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APPENDICES

ศูนย์วิทยทรัพยากร
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Table 8 Seven-day body weight of individual rat

Rat No.	day0	Day7	day14	Day21	day28
control					
1	288.8	324.8	358.5	373.8	385.9
2	312.4	342.5	361.9	378.5	397
3	313.3	368	403.8	423.9	424.7
4	335.6	383.7	402.3	413	419.4
5	352.2	372.3	374.4	397.3	401.8
6	328.9	339.8	355.3	362.7	366
7	392.5	402	425.4	444.6	467.8
8	415.5	431.7	460.7	466.9	478.3
9	399.2	415	393.7	426.1	443.5
10	419.9	445.3	431.2	459.5	468.3
ML-group I					
1	310.6	323.8	360.5	383.3	400.3
2	272.4	309.0	334.9	353.0	366.4
3	299.2	350.5	374.8	390.3	384.8
4	302.7	342.5	372.5	385.9	388.7
5	356.7	367.8	365.8	363.7	375.0
6	345.5	397.8	416.8	413.0	455.5
7	388.9	420.9	433.7	423.9	442.8
8	377.8	381.1	390.0	393.0	401.3
9	360.2	365.3	369.7	396.7	412.5
10	389.7	383.3	405.9	433.0	445.3
ML-group II					
1	292.6	311.7	340.5	364.3	384.8
2	267.4	321.5	365.2	391.0	424.9
3	309.3	355.5	389.8	409.3	406.7
4	345.9	401.0	445.5	464.3	474.2
5	371.9	395.3	411.3	416.9	432.7
6	334.5	379.8	396.3	388.4	415.9
7	386.5	386.1	396.3	398.2	423.8
8	436.0	449.3	479.1	491.8	509.8
9	406.7	416.7	409.9	432.0	439.0
10	372.8	370.7	391.6	397.6	404.3

Unit expressed as g

Table 9 Water consumption of individual rat

Rat No.	Day7	Day14	Day21	Day28
control				
1	42	43	34	38
2	56	36	35	28
3	63	53	45	51
4	48	49	47	53
5	60	56	47	55
6	62	96	54	55
7	61	34	45	38
8	38	45	38	12
9	71	47	40	38
10	47	39	40	38
ML-group I				
1	67	61	49	39
2	84	46	42	47
3	59	38	47	46
4	52	55	43	50
5	89	50	42	66
6	42	50	43	36
7	34	33	33	33
8	35	28	44	37
9	49	40	30	28
10	43	51	45	32
ML-group II				
1	67	61	49	39
2	84	46	42	47
3	59	38	47	46
4	52	55	43	50
5	89	50	42	66
6	42	50	43	36
7	34	33	33	33
8	35	28	44	37
9	49	40	30	28
10	43	51	45	32

Unit expressed as ml/day

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Table 10 Food consumption of individual rat

Rat No.	Day7	Day14	Day21	Day28
control				
1	13	18	22	20
2	20	19	19	18
3	43	25	28	23
4	26	24	22	28
5	21	22	10	20
6	20	21	20	20
7	24	24	29	23
8	24	28	23	11
9	15	23	23	21
10	23	28	23	21
ML-group I				
1	32	22	22	23
2	33	25	20	15
3	33	28	29	26
4	28	41	23	31
5	22	33	13	22
6	35	36	24	26
7	23	23	28	23
8	23	16	24	24
9	30	25	23	22
10	23	35	20	18
ML-group II				
1	32	22	22	23
2	33	25	20	15
3	33	28	29	26
4	28	41	23	31
5	22	33	13	22
6	35	36	24	26
7	23	23	28	23
8	23	16	24	24
9	30	25	23	22
10	23	35	20	18

Unit expressed as g/day

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Table 11 Terminal body weight of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	380.50	384.50	370.20
2	380.90	350.70	396.70
3	439.70	407.00	421.30
4	409.20	382.30	465.00
5	392.10	356.80	417.30
6	349.40	438.10	397.90
7	446.70	430.10	408.00
8	461.80	387.00	487.40
9	417.20	405.70	434.80
10	457.40	438.60	401.60
Average	413.49	398.08	420.02
SEM	11.93	9.95	10.95

