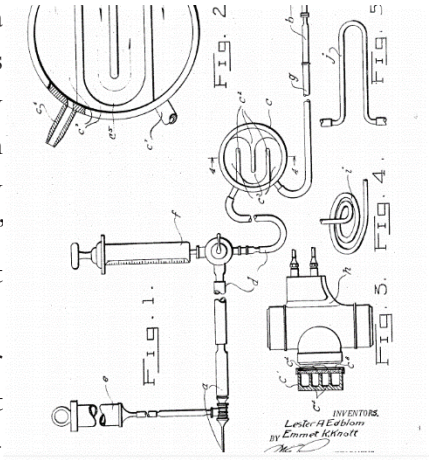
– CHAPTER NINE –

UBI Machines

Light generated and what makes for a good therapy?

Sometime around 1923, Emmet Knott and his colleague Lester Edblom began to think – "Let's cure bloodstream infections with light." These mid-20-year-old entrepreneurs and researchers took it on themselves to begin the process.



Where can I get a UV light source? What glass lets UV light through? How do I get the blood to travel in something that would allow for the blood to get "rayed?" What is too much light, what is too little?

This was a 5-year journey, and they were in it together. Their theory obtained from the patent was that: [1] UV light will kill infections that are in the blood. They speculated that:

1. Treating with UV light removed toxins from the infected person's bloodstream
2. Beneficial energy is stored up in the rayed blood…and when returned, it will throw off secondary radiations which will stimulate and energize the patient

The simple design gave us the first UBI patent in 1928. There were a number of challenges, but foremost was the cuvette (exposure device for blood) and the water-cooled UV light generator.

The generating light is one main component of UBI therapy.

- What intensity is best?
- What wavelengths?
- How is it delivered to the blood?
- When does overdosing occurs?
- Might it heat up the blood too much?

UBI Has No Serious Critics

Dillon says it well "The curious reality is that UBI has no serious critics. A serious critic would read widely in the UBI medical literature, carefully study the photobiological and pharmacological mechanisms of UBI, consult extensively with UBI practitioners, and conduct well-conceived and objective clinical trials. Nor do there appear to be any serious criticisms of UBI, i.e., criticisms that are based on in-depth knowledge and evidence."

From the years 1933-1952, Knott therapy was powerful against infections. We must admit that Emmet Knott and his fellow physicians had thousands of patients that had only one treatment and recovered. Many had 3 or 4 treatments and recovered from very serious disorders. They included polio, acute hepatitis, pyogenic (pus producing) infections, pneumonia, tuberculosis, pelvic inflammation (associated with pregnancy),

and septicemia. These disorders produced infections that, at that time, could not easily be remedied. This is a pre-antibiotic time.

I have talked with many of today's physicians that have said, "Things have changed. The diseases and conditions are harder to treat today than they were 30 years ago." Many would point to reduced nutrition in our food, pesticide and herbicides, antibiotics, compromised gut health, and a general decline in exercise and poor mental health (i.e., stress) as major factors in this. It makes treatment a multifaceted "animal." There are many tools in the toolbox of alternative medicine physicians today. For Knott, Rebbeck, and others, UBI was a godsend. They had one tool to combat inflammation, infection, poor oxygenation, and even autoimmune disorders.

Today it may take more treatments than in Knott's day, but the UBI therapies seems a bit gentler but still effective. You may like to skip to the next chapter, but from a scientist's perspective, it may be beneficial to look at the energy levels of Knott's original machine.

Knott's Energy Level

One of the best quantifications comes from the AMA in a 1952 paper. [2] This paper had the distinct purpose of discrediting Dr. Knott and his therapy.

From their study, I think that we can trust that they measured the light properly (a Burdick water-cooled ultraviolet generator). They even listed that Dr. Frank Oppenheimer did the testing.

> *"The lamp submitted to us was an ultraviolet mercury lamp with a 250-watt alternating current burner. Measurements with phototubes at 2 cm. distance gave the following results:*

4 milliwatts energy below 2,800 A.

