

Stem cells and orthodontics

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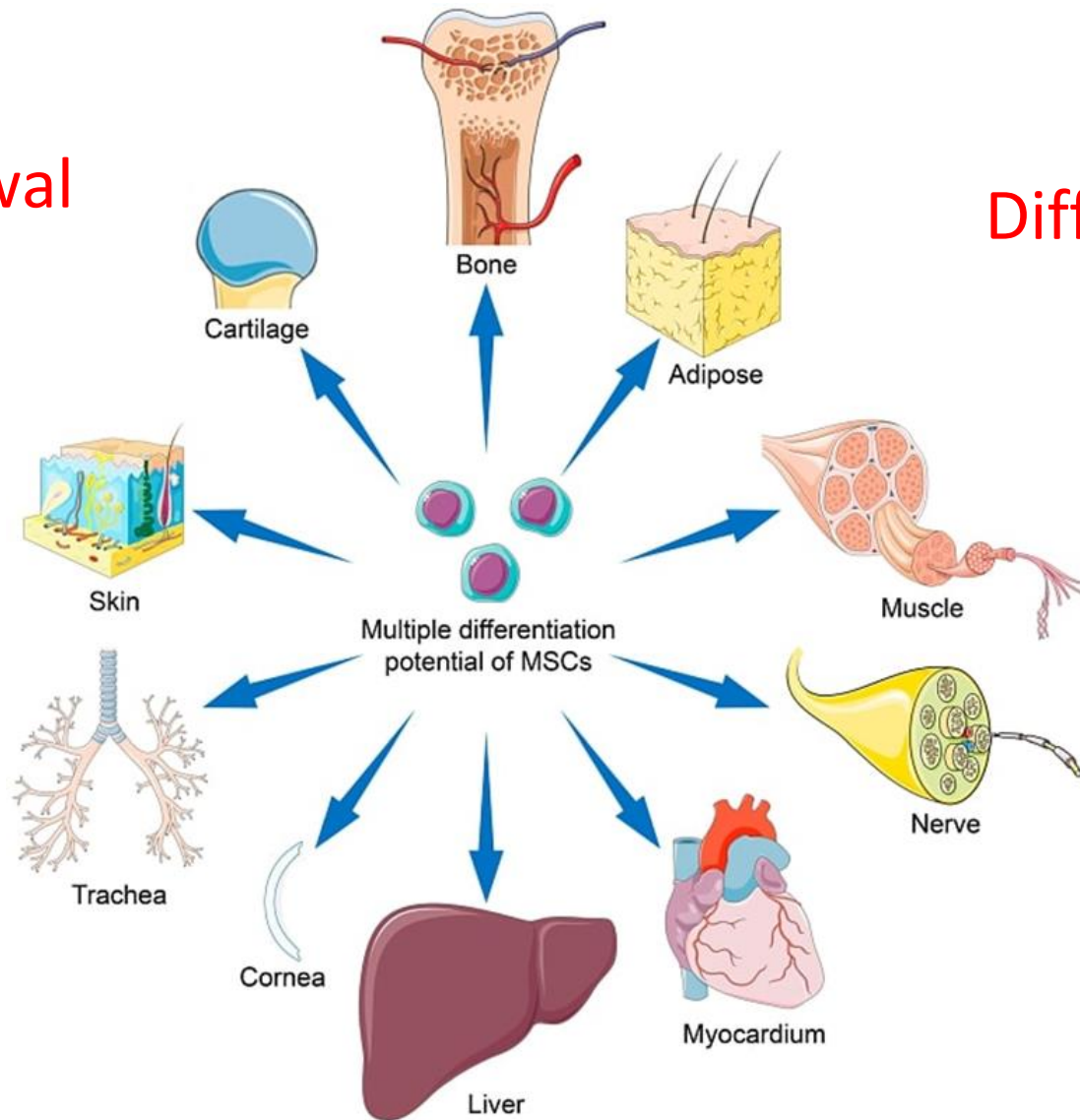
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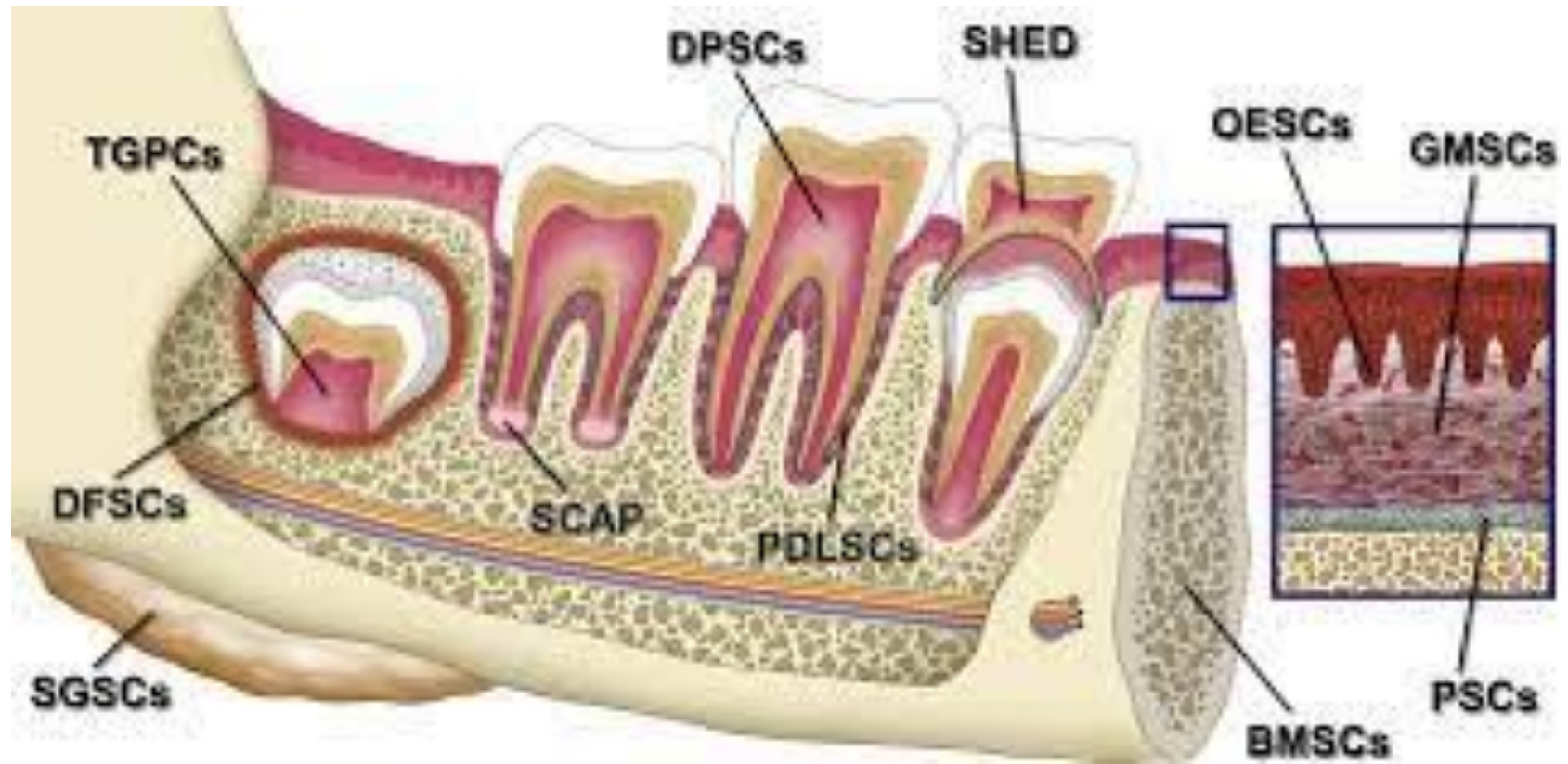
Differentiation potential of MSC?

