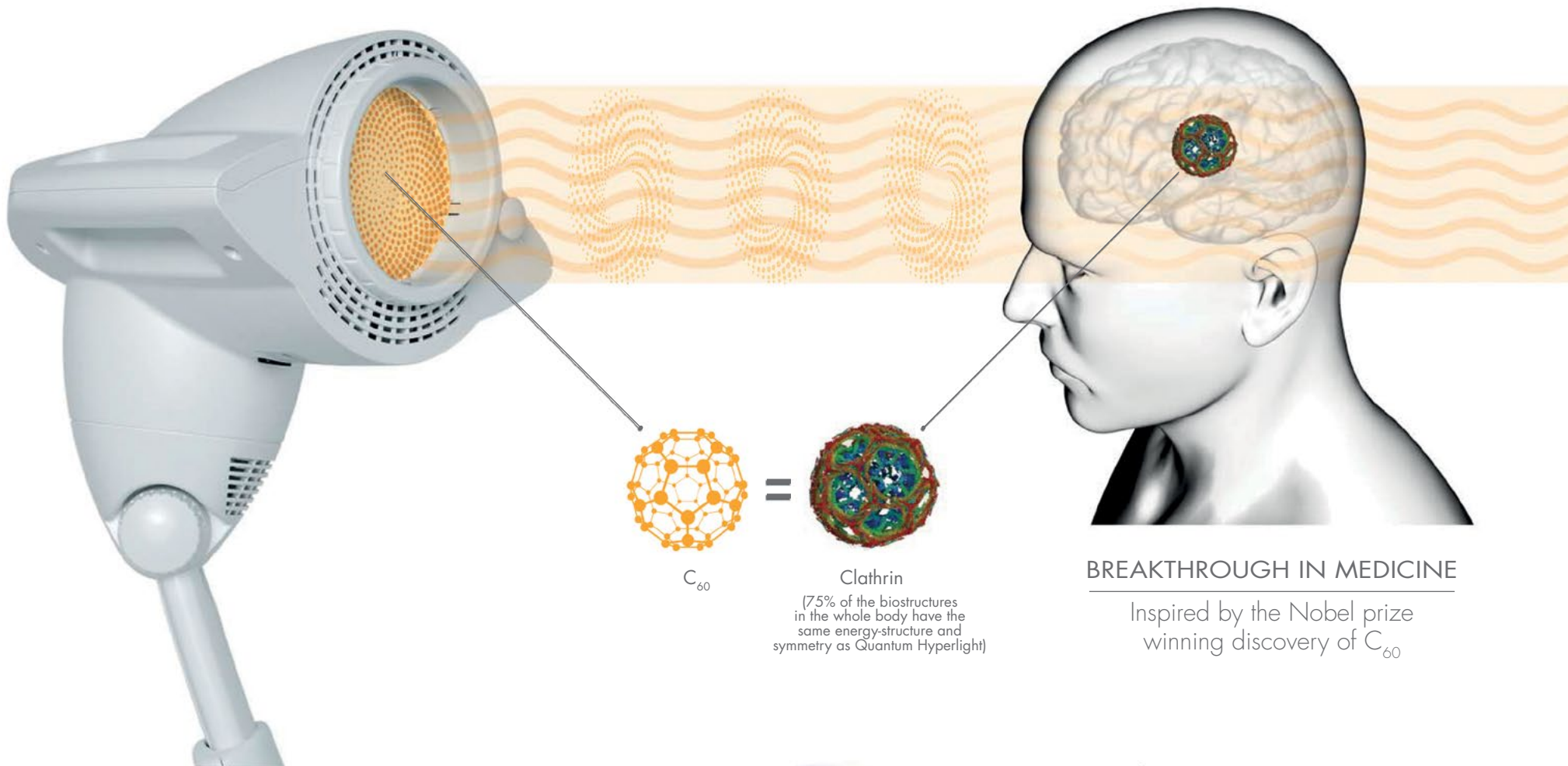


# BIOPTRON® QUANTUM HYPERLIGHT®

(hyperpolarized light)



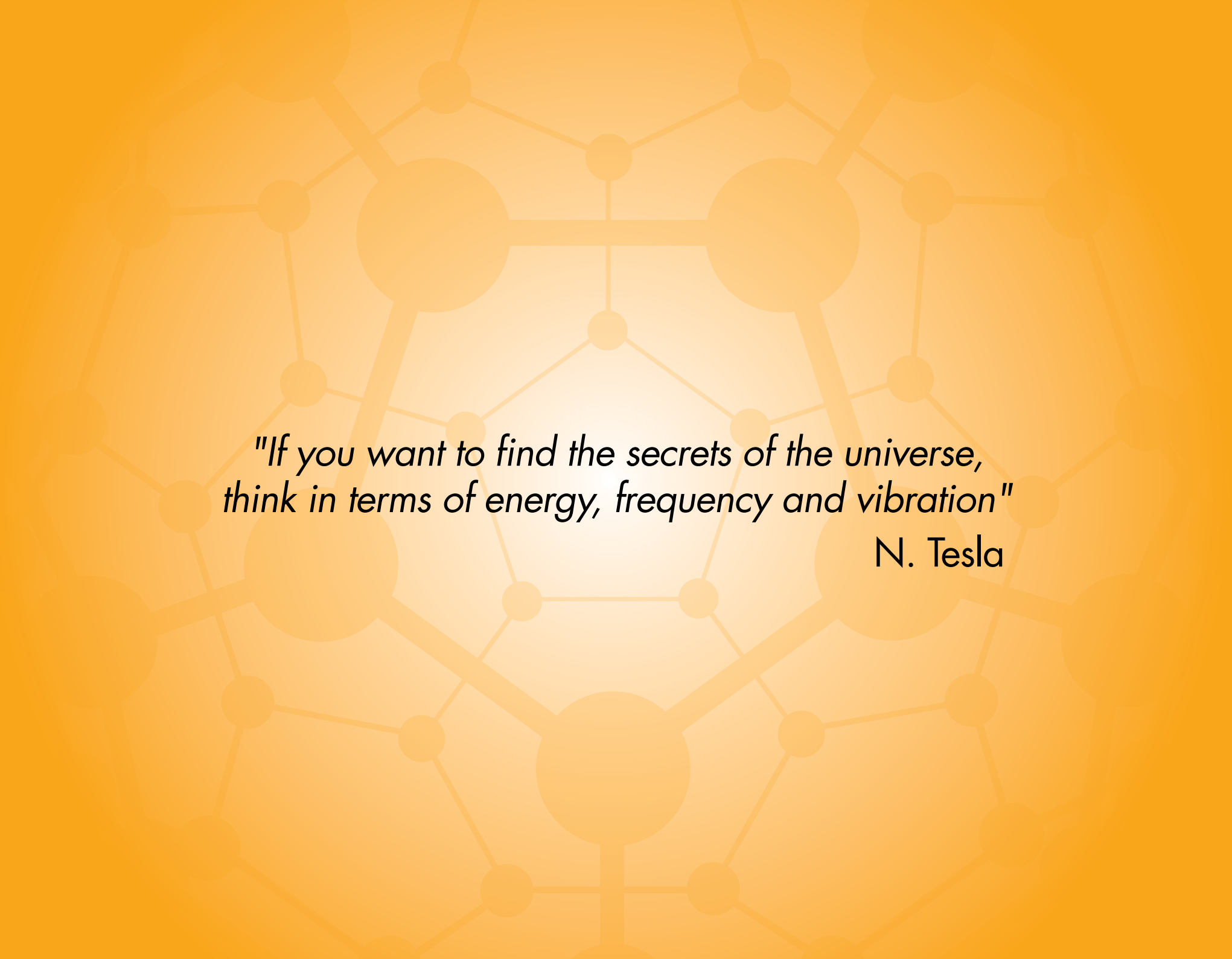
$C_{60}$

Clathrin

(75% of the biostructures  
in the whole body have the  
same energy-structure and  
symmetry as Quantum Hyperlight)

BREAKTHROUGH IN MEDICINE

Inspired by the Nobel prize  
winning discovery of  $C_{60}$



*"If you want to find the secrets of the universe,  
think in terms of energy, frequency and vibration"*

N. Tesla

## CONTENTS:

BIOPTRON® Quantum Hyperlight as Quantum Medicine.....	1
International Awards and Gold Medals for the Invention of Hyperpolarized Light and Nano-Photonic Glasses.....	6
BIOPTRON® Quantum Hyperlight - a Quantum Medicine for a Quantum Body.....	7
Structured Hyperlight Restores Self-Similar Structured Body-Matter.....	8
BIOPTRON® Technology Inspired by the Nobel Prize Winning Discovery of C <sub>60</sub> .....	12
Molecule C <sub>60</sub> .....	14
The Emoto Hyperlight Experiment in Japan.....	15
BIOPTRON® Quantum Hyperlight Exposure: Live Blood Cell Analysis.....	18
Technical and Medical BIOPTRON® Quantum Hyperlight Features.....	19
Fibonacci Sequence.....	24
Distinction in Light Penetration and the Healing Effects of Different Kinds of Light.....	25
BIOPTRON® Quantum Hyperlight is Recognized as a Unique Method of Treatment for Different Medical Indications.....	27
The Main Therapeutic Effects of BIOPTRON® Quantum Hyperlight.....	29
Wound Healing.....	31
Pain Relief.....	33
Dermatology/Skin Diseases.....	34
Aesthetics & Anti-Aging.....	35
Dentistry - Adjuvant Oral Treatment.....	37
Seasonal Affective Disorder (SAD).....	38
Pediatrics.....	40
Veterinary Medicine.....	41
Technical Information - Advanced Swiss Technology and Design - 3 BIOPTRON® Devices.....	42
References.....	44

# BIOPTRON® QUANTUM HYPERLIGHT AS QUANTUM MEDICINE

Natural prevention and natural healing without side effects!  
Prolonging the life-span and improving the good quality of life!

## EVERY YEAR, MILLIONS OF PEOPLE WORLDWIDE SUFFER FROM INJURIES AND ILLNESSES IN EUROPE ALONE:

- 60 million people suffer from injuries
- 1 in 5 adults suffer from chronic pain
- 100 million people suffer from muscle and joint pain
- 100 million people in Europe are affected by arthritis/rheumatism
- 67 million people suffer from lower or upper back pain
- 4 million people suffer from wounds
- 12 million people in Northern Europe suffer from SAD (seasonal affective disorder)



## EVERYDAY LIFE CAN TAKE A TOLL ON OUR BODY DUE TO:

- Accidents and falls
- Fractures and breaks
- Strains and sprains
- Minor cuts or injuries
- Burns and scalds
- Bruises and hematomas

All these painful and life-threatening conditions have to be medically treated. Every year, worldwide 600 billion US dollars are spent on pharmaceuticals (chemical drugs). Despite the efficacy, the risk of serious side effects and the costs involved treatment with medicaments is both dangerous and expensive. It makes no sense.



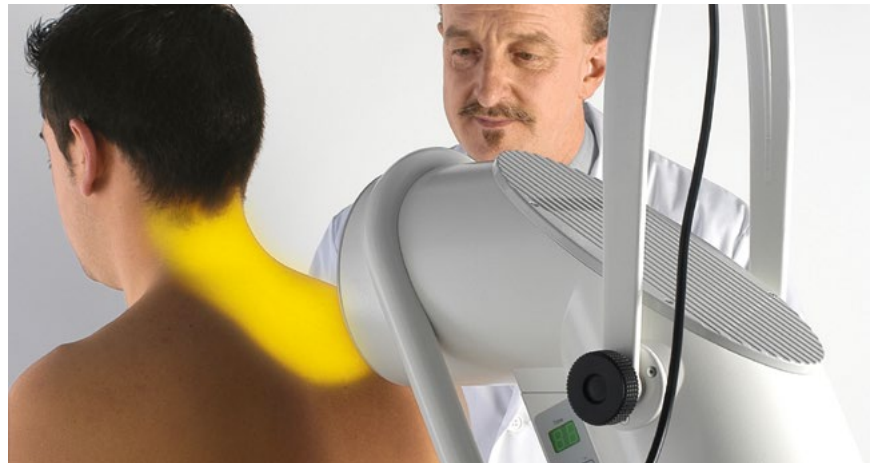
## Chemical Drugs - Common Side Effects

<p><b>NSAIDS</b></p> <ul style="list-style-type: none"> <li>• Liver damage</li> <li>• Allergic reactions</li> <li>• Clotting disorders</li> <li>• Potential influence on brain development during pregnancy and infancy</li> <li>• Addiction</li> <li>• Stomach ulcers</li> </ul>	<p><b>Opioids</b></p> <ul style="list-style-type: none"> <li>• Addiction</li> <li>• Stomach ulcers</li> <li>• Clotting disorders</li> <li>• Liver problems</li> <li>• Kidney problems</li> <li>• Changes in bowel habits</li> </ul>	<p><b>Hypertensive Drugs</b></p> <ul style="list-style-type: none"> <li>• Dizziness</li> <li>• Skin rashes</li> <li>• Changes in taste perception</li> <li>• Swelling of the face</li> <li>• Muscle weakness</li> <li>• Changes in bowel habits</li> </ul>
---	---	--

The challenge is to provide **a medical treatment WITH EXCELLENT RESULTS and WITHOUT SIDE EFFECTS** that is at the same time **economical!**

BIOPTRON® Light Therapy System is the solution. **Clinically tested and certified as a medical device, for successful treatment of various health issues.** A user-friendly, painless, safe, effective and economical treatment!

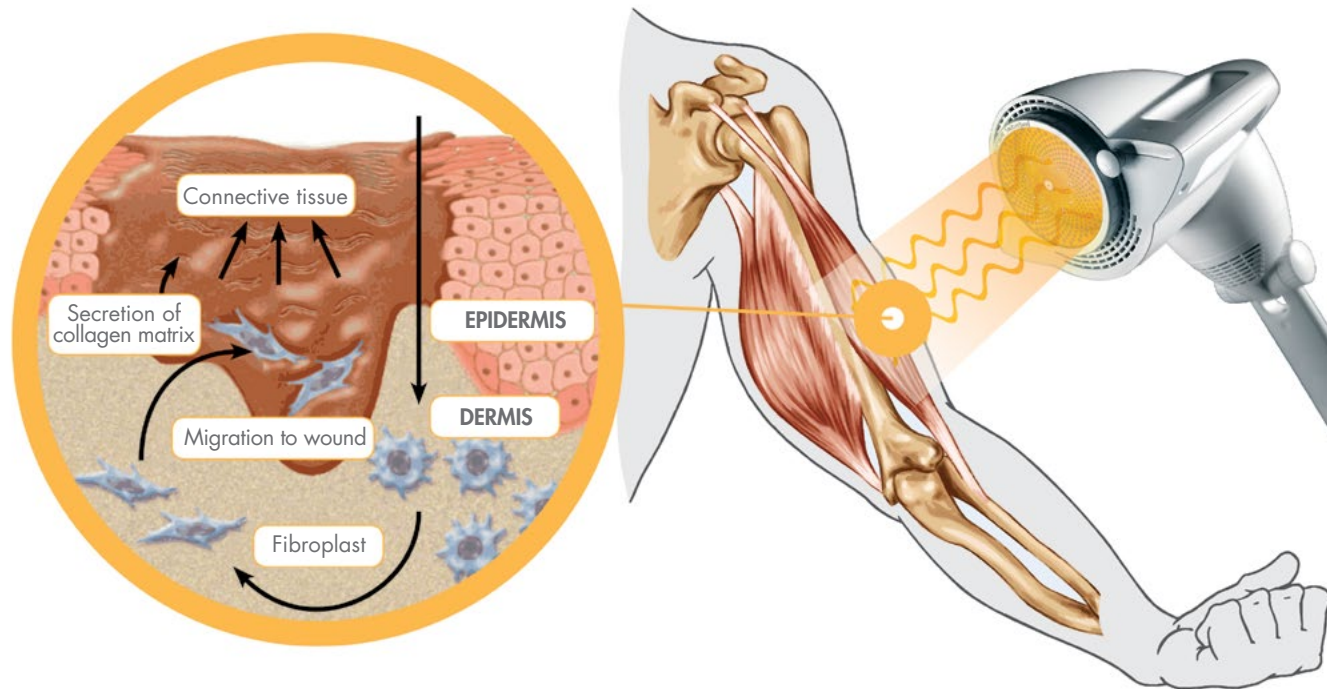
BIOPTRON® Quantum Hyperlight restores and heals the body with **positive local and systemic effects, thus healing the whole body system at the QUANTUM LEVEL! NO SIDE EFFECTS!**



BIOPTRON® Quantum Hyperlight has been accepted as a unique form of treatment, **DISEASE PREVENTION, THERAPY and RECOVERY for various medical indications and health issues:**

- Wound healing
- Pain relief
- Skin diseases - dermatological disorders
- Mental disorders, depression and seasonal affective disorders (SAD)
- Pediatrics
- Dentistry
- Anti-ageing
- Veterinary care





All over the world, in reputable hospitals and institutions, wellness and sports centers, health professionals are using BIOPTRON® Quantum Hyperlight and are reporting the following significant improvements while treating patients who suffer from various medical conditions:

- Faster and painless healing of (chronic) wounds
- Dilatation of blood vessels and improved local blood circulation, thus improving healing processes
- Increased delivery of oxygen and nutrients and reduced edema in affected areas
- Improved regeneration
- Decreased pain and improved recovery from trauma and injuries
- Significant pain reduction in arthritis and neuropathy
- Gibbs free energy regulation.

By way of introduction, **BIOPTRON AG** was founded in 1988 in Switzerland. In 1996, the company became a part of the Zepter Group. BIOPTRON® has since become a brand that stands for **innovative medical healthcare products**, unrivalled in both **prevention and recovery for a number of medical conditions**.

BIOPTRON® QUANTUM HYPERLIGHT already helped millions of people to improve their body's ability to **repair itself and maintain optimal health**. It speeds up the healing process, restores impaired body functions and one's metabolic balance, **increases resistance to external stressors and increases immunity by accelerating the body's natural healing processes for both acute and chronic conditions**.



BIOPTRON® headquarters and production facilities in Switzerland



Certificates: BIOPTRON® is in full compliance with high quality standards and medical device requirements in accordance with the EU Medical Devices Directive, 93/42/EEC. It is also approved by the FDA (510 (k) clearance for pain, No.: K032216) for the US market and is registered as a medical device in Australia (TGA certificate) and Canada (Health Canada certificate).



# INTERNATIONAL AWARDS AND GOLD MEDALS FOR THE INVENTION OF BIOPTRON® QUANTUM HYPERLIGHT (HYPERPOLARIZED LIGHT) AND BIOPTRON HYPERLIGHT OPTICS



Gold Medal,  
China Association  
of Inventions,  
Foshan, 2018



Gold Medal,  
Invent Arena,  
Trinec, 2018



Gold Medal,  
International Federation  
of Inventors' Association,  
Geneva, 2018



Gold Plaque and  
Gold Medal,  
Inventions  
Belgrade, 2018



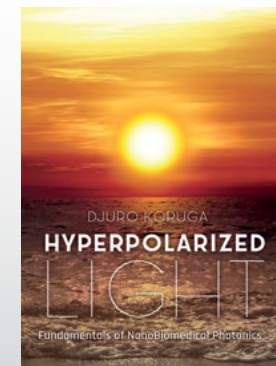
WIPO Medal  
for inventors,  
Belgrade, 2018



Prof. in Nanotechnology  
Dr. Djuro Koruga

Recipient of several prestigious awards from  
the International Federation of Inventors' Association.

Author of the book  
"Hyperpolarized light".



## BIOPTRON® QUANTUM HYPERLIGHT FOR A QUANTUM BODY

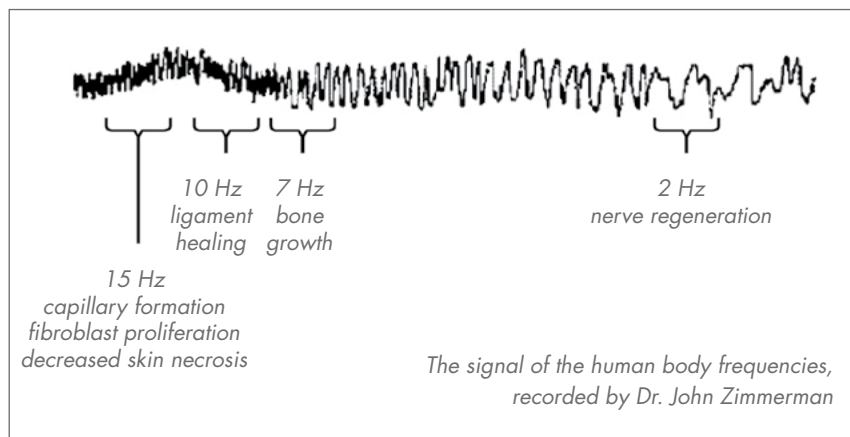


BIOPTRON AG works at the highest scientific level, taking reference and developments from physics, chemistry, quantum mechanics and medical science. The company develops and produces **clinically tested and certified high-tech medical devices** that generate Hyperpolarized Light and/or Quantum Hyperlight that **acts at the quantum level, restoring the whole body system.**

In 1989 in Brussels, on the Chair of Experimental Medicine, the **quantum medicine** (resonance therapy) was proclaimed as the **medicine of the third millennium**, when a team of quantum physicists presented a radically new approach to comprehending live systems.

