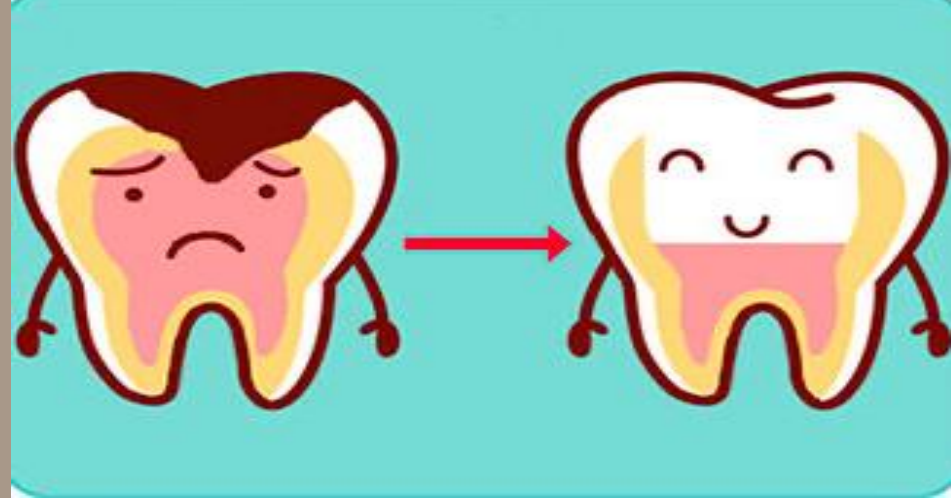


# From Trauma to Triumph: The Vital Pulp Journey

Materials Used and Success of Direct and Indirect Pulp Capping : A Retrospective Literature Review

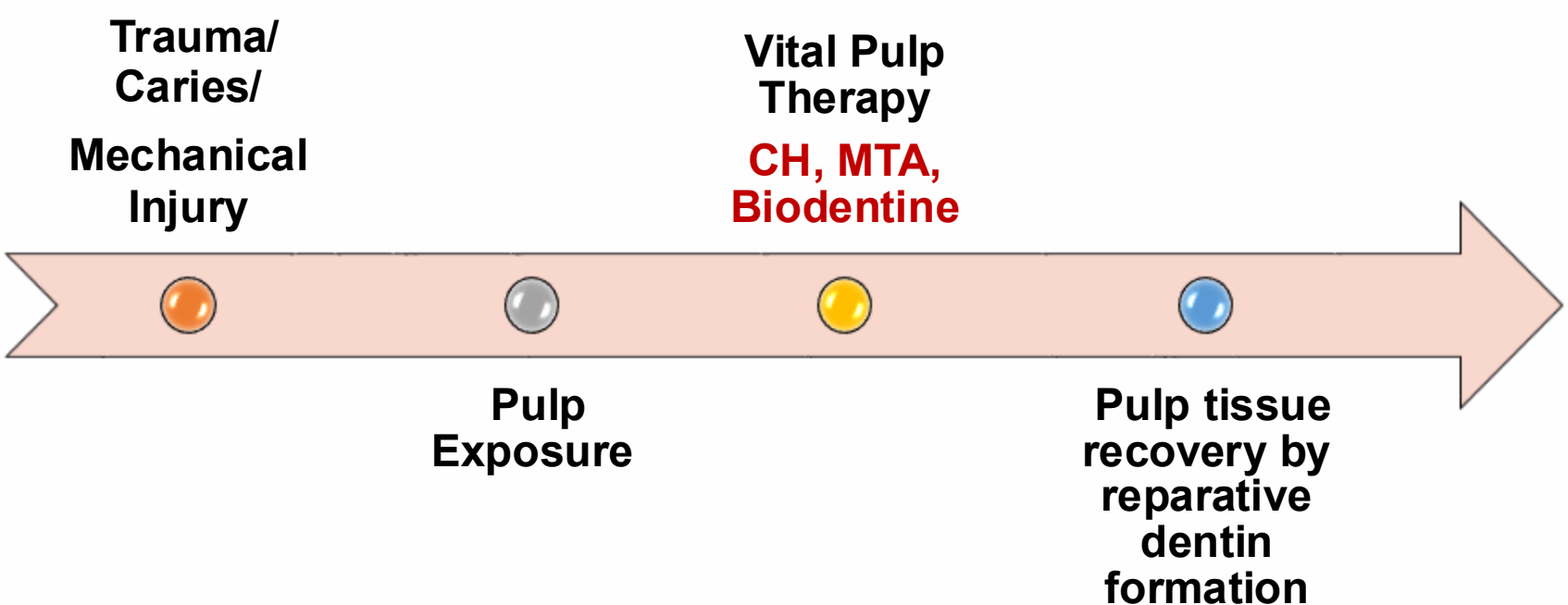
Anjali Raheja, DDS; Swetha Sabbineni, DDS; Dr. Praveena Ganesh, DDS (Mentor)

