

ONYCHOMYCOSIS TREATMENT WITH FUNGUS CLINIC IPL DEVICE

Roma Agostino (DPM), Ponti Valerio (DPM), Montesi Mauro (DPM)
University of Rome "La Sapienza" - Italy



Onychomycosis Treatment with “Fungus Clinic” IPL Device

Roma Agostino (DPM), Ponti Valerio (DPM), Montesi Mauro (DPM) University of Rome “La Sapienza” - Italy

Introduction: in a research conducted in the second semester of 2011 by the Italian institute of podiatry (IPI) in association with the degree course in podiatry of Rome University “La Sapienza”, an innovative IPL device “Fungus Clinic”™ produced by Formatk Systems Ltd. - Israel, has been tested as an alternative therapeutic method for nail fungus (Onychomycosis). This research was subject of a thesis as part of the degree course in podiatry in the academic year 2011-2012. Twenty five patients suspected of Onychomycosis attended the study and were treated regularly in the institute. The trial’s results demonstrated significant cure validity in terms of nail clearance and laboratory analysis.

Background: Onychomycosis is a chronic infection, very common, which is a frequent cause of deformity of the nails. The term Onychomycosis refers to all the fungal infections of the nail rather they incurred by dermatophytes, yeasts or molds. The fungal infection usually does not involve the nails evenly or symmetrically and frequently affects only one or two nails primarily or secondarily to other nail disease. The majority of infections caused by filamentous fungi called dermatophytes. Yeasts of the genus *Candida*, in particular *Candida Albicans*, are the second most common cause of nails infection. Rarely some other fungi can also affect the nails, such as *Scopulariopsis*, *Hendersonula* and *Scytalidium*. Although these infections appear to be very rare, it is important to identify correctly the causative agent, since most cases respond poorly or not at all to the antifungal treatments currently available. The Onychomycosis is generally a disease of the adult; toenails and especially the big toe are more commonly affected than the hands. Environmental factors are certainly important in the epidemiology of Onychomycosis that, in fact, seems to be much rarer in those populations that do not use shoes, while it is more frequent in civilized countries,

especially in those categories of people that fit athletic shoes that avoid adequate ventilation. Going to gyms and swimming pools is a major risk factor; consider the promiscuity of the people and the warm and moist environment. Not rarely it originate from pre-existing skin outbreaks, in fact, can often be caused by fungal infection between the toes, where the fungus, or by contiguity or indirectly through shoes and socks, get into the nail. So, it is possible to have a contagion indirectly through contaminated objects or clothing. This is the most common mode of transmission of dermatophyte Onychomycosis. Moreover, the infection can occur by:

Autoinoculation, even at a distance through scratching as in the case of *Candida albicans*, responsible for onychomycosis more frequently in females, because of *Candida perionyxis*. This disease affects mostly housewives, as they are subjected to a prolonged contact with water and rubber gloves.

Etero-inoculation, which can be direct (contact of the fungal infection lamina of the mother with the one of the child) or indirect (cutting the nail with non-sterile instruments) Other predispositional factors to fungal infection can also be considered the indiscriminate use of drugs, detergents or irritating substances, which lower the immune system. The host immune defense has a very important role in the establishment of the infection. This explains why the incidence of fungal infection in immune compromised patients increases

Clinical characteristics:

The Onychomycosis are classified into four different types:

Distal and lateral subungual Onychomycosis

White superficial Onychomycosis

Proximal subungual Onychomycosis

Total Onychomycosis

Diagnosis of Onychomycosis:

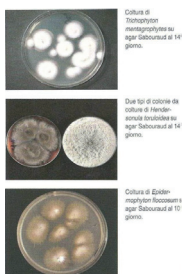
In the diagnosis of Onychomycosis it is important to bear in mind the clinical picture of nail infections, but is impossible to make a definitive diagnosis based only on clinical examination.



It is therefore essential the confirmation of the laboratory, both for an accurate diagnosis and for monitoring of the antifungal treatment. Laboratory diagnosis of fungal infections is based on microscopic examination of the clinical material in a 10% solution of KOH (potassium hydroxide) and on the mycological culture. The reliability of these procedures is given by the professionalism of the laboratory staff and the quality of the sample examined, in addition, the patient should not have applied topical antifungals for several weeks previously.