The word **quantum** is derived from the Latin word *quanta*, which denotes the **smallest amount of energy information influencing body molecules and atoms responsible for healthy elementary processes.**

The main principle of quantum physics indicates that absolutely everything that exists has a certain frequency. So, every **healthy cell in the body must have its own ideal frequency.** Due to different stress factors, the body frequencies change, which radically disrupts the biophoton communication (electromagnetic radiation); in the long run, it results in illnesses. Quantum medicine observes an illness as “disrupted frequencies in energy body”. Instead of suppressing the symptoms in physical body with synthetic drugs (migraine, PMS, etc.), **Quantum Hyperlight with its quantum energetic properties restores the energy and frequency in stagnation in the disturbed areas** (biophotons communication, energy centers, cells and the vital organs).



## STRUCTURED HYPERLIGHT RESTORES SELF-SIMILAR STRUCTURED BODY-MATTER

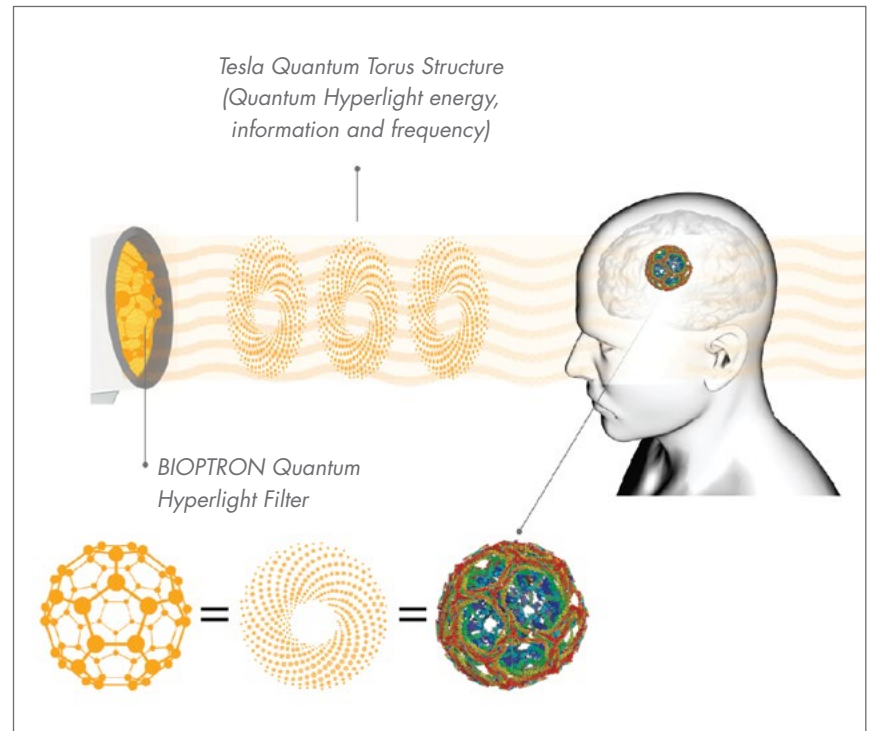
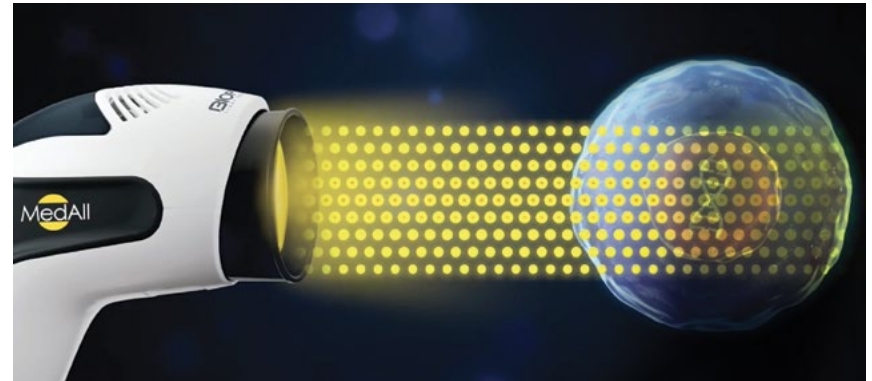
Due to a number of diseases or even the body's natural ageing process, the natural healthy state in biological structures becomes unordered, causing continued illnesses and accelerated ageing.

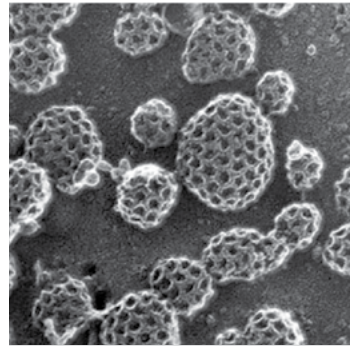
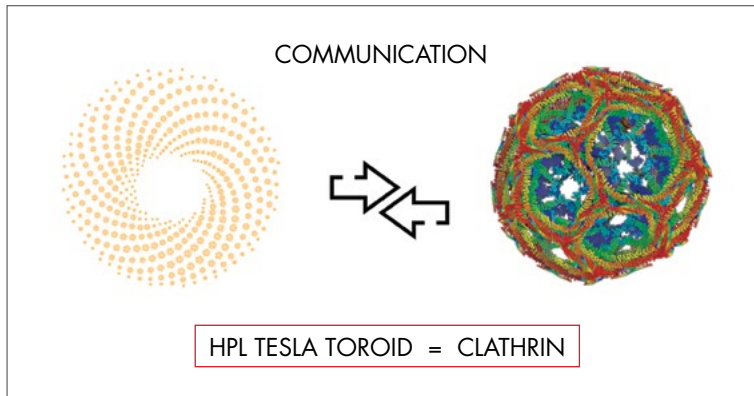
**Quantum Hyperlight (structured light) maintains and restores the disturbed biological structures (structured matter),** bringing them into a natural healthy state through the resonance principles of biomimicry, where pattern seeks identical pattern. According to the resonance principles, if two entities (as Quantum Hyperlight and biostructures) possess the same type of symmetry, Quantum Hyperlight as constantly perfect structure will prevail and impose its energetic properties on the disturbed entity - biostructures, **bringing it into homeostasis (natural healthy state).**

The serendipitous discovery of **Fullerene C<sub>60</sub>**, which resulted in the **1996 Nobel Prize** in chemistry, triggered a new field of research, introducing the world to a new kind of symmetric quantum nanomaterials, thus opening an entirely new chapter of nanotechnology and nanomedicine: these studies led scientists and engineers to think of the multiple applications that the **C<sub>60</sub>** could contribute, e.g. **new medical treatments even to prolong life.**

In 2017, inspired by the properties of the Nobel Prize winning discovery of fullerene molecule and understanding the biology of life, **our scientists have developed and patented the unique Biopton Hyperlight Optics®**, act as nanophotonic generators that transform Linearly Polarized Light (VLPL) into **Hyperpolarized Light with quantum properties.**

BIOPTRON® Quantum Hyperlight provides: 1. information, 2. energy and 3. vibrations deep into the body, biostructures and organs, **bringing the whole body system into homeostasis (internal natural stability).**



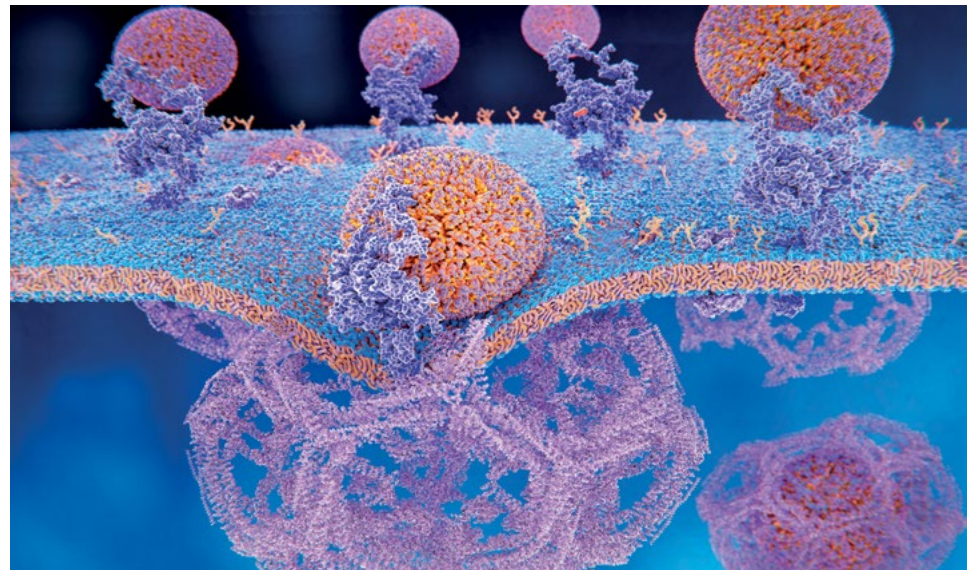


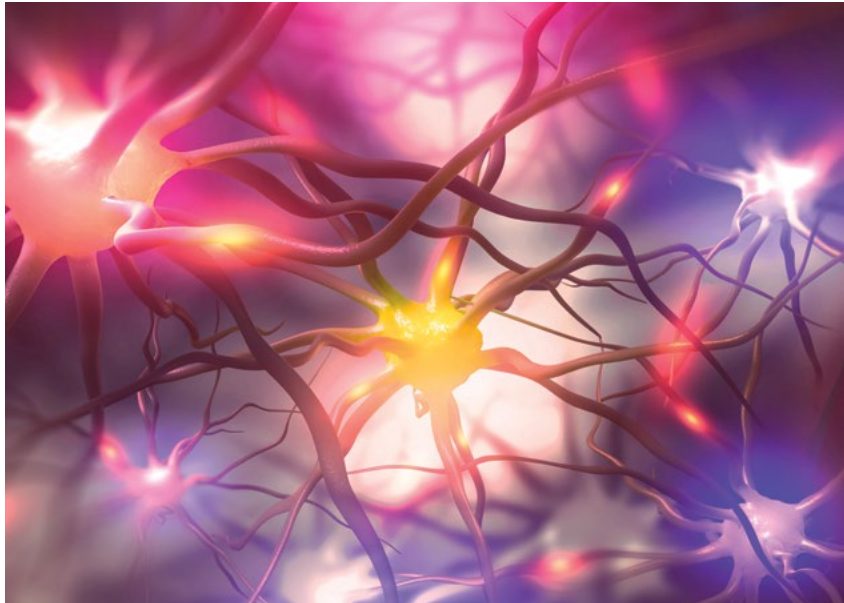
A microscopic view of a clathrin

85% of the human body has the same ideal type of symmetry as HLPL: biomolecules, water-chains, clusters, clathrin, microtubules, collagen, centrioles, targets, flagella and processes based on Gibbs free energy/negative ions, water 65%, proteins 15% and lipids 5%.

Due to its Tesla Quantum toroidal properties, based on **Fibonacci Sequence**, this light emission penetrates deep through the tissue, reaching the very important protein – clathrin, and harmonizing it. Clathrin recognizes a self-similar Quantum Hyperlight symmetry pattern and through the energy resonance principles **conveys the proper necessary energy information, at the quantum level, into the cell**. The endocytic pathways are thereby **ideally energized directly with Quantum Hyperlight as the source of proper energy** (even without “classic” food as the main energy-mediator)!

*Clathrin is the main protein responsible for the two crucial processes: endocytosis and exocytosis. Endocytosis is the process where clathrin transmits the necessary energy (metabolites, hormones, other proteins, etc.) into the cells for their optimal intracellular communication and functioning. Exocytosis is the process where the cell debris is eliminated by the tissue inflammation.*





*“If all the information required to control the body’s biochemical processes is in the light that the body emits, and if disturbances in that light disrupt biochemical processes and cause disease, then it must be possible to **“examine” the light and remove the disease.**” - Dr Fritz Albert Popp.*

Everything is built and maintained by **light as the main source of energy**, information and frequency.

**The thought processes of the human brain are also fed from light as the main energy source.** An improper "light diet" (not enough light) causes malillumination, which implies serious illnesses: light is the basic nutrient of all life.



**Light is a fundamental part of our being:** through evolution, we have become light bodies, living photoreceptors, **we consume light** (through food and photosynthesis processes), **our thoughts consist of light**; the nervous system, as well as our DNA, produce light: every cell in our body emits more than 100,000 light photon impulses per second, called biophotons, responsible for maintaining good health. This light emission is responsible for information and energy exchange and for the proper communication between adjacent cells, which is a crucial steering mechanism behind all biochemical reactions (Ref.: 16.1-16.5).

Biolight is made up of biophotons (from the Greek word “βίος” meaning “life” and “φως” meaning “light”). Biophotons must be distinguished from the more commonly discussed physical photons. **Biophotons are defined as the electromagnetic radiation of biomolecules.** Dr. Popp, F.A. demonstrated that cells emit either a structured healthy light responsible for good health, or a chaotic light which indicates disease. The explanation here is simple: if biophotons manage the body’s biochemical processes in a chaotic manner, the symmetry will be disrupted.

**The healthy human body possesses the highest level of harmony.** Sick individuals with weak immune systems have a poor and chaotic level of harmony, disturbed coherence and disturbed biophoton cellular communication.

Once the cellular metabolism is compromised, the cell becomes isolated from the regulated process of natural growth control. **BIOPTRON® Quantum Hyperlight** - as structured light could **establish the natural healthy state in the biophoton cellular communication.** (Influence of light on biophotons, Dr. Johan Boswinkel, Institute for Applied Biophoton Science IABS).



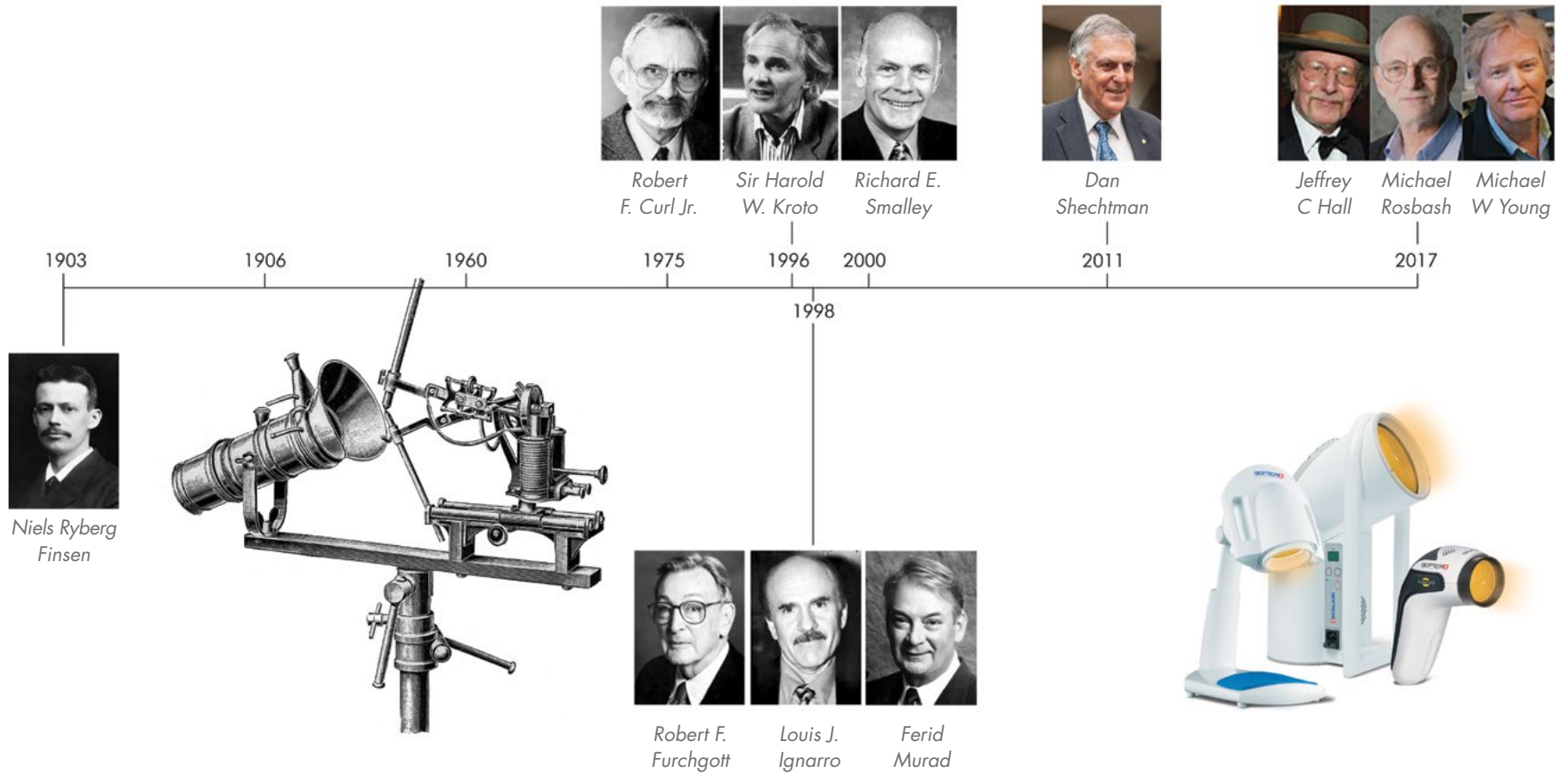
BIOPTRON® Quantum Hyperlight is identically hexagonally energy-structured as biophotons.

QUANTUM HYPERLIGHT (perfectly ordered photon stream) = BIOPHOTONS (perfectly ordered electromagnetic radiation of biomolecules).

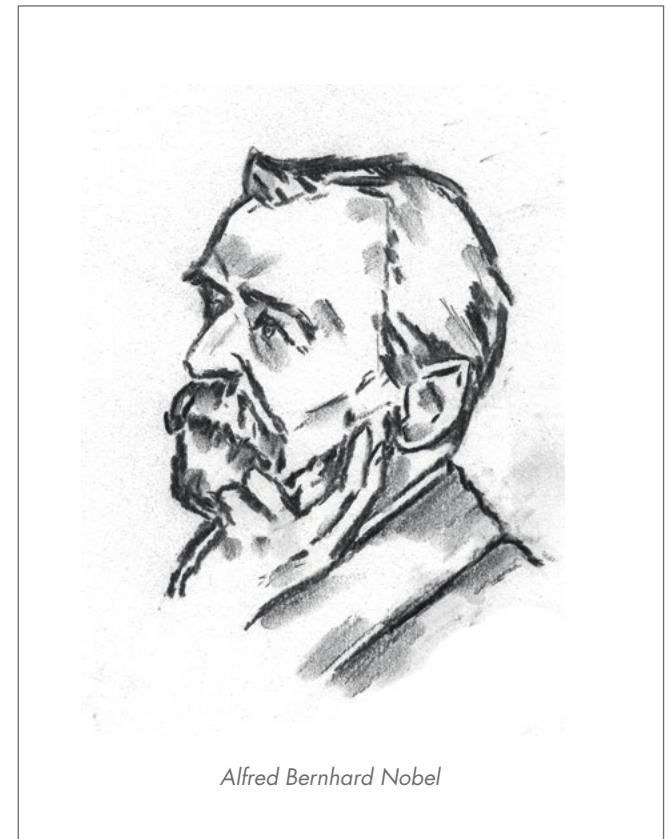
When Quantum Hyperlight is applied, “the pattern seeks the identical pattern” and a resonant energy interaction occurs: the biological structures are supplied with additional electrons (energy) and information, which is transmitted through the hydrogen water-bond chain.

**A perfect match between BIOPTRON® Quantum Hyperlight and biophotons is achieved through the identical symmetry at the quantum level.** By symmetry, BIOPTRON® Quantum Hyperlight maintains and restores structured biophotons and reestablishes their communication.

# BIOPTRON® TECHNOLOGY INSPIRED BY THE NOBEL PRIZE WINNING DISCOVERY OF C<sub>60</sub>



- The Nobel Prize in physiology or medicine in 1903 was awarded to **Dr. Niels Ryberg Finsen**. He demonstrated the **efficacy of ordered light for medical treatment of various diseases**, such as Lupus Vulgaris, also known as tuberculosis of the skin (cutaneous tuberculosis). He is therefore considered the founder of modern light therapy.
- The Nobel Prize in chemistry was awarded in 1996 to Sir Harold W. Kroto, Robert F. Curl and Richard E. Smalley **for discovering C<sub>60</sub>** as a Fibonacci structure – icosahedral entity. These three researchers together with a British-American team from the Rice University in the U.S. managed to obtain the nano-molecule fullerene C<sub>60</sub> during experiments with graphite. Based on the discovery of C<sub>60</sub>, **BIOPTRON® scientists invented the C<sub>60</sub> Biopton Hyperlight Optics®** which acts as a nanophotonic generator of Quantum Hyperlight. The influence of **BIOPTRON® Quantum Hyperlight on matter (biostructures) is at its most efficient. This is the quantum phenomenon whereby the information is able to modify the matter, bringing the whole body into homeostasis.**
- The Nobel Prize in physiology or medicine in 1998 was awarded to Robert F. Furchgott, Louis J. Ignarro and Ferid Murad “for their discoveries of nitric oxide as a signaling molecule in the cardiovascular system”. (The **near infrared part of the BIOPTRON® Quantum Hyperlight spectrum** stimulates the local production of nitric oxide, which **improves vasodilatation in blood vessels, playing an important role in the protection of cardiovascular diseases**).
- The Nobel Prize in chemistry in 2011 was awarded to Dan Shechtman for discovering a periodic icosahedral phase transition process and structures (quasicrystals) by Fibonacci’s Law (quasicrystals are also known as **Fibonacci crystals**, since they naturally arrange according to the Golden Ratio, **the same spatial arrangement present in photons of Hyperpolarized Light**).
- The Nobel Prize in physiology in 2017 was awarded to Jeffrey C. Hall, Michael Rosbash and Michael W. Young for their discoveries of molecular mechanisms that control the circadian rhythm. **BIOPTRON® Quantum Hyperlight is medically certified for Seasonal Affective Disorder (SAD), as it regulates the circadian rhythm** (see section for SAD, page No.: 38).



