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## Appendices

## Appendix A

Data of mouse hot-plate test



Table 1 %MPE-min in mouse hot-plate test from 0-240 minutes after intraperitoneal administration of 0.9% normal saline solution (NSS), MO (10 mg/kg), ASA (150 mg/kg) and various doses of CQ (43.5-700 mg/kg). N=10 for all groups.

|              | 15 min.     | 30 min.     | 45 min.     | 60 min.     | 90 min.     | 120 min.    | 240 min.    |
|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| NSS          | -8.55457743 | -18.9827349 | -14.1321674 | -16.1489243 | -11.3909609 | -8.7404913  | -5.73394422 |
| 42.5 mg/kg   | 2.430513728 | -0.51339823 | 2.164172907 | 13.92257951 | 18.04245307 | 17.52831939 | 13.34736028 |
| 87.5 mg/kg   | 4.981981488 | 4.191425686 | 23.57231217 | 17.56375117 | 19.64343178 | 14.95015026 | 22.97986449 |
| 175 mg/kg    | 7.99936856  | 32.97342095 | 25.45513557 | 19.72554072 | 35.87811373 | 30.57753517 | 30.03197934 |
| 350 mg/kg    | 12.93851122 | 13.12129743 | 7.022743484 | 33.06243587 | 36.45033525 | 44.2923073  | 39.03667495 |
| 700 mg/kg    | 27.11527901 | 15.62851891 | 12.78547204 | 31.18887389 | 64.18939886 | 31.27251018 | 22.93113279 |
| MO 10mg/kg   | 32.7915622  | 47.62909912 | 53.78081141 | 58.96584931 | 13.80031761 | 28.98906677 | 35.26467168 |
| ASA 150mg/kg | 11.03810255 | 12.56274156 | 25.38413374 | 31.43215003 | 38.07041354 | 16.73554226 | 25.51597446 |

## Appendix B

Data of mouse tail-flick test

Table 2 %MPE-min in mouse tail-flick test from 0-240 minutes after intraperitoneal administration of 0.9% normal saline solution (NSS), MO (10 mg/kg), ASA (150 mg/kg) and various doses of CQ (43.5-700 mg/kg). N=10 for all groups.

|              | 15 min.     | 30 min.     | 45 min.     | 60 min.     | 90 min.     | 120 min.    | 240 min.    | 120 min.    |
|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| NSS          | -4.367419   | 6.750095843 | -5.94497869 | 2.828291456 | 4.313184714 | -0.21471456 | -8.09835333 | -0.21471456 |
| 42.5 mg/kg   | -4.45062025 | -1.67316927 | -3.26564626 | 0.75230092  | 6.860084034 | 0.792476991 | -1.62382953 | 0.792476991 |
| 87.5 mg/kg   | -2.1528947  | 3.151135354 | 6.491965035 | 9.144645241 | 12.86390966 | 9.106852346 | 4.559569435 | 9.106852346 |
| 175 mg/kg    | 8.129421703 | 8.094918502 | 11.16369937 | 9.131234639 | 20.16849793 | 7.930321866 | -1.17556605 | 7.930321866 |
| 350 mg/kg    | 4.438495612 | 10.83210572 | 14.86575815 | 18.41735488 | 23.64524569 | 19.27596019 | 14.48114277 | 19.27596019 |
| 700 mg/kg    | 7.733529124 | 13.49076819 | 20.86595585 | 28.54106092 | 33.4461804  | 28.8054941  | 25.82444565 | 28.8054941  |
| MO 10mg/kg   | 40.56983436 | 48.3774274  | 56.14943594 | 48.25861213 | 43.31728327 | 40.50401467 | 39.4556782  | 40.50401467 |
| ASA 150mg/kg | 3.904649091 | 4.049819221 | 6.550086988 | 10.98851505 | 10.98561959 | 18.01929077 | 3.062194407 | 18.01929077 |

## Appendix C

Data of rat paw-pressure test

Table 3 %MPE-min in rat paw-pressure test from 0-240 minutes after intraperitoneal administration of 0.9% normal saline solution (NSS), MO (10 mg/kg), ASA (150 mg/kg) and various doses of CQ (43.5-700 mg/kg). N=10 for all groups.

