

# The Bioactive Healing Abutment (BHA) for controlling microflora in periimplantitis

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## Background and Aim

One of the most frequently mentioned causes of complications after implant treatment is periimplantitis. It is described as an irreversible inflammatory process that involves the loss of bone tissue surrounding the implants, the formation of pockets and exudate.

The bacterial flora plays an important role in the development of periimplantitis. Treatment of periimplantitis is currently a serious clinical challenge and often requires a traumatic surgical procedures with an uncertain prognosis.

The aim of the study was to check if there is a clinical possibility of reducing the potentially pathogenic bacterial flora causing periimplantitis in the area of the implant socket with a modified healing screw (Bioactive Healing Abutment) filled with an antibacterial drug.

## Methods and Materials

The experiment used a bioactive healing abutment (BHA) developed according to own design, which is the subject of patent application No. PCT / PL2018 / 427453. BHA is a modification of the standard healing screw used in implantology. The standard healing screw is solid, while the BHA is hollow and has an internal chamber that allows it to be filled with medicinal substances. They may be released to the implant pockets through the holes in BHA bottom.

The study involved 20 patients who have implants exposed and healing screws fixed. After two weeks of healing, healing screws were detached and the composition and amount of bacterial flora responsible for the development of periimplantitis in the implant pocket were examined. Then BHA filled with clindamycin on a collagen carrier was tightened to the implant. After two days, the bacterial flora was re-examined and the prosthetic restoration continued. A PET (MIP Pharma) test based on the Real-Time PCR method was used to assess microflora.

## Results

Analysis of the qualitative and quantitative composition of the bacterial flora in the pockets of the implants two weeks after their exposure revealed the presence of a bacterial flora pathogenic to periimplantitis. A particularly high bacterial titer was found in relation to the *Aggregatibacter actinomycetemcomitans* and red complex including: *Porphyromonas gingivalis*, *Treponema denticola*, *Tannerella forsythia*.

The application of clindamycin on a collagen carrier placed in the BHA chamber within 48 hours resulted in statistically significant reduction of all pathogenic bacteria strains ( $p < 0,05$ ). The obtained results show that the proposed bioactive healing screw can be an effective and precise medication carrier. The release of clindamycin from the BHA into the implant pocket is easily controllable and allows effective local antibacterial activity in clinical settings. The procedure for applying the active substance to BHA is cheap, easy, painless and can be repeated.

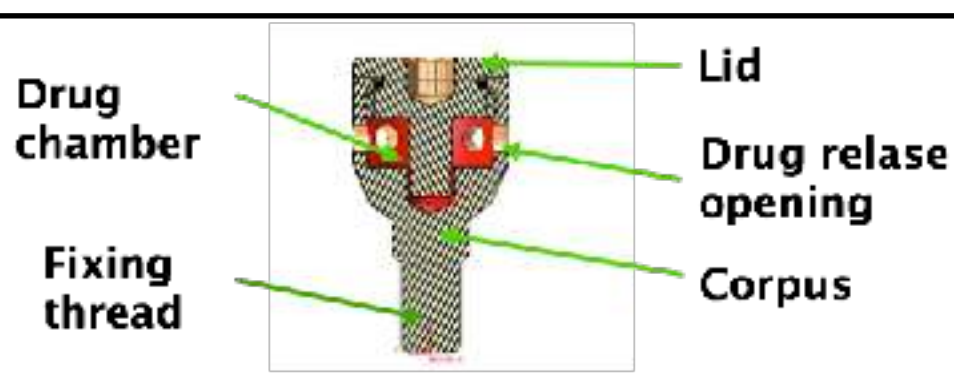


Fig. 1 Bioactive healing abutment scheme



Fig. 3. Bioactive healing abutment structure and dental implant fixation

1. Drug chamber vertical view
2. Corpus and lid horizontal view
3. Bioactive healing abutment with closed lid
4. Bioactive healing abutment with closed lid mounted on the dental implant

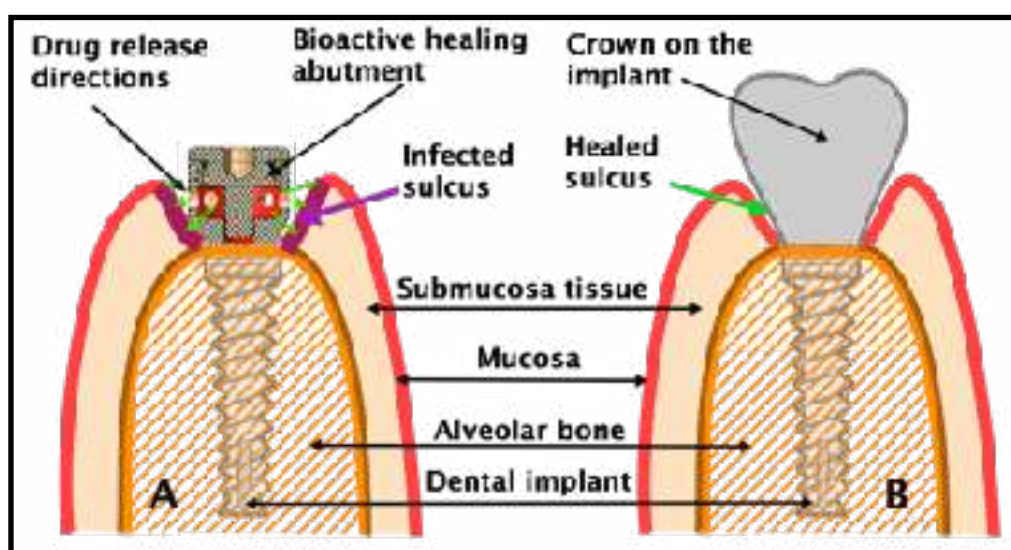


Fig. 2 Bioactive healing abutment idea of action  
 A. Treatment with bioactive healing abutment  
 B. Implant restoration after treatment

## Conclusion

1. The local application of clindamycin in the area of the implant socket using bioactive healing abutment significantly reduces the amount of pathogenic bacterial flora responsible for inducing periimplantitis.
2. The clinical use of the BHA to reduce the surrounding microflora should be further investigated in terms of the type, dosage and pharmacological formulation of the antibacterial drug being applied and topical administration of anti-inflammatory drugs and analgesics in implant therapy.