Self-renewal

Differentiation



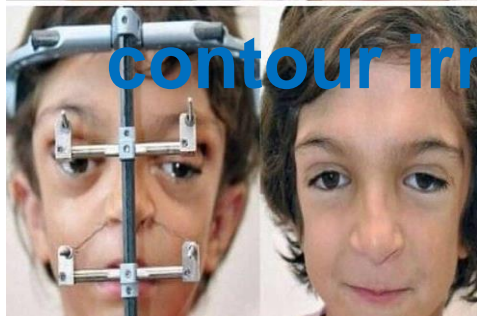
Oral mesenchymal stem cells



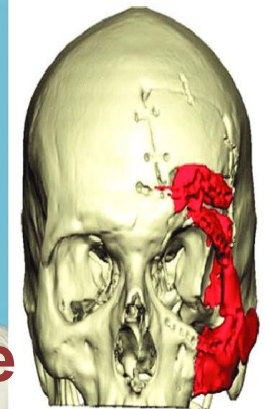
Applications of stem cells in dentofacial orthopedics

- Current surgical techniques have **several complications.**

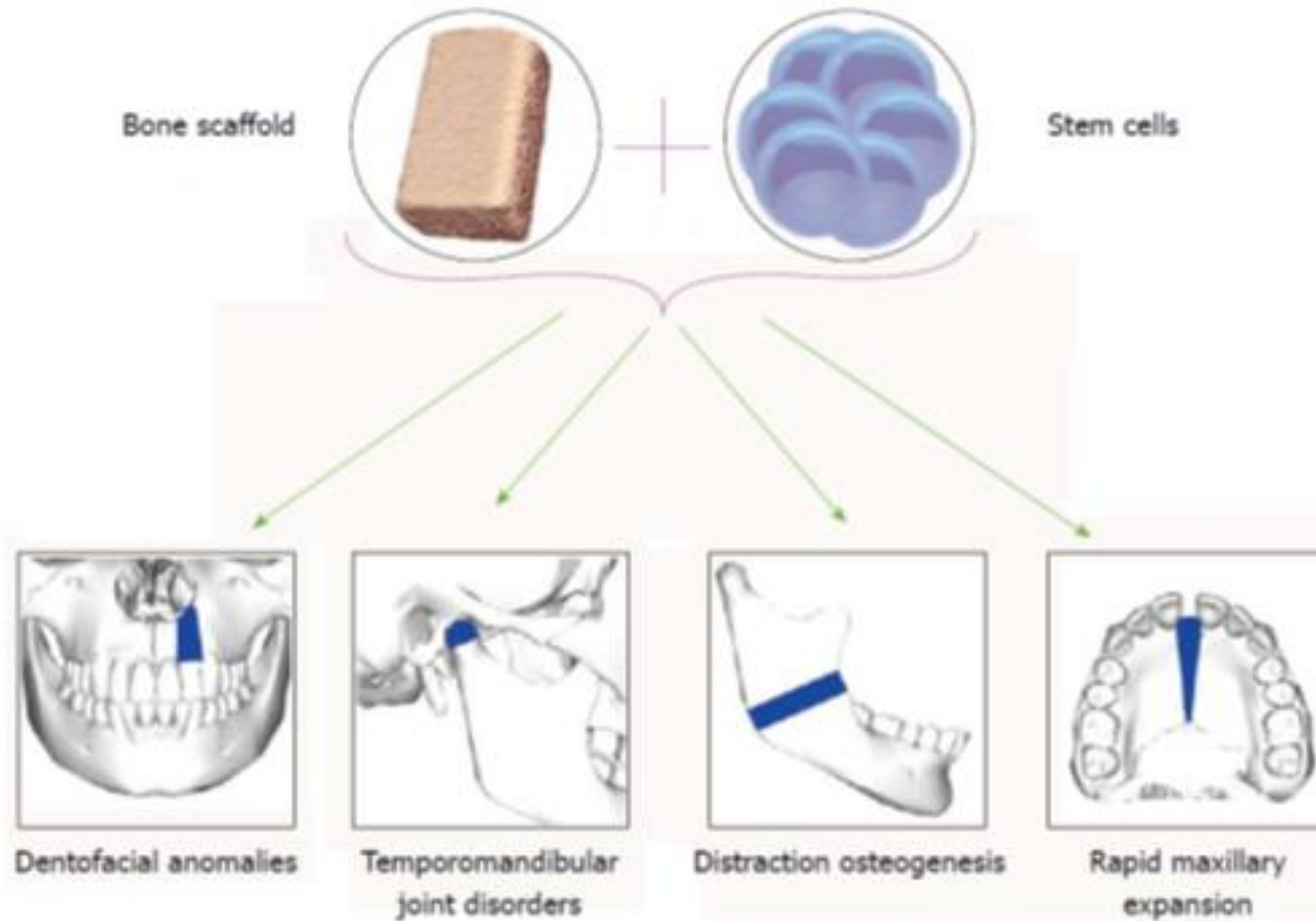
insufficient autogenous resources