Interpretation of results:

Recognition of fungal elements in a sample of fingernail requires considerable experience, so it is important to contact a specialized laboratory. In fact, some of the fungal elements can be not detected by inexperienced eyes and thus give rise to a false negative. On the contrary, cell walls, fibers or other artifacts can be exchanged with the fungus and result in false positives. The direct visualization under a microscope of fungal elements does not identify the type of fungus, with the exception of the recognition of yeasts by dermatophytes. Positive identification can only be made through fungal culture. Yeasts grow within 3 days, while most of the dermatophytes grow very slowly in culture, so as to be hardly identified before 7 - 10 days and the culture also should be continued for at least 3 weeks prior to define negative result.



Common treatment of Onychomycosis:

Topical treatment

Very often it is not sufficient, especially in onychomycosis due to dermatophytes. Antifungal drugs most fre-

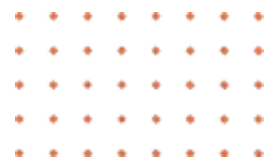
quently used are the imidazole and the ciclopiroxolamine. There are several commercially available preparations in the forms of lotions, creams, gels, dyes, foams, lacquers, sprays, etc. The choice is very important for treatment success. In most cases the topical treatment is the solution of first choice as they are spared the risks of side effects. the antifungal drug may be associated with: Corticosteroid in the hyper-reactive forms and Antibiotics for over microbial infection.

The topical medications most commonly used are: Miconazole Nitrate, Clotrimazole, Tioconazole, Amorolfine, Ciclopirox, Naftifine, etc.

Topical antifungal agents often prove disappointing in the treatment of Onychomycosis because they require a long and constant treatment, and reported at a low mycological cure.

Systemic treatment

Griseofulvin is a substance isolated from *penicillium griseofulvum*. Is inactive towards the bacteria, but causes wrinkling and inhibition of fungal hyphae. Introduced for the treatment of dermatophytosis which affects the skin, hair or nails. It has been a mainstay of systemic treatment of dermatophyte onychomycosis in the last thirty years. It binds to the keratin making it resistant to the growth of fungi, so the regrowth of hair and nails will be free of infection. The intake can cause nausea, headache, intolerance to alcohol and an annoying photosensitivity in some patients. This therapy has been disappointing for the treatment of Onychomycosis of the foot with only 30% of healing. Ketoconazole active on dermatophytes. Its use is limited because of side effects, it can cause nausea, headaches, digestive disorders, gynecomastia, impotence, and sometimes can be hepatotoxic. Triazole, azole derivatives are the most recent development. Are active on both dermatophytes and *Candida*, the side effects are less severe compared to ketoconazole; itraconazole, fluconazole Allylamines these compounds have a mechanism of action different from that of the azole derivatives; they in fact inhibit squalene epoxidase. This enzyme is necessary for the biosynthesis of the fungal cell membrane. Terbinafine is one of the allylamine that has yielded good results and high cure rate in the treatment of onychomycosis of the foot. Treatment times ranging from 3 to 6 months.



Generally, these methods are considered:

Poorly effective (vicious circle expectation-disappointment - expectation)

Are not always compatible with the patient's health;

Do not totally decisive;

Old, not the result of new research.

For these reasons, in 2011 a new device was tested: "Fungus Clinic" Intense pulsed light (IPL Formatk Ltd. - Israel).

An innovative method for the treatment of nails affected by Onychomycosis, based on the emission of a light beam of a specific range of wavelengths (530 nm - 1100 nm) and a pulse duration inferior than the TRT, which disables the fungus by thermal shock.

According to the principle of selective photo-thermolysis, the radiation absorbed by the target tissue is converted into thermal energy that causes disabling parasitic organism, since it destroys it and makes it unable to grow and / or reproduce. This treatment eliminates basically the pathogenic source in the nail. It is the organism itself that absorbs the photo - energy, leaving the surrounding tissue completely intact. The deactivation of the organism may result from a thermal destruction, by denaturation or partial denaturation of one or more molecules that form the fungus body, making it unable to grow and reproduce. The temperature in the region where the unwanted organism resides must be sufficiently high to destroy it, but not high enough to cause injury to the surrounding environment. This can be achieved by irradiating the target organism for a period not greater than the thermal relaxation time of tissues (TRT), which is the time that takes to disperse the heat in the environment.

