BREATKTHROUGH in Photo Dynamic Therapy (PDT).

+ Kills Germs
+ No Pain
+ No Antibiotics
+ No Discomfort
+ Destroys ALL Bacteria
+ Simply Rinse Away

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More than 75% of adults suffer from periodontitis (PD) and other bacterial infections of the gums or the oral cavity. In addition to the eventual loss of teeth, doctors and dentists believe that inflamed gums for an extended period of time may be associated with systemic diseases. Attempts to mechanically clean the bleeding gums may lead to the transfer of bacteria in the mouth into the bloodstream (bacteremia) potentially causing the bacteria to spread throughout the body, resulting in cerebrovascular diseases.

Due to stress on the immune system, the risk of diseases of the arteria carotis, heart attacks, arthritis, diabetes and premature births are rising. Therefore, PD bacteria is more harmful than smoking, obesity or high cholesterol levels.

This brochure will explain

- What is Photo Dynamic Therapy (PDT)?
- How does it work?
- Question & Answer (Q&A)
- Features and Benefits
- Clinical Applications
- EmunDo® Therapy
If the bacterial count in the gingival pockets is extremely high, then the PD-therapy is problematic because the mechanical cleaning and the curettage are no longer sufficient to stop the inflammation. A.R.C. Laser developed EmunDo®, a new innovative dye for photo dynamic therapy (PDT). Now it is possible to reduce or totally avoid the use of antibiotics – and eliminate all of the associated health risks – for patients with periodontitis. Independent of antibiotic resistance, EmunDo® selectively destroys the relevant PD-germs, especially the AA-Complex³

The pathogens that arise during PD are the same in peri-implantitis. Due to the rise in the number of implants, there has been a dramatic increase in the number of reported cases; therefore, dentists and researchers are looking for an effective therapy. Since the implant is difficult to clean without compromising the surface, it is necessary to do so before the dental abutment is covered and the connective tissue of the mucosa surrounding the implant is decreasing. EmunDo® provides an alternative to fight the bacterial inflammation and to save the implants.

The mechanism of action:
Upon irradiation with the FOX Laser, the EmunDo® dye generates singlet oxygen. The Gram-positive and Gram-negative bacteria can not survive in this oxygen rich environment.

1) Initiative Parodontitisfreies Deutschland http://www.parodontitisfreies-deutschland.de/
2) Moïse Desvarieux, et. al.: Epidemiology:Periodontal Microbiota and Carotid Intima-Media Thickness: The Oral Infections and Vascular Disease Epidemiology Study (INVEST), Circulation. 2005;111:576-582. doi:10.1161/01.CIR.0000154582.37151.15
What is photo dynamic therapy (PDT)?

Photo dynamic therapy (PDT) was originally a treatment method for skin diseases. It has proven itself as a particularly useful therapy for treating the primary stages of skin cancer. Over the past 10 years, a number of new applications have been discovered. The basic concept of PDT is to enrich the specific light sensitive photosensitizers in or on the areas to be treated. Infected or harmful cells can be selectively isolated and destroyed by irradiation of the photosensitizer using of an appropriate wavelength of light. Applying this same medical approach, not only can tumor cells be destroyed but also unwanted bacteria.

When was photo dynamic therapy invented?

Since the beginning of the 20th century, the scientific advantages of light irradiation in conjunction with a photosensitizer like EmunDo® were known in the treatment of skin related diseases. Nearly 100 years ago Hermann von Tappeiner, head of pharmacology at the University of Munich, recognized that certain dyes in combination with light can be destructive to specific cells in the presence of oxygen. He called this discovery “photodynamic reaction”. In recent years, especially since the late 70s, clinical studies have been conducted to determine how this reaction can be utilized for treatment of various diseases. Ultimately, these findings have become part of the history of modern medicine under the name of „photo dynamic therapy“.

What light sources are used and are they harmful?

The EmunDo® dye is activated using a laser light wavelength of 810 nm. The laser light is so low in energy that the healthy tissue surrounding the treatment area is not affected. In fact, similar laser light energy is used for bio-stimulation treatments (low-level laser therapy, LLLT) for a wound healing effect. Therefore, this treatment has the added advantage of achieving excellent cosmetic results with minimal risk of scarring.

Is EmunDo® toxic?

