phosphorylation. In mice, Sanghuang attenuated alveolar bone loss, reduced inflammatory infiltration, and enhanced collagen fiber organization.

Conclusions: Sanghuang exerts anti-inflammatory effects by modulating the PI3K/AKT/NF-κB pathway, suggesting its potential as a novel therapeutic agent for periodontitis.

Key Words: Periodontitis, Sanghuang (Phellinus igniarius), Natural extract, Network pharmacology, Molecular docking.

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CA5431

Carbon Nitride Nanocomposites For Periodontitis Targeted Antibacterial And Osteogenesis

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Aim or purpose: Periodontitis, a major cause of tooth loss, is challenging to treat. Traditional PDT is effective but has poor photosensitizer targeting and excessive ROS accumulation, causing bone damage. This study develops a novel CeO2-g-C3N4-BA NPs nanocomposite to enhance PDT selectivity, reduce ROS side effects, and promote periodontal bone repair and regeneration.

Materials and methods: In this study, we employed ultrasonic-assisted technology to obtain g-C3N4 nanosheets. Boronic acid groups were introduced via HATU/DIEA coupling reaction, and the resulting material was mixed with Ce(NO3)3·6H2O. After pH adjustment and thermal treatment, the CeO2-g-C3N4-BA NPs nanocomposite was synthesized. The material was comprehensively characterized. Its antibacterial effects and promotion of periodontal bone tissue repair were evaluated in vitro co-culture models and in animal models of periodontitis. The regulation of the Nrf2/HO-1 pathway and the impact on cellular antioxidant capacity were explored using ROS detection techniques and cell pathway analysis.

Results: Experimental results demonstrate that CeO2-g-C3N4-BA NPs exhibit potent antibacterial activity in vitro and effectively promote alveolar bone repair in periodontitis animal models. ROS detection and cell pathway analysis reveal that the material regulates the Nrf2/HO-1 pathway, enhances cellular antioxidant capacity, alleviates inflammatory responses, and promotes osteoblast activity.

Conclusions: CeO2-g-C3N4-BA NPs serve as a novel periodontitis treatment material, effectively killing bacteria and promoting alveolar bone repair and regeneration, with excellent biocompatibility. This study provides new strategies and theoretical basis for periodontitis treatment, potentially overcoming limitations of traditional PDT.

Key Words: Periodontitis, Photodynamic Therapy, Antibacterial Effect, Nrf2/HO-1 Pathway.

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CA3027

Optimization And Evaluation Of Mouse Models Of Severe Periodontitis

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Aim or purpose: To investigate a more ideal mouse model of severe periodontitis by comparing simple ligature and ligature combined with injection of Porphyromonas gingivalis lipopolysaccharide (P.g. LPS).

Materials and methods: Compare the methods of constructing a mouse periodontitis model using ligation and ligation with continuous injection of lipopolysaccharide derived from Porphyromonas gingivalis. Before euthanizing the mice 14 days later, the following checks were conducted: body stereomicroscopy to detect the degree of tooth mobility and probing depth; the degree of alveolar bone resorption was analyzed by microcomputed tomography and stereomicroscopy, and the inflammatory level in the blood of the mice was assessed by enzyme-linked immunosorbent assay for interleukin-1β and tumor necrosis factor-α.

Results: Compared with the change of tooth mobility and average probing depth in mice with ligation, the changes of tooth mobility and average probing depth were more serious in mice with ligation and continuous injection of P.g. LPS ($P<0.05$). Compared with percent bone volume, bone mineral density, CEJ-ABC and the area of attachment loss of the left maxillary of mice with ligation, the percent bone volume and bone mineral density of the left maxillary of mice with ligation and continuous injection of P.g. LPS were significantly reduced, CEJ-ABC and attachment loss area were significantly increased ($P<0.05$).

Conclusions: Ligation and continuous injection of P.g. LPS combination model may be more suitable for the study of the development and treatment of severe periodontitis.

Key Words: animal model, periodontitis, mouse, lipopolysaccharide (LPS).

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CA5347

Influence Of Osteoporosis On Periodontal Health In Postmenopausal Women

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Aim or purpose: Aim: to evaluate periodontal health in postmenopausal women, with diagnosed systemic osteoporosis, to determine serum and salivary values of sex hormone levels, the oral hygiene habits, dental and prosthetic status; and periodontal health through gingival and periodontal index values.

Materials and methods: The first group of patients was consisted of 30 postmenopausal women with diagnosed periodontitis and the second group of 30 postmenopausal patients with osteoporosis were examined with densitometry methods (DEXA-dual energy x-ray absorption) with t-score <-2.5 SD; also laboratory, clinical and radiological examination were made to verify periodontal disease in both groups.