postoperative pain

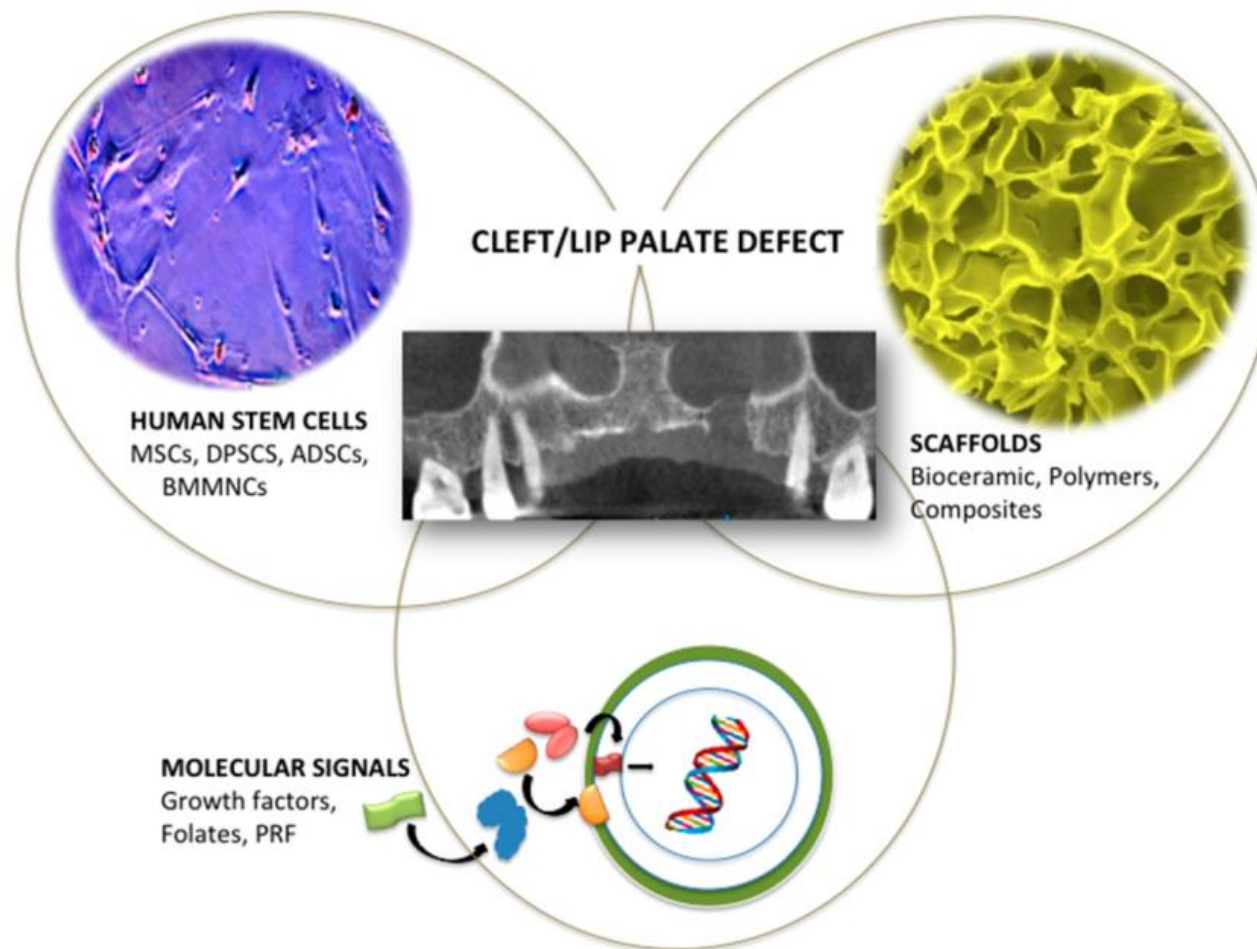


To overcome these complications



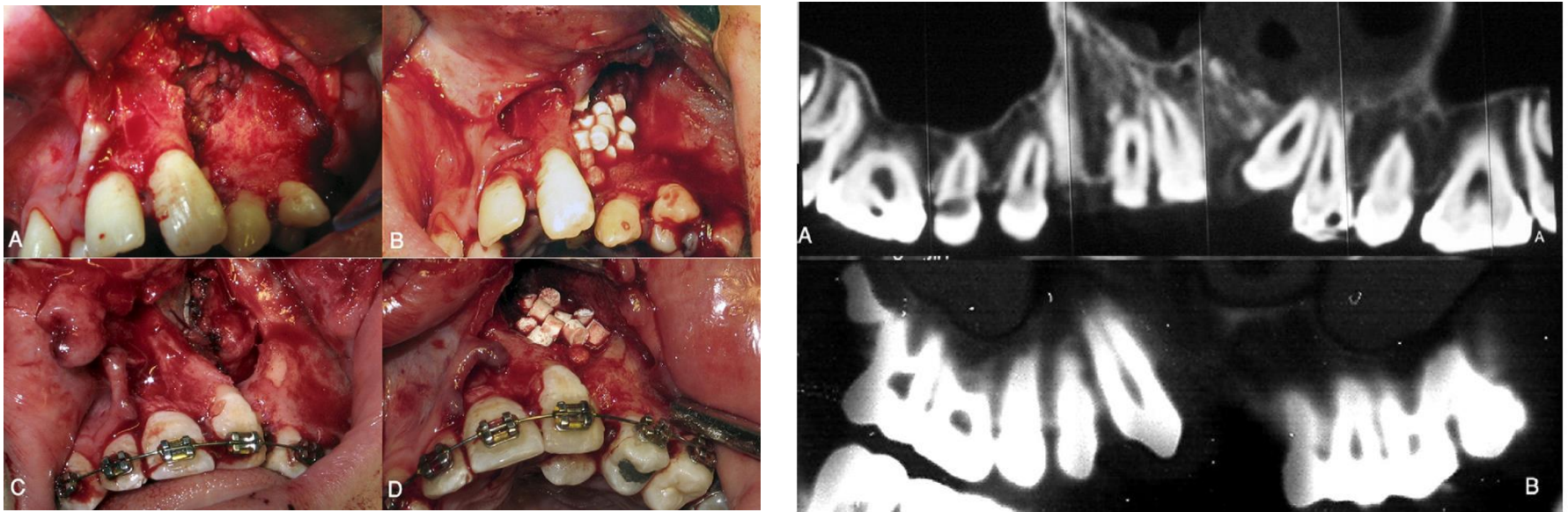
Dentofacial anomalies (Cleft lip and palate)

- With tissue engineering techniques, **MSCs** have been shown to have the ability to form new bone when transplanted.



Dentofacial anomalies (Cleft lip and palate)

