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Letter to the Editor

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Melatonin is primarily produced by the photoreceptor cells in the pineal organ, which acts as a photoneuroendocrine transducer and secretes melatonin into the blood (1,2). It is not stored in the pineal; therefore its plasma level reflects the synthesis capacity of the gland of fish (3,4). The synthesis and release of this hormone is low during the light period and rises during the dark period (5). In some fishes, rhythmic melatonin production is driven by intra-pineal circadian oscillators (=pineal clocks), entrained by the Light-Dark (LD) cycle and capable of rhythmic melatonin production and release in the absence of light (e.g., pike) (6). In contrast, rhythmic melatonin production in rainbow trout (*Oncorhynchus mykiss*) is under the direct control of the LD cycle (7,8).

Fish respond to changes in their internal and external environments by altering circulating catecholamines. As neurotransmitter catecholamines such as epinephrine, norepinephrine, dopamine, metanephrine etc. play important roles in the control and regulation of the central and peripheral nervous system (9). It is reported that arterial oxygen (PO_2) (10), carbon dioxide (11) tensions during hypoxia are involved in catecholamines release. The resultant release of catecholamines is considered to be a compensatory response to optimize cardiovascular and respiratory functions (12).

Carbonic anhydrase (CA; systematic name: carbonate hydrolyase [enzyme number 4.2.1.1; IUBMB 1992]) is one of the zinc metalloenzymes, an important class of enzymes that regulate CO_2 levels in living organisms. Fourteen different CA isozymes have been described so far in higher vertebrates. The only known physiological function of these isozymes is to facilitate the interconversion of CO_2 to HCO_3^- and H^+ (13). They therefore play key roles in such diverse processes like controlling of physiological pH and gas balance (14).

At the studies about interactions among melatonin hormone, catecholamines and carbonic anhydrase in trout, it was reported that nocturnal melatonin production was changed by catecholamines in cultured pike pineals but no effect could be induced in trout pineals cultured under similar conditions (15). It is clear that pike has different physiological mechanism in terms of regulating melatonin hormone than trout. Moreover, melatonin hormone inhibited the rainbow trout erythrocyte CA enzyme activity in vivo and it may demolish physiological events i.e. preservation red cell intracellular pH, ventilatory control and red cell fragility were reported (16).

The assumption is that if melatonin inhibits erythrocyte CA enzyme activity in vivo in trout, ventilatory control would be depended on not only catecholamines but also melatonin during hypoxia. Considering the facts above it should be made clear if melatonin hormone also inhibits CA enzyme or not in other fish species.

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