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APPENDICES

Table 2 Chemical compound for Krebs-Henseleit Solution (mM/L)

Chemicals	mM
Sodium chloride (NaCl)	118.0
Potassium chloride (KCl)	4.70
Magnesium sulfate ($\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$)	1.64
Calcium chloride ($\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$)	2.52
Sodium bicarbonate (NaHCO_3)	24.88
Potassium dibasic phosphate (KH_2PO_4)	1.18
Glucose	11.10

Table 3 Effects of DMSO (0.25 % v/v) on rate and force of contraction on isolated left and right atria (n=6) (mean \pm SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100 \pm 0.00	100 \pm 0.00	100 \pm 0.00
1 min	94.92 \pm 2.79	97.16 \pm 1.59	99.83 \pm 0.60
3 min	91.95 \pm 3.66	96.86 \pm 1.78	99.22 \pm 0.55
5 min	91.80 \pm 5.04	96.77 \pm 1.94	100.21 \pm 1.28
10 min	86.71 \pm 4.19	94.98 \pm 2.78	98.36 \pm 1.05
15 min	86.47 \pm 4.78	95.78 \pm 2.92	98.79 \pm 1.10

Table 4 Effects of PF002-(1-4) (100 μ g/ml) on rate and force of contraction on isolated left and right atria (n=6) (mean \pm SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100 \pm 0.00	100 \pm 0.00	100 \pm 0.00
1 min	93.59 \pm 2.68	89.80 \pm 5.31	98.32 \pm 0.82
3 min	92.38 \pm 4.10	89.93 \pm 6.06	100.24 \pm 1.79
5 min	92.32 \pm 4.92	93.58 \pm 3.43	101.70 \pm 2.74
10 min	95.02 \pm 6.40	88.88 \pm 4.37	103.42 \pm 3.70
15 min	92.17 \pm 6.21	87.56 \pm 6.00	104.13 \pm 3.94

Table 5 Effects of PF002-(5-6) (100 µg/ml) on rate and force of contraction on isolated left and right atria (n=6) (mean ± SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100±0.00	100±0.00	100±0.00
1 min	91.23±3.63*	88.20±4.32	98.30±0.70
3 min	92.02±4.00	90.07±5.57	99.23±1.30
5 min	91.92±3.93	88.05±6.28	100.44±1.82
10 min	94.60±2.50	86.42±7.19	100.05±2.13
15 min	94.09±2.17	84.38±7.54	100.12±1.90

* $p < 0.05$, significantly different from DMSO 0.25% group (unpaired *t*-test)

Table 6 Effects of PF002-7 (100 µg/ml) on rate and force of contraction on isolated left and right atria (n=6) (mean ± SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100±0.00	100±0.00	100±0.00
1 min	81.10±3.16*	85.00±4.04	96.46±2.21
3 min	90.35±4.91	92.66±5.47	95.81±2.37
5 min	95.24±5.10	94.62±5.96	95.78±2.64
10 min	100.87±5.22	97.32±5.59	93.66±2.63*
15 min	100.72±5.35	96.17±7.26	90.05±2.79*

* $p < 0.05$, significantly different from DMSO 0.25% group (unpaired *t*-test)

Table 7 Effects of PF003-1 (100 µg/ml) on rate and force of contraction on isolated left and right atria (n=6) (mean ± SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100±0.00	100±0.00	100±0.00
1 min	96.55±1.98	92.67±1.50	96.44±2.15
3 min	95.78±3.31	92.66±2.54	97.91±1.18
5 min	94.65±2.80	88.23±3.76	98.98±0.91
10 min	95.06±3.24	84.29±3.25*	99.69±1.00
15 min	90.76±3.67	81.49±4.01*	99.52±1.35

* $p < 0.05$, significantly different from DMSO 0.25% group (unpaired t -test)

Table 8 Effects of PF003-2 (100 µg/ml) on rate and force of contraction on isolated left and right atria (n=6) (mean ± SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100±0.00	100±0.00	100±0.00
1 min	84.48±1.22**	101.17±3.93	99.42±1.01
3 min	108.76±4.01*	103.69±8.44	98.49±0.59
5 min	113.20±3.18**	108.20±6.32	98.41±0.20
10 min	119.48±2.90**	111.99±4.66*	99.18±0.40
15 min	119.22±4.95**	115.41±3.47*	99.62±0.62