IDS 2026 SACRAMENTO, University of the Pacific, Arthur A. Dugoni School of Dentistry, PDS Health Care Collaborative, Sacramento

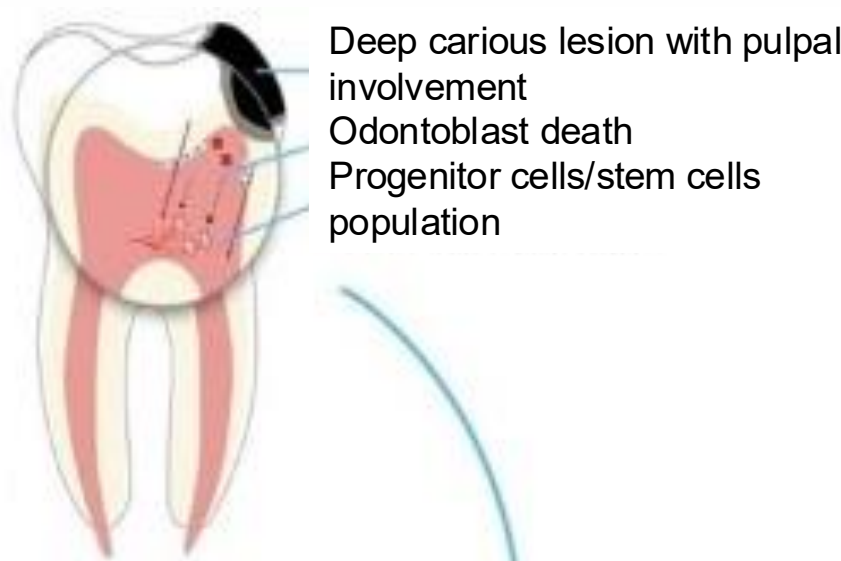


## INTRODUCTION

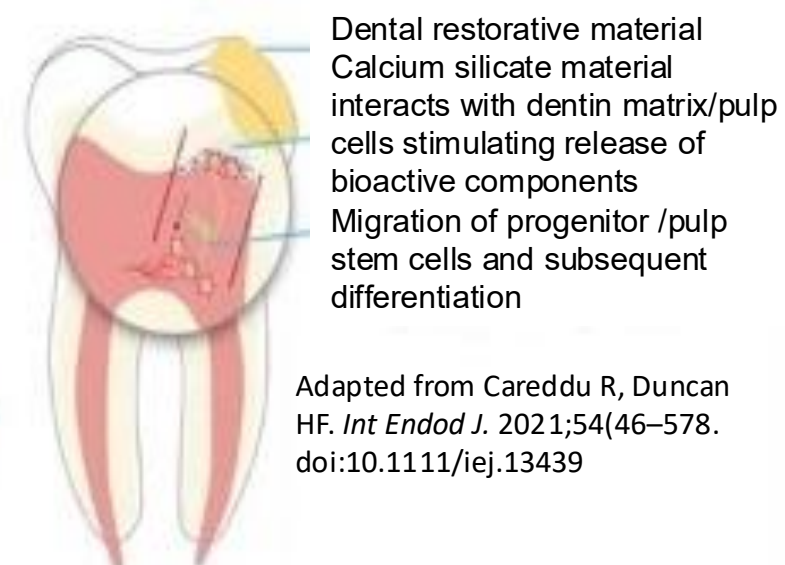
Vital Pulp Therapy is a biologically based treatment approach aimed at preserving the health and functionality of the dental pulp and involves the application of biocompatible materials directly or indirectly to the pulp to promote healing, maintain vitality, and function.



