Salicylic acid base poly anhydride esters (SAPAE) in periodontitis and periimplantitis


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Abstract: Salicylic acid's (SA) anti-inflammatory and antibacterial qualities suggest that it may have medicinal use. SAPAE polymer has potential applications in the management of periodontal disease and other cranial osseous abnormalities. Salicylic acid (SA) has medicinal promise because of its ability to reduce inflammation and kill bacteria. The short half-life of SA in vivo is a drawback of treatment, however this can be solved by incorporating it into a polymer backbone for prolonged release, creating biodegradable salicylic acid-based poly(anhydride-esters) (SAPAE). In addition to having a delayed release for up to a month, SAPAE is easy to make and a good, affordable substitute for biologic factors. In order to treat peri-implantitis, surgical debridement and surface decontamination/detoxification have been often employed. SAPAEs' polymers are examples of polymeric biodegradable devices that can be utilised to deliver controlled chemicals over a prolonged amount of time.

By using bone grafting material in conjunction with SAPAE, bone fill was considerably boosted in a rat critical size defect model as determined by histomorphometry and micro-computed tomography (CT). In the normoglycemic group, bone growth was increased, but In rats with diabetes, bone production was both boosted and accelerated. A decrease in inflammation throughout the period of bone development, an increase in osteoblast count, and a decrease in osteoclast count were linked to the increased bone production in the diabetic group. The findings imply that SAPAE polymer has potential applications in the management of periodontal disease and other cranial osseous abnormalities. It may also be helpful in the treatment of peri-implantitis, especially in those with diabetes.

A polymeric prodrug developed by Erdmann et al. allows for a greater percentage of the drug to be given (62 weight percent) as the polymer degrades. Unlike previous polymeric prodrug systems, the drug in these polymers is chemically incorporated into the polymer backbone instead of connected as a side group. Up to 100% of the medication's weight can be included into the polymer framework thanks to this design. Another feature of the polymer is complete degradation due to the ester and anhydride linkages in the polymer backbone. They describe the synthesis of a poly(anhydride-ester) comprising alkyl chains joined by ester links and salicylic acid aromatic moieties.

The inclusion of osteogenic growth agents to these approaches highlights their poor capacity to mend large bone defects at relevant timescales. Because biodegradable membranes eliminate the need for a second operation to remove non-biodegradable GBR membranes, including polytetrafluoroethylene (PTFE), they may improve this technique of treating bone defects. Salicylic acid-based poly(anhydride-esters) (SAPAEs) as GBR barrier materials

Salicylic acid (SA) has medicinal promise because of its ability to reduce inflammation and kill bacteria. The short half-life of SA in vivo is a drawback of treatment, however this can be solved by incorporating it into a polymer backbone for prolonged release, creating biodegradable salicylic acid-based poly(anhydride-esters) (SAPAE). In addition to having a delayed release for up to a month, SAPAE is easy to make and a good, affordable substitute for biologic factors. These qualities are helpful in supporting bone repair, especially when inflammation is exacerbated by systemic diseases like diabetes.
Nsaid-derived poly (anhydride-esters) in bone and periodontal regeneration
This preliminary study by Reynolds et al. describes the early stages of wound healing in calvarial defects grafted with demineralized bone matrix (DBM) and covered with membranes made from a novel class of non-steroidal anti-inflammatory medication (NSAID)-derived poly(anhydride-esters). As these polymers hydrolyze and chemically incorporate salicylic acid (SA) into the polymeric backbone, NSAIDs are produced. When compared to defects treated with DBM and covered in polymers generated from NSAIDs, defects treated with PLA consistently displayed a moderate to severe inflammatory cell infiltration after 21 days. NSAID-derived polymers did not exhibit any anomalies that displayed histopathological features such fibrous encapsulation or big foreign body cells. Cellular traits suggestive of bone development were seen in all transplanted defects. This novel class of poly (anhydride-esters) generated from NSAIDs was well-tolerated and didn't significantly increase inflammation.(4)

Potential role of sapae in peri-implantitis in normal or diabetic situations
Most periimplantitis treatments available today are ambiguous and oftentimes unproductive. The cornerstones of periimplantitis treatment protocols have included access flap surgeries, implant surface cleaning, administration of local and systemic antibacterial agents, and bone grafting procedures. The two primary issues are how to stop peri-implantitis from getting worse and how to effectively stimulate bone rebuilding around the implant after it has progressed. Since there is no pharmaceutical that works, both are challenging for healthy individuals. Moreover, it is anticipated that treating systemic and local inflammatory illnesses associated with diabetes will become more challenging. The best course of action has been thought to be the continuous local supply of antibacterial medicines that lessen the protracted inflammation caused by periimplantitis, promote bone healing, and cause the implant surface to mend and reattach. In order to treat peri-implantitis, surgical debridement and surface decontamination/detoxification have been often employed. SAPAEs' polymers are examples of polymeric biodegradable devices that can be utilised to deliver controlled chemicals over a prolonged amount of time.

Conclusion
Salicylic acid functions as an analgesic, antipyretic, and anti-inflammatory. Treatment is limited by the short half-life of salicylic acid; however, this can be addressed by incorporating salicylic acid into a polymer backbone for prolonged release, resulting in biodegradable poly(anhydride-esters) based on salicylic acid (SAPAE).Salicylic acid-based poly(anhydride-esters) (SAPAEs) as GBR barrier materials offer therapeutic potential because of their anti-inflammatory and antibacterial properties. These characteristics are beneficial for promoting bone healing, particularly in cases when systemic illnesses like diabetes aggravate inflammation.

References
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