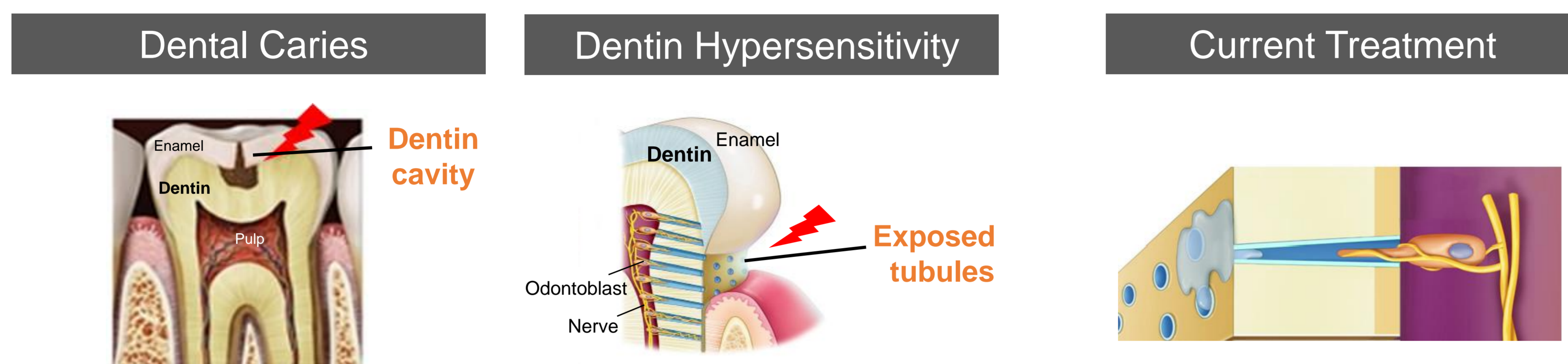


## Therapeutics for dentin hypersensitivity using dentin regeneration technology

- Dentin hypersensitivity is one of the most common incurable diseases, such as dental caries and periodontal diseases
- Dentin regeneration is a fundamental solution for alleviating pain from dentin hypersensitivity, dental caries, and other dental diseases
- We aim to establish our KH001 Peptide Dentin Regeneration Technology as the most powerful treatment for 2.3B caries patients, in \$40B market of dentin hypersensitivity & dental caries, and in \$6B market of toothpaste & mouthwash

### What Causes Tooth Pain & Why Pain Cannot be Recovered



- Dentin exposure following damage to the enamel
- Temporary treatment with desensitizer or tubule occlusion from the outside
- Persistent pain due to treating symptoms only, not the root cause

