Transcriptional regulation of gametogenesis-related and apoptosis marker genes along the HPG-axis of the thicklip grey mullet from a polluted harbour in the Bay of Biscay, Southwestern Europe

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The sexual cycle and gonadal development of teleost fishes is dependent on
dormone communication between the brain, pituitary and gonads. This
communication network has been known to be affected by endocrine disrupting
chemicals (EDCs), particularly xenoestrogens, resulting in intersex condition
(feminization) in thicklip grey mullets (Chelon labrosus). The study analysed
specific transcripts along gametogenesis characterizing the relevance of their
transcriptional regulation as molecular markers of xenoestrogenic exposure. Key
genes regulating gametogenesis and follicular atresia were sequenced and their
gonadal transcription profile quantified by qRT-PCR at different gametogenic
stages of mature adult female, male and intersex mullets, collected during a
whole reproductive cycle. Partial cDNA sequences of both pituitary
gonadotropins (fshβ and lhβ), gonadal luteinizing hormone receptor (lhr), and
apoptosis related E3 ubiquitin-protein ligase mdm² were successfully sequenced
and published in the Genbank. Their sequences were found to be conserved in C.
laborus when compared to orthologs in other vertebrate species, specially other
teleost fishes. The transcription profiles of lhr and vitellogenin receptor (vtgr) in
gonads showed a decline in transcription levels during late vitellogenesis in
ovaries, with no observable differences during spermatogenesis. Apoptosis
markers p53 and mdm² showed opposite transcription profiles in late
vitellogenesis, p53 increasing while mdm² decreased in comparison to early
vitellogenic ovaries, suggesting an up-regulation of the apoptosis regulating
cascade during the preparation of oocytes for resorptive atresia. The
transcription levels of all analysed genes were lower in intersex males in
comparison to normal males, suggesting that testis feminisation and production
of oocytes results in modulation of transcription. These genes could be studied in
relation to gonadotropin signalling and apoptotic responses as molecular

markers of intersex condition in monitoring programmes using C. labrosus as sentinel of exposure to xenoestrogenic compounds.