Abstract

Odontogenesis has been extensively studied to ascertain the cellular pathways and biochemical signals that help to regulate this developmental system. Various gene families and growth factors that been identified as important regulators of tooth development. However other molecules such as retinoic acid and PI3K have also been implicated in the regulation of tooth development, especially in the initiation stage of tooth development and cusp morphogenesis. By inhibiting RA synthesis with citral, and PI3K activation using wortmannin, the study sought to investigate how amelogenesis and cusp morphogenesis were affected in murine developing first mandibular molars. Tooth development of the 14.5 and 16.5 day embryonic mouse, *in* vitro for 12 days, did not progress beyond the early bell stage. This was indicated by the absence of an enamel layer and possible remnant basement membrane in the cultured molars. Furthermore, no deviations in cusp morphology were observed, when inhibitors against either RA or PI3K were applied. However utilizing QRT-PCR, it was noted that the synthesis of amelogenin-mRNA increased in the 14.5 day tooth explants treated with citral, but not in the 16.5 day molar explants subjected to the same treatment. These results could therefore suggest that the degradative pathways or feedback systems controlling amelogenin-mRNA levels are inactive prior to the onset of amelogenesis on day 15-16. On the other hand, PI3K did not appear to regulate amelogenin expression, in either 14.5 or 16.5 day embryonic mouse molar explants that were treated with wortmannin. Statistical analysis revealed no changes in the laminin α5-mRNA levels in either 14.5 or 16.5 day molars treated with either citral or wortmannin, which suggests that PI3K is not the only cellular pathway that controls laminin-mRNA synthesis.