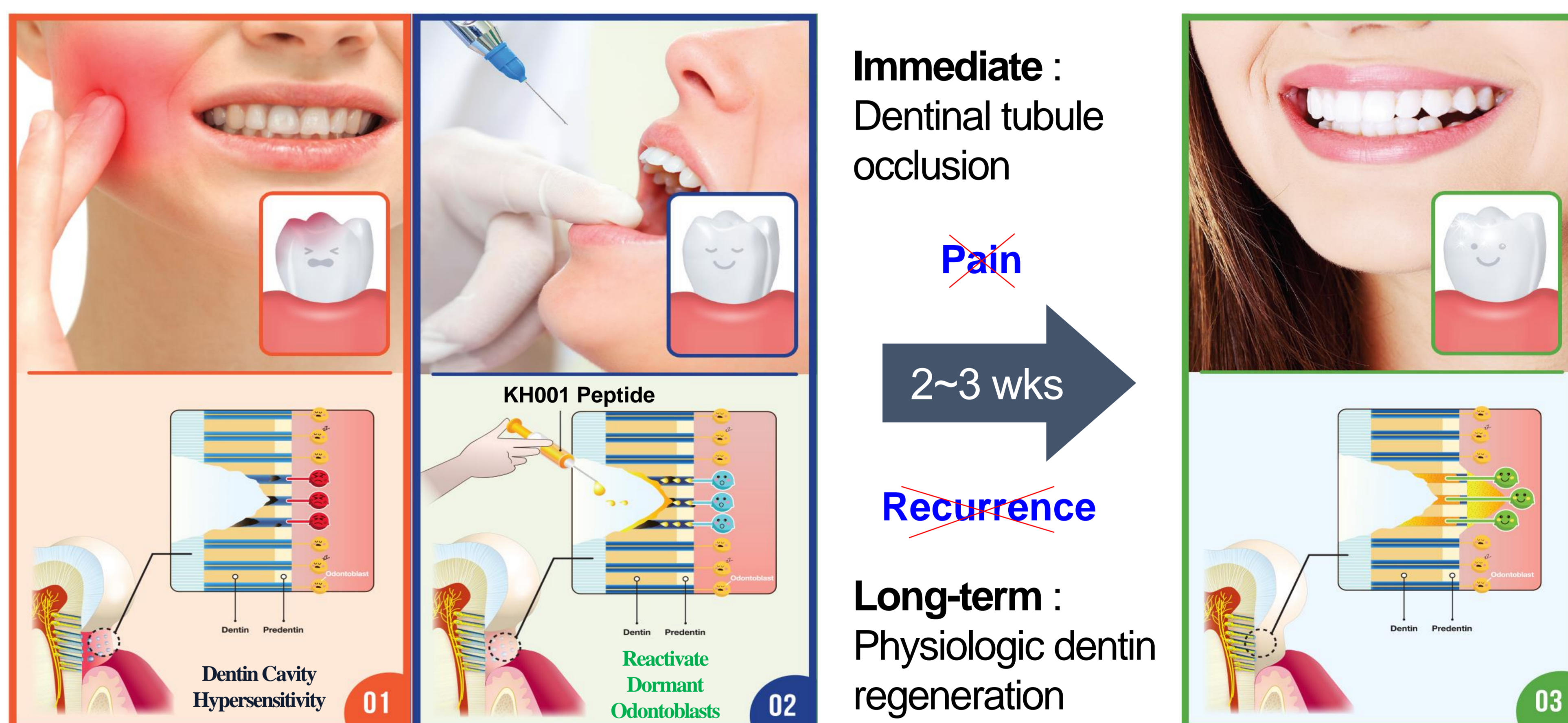
### Mode of Action of Dentin Regenerative Protein

**Dentin Regenerative Protein** promotes physiologic dentin regeneration either by inducing differentiation of mesenchymal stem cells into odontoblast cells or by reactivating the dormant odontoblasts.

Using biological data analysis of the dentin regenerative protein, HysensBio developed a novel KH001 functional peptide consisted of 10 amino acids.

