# APPENDICES

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# APPENDIX A

## SOLVENTS PREPARATION

The organic solvents were commercial grade and distilled before using for extraction, as eluent for thin layer chromatography and column chromatography.

## MEDIA PREPARATION

**1. Potato Dextrose Agar (PDA)**

- Sliced potato 200 g
- Glucose 20 g
- Agar 20 g

In 1 liter of Reverse osmosis water and autoclaved at 121$^{o}$C for 15 minutes

**2. Transform medium I: Sabouraud Dextrose Broth (SDB)**

- Glucose 40 g
- Peptone 10 g

In 1 liter of Reverse osmosis water and the pH was adjusted to 5.8 before autoclaving at 121$^{o}$C for 15 minutes

**3. Transform medium II: Potato Dextrose Broth (PDB)**

- Sliced potato 200 g
- Glucose 20 g

In 1 liter of Reverse osmosis water and autoclaved at 121$^{o}$C for 15 minutes

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**4. Microbial Transformation Media**

- Glucose 5 g
- Peptone 1 g
- Yeast extract 1 g
- Beef extract 1 g
- Dipotassium hydrogen phosphate ($K_2HPO_4$) 2 g
- Potassium dihydrogen phosphate ($KH_2PO_4$) 2 g

In 1 liter of Reverse osmosis water and autoclaved at 121$^{o}$C for 15 minutes

**5. Transform medium III: 0.05 M Phosphate Buffer pH 7.0**

- 0.2 M Sodium dihydrogen phosphate ($NaH_2PO_4$) 78 ml
- 0.2 M Disodium hydrogen phosphate ($Na_2HPO_4$) 122 ml

Adjust volume to 800 ml with distilled water

**6. LB Broth**

- Tryptone peptone 10 g
- Yeast extract 5 g
- Sodium chloride (NaCl) 5 g

In 1 liter of Reverse osmosis water and autoclaved at 121$^{o}$C for 15 minutes

**7. LB Agar**

- Tryptone peptone 10 g
- Yeast extract 5 g
- Sodium chloride (NaCl) 5 g

In 1 liter of Reverse osmosis water and autoclaved at 121$^{o}$C for 15 minutes

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**8. Nutrient broth (NB)**

- Gelatin peptone 5 g
- Beef extract 3 g

In 1 liter of Reverse osmosis water and autoclaved at 121$^{o}$C for 15 minutes

**9. Nutrient Agar (NA)**

- Agar 20 g
- Gelatin peptone 5 g
- Beef extract 3 g

In 1 liter of Reverse osmosis water and autoclaved at 121$^{o}$C for 15 minutes

**ARTEMISININ REAGENT (*P*-ANISALDEHYDE)**

Add 2.5 ml of anisaldehyde to 2.5 ml of concentrated sulfuric acid ($H_2SO_4$). Then, add 45 ml of ethanol 95% and 1 ml of acetic acid to the mixture.

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## APPENDIX B

**Table B1** Calculation $LD_{50}$ of L929 cell line treated with deoxyartemisinin (Experiment 1)

| Concentration (mg/ml) | $A_{550}$ | | | | |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 4.059 | 3.623 | 3.516 | 3.733 | 0.288 |
| **Negative** | 0.076 | 0.076 | 0.085 | 0.079 | 0.005 |
| **2.5** | 0.106 | 0.113 | 0.106 | 0.108 | 0.004 |
| **1** | 1.698 | 1.222 | 1.865 | 1.595 | 0.334 |
| **0.75** | 2.322 | 2.712 | 1.46 | 2.165 | 0.641 |
| **0.5** | 1.962 | 2.259 | 2.258 | 2.160 | 0.171 |
| **0.1** | 2.515 | 3.235 | 3.274 | 3.008 | 0.427 |
| **0.01** | 3.978 | 3.395 | 3.178 | 3.517 | 0.414 |
| **0.0075** | 2.989 | 3.016 | 3.071 | 3.025 | 0.042 |
| **0.001** | 2.914 | 2.795 | 2.972 | 2.894 | 0.090 |
| **Concentration (mg/ml)** | $A_{620}$ | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 1.404 | 1.477 | 1.154 | 1.345 | 0.169 |
| **Negative** | 0.055 | 0.057 | 0.059 | 0.057 | 0.002 |
| **2.5** | 0.065 | 0.072 | 0.066 | 0.068 | 0.004 |
| **1** | 0.509 | 0.348 | 0.605 | 0.487 | 0.130 |
| **0.75** | 0.693 | 0.872 | 0.488 | 0.684 | 0.192 |
| **0.5** | 0.528 | 0.731 | 0.704 | 0.654 | 0.110 |
| **0.1** | 0.77 | 1.018 | 1.016 | 0.935 | 0.143 |
| **0.01** | 1.271 | 1.011 | 0.967 | 1.083 | 0.164 |
| **0.0075** | 0.975 | 0.943 | 0.938 | 0.952 | 0.020 |
| **0.001** | 1.048 | 0.89 | 0.946 | 0.961 | 0.080 |

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| Concentration (mg/ml) | $A_{550}$-$A_{620}$ | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Mean | SD |
| Positive | 2.655 | 2.146 | 2.362 | 2.388 | 0.255 |
| Negative | 0.021 | 0.019 | 0.026 | 0.022 | 0.004 |
| 2.5 | 0.041 | 0.041 | 0.04 | 0.041 | 0.001 |
| 1 | 1.189 | 0.874 | 1.26 | 1.108 | 0.205 |
| 0.75 | 1.629 | 1.84 | 0.972 | 1.480 | 0.453 |
| 0.5 | 1.434 | 1.528 | 1.554 | 1.505 | 0.063 |
| 0.1 | 1.745 | 2.217 | 2.258 | 2.073 | 0.285 |
| 0.01 | 2.707 | 2.384 | 2.211 | 2.434 | 0.252 |
| 0.0075 | 2.014 | 2.073 | 2.133 | 2.073 | 0.060 |
| 0.001 | 1.866 | 1.905 | 2.026 | 1.932 | 0.083 |
| Concentration (mg/ml) | %Viability | | | | |
| | 1 | 2 | 3 | Mean | SD |
| Positive | 111.181 | 89.866 | 98.911 | 99.986 | 10.698 |
| Negative | 0.879 | 0.796 | 1.089 | 0.921 | 0.151 |
| 2.5 | 1.717 | 1.717 | 1.675 | 1.703 | 0.024 |
| 1 | 49.791 | 36.600 | 52.764 | 46.385 | 8.603 |
| 0.75 | 68.216 | 77.052 | 40.704 | 61.991 | 18.957 |
| 0.5 | 60.050 | 63.987 | 65.075 | 63.037 | 2.644 |
| 0.1 | 73.074 | 92.839 | 94.556 | 86.823 | 11.938 |
| 0.01 | 113.358 | 99.832 | 92.588 | 101.926 | 10.542 |
| 0.0075 | 84.338 | 86.809 | 89.322 | 86.823 | 2.492 |
| 0.001 | 78.141 | 79.774 | 84.841 | 80.918 | 3.494 |
| $IC_{50}$ | 1.599 | 1.597 | 1.619 | 1.605 | 0.012 |

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**Table B2** Calculation $LD_{50}$ of L929 cell line treated with deoxyartemisinin (Experiment 2)

| **Concentration (mg/ml)** | **$A_{550}$** | | | | |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 0.735 | 0.849 | | 0.792 | |
| **2.5** | 0.090 | 0.100 | 0.110 | 0.100 | 0.010 |
| **1** | 1.159 | 0.813 | 0.779 | 0.917 | 0.210 |
| **0.75** | 0.626 | 0.689 | 0.774 | 0.696 | 0.074 |
| **0.5** | 1.134 | 0.824 | 0.992 | 0.983 | 0.155 |
| **0.25** | 0.735 | 0.885 | 0.938 | 0.853 | 0.105 |
| **0.1** | 1.000 | 1.100 | 1.214 | 1.105 | 0.107 |
| **0.05** | 1.018 | 0.813 | 0.659 | 0.830 | 0.180 |
| **Concentration (mg/ml)** | **$A_{620}$** | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 0.278 | 0.317 | | 0.298 | |
| **2.5** | 0.061 | 0.066 | 0.067 | 0.065 | 0.003 |
| **1** | 0.427 | 0.284 | 0.309 | 0.340 | 0.076 |
| **0.75** | 0.263 | 0.240 | 0.285 | 0.263 | 0.023 |
| **0.5** | 0.380 | 0.315 | 0.351 | 0.349 | 0.033 |
| **0.25** | 0.303 | 0.330 | 0.351 | 0.328 | 0.024 |
| **0.1** | 0.321 | 0.450 | 0.444 | 0.405 | 0.073 |
| **0.05** | 0.387 | 0.328 | 0.267 | 0.327 | 0.060 |
| **Concentration (mg/ml)** | **$A_{550}$-$A_{620}$** | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 0.457 | 0.532 | | 0.495 | |
| **2.5** | 0.029 | 0.034 | 0.043 | 0.035 | 0.007 |
| **1** | 0.732 | 0.529 | 0.470 | 0.577 | 0.137 |
| **0.75** | 0.363 | 0.449 | 0.489 | 0.434 | 0.064 |
| **0.5** | 0.754 | 0.509 | 0.641 | 0.635 | 0.123 |
| **0.25** | 0.432 | 0.555 | 0.587 | 0.525 | 0.082 |
| **0.1** | 0.679 | 0.650 | 0.770 | 0.700 | 0.063 |
| **0.05** | 0.631 | 0.485 | 0.392 | 0.503 | 0.120 |
| **Concentration (mg/ml)** | **%Viability** | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 92.323 | 107.475 | | 99.899 | |
| **2.5** | 5.859 | 6.869 | 8.687 | 7.138 | 1.433 |
| **1** | 147.879 | 106.869 | 94.949 | 116.566 | 27.765 |
| **0.75** | 73.333 | 90.707 | 98.788 | 87.609 | 13.007 |
| **0.5** | 152.323 | 102.828 | 129.495 | 128.215 | 24.772 |
| **0.25** | 87.273 | 112.121 | 118.586 | 105.993 | 16.532 |
| **0.1** | 137.172 | 131.313 | 155.556 | 141.347 | 12.649 |
| **0.05** | 127.475 | 97.980 | 79.192 | 101.549 | 24.338 |
| **$IC_{50}$** | **1.775** | **1.287** | **1.516** | **1.526** | **0.244** |

