	2	*	0	0	1	1	1	*	-	-
18	*Streptococcus*	*oralis*	8	16	2	*	0	0	1	2	2	*	-	-
19	*Streptococcus*	*oralis*	4	8	2	*	0	0	2	2	1	*	-	-
20	*Streptococcus*	*oralis*	8	16	2	*	0	0	2	4	2	*	-	-
21	*Streptococcus*	*oralis*	8	16	2	*	0	0	2	2	1	*	-	-
22	*Streptococcus*	*oralis*	8	16	2	*	0	0	2	2	1	*	-	-

23	*Streptococcus*	*oralis*	16	16	1	*	0	0	2	2	1	*	-	-
24	*Streptococcus*	*oralis*	16	8	0.5	*	0	0	2	2	1	*	-	-
25	*Streptococcus*	*oralis*	8	8	1	*	0	0	2	2	1	*	-	-
27	*Streptococcus*	*oralis*	16	16	1	*	0	0	2	2	1	*	-	-
28	*Streptococcus*	*oralis*	8	16	2	*	0	0	2	4	2	*	-	-
29	*Streptococcus*	*oralis*	4	16	4	16	4	1	4	4	1	*	-	-
30	*Streptococcus*	*oralis*	32	16	0.5	*	0	0	2	8	4	2	1	0.25
31	*Streptococcus*	*oralis*	16	16	1	*	0	0	2	2	1	*	-	-
32	*Streptococcus*	*oralis*	32	16	0.5	*	0	0	2	2	1	*	-	-
33	*Streptococcus*	*oralis*	16	16	1	*	0	0	2	4	2	*	-	-
34	*Streptococcus*	*oralis*	16	16	1	*	0	0	2	4	2	*	-	-
35	*Streptococcus*	*oralis*	32	16	0.5	*	0	0	2	2	1	*	-	-
36	*Streptococcus*	*oralis*	32	16	0.5	*	0	0	2	2	1	*	-	-
37	*Streptococcus*	*sanguinis*	16	8	0.5	*	0	0	2	4	2	*	-	-
38	*Streptococcus*	*sanguinis*	8	16	2	*	0	0	2	4	2	*	-	-
39	*Streptococcus*	*sanguinis*	8	8	1	*	0	0	4	4	1	*	-	-
40	*Streptococcus*	*sanguinis*	16	8	0.5	*	0	0	4	4	1	*	-	-
41	*Streptococcus*	*sanguinis*	16	16	1	*	0	0	4	2	0.5	*	-	-
42	*Streptococcus*	*sanguinis*	32	16	0.5	*	0	0	4	16	4	8	2	0.5
43	*Streptococcus*	*sanguinis*	32	32	1	*	0	0	4	2	0.5	*	-	-
44	*Streptococcus*	*sanguinis*	32	16	0.5	*	0	0	2	2	1	*	-	-
45	*Streptococcus*	*sanguinis*	8	16	2	*	0	0	2	4	2	*	-	-
46	*Streptococcus*	*sanguinis*	8	16	2	*	0	0	4	2	0.5	*	-	-
47	*Streptococcus*	*sanguinis*	16	32	2	*	0	0	8	2	0.25	*	-	-
48	*Streptococcus*	*sanguinis*	32	16	0.5	*	0	0	8	2	0.25	*	-	-
49	*Streptococcus*	*sanguinis*	32	16	0.5	*	0	0	8	2	0.25	*	-	-
50	*Streptococcus*	*sanguinis*	4	8	2	*	0	0	4	2	0.5	*	-	-
51	*Streptococcus*	*sanguinis*	2	8	4	8	4	1	8	2	0.25	*	-	-
52	*Streptococcus*	*sanguinis*	4	4	1	*	0	0	4	2	0.5	*	-	-
53	*Streptococcus*	*sanguinis*	4	4	1	*	0	0	4	2	0.5	*	-	-

56	*Streptococcus*	*sanguinis*	4	4	1	*	0	0	4	16	4	8	2	0.5
57	*Streptococcus*	*intermedius*	4	8	2	*	0	0	8	4	0.5	*	-	-
59	*Streptococcus*	*mutans*	0.5	4	8	4	8	1	8	2	0.25	*	-	-
60	*Streptococcus*	*gordonii*	8	8	1	*	0	0	8	4	0.5	*	-	-
61	*Streptococcus*	*gordonii*	8	16	2	*	0	0	2	4	2	*	-	-
62	*Streptococcus*	*gordonii*	4	16	4	32	8	2	2	4	2	*	-	-