Fungus clinic has developed an innovative non-invasive method for the treatment of Onychomycosis and pigmented lesions based on IPL technology, using the correct spectrum of wavelengths combined with an appropriate pulse duration in respect of TRT, reaching the most effective and safe technique for the treatment of Onychomycosis.

CHARACTERISTICS OF THE APPARATUS

The device "FUNGUS CLINIC" (IPL Formatk Ltd - Israel) generates:

Light source filtered into a specific range of wavelengths;

Photo-energy that is absorbed and converted into heat by all Dermatophytes: (Epidermophyton floccosum. Tricophyton rubrum 70% incidence, Tricophyton mentagrophytes 20% incidence);

Irradiation of the infected area for a period not exceeding thermal relaxation time of the tissue (TRT);

Damages only to the target and does not affect the surrounding tissue.

This technology uses flash lamps and benches of capacitors controlled by a computer that generates high intensity polychromatic pulsed light determined by the capacity and condensed by the electric pulse duration. Similar to the laser, the basic principle of the IPL devices is the selective thermal damage to the target.

The combination of wavelength, pulse duration, fluence and pulse intervals allows treating a broad spectrum of skin conditions.

The intense pulsed light technology is characterized by its capacity to storage energy and a special xenon lamp. The electrical energy stored in the battery of capacitors is passed, in the form of electrical excitation through the gas, contained in this lamp so that the light is emitted; the electric energy is converted, therefore into optical energy. The emission spectrum pulsed light varies from 500 to 1300 nm. The distribution of light is not continuous but occurs through very short pulses. Two parameters should be considered essential in the treatment of onychomycosis with IPL and are:

- wavelength
- pulse duration

Wavelengths in the spectrum

Target a specific part of the photo-spectrum and then

directly to dermatological problem to treat. Most of the dermatophytes responsible for Onychomycosis are characterized by a color between yellow, orange, red and brown in the photo-spectrum, for this reason, an adequate spectrum of wavelengths has been chosen for the treatment of Onychomycosis with a source of light between 530 and 1100 nm.

Pulse width or pulse duration

Derived from the time / energy; since biological tissue, is a fundamental physical parameter that helps us to optimize the result, increasing effectiveness and reducing damage or non-selective side effects. It is essential in the treatment because if the light radiation persists for a longer duration than TRT, the heat is conducted to the surrounding tissue and this can lead to a non-selective thermal injury of the tissue. In other words must be considered in particular two parameters:

- The right wavelengths spectrum, in order to aim at the fungus- mode specification;
- The pulse width, less than the TRT value, in order to prevent damage to surrounding tissues.

DESCRIPTION OF THE DEVICE

The apparatus consists of a body and a hand applicator. Body: Featuring a screen where it is possible to set the mode of working, the fluence, the clinical application.

Applicator F-SR:

Purpose of application:
Onychomycosis

*3 modes: single pulse,
Single or double every 2 sec,
continuous pulse every 0.33 sec*

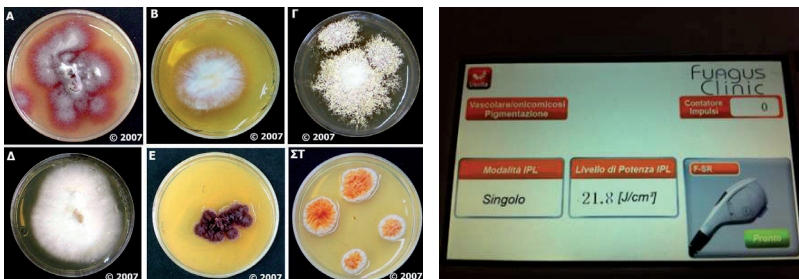
Fluence: up to 21.8 J/cm²;

Wavelength: 530 - 1100 nm;

Spot size: face 1.6 cm²;

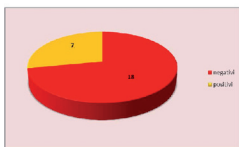
Security: proximity sensor;

*Pulse duration: • Single: from 3 to 10 milliseconds;
• Double: 2 to 5 milliseconds; • Continuous: 1.1 to 3.3 milliseconds;*



