Supporting Information for

Boosting Antimicrobial Activity of Imipenem in Combination with Silver Nanoparticles towards *S. fonticola* and *Pantoea sp.*

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**Table S1** PCR primers and their sequence with Gen Bank codes

| Primer | Sequence 5'-3' | Size of PCR amplicon (bp) | Bacterium |
|--------|---------------|---------------------------|-----------|
| EsaI gene F | TTTTGCCCACCGGCTCAAAAC | 127 | Pantoea sp. |
| EsaI gene R | TGGCGTATCTGGCTGCAATC | | |
| SmaI gene F | TCACGTCAATTGCGAGCTTGC | 73 | Serratia sp. |
| SmaI gene R | ATTGTTGACACGCACCATCGC | | |

**Table S2** PCR master mix by instructions of the company for each gene

| PCR master mix | Volume (μL) |
|----------------|-------------|
| DNA template | 5 |
| Forward primer (10 pmol) | 1.5 |
| Reverse primer (10 pmol) | 1.5 |
| PCR water | 12 |
| Total volume | 20 |
| PCR master mix | Volume (μL) |

**Table S3** Parameters of PCR thermocycler

| PCR step | Temperature (°C) | Time (min) | Repeat cycle |
|-----------|------------------|------------|--------------|
| Initial denaturation | 95 | 3 | 1 |
| Denaturation | 95 | 0.5 | |
| Annealing | 58 | 0.5 | 30 |
| Extension | 72 | 0.5 | |
| Final extension | 72 | 5 | 1 |
| Melting | 4 | | Hold |

**Appendix 1** Statistical analysis of gene expression of *S. fonticola* 1, 2 isolates after treatment with chemical and biological SNPs and imipenem

| Sample | Mean ± SE | P-value  |
|--------|-----------|----------|
| T1 | 3.6787 ± 0.22704 |  |
| T2 | 1.6407 ± 0.36673 |  |
| T3 | 2.0047 ± 0.02598 | 0.009 |
| T4 | 6.9533 ± 1.65687 |  |

**Appendix 2** Statistical analysis of gene expression of *S. fonticola* 3 isolates after treatment with chemical and biological SNPs and imipenem
### Appendix 3
Statistical analysis of gene expression of Pantoea sp.1,2 isolates after treatment chemical and biological SNPs and imipenem

| Sample | Mean ± SE | P-value |
|--------|-----------|---------|
| T1     | 3.7857 ± 0.93741 |         |
| T2     | 2.6660 ± 0.08166 | 0.006   |
| T3     | 4.4687 ± 0.35743 |         |
| T4     | 6.7347 ± 0.52331 |         |

### Appendix 4
Statistical analysis of gene expression of Pantoea sp.1, 2 isolates after treatment chemical and biological SNPs and imipenem

| Sample | Mean ± SE | P-value |
|--------|-----------|---------|
| T1     | 3.7857 ± 0.93741 |         |
| T2     | 2.6660 ± 0.08166 | 0.006   |
| T3     | 4.4687 ± 0.35743 |         |
| T4     | 6.7347 ± 0.52331 |         |

### Appendix 5
Statistical analysis of gene expression of Pantoea sp.2, 3 isolates after treatment chemical and biological SNPs and imipenem

| Sample | Mean ± SE | P-value |
|--------|-----------|---------|
| T1     | 1.7827 ± 0.04541 |         |
| T2     | 1.0897 ± 0.09381 | 0.007   |
| T3     | 3.0890 ± 1.13238 |         |
| T4     | 5.5933 ± 0.73031 |         |

### Appendix 6
Statistical analysis of gene expression of S. fonticola 1,2 isolates after treatment with combination of chemical SNPs and imipenem

| Sample | Mean ± SE | P-value |
|--------|-----------|---------|
| T1     | 0.4547 ± 0.08673 |         |
| T2     | 1.6673 ± 0.76251 |         |
| T3     | 2.2427 ± 0.13626 |         |
| T4     | 6.6463 ± 0.84380 |         |
| T5     | 6.8287 ± 1.87678 | 0.002   |
| T6     | 7.2350 ± 1.42994 |         |
| T7     | 7.4167 ± 0.94686 |         |
| Control| 8.6147 ± 2.51172 |         |

### Appendix 7
Statistical analysis of gene expression of S. fonticola 1, 2 isolates after treatment with combination of biological SNPs and imipenem

| Sample | Mean ± SE | P-value |
|--------|-----------|---------|
| T1     | 1.0293 ± 0.03656 |         |
| T2     | 2.0493 ± 0.69233 |         |
| T3     | 2.7200 ± 0.87973 |         |
| T4     | 4.5873 ± 0.25321 | 0.244   |
| T5     | 6.2080 ± 4.62522 |         |
| Control| 7.5070 ± 1.30800 |         |
### Appendix 8 Statistical analysis of gene expression of *S. fonticola* 3 after treatment with combination of chemical SNPs and imipenem

| Sample | Mean ± SE   | P-value |
|--------|-------------|---------|
| T1     | 0.1600 ± 0.12879 |         |
| T2     | 0.6437 ± 0.05795 |         |
| T3     | 1.4707 ± 0.15057 |         |
| T4     | 6.0410 ± 0.75446 |         |
| T5     | 7.0890 ± 2.56477 | 0.000   |
| T6     | 7.4423 ± 2.24652 |         |
| T7     | 9.9467 ± 1.76125 |         |
| Control | 13.6263 ± 1.22144 |         |