The tricarbocyanine dye in EmunDo® contains indocyanine green (ICG, MW775), which has been extensively tested for biocompatibility (e.g. in ophthalmology as a contrast agent). In addition, since 1956, it has been widely used to measure blood flow through various organs to determine the cardiac output, the cardiac ejection fraction and liver function diagnostics¹. EmunDo® is an iodine free dye; therefore, it is compatible with allergy suffers.

Unlike inflamed tissue where the surface roughness promotes the attachment of ICG molecules, the molecular size of the ICG is so large that it will not accumulate in healthy tissue; hence making this treatment tissue selective!

Applications in the dental practice

Until now, the success of periodontitis treatment primarily depended upon antibiotic therapy and patient compliance. For years, researchers have been looking for a long term, more predictable alternative.

PDT is a scientifically proven, non-surgical therapy which effectively treats periodontal disease and simultaneously prevents the serious sequelae that can occur². In addition, it is a welcome alternative treatment for peri-implantitis to save the implant (to maintain the protective function of the mucosa).

FOX Diode Laser

A large number of applications are possible in your dental practice with the usage of FOX diode laser. For example, the diode laser is a useful tool for soft tissue surgery (e.g. exposure of implants, frenectomy) and endodontitis.
Photo dynamic therapy (PDT)

Why is it desirable to not prescribe antibiotics?
The German State Ministry of Health in Niedersachsen (Lower Saxony) stated:
"In recent years, mainly in industrialized nations, the number of antibiotic resistant bacterial pathogens grew alarmingly. According to the European Centre for Disease Prevention and Control (ECDC report 2007), the development of bacterial resistance to antibiotics is currently one of the most important health problems in Europe. The World Health Organization and the European Union demand their members to be vigilant and to develop effective countermeasures to raise awareness in both the scientific and social community. Due to this issue on 11/18/2008 the „Antibiotic day“ was introduced in Europe. Antibiotic resistance was also the theme of World Health Day 2011 (on April 7th 2011). […]"

Further information about Antibiotic resistance can be found: http://www.cdc.gov/drugresistance/index.html


Centers for Disease Control and Prevention (USA) http://www.cdc.gov/drugresistance/index.html

Primary features of EmunDo® therapy

The germicidal effects can be achieved without antibiotics

+ All of the bacteria will be destroyed, regardless of the Gram stain, whether it is Gram-positive / -negative bacteria, as well as Gram-variable and Gram-undetermined species.

+ As a result of the germicidal effect, no antibiotics are necessary; therefore, potential problems with existing antibiotic resistance or resistance formation can be avoided!

Reduce the need to use antibiotics and avoid the risk of developing antibiotic resistance

Faster and better healing through biostimulation

Gingival pockets close germ free

Further information about Antibiotic resistance can be found: http://www.cdc.gov/drugresistance/index.html


Centers for Disease Control and Prevention (USA) http://www.cdc.gov/drugresistance/index.html

1 R.M. Saeima et al.; Photochemotherapy kutaner Aids-assoziierter Kaposi-Sarkome mit Indocyaningrün und Laserlicht Hautarzt, Volume 52, Number 4, 322-326, DOI: 10.1007/s001050051315
EmunDo® is a very gentle therapy

There is no thermal effect with the laser light activation so there is no risk of thermal injury to tissue.

There is no glazing of the dentin because the laser irradiation is applied at low power.

PDT assists the dentist with scaling & root planing because the concrements are loosened by the therapy, making cleaning easier.

The treatment is quick and easy with minimal patient discomfort.

- Once PDT destroys the biofilm and the germs, the patient loses less root material during aggressive, mechanical cleaning resulting in less dentine hypersensitivity.
- PDT makes it possible to target difficult to access areas such as furcations and deep invaginations, which are very difficult to clean mechanically.

Features and benefits of PDT:
- The dye accumulates preferentially in the inflamed tissue. Poorly cleaned areas can be shown to the patient to educate them on problem areas and to promote better oral hygiene.
- The application is so easy it can be delegated to the support staff (see treatment plan).
- This is the best treatment option for anyone who has a positive aMMP-8 test.

+ Treating bleeding pockets is more clinically effective than only relying upon better oral hygiene from patients.
+ No waiting period: the dye can be irradiated immediately.
+ PDT therapy is compatible for patients prone to iodine allergy.
+ In addition to performing PDT with EmunDo®, the 810 nm wavelength can also be used for other soft tissue applications.