* $p < 0.05$, ** $p < 0.001$, significantly different from DMSO group (unpaired t -test)

Table 9 Effects of PF003-(3-5) (100 µg/ml) on rate and force of contraction isolated on left and right atria (n=6) (mean ± SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100±0.00	100±0.00	100±0.00
1 min	88.05±4.53	95.76±4.75	92.84±1.47
3 min	91.53±3.27	113.58±8.66	90.39±1.53*
5 min	93.51±1.96	115.83±7.59	87.97±1.35*
10 min	92.80±4.13	116.32±10.82	86.05±1.00*
15 min	95.24±4.77	110.15±8.31	85.13±1.17*

* $p < 0.05$, significantly different from DMSO 0.25% group (unpaired t -test)

Table 10 Effects of NE (0.1 µM) on rate and force of contraction on isolated left and right atria (n=4) (mean ± SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100±0.00	100±0.00	100±0.00
1 min	165.91±11.40*	148.11±15.14*	132.22±6.30*
3 min	182.41±13.65*	125.93±13.85	133.69±6.06*
5 min	179.60±18.13*	125.33±12.81	134.26±6.33*
10 min	166.62±19.59*	113.48±8.97	132.49±6.53*
15 min	151.88±20.34*	112.02±12.05	130.47±6.48*

* $p < 0.05$, significantly different from response at 0 min (paired t -test)

Table 11 Effects of propranolol (10 μM) on rate and force of contraction isolated on left and right atria (n=6) (mean \pm SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100 \pm 0.00	100 \pm 0.00	100 \pm 0.00
1 min	95.76 \pm 0.86**	100.36 \pm 5.80	87.85 \pm 1.24*
3 min	89.99 \pm 1.67**	107.77 \pm 3.62	81.94 \pm 1.69*
5 min	85.10 \pm 2.80**	110.36 \pm 3.20*	79.81 \pm 1.98*
10 min	82.72 \pm 5.61**	114.03 \pm 3.45*	76.57 \pm 2.85*
15 min	84.86 \pm 3.35**	109.70 \pm 3.74*	74.99 \pm 3.53*

* $p < 0.05$, ** $p < 0.001$, significantly different from response at 0 min (paired *t*-test)

Table 12 Effects of NE (0.1 μM) in the presence of propranolol (10 μM) on rate and force of contraction on isolated left and right atria (n=4) (mean \pm SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100 \pm 0.00	100 \pm 0.00	100 \pm 0.00
1 min.	100.22 \pm 2.68*	75.63 \pm 12.97*	97.20 \pm 2.28*
3 min.	96.84 \pm 5.34*	72.33 \pm 16.44*	95.98 \pm 2.88*
5 min.	96.94 \pm 4.90*	71.87 \pm 17.74*	95.34 \pm 4.31*
10 min.	85.37 \pm 2.50*	67.26 \pm 13.88*	92.94 \pm 4.66*
15 min.	83.64 \pm 3.33*	60.73 \pm 14.54*	89.34 \pm 2.18*

* $p < 0.05$, significantly different from NE group in the absence of propranolol (unpaired *t*-test)

Table 13 Effects of PF003-2 (100 µg/ml) in the presence of propranolol (10 µM) on rate and force of contraction on isolated left and right atria (n=6) (mean ± SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100±0.00	100±0.00	100±0.00
1 min.	93.58±0.84*	95.33±0.80	96.77±0.63*
±3 min.	91.71±2.90*	99.81±2.94	94.87±0.96*
5 min.	92.76±4.04*	93.89±4.55	94.15±1.33*
10 min.	93.79±4.35*	101.06±10.31	93.72±2.05*
15 min.	92.38±5.42*	102.11±12.64	93.20±1.88*

* $p < 0.05$, significantly different from PF003-2 group in the absence of propranolol (unpaired t -test)

Table 14 Effects of serotonin (1 µM) on rate and force of contraction on isolated left and right atria (n=4) (mean ± SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100±0.00	100±0.00	100±0.00
1 min	116.66±1.54*	113.84±2.27*	106.21±2.50
3 min	123.26±2.59*	108.60±4.17	108.77±3.14
5 min	123.32±1.74*	104.55±4.45	109.43±2.80
10 min	117.96±2.93*	102.41±5.71	107.40±2.60
15 min	112.78±2.46*	97.99±6.82	106.62±2.70