- **Composite scaffold** of demineralized bone mineral and calcium phosphate **loaded with MSCs** showed **70% regenerated bone** in the cleft area.



Case Reports > Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2009 Aug;108(2):e1-6.

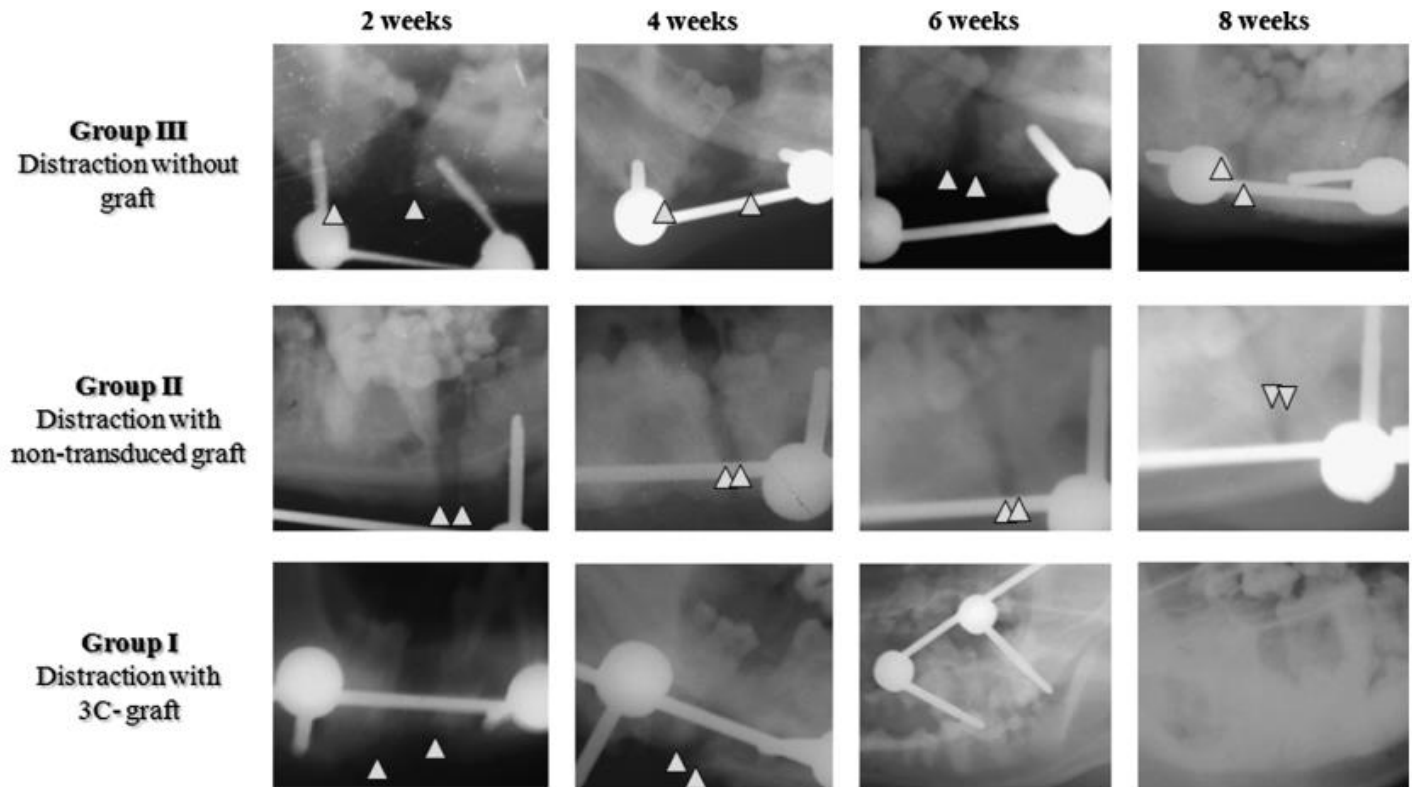
doi: 10.1016/j.tripleo.2009.03.040.

