Bioactive Glass creates the state of healing in the root canal.

Less waste and approx. 50 cases available

Slim Double Nozzle

(full scale)

Just dispense the very small amount as you need.

Root Canal Sealer

NISHIKA CANAL SEALER BG

Bioactive Glass

Nippon Shika Yakuhin Co.,Ltd.

URL: http://www.nishika.co.jp/english/

Bioactive Glass induces the optimal condition for periapical healing.

Next-generation Root Canal Sealer "NISHIKA CANAL SEALER BG"

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Introduction

Three requirements for root canal sealer

Conventional root canal sealers as typified by Grossman's formula were specifically for filling the space between gutta-percha points and root canal walls, but hardly ideal since neither adhesive nor bonding effect occurs.

Recently, a root canal sealer that strongly bonds to root canal walls and exerts high sealing properties has been desired. Root canal sealer is also required to have higher biocompatibility so as not to induce inflammatory reactions in periapical tissue. Furthermore, usability is a significant factor in clinical applications. In short, root canal sealer is required to have the three properties of excellent biocompatibility, sealing ability and removability.

Application of bioceramics to root canal sealer

Mineral Trioxide Aggregate (MTA) offers nearly ideal performance as a root canal filling material. MTA has triggered the development of new bioceramic root canal sealers, a topic of great interest in endodontics. Recently, bioceramic root canal sealers, developed from a modified composition of MTA, have been widely marketed around the world. Against this backdrop, we focused on “Bioactive Glass”[1,2] which shows similar characteristics to MTA and developed a next-generation bioceramic root canal sealer.

Characteristics of Bioactive Glass

Bioactive Glass contains the glass type of Na_2O-CaO-SiO_2-P_2O_5, as a component of Silica (SiO_2) is ≤50mol%. Bioactive Glass has been applied clinically in orthopedic surgery for several decades. When Bioactive Glass is implanted in a defect area close to bone, calcium or a few silicate ions were released from the surface of Bioactive Glass to body fluid, followed by the formation of silica-rich gel on its surface. Silica-rich gel reacts with ions of body fluid, and as a result, hydroxyapatite (HAp)-like crystals form on the surface of Bioactive Glasses (Figure 1). Furthermore, osteoblasts produce new bone in silica-rich gel and Bioactive Glass finally bonds to bone through the interaction between the HAp-like crystals and new bone.

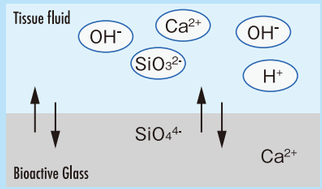
These characteristics show that Bioactive Glass is suitable as a biomaterial for the application to the hard tissues such as dentin or cementum that are similar to bone. It also shows excellent biocompatibility with soft tissues. Bioactive Glass would contribute to the progress of dental biomaterial used in Endodontics that targets the periapical tissue including hard and soft tissues.

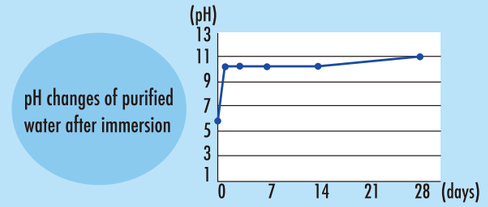
New Bioceramic root canal sealer

NISHIKA CANAL SEALER BG was born through the development of biomaterials consisting of Bioactive Glass. “BG” is an abbreviation for “Bioactive Glass” . The following are features of NISHIKA CANAL SEALER BG.

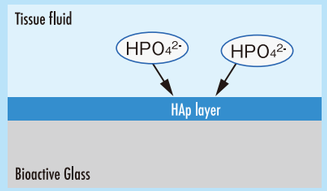
Figure 1

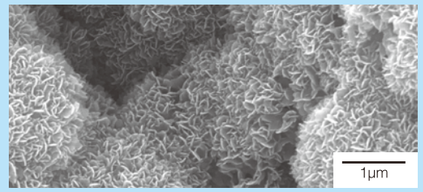
a: Releasing various ions from the surface layer of Bioactive Glass and pH changes





b: HAp formation





Source: Washio A. et al., Dental Diamond Vol.42-11 No.621 178-183 AUG.2017. (Abridged)

Features of NISHIKA CANAL SEALER BG

Physicochemical properties

NISHIKA CANAL SEALER BG is compliant with ISO standard of root canal sealing materials (ISO 6876) (Table 1) and has the property that allows for slight expansion during setting (Figure 2).