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**Table B3** Calculation $LD_{50}$ of L929 cell line treated with artemisinin (Experiment 1)

| Concentration (mg/ml) | $A_{550}$ | | | | |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 3.392 | 3.296 | 3.274 | 3.321 | 0.063 |
| **Negative** | 0.094 | 0.076 | 0.078 | 0.083 | 0.010 |
| **2.5** | 0.649 | 1.04 | 1.49 | 1.060 | 0.421 |
| **1** | 1.277 | 1.43 | 1.442 | 1.383 | 0.092 |
| **0.75** | 1.877 | 1.453 | 1.856 | 1.729 | 0.239 |
| **0.25** | 2.063 | 2.926 | 2.573 | 2.521 | 0.434 |
| **0.075** | 2.463 | 2.527 | 2.676 | 2.555 | 0.045 |
| **0.05** | 2.735 | 2.5 | 2.427 | 2.554 | 0.166 |
| **0.025** | 3.083 | 2.722 | 2.656 | 2.820 | 0.255 |
| **0.01** | 3.381 | 2.906 | 2.609 | 2.965 | 0.389 |
| **0.0075** | 2.736 | 3.504 | 3.025 | 3.088 | 0.388 |
| **0.005** | 3.338 | 2.909 | 3.009 | 3.085 | 0.224 |
| **0.0025** | 2.322 | 2.668 | 2.654 | 2.548 | 0.196 |
| **Concentration (mg/ml)** | $A_{620}$ | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 1.064 | 1.031 | 1.024 | 1.040 | 0.021 |
| **Negative** | 0.06 | 0.054 | 0.054 | 0.056 | 0.003 |
| **2.5** | 0.248 | 0.38 | 0.755 | 0.461 | 0.263 |
| **1** | 0.415 | 0.451 | 0.454 | 0.440 | 0.022 |
| **0.75** | 0.549 | 0.444 | 0.596 | 0.530 | 0.078 |
| **0.25** | 0.625 | 0.954 | 0.79 | 0.790 | 0.165 |
| **0.075** | 0.745 | 0.816 | 0.711 | 0.757 | 0.054 |
| **0.05** | 0.796 | 0.824 | 0.764 | 0.795 | 0.030 |
| **0.025** | 0.839 | 0.973 | 0.834 | 0.882 | 0.079 |
| **0.01** | 1.041 | 0.888 | 0.764 | 0.898 | 0.139 |
| **0.0075** | 0.862 | 0.94 | 0.843 | 0.882 | 0.051 |
| **0.005** | 0.991 | 0.899 | 0.912 | 0.934 | 0.050 |
| **0.0025** | 0.742 | 0.805 | 0.831 | 0.793 | 0.046 |

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| Concentration (mg/ml) | $A_{550}$-$A_{620}$ | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Mean | SD |
| Positive | 2.328 | 2.265 | 2.25 | 2.281 | 0.041 |
| Negative | 0.034 | 0.022 | 0.024 | 0.027 | 0.006 |
| 2.5 | 0.401 | 0.66 | 0.735 | 0.599 | 0.175 |
| 1 | 0.862 | 0.979 | 0.988 | 0.943 | 0.070 |
| 0.75 | 1.328 | 1.009 | 1.26 | 1.199 | 0.168 |
| 0.5 | 1.49 | 2.14 | 1.201 | 1.610 | 0.481 |
| 0.25 | 1.438 | 1.972 | 1.783 | 1.731 | 0.271 |
| 0.1 | 1.078 | 0.996 | 0.894 | 0.989 | 0.092 |
| 0.075 | 1.718 | 1.711 | 1.965 | 1.798 | 0.145 |
| 0.05 | 1.939 | 1.676 | 1.663 | 1.759 | 0.156 |
| 0.025 | 2.244 | 1.749 | 1.822 | 1.938 | 0.267 |
| 0.01 | 2.34 | 2.018 | 1.845 | 2.068 | 0.251 |
| 0.0075 | 1.874 | 2.564 | 2.182 | 2.207 | 0.346 |
| 0.005 | 2.347 | 2.01 | 2.097 | 2.151 | 0.175 |
| 0.0025 | 1.58 | 1.863 | 1.823 | 1.755 | 0.153 |
| 0.001 | 1.643 | 1.748 | 2.228 | 1.873 | 0.312 |
| Concentration (mg/ml) | %Viability | | | | |
| | 1 | 2 | 3 | Mean | SD |
| Positive | 102.060 | 99.299 | 98.641 | 100.000 | 1.814 |
| Negative | 1.491 | 0.964 | 1.052 | 1.169 | 0.282 |
| 2.5 | 17.580 | 28.935 | 32.223 | 26.246 | 7.683 |
| 1 | 37.790 | 42.920 | 43.314 | 41.342 | 3.082 |
| 0.75 | 58.220 | 44.235 | 55.239 | 52.565 | 7.366 |
| 0.5 | 65.322 | 93.819 | 52.652 | 70.598 | 21.084 |
| 0.25 | 63.043 | 86.453 | 78.167 | 75.888 | 11.871 |
| 0.1 | 47.260 | 43.665 | 39.193 | 43.373 | 4.041 |
| 0.075 | 75.318 | 75.011 | 86.146 | 78.825 | 6.342 |
| 0.05 | 85.007 | 73.477 | 72.907 | 77.130 | 6.827 |
| 0.025 | 98.378 | 76.677 | 79.877 | 84.977 | 11.715 |
| 0.01 | 102.587 | 88.470 | 80.886 | 90.647 | 11.013 |
| 0.0075 | 82.157 | 112.407 | 95.660 | 96.741 | 15.154 |
| 0.005 | 102.893 | 88.119 | 91.933 | 94.315 | 7.670 |
| 0.0025 | 69.268 | 81.675 | 79.921 | 76.955 | 6.714 |
| 0.001 | 72.030 | 76.633 | 97.676 | 82.113 | 13.673 |
| $IC_{50}$ | 1.078 | 0.902 | 1.197 | 1.059 | 0.148 |

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**Table B4** Calculation $LD_{50}$ of L929 cell line treated with artemisinin (Experiment 2)

| **Concentration (mg/ml)** | **$A_{550}$** | | | | |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 0.735 | 0.849 | | 0.792 | |
| **2.5** | 0.594 | 0.496 | 0.471 | 0.520 | 0.065 |
| **1** | 0.436 | 0.307 | 0.331 | 0.358 | 0.069 |
| **0.75** | 0.563 | 0.565 | 0.534 | 0.554 | 0.017 |
| **0.5** | 0.949 | 0.774 | 0.742 | 0.822 | 0.111 |
| **0.25** | 0.468 | 0.460 | 0.495 | 0.474 | 0.018 |
| **0.1** | 0.666 | 0.671 | 0.747 | 0.695 | 0.045 |
| **0.05** | 0.862 | 0.727 | 0.811 | 0.800 | 0.068 |
| **Concentration (mg/ml)** | **$A_{620}$** | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 0.278 | 0.317 | | 0.298 | |
| **2.5** | 0.194 | 0.200 | 0.185 | 0.193 | 0.008 |
| **1** | 0.176 | 0.141 | 0.140 | 0.152 | 0.021 |
| **0.75** | 0.189 | 0.217 | 0.173 | 0.193 | 0.022 |
| **0.5** | 0.288 | 0.225 | 0.237 | 0.250 | 0.033 |
| **0.25** | 0.175 | 0.184 | 0.203 | 0.187 | 0.014 |
| **0.1** | 0.237 | 0.247 | 0.274 | 0.253 | 0.019 |
| **0.05** | 0.320 | 0.262 | 0.287 | 0.290 | 0.029 |
| **Concentration (mg/ml)** | **$A_{550}$-$A_{620}$** | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 0.457 | 0.532 | | 0.495 | |
| **2.5** | 0.400 | 0.296 | 0.286 | 0.327 | 0.063 |
| **1** | 0.260 | 0.166 | 0.191 | 0.206 | 0.049 |
| **0.75** | 0.374 | 0.348 | 0.361 | 0.361 | 0.013 |
| **0.5** | 0.661 | 0.549 | 0.505 | 0.572 | 0.080 |
| **0.25** | 0.293 | 0.276 | 0.292 | 0.287 | 0.010 |
| **0.1** | 0.429 | 0.424 | 0.473 | 0.442 | 0.027 |
| **0.05** | 0.542 | 0.465 | 0.524 | 0.510 | 0.040 |
| **Concentration (mg/ml)** | **%Viability** | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 92.323 | 107.475 | | 99.899 | |
| **2.5** | 80.808 | 59.798 | 57.778 | 66.128 | 12.753 |
| **1** | 52.525 | 33.535 | 38.586 | 41.549 | 9.836 |
| **0.75** | 75.556 | 70.303 | 72.929 | 72.929 | 2.626 |
| **0.5** | 133.535 | 110.909 | 102.020 | 115.488 | 16.249 |
| **0.25** | 59.192 | 55.758 | 58.990 | 57.980 | 1.927 |
| **0.1** | 86.667 | 85.657 | 95.556 | 89.293 | 5.447 |
| **0.05** | 109.495 | 93.939 | 105.859 | 103.098 | 8.137 |
| **$IC_{50}$** | **0.915** | **1.236** | **1.127** | **1.093** | **0.163** |