Secondary repair of alveolar clefts using human mesenchymal stem cells

Hossein Behnia¹, Arash Khojasteh, Masoud Soleimani, Azita Tehranchi, Ahad Khoshzaban, Saeed Hidari Keshel, Reza Atashi

Distraction osteogenesis

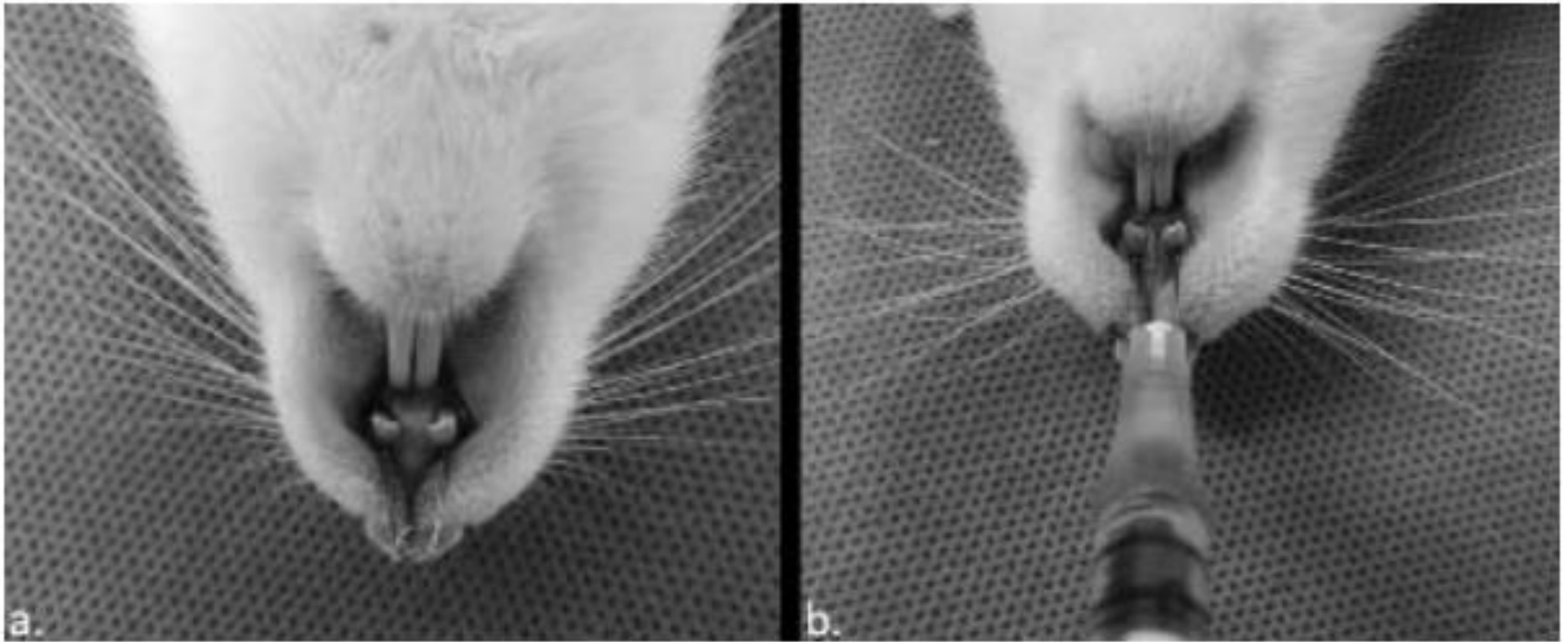
- **Greater bone formation** and **earlier mineralization** in the distracted callus, and **faster osteogenesis** (consolidation phase).



