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Appendices

Total amount of aspartate within 180 min after injection

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	36	90.40	18.48	3.08
PEG400	47	99.60	48.74	7.11
VPA200	44	91.07	27.19	4.10
VPA400	50	88.55	57.77	8.17
VPU200	45	85.63	28.24	4.21
VPU400	44	93.63	34.29	5.17

Total amount of glutamate within 180 min after injection

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	36	139.38	17.4	2.90
PEG400	50	125.87	42.14	5.96
PA200[a,b,d,f]	43	86.33	40.72	6.21
VPA400	43	141.02	59.67	9.10
PU200[a,b,d,f]	53	80.91	25.04	3.44
VPU400[a,d]	44	116.07	64.01	9.65

[a] P<0.05 denotes statistically significant from NSS

[b] P<0.05 denotes statistically significant from PEG400

[d] P<0.05 denotes statistically significant from VPA400

[f] P<0.05 denotes statistically significant from VPU400

Total amount of glycine within 180 min after injection

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	36	86.16	17.4	2.90
PEG400	50	65.78	42.14	5.96
VPA200[a]	45	65.47	61.04	9.10
VPA400[a,b,c,e,f]	51	161.88	44.34	6.21
VPU200	54	80.55	70.91	9.65
VPU400	36	84.24	20.64	3.44

[a] P<0.05 denotes statistically significant from NSS

[b] P<0.05 denotes statistically significant from PEG400

[c] P<0.05 denotes statistically significant from VPA200

[e] P<0.05 denotes statistically significant from VPU200

[f] P<0.05 denotes statistically significant from VPU400

Total amount of GABA within 180 min after injection

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	36	86.78	37.2	6.2
PEG400	50	81.27	33.65	4.76
VPA200[a,b,e]	45	143.70	97.60	14.55
VPA400[a,b,e,f]	53	169.70	187.68	25.78
VPU200[c,d]	53	94.16	63.26	8.69
VPU400[c]	45	107.61	72.98	10.88

[a] P<0.05 denotes statistically significant from NSS

[b] P<0.05 denotes statistically significant from PEG400

[c] P<0.05 denotes statistically significant from VPA200

[d] P<0.05 denotes statistically significant from VPA400

[e] P<0.05 denotes statistically significant from VPU200

[f] P<0.05 denotes statistically significant from VPU400

Amount of aspartate at various time

Time 1 (20 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	89.9	26.64	13.32
PEG400	6	79.23	47.74	19.49
VPA200	5	98.50	17.06	7.63
VPA400	6	89.96	57.93	23.65
VPU200	5	90.34	30.65	13.71
VPU400	5	80.11	34.74	15.54

Time 2 (40 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	99.1	51.18	25.59
PEG400	6	87.86	51.70	21.11
VPA200	5	104.96	27.54	12.32
VPA400	5	121.49	119.18	53.30
VPU200	5	71.97	30.47	13.63
VPU400	5	103.07	55.09	24.64

Time 3 (60 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	82.01	27.46	13.73
PEG400	5	79.39	38.88	17.39
VPA200	5	93.35	27.97	12.51
VPA400	6	130.08	121.56	49.63
VPU200	5	78.70	38.52	17.23
VPU400	5	100.93	56.50	25.27

Time 4 (80 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	107.02	52.39	26.19
PEG400	5	101.08	51.54	23.05
VPA200	4	69.62	17.42	8.71
VPA400	6	84.11	74.80	30.54
VPU200	5	83.08	25.08	11.22
VPU400	5	90.18	68.44	30.61

Time 5 (100 min after injection

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	93.54	31.64	15.82
PEG400	5	126.24	84.24	37.66
VPA200	5	82.29	18.96	8.48
VPA400	6	92.43	84.40	34.46
VPU200	5	79.63	31.72	14.19
VPU400	5	78.56	31.64	14.15

Time 6 (120 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	93.15	72.16	36.08
PEG400	5	123.08	63.48	28.39
VPA200	5	80.50	17.82	7.97
VPA400	5	85.16	40.24	18.00
VPU200	5	106.22	65.89	29.47
VPU400	5	76.25	33.70	16.85

\Time 7 (140 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	87.81	46.78	23.39
PEG400	5	76.13	35.84	16.03
VPA200	5	85.75	23.85	10.67
VPA400	6	65.61	20.20	8.25
VPU200	5	67.79	22.71	10.16
VPU400	5	87.33	42.41	18.97

