Causes of Dentinal Hypersensitivity

- Stimuli such as thermal, evaporative, tactile, osmotic or chemical can cause sensitivity through the rapid fluid movement in the dentinal tubes.

**Mechanism of Hypersensitive Dentin**

1. **Dentin**
2. **Fluid**
3. **Dental nerve**

- Arrow indicating **Rapid fluid movement**
Shield Force Plus is indicated for:

- Under Crowns
- Bridges
- Inlays and Onlays
- Veneers
- Provisionals
- Under Direct Restorations
- Cervical Erosions
- Exposed Dentin Surfaces
- Gingival Recession
Shield Force Plus
Treatment of Hypersensitive Dentin

Double-Block Technology

Block #2 – Long-term sealing. A uniform thin layer and durable coating forms when light cured.

Block #1 – Quick sensitivity relief through resin tags. (with the reaction of monomer and Ca)
Block #1 for Initial Desensitization

- Initial Desensitization
  - Dentinal fluid movement stops through the creation of resin tags 50μm deep

** In-house data, R&D, Tokuyama Dental Corporation.
Note: This is a test model demonstrating hypersensitive dentin, using an extracted human tooth ground on the surface to expose the dentinal tubules.
**Block #2 for Long-Term Desensitization**

- **Long-Term Desensitization**
  - Light Curing creates a 10µm layer that provides desensitization for up to 3 years.*

*Results may vary based on patient diet, proper oral care, and conformance to product directions. Wear data tested in vitro.

**Diagram:**
- **Reaction of SR monomer with calcium ions.**
- **Formation of resin layer, after air drying to remove solvent and water.**
- **Polymerization of resin layer when light cured.**
Superior Long-Term Results

Shield Force Plus provides longer-lasting desensitization properties versus competitors.

Dentinal tubules initial sealing and long-term durability: Thermacycle test (10,000 thermal cycles) 4°C – 60°C.**

*Not a registered mark of Tokuyama Dental Corporation.
** In-house data, R&D, Tokuyama Dental Corporation.
Reduction of Abrasion and Erosion of Exposed Cervical Dentin

**Toothbrush Abrasion Test (10,000 cycles)**
The layer of Shield Force Plus exhibits only 1.5 μm of wear while Seal & Protect®* exhibits 8.4 μm of wear after the test.

*Not a registered mark of Tokuyama Dental Corporation. 
** In-house data, R&D, Tokuyama Dental Corporation.
**Superior Sealing Effect**

- When used under direct/in-direct restorations, Shield Force Plus will:
  - alleviate and/or prevent tooth sensitivity caused by cold water and air pressure during the preparation
  - protect the tooth from bacteria and unexpected contamination to the dentin.
  - alleviate and/or prevent post operative sensitivity.
1. **Treatment Of Dentinal Hypersensitivity/Coating Of Exposed Cervical Dentin**

1. **Apply**
   - Dispense

2. **Apply Shield Force Plus, then leave for 10+ seconds**

3. **Dry**
   - Apply weak air for five seconds then strong air for five or more seconds

4. **Cure**
   - Light cure for 10+ seconds
Sealing Of Prepared Tooth To Alleviate/Prevent Tooth Sensitivity (Direct Restorations)

1. Dispense
   - Apply Shield Force Plus, then leave for 10+ seconds

2. Apply
   - Apply weak air for five seconds then strong air for five or more seconds

3. Dry
   - Light cure for 10+ seconds

4. Cure

5. Adhesive Treatment*

6. Composite Resin Filling

* If using a total etch bonding system, etchant must be applied "AFTER" Shield Force Plus procedure.
Sealing of Prepared Tooth To Alleviate/Prevent Tooth Sensitivity (Indirect Restorations)

Apply Shield Force Plus, then leave for 10+ seconds

Dispense

Apply weak air for five seconds then strong air for five or more seconds

Dry

Light cure for 10+ seconds

Cure

**Wipe unpolymerized layer with alcohol

6 Impression

7 Temporary Filling/ Cementing Application***

8 Permanent Restoration

**BEFORE taking impression, it is essential to wipe dentin surface with alcohol, removing unpolymerized layer of Shield Force Plus that could prevent an accurate impression.

**Do NOT use temporary resin-based material, it may adhere to the cured Shield Force Plus. The use of water-based cement would be recommended for temporary cementing, and temporary stopping would be recommended for temporary filling.
EFFECTS OF SHIELD FORCE PLUS ON BOND STRENGTH
1) Specimen was grounded using #600 silicon carbide paper to expose dentin and enamel.

2) The surface was treated with the following materials:
   SFP: Shield Force Plus, GL: Gluma,
   SP: Seal & Protect, SS: SuperSeal.

