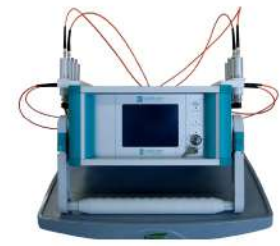


# Weber Medical:



- Products Made in Germany
- Focus on evidence-based medicine → cooperation with several research institutions
- Established in 2003 after many years of research and development in the field of medical lasers
- Received financial aid from the German government and the European Union in 2004 for the development of the world's first multichannel laser systems for invasive laser therapy
- CE approval since 2005 → 12 years of clinical experience with data from more than 1500 clinics worldwide
- Weber Medical has quickly become one of the world's leading companies in medical laser technology
- Weber Medical operates treatment and training centers in Germany and Thailand
- With the aim of building a worldwide distribution, research and education network the company founded the International Society for Medical Laser Applications (ISLA e.V.) in 2006
- Weber Medical is undertaking constant research and development in cooperation with different universities worldwide to ensure high standards and a continuous development of the products

# Technical Information and Comparison to Other Devices:



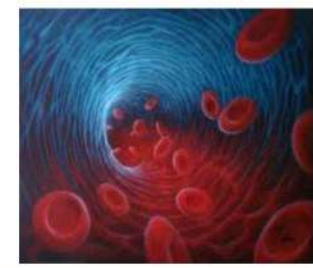
- The Weberneedle® laser devices are *modular systems* that can be equipped with up to **12 lasers with different wavelengths/ colors**
- FDA, CE and other international approvals
- Disposables such as needles and catheters available at a reasonable price
- Using real lasers instead of cheap LED technology (coherent light with high specificity to various cellular components and deeper penetration in blood and tissue)
- All available wavelengths/ colors (infrared, red, green, blue, yellow, ultraviolet) available
- Weberneedle® devices can also be used for external (superficial), interstitial and intra-articular applications (regenerative therapies for pain, osteoarthritis, chronic spine syndromes etc.) as well as for photodynamic cancer therapy
- Weberneedle® technology offers different needles: IV needles for intravenous application, interstitial needles with different lengths (4-12cm) for interstitial and intra-articular applications and 3-way needles for simultaneous infusion and IV laser therapy

# The Inventor: Michael Weber, MD



- Dr. Michael Weber is a medical practitioner for more than 30 years in Germany and leader of three medical centers for general and internal medicine, pain management and cancer treatment
- Besides his MD diploma he's also a certified bio-chemist who is working in research with many national and international institutions and universities
- He is president of the International Society for Medical Laser Applications, editor in chief of the International Journal for Medical Laser Applications and co-editor of several other medical journals
- He is also developer of the patented Weberneedle® medical laser devices which were financially supported by the German government and the European Union

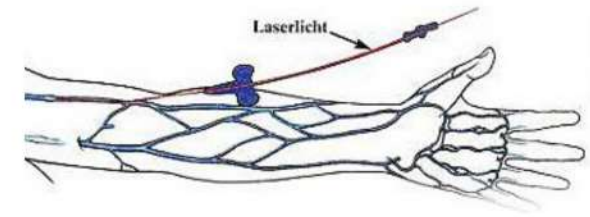
# History of Systemic Light Therapy:



## 1. UV Light Therapy (UVBI):

- In 1903 a Nobel Prize was awarded for the observation that cutaneous TB can be cured by UV light. The practice of UV light therapy began in the 1920s when a UV therapy device was developed for extracorporeal treatment of the blood by Emmet Knott
- The technique was called Ultraviolet Blood Irradiation (UVBI), Hematogenous Oxygenation Therapy (HOT) or Extracorporeal Photophoresis
- At that time, the therapy was conducted extracorporally (withdrawal of 60 cc's of blood, brief irradiation with UV light and return into patient's bloodstream)
- It was used in the 1930's to 1950's to combat polio virus and other medical conditions including pneumonia, tuberculosis and cancer
- The advent of antibiotics led to a decline in the use of UVBI as a treatment option
- Nowadays, with an increasing incidence of antibiotic resistant infections and a desire for more natural therapies, UV light therapy is enjoying rising popularity again
- Today UV light is also used to sterilize surgical instruments to eliminate MRSA etc. and in transfusion medicine for sterilizing blood probes from bacteria and viruses