63	*Streptococcus*	*gordonii*	8	16	2	*	0	0	4	1	0.25	*	-	-
64	*Streptococcus*	*gordonii*	4	16	4	32	8	2	2	1	0.5	*	-	-
65	*Streptococcus*	*gordonii*	4	16	4	16	4	1	2	4	2	*	-	-
66	*Streptococcus*	*gordonii*	8	8	1	*	0	0	2	4	2	*	-	-
67	*Streptococcus*	*gordonii*	4	8	2	*	0	0	4	4	1	*	-	-
68	*Streptococcus*	*gordonii*	4	16	4	16	4	1	4	2	0.5	*	-	-
69	*Streptococcus*	*salivarius*	2	8	4	8	4	1	2	2	1	*	-	-
70	*Streptococcus*	*salivarius*	4	8	2	*	0	0	2	2	1	*	-	-
73	*Streptococcus*	*salivarius*	1	8	8	8	8	1	2	2	1	*	-	-
74	*Streptococcus*	*salivarius*	4	16	4	16	4	1	2	2	1	*	-	-
75	*Streptococcus*	*salivarius*	4	4	1	*	0	0	2	2	1	*	-	-
76	*Streptococcus*	*salivarius*	4	2	0.5	*	0	0	2	2	1	*	-	-
77	*Streptococcus*	*sobrinus*	4	4	1	*	0	0	2	2	1	*	-	-
78	*Streptococcus*	*vestibularis*	1	8	8	8	8	1	2	1	0.5	*	-	-
80	*Streptococcus*	*downii*	4	16	4	16	4	1	4	1	0.25	*	-	-
81	*Streptococcus*	*downii*	4	16	4	16	4	1	2	1	0.5	*	-	-
82	*Streptococcus*	*parasanguinis*	4	8	2	*	0	0	4	2	0.5	*	-	-
83	*Streptococcus*	*parasanguinis*	8	16	2	*	0	0	2	2	1	*	-	-
84	*Streptococcus*	*parasanguinis*	4	16	4	32	8	2	4	2	0.5	*	-	-
85	*Streptococcus*	*parasanguinis*	4	16	4	16	4	1	4	2	0.5	*	-	-
86	*Streptococcus*	*parasanguinis*	4	16	4	16	4	1	4	2	0.5	*	-	-
87	*Streptococcus*	*parasanguinis*	8	16	2	*	0	0	2	2	1	*	-	-
89	*Streptococcus*	*mitis*	4	4	1	*	0	0	2	2	1	*	-	-
90	*Streptococcus*	*oralis*	4	16	4	32	8	2	4	2	0.5	*	-	-

91	*Streptococcus*	*mitis*	2	4	2	*	0	0	1	2	2	*	-	-
92	*Streptococcus*	*mitis*	2	4	2	*	0	0	1	2	2	*	-	-
93	*Streptococcus*	*mitis*	1	8	8	8	8	1	1	1	1	*	-	-
94	*Streptococcus*	*mitis*	2	8	4	4	2	0.5	1	2	2	*	-	-
95	*Streptococcus*	*mitis*	2	4	2	*	0	0	1	2	2	*	-	-
96	*Streptococcus*	*mitis*	2	8	4	8	4	1	1	1	1	*	-	-
97	*Streptococcus*	*mitis*	4	8	2	*	0	0	0.5	2	4	*	-	-
98	*Streptococcus*	*mitis*	4	8	2	*	0	0	1	2	2	*	-	-
99	*Streptococcus*	*mitis*	4	8	2	*	0	0	1	2	2	*	-	-
100	*Streptococcus*	*mitis*	4	8	2	*	0	0	1	2	2	*	-	-
101	*Streptococcus*	*mutans*	4	4	1	*	0	0	2	4	2	*	-	-
102	*Streptococcus*	*mutans*	4	8	2	*	0	0	2	4	2	*	-	-
103	*Streptococcus*	*mutans*	4	4	1	*	0	0	2	4	2	*	-	-
104	*Streptococcus*	*mutans*	4	4	1	*	0	0	2	1	0.5	*	-	-
105	*Streptococcus*	*mutans*	4	8	2	*	0	0	2	4	2	*	-	-
106	*Streptococcus*	*mutans*	8	4	0.5	*	0	0	2	4	2	*	-	-
107	*Streptococcus*	*mutans*	4	4	1	*	0	0	2	2	1	*	-	-
108	*Streptococcus*	*mutans*	4	4	1	*	0	0	2	4	2	*	-	-
