

| Species | Strain / isolate | Type of exposure | Increase in MIC | MIC _{max} (mg/l) | Stability | Associated changes | Ref |
|-----------------------------|---|--|---|---------------------------|---------------------------|---|------|
| <i>A. xylosoxidans</i> | Domestic drain biofilm isolate MBRG 4.31 | 14 d at various concentrations | 2fold | 31.2 | No data | None reported | [36] |
| <i>A. baumannii</i> | Strain MBRG15.1 from a domestic kitchen drain biofilm | 14 passages at various concentrations | None | 7.8 | Not applicable | None reported | [37] |
| <i>A. baylyi</i> | Strain ADP1 | 30 min at 0.000001% | Protection from lethal CHG concentration (0.00007%) | No data | No data | More resistance to a lethal hydrogen peroxide concentration (300 mM) | [38] |
| <i>A. hydrophila</i> | Domestic drain biofilm isolate MBRG 4.3 | 14 d at various concentrations | None | 15.6 | Not applicable | None reported | [36] |
| <i>A. jandaei</i> | Domestic drain biofilm isolate MBRG 9.11 | 14 d at various concentrations | 2fold | 15.6 | No data | None reported | [36] |
| <i>A. proteolyticus</i> | Domestic drain biofilm isolate MBRG 9.12 | 14 d at various concentrations | 16fold | 125 | No data | None reported | [36] |
| <i>B. fragilis</i> | ATCC 25285 | 12 h at 0.06% | No data | No data | Not applicable | Induction of multiple antibiotic resistance*; 2.7fold – 6fold increase of 6 efflux pumps | [39] |
| <i>B. cenocepacia</i> | 6 strains from clinical and environmental habitats | Up to 28 d at 15 mg/l | Survival | 100 | No data | No degradation of CHG | [40] |
| <i>B. cepacia</i> | ATCC BAA-245 | 40 d at various concentrations | 8fold | 29 | Unstable for 14 d | Decrease biofilm formation | [41] |
| <i>B. cepacia complex</i> | <i>B. lata</i> strain 383 | 5 min at 50 mg/l | No data | 700 | Not applicable | Reduced susceptibility** to ceftazidime (30 – 33 mm), ciprofloxacin (11 – 20 mm) and imipenem (15 – 21 mm; 2 of 4 experiments) and to meropenem (33 mm; 1 of 4 experiments); up-regulation of transporter and efflux pump genes | [42] |
| <i>C. coli</i> | ATCC 33559 and a poultry isolate | Up to 15 passages with gradually higher concentrations | None | 0.031 | Not applicable | None described | [15] |
| <i>C. jejuni</i> | NCTC 11168, ATCC 33560 and a poultry isolate | Up to 15 passages with gradually higher concentrations | None | 1 | Not applicable | None described | [15] |
| <i>C. indologenes</i> | MRBG 4.29 (kitchen drain biofilm isolate) | 40 d at various concentrations | None | 7.3 | Not applicable | None described | [41] |
| <i>C. indologenes</i> | Domestic drain biofilm isolate MBRG 9.15 | 14 d at various concentrations | None | 31.2 | Not applicable | None reported | [36] |
| <i>Chrysobacterium</i> spp. | Domestic drain biofilm isolate MBRG 9.17 | 14 d at various concentrations | 2fold | 7.8 | No data | None reported | [36] |
| <i>Chrysobacterium</i> spp. | 2 biocide-sensitive strains from organic foods | Several passages with gradually higher concentrations | 5fold – 6fold | 30 | Unstable | Cross-adaptation* to benzalkoniumchloride (2fold - 100fold; 2 strains), triclosan (4fold; 1 strain) and didecyldimethylammonium bromide (16fold; 1 strain); cross-resistance* to cefotaxime and ceftazidime (2 strains each), sulfamethoxazole, ampicillin and tetracycline (1 strain each) | [43] |
