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MELATONIN IN THE PROMOTION OF FISH REPRODUCTION

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Enhancement of reproductive ability that essentially includes expansion of breeding periodicity and acceleration of oocyte maturation in any economically important fish species is a fascinating area of modern aquaculture. The target is traditionally reached by effective manipulation of one or more endocrine and environmental factors, which collectively determine the rate of fecundity of the species. Accordingly, the pineal hormone melatonin (N-acetyl-5-methoxytryptamine), that transmits photoperiodic information of the environment to the neuro-endocrine regulatory axis of reproduction, has earned special attention. A number of carefully controlled experimental studies provided convincing evidence that exogenous administration of melatonin at a specific dose, for a particular duration, and at an appropriate reproductive season in a periodic breeder, like carp, stimulates the process of gonadal growth and oocyte maturation. Melatonin as a hormone seems to play a critical role in the regulation of seasonal reproduction by activating the cascade that stimulates hypothalamic neurons to produce gonadotropin-releasing hormone (GnRH), and/or by acting directly on the gonads. Thus a commercial product 'ovaprim' (a combination of GnRH and domperidone) is very popular for ready use in fish farming. Moreover, several new studies unequivocally demonstrated that melatonin, apart from playing the role of a hormone, may act as a potent antioxidant to reduce oxidative stress during maturation. A recent study by providing the first evidence that melatonin pretreatment in carp ameliorates ovaprim actions on the process of final oocyte-maturation and alleviates oxidative stress in pre-ovulatory follicles has opened up a possibility of further application of melatonin for induced spawning. This communication thus aims to bring together the current knowledge on the role of melatonin as a hormone as well as an antioxidant in the regulation of fish reproduction and shape the current working hypotheses supported by recent findings obtained in carp or based on knowledge gathered from other fish species.

Biography

Saumen Kumar Maitra has completed his PhD from Calcutta University (India) and Postdoctoral studies from Mainz University (Germany). He is the Professor and Former Head in the Department of Zoology, Visva-Bharati, a premier Central University in India. He has published more than 150 papers in reputed journals and has been serving as an Associate Editor of '*Frontiers in Experimental Endocrinology*, and Editorial Board Member of several journals of international repute. He made a break-through research in off-season breeding of carp by manipulation of duration of light (photoperiods) and/or endogenous profiles of melatonin. By demonstrating melatonin receptors on the carp oocytes, and the role of intra-ovarian melatonin as a potent antioxidant, he provided the first evidence of extra-hypothalamic actions of melatonin on any fish ovary. Collectively, his research unequivocally proved the efficacy of melatonin treatment as an effective tool for achieving desired state of spawning in a commercially important fish.

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