|              | 15 min.     | 30 min.     | 45 min.     | 60 min.     | 90 min.     | 120 min.   | 240 min.    |
|--------------|-------------|-------------|-------------|-------------|-------------|------------|-------------|
| NSS          | 23.6206334  | -11.188465  | -12.3537683 | -0.63778926 | -4.51575391 | 8.30883835 | -16.7513448 |
| 42.5 mg/kg   | -3.08458449 | -9.79001068 | 0.00286531  | -2.23680763 | 2.60707026  | 2.39189949 | -1.68352938 |
| 87.5 mg/kg   | -10.262086  | -0.13462734 | 6.40919345  | 1.66649025  | 7.87678698  | 5.42313319 | -2.80058354 |
| 175 mg/kg    | -2.18356623 | -3.34580878 | 10.1631341  | 6.59390181  | 15.8250612  | 8.11968121 | -6.02714241 |
| 350 mg/kg    | 1.47952441  | -0.20092893 | 11.1821012  | 15.6089625  | 17.7673911  | 6.73575443 | -1.17451007 |
| 700 mg/kg    | 1.04941807  | 4.22742496  | 9.67225936  | 19.3514189  | 17.8314426  | 7.87312723 | 1.86573748  |
| MO 10mg/kg   | 15.3479855  | 27.2537056  | 49.6509672  | 38.2088749  | 34.2854307  | 6.70698992 | 4.2870226   |
| ASA 150mg/kg | 16.135603   | 9.29219394  | 31.1124838  | 14.7168458  | 33.0801218  | 8.19283977 | 13.6724246  |

## Appendix D

Data of rat inflamed paw-pressure test

Table 4 %MPE-min in rat inflamed paw-pressure test from 0-240 minutes after intraperitoneal administration of 0.9% normal saline solution (NSS), MO (10 mg/kg), IND (150 mg/kg) and various doses of CQ (43.5-700 mg/kg). N=10 for all groups.

|              |     |
|--------------|-----|
| NSS          | -20 |
| 42.5 mg/kg   | -7  |
| 87.5 mg/kg   | 8   |
| 175 mg/kg    | 10  |
| 350 mg/kg    | 12  |
| 700 mg/kg    | 17  |
| MO 10mg/kg   | 25  |
| IND; 5 mg/kg | 28  |

## Appendix E

Study of mechanism of analgesic action involving opioid pathway  
using naloxone in mouse hot-plate test



Table 4 %MPE-min in mouse hot-plate test from 0-240 minutes after intraperitoneal administration of 0.9% normal saline solution (NSS), CQ (175, 350 and 700 mg/kg), Naloxone (NAL; 1 mg/kg), and NAL + CQ (1/175, 1/350, 1/700 mg/kg). N=10 for all groups.

|                 | 15 min.  | 30 min.  | 45 min.  | 60 min.  | 90 min.  | 120 min. | 240 min. |
|-----------------|----------|----------|----------|----------|----------|----------|----------|
| NSS             | -32.6104 | 13.98621 | -32.6104 | 13.98621 | -32.6104 | 13.98621 | -32.6104 |
| 175 mg/kg       | -11.0666 | 24.52715 | -11.0666 | 24.52715 | -11.0666 | 24.52715 | -11.0666 |
| 350 mg/kg       | 34.85763 | 20.8037  | 25.3641  | 27.62378 | -16.7459 | 24.02267 | 34.85763 |
| 700 mg/kg       | 29.31322 | 6.49616  | 39.25775 | 5.282952 | -17.8222 | 14.49018 | 29.31322 |
| NAL             | 18.20426 | -1.16468 | 9.411862 | -13.2658 | 9.614818 | 15.37979 | 18.20426 |
| 175 mg/kg + NAL | 26.4854  | 9.151654 | 15.89217 | -8.18986 | -3.5272  | 12.57181 | 26.4854  |
| 350 mg/kg + NAL | 27.03502 | 5.061695 | 30.89758 | 21.85507 | -10.7505 | 23.86422 | 27.03502 |
| 700 mg/kg + NAL | 27.01801 | 21.69329 | 26.32141 | 12.56364 | 11.01467 | 23.57767 | 27.01801 |

## Appendix F

Study of mechanism of analgesic action involving Opioid pathway  
using Naltrexone in mouse hot-plate test

