

relevant temperatures enhanced production of extracellular virulence factors and type III secretion-associated proteins, illustrating how virulence can increase under ectothermic infection conditions. Field and epidemiological observations support the same pattern in turbot systems: ulcerative disease outbreaks in juvenile turbot began after water temperature rose above 20°C, while broader aquaculture case studies have linked increasing temperature and salinity, especially when combined with reduced dissolved oxygen, to higher occurrence of *Vibriosis* and other infectious diseases (Spinosa et al., 2024).

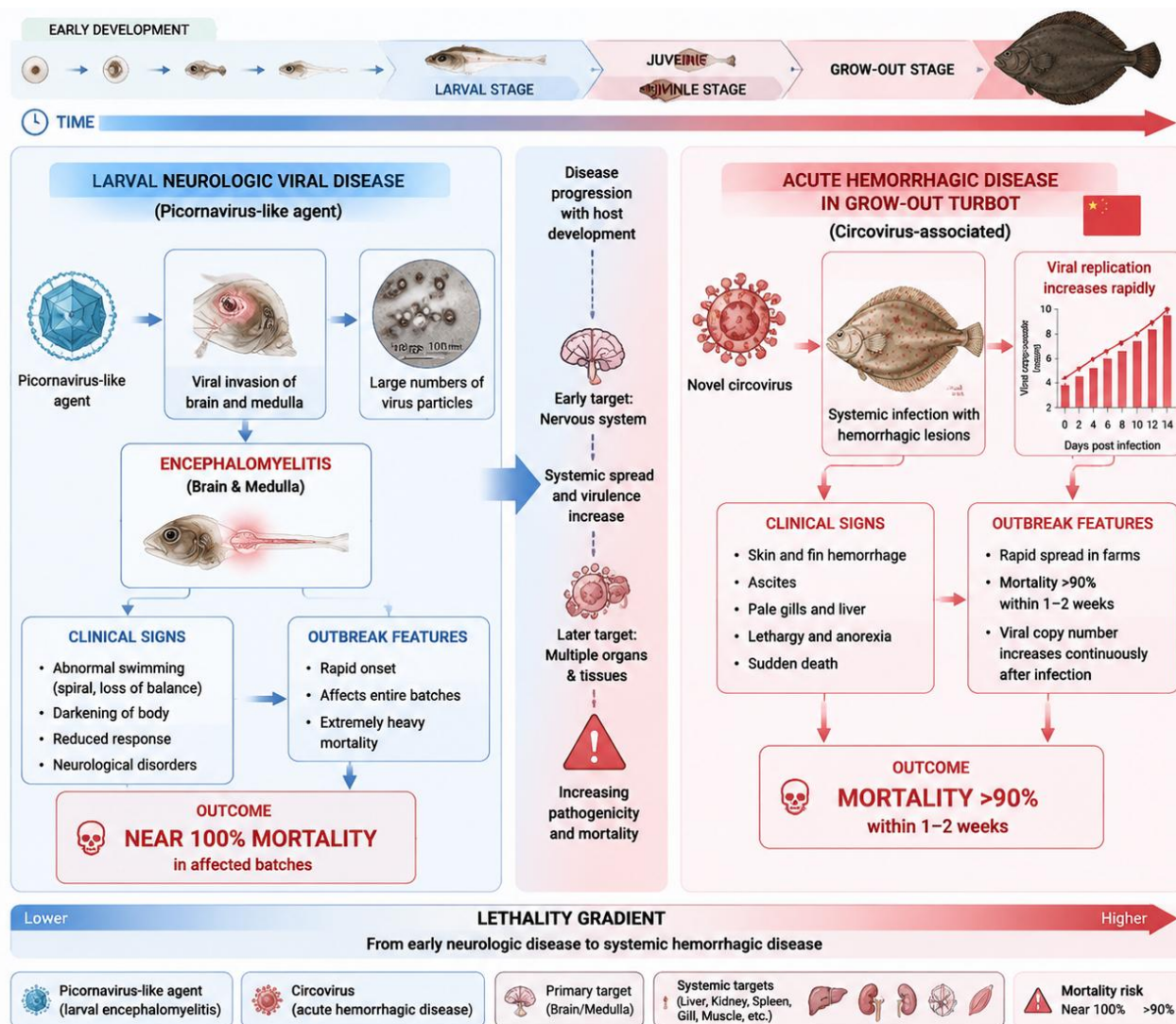


Figure 2 Progression of viral diseases in turbot from larval encephalomyelitis associated with picornavirus-like agents to acute hemorrhagic disease caused by a novel circovirus in grow-out stages

7 Feeding Environment and Nutritional Immunity

7.1 Temperature-dependent feeding behavior and digestion efficiency

As an ectothermic fish, turbot shows feeding and digestive responses that are tightly regulated by temperature, but these responses are not linear across the full thermal range. General fish evidence shows that temperature affects both feeding motivation and the capacity to digest and absorb nutrients, while turbot-specific trials indicate that feed intake increases from 14 to 18°C but declines significantly at 21°C under high-density recirculating conditions, suggesting that warming beyond the optimal range reduces appetite rather than continuously stimulating it. This pattern is consistent with the view that thermal effects on feeding are species-specific and depend on exposure intensity and duration, which is particularly relevant for a cold-water species such as turbot (Volkoff and Rønnestad, 2020).