*Alfred Bernhard Nobel*



## MOLECULE C<sub>60</sub> - Bucky ball

C<sub>60</sub> belongs to the fullerene family (C<sub>60</sub>, C<sub>70</sub>, C<sub>76</sub>, C<sub>82</sub> and C<sub>84</sub> molecules).  
It is one of the eight **allotropic forms of carbon** in nature (the well-known forms are graphite and diamond).

Carbon, along with hydrogen, oxygen, nitrogen, phosphorus and sulfur is the basis of biological life and a building block of genes, proteins, lipids and other important biomolecules.



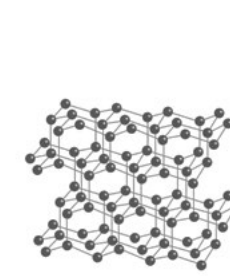
In a natural state it is so rare that it may be found in the most hidden places and only in trace amounts. It was found in a meteorite in Canada and it has been established that it was older than the solar system.



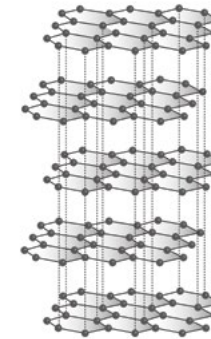
It is believed that it came from cosmic realms from red giant stars, where it was synthesized and ejected into space.



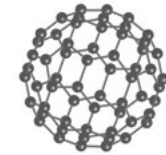
On earth, C<sub>60</sub> can be found in trace amounts in a burning candle, as activated carbon, and in Russia in a mineral called shungite.



diamond face-centered cubic crystal



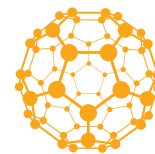
graphite hexagonal crystal layer distance: 335 pm



fullerene diameter of C<sub>60</sub>: 700 pm

C<sub>60</sub> is a molecule composed of 60 carbon atoms arranged in a geometric shape called a truncated icosahedron with the Fibonacci structure. It is the only molecule of a single element to form a spherical cage: C<sub>60</sub> has 12 regular pentagonal and 20 regular hexagonal faces. No two pentagons share an edge, which could destabilize the structure.

The C<sub>60</sub> colour is originally black in nature. The patented technology process of fullerene application changes it into the unique BIOPTRON® Quantum Hyperlight colour.



**Quantum Medicine  
for a quantum body**



C<sub>60</sub> and its healing properties date back to the 18th century.

In the early 1700's, Tzar Peter the Great had a palace in Karelia, near a magic spa center named "Martial Waters". The water at the Martial spa went through the thick layers of shungite (C<sub>60</sub>) **in order to cure weak stomach, vomiting, diarrhea, hypochondria, kidney problems, different skin conditions and many other ailments.**

Peter the Great instigated its use in providing for a purified structured drinking water for the Russian army and required every soldier to carry a piece of this energy-potent stone in his backpack. Many believed that the reason the **Russians prevailed in the battle of Poltava was due to shungite C<sub>60</sub> that they carried with them.**



## THE EMOTO EXPERIMENT REVEALED THAT QUANTUM HYPERLIGHT RESTORES WATER STRUCTURES TO THEIR HEXAGONAL SHAPE, LIKE THE SHAPE OF HEALTHY BODY-WATER



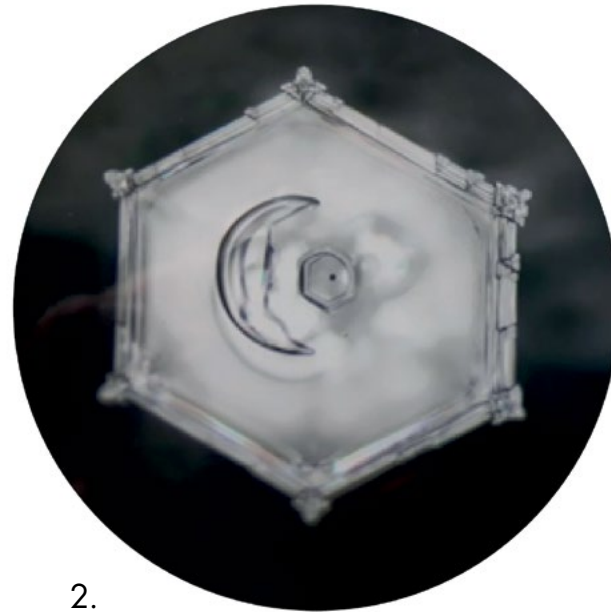
Since 1994, the **Emoto Institute** has been providing evidence that different emitted energy, information and frequencies (music, sound or light) change the water structure by assembling various coherent or non-coherent water crystals. Under the influence of diverse contents (energy, information and frequency) from transmission sources (like BIOPTRON® Quantum Hyperlight), the treated tap **water (as matter) is modified** into the new pattern that is equal to the Quantum Hyperlight pattern - **carrying the same energy structure as its informational Quantum Hyperlight source.** This is the quantum phenomenon whereby the **information is able to modify the matter**, which is confirmed in the Masaru Emoto experiment. When tap water is exposed to BIOPTRON® Quantum Hyperlight, it affects the water structure, modifying it into the same **hexagonal water shape** (like Quantum Hyperlight) that represents the ultimate state of 'molecular coherence'. Analogously to this, Hyperpolarized Light has the same **harmonizing effect on water in the human body.** Since the human body consists of +/- 70 percent of body water, **Quantum Hyperlight could ideally restore and maintain the body water structure to its optimal hexagonal energetic state of coherence, enhancing the healing processes, that leads to homeostasis.**

## Emoto's Quantum Hyperlight Experiment



1.

1. Tap-water crystal (molecule) is irregular, incoherent – unstructured, representing 'molecular incoherence', meaning that it is not symmetric to the body water.



2.

2. Emoto's experiment reveals that when tap-water is exposed to BIOPTRON® Quantum Hyperlight, it affects the water structure, modifying it into a hexagonal water shape crystal that represents the ultimate state of 'molecular coherence'.

### An Observation Report

**Method:** 10 minutes of HLPL exposure at a distance of 8 cm

**The number of observed ice drops:** 50

**Observation apparatus:** Olympus optical microscope (magnification: x 200)

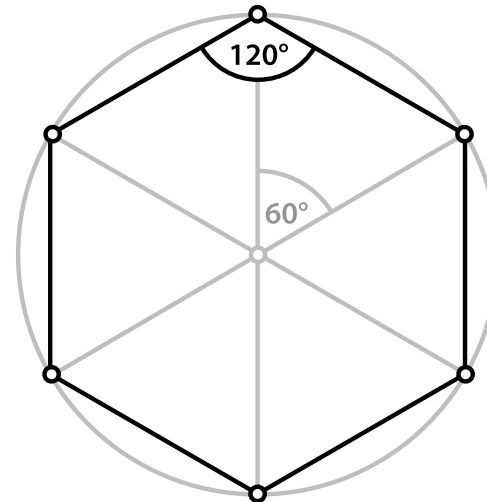
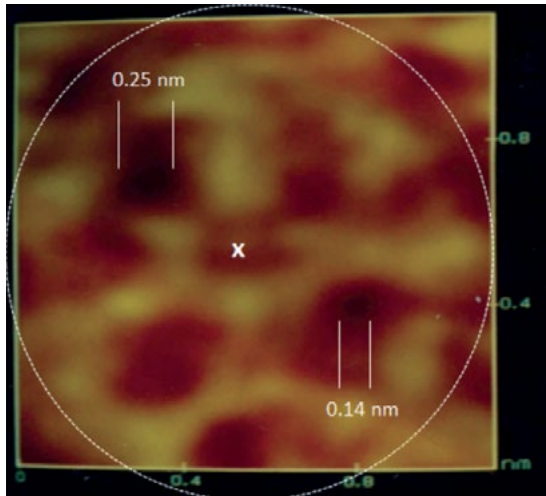
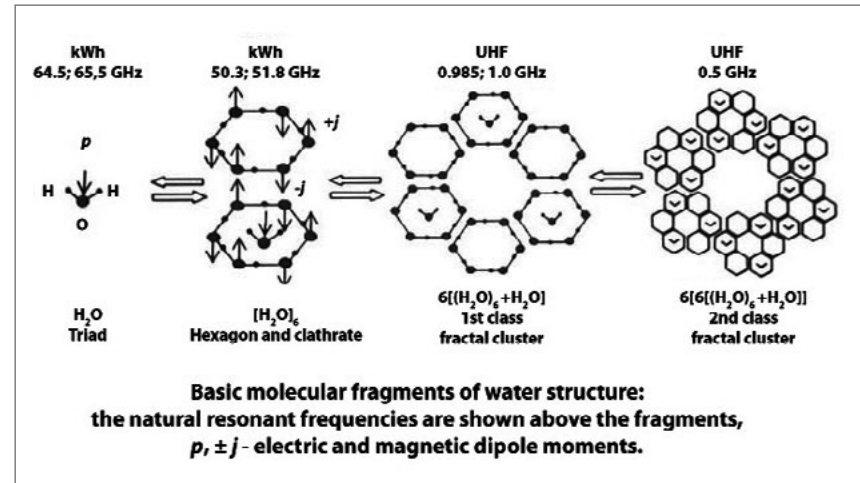
**Photographing conditions:** freezing temperature: - 25 degrees, freezing time: 4 hours, observation temperature: - 3 degrees

**Place & date:** Emoto Institute, Japan, March 2018

Graphic represents the healthy body water as structured. Dr. Brill G.E., Saratov – State Medical University, Russia.

Scientific evidence assumes that the hexagonal body water structure is preferred by all biological organisms.

Structured water is involved in the healthy functioning of the DNA, enzyme reactions and numerous metabolic functions. (Ref.: Dr. Mu Shik Jhon, Dr. G. Pollack, Dr. Yang Oh and Gil Ho Kim). Therefore, **Quantum Hyperlight as perfectly harmonized energy-structured light could arrange body water into a healthy structured state of coherence.**



A photograph of fullerene C<sub>60</sub>, taken by Professor Dr. Djuro Koruga and his team of researchers with a scanning tunneling microscope (STM) at the Nano Laboratory of the University of Belgrade (1992). This photograph confirms quantum mechanical equations governing the hexagonal "openings" of the C<sub>60</sub> molecule.

## BIOPTRON® QUANTUM HYPERLIGHT EXPOSURE: LIVE BLOOD CELL ANALYSIS

Live blood cell analysis (dark-field microscopy) after 10 minutes of BIOPTRON® Quantum Hyperlight exposure

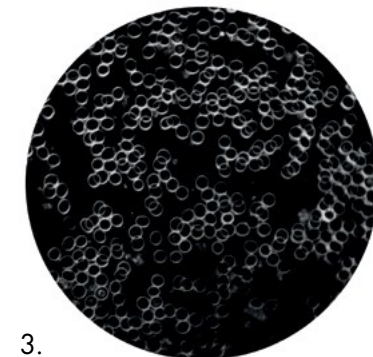
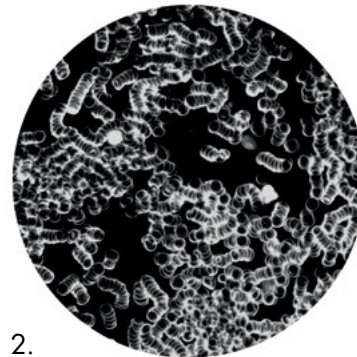
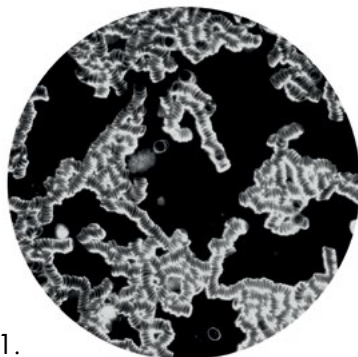
### Comparison and evaluation

(Picture 1) Red blood cells are clotted, unordered and inactive (clustered structures), which could reveal or lead to cardiovascular diseases, inflammations and oxygen deficiency at the tissue level (hypoxia).

(Picture 2) After only 10 minutes of LPL exposure, the previous blood formation (clotted, unordered and inactive blood cells), converts (from clustered structures) into separated groups or isolated red-blood cells with significantly improved blood cell condition: better blood flow and increased oxygenation - better regeneration.

(Picture 3) After 10 minutes of Quantum Hyperlight (Hyperpolarized Light) exposure, previous clustered structures change into entirely separated blood cells which embody the entire blood revitalization: from the unhealthy state, microtubules are modified into a torus shape, obtaining the same energy structure as Quantum Hyperlight, the initial natural healthy state, according to the Golden Ratio (see page No. 24). Empowered with such inconceivable light energy (energy, information and frequency), cells move faster (remarkable anti-coagulating effect). **The red cells revive from inactivity into healthy live active cells, proving that HPL has quantum properties – it heals at the quantum level.** The energized blood flows unrestrictedly through the veins, effortlessly conveying oxygen into the vital organs, improving the processes of nutrient transport into the cells, facilitating removal of debris and possibly preventing hypertension, thrombosis (hazardous blood coagulation), stroke, heart attack, inflammation, etc.

**BIOPTRON® Quantum Hyperlight can rejuvenate unhealthy cells and recreate vigorous, healthy blood cells (an ideal healthy cell condition and cell formation), all of which are critical to maintain a healthy body.**



# GENERAL BIOPTRON® HYPERLIGHT FEATURES

1. Brewster's optical unit
2. BIOPTRON® Filters/Optics
3. Low energy light
4. Incoherent light
5. Vertically Linearly Polarized Light
6. Hyperpolarized light

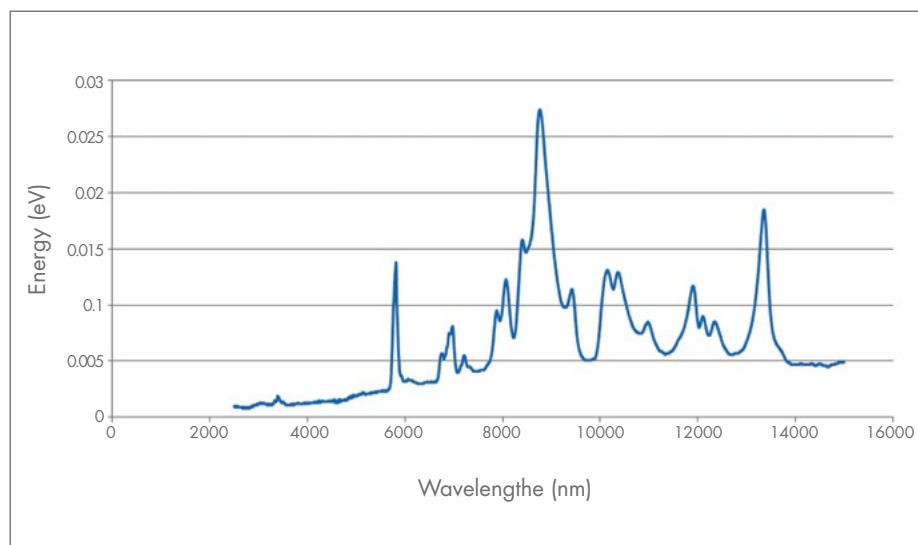
## 1. BREWSTER'S OPTICAL UNIT

The high-quality Brewster's optical unit is positioned at a specific angle in the BIOPTRON® device. When the diffuse unordered light from the light source collides-interacts with the Brewster's optical unit, it reflects with minimal intensity loss and becomes a perfectly Vertically Linearly Polarized Light (VLPL).

## 2. BIOPTRON® Medical Filters (filters designed for specific medical conditions)

BIOPTRON® can be equipped with four filters/optics, designed for specific medical conditions.

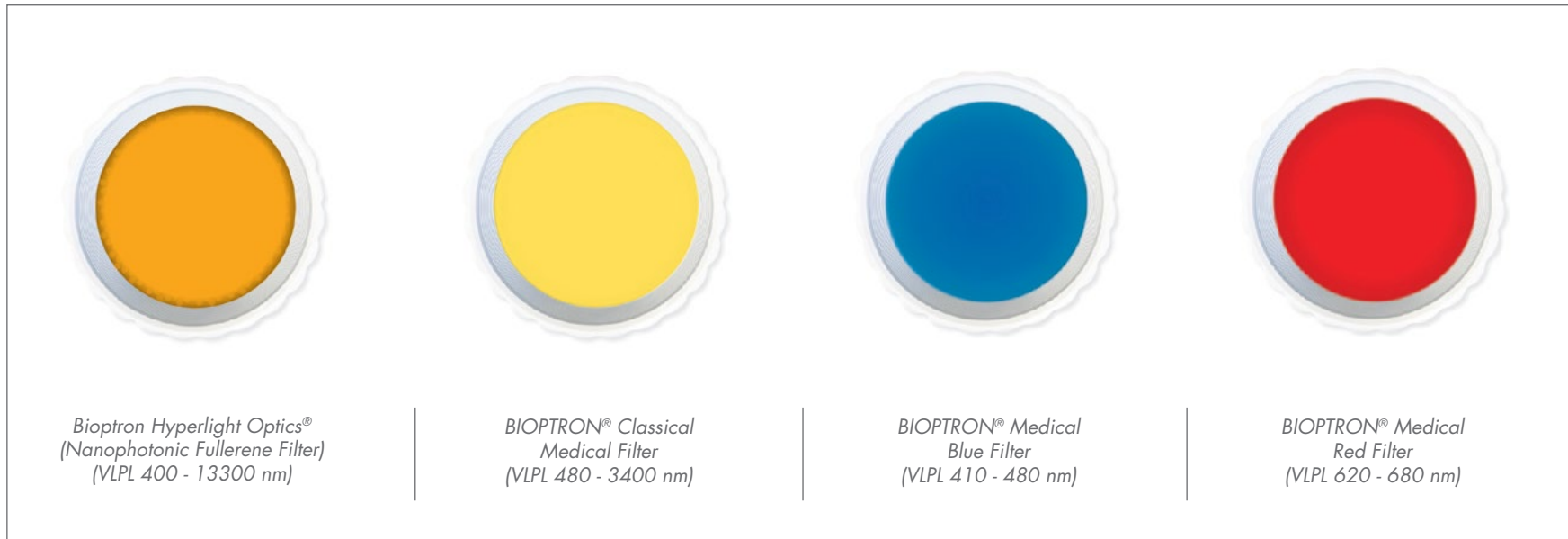
**2.1. Biopton Hyperlight Optics® (Nanophotonic Fullerene Filter) -** It generates Hyperpolarized light from 400 nm and 10% energy, slowly increases up to 459 nm and 40% energy, further raising up to 480 nm and increasing its energy to 80%, thus reaching the maximum of +/- 550 nm; it has rotation/vibration energy of nanophotonic material with 16 peaks in the range of 3000 nm to 15000 nm. There are three characteristic peaks: 5811 nm (0.0133 eV), 8732 nm (0.0268 eV) and 13300 nm (0.0181 eV) which have significant influence on the quantum state of biological structures (conformational state of biomolecules).



2.2. **BIOPTRON® Classical Medical Filter** (480 nm to 3400 nm, that is 1.15 - 2.90 eV — with a pronounced peak at 720 nm, 1.70 eV). The VLPL penetrates deep into the tissue, activating various cellular and biological processes that **accelerate regenerative and reparative healing processes, maintaining and restoring cells, tissues and organs to their healthy state (30 years of excellent medical results)**.

2.3. **BIOPTRON® Medical Blue Filter** (410 - 480 nm) - Vertically Linearly Polarized BLUE Light is used in **dentistry** (to **fight against bacteria/** periodontitis) and in cosmetic branches of aesthetic medicine (to **treat acne vulgaris** or rosacea).

2.4. **BIOPTRON® Medical Red Filter** (620 - 680 nm) - Vertically Linearly Polarized RED Light penetrates deep into the body, greatly reducing pain. Exposure to such light activates the analgesic systems of the brain. Sensitivity to pain and painful edema decrease, while microcirculation improves. **It treats muscle pain and rheumatoid arthritis and it is effective for use in physiotherapy.**



In addition to medical filters, BIOPTRON® can be equipped with orange, yellow, indigo and violet filters

### 3. Low Energy Light

BIOPTRON® delivers a consistent stream of light with a steady intensity (also known as power density) of abt. 40 mW/cm<sup>2</sup> at a distance of 10 cm from the treated area. The dosage of BIOPTRON® Quantum Hyperlight can be precisely determined. It has two components, power and time: Energy (J) = Power (W) × Time (s) (the Bunsen-Roscoe rule of reciprocity in photobiology). This light emission delivers a dose of light equivalent to an average energy density of 2.4 J/cm<sup>2</sup> per minute. This represents a **low and safe dosage of light energy** with a great response in the living matter that **stimulates natural healing with no side effects**.