109	*Streptococcus*	*mutans*	4	4	1	*	0	0	2	8	4	2	1	0.25
110	*Streptococcus*	*mutans*	8	8	1	*	0	0	2	4	2	*	-	-
111	*Streptococcus*	*mutans*	4	4	1	*	0	0	2	2	1	*	-	-
112	*Streptococcus*	*mutans*	4	4	1	*	0	0	2	2	1	*	-	-
113	*Streptococcus*	*mutans*	4	4	1	*	0	0	2	2	1	*	-	-
114	*Streptococcus*	*mutans*	4	4	1	*	0	0	2	4	2	*	-	-
115	*Streptococcus*	*mutans*	4	4	1	*	0	0	2	4	2	*	-	-
116	*Streptococcus*	*mutans*	4	8	2	*	0	0	2	2	1	*	-	-
117	*Streptococcus*	*mutans*	4	4	1	*	0	0	2	2	1	*	-	-
118	*Streptococcus*	*cristatus*	4	8	2	*	0	0	2	4	2	*	-	-
119	*Streptococcus*	*cristatus*	2	4	2	*	0	0	1	4	4	8	8	2
120	*Streptococcus*	*cristatus*	2	4	2	*	0	0	1	1	1	*	-	-

201	*Actinomyces*	*naeslundii*	2	2	1	*	-	-	1	2	2	*	-	-
202	*Actinomyces*	*naeslundii*	1	2	2	*	-	-	1	2	2	*	-	-
203	*Actinomyces*	*naeslundii*	2	2	1	*	-	-	2	2	1	*	-	-
204	*Actinomyces*	*naeslundii*	1	2	2	*	-	-	2	1	0,5	*	-	-
205	*Actinomyces*	*naeslundii*	2	2	1	*	-	-	2	2	1	*	-	-
206	*Actinomyces*	*naeslundii*	0.5	1	2	*	-	-	2	2	1	*	-	-
207	*Actinomyces*	*naeslundii*	0.5	1	2	*	-	-	2	2	1	*	-	-
208	*Actinomyces*	*oris*	2	2	1	*	-	-	2	2	1	*	-	-
209	*Actinomyces*	*oris*	0.5	2	4	*	-	-	4	2	0,5	*	-	-
210	*Actinomyces*	*oris*	2	2	1	*	-	-	4	4	1	*	-	-
211	*Actinomyces*	*oris*	4	4	1	*	-	-	4	2	0,5	*	-	-
212	*Actinomyces*	*oris*	1	4	4	*	-	-	4	2	0,5	*	-	-
213	*Actinomyces*	*odontolyticus*	4	4	1	*	-	-	4	2	0,5	*	-	-
214	*Actinomyces*	*odontolyticus*	4	4	1	*	-	-	4	2	0,5	*	-	-
215	*Actinomyces*	*odontolyticus*	8	4	0.5	*	-	-	4	2	0,5	*	-	-
216	*Actinomyces*	*odontolyticus*	4	2	0.5	*	-	-	4	2	0,5	*	-	-
217	*Actinomyces*	*odontolyticus*	4	4	1	*	-	-	4	2	0,5	*	-	-
218	*Actinomyces*	*odontolyticus*	2	2	1	*	-	-	4	2	0,5	*	-	-
219	*Actinomyces*	*odontolyticus*	1	2	2	*	-	-	2	2	1	*	-	-
301	*Rothia*	*aeria*	2	2	1	*	-	-	4	2	0,5	*	-	-
302	*Rothia*	*aeria*	2	2	1	*	-	-	4	2	0,5	*	-	-
303	*Rothia*	*aeria*	1	2	2	*	-	-	4	2	0,5	*	-	-
304	*Rothia*	*aeria*	4	4	1	*	-	-	2	2	1	*	-	-
305	*Rothia*	*aeria*	4	8	2	*	-	-	2	2	1	*	-	-
306	*Rothia*	*aeria*	4	4	1	*	-	-	2	2	1	*	-	-
307	*Rothia*	*dentocariosa*	4	4	1	*	-	-	2	2	1	*	-	-
308	*Rothia*	*dentocariosa*	4	4	1	*	-	-	2	2	1	*	-	-

309	*Rothia*	*dentocariosa*	4	4	1	*	-	-	2	2	1	*	-	-
310	*Rothia*	*dentocariosa*	4	4	1	*	-	-	2	1	0,5	*	-	-
311	*Rothia*	*dentocariosa*	4	4	1	*	-	-	2	2	1	*	-	-
312	*Rothia*	*dentocariosa*	4	4	1	*	-	-	2	2	1	*	-	-