Unit expressed as g

Table 12 Liver weight of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	10.51	12.01	11.60
2	10.36	10.14	11.61
3	16.66	15.36	14.96
4	11.85	11.00	14.95
5	9.71	11.74	14.71
6	10.98	14.86	11.26
7	14.08	12.66	12.05
8	14.00	13.21	14.67
9	13.18	13.30	16.12
10	16.44	13.72	12.24
Average	12.78	12.80	13.42
SEM	0.79	0.52	0.58

Unit expressed as g

Table 13 Serum AST concentration of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	-	116
2	132	89	83
3	70	109	102
4	104	126	100
5	105	128	112
6	135	84	104
7	109	107	95
8	103	102	76
9	107	103	82
10	84	81	101
Average	105.44	103.22	97.10
SEM	6.79	5.59	4.15

Unit expressed as U/L

Table 14 Serum ALT concentration of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	50	29
2	20	21	20
3	23	32	28
4	20	36	31
5	32	33	35
6	36	24	23
7	29	24	23
8	24	30	31
9	17	33	32
10	17	38	33
Average	24.22	32.10	28.50
SEM	2.25	2.65	1.57

Unit expressed as U/L

Table 15 Serum ALP concentration of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	108	107
2	101	120	107
3	199	266	225
4	95	114	118
5	99	117	119
6	118	127	119
7	107	107	134
8	101	100	126
9	111	125	135
10	116	166	112
Average	116.33	135.00	130.20
SEM	10.66	15.64	10.98

Unit expressed as U/L

Table 16 Serum total bilirubin concentration of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	0.60	0.10
2	0.20	0.10	0.20
3	0.20	0.10	0.20
4	0.20	0.20	0.20
5	0.20	0.20	0.00
6	0.20	0.10	0.00
7	0.00	0.20	0.10
8	0.00	0.00	0.10
9	0.20	0.00	0.60
10	0.10	0.00	0.00
Average	0.14	0.15	0.15
SEM	0.03	0.06	0.06

Unit expressed as mg/dl

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Table 17 Serum direct bilirubin concentration of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	0.40	0.00
2	0.00	0.00	0.10
3	0.10	0.10	0.10
4	0.10	0.10	0.10
5	0.10	0.10	0.00
6	0.00	0.00	0.00
7	0.00	0.00	0.10
8	0.00	0.00	0.10
9	0.20	0.00	0.60
10	0.10	0.00	0.00
Average	0.07	0.07	0.11
SEM	0.02	0.04	0.06

Unit expressed as mg/dl

Table 18 BUN concentration of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	21.80	20.50
2	18.60	15.40	20.90
3	29.60	26.80	28.30
4	20.00	18.70	17.60
5	16.80	17.50	18.10
6	22.10	15.80	13.70
7	16.50	17.80	16.50
8	18.10	17.80	14.60
9	20.60	25.00	17.40
10	20.50	23.80	29.10
Average	20.31	20.04	19.67
SEM	1.31	1.27	1.66

Unit expressed as mg/dl

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Table 19 SCr concentration of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	0.50	0.70
2	0.50	0.50	0.70
3	0.50	0.50	0.50
4	0.50	0.60	0.50
5	0.50	0.70	0.70
6	0.70	0.60	0.60
7	0.70	0.60	0.50
8	0.60	0.60	0.60
9	0.70	0.60	0.60
10	0.70	0.70	0.80
Average	0.60	0.59	0.62
SEM	0.03	0.02	0.03

Unit expressed as mg/dl

Table 20 Serum total cholesterol concentration of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	100	64
2	61	63	59
3	75	75	92
4	92	57	86
5	57	57	61
6	60	68	50
7	58	59	59
8	68	63	59
9	72	71	100
10	85	96	69
Average	69.78	70.90	69.90
SEM	4.14	4.89	5.29