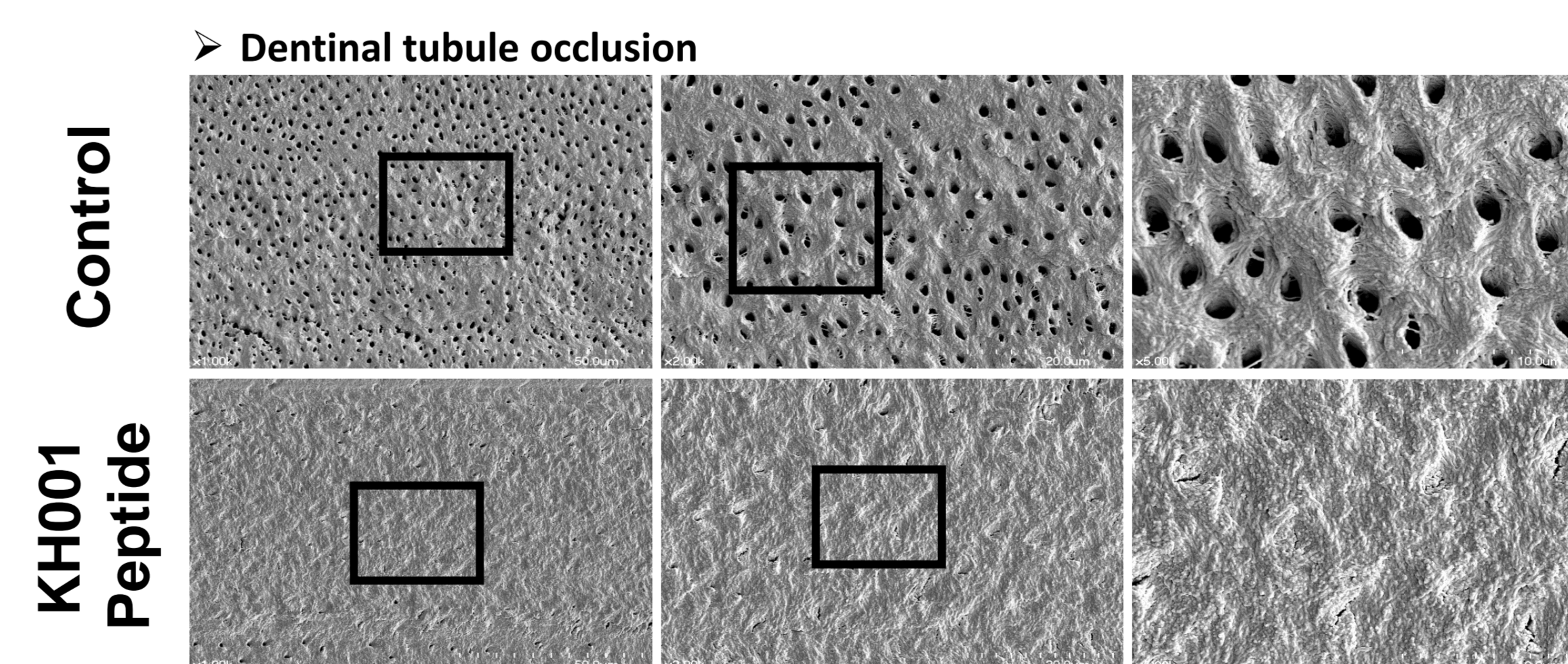
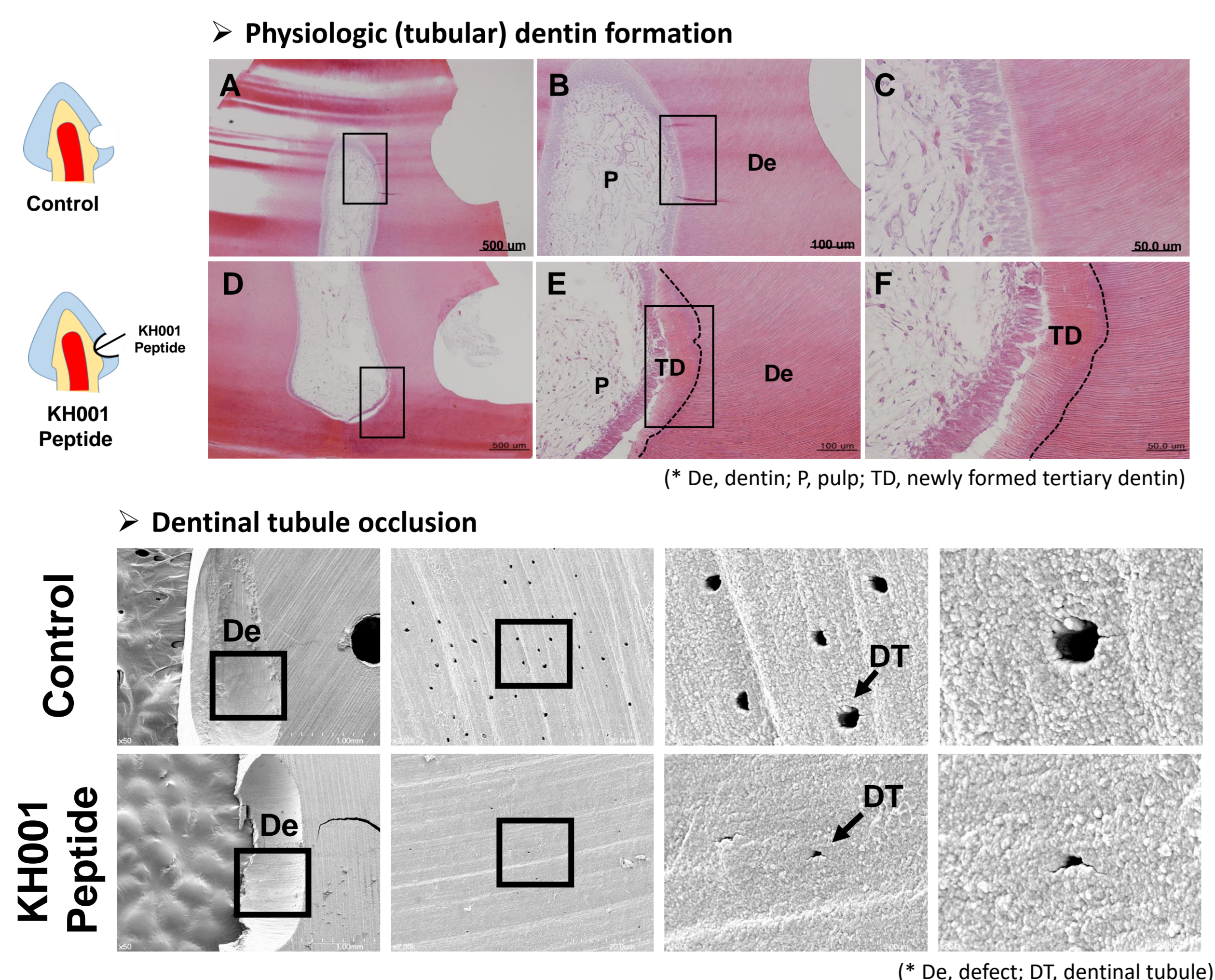
#### Key Actions & Benefits of Our Peptide