313	*Rothia*	*mucilaginosa*	4	8	2	*	-	-	2	2	1	*	-	-
314	*Rothia*	*mucilaginosa*	4	8	2	*	-	-	2	2	1	*	-	-
315	*Rothia*	*mucilaginosa*	4	4	1	*	-	-	2	2	1	*	-	-
316	*Rothia*	*mucilaginosa*	2	4	2	*	-	-	1	2	2	*	-	-
317	*Rothia*	*mucilaginosa*	4	4	1	*	-	-	4	2	0,5	*	-	-
318	*Rothia*	*mucilaginosa*	2	4	2	*	-	-	1	1	1	*	-	-
319	*Rothia*	*mucilaginosa*	4	4	1	*	-	-	1	2	2	*	-	-
320	*Rothia*	*aeria*	2	4	2	*	-	-	1	2	2	*	-	-
401	*Veillonella*	*atypica*	1	2	2	*	-	-	1	2	2	*	-	-
402	*Veillonella*	*atypica*	1	2	2	*	-	-	1	2	2	*	-	-
403	*Veillonella*	*atypica*	1	1	1	*	-	-	1	2	2	*	-	-
404	*Veillonella*	*atypica*	1	2	2	*	-	-	1	1	1	*	-	-
405	*Veillonella*	*atypica*	1	2	2	*	-	-	2	2	1	*	-	-
406	*Veillonella*	*atypica*	2	1	0.5	*	-	-	1	2	2	*	-	-
407	*Veillonella*	*atypica*	2	2	1	*	-	-	2	1	0.5	*	-	-
408	*Veillonella*	*atypica*	0.5	1	2	*	-	-	1	2	2	*	-	-
409	*Veillonella*	*atypica*	1	1	1	*	-	-	2	2	1	*	-	-
410	*Veillonella*	*atypica*	1	2	2	*	-	-	0.5	1	2	*	-	-
411	*Veillonella*	*dispar*	2	1	0.5	*	-	-	1	2	2	*	-	-
412	*Veillonella*	*dispar*	2	1	0.5	*	-	-	0.5	2	4	4	8	2
413	*Veillonella*	*parvula*	1	1	1	*	-	-	1	2	2	*	-	-
414	*Veillonella*	*parvula*	1	2	2	*	-	-	1	2	2	*	-	-
415	*Veillonella*	*parvula*	2	2	1	*	-	-	2	4	2	*	-	-
417	*Veillonella*	*parvula*	2	2	1	*	-	-	2	2	1	*	-	-

418	*Veillonella*	*parvula*	1	2	2	*	-	-	2	2	1	*	-	-
419	*Veillonella*	*parvula*	1	1	1	*	-	-	1	2	2	*	-	-
420	*Veillonella*	*parvula*	2	1	0.5	*	-	-	1	2	2	*	-	-
421	*Veillonella*	*parvula*	1	1	1	*	-	-	2	2	1	*	-	-
422	*Veillonella*	*parvula*	2	2	1	*	-	-	1	2	2	*	-	-
423	*Veillonella*	*parvula*	2	2	1	*	-	-	2	2	1	*	-	-
424	*Veillonella*	*parvula*	1	1	1	*	-	-	1	2	2	*	-	-
425	*Veillonella*	*parvula*	2	1	0.5	*	-	-	2	2	1	*	-	-
426	*Veillonella*	*parvula*	2	2	1	*	-	-	2	1	0.5	*	-	-
427	*Veillonella*	*parvula*	2	1	0.5	*	-	-	1	2	2	*	-	-

References

1. Lins, R.X.; Oliveira Andrade, A. de; Hirata Junior, R.; Wilson, M.J.; Lewis, M.A.; Williams, D.W.; Fidel, R.A.S. Antimicrobial resistance and virulence traits of Enterococcus faecalis from primary endodontic infections. *J. Dent.* **2013**, *41*, 779–786, doi:10.1016/j.jdent.2013.07.004.
2. Poyart, C.; Jardy, L.; Quesne, G.; Berche, P.; Trieu-Cuot, P. Genetic Basis of Antibiotic Resistance in Streptococcus agalactiae Strains Isolated in a French Hospital. *Antimicrob Agents Chemother* **2003**, *47*, 794–797, doi:10.1128/AAC.47.2.794-797.2003.