| <i>Citrobacter</i> spp. | Domestic drain biofilm isolate MBRG 9.18 | 14 d at various concentrations | None | 1.9 | Not applicable | None reported | [36] |
| <i>C. sakazakii</i> | Strain MBRG15.5 from a domestic kitchen drain biofilm | 14 passages at various concentrations | None | 7.8 | Not applicable | None reported | [37] |
| <i>E. cloacae</i> | 2 biocide-sensitive strains from organic foods | Several passages with gradually higher | 10fold – 16fold | 80 | Stable for 20 subcultures | Cross-adaptation* to benzalkoniumchloride (6fold; 2 strains), triclosan (6fold - 15fold; 2 | [43] |

| | | concentrations | | | (1 strain) | strains) and | |
|--------------------------|--|---|--------------------------------------|-------------|--------------------------------------|--|------|
| | | | | | | didecyldimethylammonium bromide (6fold; 1 strain); cross-resistance* to imipenem, ceftazidime and sulfamethoxazole (2 strains each), cefotaxime and tetracycline (1 strain each) | |
| <i>E. ludwigii</i> | 2 biocide-sensitive strains from organic foods | Several passages with gradually higher concentrations | 6fold – 8fold | 40 | Unstable | Cross-adaptation* to benzalkoniumchloride (6fold – 8fold; 2 strains), triclosan (8fold – 10fold; 2 strains) and didecyldimethylammonium bromide (4fold – 6fold; 2 strains); cross-resistance* to imipenem, ceftazidime and sulfamethoxazole (2 strains each) | [43] |
| <i>Enterobacter</i> spp. | 6 biocide-sensitive strains from organic foods | Several passages with gradually higher concentrations | 4fold – 10fold | 80 | Stable for 20 subcultures (1 strain) | Cross-adaptation* to benzalkoniumchloride (3fold – 20fold; 6 strains), triclosan (4fold – 100fold; 6 strains) and didecyldimethylammonium bromide (4fold – 6fold; 3 strains); cross-resistance* to ceftazidime and imipenem (3 strains each), cefotaxime and sulfamethoxazole (2 strains each) | [43] |
| <i>E. coli</i> | ATCC 25922 | 40 d at various concentrations | None | 7.3 | Not applicable | None described | [41] |
| <i>E. coli</i> | NCIMB 8879 | 6 x 48 h at variable concentrations | None | 0.7 | Not applicable | None reported | [44] |
| <i>E. coli</i> | ATCC 25922 and strain MBRG15.4 from a domestic kitchen drain biofilm | 14 passages at various concentrations | 1.5fold - 5fold | 11.7 | Stable for 14 d | None reported | [37] |
| <i>E. coli</i> | NCIMB 8545 | 0.00005% for 30 s, 5 min and 24 h | ≤ 6fold | 39 | Unstable for 10 d | No increase of MBC; unstable resistance** to tobramycin | [45] |
| <i>E. coli</i> | NCTC 8196 | 12 w at various concentrations | 32fold | No data | No data | None described | [46] |
| <i>E. coli</i> | NCTC 12900 strain O157 | 6 passages at variable concentrations | Approx. 500fold | Approx. 500 | Stable for 30 d | Increased tolerance** to triclosan (15 mm) | [47] |
| <i>E. coli</i> | CV601 | 24.4 µg/l for 3 h | No data | 4.9 | Not applicable | Induction of horizontal gene transfer (sulfonamide resistance by conjugation) | [48] |
| <i>H. gallinarum</i> | Domestic drain biofilm isolate MBRG 4.27 | 14 d at various concentrations | 2fold | 31.2 | No data | None reported | [36] |
| <i>K. oxytoca</i> | 2 biocide-sensitive strains from organic foods | Several passages with gradually higher concentrations | 2fold – 8fold | 40 | Unstable | Cross-adaptation* to benzalkoniumchloride (60fold; 1 strain), triclosan (3fold – 8fold; 2 strains) and didecyldimethylammonium bromide (6fold; 1 strain) | [43] |