- Odontoblast reactivation & differentiation
- Dentinal tubule occlusion via remineralization
- Physiologic dentin regeneration
- Quick, safe & easy application

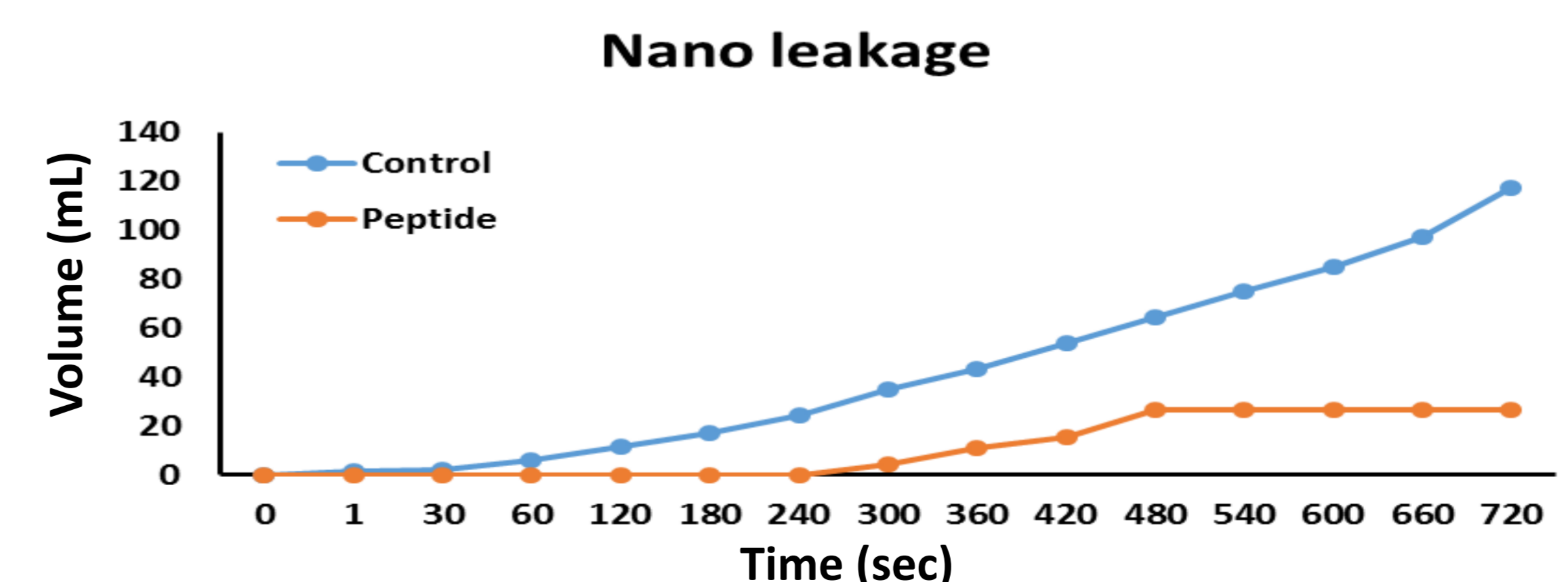


### Nonclinical Data

**KH001 peptide not only successfully regenerates physiologic dentin but also occludes dentinal tubules, eliminating the root cause of toothache**