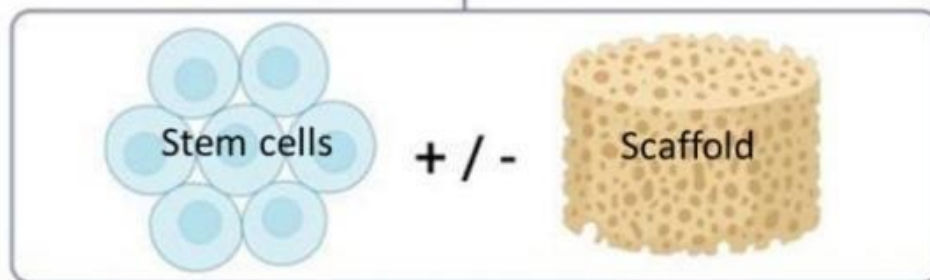
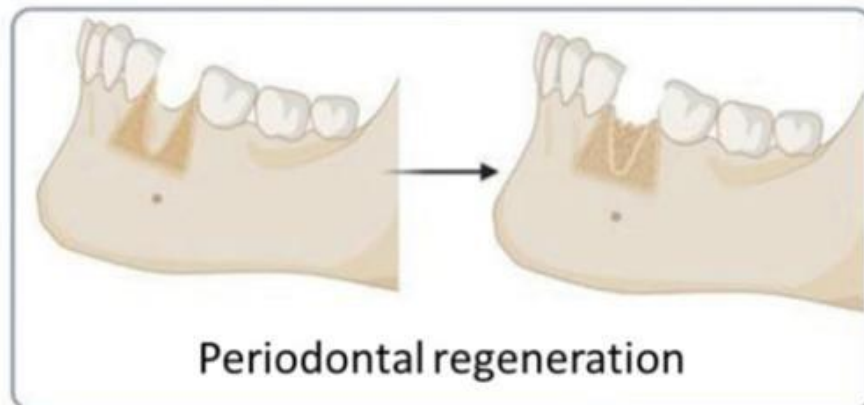
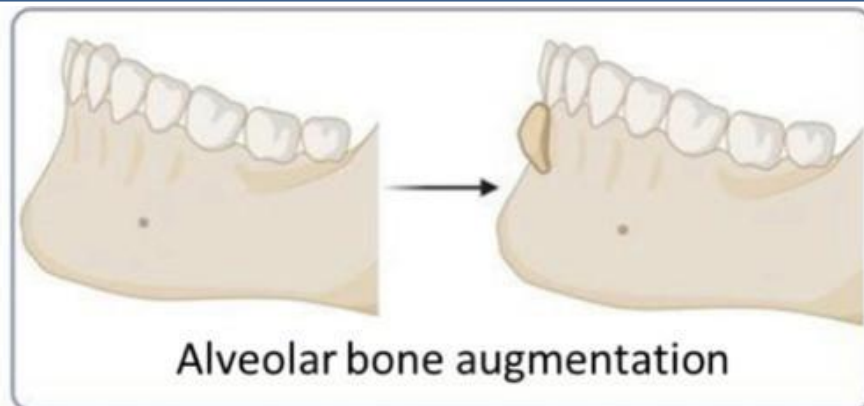
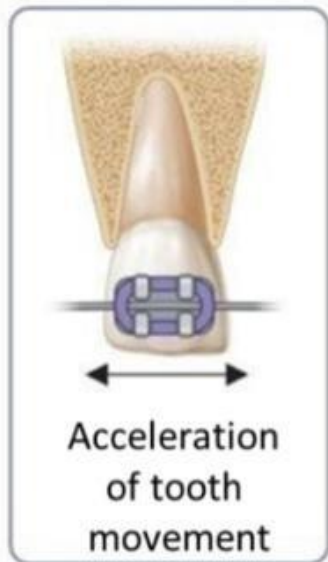
(Castro-Govea, et al., 2012)

Rapid maxillary expansion

- **local injection of MSCs** increased the bone formation

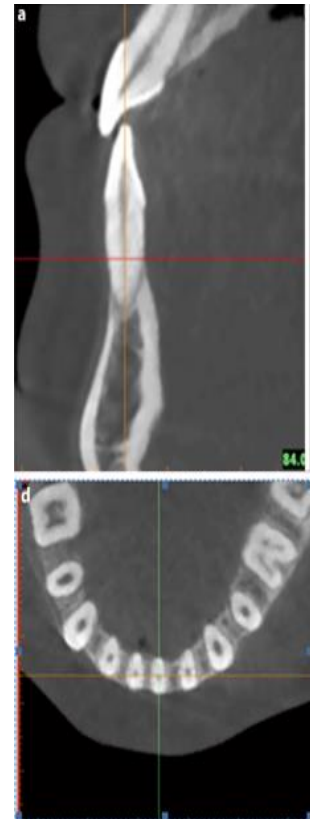
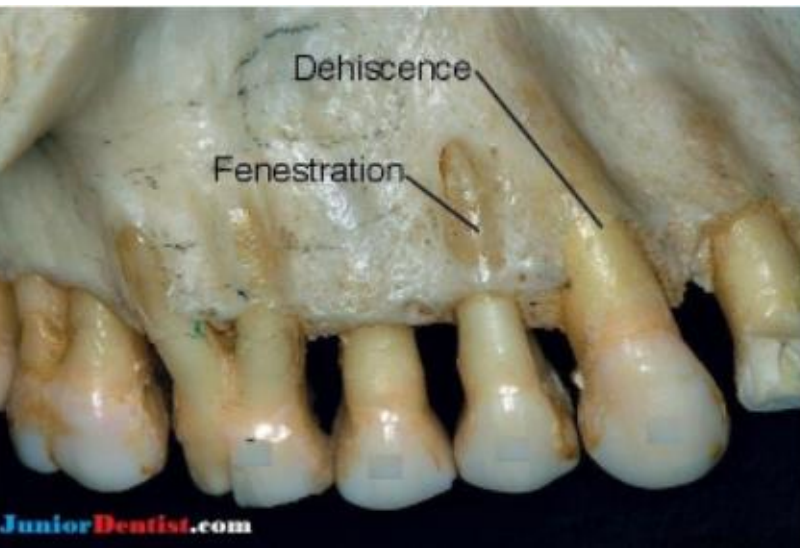