After NISHIKA CANAL SEALER BG was immersed in simulated body fluid (SBF), the pH stabilized at approximately 10 and typical spherules of petal-like HAp crystals were observed on the surfaces[3] (Figure 1). This feature offers excellent sealing ability and biocompatibility.

Excellent biocompatibility

According to *in vitro* and *in vivo* studies regarding biocompatibility, the excellent biocompatibility of NISHIKA CANAL SEALER BG was demonstrated. As the important process of wound healing, effects of NISHIKA CANAL SEALER BG on cell migration ability and viability of human periodontal ligament cells (HPDLC) and osteoblast-like cells were examined. As a result, cell migration ability and viability of HPDLC and osteoblast-like cells under NISHIKA CANAL SEALER BG showed no significant difference in comparison with a control[4]. It is also indicated that HPDLC and osteoblast-like cells migrated and grew in closely contact with the hardened block of NISHIKA CANAL SEALER BG (Figure 3). Furthermore, *in vivo* results demonstrated that NISHIKA CANAL SEALER BG did not inhibit wound healing of periapical tissue[5], showing that NISHIKA CANAL SEALER BG has excellent biocompatibility for periapical tissue.

Excellent sealing ability

When NISHIKA CANAL SEALER BG was filled in the root canal of human extracted tooth after the irrigation and drying at the same level with clinical procedures, the formation of HAp crystals in the interface between NISHIKA CANAL SEALER BG and root canal wall was observed. Furthermore, the formation of HAp crystals into dentinal tubules and a tag-like structure at the entrance of the tubules were observed. This interaction of NISHIKA CANAL SEALER BG with dentin through the formation of HAp layer brings its sealing ability[6] (Figure 4). In a sealing ability test, dye leakage of the root canal filled with gutta-percha point and NISHIKA CANAL SEALER BG by lateral condensation technique was approximately half in comparison with conventional root canal sealers, and the leakage gradually decreased over time[6]. When a root canal was filled with NISHIKA CANAL SEALER BG by the single-cone technique, the leakage was less than that of the lateral condensation technique. These results showed the excellent sealing ability of NISHIKA CANAL SEALER BG.

Table 1

Physical properties tests (ISO 6876:2012 Requirement)

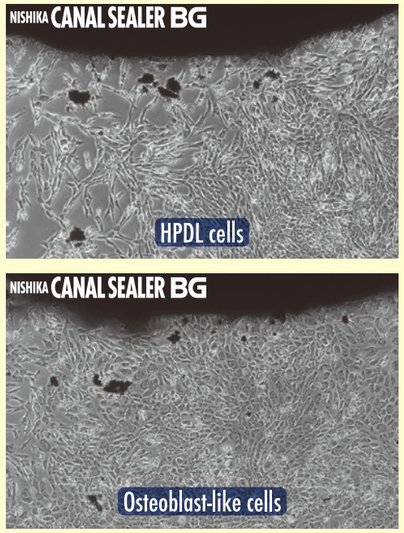
Flow	28.7mm	Solubility	0.5%
Working time	15 min	Disintegration	None
Setting time	180min	Radiopacity	5mm Al.
Film thickness	27.9µm		

Source: Washio A. et al. The Japanese Journal of Conservative Dentistry, 60(1): 14-21, 2017. (Abridged)

Figure 2

Source: Washio A. et al., Dental Diamond Vol.42-11 No.621 178-183 AUG.2017. (Abridged).

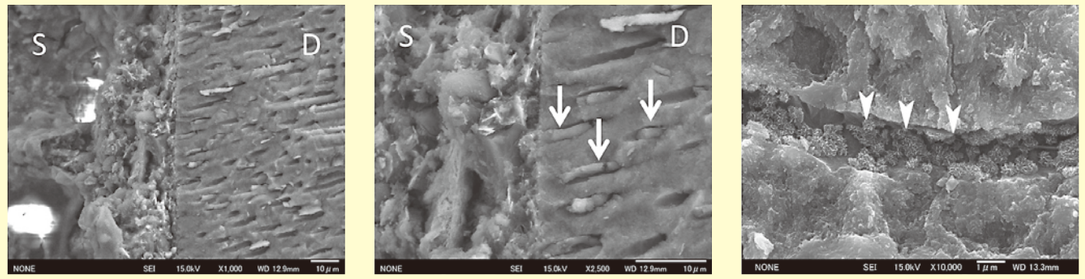
Figure 3



HPDL cells and osteoblast-like cells grew around NISHIKA CANALSEALER BG. (×40 Magnification)

Source: Washio A. et al., Dental Diamond Vol.42-11 No.621 178-183 AUG.2017. (Abridged).