#### Nano-fluid movement (nanoleakage) analysis





# Periodontal disease treatment using periodontium regeneration technology

## Periodontal Disease

An inflammatory disease of tissue surrounding the teeth, aroused by bacteria and causes bleeding, forms periodontal pocket, destroys periodontal ligament and alveolar bone, ultimately leading to tooth loss

## 790M adult patients

2019 Top 8 diseases of outpatients in Korea

No	Disease entity	Number of Cases (10k)	Medical care expenses (KRW 100k)
1	Gingivitis & Periodontal Disease	1,673	15,321
2	Acute bronchitis	1,640	9,193
3	Vascular motility and allergic rhinitis	707	2,930
4	Dental Caries	645	5,397
5	Essential (primary) hypertension	625	8,776
6	Acute upper respiratory tract infection in multiple and detailed areas	575	1,930
7	Dorsodynia	541	7,719
8	Gastritis and duodenitis	527	2,671

(Korea Health Insurance Review & Assessment Service 2020.4)

Periodontal disease occurs in majority of adults aged  $\geq 20$ , 75% of adults aged  $\geq 35$ , and 80-90% of elders aged  $\geq 40$

- Periodontal disease occurs when sticky, colorless dental plaque continuously formed on teeth is not removed and hardens, forming calculus and thereupon causing inflammation.
- The more severe the periodontitis, the deeper the periodontal pocket, causing inflammation in periodontal ligament and loss of cementum and alveolar bone.
- Periodontal disease is the most common disease among adults worldwide. It is reported to be the #1 disease in Korea, with more patients getting treated than respiratory disease (HIRA, 2019). Periodontal disease market worldwide is estimated to be \$4B.

## Cause of Periodontal Disease & Challenges in its Treatment

### Progress of Periodontal Disease

**Healthy Teeth & Gums:** Healthy gums are firm and pink.

**Gingivitis:** Gums become swollen and blackish-red and bleed when brushing teeth.

**Early Periodontitis:** Upper gum and teeth are separated, and inflammation spreads not only to the gums but also to the alveolar bones.

**Advanced Periodontitis:** Gums are severely swollen, pus is formed, and alveolar bones are damaged, causing the teeth to shake.

### Current Treatment

**Nonsurgical Tx**  
Scaling/Root Planing

**Surgical Tx**  
Gingival Curettage/Surgery

Tooth extracted due to severe periodontal disease

- Nonsurgical & surgical methods are used to treat periodontal disease. In general, such methods are quite successful in stopping the progress, yet they have limitations in regenerating the already damaged periodontium.
- Fully regenerating the severely damaged periodontal tissue is still challenging.

## KH003 Peptide's Mode of Action for Periodontal Regeneration

**KH003 Peptide**

**Activation**

**Periodontal ligament regeneration & Functional alignment**

Fibroblast

- KH003 functional peptide's periodontal ligament fibroblast activation
- Periodontal ligament regeneration & functional alignment
- Re-adhesion to cementum & alveolar bone
- Restoration & maintenance of periodontal tissue & tooth function

## Nonclinical Data

**Animal model of damaged periodontium**

**Normal**

**Control** **Collagen carrier** **PA-CM** **PA-CM + P-Reg Ab** **P-Reg Protein**

AB, normal alveolar bone; PD, normal PDL; C, cementum; D, dentin; NPD, newly formed PDL; NAB, newly formed alveolar bone; NC, newly formed cementum.

- Animal model of damaged periodontium treated with periodontal regenerative protein demonstrates the regeneration of periodontal ligament, as well as the regeneration of periodontium via re-adhesion of periodontal ligament to cementum and alveolar bone.