Table 4 %MPE-min in mouse hot-plate test test from 0-240 minutes after intraperitoneal administration of 0.9% normal saline solution (NSS), CQ (175, 350 and 700 mg/kg), Naltrixone (NALT; 5 mg/kg), and NALT + CQ (5/175, 5/350, 5/700 mg/kg). N=10 for all groups.

|                  | 15 min.  | 30 min.  | 45 min.  | 60 min.  | 90 min.  | 120 min. | 240 min. |
|------------------|----------|----------|----------|----------|----------|----------|----------|
| NSS              | 4.40309  | 19.65032 | -0.43051 | 40.51916 | 12.89139 | 22.82529 | -8.40895 |
| 175 mg/kg        | 5.707659 | 7.471732 | -15.1086 | 40.1589  | 14.03803 | 0.238943 | 2.498634 |
| 350 mg/kg        | 5.049534 | 20.61167 | 3.626351 | 29.46286 | 30.03941 | 10.10764 | -2.385   |
| 700 mg/kg        | 22.4111  | 1.198826 | -10.2221 | 27.39074 | 32.02661 | 31.17859 | -4.70498 |
| NALT             | -2.6056  | 4.547841 | 4.669556 | 37.49085 | 23.60937 | 6.077153 | 0.902433 |
| 350 mg/kg + NALT | -1.1075  | 4.188429 | -1.79186 | 24.65992 | 17.58997 | 18.0096  | -3.4998  |
| 175 mg/kg + NALT | -0.81206 | 14.19057 | -12.5144 | -4.49945 | 6.748027 | -5.62147 | 2.503993 |
| 700 mg/kg + NALT | 4.40309  | 19.65032 | -0.43051 | 40.51916 | 12.89139 | 22.82529 | -8.40895 |

## Appendix G

Study of mechanism of analgesic action involving NMDA receptor  
using NMDA in mouse hot-plate test

Table 4 %MPE-min in mouse hot-plate test from 0-240 minutes after intraperitoneal administration of 0.9% normal saline solution (NSS), CQ (175, 350 and 700 mg/kg), NMDA (0.38 mg/kg), and NMDA + CQ (0.38/175, 0.38/350, 0.38/700 mg/kg). N=10 for all groups.

|                  | 15 min.  | 30 min.  | 45 min.  | 60 min.  | 90 min.  | 120 min. | 240 min. |
|------------------|----------|----------|----------|----------|----------|----------|----------|
| NSS              | 25.3641  | 27.62378 | -3.13964 | 24.02267 | 34.85763 | 13.98621 | -32.6104 |
| 175 mg/kg        | 39.25775 | 5.282952 | -4.51904 | 14.49018 | 29.31322 | 24.52715 | -11.0666 |
| 350 mg/kg        | 9.411862 | -13.2658 | 30.64479 | 15.37979 | 18.20426 | 8.129179 | -13.8701 |
| 700 mg/kg        | 15.89217 | -8.18986 | 13.80173 | 12.57181 | 26.4854  | 17.58816 | -14.3689 |
| NMDA             | 30.89758 | 21.85507 | 4.544191 | 23.86422 | 27.03502 | 13.92388 | -7.33055 |
| 175 mg/kg + NMDA | 26.32141 | 12.56364 | 32.43887 | 23.57767 | 27.01801 | 17.45178 | -10.6332 |
| 350 mg/kg + NMDA | 22.57214 | -1.36289 | 12.94075 | 26.73955 | 42.01325 | 8.377537 | 8.02888  |
| 700 mg/kg + NMDA | 25.3641  | 27.62378 | -3.13964 | 24.02267 | 34.85763 | 13.98621 | -32.6104 |

## VITAE

Miss Sintip Vudhironarit was born in May 2, 1980 in Bangkok, Thailand. She graduated with a Bachelor of Science (Medical technology) in year 2001 from the Faculty of Allied Health Sciences, Chulalongkorn University, Bangkok, Thailand. After graduation, she continues studying for the Degree of Master of science in Pharmacology at Chulalongkorn University. Her research topic on analgesic effect of the crude extract from *Cissus quadrangularis* has been present as a poster presentation in the twenty-seventh Pharmacological and Therapeutic Society of Thailand Meeting on March 17-18, 2005 at Phra Nakhon Si Ayutthaya, Thailand.