Experimental study

The study aimed to test the effectiveness of I.P.L for the treatment of Onychomycosis using “Fungus Clinic” device (Formatk Systems Ltd. - Israel). The study group consists of 25 patients with suspected Onychomycosis, presented themselves at the Italian Institute of podiatry - Rome (IPI). A first mycological culture examination was performed on each patient’s nail sample to detect the fungi species. A cycle of 10 sessions of I.P.L -”Fungus Clinic” once a week and a final mycological culture test for assessing the effectiveness of the treatment, only for those who tested positive initially. Of these 25 patients, 18 were negative, 7 positive. All were treated with IPL, although the sample study was concentrated on only 7 patients with positive result (colored in yellow in table below). This was done because all patients presented the clinical symptoms of Onychomycosis, and for this reason, the possibility of false negatives was taken under consideration.



MATERIALS AND METHODS

For the realization of the study, a multi-steps a protocol was followed:

- Collection of patients anamnesis data;
- Compilation of medical records;
- Iconography: carried out with an optical microscope camera;
- Sample collection and a mycological culture of the nail:

The kit used for collecting the sample consists of:

Nippers, gouge No.2, sterile test tube.

With the cutter has been cut portion of the nail to be examined, while with the gouge was carried out curettage of the nail bed trying to collect as much material as possible to send in the laboratory. The obtained material was placed inside of a sterile tube with the addition of saline.

The sample was sent to a specialized laboratory accompanied by specific request. Once we received back the results, treatment’s sessions were started in both patients tested positive to Onychomycosis and in those with negative results, because of possible of false negatives.

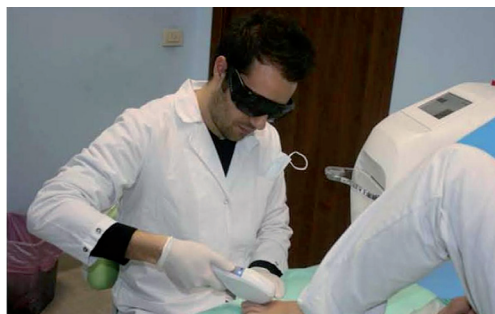
Treatment with “Fungus Clinic” IPL

After accommodate the patient; a photo of the infected nail was taken with an optical microscope camera, in order to compare it to results obtained during the course of treatment.

Afterwards, switching on the device and setting the parameters as following: single mode pulse, 21,8 J/Cm² energy fluence.

Once, the parameters were set up, we pass to operative phase by pressing the “standby button” that switches from red color into green, at this moment the applicator

is activated and ready to use. Both patient and operator had to wear goggles. Then we proceeded with the treatment with the e F-SR applicator.



9 consecutive single pulses were totally performed on the infected toenail in the following way:

- 3 flashes on the medial part of the nail; (Lengthwise) - 3 flashes on the lateral portion; (Lengthwise) - 3 flashes on the central portion. (Crosswise)

At the end, we proceeded with the cleaning of the hand probe (glass prism) using some disinfectant wipes soaked with chlorhexidine.



Collection of tissue sample for 2nd cultural examination:

A week after the final treatment, all patients tested positive for the first examination, have carried out the crop in order to verify the presence or absence of the fungus, in order to evaluate the effectiveness of the treatment after 10 sessions.

CASE REPORTS

Case study 1



Prima visita

Esami clinici e microbiologici

Cod. Fisco: [redacted]
 Sesso: M
 Età: 19

ESAMI RISULTATO UNITÀ VAL. RIFERIMENTO METODO

AN-COLTURALE
 CAMPIONE DI UNGUELA

NUMEROSE COLONIE DI CANDIDA
 NUMEROSE COLONIE DI STREPTOCOCCO ALBI
 NUMEROSE COLONIE DI PROTEUS

TECNICA MICROSCOPICA
 CAMPIONE DI UNGUELA

ALLINE BACILLI
 AMPORRE COLONIE EPITELIALI
 AMPORRE COLONIE EPITELIALI

Referto primo esame (positivo)



Dopo 10 trattamenti

Esami clinici e microbiologici

Cod. Fisco: [redacted]
 Sesso: M
 Età: 20

ESAMI RISULTATO UNITÀ VAL. RIFERIMENTO METODO

AN-COLTURALE
 NUMEROSE COLONIE DI STREPTOCOCCO ALBI, STREPTOCOCCO AUREO, STREPTOCOCCO PNEUMONIAE

TECNICA MICROSCOPICA
 NUMEROSE COLONIE EPITELIALI
 NUMEROSE COLONIE EPITELIALI

Referto secondo esame (negativo)