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**Table B5** Calculation $LD_{50}$ of L929 cell line treated with doxorubicin

| Concentration (mg/ml) | $A_{550}$ | | | | |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 3.621 | 3.617 | 3.866 | 3.701 | 0.143 |
| **Negative** | 0.08 | 0.081 | 0.09 | 0.084 | 0.006 |
| **0.01** | 0.275 | 0.312 | 0.274 | 0.287 | 0.022 |
| **0.0075** | 0.298 | 0.391 | 0.38 | 0.356 | 0.051 |
| **0.005** | 0.388 | 0.463 | 0.486 | 0.446 | 0.051 |
| **0.0025** | 0.783 | 1.008 | 1.12 | 0.970 | 0.172 |
| **0.001** | 1.529 | 1.612 | 1.797 | 1.646 | 0.137 |
| **0.00075** | 1.983 | 1.882 | 1.742 | 1.869 | 0.121 |
| **0.0005** | 2.061 | 1.778 | 2.005 | 1.948 | 0.150 |
| **0.00025** | 2.274 | 2.301 | 2.398 | 2.324 | 0.065 |
| **0.0001** | 2.515 | 1.803 | 2.672 | 2.330 | 0.463 |
| **Concentration (mg/ml)** | $A_{620}$ | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 1.116 | 1.104 | 1.273 | 1.164 | 0.094 |
| **Negative** | 0.058 | 0.06 | 0.06 | 0.059 | 0.001 |
| **0.01** | 0.113 | 0.124 | 0.113 | 0.117 | 0.006 |
| **0.0075** | 0.122 | 0.147 | 0.142 | 0.137 | 0.013 |
| **0.005** | 0.149 | 0.168 | 0.183 | 0.167 | 0.017 |
| **0.0025** | 0.264 | 0.313 | 0.383 | 0.320 | 0.060 |
| **0.001** | 0.462 | 0.541 | 0.55 | 0.518 | 0.048 |
| **0.00075** | 0.583 | 0.573 | 0.556 | 0.571 | 0.014 |
| **0.0005** | 0.653 | 0.556 | 0.585 | 0.598 | 0.050 |
| **0.00025** | 0.782 | 0.694 | 0.712 | 0.729 | 0.046 |
| **0.0001** | 0.828 | 0.615 | 0.818 | 0.754 | 0.120 |
| **Concentration (mg/ml)** | $A_{550}$-$A_{620}$ | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 2.505 | 2.513 | 2.593 | 2.537 | 0.049 |
| **Negative** | 0.022 | 0.021 | 0.03 | 0.024 | 0.005 |
| **0.01** | 0.162 | 0.188 | 0.161 | 0.170 | 0.015 |
| **0.0075** | 0.176 | 0.244 | 0.238 | 0.219 | 0.038 |
| **0.005** | 0.239 | 0.295 | 0.303 | 0.279 | 0.035 |
| **0.0025** | 0.519 | 0.695 | 0.737 | 0.650 | 0.116 |
| **0.001** | 1.067 | 1.071 | 1.247 | 1.128 | 0.103 |
| **0.00075** | 1.4 | 1.309 | 1.186 | 1.298 | 0.107 |
| **0.0005** | 1.408 | 1.222 | 1.42 | 1.350 | 0.111 |
| **0.00025** | 1.492 | 1.607 | 1.686 | 1.595 | 0.098 |
| **0.0001** | 1.687 | 1.188 | 1.854 | 1.576 | 0.347 |

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| Concentration (mg/ml) | %Viability | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Mean | SD |
| **Positive** | 98.739 | 99.054 | 102.207 | 100.000 | 1.918 |
| **Negative** | 0.867 | 0.828 | 1.182 | 0.959 | 0.194 |
| **0.01** | 6.385 | 7.410 | 6.346 | 6.714 | 0.603 |
| **0.0075** | 6.937 | 9.618 | 9.381 | 8.645 | 1.484 |
| **0.005** | 9.421 | 11.628 | 11.943 | 10.997 | 1.375 |
| **0.0025** | 20.457 | 27.395 | 29.050 | 25.634 | 4.559 |
| **0.001** | 42.058 | 42.215 | 49.153 | 44.475 | 4.052 |
| **0.00075** | 55.183 | 51.596 | 46.748 | 51.176 | 4.233 |
| **0.0005** | 55.499 | 48.167 | 55.972 | 53.212 | 4.376 |
| **0.00025** | 58.810 | 63.343 | 66.456 | 62.870 | 3.845 |
| **0.0001** | 66.496 | 46.827 | 73.078 | 62.134 | 13.659 |
| **$IC_{50}$** | **0.00181** | **0.00164** | **0.00161** | **0.00169** | **0.00011** |

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**Table B6** Calculation $IC_{50}$ of B16F10 cell line treated with deoxyartemisinin

| Concentration (mg/ml) | $A_{550}$ | | | | |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 2.328 | 2.934 | 2.751 | 2.671 | 0.311 |
| **Negative** | 0.119 | 0.117 | 0.121 | 0.119 | 0.002 |
| **2.5** | 0.307 | 0.295 | 0.362 | 0.321 | 0.036 |
| **1** | 0.762 | 0.885 | 0.161 | 0.603 | 0.387 |
| **0.75** | 1.885 | 1.433 | 0.902 | 1.407 | 0.492 |
| **0.5** | 1.124 | 1.519 | 1.429 | 1.357 | 0.207 |
| **0.1** | 2.826 | 2.937 | 3.895 | 3.219 | 0.588 |
| **0.01** | 3.102 | 3.284 | 3.577 | 3.321 | 0.240 |
| **0.0075** | 2.549 | 2.933 | 2.984 | 2.822 | 0.238 |
| **0.001** | 3.324 | 3.11 | 3.422 | 3.285 | 0.160 |
| **Concentration (mg/ml)** | $A_{620}$ | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 0.773 | 1.057 | 1.163 | 0.998 | 0.202 |
| **Negative** | 0.073 | 0.084 | 0.075 | 0.077 | 0.006 |
| **2.5** | 0.152 | 0.142 | 0.177 | 0.157 | 0.018 |
| **1** | 0.292 | 0.364 | 0.093 | 0.250 | 0.140 |
| **0.75** | 0.679 | 0.539 | 0.43 | 0.549 | 0.125 |
| **0.5** | 0.435 | 0.711 | 0.634 | 0.593 | 0.142 |
| **0.1** | 1.285 | 1.297 | 1.545 | 1.376 | 0.147 |
| **0.01** | 1.325 | 1.294 | 1.533 | 1.384 | 0.130 |
| **0.0075** | 1.219 | 1.142 | 1.138 | 1.166 | 0.046 |
| **0.001** | 1.261 | 1.244 | 1.376 | 1.294 | 0.072 |
| **Concentration (mg/ml)** | $A_{550}$-$A_{620}$ | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 1.555 | 1.877 | 1.588 | 1.673 | 0.177 |
| **Negative** | 0.046 | 0.033 | 0.046 | 0.042 | 0.008 |
| **2.5** | 0.155 | 0.153 | 0.185 | 0.164 | 0.018 |
| **1** | 0.47 | 0.521 | 0.068 | 0.353 | 0.248 |
| **0.75** | 1.206 | 0.894 | 0.472 | 0.857 | 0.368 |
| **0.5** | 0.689 | 0.808 | 0.795 | 0.764 | 0.065 |
| **0.1** | 1.541 | 1.64 | 2.35 | 1.844 | 0.441 |
| **0.01** | 1.777 | 1.99 | 2.044 | 1.937 | 0.141 |
| **0.0075** | 1.33 | 1.791 | 1.846 | 1.656 | 0.283 |
| **0.001** | 2.063 | 1.866 | 2.046 | 1.992 | 0.109 |

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| Concentration (mg/ml) | %Viability | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Mean | SD |
| **Positive** | 92.947 | 112.194 | 94.919 | 100.020 | 10.589 |
| **Negative** | 2.750 | 1.973 | 2.750 | 2.491 | 0.449 |
| **2.5** | 9.265 | 9.145 | 11.058 | 9.823 | 1.071 |
| **1** | 28.093 | 31.142 | 4.065 | 21.100 | 14.832 |
| **0.75** | 72.086 | 53.437 | 28.213 | 51.245 | 22.019 |
| **0.5** | 41.184 | 48.296 | 47.519 | 45.666 | 3.902 |
| **0.1** | 92.110 | 98.027 | 140.466 | 110.201 | 26.377 |
| **0.01** | 106.216 | 118.948 | 122.176 | 115.780 | 8.438 |
| **0.0075** | 79.498 | 107.053 | 110.341 | 98.964 | 16.938 |
| **0.001** | 123.311 | 111.536 | 122.295 | 119.048 | 6.525 |
| **$IC_{50}$** | **0.595** | **0.637** | **0.523** | **0.585** | **0.058** |

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**Table B7** Calculation $IC_{50}$ of B16F10 cell line treated with artemisinin

| Concentration (mg/ml) | $A_{550}$ | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Mean | SD |
| Positive | 2.328 | 2.934 | 2.751 | 2.671 | 0.311 |
| Negative | 0.119 | 0.117 | 0.121 | 0.119 | 0.002 |
| 2.5 | 0.566 | 1.07 | 0.819 | 0.818 | 0.252 |
| 0.25 | 2.551 | 2.471 | 2.155 | 2.392 | 0.209 |
| 0.075 | 2.261 | 2.225 | 2.015 | 2.167 | 0.133 |
| 0.05 | 2.118 | 2.469 | 2.234 | 2.274 | 0.179 |
| 0.025 | 2.308 | 2.528 | 2.174 | 2.337 | 0.179 |
| 0.01 | 2.69 | 2.488 | 2.309 | 2.496 | 0.191 |
| 0.005 | 2.792 | 2.91 | 2.534 | 2.745 | 0.192 |
| 0.0025 | 3.552 | 3.102 | 2.736 | 3.130 | 0.409 |
| 0.001 | 2.977 | 3.274 | 3.071 | 3.107 | 0.152 |
| Concentration (mg/ml) | $A_{620}$ | | | | |
| | 1 | 2 | 3 | Mean | SD |
| Positive | 0.773 | 1.057 | 1.163 | 0.998 | 0.202 |
| Negative | 0.073 | 0.084 | 0.075 | 0.077 | 0.006 |
| 2.5 | 0.219 | 0.38 | 0.313 | 0.304 | 0.081 |
| 0.25 | 0.92 | 1.007 | 0.999 | 0.975 | 0.048 |
| 0.075 | 0.839 | 0.796 | 0.927 | 0.854 | 0.067 |
| 0.05 | 0.753 | 0.977 | 1.088 | 0.939 | 0.171 |
| 0.025 | 0.874 | 0.967 | 0.859 | 0.900 | 0.059 |
| 0.01 | 1.027 | 0.941 | 0.924 | 0.964 | 0.055 |
| 0.005 | 0.983 | 1.121 | 1.137 | 1.080 | 0.085 |
| 0.0025 | 1.334 | 1.094 | 1.182 | 1.203 | 0.121 |
| 0.001 | 1.12 | 1.177 | 1.214 | 1.170 | 0.047 |
| Concentration (mg/ml) | $A_{550}$-$A_{620}$ | | | | |
| | 1 | 2 | 3 | Mean | SD |
| Positive | 1.555 | 1.877 | 1.588 | 1.673 | 0.177 |
| Negative | 0.046 | 0.033 | 0.046 | 0.042 | 0.008 |
| 2.5 | 0.347 | 0.69 | 0.506 | 0.514 | 0.172 |
| 0.25 | 1.631 | 1.464 | 1.156 | 1.417 | 0.241 |
| 0.075 | 1.422 | 1.429 | 1.088 | 1.313 | 0.195 |
| 0.05 | 1.365 | 1.492 | 1.146 | 1.334 | 0.175 |
| 0.025 | 1.434 | 1.561 | 1.315 | 1.437 | 0.123 |
| 0.01 | 1.663 | 1.547 | 1.385 | 1.532 | 0.140 |
| 0.005 | 1.809 | 1.789 | 1.397 | 1.665 | 0.232 |
| 0.0025 | 2.218 | 2.008 | 1.554 | 1.927 | 0.339 |
| 0.001 | 1.857 | 2.097 | 1.857 | 1.937 | 0.139 |