12 milliwatts energy between 2,800 A. -3,800 A.

10 milliwatts energy in visible light.

8 milliwatts energy in infrared.

The total ultraviolet emission at 2 cm. is therefore approximately 16 milliwatts, and about 10% of this is in the spectral band of 2,537 A. The energy output of ultraviolet rays is considerable, but the emission in the sterilizing range of 2,537 A. or below is relatively low. Furthermore, the quartz plate, which is 2 mm. thick, absorbs approximately 10% of the ultraviolet energy. As a sterilizing lamp, therefore, the Knott hemo-irradiator is not an efficient burner." (meaning sterilizer)

I have included the total quote to hint at the AMA's (in particular, its president, Morris Fishbein's) intention. In the same study, they quote from E.M. Knott that UBI works on the premise of the body's ability to "increase bactericidal properties" and "enables it to overcome the infection," and it seems to be "indirect action."

Knott had stated earlier, and restated later, that he had revised his original theory – that UBI was not killing bacteria directly. UBI was not a sterilizer of the blood. He knew that only a small portion of bacteria would be affected by the light. Now, 20 years after Knott had revised his theory, facts did not stop the AMA from testing and claiming that Knott's machine was a poor sterilizer.

Dynamics of UBI Devices

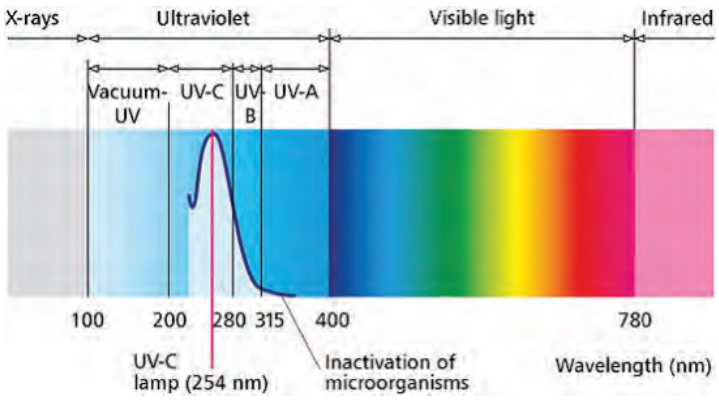
UBI units that are currently available include a number of the smaller UBI units from Germany and Canada that use a 6"

UV fluorescent bulb. Often there are one or two of these bulbs in the unit. This is woefully negligent compared to the energy put out by the Knott machine. The units are also deficient in cuvette surface area, blood flow, and surround lighting.

There are reasons to look at the Knott machine as antiquated, but to discount the energy output and the success rate of patients is myopic. A number of today's machines do not even come close to the energy output of the Knott machine as is discussed later in this chapter. There are more things to measure than output, but the basics of energy consideration are milliwatts per centimeter squared per second or $mW/cm^2/second$. This indicates energy on a square centimeter of surface area for a period of time.

Let's just say that the Knott machine had a lot of light energy…so much that they put in a shutter to block some of the light. There was also a lot of heat from the bulb that they had to deal with. That is not the problem of today. This is discussed more extensively in the Knott's Tortuous Turbulation Cuvette Chapter that follows.

The Electromagnetic Spectrum



Here is what we know:

1. Blood absorbs light energy, and it causes biological effects on the mechanism of the blood cells and other blood components.
2. UVC light is germicidal (kills germs – i.e., bacteria, virus, yeast)

What is known about these three waveband lengths of light, and their apparent healing properties can be studied in great depth? In this presentation, we fly high (an overview) … and dive in a bit lower at times.

Light is energy. Wavelength determines some of the characteristics that are used for therapy.

- **UVC –** 200-280 is the shortest wavelength and has the best germicidal qualities
- **UVB** – a bit longer at 280 - 315
- **UVA** – 315-400 longer yet and bordering on the visible spectrum of blue light

Blood Absorbs Light

One aspect of good therapy considers light and its absorption into blood products. The reference below considers what wavelengths are best absorbed by RBCs or Red Blood Cells. This is an important aspect when using various light sources.

