OBTURYS

AUTOMIX OR HANDMIX

WHITE PAPER

İTENA®

CLINICAL PRODUCTS

1- Product description

The commercially available root canal sealers are categorized according to their chemical composition:

Chemical composition
Zinc-oxide eugenol
Calcium hydroxide
Resin based
Glass ionomer based
Silicon based
Bioceramic based

According to Grossman (1974) [1], root canal filling material must possess the following properties:

- Easiness of placement into the canal
- Ability to seal all canals including accessory ones
- No shrinkage
- Completely waterproof
- Unsuitable for bacterial proliferation
- Radiopaque
- No discolouration
- Not irritant
- Easy to remove if necessary

In this context, the root canal sealer allows tissue repair, because the periapical tissues are able to rest from the previous irritation, leading to the reorganization of the periodontal ligament. [2]

It is generally agreed that the use of gutta-percha cones with a sealer cement is one of the most reliable methods for filling the root-canal system (Aydemir et al, 2009). [3]

2- Product composition

PASTE A - Base		PASTE B - Catalyst	
Main Ingredients	**Function**	**Main Ingredients**	**Function**
DGEBA	Oligomer	Diamine	Oligomer
Zirconium oxide	Filler	Zirconium oxide	Filler
Bismuth oxychloride	Filler	Bismuth oxychloride	Filler
Ytterbium oxide	Filler	Ytterbium oxide	Filler
Fumed silica	Rheology modifier	Fumed silica	Rheology modifier
		Silane quaternary ammonium salt	Amine co-initiator

OBTURYS is an epoxy-resin root canal sealer.

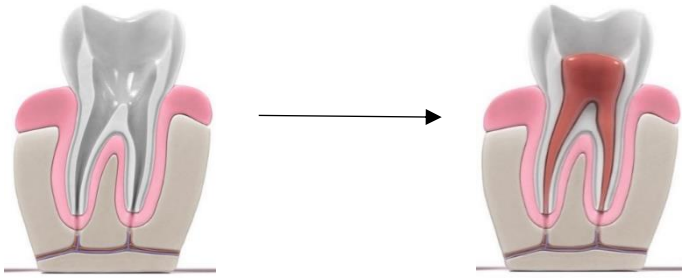
The final product consists of two components, the epoxy resin paste and the amine-containing paste portions which are mixed prior to insertion into the root canal.

DGEBA is a pale-yellow liquid epoxy compound, with epoxy groups located at both ends of the molecules. Those epoxy groups can undergo reactions of ring-opening, cross-linking and solidity with amines groups.

Epoxy resin sealers have been extensively evaluated for their physicochemical properties and biological response. [4]

3- Indications

OBTURYS is indicated for root canal filling of definitive teeth with gutta percha points.



4- OBTURYS

A- Properties, Actions & Benefits

Property	Advantages
High sealing	Perfect sealing
Excellent flow	Able to access difficult root anatomies
Low shrinkage	No gaps formation
Low solubility	Long term stability / no loss of material
High radiopacity	Easy visualization on x-rays
Bacteriostatic	Prevents bacterial proliferation

B – Key chemical reactions: crosslinking

Epoxy resin are widely used for numerous applications. Those resins are characterised by their low shrinkage during polymerization, good resistance to chemical agents, excellent adhesion on all supports and good mechanical properties. [5]

The chemical reaction starts immediately after the mixing of both pastes.

The reaction is based on the definitive and exothermic polyaddition of DGBA with a primary and a secondary diamine: Diepoxide + Mono/Diamine → Epoxide-amine addition polymer

With continued reaction of amines and epoxies, the molecular weight increases dramatically along with the crosslinking reactions resulting in a highly crosslinked network as can be seen in the schematic picture. [6]

Those reactions cause the transformation of a viscous liquid into a tri-dimensional rigid network.