### Appendix 9 Statistical analysis of gene expression of *S. fonticola* 3 after treatment with combination of biological SNPs and imipenem

| Sample | Mean ± SE   | P-value |
|--------|-------------|---------|
| T1     | 0.2340 ± 0.05186 | 0.000   |
| T2     | 0.4177 ± 0.14389 |         |
| T3     | 1.2767 ± 0.13135 |         |
| T4     | 3.2110 ± 0.64451 |         |
| T5     | 6.6567 ± 1.84217 |         |
| Control | 10.6527 ± 2.37459 |         |

### Appendix 10 Statistical analysis of gene expression of *Pantoea* sp.1, 2 after treatment with combination of chemical SNPs and imipenem

| Sample | Mean ± SE   | P-value |
|--------|-------------|---------|
| T1     | 1.6430 ± 0.76022 |         |
| T2     | 2.0737 ± 0.07872 |         |
| T3     | 2.1220 ± 0.70909 |         |
| T4     | 2.2130 ± 0.47422 |         |
| T5     | 3.7700 ± 0.99895 | 0.062   |
| T6     | 4.0500 ± 0.22398 |         |
| T7     | 4.4667 ± 1.88540 |         |
| Control | 5.8997 ± 1.13478 |         |

### Appendix 11 Statistical analysis of gene expression of *Pantoea* sp.1, 2 after treatment with combination of biological SNPs and imipenem

| Sample | Mean ± SE   | P-value |
|--------|-------------|---------|
| T1     | 0.2540 ± 0.04013 |         |
| T2     | 0.5867 ± 0.15975 |         |
| T3     | 1.1097 ± 0.08950 | 0.000   |
| T4     | 1.7313 ± 0.23242 |         |
| T5     | 2.6893 ± 0.73479 |         |
| Control | 6.0473 ± 0.89507 |         |

### Appendix 12 Statistical analysis of gene expression of *Pantoea* sp.3, 4 after treatment with combination of chemical SNPs and imipenem

| Sample | Mean ± SE   | P-value |
|--------|-------------|---------|
| T1     | 0.5827 ± 0.07670 |         |
| T2     | 1.5870 ± 0.71255 |         |
| T3     | 2.2740 ± 0.61451 |         |
| T4     | 2.9060 ± 1.18727 | 0.006   |
| T5     | 4.3330 ± 1.44956 |         |
| T6     | 4.7773 ± 1.07099 |         |
| Sample | Mean ± SE  | P-value |
|--------|------------|---------|
| T1     | 1.8947 ± 0.11299 |         |
| T2     | 2.0613 ± 0.72306  |         |
| T3     | 2.2170 ± 0.36003  | 0.020   |
| T4     | 2.7003 ± 0.90174  |         |
| T5     | 5.1297 ± 0.31823  |         |
| Control| 8.5473 ± 2.89352  |         |

**Appendix 13** Statistical analysis of gene expression of *Pantoea* sp.3, 4 after treatment with combination of biological SNPs and imipenem

| Sample | Mean ± SE  | P-value |
|--------|------------|---------|
| Chemical | 5.1383 ± 0.72740 | 0.363  |
| Biological | 4.0168 ± 0.88910  |         |

**Appendix 14** T-test analysis in comparison between combination of chemical and biological SNPs with antibiotics in *S. fonticola* 1, 2 isolates

| Sample | Mean ± SE  | P-value |
|--------|------------|---------|
| Chemical | 5.1383 ± 0.72740 | 0.363  |
| Biological | 4.0168 ± 0.88910  |         |

**Appendix 15** T-test analysis in comparison between combination of chemical and biological SNPs with antibiotics in *S. fonticola* 3 isolate

| Sample | Mean ± SE  | P-value |
|--------|------------|---------|
| Chemical | 5.1383 ± 0.72740 | 0.363  |
| Biological | 4.0168 ± 0.88910  |         |

**Appendix 16** T-test analysis in comparison between combination of chemical and biological SNPs with antibiotics in *Pantoea* sp. 1, 2 isolates

| Sample | Mean ± SE  | P-value |
|--------|------------|---------|
| Chemical | 3.2798 ± 0.40461 | 0.69   |
| Biological | 2.0697 ± 0.50096  |         |

**Appendix 17** T-test analysis in comparison between combination of chemical and biological SNPs with antibiotics in *Pantoea* sp. 3, 4 isolates.

| Sample | Mean ± SE  | P-value |
|--------|------------|---------|
| Chemical | 3.5173 ± 0.48084 | 0.785  |
| Biological | 3.7584 ± 0.73142  |         |