* $p < 0.05$, significantly different from response at 0 min (paired t -test)

Table 15 Effects of ketanserin (10 μM) on rate and force of contraction on isolated left and right atria (n=6) (mean \pm SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100 \pm 0.00	100 \pm 0.00	100 \pm 0.00
1 min	95.62 \pm 1.43*	93.10 \pm 6.90	96.98 \pm 0.57*
3 min	92.70 \pm 0.87*	93.26 \pm 4.20	93.99 \pm 0.72*
5 min	91.46 \pm 0.72*	90.21 \pm 5.87	91.24 \pm 1.11*
10 min	90.34 \pm 1.95*	95.96 \pm 2.94	85.53 \pm 1.92*
15 min	88.46 \pm 2.60*	93.08 \pm 2.40	87.30 \pm 2.29*

* $p < 0.05$, significantly different from response at 0 min (paired t -test)

Table 16 Effects of serotonin (10 μM) in the presence of ketanserin (10 μM) on isolated rate and force of contraction of left and right atria (n=4) (mean \pm SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100 \pm 0.00	100 \pm 0.00	100 \pm 0.00
1 min.	97.59 \pm 0.81**	96.94 \pm 1.29*	97.18 \pm 0.62*
3 min.	98.87 \pm 0.73*	99.92 \pm 3.80	100.97 \pm 1.94
5 min.	96.29 \pm 0.58**	95.65 \pm 1.08	103.26 \pm 3.11
10 min.	94.45 \pm 1.02**	95.10 \pm 3.24	108.71 \pm 5.93
15 min.	92.99 \pm 1.70*	99.43 \pm 5.79	111.98 \pm 6.91

* $p < 0.05$, ** $p < 0.001$, significantly different from serotonin group (unpaired t -test)

Table 17 Effects of PF003-2 (100 µg/ml) in the presence of ketanserin (10 µM) on isolated rate and force of contraction of left and right atria (n=6) (mean ± SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100±0.00	100±0.00	100±0.00
1 min.	85.16±3.07	95.62±0.85	97.11±0.40
3 min.	92.14±2.09*	109.34±2.22	97.60±1.30
5 min.	94.18±1.84**	111.16±2.52	98.12±1.84
10 min.	97.44±1.92**	113.33±2.23	100.21±2.30
15 min.	97.83±1.52*	114.42±3.23	98.33±1.55

* $p < 0.05$, ** $p < 0.001$ significantly different from PF003-2 group (unpaired *t*-test)

Table 18 Effects of PF003-2 (100 µg/ml) in the presence of propranolol (10 µM) and ketanserin (10 µM) on rate and force of contraction on isolated left and right atria (n=5) (mean ± SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100±0.00	100±0.00	100±0.00
1 min.	80.56±1.42	96.23±2.68	93.21±1.08*
3 min.	91.38±2.31*	98.96±2.55	93.08±2.22*
5 min.	97.32±2.38*	105.39±3.44	93.16±2.74
10 min.	99.61±3.03*	101.63±2.28	93.51±3.80
15 min.	93.74±1.64*	101.96±2.18	94.70±4.77

* $p < 0.05$, significantly different from PF003-2 group in the absence of ketanserin and propranolol (unpaired *t*-test)

Table 19 Effect of caffeine (10 mM) and PF003-2 (100 µg/ml) on the relationships between the T_i / T_{ss} and the rest interval of range 10 to 300 seconds (n=4) (mean \pm SEM).

Rest interval second	Post-rest contraction (PRC)			
	control	caffeine	control	PF003-2
10	2.64 \pm 0.16	1.15 \pm 0.07*	2.64 \pm 0.16	3.15 \pm 0.16
20	2.70 \pm 0.11	1.33 \pm 0.87*	2.70 \pm 0.11	3.18 \pm 0.26
30	2.66 \pm 0.11	1.39 \pm 0.07*	2.66 \pm 0.11	3.00 \pm 0.28
40	2.50 \pm 0.13	1.60 \pm 0.12*	2.50 \pm 0.13	3.07 \pm 0.39
50	2.34 \pm 0.24	1.67 \pm 0.21	2.34 \pm 0.24	2.94 \pm 0.48
60	2.30 \pm 0.21	1.82 \pm 0.18	2.30 \pm 0.21	2.92 \pm 0.43
120	2.22 \pm 0.08	1.84 \pm 0.27	2.22 \pm 0.08	2.95 \pm 0.41
300	2.06 \pm 0.03	1.95 \pm 0.26	2.06 \pm 0.03	2.71 \pm 0.40