Time 8 (160 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	91.18	60.04	30.02
PEG400	5	98.87	44.11	19.73
VPA200	5	108.03	52.90	23.66
VPA400	5	58.76	11.98	5.36
VPU200	5	97.00	67.12	30.02
VPU400	5	125.31	40.80	18.25

Time 9 (180 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	74.96	32.58	16.29
PEG400	5	129.24	57.82	25.86
VPA200	5	91.24	49.46	22.12
VPA400	5	65.30	20.92	9.32
VPU200	5	95.93	93.51	41.82
VPU400	5	98.11	20.16	9.02

Amount of glutamate at various time

Time 1 (20 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	143.46	49	24.50
PEG400	6	120.57	56.68	23.14
VPA200	5	86.21	27.43	12.27
VPA400	5	112.77	57.51	25.72
VPU200	6	97.08	55.84	22.80
VPU400	5	92.84	17.97	8.04

Time 2 (40 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	121.36	24.46	12.23
PEG400	6	136.40	30.27	12.36
VPA200	5	89.87	39.71	17.76
VPA400	5	132.95	61.67	27.58
VPU200	6	92.70	39.90	16.29
VPU400	5	96.03	58.09	25.98

Time 3 (60 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	151.33	77.36	38.68
PEG400	6	143.91	44.21	18.05
VPA200	4	66.78	11.04	5.52
VPA400	5	165.98	147.98	66.18
VPU200	6	116.39	59.25	24.19
VPU400	5	109.12	66.34	29.67

Time 4 (80 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	108.70	25.04	12.52
PEG400	6	112.87	276.47	11.44
VPA200	4	59.90	23.26	11.63
VPA400	5	153.73	99.14	44.34
VPU200	6	86.14	45.29	18.49
VPU400	5	105.21	63.28	28.30

Time 5 (100 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	139.21	66.78	33.39
PEG400	5	111.58	31.55	14.11
VPA200	5	77.69	38.72	17.32
VPA400	5	112.69	63.77	28.52
VPU200	6	74.26	40.00	16.33
VPU400	5	93.01	25.73	11.51

Time 6 (120 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	118.22	20.36	10.18
PEG400	6	147.32	107.16	43.75
VPA200	5	82.97	70.55	31.38
VPA400	4	174.41	117.16	58.58
VPU200	6	57.37	35.12	14.34
VPU400	4	111.37	40.52	20.26

Time 7 (140 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	147.01	56.12	28.06
PEG400	5	83.98	55.27	24.72
VPA200	5	106.33	66.47	29.73
VPA400	5	129.23	109.63	49.03
VPU200	6	57.23	20.60	8.41
VPU400	5	126.54	78.88	35.28

Time 8 (160 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	149.37	43.62	21.81
PEG400	5	138.16	46.26	20.69
VPA200	5	119.59	65.40	29.25
VPA400	4	150.7	174.68	87.34
VPU200	5	97.86	40.71	18.21
VPU400	5	158.56	146.90	65.70

Time 9 (180 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	175.82	71.30	35.65
PEG400	5	138.07	103.99	46.51
VPA200	5	87.65	35.26	15.77
VPA400	5	136.60	138.27	61.84
VPU200	6	79.97	21.67	8.85
VPU400	5	152.38	74.46	33.30

Amount of glycine at various time

Time 1 (20 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	96.26	36.84	18.42
PEG400	6	96.50	54.67	22.32
VPA200	5	90.62	60.44	27.03
VPA400	6	117.27	21.80	8.90
VPU200	6	88.27	19.62	8.01
VPU400	4	119.58	102.78	51.39

Time 2 (40 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	77.69	30.86	15.43
PEG400	6	73.39	37.13	15.16
VPA200	5	86.34	37.92	16.96
VPA400	5	149.42	69.04	30.88
VPU200	6	66.28	23.61	8.64
VPU400	4	69.91	40.28	20.14

Time 3 (60 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	79.07	38.78	19.39
PEG400	6	73.27	39.06	15.95
VPA200	5	47.92	20.21	9.04
VPA400	6	186.18	155.93	63.66
VPU200	6	87.09	45.90	18.74
VPU400	4	136.49	96.12	48.06

Time 4 (80 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	90.52	181.04	27.14
PEG400	6	93.69	77.30	31.56
VPA200	5	88.72	122.13	54.62
VPA400	6	137.17	102.11	41.69
VPU200	6	91.28	22.14	9.04
VPU400	4	63.44	26.06	13.03

