Estrone (CAS no. 53-16-7)

Tier 1 *in vivo* Test

(1) Results

Fish were exposed to concentrations of 29, 112, 272 and 1,009 ng/L (measured). No significant differences were observed in fertility rate, male and female mortality, total length, body weight, secondary sex characteristics, female gonadosomatic index and female hepatosomatic index.

A significant increase was observed in male hepatic vitellogenin level at 112 ng/L and higher, and this increase was dose-dependent.

A significant increase was observed in male hepatosomatic index at 272 ng/L and higher.

At 1,009 ng/L, a significant decrease was observed in number of eggs, number of fertile eggs and male gonadosomatic index, while a significant increase was observed in female hepatic vitellogenin level.

(2) Summary

The significant decrease observed in number of eggs and number of fertile eggs at 1,009 ng/L was considered adverse reproductive effects on Medaka.

Estrogenic activity of estrone has been indicated from literature. In this study, an increase in male hepatic vitellogenin level was observed at sublethal concentrations, indicating its estrogenic effect. It was concluded that estrone is an estrogenic compound.

The adverse exposure level of 1,009 ng/L was ca. 170 times as high as the highest environmental water concentration of 5.8 ng/L that was measured in MOE's Environmental Survey and Monitoring of Chemicals in FY2005.

Table 1-A Results

Measured concentration (ng/L)	Number of fish		Mortality (%)		Total length (mm)[1)]		Body weight (mg)[1)]	
	male	female[1)]	male	female	male	female	male	female
Control	12	12	0	0	36.05±1.64	34.41±1.06	468.9±54.9	452.9±34.6
29	12	12	0	0	35.82±1.72	33.79±1.03	468.1±85.0	454.1±56.3
112	12	12	0	0	36.45±1.16	34.30±1.58	480.7±43.5	459.5±85.8
272	12	12	0	0	36.47±1.31	34.01±1.02	464.0±62.3	416.9±41.3
1,009	12	12	0	0	35.94±1.36	34.24±2.09	468.2±53.8	443.3±96.5

Table 1-B Results (continued)

Measured concentration (ng/L)	Number of eggs (eggs/female/day)	Number of fertile eggs (eggs/female/day)	Fertility rate (%)	Gonadosomatic Index (%)[1)]	
				male	female
Control	17.8±2.7	16.2±3.9	90.4±9.07	1.00±0.32	10.81±1.86
29	18.4±3.2	17.1±4.4	91.6±9.78	1.15±0.31	10.68±1.42
112	19.2±2.6	18.5±2.4	96.2±1.29	1.17±0.27	11.23±1.76
272	16.6±2.5	16.0±2.5	95.8±2.81	0.84±0.32	11.34±1.04
1,009	10.1±2.0**	8.7±1.8*	86.1±3.62	0.48±0.23**	11.35±7.06

Table 1-C Results (continued)

Measured concentration (ng/L)	Hepatosomatic Index (%)[1)]		Vitellogenin (ng/mg liver)		Secondary sex characteristics[1)]	
	male	female	male	female	male	female
Control	2.10±0.49	5.99±0.93	3.676±4.34	955.2±189	101±21.8	0
29	2.03±0.28	5.36±0.61	47.92±54.0	651.6±391	97.3±13.6	0
112	2.08±0.54	5.48±0.77	381.8±351*	976.6±274	97.6±24.8	0
272	2.68±0.38*	5.99±0.76	3,649±665**	1,017±238	85.3±14.4	0
1,009	3.45±0.50**	5.13±1.24	5,429±687**	1,994±1,480**	85.1±18.3	0

Table 1-D Results (continued)

Measured concentration (ng/L)	Other observations
Control	Not found
29	Not found
112	Not found
272	Not found
1,009	Not found

1) Measured on Day 28
Data show mean ± standard deviation.
Statistically significant differences from control group (**p<0.01, *p<0.05)
nd: not detected (below detection limit of vitellogenin: 1ng/mg liver)
(-): not measured
Secondary sex characteristics: number of papillary processes