APPLICATIONS OF STEM CELLS IN ORTHODONTICS



1) Expanding envelope of discrepancy (alveolar bone augmentation)

Gingival recession secondary to bone dehiscence and fenestration



2) Periodontal regeneration



Several reports on application of SCs for regeneration of periodontal tissues.

Case Report



Journal of International Medical Research

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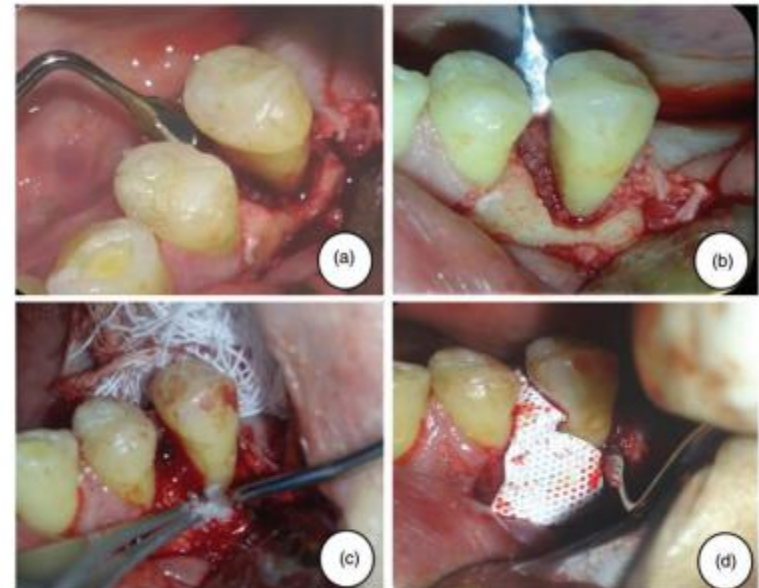
DOI: 10.1177/0300060518773244

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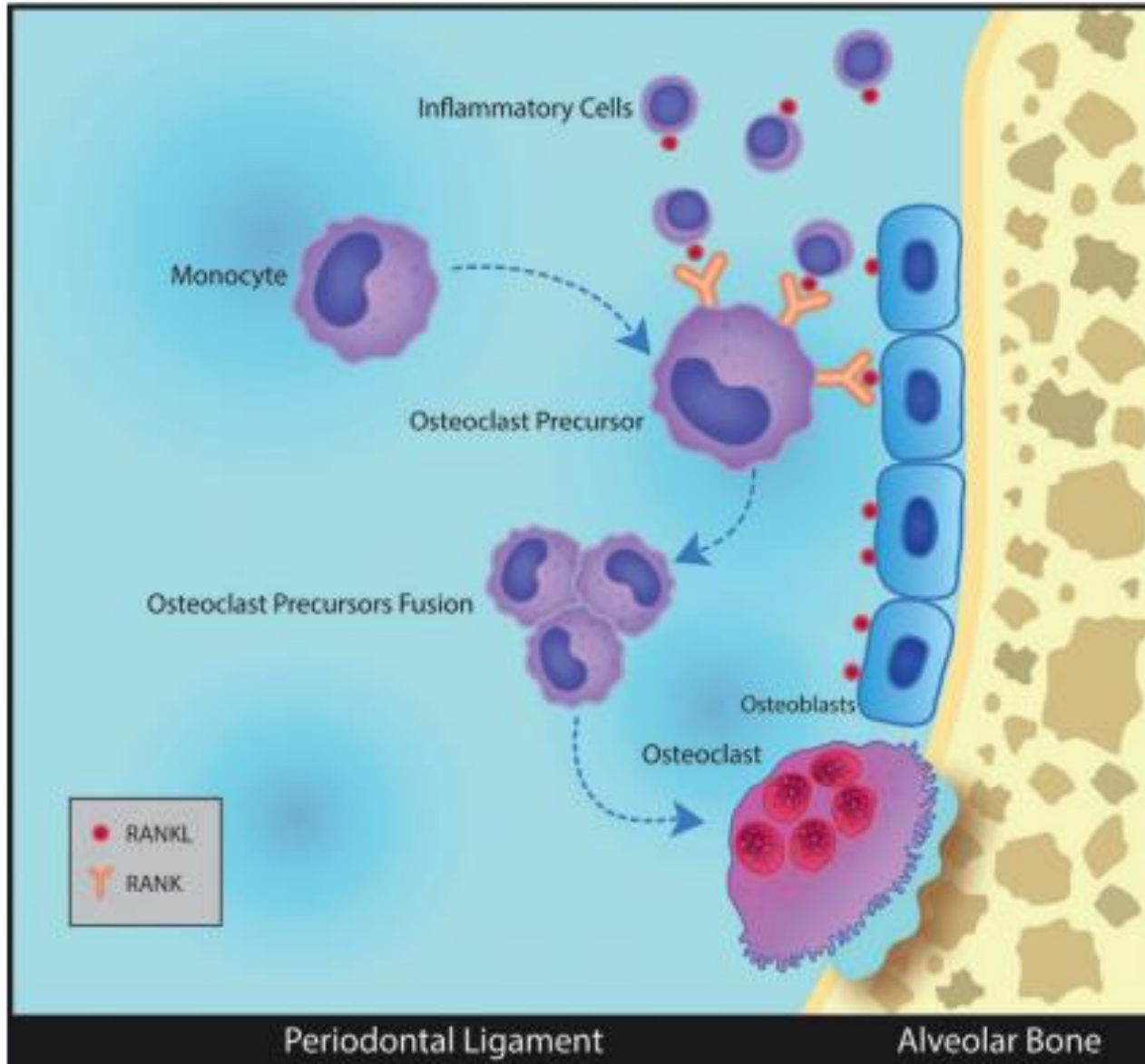