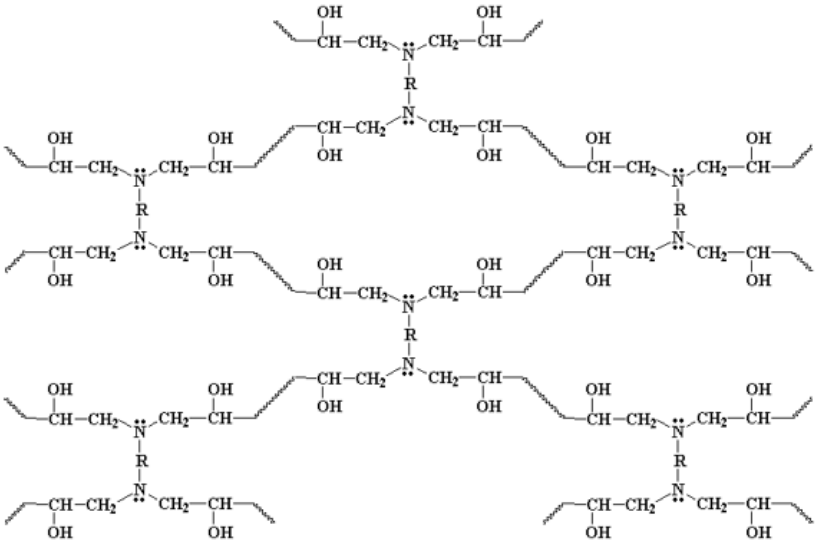
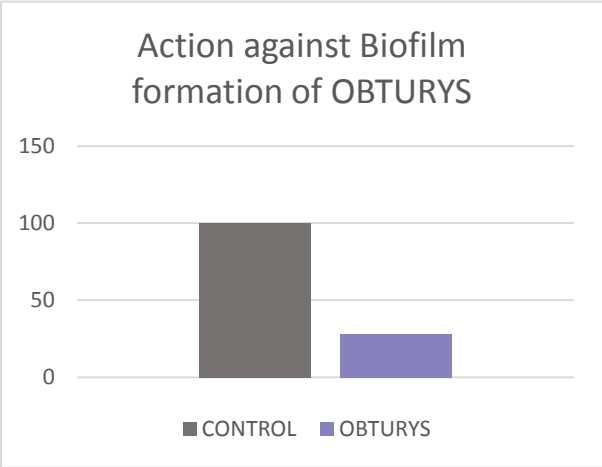
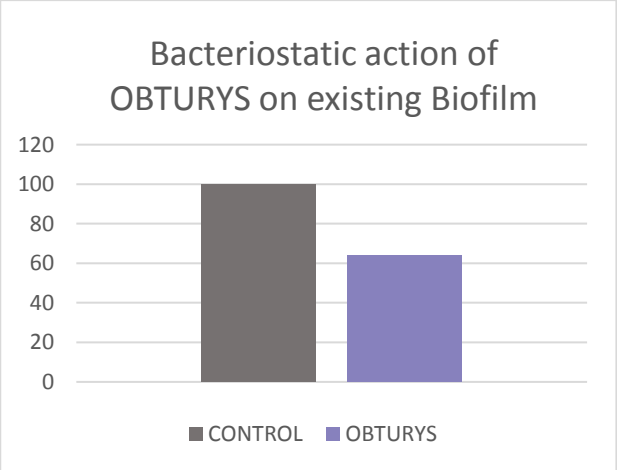


Fig1: Epoxy-resin network after polymerization

C – Bacteriostatic action

The goal of root canal treatment is to cure or prevent periapical disease. Success may be defined as a significant reduction in the infected root canal. A common reason for failure of root canal treatment is residual bacterial biofilm or reinfection due to coronal seal inadequacy. [7].





OBTURYS indeed shows a direct action on the formation of biofilms and on already existing biofilms as well. [8]

This enables OBTURYS to create a favourable micro-environment of the treated site by maintaining a bacteria-free environment.

This mechanism is based on the immobilized antibacterial technology (IABT) technology.

OBTURYS possesses a covalently-bonded immobilized macromolecule containing reactive silanol groups. Those organo-silane molecules form a protective positively-charged and non-diffusing high-weight polymer on the substrate.

The positively charged macromolecules have the ability to disrupt the negatively charged bacterial membrane, thus inhibiting bacterial proliferation by direct contact with the microorganism without releasing any active ingredients.

