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Professional Exposure:

- **STA fellow, National Research Institute of Aquaculture, Japan 1996 – 1998**
- **JSPS fellow & Distinguished CREST (JST) fellow, National Institute for Basic Biology (NIBB), Japan 1998 – 2003**
- **Visiting Scientist, NIBB, Japan May-June, 2005**
- **Visiting Scientist, the Chinese University of Hong Kong, Hong Kong December, 2006-January, 2007**
- **Guest Editor, 2005, Special issue, Fish Physiology and Biochemistry, Springer, The Netherlands**

Areas of Research:

Gonadotropin releasing hormone (GnRH) and Gonadotropins: One of the ongoing research in our laboratory aims at investigating the role of gonadotropin-releasing hormone (GnRH), a hypothalamic decapeptide, on sexual maturation of teleost fish. GnRH regulates sexual maturation and spawning by modulating gonadotropin (GTH) secretion. Levels of seabream (sb) GnRH in brain and pituitary show a close correlation with gonado-somatic index and reproductive cycle in most of the perciforms (Senthikumar et al., 1998). SbGnRH has been found to be expressed even in prepubertal fish and its release pattern is controlled by monoamines like that of the adults. This finding led us to investigate the ontogenic differences in the appearance of sbGnRH between sexes and its plausible role on sex differentiation. Our studies on this line indicated subtle differences in the localization of sbGnRH as well as GTHs (Swapna et al., 2005). Further we cloned sbGnRH cDNA and upstream elements of sbGnRH gene to understand its regulation.

Steroidogenic enzyme genes and their transcription factors: A distinct shift in steroidogenesis, i.e., from E₂ to 17 α ,20 β -DP as well as the steroidogenic enzyme genes from ovarian cytochrome P450 aromatase (oP450arom) to 20 β -hydroxysteroid dehydrogenase (20 β -HSD) occur in the granulosa layers of ovarian follicles prior to oocyte maturation (Senthilkumaran et al., 2004). Molecular level approaches revealed that the triggering of steroidogenic shift by GTHs in granulosa cells is manifested through subjugation of Ad4BP/SF-1 expression in respect of oP450arom followed by the induction of over expression of 20 β -HSD through some other transcription factors (Yoshiura et al., 2003). We cloned some of the important steroidogenic enzyme genes and their transcription factors using Indian fish species as model to understand their role in gamete development and maturation by analyzing their expression patterns. Studies on this line in the past few years indicated the role of CYP17 (Sreenivasulu et al., 2005), 20 β -HSD and CREB in gametogenesis. Our laboratory is also involved in understanding the role of 11 β -HSD, *DMRT1* and aromatase in testicular and ovarian sex differentiation. The influence of thyroid and sex steroid hormones on gametogenesis is being probed (Rasheeda et al.,

2005; Raghuvver et al., 2005; Swapna et al., 2006). Our laboratory ultimately aims at identifying some important genes which can serve as markers for sex differentiation and maturation as well as for understanding the impact of endocrine disruptors.

Research Group:

Ms. I. Swapna (Ph.D), Mr. G. Sreenivasulu (Ph.D), Mrs. Rasheeda M.K (Ph.D), Mr. K. Raghuvver (Ph.D), Ms. P. Sridevi (Ph.D), Dr. Rajneesh Tripathi (RA, DBT)

Ten best Publications:

1. Swapna I, Sathyasaikumar KV, Murthy ChRK, Dutta-Gupta A and **Senthilkumaran, B.** (2007) Alteration in kinetic and thermotropic properties of cerebral membrane bound acetylcholine esterase during thioacetamide-induced hepatic encephalopathy: correlation with membrane lipid changes. **Brain Res., 1153:188-195.**
2. Swapna I, Rajasekhar M, Supriya A, Raghuvver K, Sreenivasulu G, Rasheeda MK, Majumdar KC, Kagawa H, Tanaka H, Dutta-Gupta A and **Senthilkumaran B.** (2006). Thiourea-induced thyroid hormone depletion impairs testicular recrudescence in the air-breathing catfish, *Clarias gariepinus*. **Comp. Biochem. Physiol. A 144: 1-10.**
3. Zhou LY, Wang DS, **Senthilkumaran B**, Yoshikuni M, Shibata Y, Kobayashi T, Sudhakumari CC and Nagahama Y. (2005). Cloning, expression and characterization of three types of 17 β -hydroxysteroid dehydrogenases from the Nile tilapia, *Oreochromis niloticus*. **J. Mol. Endocrinol., 35: 103-116.**
4. **Senthilkumaran B**, Yoshikuni M and Nagahama Y. (2004). A shift in steroidogenesis occurring in ovarian follicles prior to oocyte maturation. **Mol. Cell. Endocrinol., 215:11-18.**
5. Yoshiura Y, **Senthilkumaran B**, Watanabe M., Oba Y, Kobayashi T and Nagahama Y. (2003). Synergistic expression of Ad4BP/SF-1 and cytochrome P-450 aromatase (ovarian type) in the ovary of Nile tilapia, *Oreochromis niloticus*, during vitellogenesis suggests transcriptional interaction. **Biol. Reprod., 68: 1545-1553.**
6. **Senthilkumaran B**, Sudhakumari CC, Chang XT, Kobayashi T, Oba Y, Guan G, Yoshiura Y, Yoshikuni M and Nagahama Y. (2002). Ovarian carbonyl reductase-like 20 β -hydroxysteroid dehydrogenase shows distinct surge in messenger RNA expression during natural and gonadotropin-induced meiotic maturation in Nile tilapia. **Biol. Reprod., 67: 1080-1086.**
7. Wang DS., Kobayashi T, **Senthilkumaran B**, Sakai F, Sudhakumari CC, Suzuki T, Yoshikuni M, Matsuda M, Morohashi K and Nagahama Y. (2002). Molecular cloning of DAX-1 and SHP cDNAs and their expression patterns in the Nile tilapia, *Oreochromis niloticus*. **Biochem. Biophys. Res. Commun., 297: 632-640.**
8. **Senthilkumaran B**, Okuzawa K, Gen K and Kagawa H. (2001). Serotonin, GABA and neuropeptide Y stimulate seabream gonadotropin-releasing hormone release, *in vitro*, from preoptic-anterior hypothalamus and pituitary of red seabream, *Pagrus major*. **J. Neuroendocrinol., 13, 395-400.**
9. **Senthilkumaran B** and Joy KP. (2001). Perioviulatory changes in catfish ovarian oestradiol-17 β , oestrogen-2-Hydroxylase and catechol-o-methyltransferase during GnRH analogue-induced ovulation and *in vitro* induction of oocyte maturation by catecholestrogens. **J. Endocrinol., 168, 239-247.**
10. Gen K, Okuzawa K, **Senthilkumaran B**, Tanaka H, Moriyama S and Kagawa H. (2000). Unique expression of gonadotropin-I and -II subunit genes in male and female red seabream (*Pagrus major*) during sexual maturation. **Biol. Reprod., 63, 308-319.**