> *"The outstanding absorption peaks appeared at 416, 542, 578nm in the absorptions curve of RBC, but there were also absorption peaks at 282, and 345 mm. The absorbance of RBC almost reached zero, and no characteristic absorption peaks between 600-800nm wavelength were observed."*[3]

What are the actions of UV light as a therapy for human diseases and conditions?

1. **Germicidal** – Inactivation of pathogens in the blood caused by an immune response and also anti-inflammatory effects were observed that improved the immunologic activity of the blood. [4]
2. **Rheological Effects** - increase in the oxygen-combining power of the blood and oxygen transportation to organs, vasodilation, decreased viscosity of blood, improved microcirculation, improvement in peripheral circulation, increased erythrocyte production, and decreased platelet aggregation. Improved deformability of erythrocytes results in an improved oxygen supply. [5]

   From an expert on this comes:"At the same time the leading role has membrane modification activity of UV radiation on erythrocytes, leukocytes, and thrombocytes, which determines, on the one hand, changes in functional state and properties of these cells, and on the other - elimination from and entering in the blood circulatory channel different biologically active substances and components of the cell surface"

3. **Immune boosting -** UBI stimulates the activity of white blood cells raising the anti-disease ability of the body. Dr. Gasparyan wrote:

   The bactericidal activity of extracorporeal UBI is implemented by double ways - not only and not so much due to the direct bactericidal effect of UV ray, as due to activity of the immune answer of the organism. Extracorporeal UBI results in changes of functional trends of all parts of immuno-defence. [6]

4. **Auto Immune's positive response** – When our body is attacking itself, we find that UBI will destroy

excess amounts of various white blood cells. In autoimmune disorders, it appears that the metabolically active T-cells and other immune cells are in greater quantity and absorb much greater numbers of biophotons than ordinary body cells, and this destroys them, thus slowing down or stopping the disease. [7]

Which Band of UV Light is Best?

Facts About UVC

All three of the bands A, B, & C are absorbed by the whole blood, but only one is recognized for its germicidal effects. UVC's maximum killing power is at around 260 nm, and the transmission of a Hg low-pressure fluorescent bulb is very close at 254 nm. It does this by disabling (breaking apart) the DNA strands within the nucleus of the living cells. This makes the "germ" not able to replicate. Realize the red blood cells do not have a nucleus. Also, realize that bacteria, fungus, virus – living organisms do not belong in the blood.

It is not so important that a lot of blood has undergone this germicidal light. In older UBI therapies, 3-5% of the blood is treated. Newer protocols now call for about 1% of the blood or 60cc mixed with 160ccs of saline. Few of the viruses in this blood are inactivated because of the high absorption of the first layers of RBCs. A contemporary study on Hepatitis C is a good example of a modern-day, successful UBI protocol. [8]

As a sterilizer out of the blood, UVC is powerful. We see applications of this in water, air and surface sterilization. [9]

In study used to validate a patent, UVC light was examined for both inactivation of virus and bacteria and maintaining the integrity of blood products, it was shown to do both from optimal exposures of UVC at 240 – 500J/m2. [10]

What level of Joules is too high? A University of PA study states that 1,500 J can give platelets a "sunburn." It is possible that this much energy could have unavoidable consequences to platelet function. [11]

But we are still only talking about less than 1% of the blood that gets exposed. In fact, according to a report by G.I. Levashenko reports that the top 5 cell layers of erythrocytes (top 30um) flowing through a cuvette absorb 96% of all UV radiation. [12]

This would mean that only 4% of the blood passing through the cuvette is affected by the light, and then, if only 1.2% of the blood is drawn from the individual. That means that **.05%** of the blood (less than five/100s of the total blood) of an individual is affected by the UV light per treatment. In the world of medicine, this is an astounding statement. Less than **.05%**.

Will the viruses and bacteria be affected in whole blood products with such a little amount of light? Yes. We can turn to some of the clinical studies that show viral disorders being affected by UBI.

