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Reporting Summary

Nature Portfolio wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Portfolio policies, see our Editorial Policies and the Editorial Policy Checklist.

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a	Confirmed	
☐	☒	The exact sample size (*n*) for each experimental group/condition, given as a discrete number and unit of measurement
☐	☒	A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
☐	☒	The statistical test(s) used AND whether they are one- or two-sided *Only common tests should be described solely by name; describe more complex techniques in the Methods section.*
☒	☐	A description of all covariates tested
☒	☐	A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
☐	☒	A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
☐	☒	For null hypothesis testing, the test statistic (e.g. *F*, *t*, *r*) with confidence intervals, effect sizes, degrees of freedom and *P* value noted *Give P values as exact values whenever suitable.*
☒	☐	For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
☒	☐	For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
☒	☐	Estimates of effect sizes (e.g. Cohen's *d*, Pearson's *r*), indicating how they were calculated

Our web collection on statistics for biologists contains articles on many of the points above.

Software and code

Policy information about availability of computer code

Data collection	No software was used.
Data analysis	Graphpad Prism Ver. 9.0 was used to analyze data for this study.

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio guidelines for submitting code & software for further information.

Data

Policy information about availability of data

All manuscripts must include a data availability statement. This statement should provide the following information, where applicable:
- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our policy

The datasets generated during and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Human research participants

Policy information about studies involving human research participants and Sex and Gender in Research.

Reporting on sex and gender	Total 30 teeth from 20 patients (10 male, 10, female, 1-2 tooth/patient) were used for DPSC isolation.
Population characteristics	The inclusion criteria for teeth collection were the permanent teeth from 18 to 25-year-old patients without caries, periodontal disease, periapical lesion, and systemic inflammatory diseases.
Recruitment	No recruitment advertisement was performed. All donors that provided specimens with informed consents.
Ethics oversight	The study was approved by the Medical Ethical Committee of the Affiliated Stomatology Hospital of Guangzhou Medical University (No. JCYJ2022021),

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☒ Life sciences   ☐ Behavioural & social sciences   ☐ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see nature.com/documents/nr-reporting-summary-flat.pdf

Life sciences study design

All studies must disclose on these points even when the disclosure is negative.

Sample size	In vitro experiments were performed with n=3. The animal experiments were performed at n=8 according to Kawai S et al (2019).
Data exclusions	No data were excluded from analysis.
Replication	Each experiment was performed with at least three biological replicates.
Randomization	All samples were randomly allocated into experimental groups.
Blinding	The persons performing sample preparation and Micro-CT scanning and staining imaging were unaware of the sample identity. Qualifications were performed equally for all conditions for a given experiment.

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involved in the study
☐	☒ Antibodies
☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☐	☒ Animals and other organisms
☒	☐ Clinical data
☒	☐ Dual use research of concern

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☐	☒ Flow cytometry
☒	☐ MRI-based neuroimaging

Antibodies

Antibodies used	Primary antibodies: Anti-GAPDH (ab181602; Abcam, UK),used at 1:10000 Anti-CoL-I (ab260043; Abcam, UK), used at 1:1000 Anti-RUNX2 (ab236639; Abcam, UK), used at 1:1000 Anti-WNT6(bs-6135R; Bioss, China), used at 1:1000

Anti- β-catenin (bs-1165R; Bioss, China), used at 1:1000
Anti- OCN (23418-1-AP; Proteintech, China), used at 1:500;
Secondary antibodies:
HRP-conjugated Goat Anti-Rabbit IgG (#31460,;Thermo Fisher Scientific, US), used at 1:5000
CoraLite488-conjugated Goat Anti-Rabbit IgG (SA00013-2; Proteintech, China), used at 1:200.

Validation | All antibodies validation data sheets were provided by the manufactures.

Animals and other research organisms

Policy information about studies involving animals; ARRIVE guidelines recommended for reporting animal research, and Sex and Gender in Research

Laboratory animals | Male nude mice, 6-8 weeks of age, were used in this study.

Wild animals | No wild animals were used in this study.

Reporting on sex | According to the research of Kawai S et al (2019) and Yuan Z et al (2021), we used male mice for in vivo animal experiments.

Field-collected samples | The study did not involve samples collected from the field.

Ethics oversight | All animal experiments were performed under the study protocol No.20220103, as approved by the Laboratory Animal Ethics Committee of Guangdong Huawei Testing Co., LTD.

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Flow Cytometry

Plots

Confirm that:

☒ The axis labels state the marker and fluorochrome used (e.g. CD4-FITC).

☒ The axis scales are clearly visible. Include numbers along axes only for bottom left plot of group (a 'group' is an analysis of identical markers).

☒ All plots are contour plots with outliers or pseudocolor plots.

☒ A numerical value for number of cells or percentage (with statistics) is provided.

Methodology

Sample preparation | DPSCs of P3 were digested with trypsin, centrifuged and resuspended with PBS for the flow cytometry analysis.

Instrument | Beckman Coulter, USA

Software | FlowJo 10

Cell population abundance | 0.1 million cells were analyzed in each group.

Gating strategy | Isotype matched antibodies were used to determine the negative and positive boundaries and gating strategy has been explained in manuscript.

☒ Tick this box to confirm that a figure exemplifying the gating strategy is provided in the Supplementary Information.