Quantum Hyperlight lux with an optimal specific power density of 40 mW/cm<sup>2</sup> and an energy density of 2.4 J/cm<sup>2</sup>, predominantly covers the electronic energy states of biomolecules from 1.4 to 3.4 eV.

### 4. Incoherent Light

Quantum Hyperlight is an Incoherent Light (out-of-phase or unsynchronized light), characterized by light waves that are not temporally or spatially synchronized. Frequent and random changes of phases between light photons of different wave frequencies and wavelengths make this a low-intensity light. BIOPTRON® incoherent light promotes **safe, non-invasive and effective healing processes** without the risk of developing resistance to the therapy. In contrast to this, most laser lights have a high intensity, coherent light which has a high potential for tissue damage.

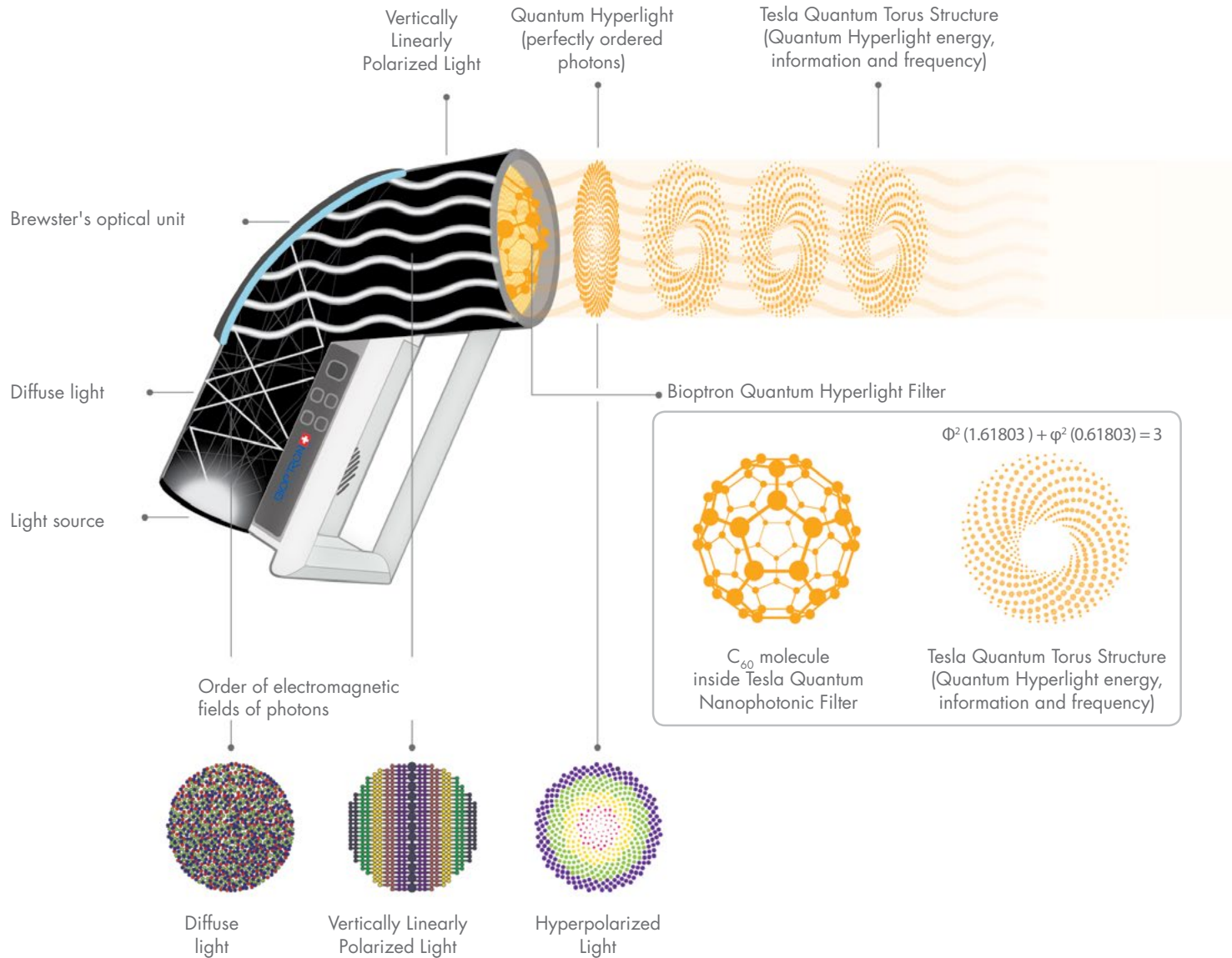
### 5. Linearly Polarized Light

Vertically Linearly Polarized Light (see page number 23).

### 6. Hyperpolarized light



**BIOPTRON® Quantum Hyperlight**



## Generating Quantum Hyperlight with Quantum Nano Properties

1. When diffuse light (emitted by a halogen bulb), collides/ interacts with the Brewster's optical unit, it reflects and becomes a **Vertically Linearly Polarized Light (VLPL)**.
2. When such VLPL passes through the Bioptron Hyperlight Optics®, it becomes **unprecedented**, perfectly-ordered **Hyperpolarized Light**, called Quantum Hyperlight.

VLPL interacts with  $C_{60}$  (integrated in the optics), which twists at a near-inconceivable 18 billion times per second.  $C_{60}$  reflects from each other without friction (paramagnetic and diamagnetic properties). As a result of VLPL interactions with twisting  $C_{60}$ , VLPL photons change their orientation:

- a. the 20 hexagons in  $C_{60}$  obtain the Faraday's effect (the plane of photon polarization rotate in hexagons), and
- b. the 12 pentagons in  $C_{60}$  obtain the Fibonacci-sequential effect (the plane of photon polarization rotates and twists in all directions in pentagons).



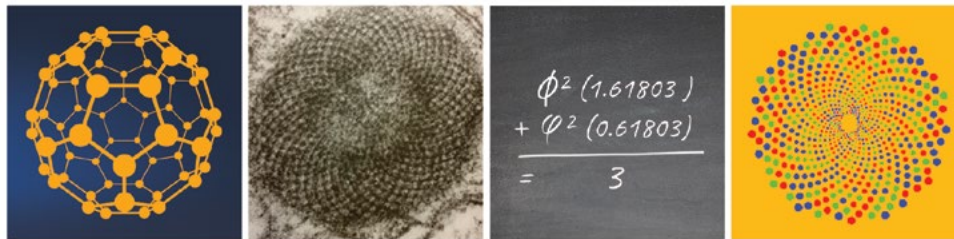
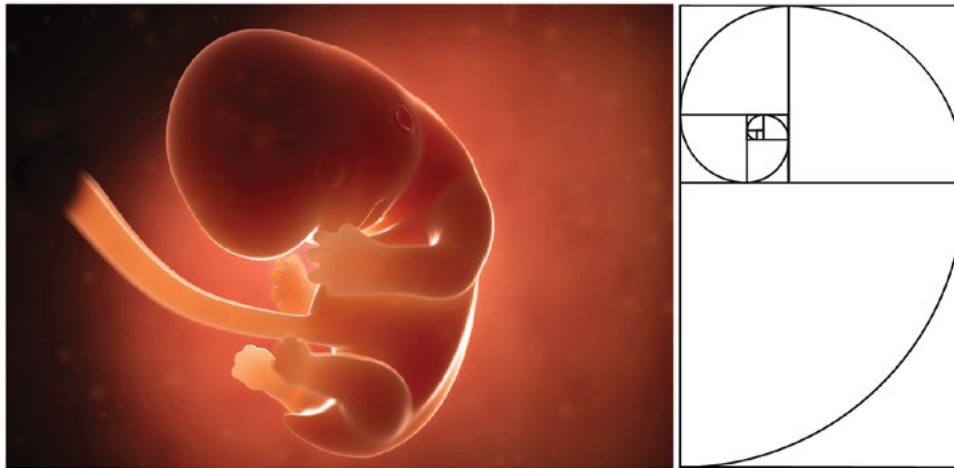
Thus, the photons' electrical plane of polarization changes position step-by-step, from Vertically Linearly Polarized Light (VLPL) into Hyperpolarized Light that has circular left and right polarization and Linearly Vertical and Horizontal polarization ("sunflower photons pattern"). This unique photon pattern, arranged by the Fibonacci Law, is the ideal energy-structure/symmetry that is fully compatible with our biostructures.

Due to its quantum properties, Quantum Hyperlight is unstoppable and unlimited, transmitting its energy, information and frequency through non-covalent bonds and the body's Living Matrix\* of biomolecules, cells and organs. Through the Resonance principles, Quantum Hyperlight can maintain and restore the disturbed biological structures, bringing them into homeostasis (natural healthy state).

*\* (Living Matrix Connective Tissue concept by biophysicist James L. Oschman)*

## FIBONACCI SEQUENCE

In mathematics, the Fibonacci numbers are an integer sequence, called the Fibonacci Sequence, and characterized by the fact that every number, after the first two, is the sum of the two preceding ones: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144... Around 1200 AD, the mathematician Leonardo Fibonacci discovered the unique properties of the Fibonacci sequence. This sequence directly relates to the Golden Ratio. It can be applied to the proportions of a rectangle, called the Golden Rectangle. This is known as one of the most visually satisfying of all geometric forms: hence the appearance of the Golden Ratio in art (e.g., the Mona Lisa and the Last Supper).

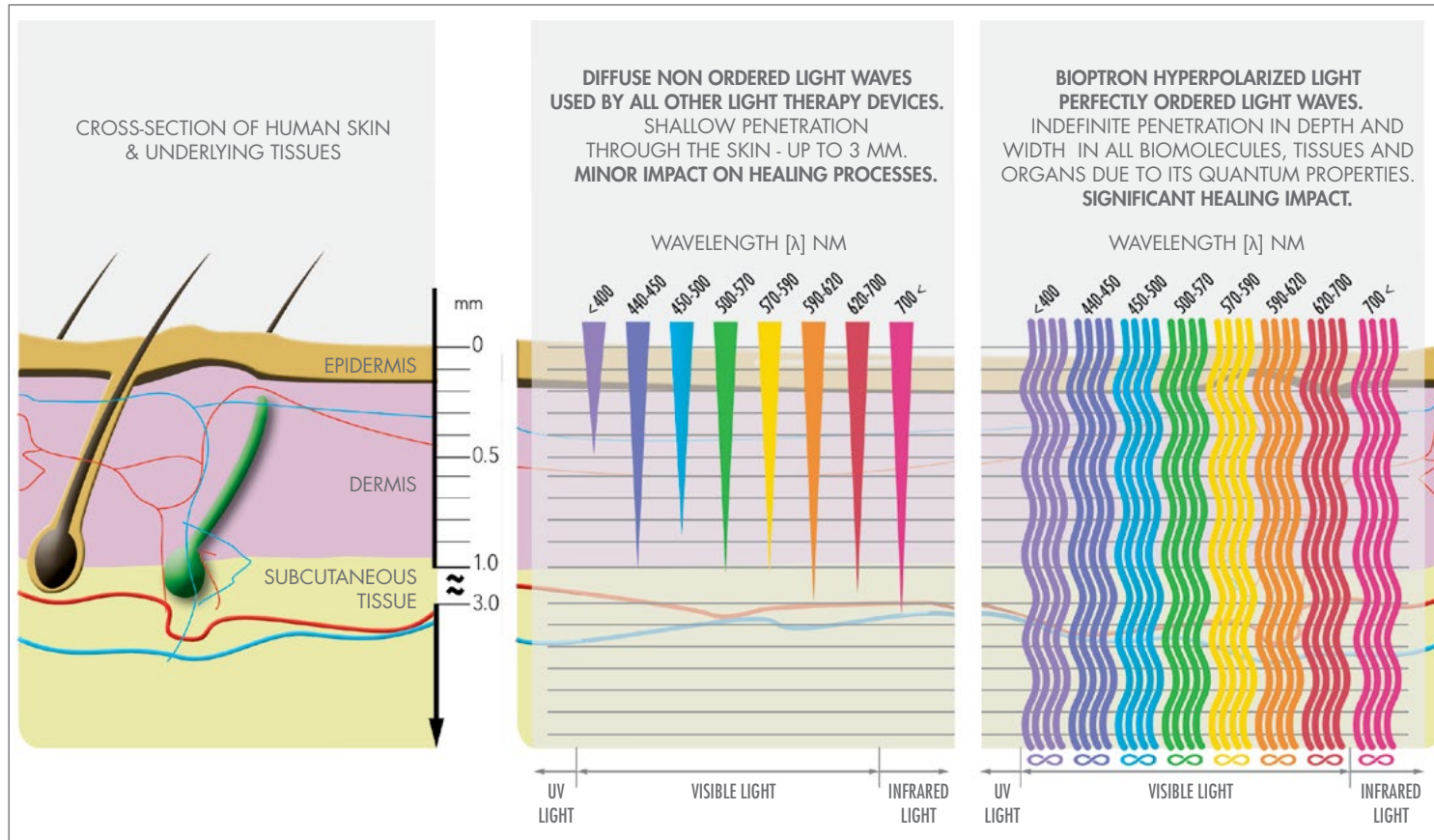


**75% of the biomolecules are arranged in accordance with Fibonacci sequence, which resembles the look of Fibonacci's spiral – the Golden Ratio.**

**The Fibonacci numbers also appear in biological settings, such as fruit sprouts, echinacea, sunflower, pineapple seeds... even in the whole universe.**



# DISTINCTION IN LIGHT PENETRATION AND THE HEALING EFFECTS OF DIFFERENT KINDS OF LIGHT



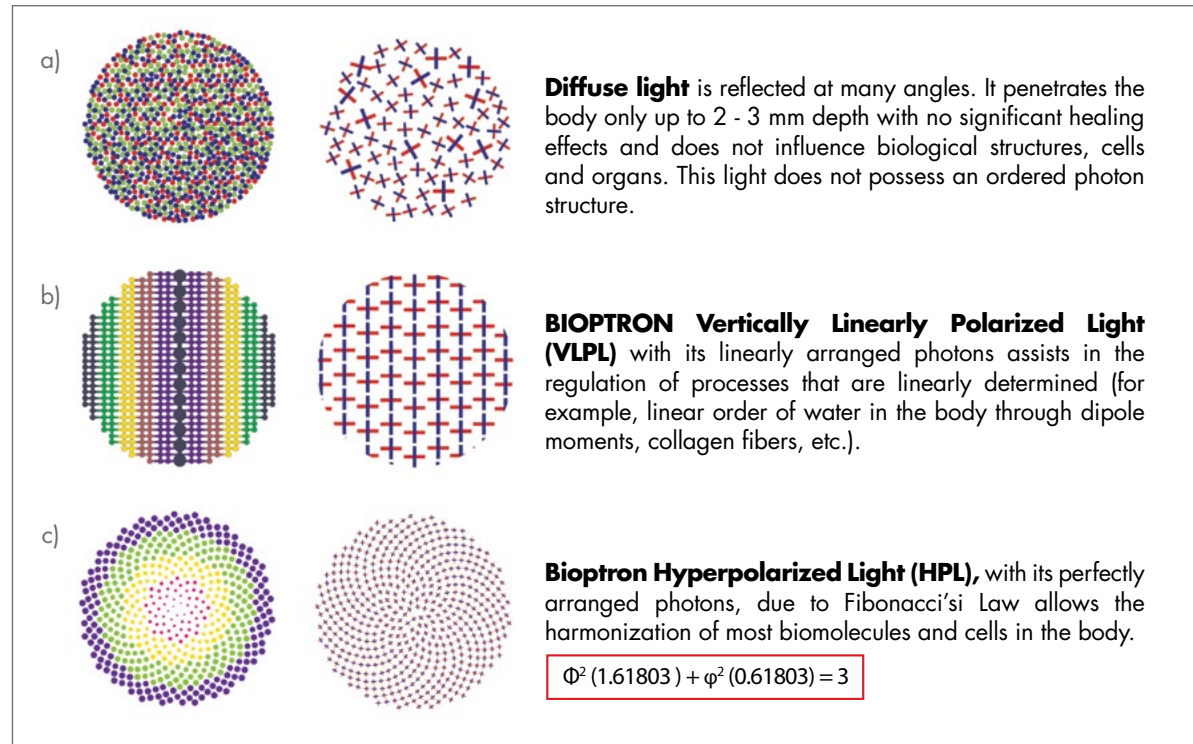
*In general, the penetration of light depends upon both tissue type and the kind of light.*

## Penetration of Diffuse Light and Its Health Efficiency

Diffuse light is chaotic, with the disordered electromagnetic fields of photons. This "chaos" acts disorderly on body water molecules with its dipole moments and on biomolecules with its positive and negative charges (their reunion again creates dipole moments). Diffuse light penetration is limited with no efficient healing effects. The benefit of diffuse light to repair imbalances exists, but is of minor importance for healing.

## VLPL Penetration and Its Health Efficiency

VLPL, with its linearly arranged photons, assists in the regulation of processes that are linearly determined and has the ability to arrange body water and dipole moments of biomolecules (for example, linear order of water in the body through dipole moments, collagen fibers, etc.). VLPL penetrates some tissues to a depth of up to 2 - 10 mm. When the tissue is rich in water, the penetration is as deep as 20 mm. Vertically Linearly Polarized Light achieves much deeper and wider penetration than diffuse light, with efficient healing effects. Due to its linear character, if VLPL encounters denser obstacles, it will be absorbed by the tissue, thus bringing therapeutic healing effects to the organism.

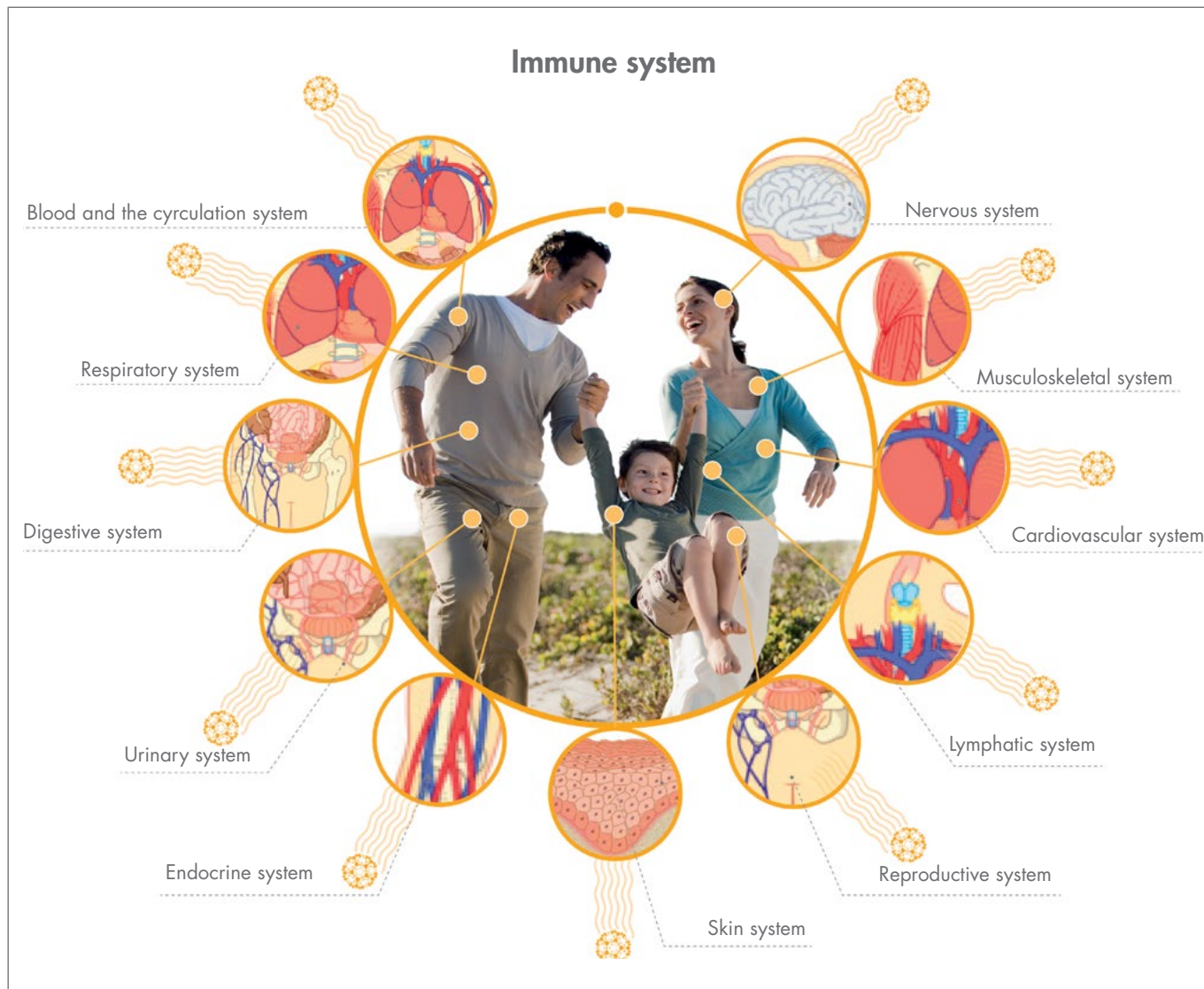


## BIOPTRON® Quantum Hyperlight - Penetration and Its Health Efficiency

**Quantum Hyperlight** as a unique quantum light with its perfectly ordered photons, according to the Fibonacci Law, penetrates deep into the body. According to the Fibonacci Law  $\Phi^2 (1.61803) + \varphi^2 (0.61803) = 3$ , **dipole moments and biomolecules and electromagnetism in tissue have the same arrangement as Quantum Hyperlight photons, making it fully compatible with biological structures.**

**Quantum Hyperlight** communicates with the molecules, cells and tissues, conveying the ideal  $C_{60}$  harmony and its energetic state, inducing harmonization and equilibrium in energetically disturbed biological structures, accelerating natural healing processes. At the same time, because of the perfect Quantum Hyperlight symmetry, biomolecules directly absorb the energy necessary for life that results from the electrical and magnetic characteristics of Quantum Hyperlight. In effect, under its influence, the cell is stimulated to heal itself, regaining its natural equilibrium and energetic properties.