Unit expressed as mg/dl

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Table 21 Serum LDL-C concentration of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	-	-
2	5	4	5
3	5	7	10
4	14	3	3
5	7	7	5
6	5	5	4
7	5	5	4
8	4	7	5
9	8	6	-
10	8	8	8
Average	6.78	5.78	5.50
SEM	1.02	0.55	0.82

Unit expressed as mg/dl

Table 22 Serum HDL-C concentration of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	42.10	32.40
2	27.00	30.20	27.80
3	41.60	47.20	57.30
4	36.70	28.90	43.80
5	24.20	27.40	31.20
6	31.30	34.30	23.30
7	28.10	31.50	30.10
8	29.60	30.70	31.60
9	34.00	35.40	50.50
10	40.70	55.10	35.20
Average	32.58	36.28	36.32
SEM	2.04	2.86	3.40

Unit expressed as mg/dl

Table 23 Serum TG concentration of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	80	101
2	88	119	134
3	131	77	107
4	53	106	122
5	60	52	98
6	110	118	109
7	83	103	105
8	134	80	135
9	85	158	-
10	118	150	94
Average	95.78	104.30	111.67
SEM	9.75	10.56	5.05

Unit expressed as mg/dl

Table 24 Serum glucose concentration of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	86	118	110
2	122	100	106
3	140	127	125
4	119	99	119
5	105	98	102
6	97	114	98
7	113	98	81
8	88	104	109
9	158	99	97
10	100	107	106
Average	112.80	106.40	105.30
SEM	7.24	3.19	3.85

Unit expressed as mg/dl

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Table 25 Serum sodium concentration of individual rat

Rat No.	group		
	Control	MLgroup I	ML-group II
1	-	145	146
2	143	144	144
3	142	143	142
4	142	144	149
5	143	143	142
6	142	143	146
7	145	146	146
8	148	146	147
9	153	145	155
10	146	143	144
Average	144.89	144.20	146.10
SEM	1.23	0.39	1.21

Unit expressed as mEq/L

Table 26 Serum potassium concentration of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	5.90	3.70
2	4.00	3.80	3.60
3	4.60	4.60	3.90
4	4.80	4.90	4.70
5	4.30	3.90	4.30
6	4.30	5.00	4.60
7	3.80	4.20	4.60
8	4.10	4.50	4.40
9	4.30	4.80	-
10	4.60	5.00	5.20
Average	4.31	4.66	4.33
SEM	0.11	0.20	0.17

Unit expressed as mEq/L

Table 27 Serum chloride concentration of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	111	106
2	104	106	104
3	102	103	104
4	105	106	110
5	103	103	104
6	105	104	106
7	105	104	106
8	107	107	105
9	113	105	114
10	104	104	105
Average	105.33	105.30	106.40
SEM	1.07	0.76	1.01

Unit expressed as mEq/L

Table 28 Serum uric acid concentration of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	3.00	2.10
2	1.80	1.60	1.30
3	2.00	1.60	1.70
4	2.00	1.90	1.70
5	1.90	2.20	1.50
6	1.90	2.00	1.90
7	1.70	1.80	1.70
8	1.90	1.50	1.80
9	2.20	1.50	1.20
10	2.70	1.90	1.80
Average	2.01	1.90	1.67
SEM	0.10	0.14	0.09

Unit expressed as mg/dl

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Table 29 Hb of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	-	-
2	16.30	16.90	16.90
3	16.30	15.40	15.80
4	16.30	16.60	16.70
5	16.50	16.50	16.90
6	17.50	17.00	15.50
7	15.30	15.80	16.90
8	17.00	16.80	16.60
9	17.10	15.60	16.70
10	16.00	16.20	15.20
Average	16.48	16.31	16.36
SEM	0.22	0.20	0.22

Unit expressed as g/dl

Table 30 Hct of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	-	-
2	52	54	53
3	51	50	49
4	50	50	52
5	51	52	53
6	53	55	49
7	49	51	53
8	52	51	51
9	55	51	53
10	53	53	50
Average	51.78	51.89	51.44
SEM	0.60	0.59	0.58