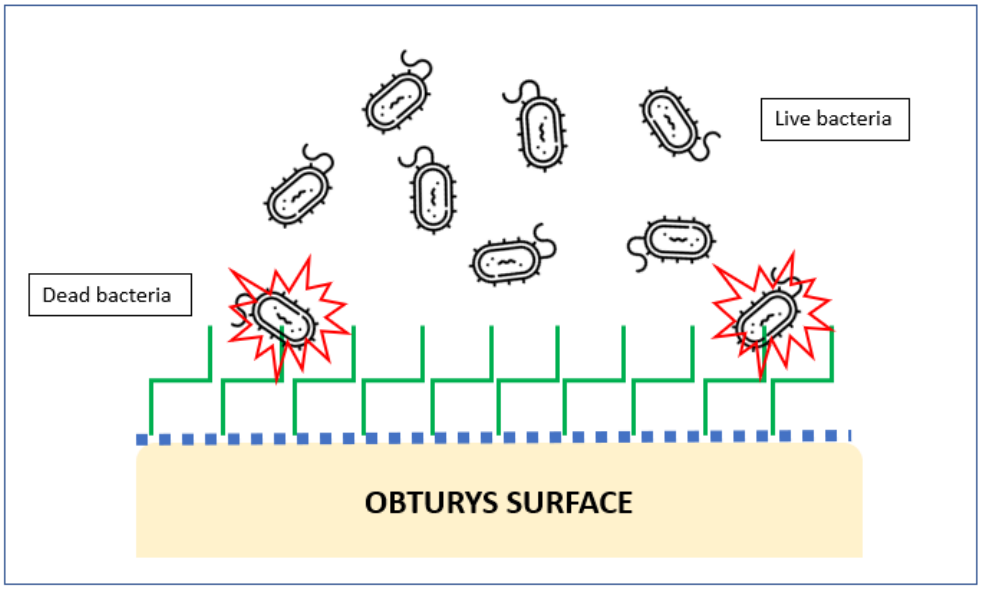


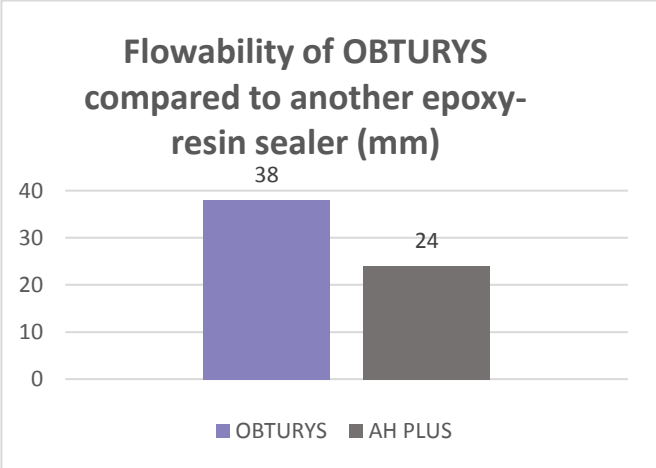
Fig2: OBTURYS mechanism of action against micro-organisms

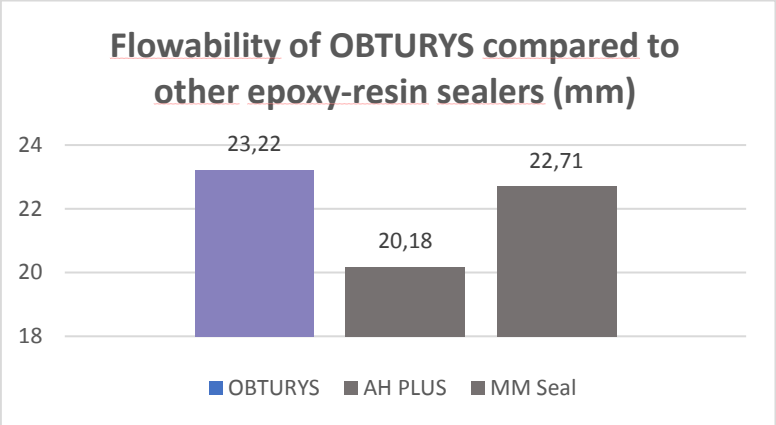
5- Technical properties / Market

A- Flowability

Zhou et al. (2013) [9] have shown that the flow of endodontic sealers has a direct effect on the obturation of accessory canals and micro-spaces.