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| Concentration (mg/ml) | %Viability | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Mean | SD |
| **Positive** | 92.947 | 112.194 | 94.919 | 100.020 | 10.589 |
| **Negative** | 2.750 | 1.973 | 2.750 | 2.491 | 0.449 |
| **2.5** | 20.741 | 41.243 | 30.245 | 30.743 | 10.260 |
| **0.25** | 97.490 | 87.507 | 69.097 | 84.698 | 14.403 |
| **0.075** | 84.997 | 85.415 | 65.033 | 78.482 | 11.649 |
| **0.05** | 81.590 | 89.181 | 68.500 | 79.757 | 10.462 |
| **0.025** | 85.714 | 93.305 | 78.601 | 85.874 | 7.353 |
| **0.01** | 99.402 | 92.469 | 82.785 | 91.552 | 8.346 |
| **0.005** | 108.129 | 106.934 | 83.503 | 99.522 | 13.886 |
| **0.0025** | 132.576 | 120.024 | 92.887 | 115.162 | 20.286 |
| **0.001** | 110.998 | 125.344 | 110.998 | 115.780 | 8.282 |
| **$IC_{50}$** | **0.934** | **0.884** | **0.795** | **0.871** | **0.070** |

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**Table B8** Calculation $IC_{50}$ of B16F10 cell line treated with doxorubicin

| Concentration (mg/ml) | $A_{550}$ | | | | |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 3.156 | 3.109 | 3.231 | 3.165 | 0.062 |
| **Negative** | 0.103 | 0.109 | 0.103 | 0.105 | 0.003 |
| **0.01** | 0.216 | 0.247 | 0.396 | 0.286 | 0.096 |
| **0.005** | 0.311 | 0.424 | 0.225 | 0.320 | 0.100 |
| **0.001** | 0.516 | 0.767 | 0.556 | 0.613 | 0.135 |
| **0.00075** | 1.794 | 1.354 | 1.266 | 1.471 | 0.283 |
| **0.0005** | 2.441 | 2.476 | 2.152 | 2.356 | 0.178 |
| **0.00025** | 2.878 | 2.457 | 1.943 | 2.426 | 0.468 |
| **0.0001** | 2.724 | 2.827 | 2.126 | 2.559 | 0.379 |
| **Concentration (mg/ml)** | $A_{620}$ | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 1.144 | 1.144 | 1.403 | 1.230 | 0.150 |
| **Negative** | 0.07 | 0.07 | 0.067 | 0.069 | 0.002 |
| **0.01** | 0.115 | 0.119 | 0.213 | 0.149 | 0.055 |
| **0.005** | 0.146 | 0.237 | 0.104 | 0.162 | 0.068 |
| **0.001** | 0.229 | 0.289 | 0.2 | 0.239 | 0.045 |
| **0.00075** | 0.617 | 0.426 | 0.458 | 0.500 | 0.102 |
| **0.0005** | 0.903 | 0.902 | 0.794 | 0.866 | 0.063 |
| **0.00025** | 1.024 | 0.866 | 0.726 | 0.872 | 0.149 |
| **0.0001** | 0.931 | 1.112 | 0.793 | 0.945 | 0.160 |
| **Concentration (mg/ml)** | $A_{550}$-$A_{620}$ | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 2.012 | 1.965 | 1.828 | 1.935 | 0.096 |
| **Negative** | 0.033 | 0.039 | 0.036 | 0.036 | 0.003 |
| **0.01** | 0.101 | 0.128 | 0.183 | 0.137 | 0.042 |
| **0.005** | 0.165 | 0.187 | 0.121 | 0.158 | 0.034 |
| **0.001** | 0.287 | 0.478 | 0.356 | 0.374 | 0.097 |
| **0.00075** | 1.177 | 0.928 | 0.808 | 0.971 | 0.188 |
| **0.0005** | 1.538 | 1.574 | 1.358 | 1.490 | 0.116 |
| **0.00025** | 1.854 | 1.591 | 1.217 | 1.554 | 0.320 |
| **0.0001** | 1.793 | 1.715 | 1.333 | 1.614 | 0.246 |

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| Concentration (mg/ml) | %Viability | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Mean | SD |
| **Positive** | 103.979 | 101.550 | 94.470 | 100.000 | 4.940 |
| **Negative** | 1.705 | 2.016 | 1.860 | 1.860 | 0.155 |
| **0.01** | 5.220 | 6.615 | 9.457 | 7.097 | 2.160 |
| **0.005** | 8.527 | 9.664 | 6.253 | 8.148 | 1.737 |
| **0.001** | 14.832 | 24.703 | 18.398 | 19.311 | 4.998 |
| **0.00075** | 60.827 | 47.959 | 41.757 | 50.181 | 9.727 |
| **0.0005** | 79.483 | 81.344 | 70.181 | 77.003 | 5.981 |
| **0.00025** | 95.814 | 82.222 | 62.894 | 80.310 | 16.543 |
| **0.0001** | 92.661 | 88.630 | 68.889 | 83.394 | 12.722 |
| **$IC_{50}$** | **0.000626** | **0.000627** | **0.000731** | **0.00066** | **0.00006** |

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**Table B9** Calculation $IC_{50}$ of A549 cell line treated with deoxyartemisinin

| Concentration (mg/ml) | $A_{550}$ | | | | |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 1.686 | 2.572 | 2.128 | 2.129 | 0.443 |
| **Negative** | 0.067 | 0.065 | 0.057 | 0.063 | 0.005 |
| **2.5** | 0.091 | 0.094 | 0.086 | 0.090 | 0.004 |
| **1** | 0.085 | 0.089 | 0.139 | 0.104 | 0.030 |
| **0.75** | 0.783 | 0.68 | 0.515 | 0.659 | 0.135 |
| **0.25** | 0.993 | 1.453 | 1.314 | 1.253 | 0.236 |
| **0.1** | 1.342 | 1.383 | 1.835 | 1.520 | 0.274 |
| **0.01** | 1.892 | 1.841 | 2.19 | 1.974 | 0.189 |
| **0.0075** | 1.706 | 2.234 | 2.458 | 2.133 | 0.386 |
| **0.005** | 1.609 | 2.051 | 1.874 | 1.845 | 0.222 |
| **0.0025** | 1.491 | 1.936 | 1.717 | 1.715 | 0.223 |
| **0.001** | 1.988 | 1.742 | 1.782 | 1.837 | 0.132 |
| **Concentration (mg/ml)** | $A_{620}$ | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 0.816 | 0.996 | 0.919 | 0.910 | 0.090 |
| **Negative** | 0.055 | 0.055 | 0.052 | 0.054 | 0.002 |
| **2.5** | 0.061 | 0.063 | 0.061 | 0.062 | 0.001 |
| **1** | 0.063 | 0.065 | 0.077 | 0.068 | 0.008 |
| **0.75** | 0.385 | 0.321 | 0.236 | 0.314 | 0.075 |
| **0.25** | 0.431 | 0.606 | 0.623 | 0.553 | 0.106 |
| **0.1** | 0.58 | 0.543 | 0.744 | 0.622 | 0.107 |
| **0.01** | 0.897 | 0.803 | 0.883 | 0.861 | 0.051 |
| **0.0075** | 0.837 | 0.943 | 0.953 | 0.911 | 0.064 |
| **0.005** | 0.663 | 0.855 | 0.885 | 0.801 | 0.120 |
| **0.0025** | 0.688 | 0.806 | 0.672 | 0.722 | 0.073 |
| **0.001** | 0.874 | 0.79 | 0.812 | 0.825 | 0.044 |
| **Concentration (mg/ml)** | $A_{550}$-$A_{620}$ | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 0.87 | 1.576 | 1.209 | 1.218 | 0.353 |
| **Negative** | 0.012 | 0.01 | 0.005 | 0.009 | 0.004 |
| **2.5** | 0.03 | 0.031 | 0.025 | 0.029 | 0.003 |
| **1** | 0.022 | 0.024 | 0.062 | 0.036 | 0.023 |
| **0.75** | 0.398 | 0.359 | 0.279 | 0.345 | 0.061 |
| **0.25** | 0.562 | 0.847 | 0.691 | 0.700 | 0.143 |
| **0.1** | 0.762 | 0.84 | 1.091 | 0.898 | 0.172 |
| **0.01** | 0.995 | 1.038 | 1.307 | 1.113 | 0.169 |
| **0.0075** | 0.869 | 1.291 | 1.505 | 1.222 | 0.324 |
| **0.005** | 0.946 | 1.196 | 0.989 | 1.044 | 0.134 |
| **0.0025** | 0.803 | 1.13 | 1.045 | 0.993 | 0.170 |
| **0.001** | 1.114 | 0.952 | 0.97 | 1.012 | 0.089 |