Unit expressed as %

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Table 31 Platelet count of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	-	-
2	719	764	814
3	699	766	591
4	912	684	736
5	674	724	674
6	712	938	792
7	666	750	716
8	934	886	806
9	852	748	680
10	626	710	658
Average	754.89	774.44	718.56
SEM	37.92	27.78	25.24

Unit expressed as x 10^3 cells / mm^3

Table 32 WBC count of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	-	-
2	2220	1400	1050
3	1710	2390	2270
4	1854	1904	2100
5	1350	1980	1096
6	1636	2320	1224
7	1478	1324	1420
8	758	958	1774
9	1328	1096	512
10	488	1936	908
Average	1424.67	1700.89	1372.67
SEM	178.05	174.12	192.10

Unit expressed as cells / mm^3

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Table 33 Percent differential WBCs of individual rat

Rat No.	% differential WBCs				
	N	Eo	B	L	Mo
Control					
1	-	-	-	-	-
2	20	1	0	79	0
3	33	0	0	67	0
4	24	2	0	74	0
5	14	2	0	83	1
6	50	0	0	50	0
7	45	3	0	52	0
8	40	0	0	60	0
9	12	0	0	88	0
10	16	0	0	82	2
ML-group I					
1	-	-	-	-	-
2	44	0	0	55	1
3	35	1	0	64	0
4	13	1	0	85	1
5	18	0	0	80	2
6	55	0	0	44	1
7	54	0	0	46	0
8	22	0	0	77	1
9	19	0	0	80	1
10	25	0	0	75	0
ML-group II					
1	-	-	-	-	-
2	29	0	0	69	2
3	32	0	0	68	0
4	30	2	0	67	1
5	21	2	0	76	1
6	40	0	0	60	0
7	20	4	0	76	0
8	41	0	0	59	0
9	13	0	0	85	2
10	18	0	0	82	0

Unit expressed as %

N = neutrophil Eo = eosinophil B = basophil L = lymphocyte Mo = momocyte

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Table 34 RBC count of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	-	-
2	8.92	9.14	8.68
3	9.20	8.98	8.54
4	8.72	8.56	9.20
5	9.14	9.50	9.42
6	9.24	9.26	8.58
7	8.50	9.20	9.10
8	9.02	9.16	8.96
9	9.86	9.34	9.18
10	8.98	8.94	8.54
Average	9.06	9.12	8.91
SEM	0.13	0.09	0.11

Unit expressed as x 10^6 cells / mm^3

Table 35 RBC morphology of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	-	-	-
2	micro3+	micro3+	micro3+
3	micro2+	micro2+	micro2+
4	micro3+	micro3+	micro3+
5	micro3+	micro3+	micro3+
6	micro2+	micro2+	micro2+
7	micro2+	micro2+	micro2+
8	micro2+	micro2+	micro2+
9	micro3+	micro3+	micro3+
10	micro3+	micro3+	micro3+

Table 36 RBC indices (MCV, MCH and MCHC)

	MCV (fL)	MCH (pg)	MCHC (g/dL)
Control			
1	-	-	-
2	58.10	18.20	31.30
3	55.70	17.70	31.80
4	57.60	18.70	32.50
5	56.20	18.10	32.20
6	57.70	18.90	32.70
7	57.80	18.00	31.10
8	58.00	18.80	32.50
9	55.90	17.30	31.00
10	58.80	17.80	30.30
Mean ± SEM	57.31 ± 0.37	18.17 ± 0.18	31.71 ± 0.28
ML-group I			
1	-	-	-
2	59.30	18.50	31.20
3	55.10	17.20	31.10
4	58.00	19.40	33.50
5	54.50	17.40	31.90
6	59.10	18.40	31.10
7	55.80	17.20	30.90
8	56.00	18.40	32.80
9	54.40	16.70	30.60
10	59.40	18.20	30.60
Mean ± SEM	56.84 ± 0.70	17.93 ± 0.29	31.52 ± 0.34
ML-group II			
1	-	-	-
2	60.80	19.40	32.00
3	57.20	18.20	31.90
4	57.10	18.20	31.90
5	56.70	17.90	31.60
6	57.40	18.00	31.40
7	58.80	18.60	31.60
8	57.40	18.60	32.30
9	57.90	18.20	31.40
10	58.20	17.80	30.60
Mean ± SEM	57.94 ± 0.41	18.32 ± 0.16	31.63 ± 0.16