## MECHANISM OF ACTION



Deep carious lesion with pulp involvement  
Odontoblast death  
Progenitor cells/stem cells population



Adapted from Careddu R, Duncan HF. *Int Endod J.* 2021;54(46–578). doi:10.1111/iej.13439

Hard tissue bridge

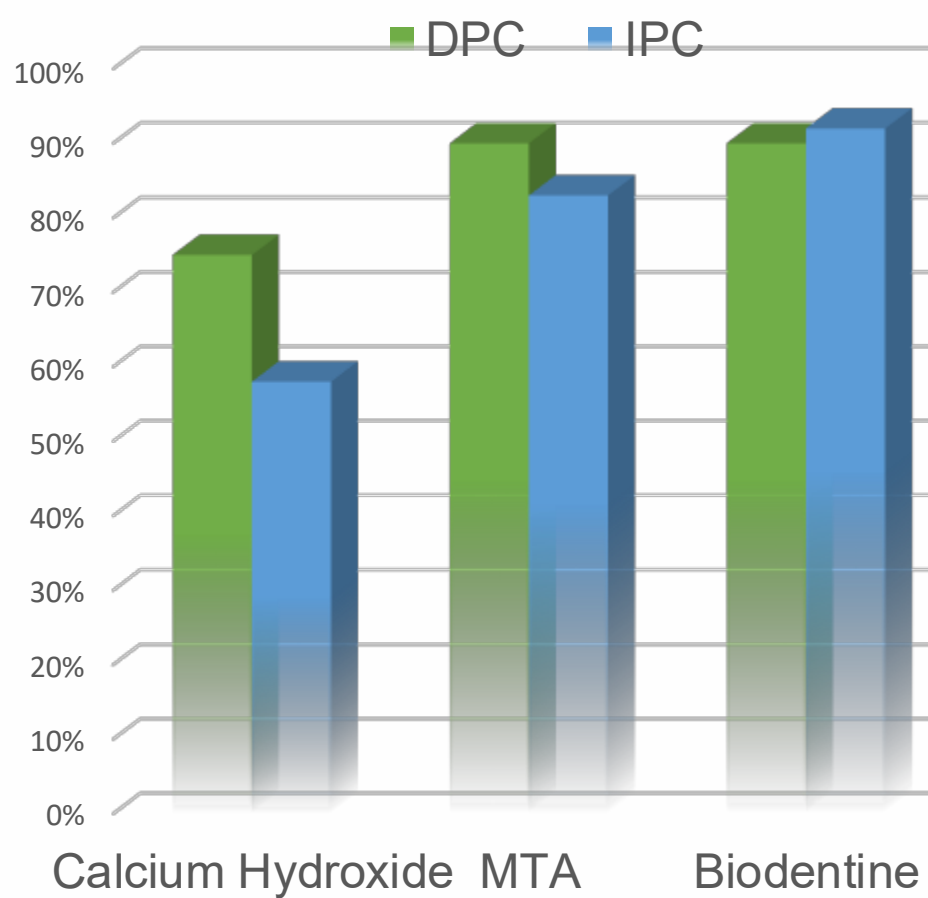
Well-oriented cells at the interface with hard tissue bridge

**Biodentine and MTA** promote hard tissue formation by releasing calcium ions, stimulating odontoblast-like cell activity, and forming a tight seal with dentin. **Calcium hydroxide** works by creating an alkaline environment that induces superficial necrosis, stimulating dentin bridge formation through pulp cell differentiation.

## THE BIG 3 in PULP CAPPING

| Feature               | Calcium Hydroxide                                  | MTA                                  | Biodentine                                                |
|-----------------------|----------------------------------------------------|--------------------------------------|-----------------------------------------------------------|
| Dentin Bridge Quality | Thin, porous, may have tunnel defects              | Thick, uniform, consistent           | Thick, homogeneous, high-quality bridge                   |
| Sealing Ability       | Poor - prone to microleakage                       | Excellent - superior marginal seal   | Excellent - forms tight seal with dentin                  |
| Setting Time          | Fast                                               | Long (~2–4 hours)                    | Fast (~12 minutes)                                        |
| Bioactivity           | Moderate                                           | High – HA formation & dentinogenesis | High – TGF- $\beta$ 1 release and odontoblastic activity  |
| Inflammatory Response | High - superficial necrosis and irritation         | Low - minimal irritation             | Very Low – minimal pulp irritation, fast healing response |
| Cost                  | Low                                                | High                                 | High                                                      |
| Long-Term Success     | Moderate - lower success due to porosity & leakage | High - proven track record           | High - promising emerging evidence                        |
| Track Record          | Gold standard for decades                          | Well established in clinical studies | Newer - growing clinical support                          |

## PULP SURVIVAL STATS



Source: *J Conserv Dent.* 2022;25(1):13–17.