> *Shyrygin showed:"The use of UBI in the complex therapy of patients with tuberculosis was ascertained to promote a rapid, two-fold, more frequent bacterial isolation cessation resulting in (an inability to spread) in the patients, to have a positive impact on the formation of immune defense, mainly of a phagocytic link, in children and adolescents, to exert a detoxifying effect, to favor a better tolerability of anti-tuberculous drugs, to cause positive X-ray changes, and to improve the quality of life."*[13]

Clinical trials of UBI were successful against pneumococcus, staphylococcus, streptococcus, and a mixture of other microbes. In a 182-patient study with 90 as a control. The treat-

ment group recovered 5-7 days more rapidly, had fewer complications, and experienced a reduction in fibrinogen to normal activation of anticoagulatory and fibrinolytic elements. Regarding patients with an initial anemia, those treated saw a 30.7% increase in erythrocytes or red blood cell production. [14]

Another study from 1994 had three groups with chronic active hepatitis and cirrhosis of the liver patients studied.

Group 1 – (20 patients) standard drugs - Group 1 – 12 of 20 had good results, two died
Group 2 – (16 patients) LBI treatment - Group 2 -13 of 16 had good results.
Group 3 – (10 patients) LBI infusion treatment. Group 3 -10 of 10 had good results.

The authors suspected that improved microcirculation in the liver was a factor and accounted for the superior outcomes [15]

Realize that UVC also loads the red blood cells with energy. Studies show that light energy is absorbed by the hemoglobin. It also affects the near membrane surfaces of the RBC, allowing for the elimination of products of inflammation. The result is increased oxygen in the system, a better rheological effect on the blood, and improved microcirculation.

What about UV B

This is the light of choice for Graft vs. Host Disease (GVHD) therapy and studies. It is somewhat different in action than that of UVC. The goal with this light is to irradiate the mononuclear leucocytes as they have been shown to induce humoral immune tolerance to major histocompatibility complex (MHC) antigens. [16]

The idea is that the application of UVB-irradiated leucocytes may induce cellular immune tolerance.

These studies have been around since the mid-1980s. The title of a Georgetown University study states one of the ideas – "Ultraviolet-B light inactivates bone marrow T lymphocytes but spares hematopoietic precursor cells." [17]

Prevention of Graft-versus-Host Disease is a major issue. Most of these drugs for this disease work by damping down your immune system and so stopping the donated cells from attacking your body. If you have GVHD, you are at a greater risk of getting an infection because it weakens your immune system. Treatments for GVHD further increase this risk. Not so with the light therapies.

Some of the studies have used UVA with psoralen, which causes photosensitization to the light. It is called PUVA (Psoralen Ultraviolet A) and is photochemotherapy or light therapy. Research has shown it can help with chronic GVHD affecting the skin. Other studies are showing a positive effect on bone marrow donors.

Not all of the GVHD studies use just UVB narrowband – some use UVB that also have UVC. Effects have been positive on both counts.

UVB is commonly used in UBI treatments that deal with immune-boosting, increased oxygenation, or even autoimmune issues.

UVA – Absorption Hero and Photopheresis

UVA is the longest of the UV lights. It appears that blood is much more suited to absorb the energy of UV light, with absorption peaks at 416nm. At 600-800nm (visible light), the absorption of whole blood, erythrocyte, leucocyte, plasma, and serum is less than 5%.

Realize that one of the major actions of light therapy is that of blood absorbing the energy of light and then causing a host of positive reactions to occur. UVC is also absorbed and is assumed to contribute to the positive effects.

