THE RIGENERA PROJECT

"A Healing Wave"

From the Italian biotech research the Fast Regeneration Device
About Our Company

HBW s.r.l. HUMAN BRAIN WAVE

- HBW was founded in April 2012 to provide innovative medical services by producing biotechnological devices for medical applications.

- HBW was founded by Antonio Graziano and Riccardo d’Aquino following their research on stem cells and regenerative medicine.

- HBW in 2014 patented its micro-graft technology called RIGENERA®.

- HBW started to test a prototype of Rigenera® protocol in the Italian market in January 2013 (first clinical tests started in 2006)

- The Rigenera® protocol is based on micro-grafts generated from autologous tissues without foreign enzymes and/or additives using a disposable medical device called Rigeneracons.

- The Rigeneracons is CE, FDA and FMA (Japan) certified as a disposable medical device.
Using RIGENERA, in just one surgical time, the patient is the donor and the acceptor of calibrated micro-grafts; this procedure led to an enrichment of progenitor cells in the acceptor site that need to be regenerated; micro-grafts suspension can be used alone or in association with different biomaterials according the tissue to regenerate.
Standard Clinical Autografts Procedures main problems

Clinical point of view
Tissue volume to collect

Biological point of view
Cells and Tissue Viability Lost
## Micro-Grafts Theory

Numerous scientific papers have demonstrated that progenitor cells reside within a population with determined morphological features called side population.

The main features of this side population are: 1) the size and 2) the expression of stem markers, significantly higher than in the wild population.
Overcome Graft Critical Point modifying the micro dimensions of the graft particles

Microdimensions \(\rightarrow\) Affects \(\rightarrow\) cell viability

**Micro-Grafts Theory**

Microdimensions \(\rightarrow\) Affects \(\rightarrow\) cell fate
Micro-Grafts Theory

Clinical Challenge

To prepare viable micro-grafts with 50 micron maximum dimensions in a fast, reliable, safe procedure without any chemical substance or tissue extensive manipulation.
The Rigenera Protocol

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EVIDENCE 1: The principle behind the Rigenera technology is the possibility of obtaining in a few minutes autologous grafts of average size 50 microns in order to maximize their biological activity in a regenerative key and minimize cell death which classically accompanies each graft from the moment of its withdrawal from the donor graft into the recipient bed.

EVIDENCE 2: Rigenera is the only technology in the world capable of getting grafts so small in size (as cell size), maintaining the vitality rating greater than 80%; today the technology has been certified as CE, FDA, FMA medical device precisely in order to make secure rapid and reliable procedure of micro-grafts.

EVIDENCE 3: Today the main field of application is wound healing and bone regeneration. Clinical indications are similar to those of the PRP, although the technology is completely different: Rigenera has no relation with blood derivatives and therefore does not incur the same technical and regulatory issues.
**RIGENERA** allows a standard tissue preparation without any particular needing in terms of doctor expertise.

**RIGENERA** is made up by two components: **RIGENERA MACHINE** and **RIGENERACONS FILTERS**. The **RIGENERA MACHINE** works with the **RIGENERACONS** at a standard rotating speed of 80 rpm.
The Rigenera Protocol

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The RIGENERACONS are disposable medical devices CE and FDA approved.

Every device owns a grid with 100 exagonal holes. Any hole is embraced by six micro-blades designed for efficient cutting of hard and soft tissues.

Advantages: - Fast preparation of the tissues - Operator safety – No Cross contamination by tissue samples - Compact Design for all operatory theatre – Standard tissue processing
The Rigenera Protocol Principles

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AUTOLOGY: RIGENERA PROTOCOL is suitable for non autologous tissue transplantation.
If a patient has a tissue or an organ damaged by diseases and trauma, RIGENERA PROTOCOL could be applied using micrografts coming from a different donor patient (*micro-grafts transplantation*).

TISSUE HOMOLOGY: the stem cell research offers new possibilities every day regarding non homologous tissue grafts. For example tissue collected from nasal mucosa and disaggregated with RIGENERA PROTOCOL could be use for generating neural regeneration.

One surgical Time: today the RIGENERA PROTOCOL is applied during the same surgeries. In the future a patient could undergo a tissue collection followed by Rigenera disaggregation and freezing of the micro-grats. In this way the patient could preserve their own micro-grafts for future applications for tissue regeneration needings.
Quality Management System Certificate

ISO 13485
CE Certification

Class I disposable Medical device
FDA Certifications

1. Disposable Medical Device for bone milling

2. Disposable Medical Device for skin cutting
FMA (JAPAN) Certification

Disposable Surgical Device
Scientific and Clinical Evidence

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Evidences of viable progenitor cells isolation within the Micro-grafts:

Dermal Tissues, Cardiac Muscle, Bone tissue, Skeletal Muscles 90% VIABILITY

The micro-grafts are rich in terms of autologous factors as BMP-2 and VEGF:
➢ Rigenera is effective in the repair of different damaged tissue as indicated by application in several clinical field.
➢ Rigenera improves the healing of bone lesions as suggested by use of micrografts obtained by periostium in combination with collagen sponge;
➢ Rigenera is effective in the process of wound healing improving the superficialization of wound and reducing wound size;
➢ Rigenera is effective in the management of ulcers promoting the development of granulation tissue.
The device showed clinical efficacy in different etiology wound healing trials.
The device showed clinical efficacy in bone and periodontal regeneration.
Current aesthetical clinical trial status & goals

The device showed clinical efficacy in aesthetical applications
Rigenera protocol in the treatment of surgical wound dehiscence.

Marcarelli M et al
Regenerative Surgery in the Management of the Leg Ulcers

Trovato et al., J Cell Sci Ther 2016, 7:1
Treatment of Oncological Post-surgical Wound Dehiscence with Autologous Skin Micrografts.

Baglioni E et al
An innovative regenerative treatment of scars with dermal micrografts.

Svolacchia F et al.,

Gentile P. et al. JPRAS GO, 2016 Accepted
Reconstruction of alar nasal cartilage defects using a tissue engineering technique based on a combined use of autologous condrocytes micro-grafts mixed with PRP: preliminary clinical and instrumental evaluation.

Facial Cartilage Rigeneration
HBW has 3 different human pipelines:
- Hospital Applications (Wound healing, orthopaedics)
- Dental Applications
- Aesthetic Applications
Future opportunities:
- Veterinary wound-healing and orthopedics
- Human Muscles and Hearth rigeneration
- Cartilage rigeneration
Emergency Trauma Kit

In July 2015 HBW launched RIGENERA Emergency Kit for military and civilian emergencies.

The HBW is part of RAWINTS Project for Rapid Wound Healing, financed by NATO Science for Peace and Security Project.

**WHY:** Rigenera is a simple technology; it can also operate with battery; it does not require special structures; it does not require specific staff skill.
Meet The Executives

HBW s.r.l. HUMAN BRAIN WAVE

Antonio Graziano
DDS, PhD
Chief Executive Officer

Riccardo d’Aquino
DDS, MS
Medical Director

Alberto Sicurella
Chief Industrial Officer

Maurizio Cordara
Marketing and Sales Director
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