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IMPACT OF IVERMECTIN ON THE GONADS OF THE MARINE MUSSEL *MYTILUS GALLOPROVINCIALIS* AND REPERCUSSION ON THE EMBRYO DEVELOPMENT

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Water pollution by emerging contaminants (ECs) is a growing global concern. Among the various ECs, active pharmaceutical compounds (PhACs) deserve particular attention. Ivermectin (IVM), a broad-spectrum antiparasitic agent, is one of the most widely used drugs in intensive farming and represents an extremely toxic EC for non-target aquatic invertebrates. The present study aimed to evaluate the multi-level effects of realistic environmental concentration of IVM (ranging from 5 ng/L to 1000 ng/L) on the mussels Mytilus galloprovincialis. A two-stage approach was adopted: (i) a long-term exposure study on adult organisms to assess gonadal responses, in which animals were exposed to IVM for 12 days (T0, T3, T6, T12), followed by an 8-day recovery period in clean seawater (T20); (ii) an embryotoxicity test to assess morphological development after 48 h exposure. Histological examination of male gonads focused on tissue organization, characterized by vesicular connective tissue (VCT) and adipogranular cells (ADG) surrounding the follicles containing gametic cells at various developmental stages. Meanwhile, qPCR analysis was applied to assess the expression of genes involved in endocrine signalling (ER1, ER2), steroid metabolism (HSD12, HSD12), gamete recognition (VCL, VERL), and embryonic energy conservation (VTG). The expression analysis of these genes in adult mussels highlighted a persistent dysregulation, since transcription levels failed to return to baseline, remaining significantly altered compared to the initial physiological condition. This lack of recovery suggests that IVM may induce long-lasting shift. Moreover, the morphological analysis conducted on embryos at 48 h highlighted developmental anomalies and larval malformation. Overall, the combination of the impairment of adult gonadal function and of embryonic development poses a high ecological risk that threatens the reproductive success and welfare of marine bivalve populations.