Time 5 (100 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	79.66	42.56	21.28
PEG400	5	60.83	33.78	15.11
VPA200	5	60.68	38.84	17.37
VPA400	6	173.10	146.62	59.86
VPU200	6	71.93	15.70	6.41
VPU400	4	72.30	29.90	14.95

Time 6 (120 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	88.09	66.34	33.17
PEG400	6	62.02	57.19	23.35
VPA200	5	43.91	24.64	11.02
VPA400	5	143.54	72.33	32.35
VPU200	6	72.74	20.50	8.37
VPU400	4	76.34	4.74	2.37

Time 7 (140 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	84.10	53.48	26.74
PEG400	5	36.42	17.37	7.77
VPA200	5	55.22	29.16	13.04
VPA400	6	164.56	110.32	45.04
VPU200	6	69.60	26.06	10.64
VPU400	4	66.67	34.00	17.00

Time 8 (160 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	78.11	51.38	25.69
PEG400	5	60.57	37.63	16.83
VPA200	5	66.85	10.21	4.57
VPA400	5	182.20	150.80	67.44
VPU200	6	84.24	36.81	15.03
VPU400	4	72.88	33.64	16.82

Time 9 (180 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	101.94	100.66	50.33
PEG400	5	63.26	54.29	24.28
VPA200	5	48.98	23.43	10.48
VPA400	6	203.52	72.48	29.59
VPU200	6	92.98	62.21	25.40
VPU400	4	103.81	47.82	23.91

Amount of GABA at various time

Time 1 (20 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	108.60	37.20	18.60
PEG400	6	92.48	43.38	17.71
VPA200	5	155.70	82.51	36.90
VPA400	6	87.46	28.73	11.73
VPU200	6	90.85	38.33	15.65
VPU400	5	87.47	83.56	37.37

Time 2 (40 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	74.96	20.04	10.02
PEG400	6	80.37	36.96	15.09
VPA200	5	98.44	55.76	24.94
VPA400	6	120.59	80.04	32.68
VPU200	6	79.30	30.17	12.32
VPU400	5	71.95	47.38	21.19

Time 3 (60 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	56.27	17.52	8.76
PEG400	6	85.58	50.09	20.45
VPA200	5	92.57	44.34	19.83
VPA400	6	91..21	70.25	28.68
VPU200	6	90.89	43.06	17.58
VPU400	5	139.48	96.46	43.14

Time 4 (80 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	68.89	13.46	6.73
PEG400	6	68.24	48.91	19.97
VPA200	5	105.62	90.82	40.62
VPA400	6	136.67	129.33	52.84
VPU200	6	81.32	30.69	12.53
VPU400	5	71.50	272.57	121.90

Time 5 (100 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	77.61	14.22	7.11
PEG400	5	64.20	23.03	10.30
VPA200	5	117.47	67.79	30.32
VPA400	6	128.52	114.24	46.64
VPU200	6	84.70	38.04	15.53
VPU400	5	137.18	150.15	67.15

Time 6 (120 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	92.69	51.58	25.79
PEG400	6	106.20	48.94	19.98
VPA200	5	148.10	104.44	46.71
VPA400	6	163.92	183.85	75.06
VPU200	6	89.47	56.77	23.18
VPU400	5	68.64	94.18	42.12

Time 7 (140 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	99.03	51.2	25.60
PEG400	5	63.36	25.8	11.54
VPA200	5	170.69	172.17	77.90
VPA400	6	272.83	272.94	111.43
VPU200	6	65.64	24.88	10.16
VPU400	5	68.43	61.22	27.38

Time 8 (160 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	91.47	49.14	24.57
PEG400	5	90.61	45.10	20.17
VPA200	5	184.10	201.84	90.27
VPA400	6	236.00	294.69	120.30
VPU200	5	156.66	72.58	32.46
VPU400	5	135.37	151.00	67.53

Time 9 (180 min after injection)

Group	count	Mean	Standard Diviation	Standard Error of Mean
NSS	4	111.66	52.06	26.03
PEG400	5	80.46	64.33	28.77
VPA200	5	220.67	282.86	126.50
VPA400	5	290.89	334.82	149.74
VPU200	6	108.07	91.02	37.16
VPU400	5	138.07	145.54	65.09

Curriculum vitae

Miss Tipsuchon chunngam was born on 19 th October, 1971, in Lopburi, Thailand. She had graduated with Bachelor Degree in Pharmacy in 1994 from faculty of Pharmaceutical Sciences, Rangsit University, Phatomthani, Thailand. After graduation, she continue studies the master's Degree programme in Pharmaceutical Sciences at Chulalongkorn University.