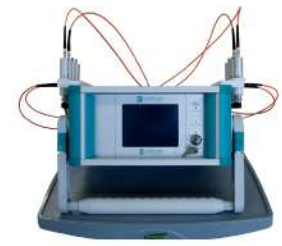
# History of Systemic Light Therapy:



## 2. Systemic Laser Therapy in Russia:

- The method of intravenous laser blood irradiation was first introduced into therapy by the Soviet scientists E.N.Meschalkin and V.S.Sergiewski in 1981 [37] for the treatment of cardiovascular diseases
- A red light laser (632nm) with a power of 1-3 mW was used for 20-60 min
- Improvement of rheologic properties of the blood as well as improvement of microcirculation and reduction of the area of infarction had been proved. Further reductions of dysrhythmia and sudden cardiac death occurred [5,24]
- In the years after, many (for the most part Russian) studies showed various effects on many organs and on the hematologic and immunologic system
- Besides clinical research and application for patients, the cell biological basis was developed by the Estonian cell biologist Tiina Karu at the same time. A summary can be found in her work “The Science of Low-Power Laser-Therapy” [21]

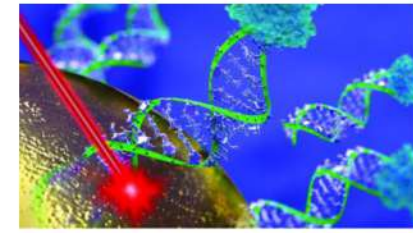
# History of Systemic Light Therapy:



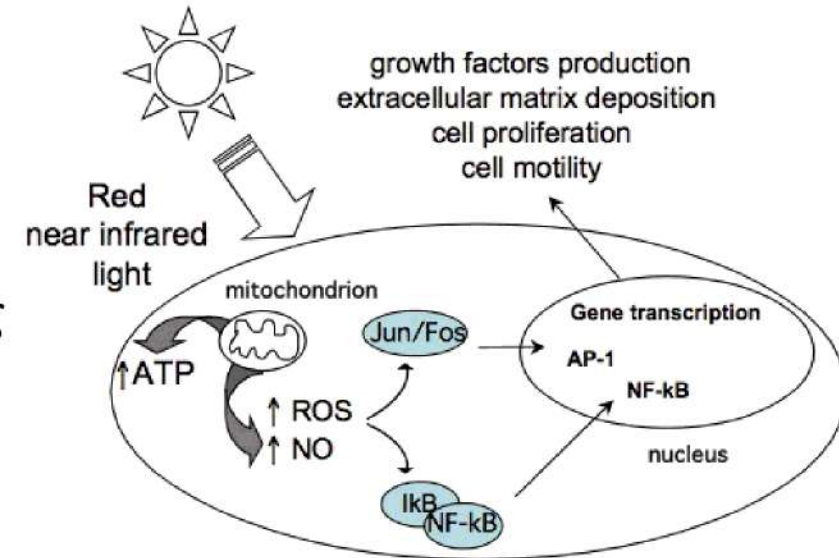
## 3. Developments in Germany:

- First machine with red laser 635nm according to Russian technology was approved in Europe in 2005
- First case studies on patients confirmed Russian data
- Distribution of technology started with simultaneous collection of data and studies from different clinics
- In 2007 first green diode was developed
- In 2008 first blue diode was developed
- In 2013 first yellow diode was developed
- In 2016 first ultraviolet diode was developed