Dopo 20 trattamenti



Dopo 30 trattamenti



Dopo 3 mesi

Case study 2



avvisita

Cod. Fiscale: [redacted]
 Sesso: M
 Età: 62
 VIA CLERMONT
 ROMA
 Palazzo n° 121 del 04912842

ESAMI RISULTATO ENTITÀ VAL. RIFERIMENTO METODO

ES. CULTURALE
 ESISTENTE SU UNICITA' ALLICIAE: 0/0
 NUMEROSE COLONIE DI STAPHYLOCOCCO ALBO E ALCUNE COLONIE DI LEVITTI

RICERCA MICROSCOPICA
 ESISTENTE SU UNICITA' ALLICIAE: 0/0
 FASCI LAMINARI NUMEROSE CELLULE EPITELIALI-DISCRETA FIORA MICROBICA
 PRESENZA DI TRICHI

Referto primo esame (positivo)



o trattamento

Cod. Fiscale: [redacted]
 Sesso: M
 Età: 62
 Palazzo n° 2911 del 1349201

ESAMI RISULTATO ENTITÀ VAL. RIFERIMENTO METODO

ES. CULTURALE
 ESISTENTE SU UNICITA' ALLICIAE: 0/0
 NUMEROSE COLONIE DI STAPHYLOCOCCO ALBO E ALCUNE COLONIE DI LEVITTI

RICERCA MICROSCOPICA
 ESISTENTE SU UNICITA' ALLICIAE: 0/0
 FASCI LAMINARI NUMEROSE CELLULE EPITELIALI-DISCRETA FIORA MICROBICA
 PRESENZA DI TRICHI

Referto secondo esame (negativo)



o trattamento



no trattamento



Dopo 3 mesi

Case study 3



Prima visita

Cod. Fiscale: [redacted]
 Sesso: M
 Età: 57
 Palazzo n° 303 del 00542012

ESAMI RISULTATO ENTITÀ VAL. RIFERIMENTO METODO

ES. CULTURALE
 ESISTENTE SU UNICITA' ALLICIAE: 0/0
 NUMEROSE COLONIE DI LEVITTI E
 ALCUNE COLONIE DI STAPHYLOCOCCO ALBO

Referto primo esame (positivo)



Primo trattamento

Cod. Fiscale: [redacted]
 Sesso: M
 Età: 58
 Palazzo n° 3039 del 15932012

ESAMI RISULTATO ENTITÀ VAL. RIFERIMENTO METODO

ES. CULTURALE
 ESISTENTE SU UNICITA' ALLICIAE: 0/0
 NUMEROSE COLONIE DI STAPHYLOCOCCO ALBO

Referto secondo esame (negativo)



Quinto trattamento



Decimo trattamento



Dopo 3 mesi

Case study 4



Primo trattamento

gan felice
 Cod.Fiscale: [REDACTED]
 Sesso: F
 Età: 49
 Paziente n° 122 del 04/01/2012

Pagina 1 di 1
 Referto primo esame (positivo)

ESAMI	RISULTATO	UNITÀ	VAL. RIFERIMENTO	METODO
ES. CULTURALE	ESAMINE ESISTITO SU ALLUCE DX: NUMEROSE COLONIE DI STAFFILOCOCCO ALBO E ALCUNE COLONIE DI MICETI			
RICERCA MICROSCOPICA	ESAMINE ESISTITO SU ALLUCE DX: ALCUNI LEUCOCITTI-NUMEROSE CELLULE EPITELIALI SCARSA PUSO MICROSCOPICA PRESENZA DI MICETI			



Quinto trattamento



Decimo trattamento

gan felice
 Cod.Fiscale: [REDACTED]
 Sesso: F
 Età: 49
 Paziente n° 2002 del 14/02/2012

Pagina 1 di 1
 Referto secondo esame (negativo)

ESAMI	RISULTATO	UNITÀ	VAL. RIFERIMENTO	METODO
ES. CULTURALE	ESAMINE ESISTITO SU ALLUCE DX: NUMEROSE COLONIE DI STAFFILOCOCCO ALBO, COCCOSTI NEGATIVA E NUMEROSE COLONIE DI PSEUDOMONAS			
RICERCA MICROSCOPICA	ESAMINE ESISTITO SU ALLUCE DX: ALCUNI SINGOLI ALICINI CELLULE EPITELIALI SCARSA PUSO MICROSCOPICA			