# BIOPTRON® QUANTUM HYPERLIGHT IS RECOGNIZED AS A UNIQUE METHOD OF TREATMENT FOR DIFFERENT MEDICAL INDICATIONS



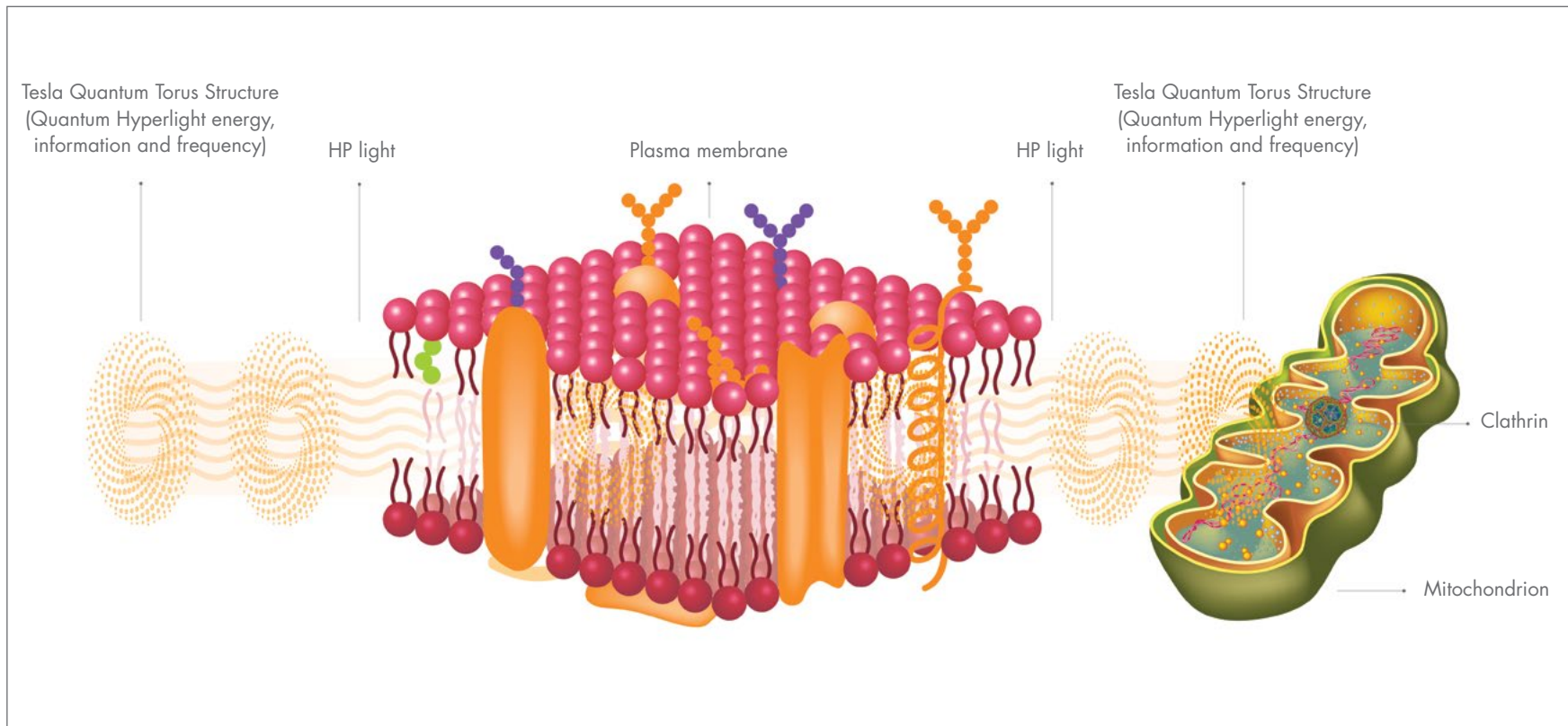
## Information:

We recommend consulting a physician before using BIOPTRON® Hyperlight therapy in order to receive professional advice as to whether this treatment is advisable or some other medical treatment may be necessary. Due to the Quantum properties, the list of medical conditions that can be treated with Quantum Hyperlight is long. It can be used efficiently in all medical branches and for all parts of the body [Ref. 2.5-13.4]. **The duration of daily treatment for each disease is usually 4 - 10 minutes per zone of treatment, once or twice a day.**

**According to BIOPTRON® scientific research:**

1. Quantum Hyperlight maintains cells, **delaying** the apoptosis process (natural **cell death**). It has been shown that Quantum Hyperlight stimulates cell plasma membranes to **promote an optimal healthy state of the cell**.
2. Quantum Hyperlight maintains cell functions, reducing the number of necrotic cells, thus **reducing the necrosis processes** (premature cell death) [Ref. 12.6].

When Quantum Hyperlight is applied, it penetrates the plasma membranes of dysfunctional cells and creates a spatial rearrangement of their structural components; **it maintains and restores cells in the whole body into their natural, healthy state.**



# THE MAIN THERAPEUTIC EFFECTS OF BIOPTRON® QUANTUM HYPERLIGHT:

1. Quantum Hyperlight stimulates tissue self-repair processes and prevents tissue degradation (even for deeper systems, such as nerves, tendons, cartilage, bones, and internal organs).

Below are a few health effects of the therapy we provide:

- Improved regulation of cellular proliferation
- Enhanced cellular energy
- Release of growth factors
- Excellent neovascularization and promotion of angiogenesis
- Accelerated wound healing (by increased RNA and protein synthesis, particularly the production of collagen and elastin)
- Significant improvement in the quality of scar tissue
- Stimulation of nerve functions
- Increase in cellular oxygenation and detoxification

2. Stimulates the body's natural defense mechanisms

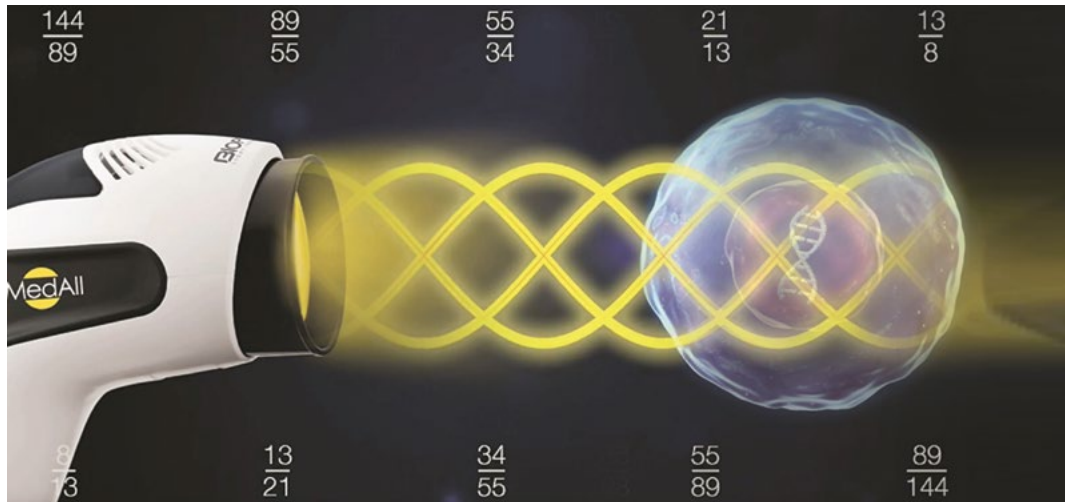
- Eradicates pathogenic microorganisms (acne vulgaris, herpes simplex and zoster viruses)
- Activates natural killer cells

3. Significantly reduces the pain sensation

- Reduces swelling and hematomas as well as the resolution of inflammation caused by injuries and autoimmune diseases
- Improves deep microcirculation
- Reduces muscle spasms
- Decreases pain transmission by direct action on peripheral nerves

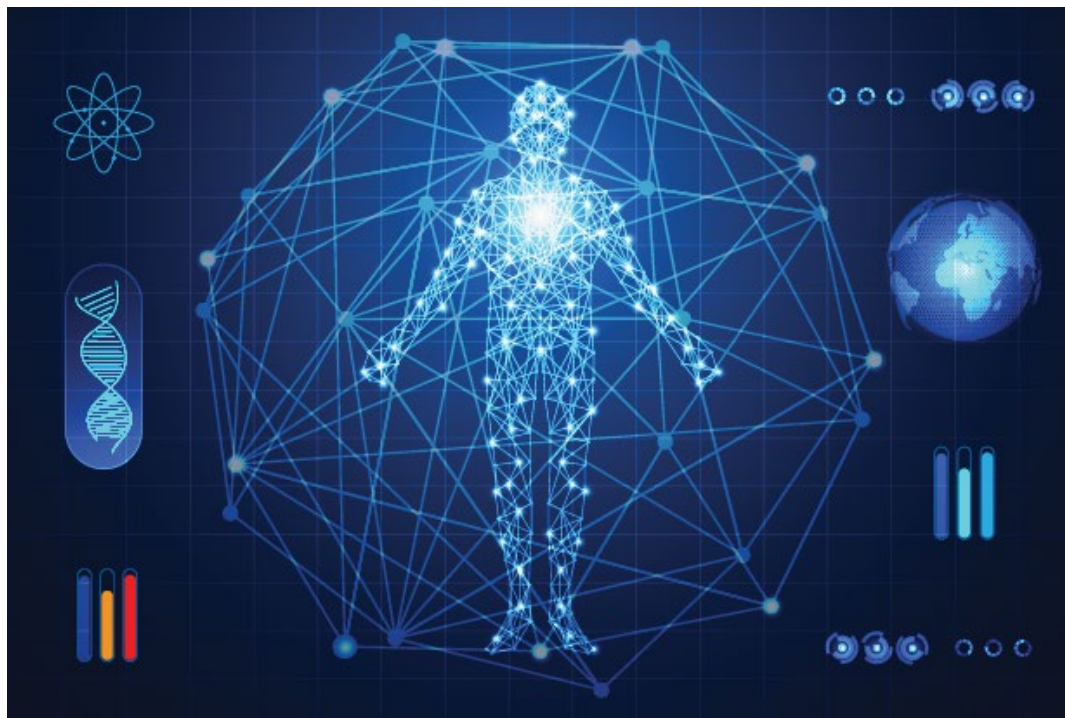
4. Quantum Hyperlight thermo-sensory and opto-sensory stimulation has sensory and neural effects that can reduce the symptoms of SAD and non-seasonal depression. It can be sensed by the skin (thermo-sensory stimulation) as well as by photoreceptors in the eye (opto-sensory stimulation).





**Quantum Hyperlight accelerates the healing processes** - it promotes deep microcirculation and cell biostimulation at the quantum level, and in this way improves the body's defence system.

Due to its quantum properties, Quantum Hyperlight has a positive and long-lasting effect not only on the treated area, but also on the whole body.



**The results:**

- Light is absorbed by living tissues, increasing the level of ATP (adenosine triphosphate), which improves the cell metabolism
- Increased cellular energy
- Increased deep microcirculation and cell biostimulation
- Increased protein synthesis (production of collagen and elastin)
- Reduced swelling and inflammation
- Reinforces the body's defence system
- Stimulates regenerative and reparative processes in all biological structures
- Significant acceleration of wound healing
- Relieves pain or decreases its intensity - efficient natural analgesic, no side effects

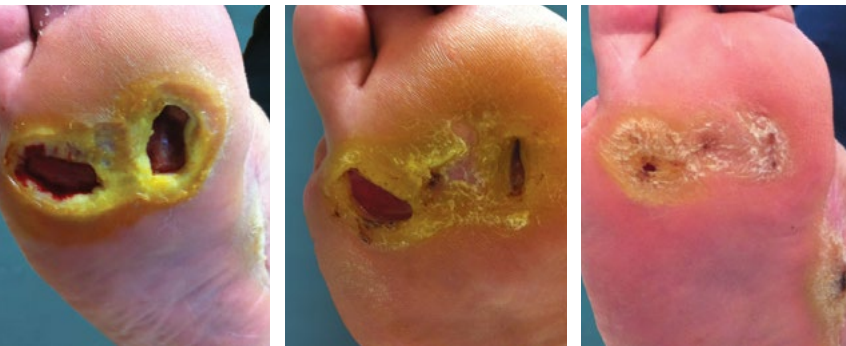
# BIOPTRON® QUANTUM HYPERLIGHT FOR WOUND HEALING

BIOPTRON® Quantum Hyperlight significantly reduces the time required for complete epithelialization (dermal regeneration) of damaged skin and reduces scar formation. It helps to **accelerate the healing time and reduces the length of hospital stays while improving life quality.**

Conservative approach to deep dermal burn wounds with BIOPTRON® Light Therapy



RETROAURICULAR EXULCERATION: Healing was achieved after seven weeks of BIOPTRON® Hyperlight treatment.



ULCERA PEDIS: Diabetes mellitus healing [A1] was achieved after nine months with BIOPTRON® exposure.



Start therapy

After 12 days

After 15 months

Monstrey et al (2002a)



Start therapy

After 15 days

After 19 days

After 29 days

After 9 months

Monstrey et al (2002b)

## Hyper Light in the treatment of 2<sup>nd</sup> degree burn



The first day

The third day

The fifth day

The seventh day

A second degree burn was caused by hot cosmetic wax. HL was applied for 7 days and complete healing occurred in 14-21 days. Wound healing of this kind normally takes up to 40 days.

Source: Dr Biljana Lucic and Dr Milica Komnenic, ZEPTER MEDICAL General practice, Belgrade

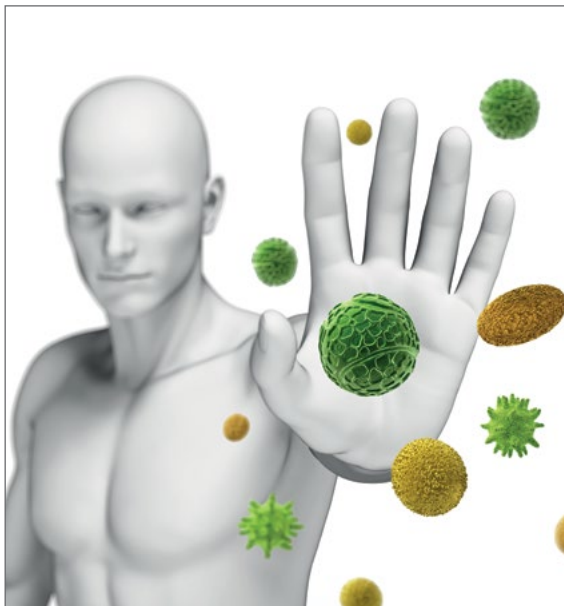
Less hypertrophic scarring and superficial second-degree burns can be treated with conventional local medical treatments in combination with Quantum Hyperlight treatment. Several studies have shown that the routine use of Quantum Hyperlight for the treatment of these burns can significantly reduce the time necessary for complete epithelialization (regeneration of the skin) of the damaged skin (complete healing), reducing the risk of scar formation that is functionally and aesthetically unacceptable. Further, Quantum Hyperlight can reduce the need for surgery in the treatment of deep dermal burns, particularly those located in the areas where the likelihood of scar formation after surgery is extremely high.

Quantum Hyperlight is a highly valuable choice of treatment in avoiding surgery in patients with deep dermal burns:

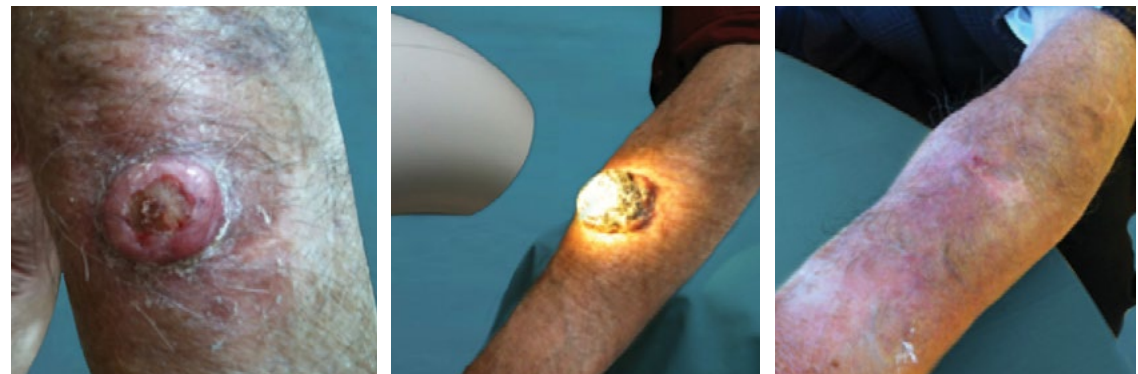
- No operation risks
- Less pain
- No skin grafts needed

These wounds often require the surgical removal of dead tissue and transplantation of the skin (skin grafting).

## **BIOPTRON® QUANTUM HYPERLIGHT AS A NATURAL IMMUNE BOOSTER**



Quantum Hyperlight activates nonspecific cellular and humoral immunities by several means. It first eradicates pathogenic microorganisms (acne, for example) and stimulates natural killer cells [Ref. 6.1 - 6.27].



14. November 2011

29. November 2011

14. April 2011

SKIN TUMOR: Treatment with BIOPTRON® Quantum Hyperlight (Courtesy of Dr. Surböck, Mariazell)



## BIOPTRON® QUANTUM HYPERLIGHT FOR PAIN RELIEF

Quantum Hyperlight significantly reduces one's pain sensation [Ref 7.1 - 7.22], swelling and hematomas, and reduces inflammation caused by injuries, degenerative diseases or autoimmune diseases. One can experience improved microcirculation, reduced muscle spasms and the activation of natural pain-killing processes.

In the field of pain treatment, HLPL can be used as a monotherapy and/or a complementary therapy in the following cases:

- **Rheumatology:** osteoarthritis, rheumatoid arthritis (chronic), and arthrosis
- **Physiotherapy:** lower back pain, shoulder and neck pain, carpal tunnel syndrome, scar tissue, injuries of the movement apparatus–locomotor systems
- **Sports medicine:** injuries to the soft tissues or muscles, tendons and ligaments: muscle cramps, sprains, strains, bruises, tendon inflammations, ligaments and muscle tears, tennis elbow



Quantum Hyperlight importantly optimizes muscle metabolism, accelerates tissue development in athletes and promotes healing after sports injuries, thus reducing one's downtime [Ref 5.1 - 5.8). It is effective for: muscle spasms, sprains, strains, tendonitis, ligament and muscle tears, contusions, tennis elbow/golfer's elbow, shoulder rotator cuff strain, calf and hamstring injuries, back pain, swelling, spasms and knots, neck pain, pre and post-training stiffness, plantar fasciitis, etc.