# Biochemical Mechanisms:

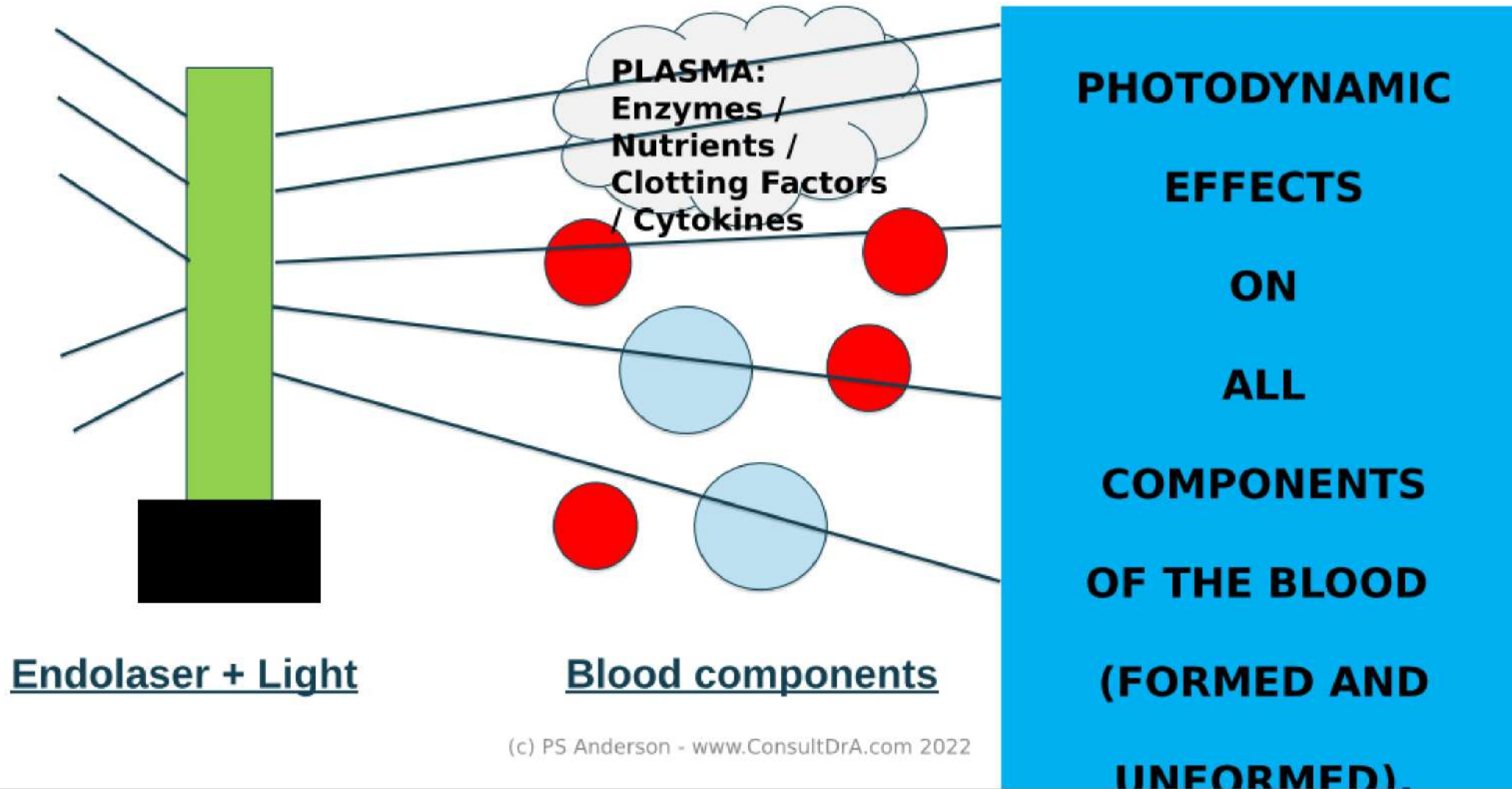
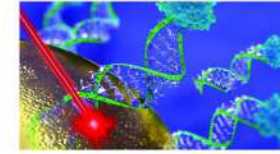


- In general, there are specific cellular structures that are able to absorb specific wavelengths (colors) of light (known as photoreceptors)
- The light stimulus gives a cellular signal affecting the chemical behavior, metabolism, movement and gene expression
- All associated enzymes and/or proteins are now affected
- This cascade event can ripple across an entire cell



Hamblin:  
<http://photobiology.info/Hamblin.html>

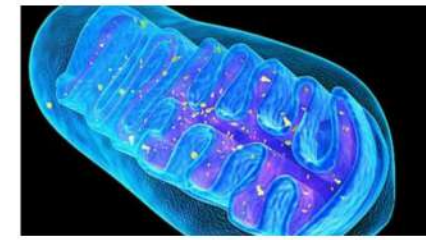
# Photobiomodulation: Serum-Plasma / RBC / WBC



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# Absorption of Different Light Wavelengths (Colors) in Mitochondria



- One example for the absorption of different colors within cells is the process in the mitochondrial respiratory chain [21]
- Complex 1 (NADH dehydrogenase) absorbs blue and ultraviolet light
- Complex 3 (cytochrome c reductase) absorbs green and yellow light
- Complex 4 (cytochrome c oxidase) absorbs red and infrared light