Figure 4



Field emission scanning electron microscope (FE-SEM) photographs of sealer-dentin interfaces of samples (S: Sealer, D: Dentin).
Arrows: the formation of tag-like structures in dentinal tubules, arrow heads: hydroxyapatite-like crystals in dentinal tubules.

Source: Washio A. et al., Dental Diamond Vol.42-11 No.621 178-183 AUG.2017. (Abridged).

Features of NISHIKA CANAL SEALER BG

Handleability

NISHIKA CANAL SEALER BG is a 2-paste and double syringe model.

By pushing the plunger of a double syringe, it is very easy to dispense 2-paste at a 1:1 ratio. The dispensed paste can be mixed easily and quickly.

Anyone can prepare the same ideal consistency at any time (Figure 5).

Removability

For the successful retreatment, the removal of root canal sealers from root canal is also one of important properties. *In vitro* study with extracted tooth demonstrated that NISHIKA CANAL SEALER BG was removed completely by the re-preparation and the irrigation, and dentinal tubules of root canal dentin were opened[7] (Figure 6), showing that NISHIKA CANAL SEALER BG does not inhibit retreatment.

Precaution

Paste of NISHIKA CANAL SEALER BG tends to get hardened due to heat or moisture absorption. Therefore, NISHIKA CANAL SEALER BG is provided with an aluminum foil resealable bag. It is recommended that the syringe should be stored in the aluminum foil resealable bag and then stored in a cold place (1-10℃) without freezing.

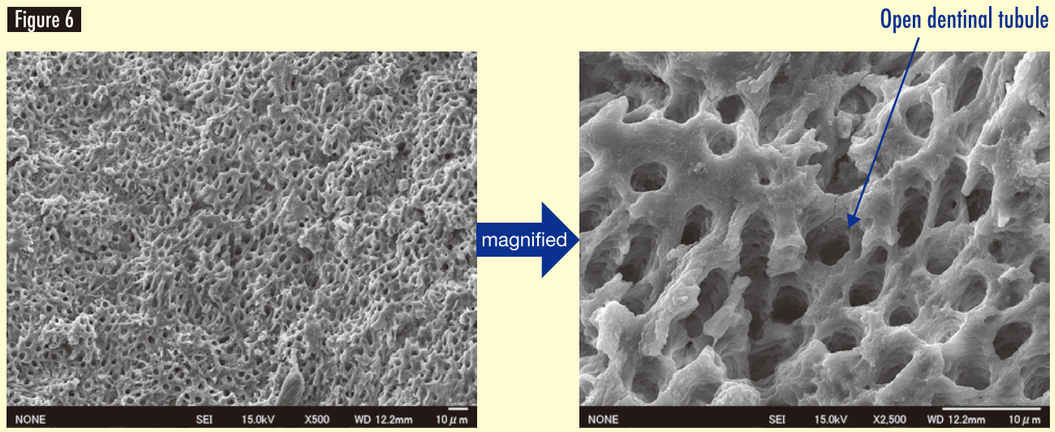
Regarding mixing paste, stainless-steel spatula may be worn out by its ingredient. Plastic spatula is recommended in order to avoid contaminations.

Figure 5

Mixing time: just 5 seconds or more
(A Plastic spatula is recommended)

The paste is always prepared to the same consistency.

Figure 6



The removal of hardened cement of NISHIKA CANAL SEALER BG and a root canal wall after irrigation. The cement was removed and the open dentinal tubules were observed.

Source: Washio A. et al., Dental Diamond Vol.42-11 No.621 178-183 AUG.2017. (Abridged)

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Presentation

Packaging

1 Double syringe [Paste A: 1.5g . Paste B: 1.5g]

Composition

Paste A: Fatty acid, Bismuth subcarbonate, Silicon dioxide

Paste B: Magnesium oxide, Purified water,
Calcium silicate glass (a type of Bioactive Glass), Silicon dioxide, etc.