## BIOPTRON® QUANTUM HYPERLIGHT IN DERMATOLOGY/SKIN DISEASES

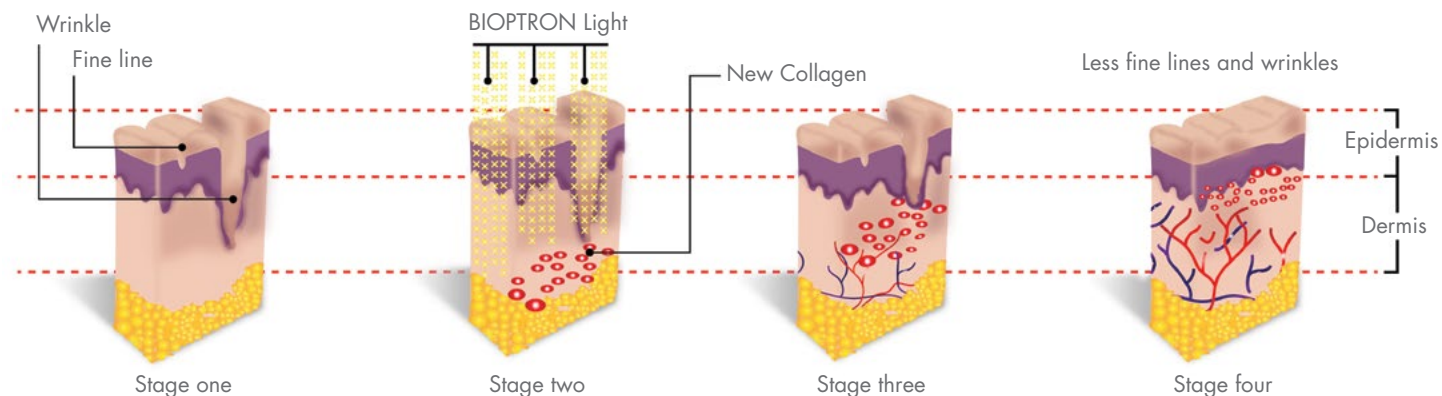
**BIOPTRON® QUANTUM HYPERLIGHT can significantly help to heal skin diseases [Ref 4.1 - 4.5].**

These include: atopic dermatitis, herpes simplex, herpes zoster, psoriasis, eczema, rosacea, mucosal injuries, acne and surface bacterial infections. HLPL stimulates tissue self-repair processes and prevents tissue degradation (even of deeper structures, such as nerves, tendons, cartilage, bones and internal organs).

- Improves the body's regulation of cellular proliferation
- Enhances cellular energy
- Releases growth factors
- Enhances neovascularization and promotes angiogenesis
- Accelerates wound healing (by increased RNA and protein synthesis, particularly the production of collagen and elastin)
- Improvement in the quality of scar tissue, Quantum Hyperlight accelerates wound and burn healing, making it up to twice as fast, at the same time reducing pain, discomfort and scarring [Ref. 3.1 - 3.16]

In the field of wound healing, it could also help as a complementary therapy for the following conditions: post-surgical wounds, burns, transplants, healing after trauma, venous ulcers (stasis ulcers), pressure ulcers, skin grafts, venous leg ulcers (stasis ulcers), decubitus (pressure) sores, diabetic foot ulcers.

The main mechanism of Quantum Hyperlight and its influence on healing wounds without scarring is related to the orthogonal arrangement of collagen type I and III with collagen type VII in the basal membrane. At the quantum level, it stimulates the basal membrane very rapidly, which reduces, prevents and averts the formation of scars.





## BIOPTRON® QUANTUM HYPERLIGHT FOR DERMATOLOGICAL SCALP AND HAIR DISORDERS

Quantum Hyperlight stimulates the immune system and stabilizes the production of keratinocytes, whilst minimizing the occurrence of scaly, flaky scalp patches and eliminating dryness of the scalp. Quantum Hyperlight brings back hair shine and **strengthens hair follicles**. Early clinical testing has demonstrated a **60% reduction in hair loss during only one month of treatment** [Ref. 14.1 - 14.3].



## BIOPTRON® QUANTUM HYPERLIGHT IN AESTHETICS & ANTI-AGING

Quantum Hyperlight slows down the skin's natural ageing process. It stimulates specific cells in the skin known as fibroblasts which produce collagen and elastin and is a natural **rejuvenation treatment for the skin** [Ref. 13.1 - 13.7].

Our product **reduces both fine and deep wrinkles by stimulating elastin and collagen production**. The effect is a rejuvenation of the skin via a smoother complexion.

The **BIOPTRON**<sup>®</sup> Quantum Hyperlight spectrum promotes a series of soothing processes in the skin:

The 900 nm promotes peripheral vasodilatation, improving **deep skin circulation**.

The 830 nm provides protein delivery to mastocytes, which are associated with **tissue repair**.

The 660 nm stimulates collagen production and thus contributes to tighter, **firmer skin and reduces traces of ageing**.

The 633 - 640 nm stimulates the production of adenosine triphosphate (ATP, the molecule that transfers energy to cells). The increase in cell activity stimulates **skin repair along with the regeneration processes and combats the appearance of fine wrinkles**.

The 590 nm stimulate the formation of new blood vessels, helping the **skin maintain its moisture and retain its elasticity**.

525 nm **eliminates melanosomes** (skin cells that contain melanin).

The Quantum Hyperlight wavelengths of more than 400 nm penetrate into the layers of the dermis and epidermis by interacting with lymphocytes, **strengthening the immune system as well as skin repair processes. Regeneration and tensioning the skin for a visibly younger appearance**.



## BIOPTRON® BLUE VERTICALLY LINEARLY POLARIZED LIGHT (VLPL) IN DENTISTRY - ADJUVANT ORAL TREATMENT



The **BIOPTRON®** Vertically Linearly Polarized Light efficiently fights oral infections and/or inflammation, **stimulating elastin and collagen production for faster oral healing** [Ref. 8.1].

Clinical Research Box [Ref. 8.2]: Clinical studies have shown that **BIOPTRON®** Blue VLPL applied into the oral cavity for ten minutes during five consecutive days **significantly reduces plaque formation** in adult dental patients. Besides, phototherapeutic treatment of dental diseases of various etiopathogenesis with **BIOPTRON®** blue spectrum showed positive influences on immune cells (T-lymphocytes for cell immunity), increased the local concentration of immunoglobulins (B lymphocytes for humoral immunity) and stimulates the proliferation of fibroblasts for the formation of collagen and stimulated angiogenesis (the formation of new blood vessels).

In patients with parodontium - dental orthodontic diseases, the treatment with **BIOPTRON®** Blue VLPL for 4-6 minutes for a duration of 8-10 sessions shortened an individual's recovery time and reduced the consequences of cryotherapy and facilitated epithelization by 1.5 to 2 times.

More importantly, **BIOPTRON®** Blue VLPL reduced drug load and local anesthesia and induced local regenerative and immunostimulating actions. Taken together, these observations contribute to the **improvement of the treatment quality and shorten a disease duration**. **BIOPTRON®** Blue VLPL has the following properties: **antibacterial and antiviral action, it accelerates healing processes** after oral surgery, supports the periodontal regeneration process after clinical therapy (periodontal disease and dental plaque), **reduces swelling, increases tissue regeneration and assists in orthodontal pain reduction**.



## BIOPTRON® QUANTUM HYPERLIGHT FOR SEASONAL AFFECTIVE DISORDER (SAD)

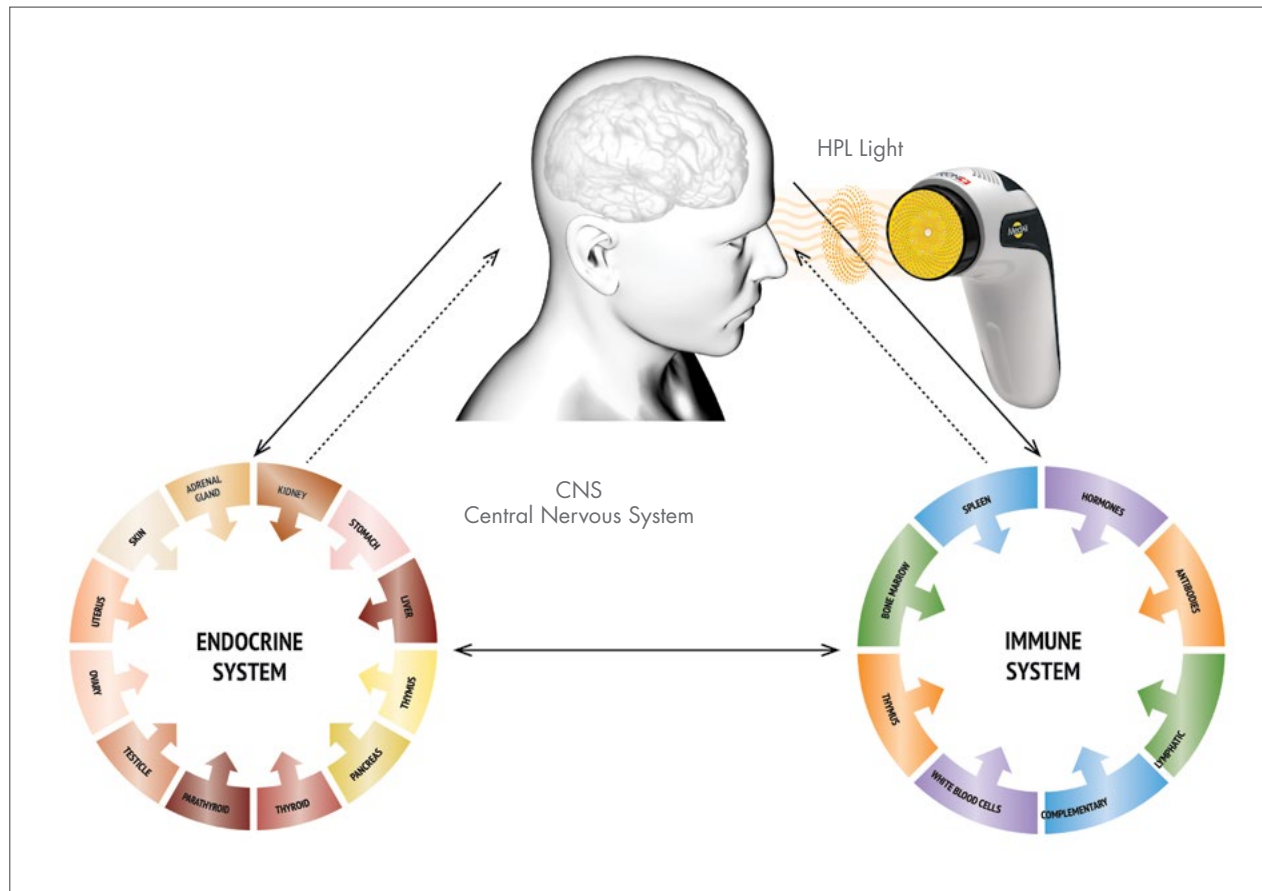
BIOPTRON® Quantum Hyperlight is medically approved and ideal for the treatment of seasonal depression. This system can be used as a monotherapy or in combination with other medical treatments.

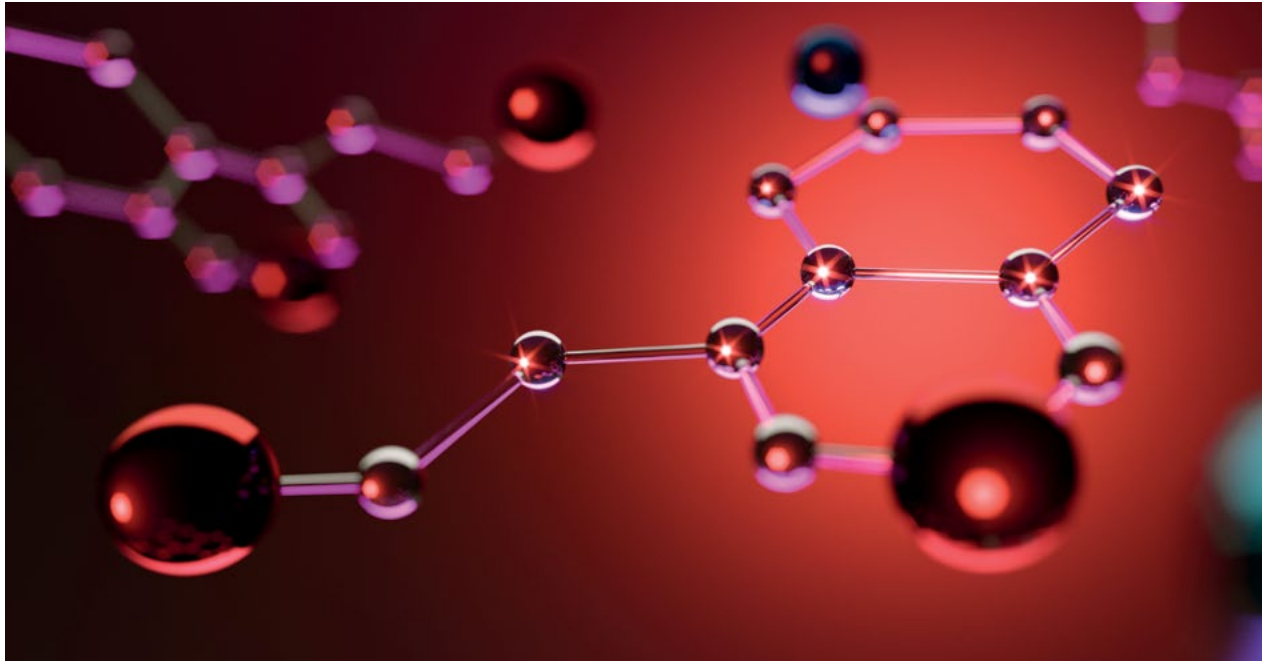
Skin-sensory and optic-sensory stimulation light deprivation and consequently the disruption of the circadian rhythm is associated with the increased risk of serious psychological disorders, including depression.



Quantum Hyperlight has sensory and neural effects that can reduce the symptoms of seasonal affective disorder (SAD) and non-seasonal depression: it has an intensity of more than 10,000 Lux. Conventional light therapy devices provide a light intensity of 10,000 light units (called Lux). A daily treatment of about 30 minutes is considered effective.

The light intensity in all BIOPTRON® products (BIOPTRON® MedAll, BIOPTRON® Pro 1 and BIOPTRON® 2) exceeds 10,000 Lux. As a point of comparison, the luminance of standard room light is approximately 500 Lux; a cloudy day equals up to 5,000 Lux and mid-day summer sunlight reaches at least 50,000 Lux [Ref. 9.1-9.6].





### Clinical Research Box:

The scientific studies have shown that there is a change in the EEG signal under the influence of medical Quantum Hyperlight and that this effect can be used to alleviate depression or help in its treatment.

Exposure:

20 - 40 min. = 20 cm distance,  
40 - 60 min. = 30 cm distance or  
60 - 120 min. = 40 cm distance.

The BIOPTRON® pilot study on the neuroendocrine effects of HLPL in the domain of visible and infrared light has shown positive effects. Researchers have investigated the effects of Quantum Hyperlight through the neuroendocrine-immune system on general blood parameters (red and white blood cells, hemoglobin, potassium, sodium, etc.) as well as insomnia, depression, heart rhythm, blood pressure, other parameters and the psychological parameters of personality.

Participants in the study were exposed to BIOPTRON® Quantum Hyperlight in ten minute sessions (3 x per week on the face, with open eyes, at a 40 cm distance). The **results indicated a significant decline in anxiety, even for the subjects within the normal range of values.** There was considerable improvement regarding the somatization of anxiety disorder, i.e. a reduction of cardiovascular, respiratory and digestive symptomatology, as well as **significant improvements in the quality of sleep** (evident by improvements in a person's melatonin levels).

Results showed **increases in serotonin and dopamine levels and decreases in stress hormone.** At the same time, the exposure to such light is beneficial for sleep because of the effects on melatonin, as shown by clinical parameters. As a result, the general recommendation for sleeping problems with the Quantum Hyperlight is five minutes per day at a distance of 40-60 cm.

## BIOPTRON® QUANTUM HYPERLIGHT FOR CHILDREN

Quantum Hyperlight can be used for children as a complementary therapy to **reduce pain and promote healing** in various types of conditions, such as: pediatric dermal affections, endogenous eczema, upper respiratory tract infections, allergic respiratory diseases, pediatric musculoskeletal disorders and neurological disorders and deficits. [Ref. 10.1 - 10.4]

Clinical Research Box: Clinical studies of newborn babies in the intensive care unit (including life support systems) with various conditions listed above demonstrated that the exposure to BIOPTRON® Quantum Hyperlight for ten minutes, three or four times daily, improved treatment responses without negative side effects.

Pain was relieved within 24 hours and skin problems decreased within two to three days. The best results have been obtained in the treatment of venous infections [Ref. 10.2].



BIOPTRON® Quantum Hyperlight is also suitable for newborns as well. It can be used in cases of venous infections, after injections, blood collections, fluid or blood infusion, pressure sores in movement-impaired babies, skin rash caused by moist heat, diaper rash.

Quantum Hyperlight therapy can be used to treat yeast infections, skin diseases, phlebitis, decubitus and intertrigo.

Treatment of the eye area should not be performed and blindfolds are provided for children who undergo light therapy.

## BIOPTRON® QUANTUM HYPERLIGHT IN VETERINARY MEDICINE

Similar to the medical effects on humans, BIOPTRON® Quantum Hyperlight is also a recommended and **successfully used therapy in veterinary medicine**, in the professional and home care of animals.

BIOPTRON® light therapy ensures fast and effective healing for common, everyday health ailments. It is an easy, effective, non-invasive method of treatment of wounds of different origins, skin problems (e.g., trichophytia, alopecia, bacterial and allergic dermatitis, demodicosis), as well as arthritis pain, problems with cramping syndrome and inflammatory disorders (e.g., otitis externa, mastitis, etc.). Under the influence of Hyperpolarized light, cell disorders can be restored to their natural state, bringing the animal body to a natural energetic equilibrium. [Ref. 11.1 - 11.6].



*The images are of a two-year-old horse. The wound was one day old when the treatment started. The course of treatment ended seven weeks later with comprehensive results. The effects reported on biological structures are the same as in humans.*



### Clinical Research Box:

BIOPTRON® Quantum Hyperlight in cow mastitis treatment, 24 hours after the first exposure, had positive effects and the following results were achieved:

In subclinical mastitis: 40% leukocyte reduction and 43% somatic cell reduction in milk (in relation to baseline).

In clinical mastitis, there were no inflammation symptoms, pain, nor redness; with no need for another exposure and no need for classical antimicrobial drugs.

NOTE: Satisfactory results from veterinary medicine are promising solutions for successful human medicine mastitis treatments (Ref.: 11.7).

## TECHNICAL INFORMATION - ADVANCED SWISS TECHNOLOGY AND DESIGN - 3 BIOPTRON® DEVICES

The essence of the BIOPTRON® light therapy system consists of five crucial elements:

1. Light source emits (conveys to Brewster's optical unit) non-polarized, polychromatic and incoherent light,
2. Brewster's optical unit (a patented five-layered optical system) provides vertical linear polarization of up to 95%,
3. Safety glass,
4. Patented BIOPTRON® Filters/Optics that generate unique BIOPTRON Hyperlights (see page 19),
5. Special certificates for medical devices.

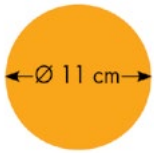
There are three models of the BIOPTRON® device: BIOPTRON® 2, BIOPTRON® Pro1 and BIOPTRON® MedAll.

All BIOPTRON® devices include the same physical characteristics of light and therefore the same beneficial medical effects on the human body. Devices only differ in design and individual treatment area and size.



The BIOPTRON® 2 therapy device is primarily designed for use by health professionals in medical facilities. We offer three different stands (home, professional and wall-mounted) to assure the best space-saving and practical solutions. The device can be positioned so as to ensure comfort for both the patient and medical staff.

The control panel allows the operator to easily program treatment sessions lasting up to 95 minutes, divisible into one-minute increments. The filter diameter (approx. 15 cm) permits the treatment of larger areas and hence offers time effective therapy. The BIOPTRON® 2 guarantees the highest degree of comfort for all applications and, like other BLT devices, is very easy to use.



FILTER DIAMETER

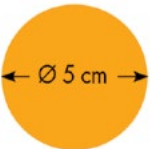


BIOPTRON® Pro1



The BIOPTRON® Pro 1 therapy device is designed for use at home, in hospitals, in treatment centers and other beauty or health care facilities. The device is available either with a functional floor stand or an ergonomic table stand for more user-friendly handling. With an easily adjustable height and head inclination, as well as the ability to rotate the device head up to 360°, this device allows for convenience and comfort.

Treatment times can be easily set using the control panel down to 30 second intervals. The filter diameter of the BIOPTRON® Pro 1 (approx. 11 cm) allows for treatments of various medium-sized areas. An optional wheel set is also available for easier mobility.



FILTER DIAMETER



BIOPTRON® MedAll



The BIOPTRON® MedAll is a small yet powerful device, easy to use and having a state-of-the-art technology. It is intended as a personal polarized light therapy medical device for use in all circumstances and locations. Ergonomic and portable, it can be carried anywhere; on business or leisure trips, fitting easily into your handbag or luggage.

It is available with a floor stand and a sleek case for safe storage and transport. With the 5 cm filter diameter you can cover small, yet precise, treatment areas while experiencing its benefits throughout your entire body. The innovative standby mode saves energy, time and money, as this function uses only 0.5 W of power. The LED timer display (common to all three models of the BIOPTRON® devices) ensures better visibility in all light conditions and highly effective resolution for easy reading. The user-friendly device control interface, consisting of smartly designed buttons, additionally ensures practical and easy usage. Finally, the ergonomic anti-slip grip, in combination with its modern design and biocompatible allergy-free material, guarantees easy handling, safety and comfort while holding the device.

## REFERENCES

### 1. BIOPTRON<sup>®</sup> Effects on Water

- 1.1. Farashchuk NF, Mikhaylova RI, Telenkova OG. Biological testing of water with different structural states in rats and frogs. *Gig Sanit.* 2014 Mar-Apr; (2): 84-6. (in Russian).
- 1.2. Farashchuk NF, Rakhmanin YA, Savostikova ON, Telenkova OG. Crystallographic evaluation of structural changes in water. *Gig Sanit.* 2014 Jul-Aug; (4): 107-9. (in Russian).
- 1.3. Zilov VG, Khadartsev AA, Bitsoev VD. Effects of polychromatic visible and infrared light on biological liquid media. *Bull Exp Biol Med.* 2014 Aug; 157(4): 470-2.