- Cleansing solutions are not as effective as EmunDo® because they do not penetrate into the tissue pockets. The penetration depth of chemical disinfectants is only about 100 microns versus the diode laser which penetrates more than 1,000 microns into tissue!
- Furthermore, alternative solutions do not last long enough in the pockets in order to take effect on the germs. The solutions are washed out by e.g. the saliva.
- Despite its germicidal effect, use of the bactericidal gas “ozone” has only a limited effect against relevant PD-germs: AA, Pg, Tf, Pm inside the biofilm.

- In addition, local indicated 'chips' have only a limited effect on the relevant germs AA and Pg.

Principle characteristics of EmunDo® therapy

photo dynamic therapy

Germicidal Effect without Antibiotics

+ All of the bacteria will be destroyed, regardless of the Gram stain, including Gram-positive / -negative bacteria, as well as Gram-variable and Gram-undetermined species.

+ Because of the germicidal effect, no antibiotics are necessary, therefore potential problems with existing antibiotic resistance or resistance formation is avoided!

+ EmunDo® has a selective, localized effect because it accumulates only in the inflamed areas.

+ Furthermore, the bacteria contained in plaque or biofilm is less affected by antibiotics, because they are shielded by the organic matrix in the film and may be absorbed by or adhere to the tooth and epithel cells.

Selective colouring of inflamed areas

Transgingival- and Bulb irradiation

Wide field of application

Inflamed areas are dyed and concrements are loosened

Activation with the FOX 810 nm

Inflamed tissue is easy to remove with Bare Fiber
Advantages of EmunDo® therapy

EmunDo® therapy is safe and effective for removing all harmful bacteria. By comparison, mechanical cleaning is unable to reach and remove bacteria from all areas. Other laser based therapies are not clinically effective on all types of germs. If any method does not remove all of the bacteria, harmful bacteria will quickly repopulate the area. EmunDo® therapy helps to prevent the spread of bacteria to potentially infect the body.

Gingivitis and periodontitis:
Leads to bone degradation and the loss of teeth

Periodontitis
Bacterial inflammation in periodontal pockets, leads to bleeding gums, pocket formation, reformation of gums with loosening and eventual loss of teeth. Furthermore, scientific evidence indicates that there is an increased risk of infection developing in the rest of the body, eventually resulting in vascular diseases in the heart and arteries.
Bacterial infection around an implant could lead to its loss. The primary goal is the complete removal of the microbial contamination. The germs are similar to those in periodontitis, thus peri-implantitis could be avoided if the risk of infection could be eliminated prior to implant placement. Patients with periodontitis are not suitable candidates for implants. Since germs colonize the rough surface of the implant, which is not covered by tissue, the use of oral antibiotics is ineffective.

Advantages of treatment with EmunDo®

PDT has the ability to treat exposed areas without any thermal effect.
EmunDo® is a very gentle therapy

Treatment procedure with EmunDo® of a full mouth – periodontitis

In general, the PA method is very similar to a conventional treatment, except that the EmunDo® ensures sterility of the pockets and allows easier curettage by loosening the plaque layer. Prior to the first EmunDo® session, a standard professional dental cleaning is performed.

1. Mix the EmunDo® dye

2. Apply the green EmunDo® dye to the teeth and the adjacent gums.

Accessories

- EmunDo®- hand piece
- Bulb Fiber
- Bare Fiber

APPLYING the EmunDo® dye
No pain or discomfort during laser activation.

3. Laser irradiation can be performed immediately. The photodynamic process is initiated in the dye (ACTIVATION) using a low power setting, hence without heat. Highly reactive singlet oxygen is produced which achieves a germicidal effect without patient discomfort.

4. EmunDo® therapy is performed using three different hand pieces, starting with the large irradiation EmunDo hand piece. Change to the smaller bulb tip fiber to activate all dyed regions. Finish by using the bare fiber for deepithelisation.

5. Upon completion, simply rinse out the mouth to remove remaining dye. NOTE: The dye is completely bio-compatible and will not be absorbed.

6. The mechanical removal of concrements (Scaling and Root Planing) is now easier, due the loosening effects of PDT on the plaque.

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FOX

HIGH POWER LASER

now for Photo Dynamic Therapy (PDT).

APPLICATIONS
- Endodontics
- Periodontology
- Surgery
- Implantology
- Biostimulation
- Bleaching
- PDT – EmunDo®

ADVANTAGES
- Store Treatment Protocols
- Easy to use
- Touch Screen Display

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