E121 Circadian Change of Lactate Dehydrogenase Activity in the Fish (각시붕어; *Rhodeus uyekii*).

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Circadian changes of LDH activity of skeletal muscle were examined in the Korean endemic small fish on various light-dark conditions. In a 12L:12D (light onset 06:00) condition, LDH activity varied in its rhythmic way: the highest peak at midnight with two lower peaks at 06 hr and 15 hr and the trough at noon. When the environment changed from 12L:12D to DD (all dark), phase delayed about 1 hr per day, which indicates that endogenous 25-hr circadian rhythm controlled the LDH activity in the dark condition. Upon changing to constant dark environment, LDH activity increased transiently for one day then restored for original feature gradually. On maintaining the fish in dark for 4 weeks, only one peak at about 14 hr was appeared. Upon transferring the fish from DD to LD cycle, phase-advanced shift was observed.

These data suggest that endogenous circadian rhythm regulates LDH activity and the light may be the environmental zeitgever that control LDH biological rhythm in Korean endemic fish, 각시붕어.

E122 Expression of Stress Proteins during Hypoxia and Heat Shock in the Fish (각시붕어; *Rhodeus uyekii*).

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During hypoxia and heat-shock stress, the expression of stress proteins was examined in skeletal muscle of endemic fish, *Rhodeus uyekii* by SDS-PAGE and western blot analysis. The amount of heat shock protein 70 (Hsp 70) increased by hyperthermic stress from 20℃ to 30℃. When the fish, acclimated at 5.0 ppm of dissolved oxygen, were transferred to the hypoxic condition of 1.7 ppm, there was no appreciable change in HSP70. In contrast, 80 kDa protein was markedly induced by both hypoxic and hyperthermic stress. The 80 kDa protein appeared from 1 hr of stress, reaching a maximum level at 1 hr 30 min, and declined thereafter. But, the decrease of 80 kDa protein from 1.5 hr of stress was faster in heat-shock than in hypoxic stress.

These results suggest that 80 kDa protein was the major protein induced by hypoxic and heat-shock stress in *Rhodeus uyekii*, and the expression of stress proteins during hypoxic and hyperthermic stress was regulated by different mechanisms.