### 2. BIOPTRON<sup>®</sup> - Induced Cellular Effects

- 2.1. Albrecht-Buehler G (2013, Sept 4) Cell intelligence. Northwestern University Medical School, Chicago. Accessed 9 November 2017. Retrieved from: <http://www.basic.northwestern.edu/g-buehler/FRAME.HTML>.
- 2.2. Beltrán B, Mathur A, Duchon MA, Erusalimsky JD, Moncada S. The effect of nitric oxide on cell respiration: A key to understanding its role in cell survival or death. *Proc. Natl. Acad. Sci. U.S.A.* Dec 2000. 97(26): 14602–14607.
- 2.3. Greco M, Guida G, Perlino E, Marra E, Quagliariello E. Increase in RNA and protein synthesis by mitochondria irradiated with helium-neon laser. *Biochem. Biophys. Res. Commun.* Sep 1989. 163(3): 1428–1434.
- 2.4. Gulyar SA. Limansky YuP. Static magnetic fields and their application in medicine. Kyiv: BIP NASU. 2006. p. 320 (in Russian).
- 2.5. Gulyar SA. BIOPTRON light therapy and color therapy bibliography and analysis of publications. In: Anthology of light therapy. Medical BIOPTRON technology. Kyiv: Bogomoletz Institute of Physiology at the National Academy of Sciences of Ukraine. 2009. p. 917-78 (in Russian).
- 2.6. Gulyar SA. (Editor-in-Chief) ANTHOLOGY OF LIGHT THERAPY. Medical BIOPTRON technologies (theory, clinical application, prospects). Proceeding. Kyiv: Publ. BIP NASU. 2009. p. 1024 (in Russian).
- 2.7. Gulyar SA, Nikula TD, Kirilenko EE, Kirilenko EK. Effects of PILER light on the visceral systems: cardio-renal effects. In: Anthology of light therapy. Medical BIOPTRON technology. Kyiv: Bogomoletz Institute of Physiology at the National Academy of Sciences of Ukraine. 2009. p. 421-29 (in Russian).
- 2.8. Gulyar SA. Medolight: basic action of LED technology. 6th Ed., augmented. Kyiv: IMIC. 2016. p. 64 (in Ukrainian).
- 2.9. Karu TI, Pyatibrat L, Kalendo G. Mar 1995. Irradiation with He-Ne laser increases ATP level in cells cultivated in vitro. *J. Photochem. Photobiol.* Mar 1995. 27(3): 219–223.
- 2.10. Karu TI. Primary and secondary mechanisms of action of visible to near-IR radiation on cells. *J. Photochem. Photobiol.* Mar 1999. B, 49(1): 1–17.
- 2.11. Karu TI, Pyatibrat LV, Kalendo GS. Photobiological modulation of cell attachment via cytochrome c oxidase. *Photochem. Photobiol. Sci. Off. J. Eur. Photochem. Assoc. Eur. Soc. Photobiol.* Feb 2004 3(2): 211–216.

- 2.12. Karu TI, Pyatibrat LV, Afanasyeva NI. A novel mitochondrial signaling pathway activated by visible-to-near infrared radiation. *Photochem. Photobiol.* Oct 2004. 80(2): 366–372.
- 2.13. Karu TI, Pyatibrat LV, Afanasyeva NI. Cellular effects of low power laser therapy can be mediated by nitric oxide. *Lasers Surg. Med.* Apr 2005. 36(4): 307–314.
- 2.14. Karu TI, Kolyakov SF. Exact action spectra for cellular responses relevant to phototherapy. *Photomed. Laser Surg.* Aug 2005. 23(4): 355-361.
- 2.15. Kubasova T, Horvath M, Kocsis K, Fenyö M. Effect of visible light on some cellular and immune parameters. *Immunology and Cell Biology.* 1995. 73: 239-244. 45
- 2.16. Kubasova T, Fenyö M, Somosy Z, Gazso L, Kertesz I. Investigations on biological effect of polarized light. *Photochemistry and Photobiology.* 1988. 48: 505-509.
- 2.17. Lane N. Mitochondrial disease: powerhouse of disease. *Nature.* Mar 2006. 440(7084): 600–602.
- 2.18. Lane N. Cell biology: power games. *Nature.* Oct 2006. 443(7114): 901–903.
- 2.19. Liu H, Colavitti R, Rovira II, Finkel T. Redox-dependent transcriptional regulation. *Circ. Res.* Nov 2005. 97(10): 967–974.
- 2.20. Moore P, Ridgway TD, Higbee RG, Howard EW, Lucroy MD. Effect of wavelength on low-intensity laser irradiation-stimulated cell proliferation in vitro. *Lasers Surg. Med.* Jan 2005. 36(1): 8–12.
- 2.21. Nikula TD. Gulyar SA. Moiseenko VO. Biyakova OV. Correction of vasoregulation and hemodynamic disorders in patients with chronic glomerulonephritis and concomitant arterial hypertension by PILER Light treatment. In: *Anthology of light therapy. Medical BIOPTRON technology.* Kyiv: Bogomoletz Institute of Physiology at the National Academy of Sciences of Ukraine. 2009. p. 597-603 (in Russian).
- 2.22. Pastore D, Greco M, Petragallo VA, Passarella S. Increase in  $\text{c-H}^+/\text{e}^-$  ratio of the cytochrome c oxidase reaction in mitochondria irradiated with helium-neon laser. *Biochem. Mol. Biol. Int.* Oct 1994. 34(4): 817–826.
- 2.23. Pinheiro AL, Meireles GC, de Barros Vieira AL, Almeida D, Carvalho CM, dos Santos JN. Phototherapy improves healing of cutaneous wounds in nourished and undernourished Wistar rats. *Braz Dent J.* 2004; 15 Spec No: S121-8.
- 2.24. Samoïlova KA, Bogacheva ON, Obolenskaya KD, Blinova MI, Kalmykova NV, Kuzminikh EV. Enhancement of the blood growth promoting activity after exposure of volunteers to visible and infrared polarized light. I. Stimulation of human keratinocyte proliferation in vitro. *Photochemical and Photobiological Sciences.* 2004. Vol.3(1): 96-101.
- 2.25. Samoïlova KA. Perspectives of using phototherapeutical apparatus BIOPTRON in medicine: an interview with professor K. A. Samoïlova by S. Stevanovich. *Klin Khir.* 2005 Jul; 7): 63-4. (in Russian).
- 2.26. Sutherland JC. Biological effects of polychromatic light. *Photochem. Photobiol.* Aug 2002. 76(2): 164–170.
- 2.27. Tuby H, Maltz L, Oron U. Induction of autologous mesenchymal stem cells in the bone marrow by low-level laser therapy has profound beneficial effects on the infarcted rat heart. *Lasers Surg. Med.* Jul 2011. 43(5): 401–409.



- 2.28. Wong-Riley MT, Liang HL, Eells JT, Chance B, Henry MM, Buchmann E, Kane M, Whelan HT. Photobiomodulation directly benefits primary neurons functionally inactivated by toxins: role of cytochrome c oxidase. *J. Biol. Chem.* Feb 2005. 280(6): 4761–4771.
- 2.29. Yu W, Naim JO, McGowan M, Ippolito K, Lanzafame RJ. Photomodulation of oxidative metabolism and electron chain enzymes in rat liver mitochondria. *Photochem. Photobiol.* Dec 1997. 66(6): 866–871.
- 2.30. Zhevago NA, SamoiloVA KA, Glazanova TV, Pavlova IE, Bubnova LN, Rosanova OE, Obolenskaya KD. Exposures of human body surface to polychromatic (visible + infrared) polarized light modulate a membrane phenotype of the peripheral blood mononuclear cells. *Laser Technology.* 2002. Vol. 12 (1): 7-24.
- 2.31. Quevli N. CELL INTELLIGENCE - the Cause of Growth, Heredity and Instinctive Actions . 1916. Cornwall Press. Minneapolis. Minn, Accessed on: 14.01.2019. Available from: <https://archive.org/details/cellintelligence00queviala/page/n3>
- 2.32. Albrecht-Buehler G, Cell Intelligence, Northwestern University, 2009. Accessed on: 14.01.2019. Available from: <http://www.basic.northwestern.edu/g-buehler/cellint0.htm>

### **3. BIOPTRON<sup>®</sup> for Wound Healing**

- 3.1. Aragona SE, Grassi FR, Nardi G, Lotti J, Mereghetti G, Canavesi E, Equizi E, Puccio AM, Lotti T. Photobiomodulation with polarized light in the treatment of cutaneous and mucosal ulcerative lesions. *J Biol Regul Homeost Agents.* Apr-Jun 2017. 31(2 Suppl. 2): 213-218.
- 3.2. Bogacheva ON, SamoiloVA KA, Zhevago NA, Obolenskaia KD, Blinova MI, Kalmykova NV, Kuz'minykh EV. Enhancement of fibroblast growth promoting activity of human blood after its irradiation in vivo (transcutaneously) and in vitro with visible and infrared polarized light. *Tsitologiya.* 2004. 46(2): 159–171.
- 3.3. Bolton P. The effect of polarized light on the release of the growth factors from the U-937 macrophage-like cell line. *Laser Ther.* 1992.7(33).
- 3.4. Colić MM, Vidojković N, Jovanović M, Lazović G. The use of polarized light in aesthetic surgery. *Aesthetic Plast. Surg.* Oct 2004. 28(5): 324–327.
- 3.5. Drozhzhin EV, Sidorkina ON. Ozone therapy and phototherapy with polarized polychromatic light in treatment of patients suffering from lower limb critical ischaemia. *Angiol Sosud Khir.* 2012; 18(4): 23-7. (in Russian).
- 3.6. Durović A, Marić D, Brdareski Z, Jevtić M, Durdević S. The effects of polarized light therapy in pressure ulcer healing. *Vojnosanit Pregl.* 2008 Dec; 65(12): 906-12.
- 3.7. Gehrke A. Influencing skin surface temperature using incoherent linear-emitted, polarised light from BIOPTRON compact light therapy device. Data on file. 2013.
- 3.8. Gulyar SA. BIOPTRON-light therapy and resources of its application in surgery. *Photobiology and photomedicine.* 2012. 9(1-2): 16-30 (in Russian).
- 3.9. Gulyar SA, Strelchenko II, Jelskii VN. Physiological mechanisms of polychromatic polarized light influence at skin injuries by high temperature. *Medical Informatics and Engineering.* 2016. 1(33): 24-35.
- 3.10. Man'kovskaya IN, Gulyar SA. Effects of polarized light on the development of the wound related process (experimental and clinical observations). In: Anthology of light therapy. Medical BIOPTRON technology. Kyiv: Bogomoletz Institute of Physiology at the National Academy of Sciences of Ukraine. 2009. p. 276-82 (in Russian).  
Hass HL. Therapeutic potentials of the BIOPTRON light: treatment of disorders in wound healing. *Krankenpfl J.* 1998 Nov; 36(11): 451-3. (in German).

- 3.11. Hass HL. The therapeutic activity of the BIOPTRON-lamp in the treatment of disorders of wound healing. Diabetic gangrene. *Krankenpfl J.* 1998 Dec; 36(12): 494- 6. (in German).
- 3.12. Iordanou P, Baltopoulos G, Giannakopoulou M, Bellou P, Ktenas E. Effect of polarized light in the healing process of pressure ulcers. *Int J Nurs Pract.* 2002. Feb; 8(1): 49-55.
- 3.13. Iordanou P1, Lykoudis EG, Athanasiou A, Koniaris E, Papaevangelou M, Fatsea T, Bellou P. Effect of visible and infrared polarized light on the healing process of full-thickness skin wounds: an experimental study. *Photomed Laser Surg.* 2009. Apr; 27(2): 261-7.
- 3.14. Medenica L & Lens M, The use of polarised polychromatic non-coherent light alone as a therapy for venous leg ulceration. *Journal of Wound Care.* 2003. 12(1): 37- 40.
- 3.15. Monstrey S, Hoeksema H, Saelens H, Depuydt K, Hamdi M, Van Landuyt K, Blondeel P. A conservative approach for deep dermal burn wounds using polarised-light therapy. *British Journal of Plastic Surgery.* 2002. 55: 420-426.
- 3.16. Monstrey S, Hoeksema H, Depuydt K, Van Maele G, Van Landuyt K, Blondeel P. The effect of polarized light on wound healing. *European Journal of Plastic Surgery.* 2002. 24(8): 377-382.
- 3.17. Sharipova MM, Voronova SN, Rukin EM, Vasilenko AM. The comparative assessment of the wound-healing effects of the treatment with the use of BIOPTRON, Minitag, Orion + apparatuses and hollow cathode lamps (experimental study). *Vopr Kurortol Fizioter Lech Fiz Kult.* 2011 Jul-Aug;(4): 42-5. (in Russian).
- 3.18. Tomashuk IP, Tomashuk II. Clinical efficacy of alprostan in combination with "BIOPTRON-II" rays and iruxol-miramistin in the treatment of the diabetic foot complicated by atherosclerosis. *Klin Khir.* 2001 Aug; (8): 49-51. (in Russian).

#### **4. BIOPTRON® in Dermatology**

- 4.1. Charakida A, Seaton ED, Charakida M, Mouser P, Avgerinos A, Chu AC. Phototherapy in the treatment of acne vulgaris: what is its role? *Am. J. Clin. Dermatol.* 2004. 5(4): 211–216.
- 4.2. Dediulescu L. The BIOPTRON light therapy. *Oftalmologia.* 2004; 48(4): 70-6. Review. (in Romanian).
- 4.3. Hass HL. Therapeutic effects of the BIOPTRON light in cosmetic medicine. Acne vulgaris. *Krankenpfl J.* 1998 Oct; 36(10): 394-5. (in German).
- 4.4. Monakhov SA, Perminova MA, Shablii RA, Korchazhkina NB, olisova Olu. The methods of phototherapy for the treatment and prevention of chronic dermatoses. *Vopr Kurortol Fizioter Lech Fiz Kult.* 2012 Jul-Aug; (4): 33-6. (in Russian).
- 4.5. Ulamec M, Soldo-Belić A, Vucić M, Buljan M, Kruslin B, Tomas D. Melanoma with second myxoid stromal changes after personally applied prolonged phototherapy. *Am J Dermatopathol.* 2008 Apr; 30(2): 185-7.

#### **5. BIOPTRON® in Sports Medicine**

- 5.1. Raeissadat SA, Rayegani SM, Rezaei S, Sedighipour L, Bahrami MH, Eliaspour D, Karimzadeh A. The effect of polarized polychromatic noncoherent light (BIOPTRON) therapy on patients with carpal tunnel syndrome. *J Lasers Med Sci.* 2014 Winter; 5(1): 39-46.

- 5.2. Stasinopoulos D, Stasinopoulos I, Johnson MI. Treatment of carpal tunnel syndrome with polarized polychromatic noncoherent light (BIOPTRON light): a preliminary, prospective, open clinical trial. *Photomed Laser Surg.* 2005 Apr; 23(2): 225-8.
- 5.3. Stasinopoulos D. The use of polarized polychromatic noncoherent light as therapy for acute tennis elbow/lateral epicondylalgia: a pilot study. *Photomed Laser Surg.* 2005 Feb; 23(1):66-9.
- 5.4. Stasinopoulos D, Stasinopoulos I. Comparison of effects of Cyriax physiotherapy, a supervised exercise programme and polarized polychromatic noncoherent light (BIOPTRON light) for the treatment of lateral epicondylitis. *Clin Rehabil.* 2006 Jan; 20(1): 12-23.
- 5.5. Stasinopoulos D, Stasinopoulos I, Pantelis M, Stasinopoulou K. Comparing the effects of exercise program and low-level laser therapy with exercise program and polarized polychromatic noncoherent light (BIOPTRON light) on the treatment of lateral elbow tendinopathy. *Photomed Laser Surg.* 2009 Jun; 27(3): 513-20.
- 5.6. Stasinopoulos D, Papadopoulos C, Lamnisis D, Stasinopoulos I. The use of BIOPTRON light (polarized, polychromatic, non-coherent) therapy for the treatment of acute ankle sprains. *Disabil Rehabil.* 2017 Mar; 39(5):450-457.
- 5.7. Tondiy OL, Ladnaya ID, Tarasova OI. Use of PILER Light in complex treatment of post neuropathic mimic muscles contractures. In: *Anthology of light therapy. Medical BIOPTRON technology.* Kyiv: Bogomoletz Institute of Physiology at the National Academy of Sciences of Ukraine. 2009. p. 645-48 (in Russian).
- 5.8. Wells J, Konrad P, Kao C, Jansen ED, Mahadevan-Jansen A. Pulsed laser versus electrical energy for peripheral nerve stimulation. *J. Neurosci. Methods.* Jul 2007. 163(2): 326–337.

## **6. BIOPTRON<sup>®</sup> for Immunity**

- 6.1. Anashkin KN, Gulyar SA, Opsha IL. Experience of BIOPTRON application in divers. In: *Anthology of light therapy. Medical BIOPTRON technology.* Kyiv: Bogomoletz Institute of Physiology at the National Academy of Sciences of Ukraine. 2009. p. 344-47 (in Russian).
- 6.2. Fenyo M, Mandl J, Falus A. Opposite effect of linearly polarized light on biosynthesis of interleukin-6 in a human B lymphoid cell line and peripheral human monocytes. *Cell Biol Int.* 2002; 26(3): 265-269.
- 6.3. Filatova NA, Knyazev NA, Kosheverova VV, Shatrova AN, SamoiloVA KA. The effect of radiation with polychromatic visible and infrared light on the tumorigenicity of murine hepatoma 22A cells and their sensitivity to lysis by natural killers. *Cell and Tissue Biology.* 2013. Vol.7(6): 573-577. 48
- 6.4. Gulyar SA. Correction of hyperbaric respiratory syndrome in divers with the help of BIOPTRON polarized light. *Clin. and Experim. Pathol.* 2004. 4(2). Part 1:101-103 (in Russian).
- 6.5. Gulyar SA, Stepanova EI, Kolpakov IE, Vdovenko VYu, Kondrashova VG. Visceral and hemic effects of PILER light in children with acute and chronic radiational impairment in the zone of Chernobyl' catastrophe. In: *Anthology of light therapy. Medical BIOPTRON technology.* Kyiv: Bogomoletz Institute of Physiology at the National Academy of Sciences of Ukraine. 2009. p. 430-42 (in Russian).
- 6.6. Gulyar SA, Strelchenko II, Jelskii VN. Influence of polychromatic polarized light combined with near-infrared radiation on neurohumoral, immune and tissue changes at burn injury. *Medical Informatics and Engineering.* 2016. 2(34): 15-20.

- 6.7. Hass HL. The effect of BIOPTRON-light in rheumatology. *Krankenpfl J.* 2000 Dec; 38(11-12): 396-7. (in German).
- 6.8. Knyazev NA., SamoiloVA KA, Filatova NA, Galaktionova AA. Effect of polychromatic light on proliferation of tumor cells under condition in vitro and in vivo – after implantation to experimental animals. *Proc SPIE.* 2009. Vol.1142: 79-86
- 6.9. Knyazev NA, SamoiloVA KA, Abrahamse H, Filatova NA. Downregulation of tumorigenicity and changes in the actin cytoskeleton of murine hepatoma after irradiation with polychromatic visible and IR light. *Photomedicine and Laser Surgery.* 2015. Vol. 33(4). P.185-192.
- 6.10. Knyazev NA, Filatova NA, SamoiloVA KA. Proliferation and tumorigenicity of murine hepatoma cells irradiated with polychromatic visible and infrared light. *Cell and Tissue Biology.* 2013. Vol.7(1): 79-85.
- 6.11. Knyazev NA, SamoiloVA KA, Abrahamse H, Filatova NA. Polychromatic Light (480-3400 nm) Upregulates Sensitivity of Tumor Cells to Lysis by Natural Killers. *Photomed Laser Surg.* 2016. Sep; 34(9): 373-8.
- 6.12. Kuznetsova LV. Babadjan VD. Frolov BM. Gulyar SA. et al. The clinical and laboratory immunology. National Textbook. Kyiv: Polygraf Plus. 2012. p.922 (in Ukrainian).
- 6.13. Nikolaeva OD. Savitskaya AV. Influence of polarized light on systemic immunity parameters in patients with pulmonary tuberculosis. In: Anthology of light therapy. Medical BIOPTRON technology. Kyiv: Bogomoletz Institute of Physiology at the National Academy of Sciences of Ukraine. 2009. p. 593-96 (in Russian).©
- 6.14. Obolenskaya K.D., SamoiloVA K.A. Comparative study of effects of polarized and nonpolarized light on human blood in vivo and in vitro. I. Phagocytosis of monocytes and granulocytes. *Laser Technology.* 2002. Vol. 12(2-3). P.7-13.
- 6.15. Roberts JE. Visible light induced changes in the immune response through an eye-brain mechanism (photo neuroimmunology). *J. Photochem. Photobiol. B,* Jul 1995. 29(1): 3–15.
- 6.16. SamoiloVA KA, Zubanova OI, Snopov SA, Mukhuradze NA, Mikhelson VM. Single skin exposure to visible polarized light induces rapid modification of entire circulating blood.
- 6.17. SamoiloVA KA, Obolenskaya KD, Vologdina AV, Snopov SA, Shevchenko EV. Single skin exposure to visible polarized light induces rapid modification of entire circulating blood.
- 6.18. SamoiloVA KA, Zimin AA, Buinyakova AI, Makela AM, Zhevago NA. Regulatory systemic effect of postsurgical polychromatic light (480-3400 nm) irradiation of breast cancer patients on the proliferation of tumor and normal cells in vitro. *Photomedicine and Laser Surgery.* 2015. Vol. 33(11): 555-563.
- 6.19. Voronenko YuV. Kuznetsova LV. Gulyar SA. et al. Allergology (Manual). Kyiv. 2009. p. 366 (in Ukrainian).
- 6.20. Young S, Bolton P, Dyson M, Harvey W, Diamantopoulos C. 1989. Macrophage responsiveness to light therapy. *Lasers Surg. Med.* 9(5): 497–505. 49
- 6.21. Zhevago NA, SamoiloVA KA, Obolenskaya KD. The regulatory effect of polychromatic (visible and infrared) light on human humoral immunity. *Photochemical and Photobiological Sciences.* 2004. Vol.3(1): 102-108.