Here is one summary/suggestion:

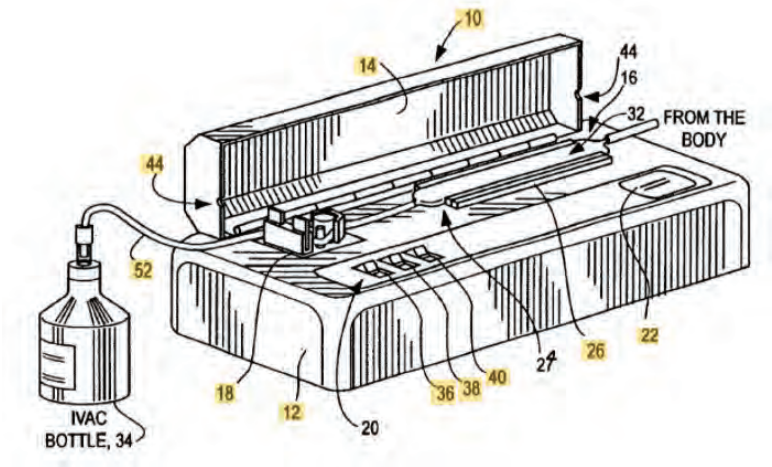
"The cytochrome absorption makes the photon act as a carrier of biological energy as the cytochrome system in the mitochondria can absorb the photon and stimulate electron transport, which generates bioenergy in the form of ATP from ADP. Many feel that the respiratory chain is at the base of any effects that laser (light) therapy might have." [18]

As far as UBI on the whole…

"Other short-term effects include a modification of erythrocyte membranes that releases substances into the blood that appear to stimulate further changes; structural changes in plasma proteins (IgM can be activated up to 16 times normal); activation of complement; immediate release of free radical oxygen, followed by a rise of antiradical factors; expansion of blood volume and a slight decline in hematocrit; a drop in blood pressure; degranulation of granulocytes and mast cells; short-term decline in the number of platelets and sometimes in their functioning; activation of fibrinolytic factors and reduction in the activity of coagulants; and enhanced phagocytosis. In effect, the entry of the energy from UBI into the blood – a dynamic, energy-bearing fluid – change the "correlation of forces" in the body in dozens of ways that benefit the entire organism. [19]

The First US UBI machines after Knott

Back about 15 years ago, I came upon the Bob Clark UBI machine. There were a couple of local physicians in Michigan using it, and it was certainly having some success. It was using a Russian flat cuvette that was expensive ($100). The cuvette had to be cleaned out each time and usually used for the same patient on subsequent treatments. The blood would flow through the 1" wide cuvette that had an upper and lower 6" UV bulb. I will talk about the extremely important topic of turbulation in the next chapter. The intensity and energy of the light is also discussed later on in this chapter. The flat cuvette is particularly troublesome regarding its blood flow, in that it tends to race down the center while the blood eddies on the sides and can overheat. This has been attested to by a number of physicians who did thousands of flat cuvette treatments.



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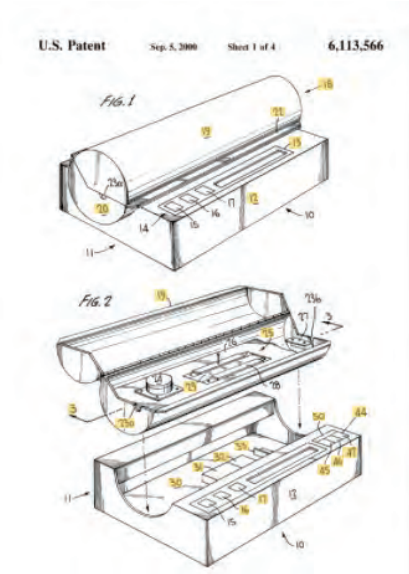


Carl Schleicher Patent

The patented Clark machine is very similar to the Carl Schleicher machine of 1990 in that it used 2 – 6" UV bulbs.

