

pH-responsive Antibacterial Monomers for the Inhibition of Dental Caries

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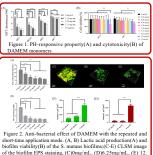
INTRODUCION

In recent years, more researchers have been focusing on anti-bacterial materials that could help regulate oral micro-ecology instead of killing all the bacteria. pH-responsive intelligent materials that could only show antibacterial effect in acidic environment have shown great potential.

Our group recently designed a novel kind of pHresponsive tertiary amine monomer originally. dodecvlmethylaminoethyl methacrylate (DMAEM). Here, we investigated the impact of the monomers on oral biofilms and their anti-caries potential.

THODS

DMAEM was used to treat Streptococcus mutans biofilms and HOK cells for 10min at different pH values. Then, DMAEM monomers were used to treat the biofilms with a repeated and short-time application mode like daily oral care for 48h (10min/12h). Saliva-derived biofilms were treated in the same way and the microbial diversity was tested by 16S rDNA test. A rat dental caries model was also conducted. DMAEM was used to treat the rats twice a day.



5mg/mL; (F.G) Biomass of the biofilms (F) and EPS (G).

Figure 3. Effect of DMAEM on saliva derived biofilms.(A) Heat map of biofilms after treatment (B) ß diversity the biofilms; (C) biofilm viability; (D, E) a diversity of the biofilms, (D) Shannon index; (E) Shannon index;

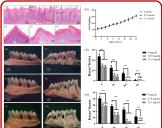


Figure 4. Effect of DMAEM on rat dental caries model.(A-F) histological images of palate mucosa(A-C) and buccal mucosa (D-F), (A, D) 0mg/mL, (B, E)6.25mg/mL, (C, F) 12. 5mg/mL; (G) Daily relative change in rat body weight ; (H-M) Images of the smooth surface(H, J, L) and occlusal surface (I, K, M) of the rat teeth, (H, I) 0mg/mL, (J, K)6.25mg/mL, (L, M) 12. 5mg/mL; (N, O) Keyes' scores of the smooth surface(N) and occlusal surface (O) ;

CONCLUSIONS

With a repeated and short-time application mode. DMAEM showed significant anti-bacterial and anticaries effect. It also demonstrated great potential to keep oral micro-eubiosis