| <i>K. pneumoniae</i> | 7 “Murray isolates” from the pre-CHG era | Up to 5 w at various concentrations | None (5 isolates) 4fold (2 isolates) | 256 | Stable for 10 d | None reported | [49] |
| <i>K. pneumoniae</i> | 7 modern isolates / strains | Up to 5 w at various concentrations | 4fold - 16fold | > 512 | Stable for 10 d | None reported | [49] |
| <i>K. pneumoniae</i> | 6 clinical strains with a variety of antibiotic resistance markers | 6 passages of 2 days at various concentrations | 4fold – 16fold | 512 | Stable for 10 d | Cross-resistance*** to colistin (6 strains); no cross-adaptation to benzalkoniumchloride, octenidine, hexadecylpyridinium chloride monohydrate and ethanol | [16] |
| <i>K. pneumoniae</i> | ATCC 13883 | 40 d at various concentrations | 6.9fold | 14.5 | Stable for 14 d | Increase biofilm formation | [41] |
| <i>Klebsiella</i> spp. | Biocide-sensitive strain from organic foods | Several passages with gradually higher concentrations | 2fold | 30 | Unstable | Cross-adaptation* to benzalkoniumchloride (12fold) and triclosan (12fold); cross-resistance* to imipenem and ceftazidime | [43] |
| <i>M. osloensis</i> | Strain MBRG15.3 from a domestic kitchen drain biofilm | 14 passages at various concentrations | None | 2.0 | Not applicable | None reported | [37] |

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| <i>P. agglomerans</i> | 5 biocide-sensitive strains from organic foods | Several passages with gradually higher concentrations | 5fold – 10fold | 50 | Unstable | Cross-adaptation* to benzalkoniumchloride (30fold – 40fold; 5 strains), triclosan (8fold – 100fold; 5 strains) and didecyldimethylammonium bromide (4fold - 6fold; 2 strains); cross-resistance* to cefotaxime and ceftazidime (3 strains each), tetracycline and sulfamethoxazole (2 strains each) and imipenem (1 strain) | [43] |
| <i>P. ananatis</i> | 2 biocide-sensitive strains from organic foods | Several passages with gradually higher concentrations | 10fold – 50fold | 50 | Unstable | Cross-adaptation* to benzalkoniumchloride (20fold – 30fold; 2 strains), triclosan (60fold – 100fold; 2 strains) and didecyldimethylammonium bromide (6fold; 2 strains); cross-resistance* to cefotaxime (2 strains), sulfamethoxazole, imipenem, ceftazidime and tetracycline (1 strain each) | [43] |
| <i>Pantoea</i> spp. | 3 biocide-sensitive strains from organic foods | Several passages with gradually higher concentrations | 5fold – 16fold | 80 | Unstable | Cross-adaptation* to benzalkoniumchloride (6fold – 60fold; 2 strains), triclosan (8fold; 3 strains) and didecyldimethylammonium bromide (4fold - 6fold; 3 strains); cross-resistance* to tetracycline (2 strains), ampicillin, ceftazidime, cefotaxime, sulfamethoxazole and imipenem (1 strain each) | [43] |
| <i>P. aeruginosa</i> | 178 CHG sensitive strains | Exposure to CHG | None | 625 | Not applicable | None reported | [50] |
| <i>P. aeruginosa</i> | ATCC 9027 | 40 d at various concentrations | 2fold | 14.5 | Unstable for 14 d | None described | [41] |
| <i>P. aeruginosa</i> | ATCC 9027 | 14 passages at various concentrations | 4fold | 31.3 | Stable for 14 d | None reported | [37] |
| <i>P. aeruginosa</i> | NCIMB 10421 | 6 x 48 h at variable concentrations | 7fold | 70 | Stable for 15 d | High MICs to BAC did not change in a relevant extent | [44] |
| <i>P. aeruginosa</i> | NCTC 6749 | 12 w at various concentrations | 8fold – 32fold | 1,024 | Stable for 7 w | None described | [46] |
