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# Brain-associated alterations of Hippo pathway transcription in early maturing Atlantic salmon

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## Abstract

**Background** Pubertal timing is a key life history trait, shaped by ecological pressures to balance reproductive success and survival. Emerging evidence suggests a link between adiposity and early maturation, potentially through hormonal signaling pathways governing puberty timing. The timing of sexual maturation in Atlantic salmon has a strong genetic basis in addition to being linked with environmental shifts and lipid reserves. A gene encoding a co-factor of the Hippo pathway, *vgll3*, is a major determinant of maturation timing in salmon. The Hippo pathway is known for its evolutionary conserved molecular signal role in both sexual maturation and adipogenesis.

**Results** In this study, we tested the expression of Hippo pathway genes in the brain of immature and mature male Atlantic salmon carrying either the *early* or the *late* maturation genotype of *vgll3*. We found increased brain expression of a major Hippo pathway kinase (*lats1b*) in individuals with *early* maturation genotypes of *vgll3* before maturation development of testes was evident. Moreover, we found components and regulating partners of the Hippo pathway showing differential expression in brain of individuals with *early* and *late* *vgll3* genotypes prior to maturation. This may suggest a role for the Hippo pathway in central nervous system processes that regulate the preparation for maturation.

**Conclusions** This study characterizes transcriptional changes in components of the Hippo pathway in the brain in relation to *vgll3*-mediated early maturation in Atlantic salmon, highlighting the potential involvement of this pathway in the central regulation of maturation prior to gonadal development.

**Keywords** Gene expression, Atlantic salmon, *vgll3*, Hippo pathway, Brain, Early maturation