Case study 5



Prima visita

gan felice
 Cod.Fiscale: [REDACTED]
 Sesso: F
 Età: 50
 Paziente n° 139 del 12/01/2012

Pagina 1 di 1
 Referto primo esame (positivo)

ESAMI	RISULTATO	UNITÀ	VAL. RIFERIMENTO	METODO
ES. CULTURALE	ESAMINE ESISTITO SU ALLUCE DX: NUMEROSE COLONIE DI PSEUDOMONAS NUMEROSE COLONIE DI STAFFILOCOCCO ALBO			



Primo trattamento

gan felice
 Cod.Fiscale: [REDACTED]
 Sesso: F
 Età: 50
 Paziente n° 1377 del 12/01/2012

Pagina 1 di 1
 Referto secondo esame (negativo)

ESAMI	RISULTATO	UNITÀ	VAL. RIFERIMENTO	METODO
ES. CULTURALE	ESAMINE ESISTITO SU ALLUCE DX: NUMEROSE COLONIE DI PSEUDOMONAS			



Quinto trattamento



Decimo trattamento



Dopo 3 mesi

Case Study 6



Primo trattamento

Cod. Fiscale: [redacted]
Sexo: F
Eda: 55
 Pagina 1 di 1
 Paziente n° 3731 del 11/01/2012

ESAMI	RISULTATO	UNITÀ	VAL. RIFERIMENTO	METODO
ES. COLTURALE				
ESISTE COLONIE DI <i>TRICHOFITON</i> ESISTE COLONIE DI <i>SPHONGLARIUM ALBUM</i> ESISTE COLONIE DI <i>TRICHOSPORON</i>				

Referto primo esame (positivo)



Quinto trattamento

Cod. Fiscale: [redacted]
Sexo: F
Eda: 55
 Pagina 1 di 1
 Paziente n° 3731 del 21/03/2012

ESAMI	RISULTATO	UNITÀ	VAL. RIFERIMENTO	METODO
ES. COLTURALE				
ESISTE COLONIE DI <i>TRICHOFITON</i> ESISTE COLONIE DI <i>SPHONGLARIUM ALBUM</i> ESISTE COLONIE DI <i>TRICHOSPORON</i>				

Referto secondo esame (negativo)



Decimo trattamento

Case study 7



Primo trattamento

Cod. Fiscale: [redacted]
Sexo: F
Eda: 44
 Pagina 1 di 1
 Paziente n° 3712 del 11/01/2012

ESAMI	RISULTATO	UNITÀ	VAL. RIFERIMENTO	METODO
ES. COLTURALE				
ESISTE COLONIE DI <i>TRICHOFITON</i> ESISTE COLONIE DI <i>SPHONGLARIUM ALBUM</i>				

Referto primo esame (positivo)



Quinto trattamento

Cod. Fiscale: [redacted]
Sexo: F
Eda: 44
 Pagina 1 di 1

ESAMI	RISULTATO	UNITÀ	VAL. RIFERIMENTO	METODO
ES. COLTURALE				
ESISTE COLONIE DI <i>TRICHOFITON</i> ESISTE COLONIE DI <i>SPHONGLARIUM ALBUM</i>				

Referto secondo esame (negativo)



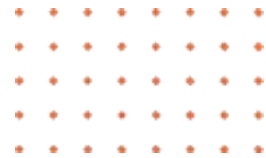
Decimo trattamento

CONCLUSIONS

The Onychomycosis in general and particularly those of dermatophytes, constitute one of the most common nail diseases. Although not representing a severe disease, in terms of morbidity and mortality, is often a source of suffering for these patients, which sometimes find hard to accept their nail's alteration or deformation.