3. Aminov, R.I.; Garrigues-Jeanjean, N.; Mackie, R.I. Molecular Ecology of Tetracycline Resistance: Development and Validation of Primers for Detection of Tetracycline Resistance Genes Encoding Ribosomal Protection Proteins. *Appl Environ Microbiol* **2001**, *67*, 22–32, doi:10.1128/AEM.67.1.22-32.2001.
4. Lanz, R.; Kuhnert, P.; Boerlin, P. Antimicrobial resistance and resistance gene determinants in clinical Escherichia coli from different animal species in Switzerland. *Veterinary Microbiology* **2003**, *91*, 73–84, doi:10.1016/S0378-1135(02)00263-8.
5. Call, D.R.; Bakko, M.K.; Krug, M.J.; Roberts, M.C. Identifying Antimicrobial Resistance Genes with DNA Microarrays. *Antimicrob Agents Chemother* **2003**, *47*, 3290–3295, doi:10.1128/AAC.47.10.3290-3295.2003.
6. Iwahara, K.; Kuriyama, T.; Shimura, S.; Williams, D.W.; Yanagisawa, M.; Nakagawa, K.; Karasawa, T. Detection of cfxA and cfxA2, the beta-lactamase genes of Prevotella spp., in clinical samples from dentoalveolar infection by real-time PCR. *J. Clin. Microbiol.* **2006**, *44*, 172–176, doi:10.1128/JCM.44.1.172-176.2006.
7. Dutour, C.; Bonnet, R.; Marchandin, H.; Boyer, M.; Chanal, C.; Sirot, D.; Sirot, J. CTX-M-1, CTX-M-3, and CTX-M-14 beta-lactamases from Enterobacteriaceae isolated in France. *Antimicrob. Agents Chemother.* **2002**, *46*, 534–537, doi:10.1128/AAC.46.2.534-537.2002.
8. Ehrmann, E.; Handal, T.; Tamanai-Shacoori, Z.; Bonnaure-Mallet, M.; Fosse, T. High prevalence of -lactam and macrolide resistance genes in human oral Capnocytophaga species. *Journal of Antimicrobial Chemotherapy* **2014**, *69*, 381–384, doi:10.1093/jac/dkt350.
9. Voha, C.; Docquier, J.-D.; Rossolini, G.M.; Fosse, T. Genetic and biochemical characterization of FUS-1 (OXA-85), a narrow-spectrum class D beta-lactamase from Fusobacterium nucleatum subsp. polymorphum. *Antimicrob. Agents Chemother.* **2006**, *50*, 2673–2679, doi:10.1128/AAC.00058-06.
10. Böckelmann, U.; Dörries, H.-H.; Ayuso-Gabella, M.N.; Salgot de Marçay, M.; Tandoi, V.; Levantesi, C.; Masciopinto, C.; van Houtte, E.; Szewzyk, U.; Wintgens, T.; et al. Quantitative PCR Monitoring of Antibiotic Resistance Genes and Bacterial Pathogens in Three European Artificial Groundwater Recharge Systems. *Appl Environ Microbiol* **2009**, *75*, 154–163, doi:10.1128/AEM.01649-08.
11. Nakayama, A.; Takao, A. β-Lactam resistance in Streptococcus mitis isolated from saliva of healthy subjects. *Journal of Infection and Chemotherapy* **2003**, *9*, 321–327, doi:10.1007/s10156-003-0286-Y.
12. Malhotra-Kumar, S.; Lammens, C.; Piessens, J.; Goossens, H. Multiplex PCR for Simultaneous Detection of Macrolide and Tetracycline Resistance Determinants in Streptococci. *Antimicrob Agents Chemother* **2005**, *49*, 4798–4800, doi:10.1128/AAC.49.11.4798-4800.2005.
13. Reinert, R.R.; Filimonova, O.Y.; Al-Lahham, A.; Grudinina, S.A.; Ilina, E.N.; Weigel, L.M.; Sidorenko, S.V. Mechanisms of Macrolide Resistance among Streptococcus pneumoniae Isolates from Russia. *Antimicrob Agents Chemother* **2008**, *52*, 2260–2262, doi:10.1128/AAC.01270-07.

14. Perreten, V.; Vorlet-Fawer, L.; Slickers, P.; Ehricht, R.; Kuhnert, P.; Frey, J. Microarray-Based Detection of 90 Antibiotic Resistance Genes of Gram-Positive Bacteria. *J Clin Microbiol* **2005**, *43*, 2291–2302, doi:10.1128/JCM.43.5.2291-2302.2005.