* $p < 0.05$, significantly different from control group (paired t -test)

Table 20 Effects of tyramine (10 μ M) on rate and force of contraction on isolated left and right atria (n=4) (mean \pm SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100 \pm 0.00	100 \pm 0.00	100 \pm 0.00
1 min	287.47 \pm 29.30*	195.22 \pm 32.13	143.32 \pm 4.29*
3 min	304.22 \pm 25.93*	165.35 \pm 28.18	150.88 \pm 13.68*
5 min	287.28 \pm 23.69*	135.98 \pm 25.50	163.10 \pm 3.54*
10 min	278.50 \pm 25.28*	116.01 \pm 18.02	166.00 \pm 5.83*
15 min	262.84 \pm 19.95*	108.39 \pm 16.55	160.27 \pm 8.72*

* $p < 0.05$, significantly different from response at 0 min (paired t -test)

Table 21 Effects of tyramine (10 μ M) on rate and force of contraction on isolated left and right atria in rat pretreated with reserpine (5 mg/kg. i.p. for 5 days)(n=4) (mean \pm SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100 \pm 0.00	100 \pm 0.00	100 \pm 0.00
1 min	99.90 \pm 1.15*	105.01 \pm 4.58*	106.12 \pm 3.23*
3 min	101.29 \pm 2.23*	100.60 \pm 3.22*	108.91 \pm 3.86*
5 min	99.54 \pm 2.04*	97.52 \pm 2.66*	109.22 \pm 3.99*
10 min	95.31 \pm 1.78*	94.56 \pm 2.25	108.26 \pm 3.53*
15 min	93.06 \pm 1.62*	91.87 \pm 1.87	107.10 \pm 3.19*

* $p < 0.05$, significantly different from tyramine group in normal rats (unpaired t -test)

Table 22 Effects of PF003-2 (100 µg/ml) on rate and force of contraction on isolated left and right atria in rat pretreated with reserpine (5 mg/kg. i.p. for 5 days)(n=4) (mean ± SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100±0.00	100±0.00	100±0.00
1 min	92.92±1.30*	98.53±2.12	95.92±0.62*
3 min	104.17±2.09	109.65±2.53	97.36±0.79
5 min	108.30±2.78	108.48±1.72	99.75±0.99
10 min	112.12±4.10	109.60±3.13	103.88±1.46*
15 min	108.46±2.79	107.49±4.29	106.81±1.55*

* $p < 0.05$, significantly different from PF003-2 group in normal rat (unpaired t -test)

Table 23 Effects of NE (0.1 µM) on rate and force of contraction on isolated left and right atria in 5 min (n=6) (mean ± SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100±0.00	100±0.00	100±0.00
1 min	152.82±5.18**	131.24±8.14*	139.50±5.00*
2 min	156.80±3.99**	107.15±5.45	146.02±5.42**
3 min	156.39±3.94**	99.78±4.70	148.25±5.53**
4 min	156.08±4.70**	94.78±5.38	146.16±5.61**
5 min	155.07±5.23**	90.66±5.14	149.06±5.75**

* $p < 0.05$, ** $p < 0.001$, significantly different from response at 0 min (student's t -test)

Table 24 Effects of NE (0.1 μM) on rate and force of contraction on isolated left and right atria (5 min) in the presence of amitriptyline(10 μM) ((n=6) (mean \pm SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100 \pm 0.00	100 \pm 0.00	100 \pm 0.00
1 min	163.92 \pm 17.97	140.05 \pm 11.53	133.30 \pm 8.38
2 min	155.74 \pm 16.73	107.62 \pm 8.93	141.65 \pm 9.27
3 min	148.26 \pm 16.15	102.36 \pm 9.62	143.56 \pm 9.31
4 min	143.81 \pm 16.07	96.98 \pm 8.47	142.12 \pm 9.47
5 min	139.54 \pm 14.86	99.16 \pm 9.07	139.82 \pm 9.60

