

BRIEF COMMUNICATION

MIF-1 (Pro-Leu-Gly-NH₂) Decreases Activity in Siamese Fighting Fish (*Betta splendens*)

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BROWN, M. M., P. B. SARDENGA, G. A. OLSON, S. W. DELATTE AND R. D. OLSON. MIF-1 (Pro-Leu-Gly-NH₂) decreases activity in Siamese fighting fish (*Betta splendens*). PHARMACOL BIOCHEM BEHAV 20(4) 629-630, 1984.— The effects of MIF-1 (Pro-Leu-Gly-NH₂) on activity and aggression of male Siamese Fighting Fish (*Betta splendens*) were considered. Animals were given intraperitoneal injections of 0.0 or 10.0 mg/kg MIF-1. After a 10-minute delay, they were placed in a 10 gallon aquarium and their activity was monitored for 60 minutes. Although aggressive responses in the presence of suitable opponents were not reliably affected, a significant decrease in general activity was produced. This is compatible with differential effects of MIF-1 across species.

MIF-1 Activity *Betta splendens*

EXPERIMENTS across several species have been used to investigate the behavioral effects of the hypothalamic tripeptide MIF-1 (Pro-Leu-Gly-NH₂) [10]. MIF-1 has been shown to increase activity in goldfish [5], to counteract the sedative effects of a reserpine derivative in mice and monkeys [8], and, in a dose-dependent fashion, to affect foot-shock-induced aggression in mice [7]. In addition, the opiate antagonist naloxone, with which MIF-1 has been found to share several actions [3, 4, 6, 9, 11], has produced increases in defensive aggression in rats [1]. A change only in general activity has been shown to be an unlikely explanation for such behavioral observations [2]. There is abundant literature on the measurements of activity and aggression of the Siamese Fighting Fish (*Betta splendens*); in addition, behavioral effects of MIF-1 have been demonstrated in fish [5]. The Siamese Fighting Fish thus was chosen to be the subject of the present study.

METHOD

Animals

Forty male Siamese Fighting Fish were obtained from a local pet store. The fish were housed, separately and in visual isolation from each other, in one-quart jars.

Drugs

Animals (n=20) received either 0.0 or 10.0 mg/kg MIF-1 dissolved in a vehicle consisting of 0.9% saline made to 0.01

M with acetic acid. The injections were given in a volume proportional to weight of 1 μ l/g and were administered intraperitoneally. To prevent experimenter bias, the vials containing the solutions were coded and the code was not broken until the data had been collected.

Apparatus

The observation tank was a ten-gallon aquarium, lit from above and heated to an average temperature of 27°C. Each session was video-taped for later scoring.

Procedure

Animals were randomly assigned to groups as described below. Counter-balancing techniques were employed to preclude any effects due to the relative positions of the one-quart jars.

Ten of the forty fish were observed for measures of general activity. Of these, five animals received MIF-1, while the other five were injected with the vehicle.

The thirty remaining fish were observed for evidence of aggressive activity. The fish were assigned to pairs, and the group was subdivided as follows. In five of the pairs, each animal was given MIF-1. In five other pairs, each fish received the vehicle. In the remaining five pairs, one member of each pair was injected with MIF-1, while the other received the vehicle.

After injection, each fish was returned to its home jar for ten minutes. Each fish, or pair of fish, then was placed in the

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observation tank and its activities were filmed for the ensuing sixty minutes.

The film generated in this manner was scored in the following manner. Fish in the "activity" group were scored for the number of air glups at the surface, and for the duration of periods of inactivity. The fish in the "aggression" group were scored for the number of displays (broadside-turning-to-face and lateral display) and the number of bites exhibited.

RESULTS

A significant difference between treatment groups was found for the duration of inactivity, $t(8)=3.587, p<0.01$, with the group receiving MIF-1 being less active. No other significant results were obtained.

DISCUSSION

As mentioned previously, an earlier study demonstrated an increase in activity in goldfish after treatment with MIF-1 [5]. In the present study, Siamese Fighting Fish injected with MIF-1 were significantly less active than fish given the vehicle. This suggests the difference in the effect of MIF-1 between the two species might exist.

Although none of the measures of aggression indicated statistically reliable differences between the treatment groups, a general trend toward lower levels of aggression was observed among those pairs in which each member had been treated with MIF-1, as compared to those in which both members of the pair had been injected with the vehicles. The differences between the treatment means were quite large in the measures of aggressive behavior (broadside-turning-to-face: mean for pairs given vehicle was 25.2, compared to 6.8 for pairs given MIF-1; lateral displays: 46.6 for vehicle vs. 4.8 for MIF-1), but the variability of the scores precluded significance.

In recent years, a number of studies have suggested MIF-1 to be an endogenous opiate antagonist, with effects similar to those produced by naloxone [3, 4, 6, 9, 11]. The results of the present study suggest that the effects of MIF-1 and naloxone should be compared in additional studies of activity to investigate possible species differences in more detail.

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