Differential expression of gonadotropin and estrogen receptors and oocyte cytology during follicular maturation associated with egg viability in European eel (Anguilla anguilla)

In captivity, oogenesis and ovarian follicle maturation in European eel can be induced experimentally using hormonal therapy. The follicle's ability to respond effectively to the induction of maturation and ovulation, resulting in viable eggs, depends on the oocyte stage at the time of induction. We hypothesized that variation in the expression of key hormone receptors in the ovary and size of oocyte lipid droplets are associated with changes in oocyte stage. Thus, we induced ovarian follicle maturation using a priming dose of fish pituitary extract followed by the administration of a 17α, 20β-dihydroxy-4-pregnen-3-one (DHP) injection. Females were then strip-spawned, the eggs were fertilized in vitro, incubated and larval survival was recorded at 3 days post hatch (dph). The expression of gonadotropin receptors (fshr, lhcgr1 and lhcgr2) and estrogen receptors (esr1, esr2a, esr2b, gpera and gperb) was quantified and the size of oocyte lipid droplets measured. Larval survival at 3 dph was used to differentiate high- and low-quality egg batches. Results showed significantly higher abundance of lhcgr1 and esr2a at priming for high-quality egg batches whereas fshr and gperb transcripts were significantly higher at DHP injection for low-quality egg batches. Therefore, high levels of lhcgr1 and esr2a may be important for attaining follicular maturational competence, while high fshr and gperb mRNA levels may indicate inadequate maturation competence. Furthermore, lipid droplet size at DHP and in ovulated eggs was significantly smaller in high-quality egg batches than in low-quality, which indicates that droplet size may be a useful marker of follicular maturational stage.

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