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| Concentration (mg/ml) | %Viability | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Mean | SD |
| **Positive** | 71.429 | 129.392 | 99.261 | 100.027 | 28.990 |
| **Negative** | 0.985 | 0.821 | 0.411 | 0.739 | 0.296 |
| **2.5** | 2.463 | 2.545 | 2.053 | 2.354 | 0.264 |
| **1** | 1.806 | 1.970 | 5.090 | 2.956 | 1.850 |
| **0.75** | 32.677 | 29.475 | 22.906 | 28.352 | 4.981 |
| **0.25** | 46.141 | 69.540 | 56.732 | 57.471 | 11.717 |
| **0.1** | 62.562 | 68.966 | 89.573 | 73.700 | 14.114 |
| **0.01** | 81.691 | 85.222 | 107.307 | 91.407 | 13.883 |
| **0.0075** | 71.346 | 105.993 | 123.563 | 100.301 | 26.570 |
| **0.005** | 77.668 | 98.194 | 81.199 | 85.687 | 10.974 |
| **0.0025** | 65.928 | 92.775 | 85.796 | 81.500 | 13.930 |
| **0.001** | 91.461 | 78.161 | 79.639 | 83.087 | 7.290 |
| **$IC_{50}$** | **0.339** | **0.409** | **0.433** | **0.394** | **0.049** |

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**Table B10** Calculation $IC_{50}$ of A549 cell line treated with artemisinin

| Concentration (mg/ml) | $A_{550}$ | | | | |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 2.085 | 1.861 | 1.882 | 1.943 | 0.124 |
| **Negative** | 0.061 | 0.078 | 0.057 | 0.065 | 0.011 |
| **2.5** | 0.453 | 0.424 | 0.413 | 0.430 | 0.021 |
| **1** | 0.57 | 0.59 | 0.541 | 0.580 | 0.014 |
| **0.75** | 0.563 | 0.587 | 0.767 | 0.639 | 0.111 |
| **0.5** | 0.989 | 1.074 | 1.092 | 1.052 | 0.055 |
| **0.25** | 1.115 | 1.146 | 0.967 | 1.076 | 0.096 |
| **0.075** | 0.997 | 1.18 | 1.178 | 1.088 | 0.128 |
| **0.05** | 1.046 | 1.507 | 1.689 | 1.368 | 0.455 |
| **0.0075** | 1.534 | 1.581 | 1.041 | 1.385 | 0.299 |
| **0.005** | 1.366 | 1.117 | 1.049 | 1.177 | 0.167 |
| **0.0025** | 1.552 | 1.44 | 1.149 | 1.380 | 0.208 |
| **0.001** | 1.546 | 1.561 | 1.177 | 1.428 | 0.218 |
| **Concentration (mg/ml)** | $A_{620}$ | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 0.926 | 0.958 | 0.74 | 0.875 | 0.118 |
| **Negative** | 0.054 | 0.058 | 0.052 | 0.055 | 0.003 |
| **2.5** | 0.19 | 0.193 | 0.177 | 0.192 | 0.009 |
| **1** | 0.246 | 0.254 | 0.255 | 0.250 | 0.005 |
| **0.75** | 0.26 | 0.283 | 0.332 | 0.272 | 0.037 |
| **0.5** | 0.417 | 0.458 | 0.464 | 0.438 | 0.026 |
| **0.25** | 0.449 | 0.491 | 0.395 | 0.470 | 0.048 |
| **0.075** | 0.417 | 0.498 | 0.474 | 0.458 | 0.042 |
| **0.05** | 0.45 | 0.623 | 0.745 | 0.537 | 0.148 |
| **0.0075** | 0.604 | 0.863 | 0.511 | 0.734 | 0.182 |
| **0.005** | 0.657 | 0.546 | 0.502 | 0.602 | 0.080 |
| **0.0025** | 0.725 | 0.685 | 0.565 | 0.705 | 0.083 |
| **0.001** | 0.704 | 0.783 | 0.522 | 0.744 | 0.134 |

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| Concentration (mg/ml) | $A_{550}$-$A_{620}$ | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Mean | SD |
| Positive | 1.159 | 0.903 | 1.142 | 1.068 | 0.143 |
| Negative | 0.007 | 0.02 | 0.005 | 0.011 | 0.008 |
| 2.5 | 0.263 | 0.231 | 0.236 | 0.247 | 0.017 |
| 1 | 0.324 | 0.336 | 0.286 | 0.330 | 0.026 |
| 0.75 | 0.303 | 0.304 | 0.435 | 0.304 | 0.076 |
| 0.5 | 0.572 | 0.616 | 0.628 | 0.594 | 0.029 |
| 0.25 | 0.666 | 0.655 | 0.572 | 0.661 | 0.051 |
| 0.075 | 0.58 | 0.682 | 0.704 | 0.631 | 0.066 |
| 0.05 | 0.596 | 0.884 | 0.944 | 0.740 | 0.186 |
| 0.0075 | 0.93 | 0.718 | 0.53 | 0.824 | 0.200 |
| 0.005 | 0.709 | 0.571 | 0.547 | 0.640 | 0.087 |
| 0.0025 | 0.827 | 0.755 | 0.584 | 0.791 | 0.125 |
| 0.001 | 0.842 | 0.778 | 0.655 | 0.810 | 0.095 |
| Concentration (mg/ml) | %Viability | | | | |
| | 1 | 2 | 3 | Mean | SD |
| Positive | 108.521 | 84.551 | 106.929 | 100.000 | 13.403 |
| Negative | 0.655 | 1.873 | 0.468 | 0.999 | 0.763 |
| 2.5 | 24.625 | 21.629 | 22.097 | 23.127 | 1.612 |
| 1 | 30.337 | 31.461 | 26.779 | 30.899 | 2.444 |
| 0.75 | 28.371 | 28.464 | 40.730 | 28.418 | 7.109 |
| 0.5 | 53.558 | 57.678 | 58.801 | 55.618 | 2.761 |
| 0.25 | 62.360 | 61.330 | 53.558 | 61.845 | 4.812 |
| 0.075 | 54.307 | 63.858 | 65.918 | 59.082 | 6.195 |
| 0.05 | 55.805 | 82.772 | 88.390 | 69.288 | 17.419 |
| 0.0075 | 87.079 | 67.228 | 49.625 | 77.154 | 18.738 |
| 0.005 | 66.386 | 53.464 | 51.217 | 59.925 | 8.186 |
| 0.0025 | 77.434 | 70.693 | 54.682 | 74.064 | 11.687 |
| 0.001 | 78.839 | 72.846 | 61.330 | 75.843 | 8.899 |
| $IC_{50}$ | **0.624** | **0.474** | **0.670** | **0.589** | **0.102** |

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**Table B11** Calculation $IC_{50}$ of A549 cell line treated with doxorubicin

| Concentration (mg/ml) | $A_{550}$ | | | | |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 1.896 | 2.34 | 1.983 | 2.073 | 0.235 |
| **Negative** | 0.067 | 0.061 | 0.066 | 0.065 | 0.003 |
| **0.005** | 0.554 | 0.516 | 0.509 | 0.535 | 0.027 |
| **0.0025** | 0.38 | 0.507 | 0.678 | 0.444 | 0.090 |
| **0.001** | 1.331 | 1.388 | 1.366 | 1.362 | 0.029 |
| **0.00075** | 1.596 | 1.281 | 1.501 | 1.459 | 0.162 |
| **0.0005** | 1.610 | 1.622 | 1.765 | 1.666 | 0.086 |
| **0.00025** | 1.979 | 1.829 | 1.624 | 1.811 | 0.178 |
| **0.0001** | 1.999 | 2.025 | 1.951 | 1.992 | 0.038 |
| **Concentration (mg/ml)** | $A_{620}$ | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 0.867 | 1.028 | 0.986 | 0.960 | 0.084 |
| **Negative** | 0.055 | 0.054 | 0.053 | 0.054 | 0.001 |
| **0.005** | 0.232 | 0.229 | 0.206 | 0.231 | 0.002 |
| **0.0025** | 0.176 | 0.227 | 0.285 | 0.202 | 0.036 |
| **0.001** | 0.517 | 0.562 | 0.544 | 0.541 | 0.023 |
| **0.00075** | 0.612 | 0.486 | 0.584 | 0.561 | 0.066 |
| **0.0005** | 0.646 | 0.635 | 0.66 | 0.647 | 0.013 |
| **0.00025** | 0.771 | 0.732 | 0.643 | 0.715 | 0.066 |
| **0.0001** | 0.953 | 0.844 | 0.779 | 0.859 | 0.088 |
| **Concentration (mg/ml)** | $A_{550}$-$A_{620}$ | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 1.029 | 1.312 | 0.997 | 1.113 | 0.173 |
| **Negative** | 0.012 | 0.007 | 0.013 | 0.011 | 0.003 |
| **0.005** | 0.322 | 0.287 | 0.303 | 0.305 | 0.025 |
| **0.0025** | 0.204 | 0.28 | 0.393 | 0.242 | 0.054 |
| **0.001** | 0.814 | 0.826 | 0.822 | 0.821 | 0.006 |
| **0.00075** | 0.984 | 0.795 | 0.917 | 0.899 | 0.096 |
| **0.0005** | 0.964 | 0.987 | 1.105 | 1.019 | 0.076 |
| **0.00025** | 1.208 | 1.097 | 0.981 | 1.095 | 0.114 |
| **0.0001** | 1.046 | 1.181 | 1.172 | 1.133 | 0.075 |

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| Concentration (mg/ml) | %Viability | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Mean | SD |
| **Positive** | 92.453 | 117.880 | 89.578 | 99.970 | 15.577 |
| **Negative** | 1.078 | 0.629 | 1.168 | 0.958 | 0.289 |
| **0.005** | 28.931 | 25.786 | 27.224 | 27.358 | 2.224 |
| **0.0025** | 18.329 | 25.157 | 35.310 | 21.743 | 4.828 |
| **0.001** | 73.136 | 74.214 | 73.854 | 73.735 | 0.549 |
| **0.00075** | 88.410 | 71.429 | 82.390 | 80.743 | 8.610 |
| **0.0005** | 86.613 | 88.679 | 99.281 | 91.524 | 6.797 |
| **0.00025** | 108.535 | 98.562 | 88.140 | 98.413 | 10.198 |
| **0.0001** | 93.980 | 106.110 | 105.301 | 101.797 | 6.782 |
| **$IC_{50}$** | **0.00146** | **0.00176** | **0.00248** | **0.00190** | **0.00052** |