Indeed, flow is the ability of a sealer composite to penetrate into accessory canals and irregularities of the root canal system, and it is considered to be a very important property.



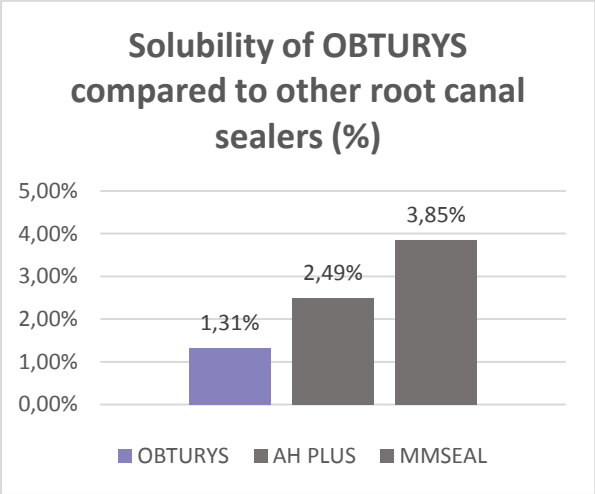


Root canal sealers should have suitable flow values in order for them to be able to penetrate easily accessory canals and irregularities of root anatomies, where microorganisms are present.

With its high flow values, OBTURYS is able to fill difficult cavities with hard anatomies. [10][11]

B- Solubility

In general, endodontic sealers should have low solubility when in contact with tissue fluids to prevent the release of chemical compounds into the periapical region which can trigger an inflammatory reaction. [12]



Moreover, long term solubility increases the possibility of gap formation between root canal dentin and the filling material, increasing the risk of bacterial leakage and fracture at the interface. [13]

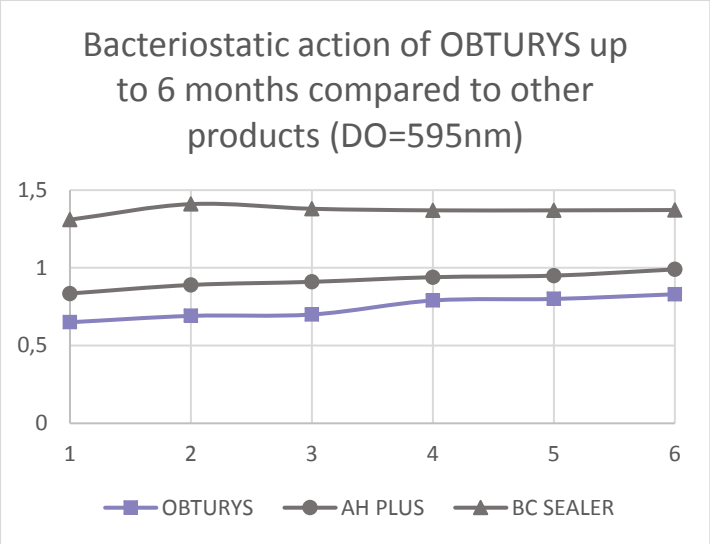
OBTURYS shows lower solubility values compared to the other products in the graph. [11]

C- Bacteriostatic action

Endodontic disease is a biofilm-mediated infection, and the primary aim in the management of endodontic disease is the elimination of bacterial biofilm from the root canal system.

Indeed, a bacteria free environment is required after endodontic treatment in order to get a clinical long-term success after root canal treatment.

Due to the chemical reaction, Epoxy resin sealers exhibit antibacterial activity during setting, however, they do not have a long-lasting bacteriostatic activity once the material is totally set.



OBTURYS root canal sealer shows a higher bacteriostatic action against biofilms compared to other products on the market.

OBTURYS root canal sealer thus enables to conserve a bacteriostatic environment up to 6 months after treatment in order to prevent bacterial and biofilm proliferation.