Table 37 Microsomal protein concentration of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	31.46	21.24	10.42
2	23.95	26.02	21.36
3	40.43	29.75	36.90
4	37.73	28.30	38.04
5	27.47	22.30	25.87
6	28.47	28.41	30.43
7	33.57	26.43	33.30
8	32.27	27.50	29.23
9	33.14	34.55	36.39
10	38.35	34.88	35.53
Average	32.68	27.94	29.75
SEM	1.64	1.41	2.73

Unit expressed as mg/ml

Table 38 Hepatic microsomal total CYP content of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	0.874	1.016	1.044
2	0.83	0.885	1.264
3	0.588	0.692	0.714
4	0.582	0.863	0.852
5	0.703	0.901	0.841
6	0.720	0.769	0.720
7	0.709	0.879	0.780
8	0.643	0.736	0.676
9	0.747	0.632	0.632
10	0.582	0.659	0.709
Average	0.698	0.803	0.823
SEM	0.032	0.039	0.062

Unit expressed as nmole/mg protein

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Table 39 Hepatic microsomal EROD activity of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	29	42	40
2	32	34	43
3	15	17	17
4	18	27	14
5	28	36	30
6	34	25	37
7	28	24	24
8	22	20	14
9	32	13	13
10	15	24	40
Average	25.30	26.20	27.20
SEM	2.29	2.82	3.87

Unit expressed as pmole/mg protein/min

Table 40 Hepatic microsomal MROD activity of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	14	14	19
2	12	10	18
3	3	5	6
4	8	11	5
5	9	8	7
6	10	6	8
7	8	12	7
8	4	8	3
9	10	5	4
10	4	9	9
Average	8.20	8.80	8.60
SEM	1.14	0.95	1.75

Unit expressed as pmole/mg protein/min

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Table 41 Hepatic microsomal BROD activity of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	6	8	23
2	13	13	18
3	6	7	8
4	7	12	9
5	18	14	14
6	22	14	20
7	15	20	17
8	12	11	8
9	13	7	9
10	8	11	13
Average	12.00	11.70	13.90
SEM	1.70	1.25	1.72

Unit expressed as pmole/mg protein/min

Table 42 Hepatic microsomal PROD activity of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	4	3	7
2	3	4	5
3	1	4	1
4	2	5	3
5	4	3	5
6	5	4	6
7	5	2	4
8	4	2	2
9	4	1	2
10	2	4	4
Average	3.40	3.20	3.90
SEM	0.43	0.39	0.61

Unit expressed as pmole/mg protein/min

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Table 43 Hepatic microsomal aniline 4-hydroxylase activity of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	0.117	0.102	0.146
2	0.117	0.130	0.110
3	0.026	0.027	0.017
4	0.029	0.071	0.037
5	0.103	0.155	0.106
6	0.125	0.033	0.087
7	0.117	0.099	0.068
8	0.084	0.094	0.076
9	0.103	0.063	0.096
10	0.046	0.020	0.099
Average	0.087	0.079	0.084
SEM	0.012	0.014	0.012

Unit expressed as nmole/mg protein/min

Table 44 Hepatic microsomal erythromycin N-demethylase activity of individual rat

Rat No.	group		
	Control	ML-group I	ML-group II
1	0.842	1.244	1.161
2	0.940	0.999	0.936
3	1.156	1.171	1.151
4	0.823	1.205	1.009
5	0.945	0.857	0.872
6	1.024	1.102	0.828
7	0.764	0.882	0.808
8	1.043	0.950	0.779
9	1.185	1.107	0.891
10	0.960	1.200	1.053
Average	0.968	1.072	0.949
SEM	0.044	0.045	0.044

Unit expressed as nmole/mg protein/min

Table 45 Normal values of hematology and clinical blood chemistry parameters in rat (The Rat Fan Club, 2003).