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**Table B12** Calculation $IC_{50}$ of HT-29 cell line treated with deoxyartemisinin (Experiment 1)

| Concentration (mg/ml) | $A_{550}$ | | | | |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 1.701 | 2.432 | 2.306 | 2.146 | 0.391 |
| **Negative** | 0.089 | 0.084 | 0.086 | 0.086 | 0.003 |
| **2.5** | 0.356 | 0.229 | 0.375 | 0.320 | 0.079 |
| **1** | 1.712 | 2.392 | 2.334 | 2.146 | 0.377 |
| **0.75** | 2.235 | 2.017 | 2.716 | 2.323 | 0.358 |
| **0.5** | 2.327 | 2.46 | 2.699 | 2.495 | 0.189 |
| **0.25** | 2.112 | 2.053 | 3.3 | 2.488 | 0.704 |
| **0.01** | 3.316 | 3.423 | 4.018 | 3.586 | 0.378 |
| **0.0075** | 3.137 | 3.075 | 2.921 | 3.044 | 0.111 |
| **0.001** | 3.249 | 3.519 | 3.513 | 3.427 | 0.154 |
| **Concentration (mg/ml)** | $A_{620}$ | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 0.647 | 0.881 | 0.908 | 0.812 | 0.144 |
| **Negative** | 0.058 | 0.057 | 0.059 | 0.058 | 0.001 |
| **2.5** | 0.126 | 0.098 | 0.133 | 0.119 | 0.019 |
| **1** | 0.541 | 0.724 | 0.686 | 0.650 | 0.097 |
| **0.75** | 0.718 | 0.656 | 0.758 | 0.711 | 0.051 |
| **0.5** | 0.691 | 0.725 | 0.76 | 0.725 | 0.035 |
| **0.25** | 0.655 | 0.658 | 1.057 | 0.790 | 0.231 |
| **0.01** | 1.172 | 1.026 | 1.569 | 1.256 | 0.281 |
| **0.0075** | 1.006 | 0.95 | 1.093 | 1.016 | 0.072 |
| **0.001** | 1.108 | 1.197 | 1.185 | 1.163 | 0.048 |
| **Concentration (mg/ml)** | $A_{550}$-$A_{620}$ | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 1.054 | 1.551 | 1.398 | 1.334 | 0.255 |
| **Negative** | 0.031 | 0.027 | 0.027 | 0.028 | 0.002 |
| **2.5** | 0.23 | 0.131 | 0.242 | 0.201 | 0.061 |
| **1** | 1.171 | 1.668 | 1.648 | 1.496 | 0.281 |
| **0.75** | 1.517 | 1.361 | 1.958 | 1.612 | 0.310 |
| **0.5** | 1.636 | 1.735 | 1.939 | 1.770 | 0.155 |
| **0.25** | 1.457 | 1.395 | 2.243 | 1.698 | 0.473 |
| **0.01** | 2.144 | 2.397 | 2.449 | 2.330 | 0.163 |
| **0.0075** | 2.131 | 2.125 | 1.828 | 2.028 | 0.173 |
| **0.001** | 2.141 | 2.322 | 2.328 | 2.264 | 0.106 |

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| Concentration (mg/ml) | %Viability | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Mean | SD |
| **Positive** | 79.010 | 116.267 | 104.798 | 100.025 | 19.081 |
| **Negative** | 2.324 | 2.024 | 2.024 | 2.124 | 0.173 |
| **2.5** | 17.241 | 9.820 | 18.141 | 15.067 | 4.567 |
| **1** | 87.781 | 125.037 | 123.538 | 112.119 | 21.091 |
| **0.75** | 113.718 | 102.024 | 146.777 | 120.840 | 23.211 |
| **0.5** | 122.639 | 130.060 | 145.352 | 132.684 | 11.582 |
| **0.25** | 109.220 | 104.573 | 168.141 | 127.311 | 35.436 |
| **0.01** | 160.720 | 179.685 | 183.583 | 174.663 | 12.231 |
| **0.0075** | 159.745 | 159.295 | 137.031 | 152.024 | 12.986 |
| **0.001** | 160.495 | 174.063 | 174.513 | 169.690 | 7.967 |
| **$IC_{50}$** | **2.034** | **1.668** | **1.246** | **1.649** | **0.394** |

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**Table B13** Calculation $IC_{50}$ of HT-29 cell line treated with deoxyartemisinin (Experiment 2)

| Concentration (mg/ml) | $A_{550}$ | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Mean | SD |
| Positive | | | | 1.148 | |
| 2.5 | 0.156 | 0.152 | 0.161 | 0.156 | 0.005 |
| 1 | 0.507 | 0.510 | 0.477 | 0.498 | 0.018 |
| 0.75 | 0.669 | 0.504 | 0.565 | 0.579 | 0.083 |
| 0.5 | 0.669 | 0.541 | 0.565 | 0.592 | 0.068 |
| 0.25 | 0.466 | 0.526 | 0.462 | 0.485 | 0.036 |
| 0.1 | 0.655 | 0.597 | 0.524 | 0.592 | 0.066 |
| 0.05 | 0.430 | 0.454 | 0.390 | 0.425 | 0.032 |
| Concentration (mg/ml) | $A_{620}$ | | | | |
| | 1 | 2 | 3 | Mean | SD |
| Positive | | | | 0.463 | |
| 2.5 | 0.156 | 0.152 | 0.161 | 0.156 | 0.005 |
| 1 | 0.507 | 0.510 | 0.477 | 0.498 | 0.018 |
| 0.75 | 0.669 | 0.504 | 0.565 | 0.579 | 0.083 |
| 0.5 | 0.669 | 0.541 | 0.565 | 0.592 | 0.068 |
| 0.25 | 0.466 | 0.526 | 0.462 | 0.485 | 0.036 |
| 0.1 | 0.655 | 0.597 | 0.524 | 0.592 | 0.066 |
| 0.05 | 0.430 | 0.454 | 0.390 | 0.425 | 0.032 |
| Concentration (mg/ml) | $A_{550}$-$A_{620}$ | | | | |
| | 1 | 2 | 3 | Mean | SD |
| Positive | | | | 0.685 | |
| 2.5 | 0.264 | 0.236 | 0.250 | 0.250 | 0.014 |
| 1 | 0.638 | 0.615 | 0.632 | 0.628 | 0.012 |
| 0.75 | 0.963 | 0.988 | 0.753 | 0.901 | 0.129 |
| 0.5 | 1.019 | 0.889 | 0.993 | 0.967 | 0.069 |
| 0.25 | 0.675 | 0.960 | 0.863 | 0.833 | 0.145 |
| 0.1 | 1.044 | 0.832 | 0.839 | 0.905 | 0.120 |
| 0.05 | 0.534 | 0.645 | 0.722 | 0.634 | 0.095 |
| Concentration (mg/ml) | %Viability | | | | |
| | 1 | 2 | 3 | Mean | SD |
| Positive | | | | 100.000 | |
| 2.5 | 38.540 | 34.453 | 36.496 | 36.496 | 2.044 |
| 1 | 93.139 | 89.781 | 92.263 | 91.727 | 1.742 |
| 0.75 | 140.584 | 144.234 | 109.927 | 131.582 | 18.842 |
| 0.5 | 148.759 | 129.781 | 144.964 | 141.168 | 10.042 |
| 0.25 | 98.540 | 140.146 | 125.985 | 121.557 | 21.153 |
| 0.1 | 152.409 | 121.460 | 122.482 | 132.117 | 17.581 |
| 0.05 | 77.956 | 94.161 | 105.401 | 92.506 | 13.797 |
| $IC_{50}$ | 1.144 | 1.211 | 1.193 | 1.183 | 0.035 |

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**Table B14** Calculation $IC_{50}$ of HT-29 cell line treated with artemisinin

| Concentration (mg/ml) | $A_{550}$ | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Mean | SD |
| Positive | 3.624 | 2.506 | 2.201 | 2.777 | 0.749 |
| Negative | 0.085 | 0.078 | 0.078 | 0.080 | 0.004 |
| 2.5 | 0.751 | 1.040 | 1.099 | 0.963 | 0.186 |
| 0.1 | 1.064 | 1.072 | 0.965 | 1.034 | 0.060 |
| 0.075 | 1.510 | 1.876 | 1.770 | 1.719 | 0.188 |
| 0.025 | 2.060 | 1.900 | 2.237 | 2.066 | 0.169 |
| 0.0075 | 2.524 | 2.061 | 2.115 | 2.233 | 0.253 |
| 0.005 | 2.069 | 2.378 | 2.285 | 2.244 | 0.159 |
| **Concentration (mg/ml)** | **$A_{620}$** | | | | |
| | 1 | 2 | 3 | Mean | SD |
| Positive | 1.259 | 0.899 | 0.818 | 0.992 | 0.235 |
| Negative | 0.057 | 0.053 | 0.057 | 0.056 | 0.002 |
| 2.5 | 0.264 | 0.302 | 0.323 | 0.296 | 0.030 |
| 0.1 | 0.413 | 0.461 | 0.403 | 0.426 | 0.031 |
| 0.075 | 0.551 | 0.622 | 0.549 | 0.574 | 0.042 |
| 0.025 | 0.682 | 0.752 | 0.789 | 0.741 | 0.054 |
| 0.0075 | 0.949 | 0.744 | 0.842 | 0.845 | 0.103 |
| 0.005 | 0.700 | 0.867 | 0.808 | 0.792 | 0.085 |
| **Concentration (mg/ml)** | **$A_{550}$-$A_{620}$** | | | | |
| | 1 | 2 | 3 | Mean | SD |
| Positive | 2.365 | 1.607 | 1.383 | 1.785 | 0.515 |
| Negative | 0.028 | 0.025 | 0.021 | 0.025 | 0.004 |
| 2.5 | 0.487 | 0.738 | 0.776 | 0.667 | 0.157 |
| 0.1 | 0.651 | 0.611 | 0.562 | 0.608 | 0.045 |
| 0.075 | 0.959 | 1.254 | 1.221 | 1.145 | 0.162 |
| 0.025 | 1.378 | 1.148 | 1.448 | 1.325 | 0.157 |
| 0.0075 | 1.575 | 1.317 | 1.273 | 1.388 | 0.163 |
| 0.005 | 1.369 | 1.511 | 1.477 | 1.452 | 0.074 |
| **Concentration (mg/ml)** | **%Viability** | | | | |
| | 1 | 2 | 3 | Mean | SD |
| Positive | 132.493 | 90.028 | 77.479 | 100.000 | 28.831 |
| Negative | 1.569 | 1.401 | 1.176 | 1.382 | 0.197 |
| 2.5 | 27.283 | 41.345 | 43.473 | 37.367 | 8.798 |
| 0.1 | 36.471 | 34.230 | 31.485 | 34.062 | 2.497 |
| 0.075 | 53.725 | 70.252 | 68.403 | 64.127 | 9.055 |
| 0.025 | 77.199 | 64.314 | 81.120 | 74.211 | 8.793 |
| 0.0075 | 88.235 | 73.782 | 71.317 | 77.778 | 9.140 |
| 0.005 | 76.695 | 84.650 | 82.745 | 81.363 | 4.154 |
| **$IC_{50}$** | **0.080** | **0.082** | **0.079** | **0.080** | **0.001** |