[10]

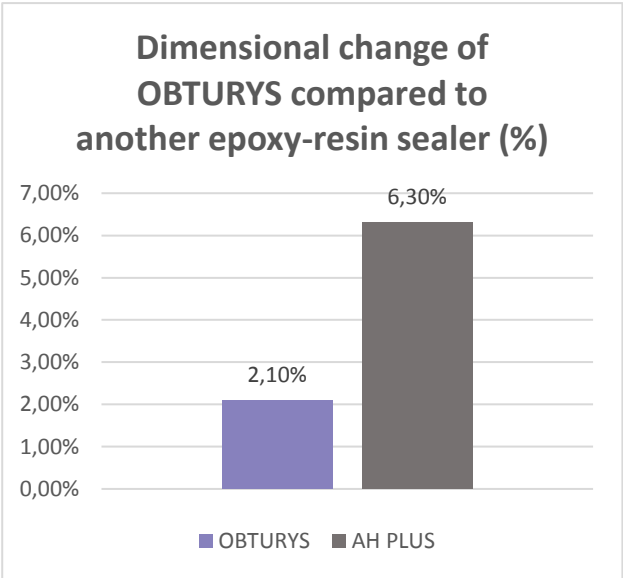
D- Dimensional change

Dimensional stability represents the degree to which a material maintains its original dimensions when subjected to changes in temperature and humidity.

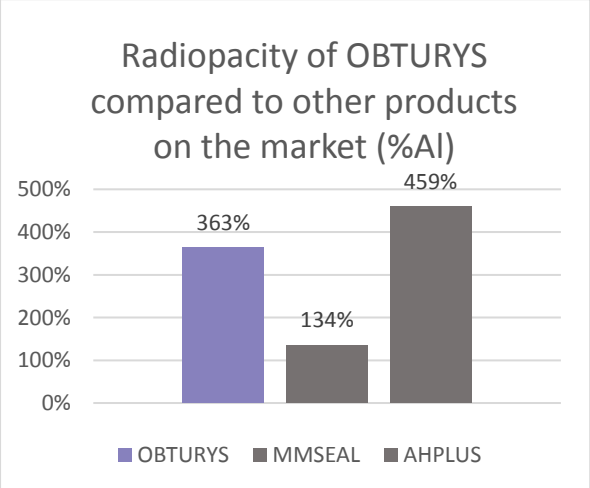
According to ISO 6876, values of dimensional stability should be assessed.

Dimensional change of dental material happens in the form of expansion or contraction of the material after setting.

OBTURYS root canal sealers shows a dimensional stability after setting, indicating the long-term performance of the filling material. [11]



E- Radiopacity



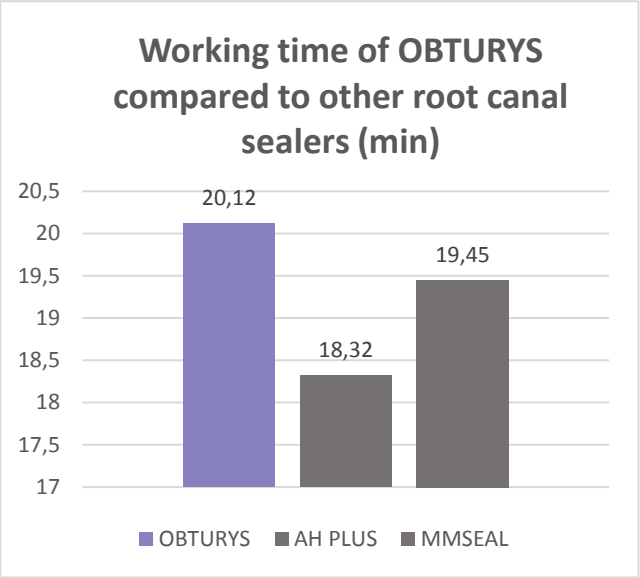
According to the ISO 6876, endodontic root canal sealers should be radiopaque enough in order to allow their visualization next to adjacent anatomical tissues such as teeth and bone, and other restoration elements.

OBTURYS possesses high values of radiopacity for an easy visualization. [10]

F- Working time

The working time is the period of time measured between the start of mixing until it is no longer possible to handle the sealer without inducing adverse effects on its properties.

OBTURYS possesses a working time of approximately 20 minutes, suitable time for the endodontic session [11]



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