Blood parameter	Normal values
AST (U/L)	77-110
ALT (U/L)	57-42
ALP (U/L)	104-160
Total bilirubin (mg/dl)	0.20-0.55
BUN (mg/dl)	15-21
SCr (mg/dl)	0.2-0.8
Total cholesterol (mg/dl)	55-88
Glucose (mg/dl)	50-135
Sodium (mEq/L)	143-156
Potassium (mEq/L)	4.6-5.9
Chloride (mEq/L)	100-110
Hb (g/dl)	10.0-16.7
Hct (%)	41.7-49.2
Platelet (x 10^3 cells / mm^3)	685-1436
Neutrophil (%)	5.3-38.1
Eosinophil (%)	0-3.4
Basophil (%)	0-0.4
Lymphocyte (%)	56.7-93.1
Momocyte (%)	0-7.7
RBC (x 10^6 cells / mm^3)	6.76-9.75
MCV (fL)	50.0-77.8
MVH (pg)	16.0-23.1
MCHC (g/dL)	28.2-34.1

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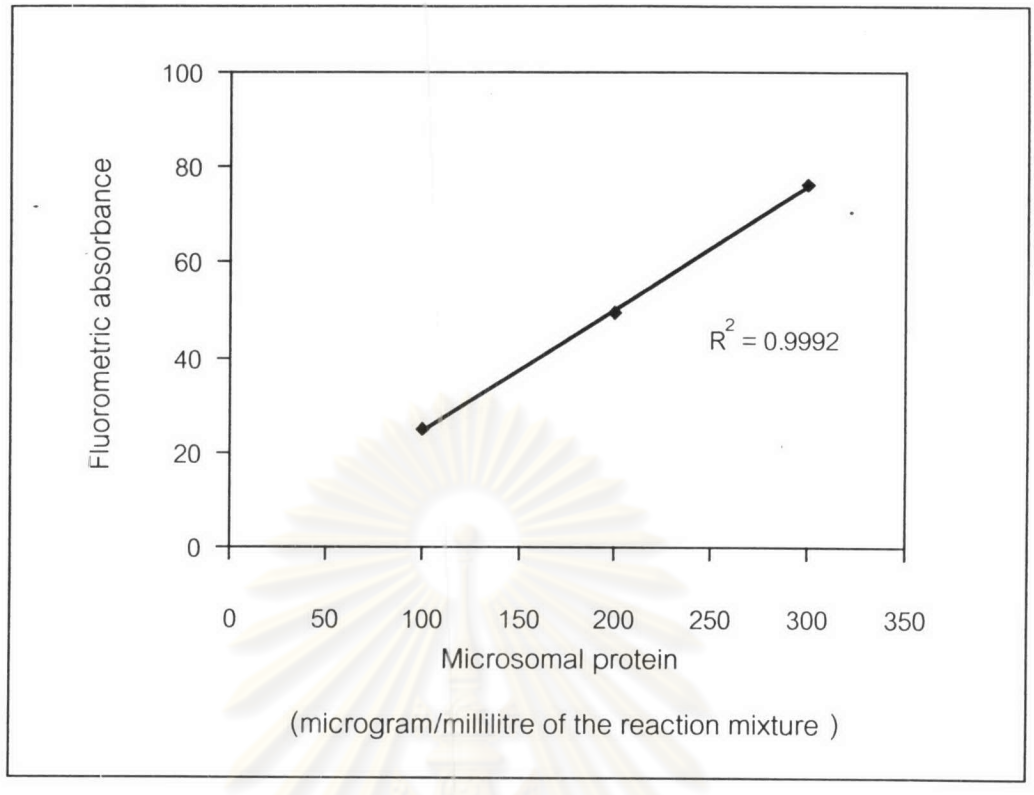

Figure 32 Verification of alkoxyresorufin O-dealkylation. Correlation between the amount of microsomal protein used in the reaction and fluorometric absorbance was shown with a correlation coefficient (r^2) of 0.9992. Each point was mean of n=2. (Procedure was demonstrated in the Materials and Methods).