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**Table B15** Calculation $IC_{50}$ of HT-29 cell line treated with doxorubicin

| Concentration (mg/ml) | $A_{550}$ | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Mean | SD |
| Positive | 1.211 | 1.313 | 1.046 | 1.190 | 0.135 |
| Negative | 0.094 | 0.094 | 0.095 | 0.094 | 0.001 |
| 0.01 | 0.504 | 0.408 | 0.475 | 0.462 | 0.049 |
| 0.0025 | 0.587 | 0.546 | 0.597 | 0.577 | 0.027 |
| 0.0005 | 0.749 | 0.747 | 0.755 | 0.750 | 0.004 |
| 0.00025 | 0.716 | 0.621 | 0.604 | 0.647 | 0.060 |
| 0.0001 | 0.677 | 0.67 | 0.665 | 0.671 | 0.006 |
| Concentration (mg/ml) | $A_{620}$ | | | | |
| | 1 | 2 | 3 | Mean | SD |
| Positive | 0.415 | 0.43 | 0.37 | 0.405 | 0.031 |
| Negative | 0.062 | 0.06 | 0.063 | 0.062 | 0.002 |
| 0.01 | 0.194 | 0.18 | 0.185 | 0.186 | 0.007 |
| 0.0025 | 0.203 | 0.191 | 0.204 | 0.199 | 0.007 |
| 0.0005 | 0.254 | 0.268 | 0.253 | 0.258 | 0.008 |
| 0.00025 | 0.238 | 0.211 | 0.201 | 0.217 | 0.019 |
| 0.0001 | 0.233 | 0.23 | 0.223 | 0.229 | 0.005 |
| Concentration (mg/ml) | $A_{550}$-$A_{620}$ | | | | |
| | 1 | 2 | 3 | Mean | SD |
| Positive | 0.796 | 0.883 | 0.676 | 0.785 | 0.104 |
| Negative | 0.032 | 0.034 | 0.032 | 0.033 | 0.001 |
| 0.01 | 0.31 | 0.228 | 0.29 | 0.276 | 0.043 |
| 0.0025 | 0.384 | 0.355 | 0.393 | 0.377 | 0.020 |
| 0.0005 | 0.495 | 0.479 | 0.502 | 0.492 | 0.012 |
| 0.00025 | 0.478 | 0.41 | 0.403 | 0.430 | 0.041 |
| 0.0001 | 0.444 | 0.44 | 0.442 | 0.442 | 0.002 |
| Concentration (mg/ml) | %Viability | | | | |
| | 1 | 2 | 3 | Mean | SD |
| Positive | 101.401 | 112.484 | 86.115 | 100.000 | 13.240 |
| Negative | 4.076 | 4.331 | 4.076 | 4.161 | 0.147 |
| 0.01 | 39.490 | 29.045 | 36.943 | 35.159 | 5.447 |
| 0.0025 | 48.917 | 45.223 | 50.064 | 48.068 | 2.530 |
| 0.0005 | 63.057 | 61.019 | 63.949 | 62.675 | 1.502 |
| 0.00025 | 60.892 | 52.229 | 51.338 | 54.820 | 5.278 |
| 0.0001 | 56.561 | 56.051 | 56.306 | 56.306 | 0.255 |
| $IC_{50}$ | **0.00155** | **0.00224** | **0.00270** | **0.00216** | **0.00058** |

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**Table B16** Calculation $IC_{50}$ of Caco-2 cell line treated with deoxyartemisinin

| Concentration (mg/ml) | $A_{550}$ | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Mean | SD |
| Positive | 0.886 | 1.248 | 1.395 | 1.176 | 0.262 |
| Negative | 0.091 | 0.078 | 0.076 | 0.082 | 0.008 |
| 2.5 | 0.232 | 0.085 | 0.15 | 0.156 | 0.074 |
| 1 | 0.602 | 0.426 | 0.762 | 0.597 | 0.168 |
| 0.75 | 0.735 | 0.477 | 0.759 | 0.657 | 0.156 |
| 0.5 | 0.683 | 0.82 | 0.596 | 0.700 | 0.113 |
| 0.25 | 0.804 | 1.482 | 1.114 | 1.133 | 0.339 |
| 0.1 | 0.855 | 1.118 | 1.107 | 1.027 | 0.149 |
| 0.075 | 0.669 | 0.755 | 1.087 | 0.837 | 0.221 |
| 0.005 | 1.198 | 1.059 | 0.817 | 1.025 | 0.193 |
| 0.0025 | 1.368 | 0.989 | 0.543 | 0.967 | 0.413 |
| 0.001 | 1.225 | 1.389 | 0.892 | 1.169 | 0.253 |
| Concentration (mg/ml) | $A_{620}$ | | | | |
| | 1 | 2 | 3 | Mean | SD |
| Positive | 0.408 | 0.517 | 0.64 | 0.522 | 0.116 |
| Negative | 0.062 | 0.058 | 0.057 | 0.059 | 0.003 |
| 2.5 | 0.112 | 0.063 | 0.094 | 0.090 | 0.025 |
| 1 | 0.276 | 0.22 | 0.337 | 0.278 | 0.059 |
| 0.75 | 0.313 | 0.247 | 0.353 | 0.304 | 0.054 |
| 0.5 | 0.336 | 0.376 | 0.288 | 0.333 | 0.044 |
| 0.25 | 0.384 | 0.591 | 0.481 | 0.485 | 0.104 |
| 0.1 | 0.379 | 0.484 | 0.499 | 0.454 | 0.065 |
| 0.075 | 0.331 | 0.368 | 0.493 | 0.397 | 0.085 |
| 0.005 | 0.566 | 0.542 | 0.399 | 0.502 | 0.090 |
| 0.0025 | 0.608 | 0.416 | 0.279 | 0.434 | 0.165 |
| 0.001 | 0.519 | 0.595 | 0.402 | 0.505 | 0.097 |
| Concentration (mg/ml) | $A_{550}$-$A_{620}$ | | | | |
| | 1 | 2 | 3 | Mean | SD |
| Positive | 0.478 | 0.731 | 0.755 | 0.655 | 0.153 |
| Negative | 0.029 | 0.02 | 0.019 | 0.023 | 0.006 |
| 2.5 | 0.12 | 0.022 | 0.056 | 0.066 | 0.050 |
| 1 | 0.326 | 0.206 | 0.425 | 0.319 | 0.110 |
| 0.75 | 0.422 | 0.23 | 0.406 | 0.353 | 0.107 |
| 0.5 | 0.347 | 0.444 | 0.308 | 0.366 | 0.070 |
| 0.25 | 0.42 | 0.891 | 0.633 | 0.648 | 0.236 |
| 0.1 | 0.476 | 0.634 | 0.608 | 0.573 | 0.085 |
| 0.075 | 0.338 | 0.387 | 0.594 | 0.440 | 0.136 |
| 0.005 | 0.632 | 0.517 | 0.418 | 0.522 | 0.107 |
| 0.0025 | 0.76 | 0.573 | 0.264 | 0.532 | 0.250 |
| 0.001 | 0.706 | 0.794 | 0.49 | 0.663 | 0.156 |

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| Concentration (mg/ml) | %Viability | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Mean | SD |
| **Positive** | 72.977 | 111.603 | 115.267 | 99.949 | 23.430 |
| **Negative** | 4.427 | 3.053 | 2.901 | 3.461 | 0.841 |
| **2.5** | 18.321 | 3.359 | 8.550 | 10.076 | 7.597 |
| **1** | 49.771 | 31.450 | 64.885 | 48.702 | 16.743 |
| **0.75** | 64.427 | 35.115 | 61.985 | 53.842 | 16.265 |
| **0.5** | 52.977 | 67.786 | 47.023 | 55.929 | 10.692 |
| **0.25** | 64.122 | 136.031 | 96.641 | 98.931 | 36.009 |
| **0.1** | 72.672 | 96.794 | 92.824 | 87.430 | 12.934 |
| **0.075** | 51.603 | 59.084 | 90.687 | 67.125 | 20.746 |
| **0.005** | 96.489 | 78.931 | 63.817 | 79.746 | 16.351 |
| **0.0025** | 116.031 | 87.481 | 40.305 | 81.272 | 38.242 |
| **0.001** | 107.786 | 121.221 | 74.809 | 101.272 | 23.882 |
| **$IC_{50}$** | **1.000** | **0.840** | **0.979** | **0.940** | **0.087** |