Table 25 Effects of NE (0.1 μM) on rate and force of contraction on isolated left and right atria (5 min) in the presence of PF003-2 (100 $\mu\text{g/ml}$) ((n=6) (mean \pm SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100 \pm 0.00	100 \pm 0.00	100 \pm 0.00
1 min	107.34 \pm 2.04*	113.50 \pm 3.87	106.95 \pm 2.60*
2 min	117.46 \pm 4.29*	118.43 \pm 6.10	117.97 \pm 4.96*
3 min	123.44 \pm 4.04	118.03 \pm 7.58*	124.48 \pm 5.50
4 min	129.78 \pm 4.42	118.29 \pm 6.20*	127.97 \pm 5.78
5 min	134.65 \pm 5.48	115.06 \pm 8.07*	130.33 \pm 6.29

* $p < 0.05$, significantly different from NE group (unpaired t -test)

Table 26 Effects of serotonin (1 μ M) on rate and force of contraction on isolated left and right atria (5 min) (n=4) (mean \pm SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100 \pm 0.00	100 \pm 0.00	100 \pm 0.00
1 min	120.05 \pm 1.78**	109.16 \pm 1.78*	102.35 \pm 0.30*
2 min	130.08 \pm 3.00*	107.90 \pm 1.82*	102.68 \pm 0.22*
3 min	132.76 \pm 3.65**	109.82 \pm 3.27*	102.57 \pm 0.24*
4 min	136.61 \pm 4.01*	109.02 \pm 1.96*	102.15 \pm 0.33*
5 min	133.00 \pm 4.88*	107.79 \pm 1.40*	101.94 \pm 0.42*

* $p < 0.05$, ** $p < 0.001$, significantly different from response at 0 min (paired t -test)

Table 27 Effects of fluoxetine (1 μ M) on rate and force of contraction on isolated left and right atria (5 min) (n=4) (mean \pm SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100 \pm 0.00	100 \pm 0.00	100 \pm 0.00
1 min	94.91 \pm 1.72*	95.72 \pm 1.63	97.57 \pm 0.64*
2 min	92.64 \pm 2.70*	98.46 \pm 3.97	96.53 \pm 0.66*
3 min	90.64 \pm 2.84*	95.74 \pm 2.50	95.27 \pm 0.98*
4 min	90.02 \pm 2.46*	97.96 \pm 2.77	94.62 \pm 0.97*
5 min	89.00 \pm 2.01*	96.25 \pm 2.43	94.14 \pm 1.14*

* $p < 0.05$, significantly different from response at 0 min (paired t -test)

Table 28 Effects of serotonin (1 μM) on rate and force of contraction on isolated left and right atria (5 min) in the presence of fluoxetine (1 μM) (n=4) (mean \pm SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100 \pm 0.00	100 \pm 0.00	100 \pm 0.00
1 min	111.60 \pm 2.93*	103.45 \pm 2.08	100.81 \pm 0.34*
2 min	120.59 \pm 1.43*	98.34 \pm 4.37	100.64 \pm 0.44*
3 min	124.64 \pm 0.82	104.73 \pm 2.94	100.42 \pm 0.45*
4 min	126.90 \pm 1.56	105.70 \pm 3.59	99.80 \pm 0.56*
5 min	128.01 \pm 0.50	108.59 \pm 6.53	99.60 \pm 0.59*

*p < 0.05, significantly different from serotonin group (unpaired t-test)

Table 29 Effects of serotonin (1 μM) on rate and force of contraction on isolated left and right atria (5 min) in the presence of PF003-2 (100 $\mu\text{g/ml}$) (n=4) (mean \pm SEM).

Time	Response (%)		
	Left force	Right force	Right rate
Control	100 \pm 0.00	100 \pm 0.00	100 \pm 0.00
1 min	109.86 \pm 0.99	100.08 \pm 2.02	101.23 \pm 0.69
2 min	115.46 \pm 3.13	103.27 \pm 3.53	102.25 \pm 0.98
3 min	116.90 \pm 3.68	106.42 \pm 6.66	103.68 \pm 1.40
4 min	120.15 \pm 2.56	103.10 \pm 4.21	104.38 \pm 1.51
5 min	124.07 \pm 2.90	104.08 \pm 4.96	104.86 \pm 1.74

CURRICULUM VITAE

Miss Salinee Sirodom was born in October 23, 1977 in Bangkok, Thailand. She graduated with a Bachelor of Science (Pharmacy) in 2002 from the Faculty of Pharmaceutical Science, Mahidol University, Thailand. After graduation, she worked as a pharmacist in Bangplee Hospital, Samutprakarn, Thailand, for 3 years.