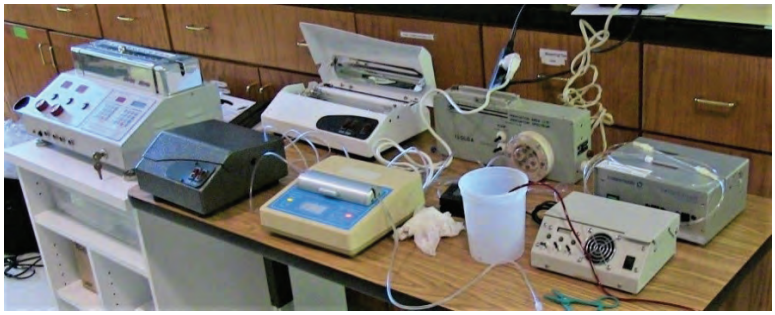
Schleicher was instrumental in seeing the ABIS (American Blood Irradiation Society) continue. He was part of putting together the 280-page "UBI – A History and Guide to Clinical Applications 1933 – 1997." This was authored and had writings and studies from the pioneers of UBI - George Miley, R.C. Olney, and Harry Lewis.[20]

A new non-profit entity was created in 1996 called 'The Foundation for Blood Irradiation.' Its goal was to promote UBI education. The Schleicher machine was somewhat modified and claimed to be the "new" Knott machine hemo-irradiator. It did not fool the FDA and was never "grandfathered" into acceptance. In contrast to the original Knott machine, it featured two rather weak UV bulbs and a flat cuvette. It was nothing like the powerful bulb of the older Knott machine and its turbulation, cascading blood shelves of the 2" circular 1" deep Knott cuvette.

I have looked at every UBI machine that I could get my hands on. There are two main components: 1) the light sources and their power, and 2) the style of cuvettes. For effective light therapy, we need to measure the intensity and wavelength of light that irradi-

Turbulation:

Changing a laminar flow to a turbulent one.



ates the blood. The cuvette also makes a huge difference (see the chapter on turbulation). A good place to measure this is at the cuvette surface. Better yet is the inside of the cuvette. To date, I know of only one manufacturer that goes to this extent.

Invisible in Germany

In 2009, I went to an alternative medicine conference that is world-renowned. It is the Baden-Baden Medical Week Conference in Germany. I was there to display a new UBI device. With great new modifications, I thought that it would be a booth that would attract many. I hired two medical students over the internet, who were fluent in German and English, and I traveled to Germany.

Set in the beautiful Bavarian Black Forest, it was a pleasant fall day when I arrived. The building was a three-story modern structure – not real big. I was accustomed to the US conferences where there are a hundred or more booths beside each other with two tracks of speakers. This was not that. Undaunted, I set up the booth and met with my interpreters. I was obviously American, and it was apparent that Germans had set up this conference, Germans had decided on the speakers, Germans were the favored companies, and they attracted the most attention.

I felt like I was invisible. Physicians would walk by with hardly a glance. It did not matter that I had a German interpreter. I was the American cowboy riding in with my new American product, and the participants had no interest.

Hans Muller was the man who had originated the German UBI machine – Eumatron. The unit uses two 6 "UV bulbs like the Clark and Schleicher machines. I did have the opportunity to meet and speak with him. He claimed to have 3,000 units out in the world. We discussed a few ideas on lights and intensity, and it was immediately apparent that he had no interest in changing his methods or machine. I am sure that I looked like a naïve soul with a small idea. The use of weak Eumatron units in the US caused many physicians to say that they were not effective. There are some 6" bulb units sold out of Canada to physicians.

UBI Lights Made Simple

Quite obviously, all units have some kind of UV light source. These easy-to-use and inexpensive fluorescent UV lights were not available to Emmet Knott in the 1930s or even 1960s. The Knott machine has been called the "gold standard" by some. It was effective but was a machine from the 1940's era with antiquated mechanisms. It was very hot and needed water cooling. Gears and chain assemblies were also

FDA

There is no UBI device nor cuvette that is available in the US that is FDA approved, registered, or certified. All devices are sold not as a medical device, but some sort of purifier. If a device manufacturer wanted to get FDA approval, it is a multi-million-dollar attempt that would take years to complete. It also may be in competition with pharmaceuticals and may bring on their "disapproval."

a part of the device. Any change in the light, power source, or mechanism changes its acceptance by the FDA. From a reliable legal source, even the Knott machine itself was not "grandfathered" in by FDA. It's older light source and mechanisms are not only outdated, but parts are unavailable.