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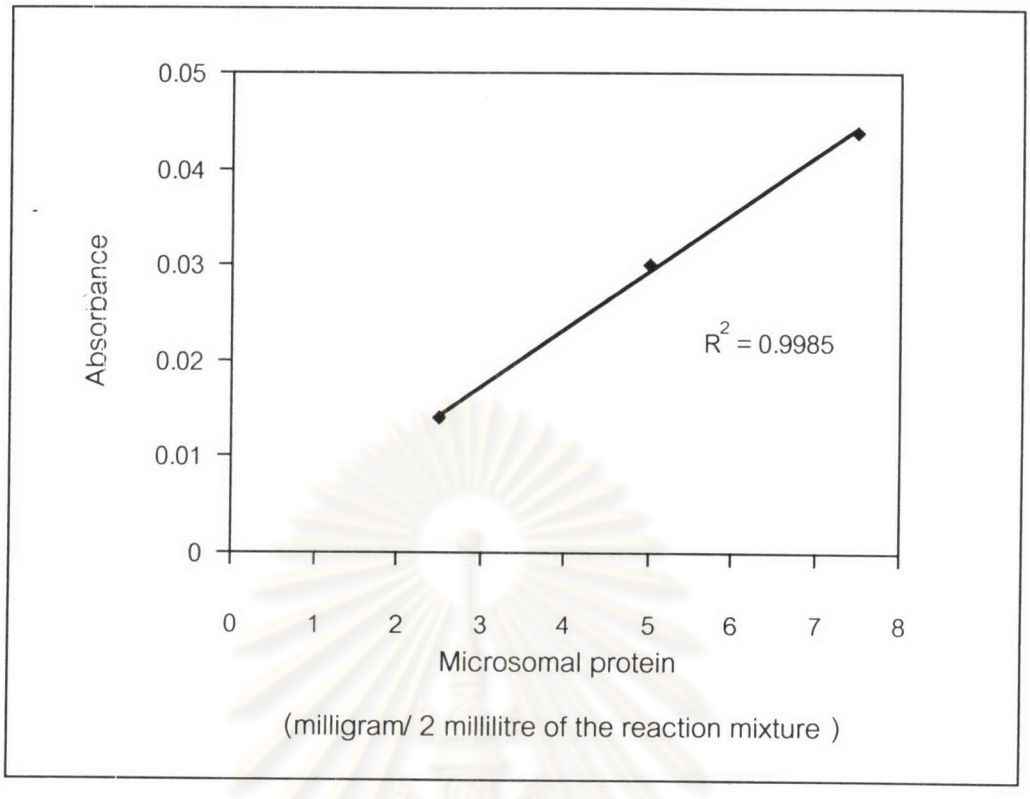

Figure 33 Verification of aniline 4-hydroxylation. Correlation between the amount of microsomal protein used in the reaction and absorbance was shown with a correlation coefficient (r^2) of 0.9985. Each point was mean of n=2. (Procedure was demonstrated in the Materials and Methods).