| <i>P. nitroreductans</i> | Domestic drain biofilm isolate MBRG 4.6 | 14 d at various concentrations | None | 3.9 | Not applicable | None reported | [36] |
| <i>P. putida</i> | Strain MBRG15.2 from a domestic kitchen drain biofilm | 14 passages at various concentrations | None | 7.8 | Not applicable | None reported | [37] |
| <i>Pseudomonas</i> spp. | Domestic drain biofilm isolate MBRG 9.14 | 14 d at various concentrations | 16fold | 15.6 | No data | None reported | [36] |
| <i>Pseudoxanthomonas</i> spp. | Domestic drain biofilm isolate MBRG 9.20 | 14 d at various concentrations | None | 0.97 | Not applicable | None reported | [36] |
| <i>Ralstonia</i> spp. | Domestic drain biofilm isolate MBRG 4.13 | 14 d at various concentrations | 21fold | 167 | No data | None reported | [36] |
| <i>S. Virchow</i> | Food isolate | 6 passages at variable concentrations | Approx. 120fold | Approx. 120 | Stable for 30 d | Increased tolerance** to triclosan (0 mm) | [47] |
| <i>Salmonella enterica</i> serovar Typhimurium | Strain SL1344 | 5 min at 0.1, 0.5, 1 and 4 mg/l | 13fold – 27fold | 800 | Unstable for 1 d | 3fold – 67fold increase of tolerance*** to BAC | [51] |
| <i>Salmonella enterica</i> serovar Typhimurium | Strain 14028S | 5 min at 1 and 5 mg/l | 3fold – 33fold | 1,000 | Unstable for 1 d | 2.5fold – 20fold increase of tolerance*** to BAC | [51] |
| <i>S. enteritidis</i> | ATCC 13076 | 7 d of sublethal exposure | ≥ 10fold | > 50 | Unstable | None reported | [52] |
| <i>Salmonella</i> spp. | 3 biocide-sensitive strains from organic foods | Several passages with gradually higher concentrations | 5fold – 10fold | 50 | Unstable | Cross-adaptation* to benzalkoniumchloride (8fold – 30fold; 2 strains) and triclosan (4fold - 8fold; 3 strains) cross-resistance* to cefotaxime, nalidixic | [43] |

| | | | | | | acid and imipenem (2 strains each), tetracycline and sulfamethoxazole (1 strain each) | |
|------------------------|---|---|------------------------------|---------|-----------------|---|------|
| <i>Salmonella</i> spp. | 6 strains with higher MICs to biocidal products | 8 days at increasing concentrations | 50fold – 200fold (2 strains) | > 1,000 | “stable” | One strain with increased tolerance*** to tetracycline (> 16 mg/l), chloramphenicol (8 mg/l) and nalidixic acid (16 mg/l) | [53] |
| <i>S. marcescens</i> | Strain GSU 86-828 | 7 d exposure to CHG-containing contact lens solutions | 8fold | 50 | No data | Increased adherence to polyethylene | [54] |
| <i>S. marcescens</i> | ATCC 13880 | 40 d at various concentrations | 9.6fold | 116 | Stable for 14 d | Increase biofilm formation | [41] |
| <i>S. marcescens</i> | Clinical isolate | 12 w at various concentrations | 32fold – 128fold | 2,048 | Stable for 7 w | None described | [46] |
| <i>Serratia</i> spp. | Not described | 5 to 8 transfers | “resistance” to CHG | No data | “stable” | None described | [55] |
| <i>S. multivorum</i> | Domestic drain biofilm isolate MBRG 9.19 | 14 d at various concentrations | None | 15.6 | Not applicable | None reported | [36] |
| <i>S. maltophilia</i> | Domestic drain biofilm isolate MBRG 9.13 | 14 d at various concentrations | 4fold | 62.5 | No data | None reported | [36] |
| <i>S. maltophilia</i> | MRBG 4.17 (kitchen drain biofilm isolate) | 40 d at various concentrations | 6fold | 29 | Stable for 14 d | None described | [41] |