Measuring energy of the different machines:

Keeping parameters equal, research was done to compare energy outputs of the differing UBI devices. Basic parameters were taken into account: cuvette surface area, the time it takes to travel in the cuvette, energy per lamp, and the number of lamps. The following chart compared energy values.

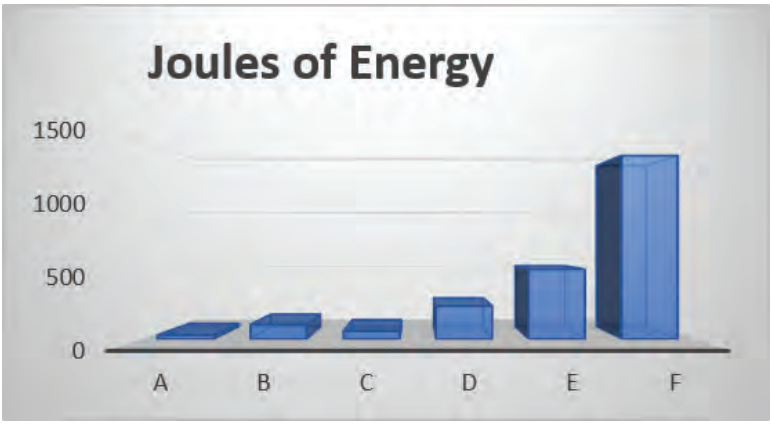
A = 6" single bulb unit
B = 6" double bulb
C = German double 6" bulb with an insert
D = Knott machine
E = double bulb with a flat cuvette
F = 12" Quadruple bulb unit with turbo insert

It is quite obvious that the 12" bulb unit puts out more energy than the Knott machine. Is it better? Yes, in that we can quantify the energy and do more exact measurements. There is now an easier protocol, and machines are available for servicing and sales. Clinical results for these newer, multi-bulb devices have been said by many to be similar to what was seen in the 1940s studies using the Knott machine.

Why the 6" bulb units are weak

When considering the light from a UV fluorescent bulb, it must be considered that full energy does not travel along the

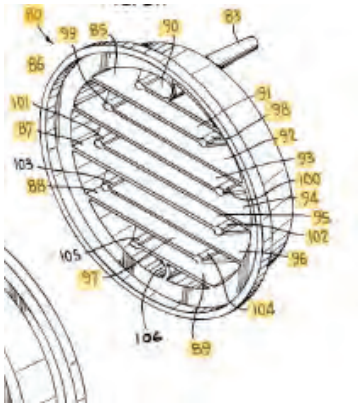
whole length of the tube. It takes getting past the electrodes before full energy is accomplished. A 6" bulb only has about 2.8" of full energy, while a 12" bulb has 8.7". A 12" bulb has over **three times** the power of a 6" bulb.



Knott Light

The older Knott machine had a single round light source. One consideration for the machine is that the energy was a strong burst. This excess light may account for its success even though its Joules/m2 was not high. One person put it this way: "Knot was like an on-off flashbulb whereas the newer units are like a continuous lamp."

It was a few years ago that Dr. Robert Rowen allowed us to come and visit his clinic and watch the operation of one of the few remaining Knott devices in operation. We were able to video the whole procedure, and it was interesting from start to finish. From our modern point of view, it was a bit cumbersome. Blood was drawn up into a bottle, and from that, an older style pump engaged and sent the blood into the cuvette and back to another bottle.



The cuvette was a fascinating design. First patented in 1933, it was about the size of a big snuff can – about 2" in diameter and 1" thick. It had an inlet and outlet attached to a silicone hose. The body was made of solid metal with plates that made the blood splash down from side-to-side as it descended to the bottom. The plates pressed up against a 2mm thick circular quartz plate. Each time therapy is accomplished, the unit is dissembled and cleaned for the next patient. Certainly not something that we want to be doing with today's medicine.