Results: During different physiological periods of woman life, there is a wide fluctuation in the production of sex steroid hormones which may result in increased gingival and periodontal tissue inflammation, microbial and pathohistological changes. Estrogen and progesterone deficiency in the postmenopausal period, besides the generalized bone loss manifested as osteopenia and osteoporosis, necessarily leads to changes in alveolar bone. We obtained significant loss of teeth in both jaws in postmenopausal women with osteoporosis, extremely low level of estradiol and progesterone in both media, and the apparent presence of periodontitis which not correlate with the level of local factors and the level of oral hygiene habits.

Conclusions: The obtained results suggest a strong relationship and serious involvement of osteoporosis in periodontal health status, which on the other hand indicate the role that dentists should play in treating these patients.

Key Words: osteoporisis, oral health, periodontitis, alveolar bone loss.

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CA5349

Mcds-Based Osteogenic And Protein-Delivery System For Periodontal Regeneration

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Aim or purpose: To develop an osteogenic and protein-delivery composite hydrogel system based on metformin carbon dots (MCDs) that enhances osteogenic potential of human periodontal ligament stem cells (hPDLSCs) under inflammatory conditions and promotes endogenous bone regeneration in periodontitis.

Materials and methods: MCDs were synthesized via a one-step hydrothermal method. The Gel/MCDs@IGF-1 hydrogel was developed by incorporating insulin-like growth factor 1 (IGF-1) via supramolecular interactions. The biocompatibility was assessed using CCK-8 assay, Transwell-migration assay, live/dead-cell-staining. The osteogenic potential was evaluated through ALP and Alizarin-Red-S staining, qRT-PCR, immunofluorescence staining (IF), and western blotting (WB). RNA sequencing and WB were performed to investigate the underlying mechanisms. In vivo, IF, immunohistochemistry, Micro-CT, H&E staining and Masson's staining were performed in rat periodontitis models.

Results: The Gel/MCDs@IGF-1 hydrogel with good biocompatibility was successfully synthesized, enabling sequential release of MCDs and IGF-1. MCDs promoted osteogenic differentiation of hPDLSCs via the PI3K/AKT pathway and alleviated inflammation. The MCDs@IGF-1 complex enhanced IGF-1 delivery and reduced its enzymatic degradation. In vitro and vivo experiments demonstrated that the composite hydrogel system increased ALP activity and calcium-nodule formation, reduced effectively attachment loss in rat periodontitis, suppressed TNF-α level, and upregulated levels of CD90 and osteogenesis-related genes and proteins.

Conclusions: The MCDs-based osteogenic and protein delivery system recruited effectively stem cells, exerted early anti-inflammatory effects, and promoted periodontal bone regeneration, offering a novel strategy for treatment of periodontitis.

Key Words: Metformin, Carbon dots, IGF-1, Osteogenic differentiation, Protein delivery.

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CA5277

Role Of Hmgb1 In Macrophage Polarization In Smoking-Related Periodontitis

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Aim or purpose: To investigate the role of HMGB1 in experimental passive smoking periodontitis mice in vivo and the effects of HMGB1 in macrophages polarization in vitro.

Materials and methods: 1. After 8 weeks of ligation and/or passive smoking, periodontal tissues were evaluated using histology,micro-CT,TRAP staining, and immunohistochemistry. 2. Immunofluorescence staining and ELISA were used to determine the translocation and release of HMGB1 in macrophages stimulated by CSE and Pg-LPS. 3.The mRNA expression of M1 markers (iNOS, TNF-α, IL-6) and M2 markers (ARG-1, RELM-α, MRC-1) in macrophages was measured using RT-PCR. 4. Western blot and flow cytometry were used to detect the expression of HMGB1-specific receptors in macrophage.

Results: 1. Periodontal inflammation,HMGB1 translocation and secretion,macrophage activation and polarization of Group Periodontitis+Smoking was significantly severe than Group Periodontitis; and less severe after antiHMGB1 injection. 2.CSE and Pg-LPS can significantly increase HMGB1 expression and translocated from the nucleus to the cytoplasm. 3.Compared to Group N, M1 markers were significantly increased in the Group Pg-LPS and Group CSE+Pg-LPS ($P<0.01$). There were no significant differences in the gene expression of M2 markers among all group except Group IL-4. 4.Compared to Group N, the expression of TLR4 were significantly increased in Group Pg-LPS and Group CSE+Pg-LPS, lower in Group CSE+Pg-LPS+antiHMGB1.