15. Kangaba, A.A.; Saglam, F.Y.; Tokman, H.B.; Torun, M.; Torun, M.M. The prevalence of enterotoxin and antibiotic resistance genes in clinical and intestinal Bacteroides fragilis group isolates in Turkey. *Anaerobe* **2015**, *35*, 72–76, doi:10.1016/j.anaerobe.2015.07.008.
16. Daly, M.M.; Doktor, S.; Flamm, R.; Shortridge, D. Characterization and prevalence of MefA, MefE, and the associated msr(D) gene in Streptococcus pneumoniae clinical isolates. *J Clin Microbiol* **2004**, *42*, 3570–3574, doi:10.1128/JCM.42.8.3570-3574.2004.
17. Sutcliffe, J.; Grebe, T.; Tait-Kamradt, A.; Wondrack, L. Detection of erythromycin-resistant determinants by PCR. *Antimicrob Agents Chemother* **1996**, *40*, 2562–2566, doi:10.1128/AAC.40.11.2562.
18. Garvey, M.I.; Baylay, A.J.; Wong, R.L.; Piddock, L.J.V. Overexpression of patA and patB, which encode ABC transporters, is associated with fluoroquinolone resistance in clinical isolates of Streptococcus pneumoniae. *Antimicrob Agents Chemother* **2011**, *55*, 190–196, doi:10.1128/AAC.00672-10.
19. Dutka-Malen, S.; Evers, S.; Courvalin, P. Detection of glycopeptide resistance genotypes and identification to the species level of clinically relevant enterococci by PCR. *J Clin Microbiol* **1995**, *33*, 24–27, doi:10.1128/jcm.33.1.24-27.1995.
20. Depardieu, F.; Perichon, B.; Courvalin, P. Detection of the van Alphabet and Identification of Enterococci and Staphylococci at the Species Level by Multiplex PCR. *J Clin Microbiol* **2004**, *42*, 5857–5860, doi:10.1128/JCM.42.12.5857-5860.2004.
21. Fines, M.; Perichon, B.; Reynolds, P.; Sahm, D.F.; Courvalin, P. VanE, a New Type of Acquired Glycopeptide Resistance in Enterococcus faecalis BM4405. *Antimicrob Agents Chemother* **1999**, *43*, 2161–2164, doi:10.1128/AAC.43.9.2161.
22. Rebelo, A.R.; Bortolaia, V.; Kjeldgaard, J.S.; Pedersen, S.K.; Leekitcharoenphon, P.; Hansen, I.M.; Guerra, B.; Malorny, B.; Borowiak, M.; Hammerl, J.A.; et al. Multiplex PCR for detection of plasmid-mediated colistin resistance determinants, mcr-1, mcr-2, mcr-3, mcr-4 and mcr-5 for surveillance purposes. *Eurosurveillance* **2018**, *23*, doi:10.2807/1560-7917.ES.2018.23.6.17-00672.
23. Malbruny, B.; Werno, A.M.; Murdoch, D.R.; Leclercq, R.; Cattoir, V. Cross-Resistance to Lincosamides, Streptogramins A, and Pleuromutilins Due to the lsa (C) Gene in Streptococcus agalactiae UCN70. *Antimicrob. Agents Chemother.* **2011**, *55*, 1470–1474, doi:10.1128/AAC.01068-10.
24. Navas, J.; Fernández-Martínez, M.; Salas, C.; Cano, M.E.; Martínez-Martínez, L. Susceptibility to Aminoglycosides and Distribution of aph and aac(3)-XI Genes among Corynebacterium striatum Clinical Isolates. *PLoS ONE* **2016**, *11*, e0167856, doi:10.1371/journal.pone.0167856.
25. Calatayud, L.; Ardanuy, C.; Cercenado, E.; Fenoll, A.; Bouza, E.; Pallares, R.; Martín, R.; Liñares, J. Serotypes, Clones, and Mechanisms of Resistance of Erythromycin-Resistant Streptococcus pneumoniae Isolates Collected in Spain. *Antimicrob Agents Chemother* **2007**, *51*, 3240–3246, doi:10.1128/AAC.00157-07.
26. Anderson, A.C.; Sanunu, M.; Schneider, C.; Clad, A.; Karygianni, L.; Hellwig, E.; Al-Ahmad, A. Rapid species-level identification of vaginal and oral lactobacilli using MALDI-TOF MS analysis and 16S rDNA sequencing. *BMC Microbiol* **2014**, *14*, 312, doi:10.1186/s12866-014-0312-5.