One more unit to mention is one that is not available. It is the "great-grandson" of the Knott machine. They have tried to duplicate the Knott therapy using up-to-date mechanics. They have also gone through two FDA trials on Hepatitis C.[21] Although UBI was proven effective, a drug combination with good Sustained Viral Response (SVR) came along and eclipsed their study.

Summary

Although dose relationships are hard to pin down from the studies, it is apparent that many of the UBI units currently being used in the world put out a very small dose. The real questions are:

1. Does the device give off what would be considered the best dosage of light?
2. Is the surface area of the cuvette adequate and getting light all around?

3. Are there good flow dynamics within the cuvette?
4. Does the medical practitioner expose the right amount of blood to that light and for the right amount of time - controlling speed and volume?
5. Are the most beneficial wavelengths being used?

Most of the physicians in the US have left the weaker UBI devices in favor of those that give out a more Knott-like amount of energy. Part of the goal of this writing is bring more standardization to the practice of UBI. Physicians need to know, and so do patients.

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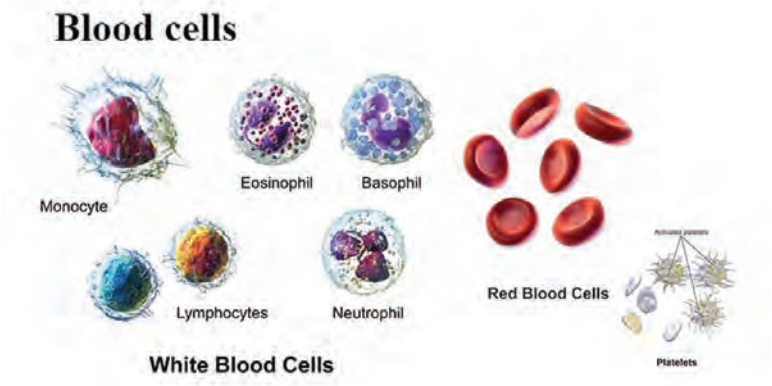
Another Quick Look at UBI action

Dr. Levon Gasparyan, Head of Research and Development of EMRED Oy, Finland, Helsinki



Extracorporeal UV blood irradiation (UBI) launches the cascade of photochemical processes in the blood.

There is membrane modification activity by UV radiation on erythrocytes, leukocytes, and platelets. Namely:

1. Changes in functional state and properties of these blood products.
2. They enter into the circulatory system as different biologically active substances on the cell surface.

Also, large albumin molecules are broken up into smaller products (a good thing).

These substances **play the role of antigens,** giving rise to the appropriate immune reactions in the patient. As a result, UV radiation induces the production of biologically active substances like prostaglandins and hormones in the blood.

Monocyte, lymphocyte – Specific immunity

Neutrophils, eosinophils, basophils – Nonspecific immunity

Red Blood cells – Transport gases

Platelets – Clotting

Quick Thoughts:

UBI acts like a "multi-drug" using only light. It causes healing by changing the blood components in a very positive way.

It also makes an army of new red blood cells all charged and ready to work.

Your blood also picks up more oxygen and flows a lot better (rheology)

UBI stimulates the making of young, highly metabolic, increased receptor activity red blood cells. The quantity of misshapen red cells also decreases.

Regarding leukocytes, immature cells diminish, and lymphocytes, monocytes, and eosinophils increase. The number of lymphocytes is enlarged more than other leukocytes.

Extracorporeal UBI also reduces the viscosity of the blood and improves misshaped red blood cell membranes.

After UBI, there is an increased oxygen transport function. Levels of O2/CO2 are balanced, reflecting heightened utilization of oxygen by tissues and activating the redox processes in them.

Killing bacterial/viruses after a UBI treatment is due to the increased immune answer of the patient. UBI changes functional trends of all parts of immune defense.

There is increased phagocytic (bacteria engulfing) function.

After UBI, the immune status changes depending on the severity of the illness. If the immune system is hyper – it quiets down; if it needs a boost, it gets a boost. It is immune-modulating.

Read the original: https://ultraluxuv.com/wp-content/uploads/2015/03/A-PHDs-look-at-UBI.pdf