3) Then the surface was treated with Bonding agent below:
   **All-In-One Self-Etching:**
   - Optibond All-In-One (Kerr)
   - Bond Force (Tokuyama)
   **Multi step Self-Etching:**
   - SE Bond (Kuraray)
   **Total-Etching:**
   - Scotch Bond Multi-Purpose (3M ESPE)
   - Single Bond Plus (3MESPE)
   - Prime & Bond NT (Dentsply)
   - Optibond Solo Plus (Kerr)

4) Estelite composite was filled and Attachment was set using Bistite II cement.

5) After leaving in water at 98.6F for 24 hours, tensile bond strength was examined at a crosshead speed of 2m/min per hour.

   **EFFECT OF BOND STRENGTH WITH DESENSITIZER**

<table>
<thead>
<tr>
<th>Bonding Agent</th>
<th>Material</th>
<th>Dentin</th>
<th>Enamel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bond Force</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SFP</td>
<td>24.7(4.9)D</td>
<td>25.1(5.0)K</td>
<td></td>
</tr>
<tr>
<td>GL</td>
<td>23.8(7.4)D</td>
<td>24.4(6.7)K</td>
<td></td>
</tr>
<tr>
<td>SP</td>
<td>12.7(2.8)K</td>
<td>6.4(4.6)K</td>
<td></td>
</tr>
<tr>
<td>SS</td>
<td>4.4(2.4)K</td>
<td>2.1(0.5)K</td>
<td></td>
</tr>
<tr>
<td>—</td>
<td>23.3(2.5)D</td>
<td>23.1(4.7)K</td>
<td></td>
</tr>
<tr>
<td>OptiBond All In One</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SFP</td>
<td>24.9(5.0)D</td>
<td>24.2(7.3)B</td>
<td></td>
</tr>
<tr>
<td>GL</td>
<td>23.3(4.9)D</td>
<td>25.1(5.0)K</td>
<td></td>
</tr>
<tr>
<td>SP</td>
<td>11.6(2.9)K</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>SS</td>
<td>9.3(2.8)K</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>—</td>
<td>20.9(2.7)K</td>
<td>24.8(5.9)K</td>
<td></td>
</tr>
<tr>
<td>SE Bond</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scotch Bond Multi Purpose</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SFP</td>
<td>20.6(5.6)B</td>
<td>19.2(7.5)B</td>
<td></td>
</tr>
<tr>
<td>GL</td>
<td>11.6(3.8)K</td>
<td>15.5(6.7)B,K</td>
<td></td>
</tr>
<tr>
<td>SP</td>
<td>10.4(1.9)K</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>SS</td>
<td>6.8(2.1)K</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>—</td>
<td>10.6(2.3)K</td>
<td>15.4(3.4)K,B</td>
<td></td>
</tr>
<tr>
<td>Single Bond PLus</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Prime &amp; Bond NT</td>
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</tr>
<tr>
<td>SFP</td>
<td>24.7(5.9)D</td>
<td>29.8(7.3)B</td>
<td></td>
</tr>
<tr>
<td>GL</td>
<td>11.3(2.8)K</td>
<td>27.6(5.2)K,B</td>
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<tr>
<td>OptiBond Solo Plus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SFP</td>
<td>25.3(6.1)D</td>
<td>26.9(4.5)K</td>
<td></td>
</tr>
</tbody>
</table>

B: Bonding cohesive fracture, D: Dentine cohesive fracture, K: Interface failure.
### Bond Strength Of The Cement On The Abutment Teeth Treated With Various Desensitizing Materials

<table>
<thead>
<tr>
<th>Cement</th>
<th>Impression</th>
<th>Temporary restoratives</th>
<th>Desensitizing materials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Without</td>
</tr>
<tr>
<td><strong>Multilink</strong></td>
<td>Aquasil Ultra Heavy</td>
<td>Stopping</td>
<td>12.8(1.1) K</td>
</tr>
<tr>
<td><strong>Optibond All In One N.X.3/Kerr</strong></td>
<td>Aquasil Ultra Heavy/ Caviton</td>
<td>10.6(7.5) K</td>
<td>16.4(7.5) D</td>
</tr>
<tr>
<td>Jeltrade/ Dentsply</td>
<td>Caviton</td>
<td>8.6(1.5) K</td>
<td>25.0(3.4) D</td>
</tr>
</tbody>
</table>

D: Dentin cohesive fracture  
K: Interface failure  
C: Cement cohesive fracture  
K’: Coating-Cement interface failure  
A: Attachment fracture

**Shield Force Plus has a positive influence on adhesion**
Shield Force Plus:
A trusted desensitizer that has been proven to provide initial and long-term tooth pain relief for happy patients.