Biodentine™: Save the root, Save the tooth

Bioactivity triggers regeneration

1. High biocompatibility to all dental tissues
2. Biodentine™ increases the mineral density of dentine through calcium ions release
3. Biodentine™ promotes cell proliferation and supports periradicular healing.

Outstanding seal and secure placement

1. Crystallisation inside the dentine tubules allowing tight interface with dentine and ensuring strong resistance to leakage
2. Biodentine™ sets in moisture in only a few minutes allowing fast repair procedures
3. Biodentine™ shows high wash-out resistance and high push-out bond strength avoiding material dislodgement during the restorative procedure.
Clinical cases

Perforation
Perforations of the root canal and of the pulp chamber floor usually are the most difficult accidents to solve and with uncertain prognosis. Biodentine™ has high sealing properties and is easy to place, particularly in areas difficult to access. The fast setting time is a major advantage as work can be continued in the same operating session.

Apical surgery
For successful apicoectomy, retrograde sealing of resected root canals is essential because gutta-percha alone is known not to be capable of inducing osseous regeneration at the root tip. Biodentine™ shows a positive effect on osseous cells and allowed, in this case, complete osseous regeneration 6 months after treatment.

Resorption
Cervical root resorption mostly occurs directly beneath the epithelial attachment and is caused ultimately by an injury to the periodontium. Biodentine™ is easy to place, sets fast, gives a tight seal and causes no tooth discolouration. It therefore positions this material as the material of choice to treat effectively these resorption cases.
Amalgam is removed. Granulation tissue is exposed with bleeding and pain on pressure.

Biodentine™ is prepared and the cavity is filled layer by layer without pressure.

1-year follow-up.

After removal of the coronal restorative material, an amalgam is noticed on the pulp chamber floor.

Both mesiobuccal root canals were retrogradely prepared and cleaned with an angled, diamond-coated ultrasound probe.

After removal of the coronal restorative material, an amalgam is noticed on the pulp chamber floor.

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1-year follow-up.

The arrow indicates the exposed fractured root canal instrument at the mesiobuccal root.

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Apicoectomy was performed in order to remove granulation tissue and the fractured instrument.

The radiograph obtained immediately postoperatively shows an osseous defect about the mesiobuccal root tip. The fractured root canal instrument was completely removed.

Even 3 1/4 years after the procedure, apical stability was found.

Amalgam is removed. Granulation tissue is exposed with bleeding and pain on pressure.

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When it comes to special endodontic treatments, success predictability can sometimes be difficult. Biodentine™ enhances your success rates thanks to innovative and bio-oriented properties.

### Technical Insights

#### Proven biocompatibility and bioactivity for endodontic repairs
- High biocompatibility assessed and evidenced through 500 scientific publications\(^1,2\)
- Higher release of Calcium ions than similar products to increase the mineral density of root canal dentine\(^3\)
- Shows both osteogenic and angiogenic properties to promote soft and hard tissues healing\(^4\)
- High purity tricalcium silicate with no aluminum inclusions or trace metals\(^5,6,7\)

#### Tight seal supporting root longevity after root repair
- Mineral tags formation in the dentine tubules ensuring strong micromechanical retention and tight consistent seal
- Higher resistance to leakage supporting clinical success for endodontic repair procedures\(^8,9\)
- High pH (=12) inducing antimicrobial properties reducing the risk of reinfection\(^9\)

#### Product properties adapted for a moist environment
- Physical properties are not affected by contact with tissue fluids and blood thanks to Biodentine’s™ hydraulic nature\(^10\)
- Biodentine doesn’t wash out and stays in place
- Higher push-out bond strength, unaffected by the use of endodontic irrigation solutions\(^11,12\)

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**Biodentine shows higher incorporation depths of Ca and Si (µm) in dentine**

<table>
<thead>
<tr>
<th>Phosphate-buffered saline immersion</th>
<th>Ca</th>
<th>Si</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodentine™ 24h</td>
<td>66.8 (5.1) a</td>
<td>14.4 (3.9) b</td>
</tr>
<tr>
<td>Biodentine™ 7 days</td>
<td>116.8 (10.1) a</td>
<td>77.8 (13.5) b</td>
</tr>
<tr>
<td>Biodentine™ 30 days</td>
<td>212.2 (26.4) a</td>
<td>166.8 (10.1) b</td>
</tr>
<tr>
<td>Biodentine™ 90 days</td>
<td>296.0 (26.0) a</td>
<td>206.6 (15.1) b</td>
</tr>
<tr>
<td>MTA</td>
<td>17.6 (2.9) a</td>
<td>13.8 (2.2) a</td>
</tr>
<tr>
<td>MTA</td>
<td>71.2 (10.0) a</td>
<td>61.0 (8.9) a</td>
</tr>
<tr>
<td>MTA</td>
<td>160.2 (16.1) a</td>
<td>115.4 (24.0) b</td>
</tr>
<tr>
<td>MTA</td>
<td>275.8 (28.9) a</td>
<td>171.2 (33.4) b</td>
</tr>
</tbody>
</table>

**Source:** Han, Okaj, *IEJ*, 2011

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**Biodentine™ shows higher resistance to dislodgement, regardless of the irrigation solution**

<table>
<thead>
<tr>
<th>Irrigation Solution</th>
<th>Biodentine™</th>
<th>MTA</th>
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<tbody>
<tr>
<td>NaOCl</td>
<td>8.0</td>
<td>7.0</td>
</tr>
<tr>
<td>CHX</td>
<td>7.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Saline</td>
<td>6.0</td>
<td>5.0</td>
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</tbody>
</table>

**Source:** Guenne et al., JOE, 2013
<table>
<thead>
<tr>
<th>Authors</th>
<th>Title</th>
<th>Journal</th>
<th>Year</th>
<th>Ref.</th>
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<tbody>
<tr>
<td>Subramanyam D, Vasantharajan M.</td>
<td>Effect of Oral Tissue Fluids on Compressive Strength of MTA and Biodentine™: An In vitro study</td>
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<td>Tsesis I, Elbahary S, Venezia NB, Rosen E.</td>
<td>Bacterial colonization in the apical part of extracted human teeth following root-end resection and filling: a confocal laser scanning microscopy study</td>
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<td>Katge FA, Shivasharan PR, Patil D.</td>
<td>Sealing ability of mineral trioxide aggregate Plus™ and Biodentine™ for repair of furcal perforation in primary molars: An in vitro study</td>
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<td>Sinkar RC, Patil SS, Jogad NP, Gade VJ.</td>
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<td>Camilleri J, Sorrentino F, Damidot D.</td>
<td>Investigation of the hydration and bioactivity of radiopacified tricalcium silicate cement, Biodentine™ and MTA Angelus</td>
<td>Dental Materials</td>
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<td>Han L, Okiji T.</td>
<td>Uptake of Calcium and Silicon released from calcium silicate based endodontic materials into root canal dentin</td>
<td>International Endodontic Journal</td>
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<td>Camilleri J.</td>
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**Presentation**

**Available in:**
- Box of 15 capsules and 15 single-dose containers