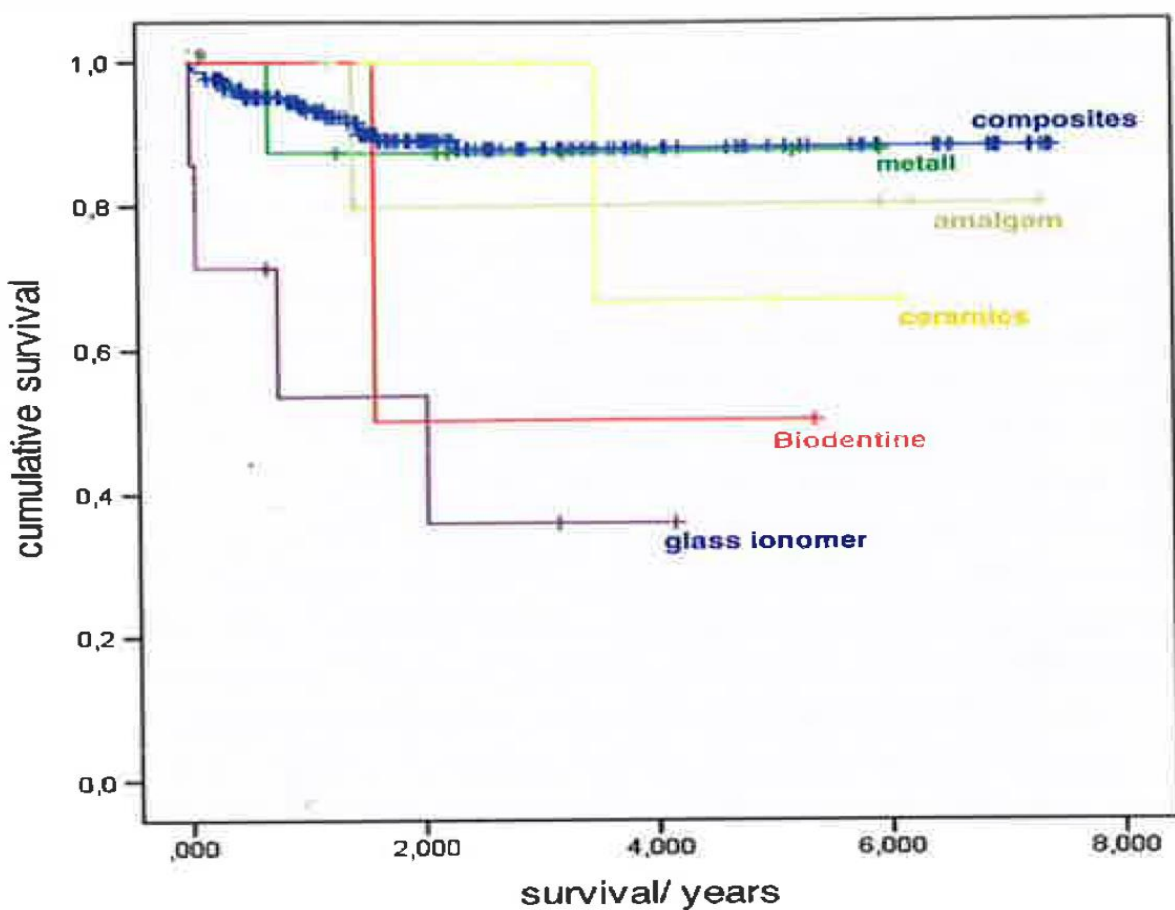


Fig. 3 Survival after direct pulp capping according to restoration

Adapted from Harms CS, Schäfer E, Dammaschke T. *Clin Oral Investig.* 2019;23(9):3491–3499. doi:10.1007/s00784-018-2767-5

## RECENT ADVANCEMENTS



**TheraCal LC:** Light-cured, resin-based, reduced micro-leakage, strong physical properties, limited calcium ion release, potential adverse pulp reaction.

**Endogain (EMD):** Promotes reparative dentin when combined with MTA.



**CEM Cement:** Emerging biocompatible alternative with dentin bridge formation, Hard tissue formed = 2 x Calcium Hydroxide

## CONCLUSION

**CH** is cost-effective but less ideal for sealing

**MTA** is the most predictable with long-term pulp vitality.

**Material choice** is vital for VPT success

**Biodentine** offers faster setting and color stability with similar outcomes.

Proper case selection, aseptic technique, & a well-sealed restoration - key for clinical success.

**Preserve the pulp, protect the tooth – Material selection is the key to success!**

## REFERENCES



# **OKU Sutro Excellence Day Project Cover Sheet**

**Project Title**

**Full name(s) and class year(s) of all project collaborators**

*Example: Jane Smith, DDS 2022; John Smith, DDS 2022*

**Project Category**

**Enter your abstract text here (max 300 words)**