From our study, emerged important results, claiming the effectiveness of Fungus Clinic IPL device (Formatk Systems Ltd. Israel) in the treatment of Onychomycosis. The culture analysis performed at the end of treatment, carried out in the same laboratory where it was first done, shows that none of the patients treated presented any longer an active Onychomycosis, which demonstrate the validity of the technology.

patient	1st lab exam	2nd lab exam
C.M	Numerous colonies of Candida yeast, of Staphylococcus. Register of Proteus	Numerous colonies of Staphylococcus. Coagulase negative.
B.F	Numerous colonies of staphylococcus register and some yeasts, the presence of fungi	Negative, low microbial flora
Q. C	Numerous colonies of staphylococcus register, some colonies of fungi.	Numerous colonies of staphylococcus aureus, poor microbial flora.
P. F	Numerous colonies of yeast and some colonies of Staphylococcus	Large colonies of Pseudomonas and some colonies of Staphylococcus
L. A	Some yeasts, Staphylococcus Albo, of Pseudomonas	Large colonies of Pseudomas, poor microbial flora
M. S	Large colonies of Pseudomanas, Large colonies of yeast	Some colonies of Pseudomonas
S. S	Some colonies of yeast, many colonies of Staphylococcus	Large colonies of Staphylococcus Register



Furthermore, our study found that while an objective examination of the nail presents all the characteristics of Onychomycosis, the laboratory test of the collected samples will not give in the vast majority of cases, positivity for the fungus, not allowing then to make a complete diagnosis.

Nevertheless, we performed the “Fungus Clinic” therapy achieving very good results especially with regard to the clinical appearance of the nail.

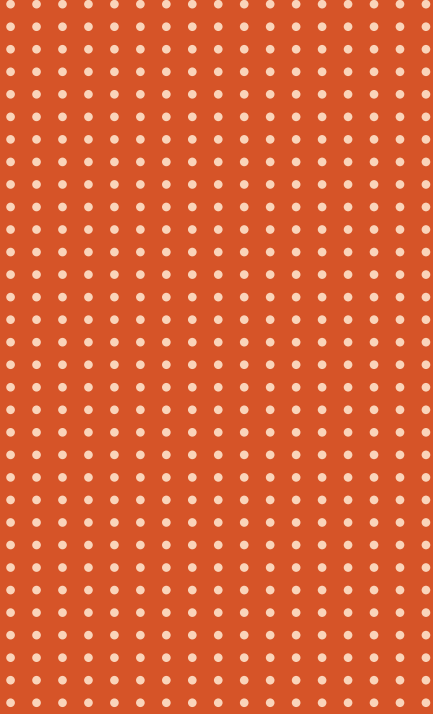
All patients recruited for the study, were treated, even those who had a negative culture response to Onychomycosis at the beginning; in all patients we have noticed an overall improvement from the initial situation.

Although the study sample cannot be considered statistically large enough, we can affirm that Onychomycosis treatment with “Fungus Clinic” (Formatk Systems Ltd. Israel) IPL device is an effective, fast and well tolerated by the patients. We carried out excellent results and patient’s totally satisfaction.

Personally we do hope this could become a pilot study for the official start for the recognition of a new technique, highly effective in the treatment of Onychomycosis.

Bibliography

- MAREGLIA A., D. Fernadez MORATO, F.J.GARCIA CAR-MONA,
T.CAPITINI. *Fungal infections of the foot: diagnosis and treatment.* Piccin
EUDESS Lanciotti. *Principles of clinical microbiology-third edition.*
Publisher Ambrosiana.
G.CARLO PRANTEDA. *Skin diseases of the foot-text atlas. Medical issues in international scientific-Rome.*
DONALD NEALSE, ISOBEL M. ADAMS. *Common ailments of the foot: diagnosis and treatment.* Verducci Publisher.
AMERIO PC, BERNENGO MG, Calvieri S, Chimenti S, PIPIONE
M. *Dermatology and Venereology.* Turin: Minerva Medica, 2003.
THE COAST. *Medical Mycology illustrated.* Padua: Piccin New book publishing; 1990.
GIANNETTI A. *Treaty of dermatology.* Padua: Piccin New book publishing; , 2007.
CAPPELLETTI L. *Rehabilitation onicopodalica-Volume 1, Number 1, year 2007.* Small-series podiatric Cappelletti publisher Roberts Evans Allen. *Pocket picture guides. The onychomycosis.* Vicenza L.E.G.O, 1992
Robert L. Baran, Rodney R. Dawber, Antonella Tosti. *DIS-EASES APPARATUS nail. Guide to diagnosis and treatment Medical and surgical treatment.* Milan: Routledge, 1995.
105



formatk
Taking care of you

Formatk Systems Ltd.
Yozma 3, Tirat Carmel