- 6.22. Zhevago N, Samoilova KA. Modulation of proliferation of peripheral blood lymphocytes after irradiation of volunteers with polychromatic visible and infrared light. *Cytology*. 2004. 46(6): 567-577.
- 6.23. Zhevago NA, Samoilova KA. Pro- and anti-inflammatory cytokine content in the human peripheral blood after its transcutaneous and direct (in vitro) irradiation with polychromatic visible and infrared light. *Photomedicine and Laser Surgery*. 2006. Vol. 24(2): 129-139.
- 6.24. Zhevago NA, Samoilova KA, Calderhead RG. Polychromatic light similar to the terrestrial solar spectrum without its UV component stimulates DNA synthesis in human peripheral blood lymphocytes in vivo and in vitro. *Photochemistry Photobiology*. 2006. Vol. 82(5): 1301-1308.
- 6.25. Zhevago NA, Samoilova KA, Davydova NI, Bychkova NV, Glazanova TV, Chubukina ZhV, Buñiakova AI, Zimin AA. The efficacy of polychromatic visible and infrared radiation used for the postoperative immunological rehabilitation of patients with breast cancer. *Vopr Kurortol Fizioter Lech Fiz Kult*. 2012 Jul-Aug;(4): 23-32. (in Russian).
- 6.26. Zhevago NA, Zimin AA, Glazanova TV, Davydova NI, Bychkova NV, Chubukina ZV, Buinyakova AI, Ballyuzek MF, Samoilova KA. Polychromatic light (480-3400 nm) similar to the terrestrial solar spectrum without its UV component in post-surgical immune rehabilitation of breast cancer patients. *J Photochem Photobiol B*. 2017. Jan; 166: 44-51.

## **7. BIOPTRON<sup>®</sup> for Pain Relief**

- 7.1. Ballyzek MF, Vesović-Potić V, He X, Johnston A. Efficacy of polarized, polychromatic, noncoherent light in the treatment of chronic musculoskeletal neck and shoulder pain. 2005. Unpublished material, BIOPTRON AG, Wollerau, Switzerland.
- 7.2. Gulyar SA. Limansky YuP. Tamarova ZA. Bidkov EG. Analgesic effects of BIOPTRON PILER Light. *General Practitioner J*. 1999. 4:21-23
- 7.3. Gulyar SA. Limansky YuP. Tamarova ZA. Pain and BIOPTRON: Treatment of pain syndromes by polarized light. Kyiv: Publ. ZEPTER. 2000. p. 80 (in Russian).
- 7.4. Gulyar SA. Limansky YuP. The mechanisms of primary reception of electromagnetic waves of optical range. *Fiziol. J*. 2003.49(2): 35-44 (in Russian).
- 7.5. Gulyar SA. Limansky YuP. Biofizyczne podstawy laseropunktury oraz mechanizmy działania fal elektromagnetycznych spektrum widzialnego. Biophysical basis of BIOPTRON light puncture and mechanisms of primary reception of electromagnetic waves of optical range. *Akupunktura Polska*. 2004. 30(1): 1097-1123 (in Polish).
- 7.6. Gulyar SA. Limansky YuP. Tamarova ZA. Pain and Color: Treatment of pain syndromes by color polarized light. Kyiv: Publ. Biosvet. 2004. p. 120 (in Russian).
- 7.7. Gulyar SA. Limansky YP. Tamarova ZA. Suppression of pain by influence of BIOPTRON Polarized Light on acupoints. *European Journal of Pain*. 5th Congress of the European Federation of IASP Chapters (EFIC). Istanbul. Sept. 13-16. 2006. 10(1): S212.
- 7.8. Gulyar SA. Kosakovsky AL (Eds) BIOPTRON PILER Light application in medicine (teaching and methodical manual for physicians). Kyiv: publishers of AA.Bogomoletz Institute of Physiology at National Academy of Sciences of Ukraine and PL. Shupyk Kyiv Medical Academy of Postgraduate Education at Ministry of Health of Ukraine. 2006. 152 p. (in Ukrainian).
- 7.9. Gulyar SA. Kosakovsky AL (Eds) BIOPTRON PILER Light application in medicine (teaching and methodical manual for physicians). 2nd Ed. Kyiv: publishers of AA.Bogomoletz Institute of Physiology at National Academy of Sciences of Ukraine and PL. Shupyk National Medical Academy of Postgraduate Education at Ministry of Health of Ukraine. 2011. p. 256 (in Russian).

- 7.10. Gulyar SA. Tamarova ZA. Physiological mechanisms of polarized light influence on pain. *Medical Informatics and Engineering*. 2016. 1(33): 41-46. 50
- 7.11. Gulyar SA. Tamarova ZA. Analgesic Effects of the Polarized Red+Infrared LED Light. *Journal of US-China Medical Science*. 2017. 14(2) Mar.-Apr. (Serial Number 106): 47-57.
- 7.12. Gulyar SA. Tamarova ZA. Analgesic and Sedative Effects of Blue LED Light in Combination with Infrared LED Irradiation. *Journal of US-China Medical Science*. 2017. 14(4). July-Aug. (Serial Number 108): 143-156.
- 7.13. Gulyar SA. Tamarova ZA. Anti-pain and sedative action of polychromatic polarized light which passed through nano modification by Fullerene or graphene. *Proc. XLVII Internat. Sci-Pract. Conf. Kyiv. October. 12-14. 2017. Kyiv. 2017. p. 95-97.*
- 7.14. Katz EJ. Ilev IK. Krauthamer V. Kim DH. Weinreich D. Excitation of primary afferent neurons by near-infrared light in vitro. *Neuroreport*. Jun 2010. 21(9): 662– 666.
- 7.15. Limansky Yu.P. Tamarova ZA. Gulyar SA. Bidkov EG. Examination of polarized light analgesic action on acupuncture points. *Fiziol. Zhurnal*. 2000. 46(6): 105-111.
- 7.16. Limansky YP. Tamarova ZA. Gulyar SA. Suppression of visceral pain by action of the low intensity polarized light on antinociceptive points of acupuncture. *Fiziol. Zhurnal J*. 2003. 49(5):43-51 (in Russian).
- 7.17. Limansky YP. Tamarova ZA. Gulyar SA. Parallel testing of analgesia evoked by polarized light and analgetics. *Fiziol. Zhurnal*. 2005. 51(2): 57-64 (in Russian).
- 7.18. Limansky YP. Tamarova ZA. Gulyar SA. Suppression of pain by exposure of acupuncture points to polarized light. *Pain Res. Manag*. 2006. Spring. 11(1):49-57.
- 7.19. Limansky YP. Gulyar SA. Tamarova ZA. BIOPTRON-Analgesia: 10. The participation of the opioidergic system in the analgesic effect of polarized light on the analgesic acupuncture point. In: *Anthology of light therapy. Medical BIOPTRON technology. Kyiv: Bogomoletz Institute of Physiology at the National Academy of Sciences of Ukraine. 2009. p. 266-75 (in Russian).*
- 7.20. Ozdemir F. Birtane M. Kokino S. The clinical efficacy of low-power laser therapy on pain and function in cervical osteoarthritis. *Clin. Rheumatol*. 2001. 20(3): 181– 184.
- 7.21. Tamarova ZA. Limansky YuP. Gulyar SA. Antinociceptive effects of color polarized light in animal formalin test model. *Fiziol. J*. 2009. 55(3): 81-93 (in Russian).
- 7.22. Zamorsky II. Gulyar SA. Changes of prooxidant-antioxidant homeostasis in front brain of rats under the influence of BIOPTRON device polarized light on acupuncture point. *Fiziol. Zhurnal*.

## **8. BIOPTRON® in Dentistry**

- 8.1. Denis TGS, Dai T, Hamblin MR. Killing bacterial spores with blue light: when innate resistance meets the power of light. *Photochemistry and Photobiology*. 2013. 89(1): 2–4.
- 8.2. Pärnänen P. Tervahartiala T. Sorsa T. Gieselmann D. McNamara MM. Oral Phototherapy with BIOPTRON MedAll and Periosafe - aMMP-8 test. University of Helsinki and Helsinki University Hospital. IADR Conference, San Francisco, USA. March 2017. Poster Presentation for Novel Approaches to treat Periodontal Disease.

## **9. BIOPTRON<sup>®</sup> for SAD**

- 9.1. Avery DH, Kizer D, Bolte MA, Hellekson C. Bright light therapy of subsyndromal seasonal affective disorder in the workplace: morning vs. afternoon exposure. *Acta Psychiatr. Scand.* Apr 2001. 103(4): 267–274.
- 9.2. Eastman CI, Young MA, Fogg LF, Liu L, Meaden PM. Bright light treatment of winter depression: a placebo-controlled trial. *Arch. Gen. Psychiatry.* Oct 1988. 55(10): 883–889. 51
- 9.3. Golden RN, Gaynes BN, Ekstrom RD, Hamer RM, Jacobsen FM, Suppes T, Wisner KL, Nemeroff CB. The efficacy of light therapy in the treatment of mood disorders: a review and meta-analysis of the evidence. *Am. J. Psychiatry.* Apr 2005. 162(4): 656–662.
- 9.4. Lam RW, Levitt A. Canadian Consensus Guidelines for the Treatment of SAD, A Summary of the Report of the Canadian Consensus Group on SAD, *Can J Diagnosis* 1998; Suppl.
- 9.5. Lee TM, Chan CC. Dose-response relationship of phototherapy for seasonal affective disorder: a meta-analysis. *Acta Psychiatr. Scand.* 1999. 99(5): 315–323.
- 9.6. Partonen T, Lönnqvist J. Bright light improves vitality and alleviates distress in healthy people. *J. Affect. Disord.* Mar 2000. 57(1–3): 55–61.

## **10. BIOPTRON<sup>®</sup> in Pediatrics**

- 10.1. Burkin I, Okateyev V. The use of BIOPTRON Light Therapy in the treatment of children with musculoskeletal injuries. Clinical Experience Report. Traumatology Department. Sperandsky; Municipal Children’s Hospital. Moscow. Russia. 2004.
- 10.2. Cerná O. The BIOPTRON Light Therapy in the life support and intensive care unit. Congress Proceedings. Prague. Czechoslovakia. 2005.
- 10.3. Khan MA. Report on use of BIOPTRON polychromatic incoherent polarized light in paediatrics. Russian Scientific Centre of Reconstructive Medicine and Balneotherapy. Moscow. Russia. 2001.
- 10.4. Khan MA, Erdes SI. Clinical efficiency of BIOPTRON polychromatic polarized light in the treatment of atopic dermatitis and frequent respiratory diseases in children. *Allergology and Immunology in Paediatrics.* 2008. N3 (14).

## **11. BIOPTRON<sup>®</sup> in Veterinary Medicine**

- 11.1. Faculty of Veterinary Medicine. University of Belgrade. The Effects of BIOPTRON light therapy on wound healing in Dogs. Internal Report. Belgrade. Serbia.
- 11.2. Gulyar S, Tamarova Z. Analgesic Effects of the polarized red+infrared LED light. *Journal of US-China Medical Sciences.* 2017. 14:47-57
- 11.3. Kehrli, J. Ulrich A. 1988. Therapeutic Lamp Emitted Polarized Light (BIOPTRON). Patent (USA) 5. 001. 608. -P8.
- 11.4. Kehrli J. Ulrich A. 1989. Patent (European) EP 0 311 125 B1. European Patent Office (BIOPTRON). - P9.

11.5. Limansky Y. Gulyar S. Tamarova Z. 2009. BIOPTRON-Analgesia: 12. Role of Color in Tonic Pain Suppression. In Anthology of Light Therapy. Medical BIOPTRON Technologies. Kyiv: Bogomoletz Institute of Physiology at the National Academy of Sciences of Ukraine. 722-31. (in Russian)

11.6. Limansky Y. Gulyar S. Tamarova Z. 2009. BIOPTRON-Analgesia: 2. Comparative Estimation of Antinociceptive Action of Polarized and Non-polarized Light. In Anthology of Light Therapy. Medical BIOPTRON Technologies. Kyiv: Bogomoletz Institute of Physiology at the National Academy of Sciences of Ukraine, 190-203. (in Russian)

11.7. Radojčić B, Jestrović D. 2018. The effect of BIOPTRON HLPL in the treatment of high-milk cow mastitis, University of Belgrade, Faculty of Veterinary Medicine, Veterinary office Vet-Velvet, Acta Veterinaria Brno (In press)

## **12. BIOPTRON® Quantum Hyperlight**

12.1. Filimonova NB. Makarchuk NE. Gulyar SA. Influence of short-term ocular exposition of fullerene light on the activity of default chains of the human brain. Proc. XLVII Internat. Sci-Pract. Conf, Kyiv. October. 12-14. 2017. Kyiv. 2017. p. 118-120. 52

12.2. Gulyar SA. Tamarova ZA. Modification of Polychromatic Linear Polarized Light by Nanophotonic Fullerene and Graphene Filter Creates a New Therapeutic Opportunities. Journal of US-China Medical Science. 2017. Koruga, Dj., Hyperpolarized Light: Fundamentals of nano-medical photonics. Submitted for publication, Zepther Book World 2017.

12.3. Koruga, Dj., Optical filter and method of manufacturing an optical filter, Patent: PCT/EP2016/063174, Applicant Fieldpoint, Cyprus, ZEPTER GROUP, 2016

12.4. Litchinitser MN. Structured Light Meets Structured Matter. Science. Aug 2012: Vol. 337, Issue 6098, pp. 1054-1055

12.5. Piazza L, Lummen TTA, Quiñonez E, Murooka Y, Reed BW, Barwick B, Carbone F. Simultaneous observation of the quantization and the interference pattern of a plasmonic near-field. Nat. Commun. 2015.6: 6407.

12.6. Ting L, Klein R, Knio O, Vortex Dominated Flows: Analysis and Computation for Multiple Scale Phenomena, Springer, Berlin, 2007

## **13. BIOPTRON® for Anti-Ageing**

13.1. Beguin A. One month Treatment with BIOPTRON® 2 Lamp on 10 Subjects. Cosmetic efficacy Results. 2003. Skin Test Institute. Intercosmetica Neuchatel SA. Neuchatel. Switzerland.

13.2. Beguin A, Vranic S. (1) Evaluation of the enhanced cosmetic efficacy of cosmetic products due to the synergistic activity with BIOPTRON® Pro 1 light therapy system. (2) Evaluation of the cosmetic efficacy of the BIOPTRON® Pro Light therapy system. One and Two Month test results. 2007. Skin Test Institute. Intercosmetica Neuchatel SA. Neuchatel. Switzerland.

13.3. Gulyar SA. Antioxidant profile and longevity. Kyiv: Publ. ZEPTER. 1999. p. 48 (in Russian).

13.4. Gulyar SA. (ed.). BIOPTRON-Color Therapy, Handbook. Kyiv: Zepther, 1999. p. 104 (in Russian).



13.5. Vranic S. 8-week cosmetic efficacy study of BIOPTRON<sup>®</sup> Pro 1 device for anticellulite performance on 11 Caucasian female volunteers. Product applications with the Vita Hand Massager. 2013. Skin Test Institute. Intercosmetica Neuchatel SA. Neuchatel. Switzerland.

13.6. Vranic S. 8-week cosmetic efficacy study of BIOPTRON<sup>®</sup> Pro 1 device for anticellulite performance on 11 Caucasian female volunteers. Product applications with bare hands. 2013. Skin Test Institute. Intercosmetica Neuchatel SA. Neuchatel. Switzerland.

13.7. Vranic S. BIOPTRON<sup>®</sup> and Raman Effect. Activation of skin moisturisation. 2017. Skin Test Institute. Intercosmetica Neuchatel SA. Neuchatel. Switzerland (In progress).

#### **14. BIOPTRON<sup>®</sup> for Hair Disorders**

14.1. Vranic S. 8-week. Pilot cosmetic efficacy study of BIOPTRON<sup>®</sup> Pro 1 device for scalp treatment on 6 Caucasian female volunteers. Assessment on scalp and hair. 2012. Skin Test Institute. Intercosmetica Neuchatel SA. Neuchatel. Switzerland

14.2. Vranic S. 8-week. Pilot cosmetic efficacy study of BIOPTRON<sup>®</sup> Pro 1 device for hair shedding reduction on 6 Caucasian female volunteers. 2012. Skin Test Institute. Intercosmetica Neuchatel SA. Neuchatel. Switzerland.

14.3. Vranic S. 8-week. Evaluation of the combined cosmetic efficacy of BIOPTRON<sup>®</sup> Pro 1 device and a hair treatment (3 products) in reducing hair loss. 8-week monocentric efficacy study on 10 healthy Caucasian male and female volunteers. 2014. Skin Test Institute. Intercosmetica Neuchatel SA. Neuchatel. Switzerland. BIOPTRON AG. Research CTE09B/R, unpublished material, 2013. BIOPTRON AG. Research CTE202B/R, unpublished material, 2013. BIOPTRON AG. Research CTE150B/R, unpublished material, 2013. 53

#### **15. Circadian Rhythm**

15.1. Pandi-Perumal SR, BaHammam AS, Brown GM, et al. Melatonin antioxidative defense: therapeutical implications for aging and neurodegenerative processes. Neurotox Res. 2013 Apr; 23(3):267-300.

15.2. Feng Z, Qin C, Chang Y, Zhang JT. Early melatonin supplementation alleviates oxidative stress in a transgenic mouse model of Alzheimer's disease. Free Radic Biol Med. 2006 Jan 1;40(1):101-9.

15.3. Borah A, Mohanakumar KP. Melatonin inhibits 6-hydroxydopamine production in the brain to protect against experimental parkinsonism in rodents. J Pineal Res. 2009 Nov; 47(4):293-300.

15.4. Reiter RJ, Sainz RM, Lopez-Burillo S, Mayo JC, Manchester LC, Tan DX. Melatonin ameliorates neurologic damage and neurophysiologic deficits in experimental models of stroke. Ann N Y Acad Sci. 2003 May; 993:35-47; discussion 48-53.

15.5. Chang HM, Wu UI, Lan CT. Melatonin preserves longevity protein (sirtuin 1) expression in the hippocampus of total sleep-deprived rats. J Pineal Res. 2009 Oct; 47(3):211-20.

15.6. Bubenik GA, Konturek SJ. Melatonin and aging: prospects for human treatment. J Physiol Pharmacol. 2011 Feb; 62(1):13-9.

15.7. Wang JZ, Wang ZF. Role of melatonin in Alzheimer-like neurodegeneration. Acta Pharmacol Sin. 2006 Jan;27(1):41-9.

15.8. Wu YH, Swaab DF. The human pineal gland and melatonin in aging and Alzheimer's disease. *J Pineal Res.* 2005 Apr; 38(3):145-52.

15.9. Atanassova PA, Terzieva DD, Dimitrov BD. Impaired nocturnal melatonin in acute phase of ischaemic stroke: cross-sectional matched case-control analysis. *J Neuroendocrinol.* 2009 Jul; 21(7):657-63.

## **16. Biophotons**

16.1. Rattemeyer M, Popp FA, Nagl W. Evidence of photon emission from DNA in living systems, 1981; 68 (11): 572-573.

16.2. Popp FA, Li K, Gu Q. Recent advances in biophoton research and its application, World scientific, 1992; 1-18.

16.3. Popp FA, Quao G, Ke-Hsuen L. Biophoton emission: experimental background and theoretical approaches, *Modern Physics Letters B*, 1994; (21-22) 8.

16.4. Popp FA, Chang JJ, Herzog A, Yan Z, Yan Y. Evidence of non-classical (squeezed) light in biological systems. *Physics Letters A*, 2002; 293 (1-2):98-102.

16.5. Cohen S, Popp FA. Biophoton emission of the human body. *Journal of Photochemistry and Photobiology B: Biology*, 1997; 40(2): 187-189.



**BIOPTRON<sup>®</sup>**   
HYPERLIGHT THERAPY SYSTEM By Zepher Group