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**Table B17** Calculation $IC_{50}$ of Caco-2 cell line treated with artemisinin

| Concentration (mg/ml) | $A_{550}$ | | | | |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 0.506 | 0.492 | 0.532 | 0.510 | 0.020 |
| **Negative** | 0.064 | 0.075 | 0.064 | 0.068 | 0.006 |
| **2.5** | 0.667 | 0.679 | 0.700 | 0.682 | 0.017 |
| **1** | 1.138 | 1.105 | 1.037 | 1.093 | 0.052 |
| **0.75** | 1.000 | 1.021 | 1.087 | 1.036 | 0.045 |
| **0.5** | 1.437 | 1.213 | 1.337 | 1.329 | 0.112 |
| **0.25** | 1.319 | 1.596 | 1.479 | 1.465 | 0.139 |
| **0.1** | 0.805 | 0.870 | 0.831 | 0.835 | 0.033 |
| **0.075** | 1.185 | 1.011 | 1.000 | 1.065 | 0.104 |
| **0.05** | 0.862 | 0.625 | 1.077 | 0.855 | 0.226 |
| **0.025** | 0.457 | 0.351 | 0.931 | 0.580 | 0.309 |
| **0.01** | 0.865 | 0.753 | 0.698 | 0.772 | 0.085 |
| **0.0075** | 1.333 | 1.469 | 0.835 | 1.212 | 0.334 |
| **0.005** | 1.036 | 1.238 | 0.804 | 1.026 | 0.217 |
| **0.0025** | 1.041 | 0.916 | 0.975 | 0.977 | 0.063 |
| **0.001** | 1.221 | 1.169 | 1.232 | 1.207 | 0.034 |
| **Concentration (mg/ml)** | $A_{620}$ | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 0.254 | 0.253 | 0.27 | 0.259 | 0.010 |
| **Negative** | 0.052 | 0.056 | 0.053 | 0.054 | 0.002 |
| **2.5** | 0.277 | 0.283 | 0.29 | 0.283 | 0.007 |
| **1** | 0.439 | 0.411 | 0.429 | 0.426 | 0.014 |
| **0.75** | 0.424 | 0.417 | 0.487 | 0.443 | 0.039 |
| **0.5** | 0.548 | 0.512 | 0.517 | 0.526 | 0.020 |
| **0.25** | 0.544 | 0.596 | 0.652 | 0.597 | 0.054 |
| **0.1** | 0.386 | 0.405 | 0.382 | 0.391 | 0.012 |
| **0.075** | 0.472 | 0.461 | 0.463 | 0.465 | 0.006 |
| **0.05** | 0.371 | 0.299 | 0.484 | 0.385 | 0.093 |
| **0.025** | 0.223 | 0.153 | 0.399 | 0.258 | 0.127 |
| **0.01** | 0.412 | 0.305 | 0.322 | 0.346 | 0.058 |
| **0.0075** | 0.516 | 0.626 | 0.386 | 0.509 | 0.120 |
| **0.005** | 0.471 | 0.487 | 0.354 | 0.437 | 0.073 |
| **0.0025** | 0.496 | 0.423 | 0.409 | 0.443 | 0.047 |
| **0.001** | 0.559 | 0.501 | 0.537 | 0.532 | 0.029 |

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| Concentration (mg/ml) | $A_{550}$-$A_{620}$ | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Mean | SD |
| **Positive** | 0.252 | 0.239 | 0.262 | 0.251 | 0.012 |
| **Negative** | 0.012 | 0.019 | 0.011 | 0.014 | 0.004 |
| **2.5** | 0.390 | 0.396 | 0.410 | 0.399 | 0.010 |
| **1** | 0.699 | 0.694 | 0.608 | 0.667 | 0.051 |
| **0.75** | 0.576 | 0.604 | 0.600 | 0.593 | 0.015 |
| **0.5** | 0.889 | 0.701 | 0.820 | 0.803 | 0.095 |
| **0.25** | 0.775 | 1.000 | 0.827 | 0.867 | 0.118 |
| **0.1** | 0.419 | 0.465 | 0.449 | 0.444 | 0.023 |
| **0.075** | 0.713 | 0.550 | 0.537 | 0.600 | 0.098 |
| **0.05** | 0.491 | 0.326 | 0.593 | 0.470 | 0.135 |
| **0.025** | 0.234 | 0.198 | 0.532 | 0.321 | 0.183 |
| **0.01** | 0.453 | 0.448 | 0.376 | 0.426 | 0.043 |
| **0.0075** | 0.817 | 0.843 | 0.449 | 0.703 | 0.220 |
| **0.005** | 0.565 | 0.751 | 0.450 | 0.589 | 0.152 |
| **0.0025** | 0.545 | 0.493 | 0.566 | 0.535 | 0.038 |
| **0.001** | 0.662 | 0.668 | 0.695 | 0.675 | 0.018 |
| **Concentration (mg/ml)** | **%Viability** | | | | |
| | **1** | **2** | **3** | **Mean** | **SD** |
| **Positive** | 100.398 | 95.219 | 104.382 | 100.000 | 4.595 |
| **Negative** | 4.781 | 7.570 | 4.382 | 5.578 | 1.737 |
| **2.5** | 155.378 | 157.769 | 163.347 | 158.831 | 4.089 |
| **1** | 278.486 | 276.494 | 242.231 | 265.737 | 20.381 |
| **0.75** | 229.482 | 240.637 | 239.044 | 236.388 | 6.033 |
| **0.5** | 354.183 | 279.283 | 326.693 | 320.053 | 37.889 |
| **0.25** | 308.765 | 398.406 | 329.482 | 345.551 | 46.931 |
| **0.1** | 166.932 | 185.259 | 178.884 | 177.025 | 9.304 |
| **0.075** | 284.064 | 219.124 | 213.944 | 239.044 | 39.074 |
| **0.05** | 195.618 | 129.880 | 236.255 | 187.251 | 53.679 |
| **0.025** | 93.227 | 78.884 | 211.952 | 128.021 | 73.039 |
| **0.01** | 180.478 | 178.486 | 149.801 | 169.588 | 17.165 |
| **0.0075** | 325.498 | 335.857 | 178.884 | 280.080 | 87.791 |
| **0.005** | 225.100 | 299.203 | 179.283 | 234.529 | 60.514 |
| **0.0025** | 217.131 | 196.414 | 225.498 | 213.015 | 14.973 |
| **0.001** | 263.745 | 266.135 | 276.892 | 268.924 | 7.003 |
| **$IC_{50}$** | | | | **Not determine** | |

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**Table B18** Calculation $IC_{50}$ of Caco-2 cell line treated with doxorubicin

| Concentration (mg/ml) | $A_{550}$ | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Mean | SD |
| Positive | 0.502 | 0.584 | 0.505 | 0.530 | 0.038 |
| Negative | 0.064 | 0.068 | 0.068 | 0.067 | 0.002 |
| 0.01 | 0.637 | 0.712 | 0.386 | 0.578 | 0.139 |
| 0.0075 | 0.928 | 0.909 | 1.028 | 0.955 | 0.052 |
| 0.005 | 0.686 | 0.883 | 0.762 | 0.777 | 0.081 |
| 0.0025 | 1.216 | 1.109 | 0.943 | 1.089 | 0.112 |
| 0.001 | 0.926 | 0.604 | 0.641 | 0.724 | 0.144 |
| 0.00075 | 0.916 | 1.662 | 1.085 | 1.221 | 0.319 |
| 0.0005 | 0.904 | 0.683 | 1.022 | 0.870 | 0.141 |
| 0.00025 | 1.133 | 0.71 | 0.702 | 0.848 | 0.201 |
| 0.0001 | 1.263 | 1.046 | 0.899 | 1.069 | 0.150 |
| Concentration (mg/ml) | $A_{620}$ | | | | |
| | 1 | 2 | 3 | Mean | SD |
| Positive | 0.242 | 0.279 | 0.242 | 0.254 | 0.017 |
| Negative | 0.053 | 0.054 | 0.055 | 0.054 | 0.001 |
| 0.01 | 0.244 | 0.304 | 0.194 | 0.247 | 0.045 |
| 0.0075 | 0.369 | 0.356 | 0.411 | 0.379 | 0.023 |
| 0.005 | 0.315 | 0.378 | 0.294 | 0.329 | 0.036 |
| 0.0025 | 0.484 | 0.464 | 0.344 | 0.431 | 0.062 |
| 0.001 | 0.397 | 0.269 | 0.267 | 0.311 | 0.061 |
| 0.00075 | 0.401 | 0.611 | 0.437 | 0.483 | 0.092 |
| 0.0005 | 0.382 | 0.255 | 0.378 | 0.338 | 0.059 |
| 0.00025 | 0.467 | 0.301 | 0.279 | 0.349 | 0.084 |
| 0.0001 | 0.442 | 0.36 | 0.319 | 0.374 | 0.051 |
| Concentration (mg/ml) | $A_{550}$-$A_{620}$ | | | | |
| | 1 | 2 | 3 | Mean | SD |
| Positive | 0.26 | 0.305 | 0.263 | 0.276 | 0.021 |
| Negative | 0.011 | 0.014 | 0.013 | 0.013 | 0.001 |
| 0.01 | 0.393 | 0.408 | 0.192 | 0.331 | 0.098 |
| 0.0075 | 0.559 | 0.553 | 0.617 | 0.576 | 0.029 |
| 0.005 | 0.371 | 0.505 | 0.468 | 0.448 | 0.057 |
| 0.0025 | 0.732 | 0.645 | 0.599 | 0.659 | 0.055 |
| 0.001 | 0.529 | 0.335 | 0.374 | 0.413 | 0.084 |
| 0.00075 | 0.515 | 1.051 | 0.648 | 0.738 | 0.228 |
| 0.0005 | 0.522 | 0.428 | 0.644 | 0.531 | 0.088 |
| 0.00025 | 0.666 | 0.409 | 0.423 | 0.499 | 0.118 |
| 0.0001 | 0.821 | 0.686 | 0.58 | 0.696 | 0.099 |

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| Concentration (mg/ml) | %Viability | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Mean | SD |
| **Positive** | 94.203 | 110.507 | 95.290 | 100.000 | 7.443 |
| **Negative** | 3.986 | 5.072 | 4.710 | 4.589 | 0.452 |
| **0.01** | 142.391 | 147.826 | 69.565 | 119.928 | 35.681 |
| **0.0075** | 202.536 | 200.362 | 223.551 | 208.816 | 10.456 |
| **0.005** | 134.420 | 182.971 | 169.565 | 162.319 | 20.472 |
| **0.0025** | 265.217 | 233.696 | 217.029 | 238.647 | 19.982 |
| **0.001** | 191.667 | 121.377 | 135.507 | 149.517 | 30.358 |
| **0.00075** | 186.594 | 380.797 | 234.783 | 267.391 | 82.568 |
| **0.0005** | 189.130 | 155.072 | 233.333 | 192.512 | 32.039 |
| **0.00025** | 241.304 | 148.188 | 153.261 | 180.918 | 42.750 |
| **0.0001** | 297.464 | 248.551 | 210.145 | 252.053 | 35.734 |
| **$IC_{50}$** | | | | **Not determine** | |

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# CURRICULUM VITAE

| | |
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