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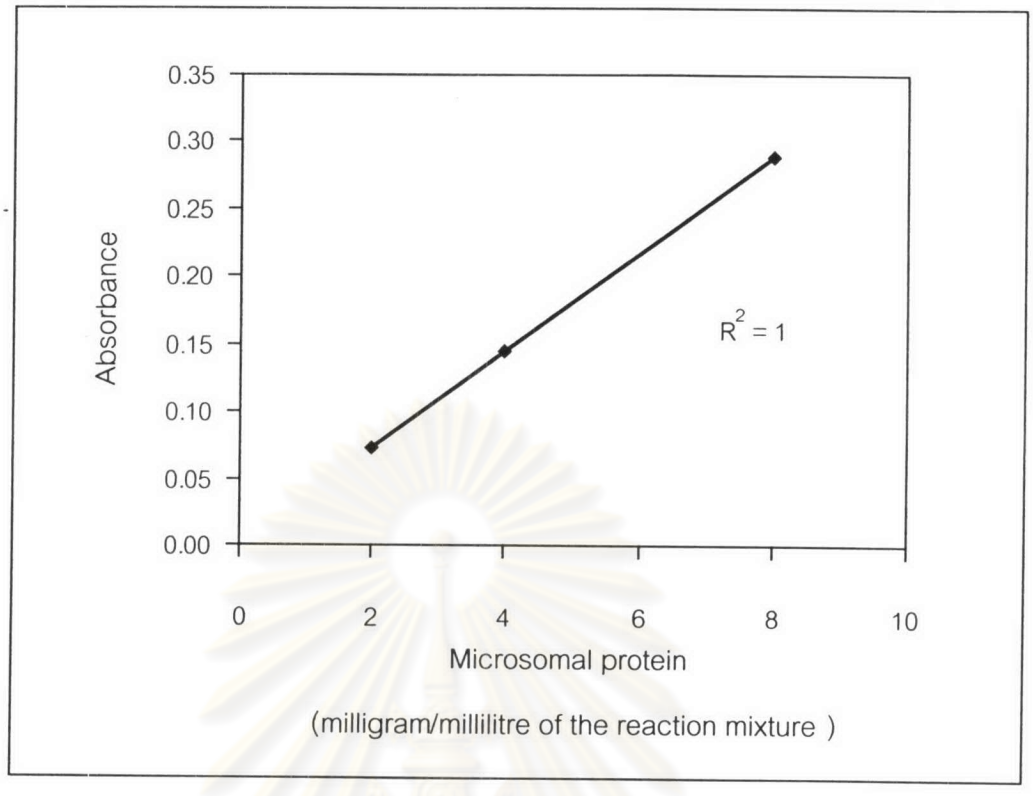

Figure 34 Verification of erythromycin N-demethylation. Correlation between the amount of microsomal protein used in the reaction and absorbance was shown with a correlation coefficient (r^2) of 1. Each point was mean of n=2. (Procedure was demonstrated in the Materials and Methods).

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Study Protocol Approval

The Ethics Committee of the Faculty of Pharmaceutical Sciences, Chulalongkorn University, Bangkok, Thailand has approved the following study to be carried out according to the protocol dated and/ or amended as follows :

Study Title	:	SUBACUTE EFFECTS OF *MURDANNIA LORIFORMIS* EXTRACT ON HEPATIC CYTOCHROME P450 AND CLINICAL BLOOD CHEMISTRY IN RATS
Study Code	:	-
Centre	:	Chulalongkorn University
Principal Investigator	:	MISS ACHARA CHATSUPANG
Protocol Date	:	April 21, 2004

A list of the Ethics Committee members and positions present at the Ethics Committee meeting on the date of approval of this study has been attached.

This Study Protocol Approval Form will be forwarded to the Principal Investigator.

Chairman of Ethics Committee : .....

(Boonyong Tantisira, Ph.D.)

Secretary of Ethics Committee : .....

(Poj Kulvanich, Ph.D.)

Date of Approval : September 26, 2003

Figure 35 Study Protocol Approval by the Ethics Committee of the Faculty of Pharmaceutical Sciences, Chulalongkorn University, Bangkok

VITAE

Miss Achara Chatsupang was born in December 23, 1974 in Samutprakarn, Thailand. She graduated with a Bachelor of Sciences in Pharmacy in 1997 from the Faculty of Pharmaceutical Sciences, Mahidol University, Bangkok, Thailand. After graduation, she worked as a pharmacist in Bantak Hospital, Tak for one year and Samutprakarn Hospital for four years.

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