BonAlive® granules (composition by weight)
• 53% SiO₂, 23% Na₂O, 20% CaO, 4% P₂O₅

Small applicator

<table>
<thead>
<tr>
<th>Ref. No</th>
<th>Granule size</th>
<th>Unit size</th>
</tr>
</thead>
<tbody>
<tr>
<td>13110</td>
<td>0.5-0.8 mm (small)</td>
<td>1 cc</td>
</tr>
<tr>
<td>13120</td>
<td>0.5-0.8 mm (small)</td>
<td>2.5 cc</td>
</tr>
</tbody>
</table>

Large applicator

<table>
<thead>
<tr>
<th>Ref. No</th>
<th>Granule size</th>
<th>Unit size</th>
</tr>
</thead>
<tbody>
<tr>
<td>13130</td>
<td>0.5-0.8 mm (small)</td>
<td>5 cc</td>
</tr>
<tr>
<td>13140</td>
<td>0.5-0.8 mm (small)</td>
<td>10 cc</td>
</tr>
<tr>
<td>13330</td>
<td>1.0-2.0 mm (medium)</td>
<td>5 cc</td>
</tr>
<tr>
<td>13340</td>
<td>1.0-2.0 mm (medium)</td>
<td>10 cc</td>
</tr>
<tr>
<td>13430</td>
<td>2.0-3.15 mm (large)</td>
<td>5 cc</td>
</tr>
<tr>
<td>13440</td>
<td>2.0-3.15 mm (large)</td>
<td>10 cc</td>
</tr>
</tbody>
</table>

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Manufacturer

BonAlive® granules
BonAlive® granules (bioactive glass S53P4) is a CE-marked, Class III medical device that is used in surgical procedures to regenerate bone.

One of the most striking features of BonAlive® granules is its ability to inhibit bacterial growth. Therefore, it is a unique product for septic bone surgery.

Indications (orthopedics)
• Bone cavity filling
• Bone cavity filling in the treatment of chronic osteomyelitis

References
Chronic osteomyelitis in the distal tibia

Patient: 36-year old male with a chronic osteomyelitis in the distal tibia.

Operation: The patient received a pilon fracture in a car crash and the fracture was stabilized with an anterior plate in the distal tibia. The patient was diagnosed with severe chronic osteomyelitis with extensive pus formation in the distal tibia. The anterior fixation plate was removed and the area was surgically cleaned through radical debridement. After surgical debridement the defect size was 100 cc. The defect was filled with 48 cc/2.0-3.15 mm (large) BonAlive® granules mixed with an equal amount of autologous bone.

Clinical outcome: The soft tissue healed well. Although a significant part of the anterior cortex of the distal tibia was removed, new cortical bone was formed. At 2.5 years post-op the fusion was stable and the patient outcome continued to be successful.

Inhibition of bacterial growth

BonAlive® granules inhibit bacterial growth without containing antibiotics. The mechanism works by leaching out ions leading to an alkaline environment (high pH) and increased osmotic pressure in the bone defect.

Effective bone formation

BonAlive® granules bond chemically to bone and stimulates the growth of new bone. The phenomenon is called osteostimulation which means that it activates genes responsible for bone formation in osteogenic cells.

Inhibition of bacterial growth

- pH increase
- Osmotic pressure
- NaOH
- Na
- Ca
- Si
- P

Formation of natural hydroxyapatite

- Ca
- P

The natural hydroxyapatite layer on the bioactive glass surface is presented in the scanning electron microscopy (SEM) image (10 000x magnification).

Immediate post-op

Post-op 2.5 years

*non-osteoinductive

The impact of bioactive glass S53P4 on methicillin-resistant *Klebsiella pneumoniae*. The inhibition of bacterial growth can be seen as changes in the morphology of the bacteria.