Retrieval of a periodontally compromised tooth by allogeneic grafting of mesenchymal stem cells from dental pulp: A case report

Beatriz Hernández-Monjaraz¹,
Edelmiro Santiago-Osorio²,
Edgar Ledesma-Martínez²,
Andrés Alcauter-Zavala¹ and
Víctor Manuel Mendoza-Núñez¹

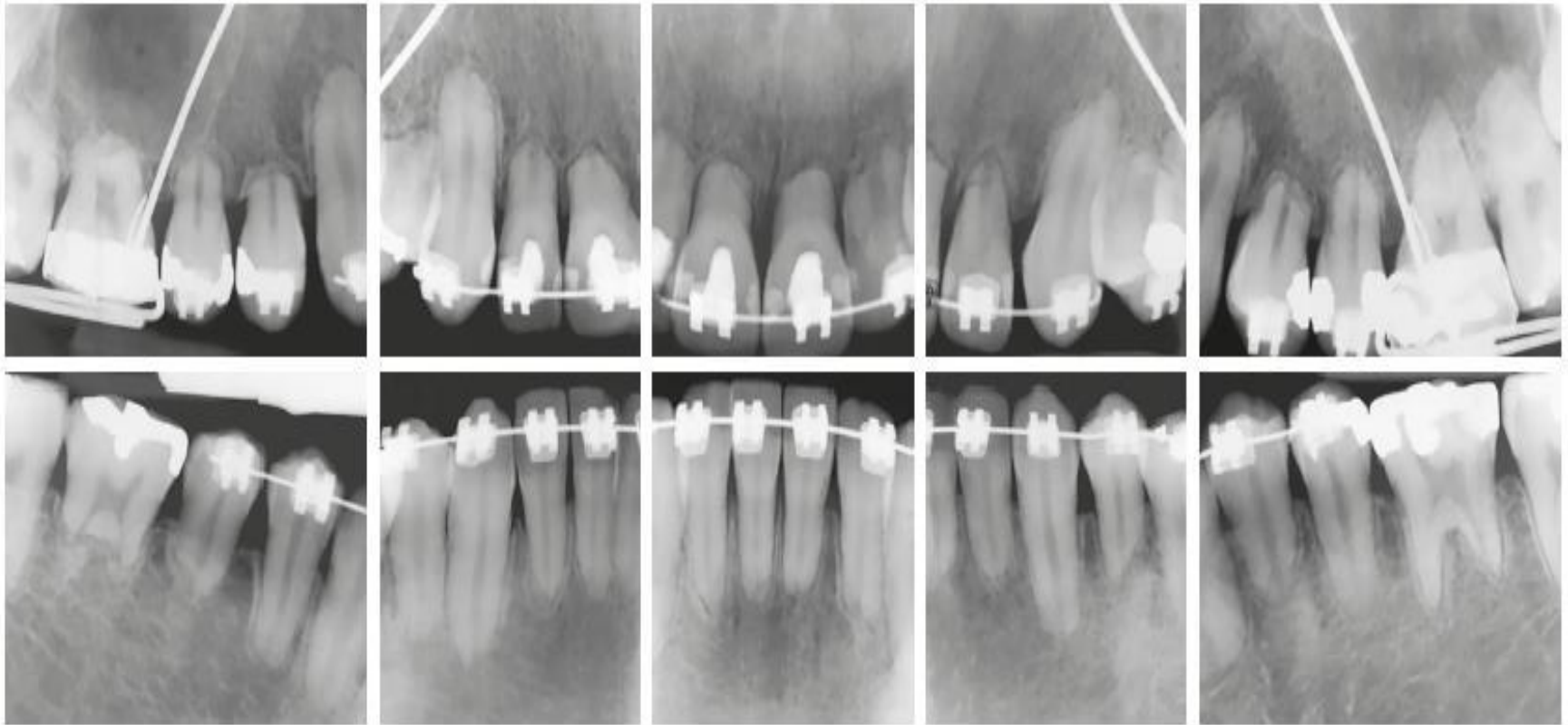


3) Accelerated orthodontic tooth movement



4) External root resorption

4. External root resorption



- One possible treatment modality could be **regeneration** of resorbed roots by application **SCs and tissue engineering**.



Archives of Oral Biology

Volume 91, July 2018, Pages 78-90



Review

Cementum regeneration using stem cells in the dog model: A systematic review

Jacqueline Crossman  , Maryam Elyasi, Tarek El-Bialy, Carlos Flores Mir

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In conclusion

- Recent studies show that SCs could
 - Improve treatment **results** .
 - Reduce treatment **duration**.
 - Accelerated **healing**.
 - Less **morbidity**.
 - Reduce **relapse**.

Thank you for listening

