

Intense pulse light System

User's Manual



Weifang KM Electronics Co.,Ltd

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Before operating and maintaining the IPL treatment instrument, please read user manual in detail

Chapter 1 General Situation

Intense pulsed light (IPL) is a kind of high intensive, broadband, oncoherent light source which has a wavelength spectrum of 500 nm-1,200 nm. These properties allow IPL to have a widely application in non-ablative rejuvenation therapies which is based on theory of human skin tissue's selective absorption and photothermolysis to light sources. Meanwhile, IPL photo rejuvenation technology is more effective and give patients less downtime than conventional therapies to photodamaged and photoaged skin.

1.1 Product structure

This machine is made up of three parts: Host computer, control panel, the IPL treatment head.

The movement and the control parts of this machine locate the host box inside.

Inside place of integrated numerical control can continue to supervise and control the equipments.

The control panel includes the color 8.4 inch LCD touché screen, the power switch and urgent switch. Among them, the LCD can show the work mode and parameters of the system, and hint the function of the general use key.

IPL treatment head includes the intense light occurrence machine and delivers the system, being provided for the customer hand to hold operation.

1.2 Treatment Range

1. Smooth small wrinkle, shrink the thick hair-pore, beauty and whiten skin, remove the black rim of eye.
2. Treat freckles, chloasma, insulations spot.
3. Permanently remove hairs in the arms and legs, lips hair, armpit hair, beard and the part under the Bikini.

1.3 Technology parameters

Light source: Intense pulsed light

Spectrum range: 530~1200nm (take the spot,pigment removal)

560~1200nm (photorejuvenation)

580~1200nm(vascular lesions)

640~1200nm (hair removal)

Option: 430-1200nm; 480-1200nm; 755-1200nm
Energy density: 10~50J/c m²
Pulse method: Intense pulsed technology (can adjust)
Pulse sequence: 2.3.5pulse
Pulse Intermission: 5-60ms
Pulse width: 2-15ms
Deliver system: Crystal Coupling
Spot size: 15×35m m² Option: 15*50mm² 8×40m m²
Operation interface: 7.0 LCD colour touch screen.
Light spot: 15*35mm² Option: 15*50mm² · 8*40mm²
Cooling system: Water cooling, forced-air cooling and semiconductor cooling
Size: 42*62*48cm³
Cooling temperature: -5°C~0°C
Power supply: 220v/50Hz or 110v/60Hz
Net weight: 30kg

Chapter 2 Safety

2.1 Brief Introduction

This chapter describes the usage of IPL treatment system, and notices the safety of the optics and the electricity system.

2.2 Notice

Warning

This machine possibly creates injury to person if you use and adjust the machine not according to this manual. So the personnel who operate or maintain the machine must be familiar with safety request and operational step before starting this machine.

The IPL treatment instrument is a kind of medical treatment equipments used for improving the whole conditions on the face skin safely. After training qualified medical treatment and nursing jobholders so that the operation and the maintenance is possible, one can use this machine. Director Doctor and all the personnel should understand safe information for proving well.

2.2.1 Safety prevention measure

Considering safety of doctor and patient first. The IPL have already considered the safety about patient and medical personnel within maximum in the designing process. The following are safeties preventions:

- A) The automatic examination system of electro circuit starts after switching on, It will continue to examine the electro circuit automatically in circulating process of equipments;
- B) The light is transmitted to the skin of the patient through closed filters (lead crystal), the light pulse only can traverse the head of the lead crystal;
- C) The design contains independent safe electro circuit. When the pulse light energy is too high, cut off the electro circuit;
- D) Use the urgent switch to cut off the power supply quickly Under urgent situations;
- E) The key switch can prevent from abusing this machine;
- F) When the equipment shoots the light pulse, the buzzer will send out as a signal.

Warning

Any intense light-shooting device if not used appropriately will cause injury to person. The personnel who operate the intense light-shooting device should keep alert every moment, and adopt necessary safeguard

Patient:

Patients' safety mainly depends upon well-trained doctor as well as the suitable arrangement

of treatment room. Their cultural manners are also very important; they should understand the principle of the treatment. While patients are accepting the intense light treatment, the doctor should adopt the corresponding *necessary safeguard*, such as wearing 5 levels of protection glasses for patients or covering the eye with thick and white gauze but not up to the eyelids during the treatment.

Medical personnel:

During the course of treatment, the medical personnel should wear 3 levels of intense light protection glasses to contact the intense light.

The treatment room:

The treatment room: Using the high strength light should be marked clearly.

2.2.2 Safety warning

Besides the authorized technical personnel of the KM company, the others can't maintain the light treatment instrument, can't check and fix the inner part, including the power supply, cooling system, optical component and IPL treatment head. The high voltage inside is very dangerous;

The voltage setting of IPL should correspond to the voltage of your area;

Only after shutting power supply, the customer can maintain the machine. Or else, the body will be injured and equipments damaged;

The light lead crystal should be kept clean always. Do not let the congealed gum infiltrate into the treatment head. After each treatment, scouring the light lead crystal with the ethyl alcohol, then putting on the plastic lid.

Do not open the machine when discovering the treatment head leak water; Once opened with water leakage, close it immediately.

2.2.3 Intense light warning

The intense light may hurt the eyes or cause the combustion and burn. While using, adopt all the necessary protection measures;

The treatment part shoots excessive light and may cause paralytic damage.

Because the IPL treatment instrument sends out the intense pulse light, the patient and medical personnel should not be exposed under the intense light (from the treatment head in direct or indirect). The patient and medical personnel should wear the protection glasses;

Even if wearing the protection glasses, person can't be look straight at intense light sent out from the treatment head.

Don't make the head shoot aim to air during surgical operation. While not used, the treatment head should be put in the Support;

Hands should keep away from the treatment head while switching on.

2.2.4 Optical safety

Safety for guaranteeing the optics, please obey the following designation:

All personnel (include the patient) who use the IPL treatment instrument should wear the protection glasses. The patient should protect the his eye with the opaque material if he can not wear the protection glasses;

Using the IPL treatment instrument in operating room should be marked clearly;
Only allows personnel with good safety training to approach this machine;
All personnel should be familiar with the control of this machine and know how to shut down quickly;
Even wearing the protection glasses, person can't look straight at the light or the reflex;
Do not use the treatment head outside this the scope of manual limit;
Don't use the IPL treatment instrument in the environment of sunlight and the easy explosive places;
Please don't point the treatment head to the area outside treatment district;
Keep the glint objects from reflected intense pulse light, such as jewelry, watch, the surgical operation apparatus and mirror...etc.

2.2.5 Electricity and machine safety

Make sure that front-panels and back cover board seals up. Opening the behind cover board may produce the danger;

The high voltage is dangerous inside this machine. Even after switching off the power supply, some parts still store the electricity probably. So besides technical personnel whom the KM company appoints, other persons can not dismantle any part of back cover board;

While maintaining the equipments, do not open the back cover board or make the equipments be placed in the situation that no man look after;

The balance of this machine is very good and can move carefully;

This machine connects the ground through three lines, connecting the ground well is important to the operation safety;

2.2.6 Fire preventing

After object absorbs the light, the temperature will go up. Keep treatment away from the ignition and flammable goods nearby.

Before doing surgical, please do not use the combustible substance during skin processing, such as alcohol and acetone etc. If it is necessary, please wash with soap;

use the soap and water to clean the IPL or disinfected for one of its parts, must need to dry then can switch on..

The machine can be switched on only after it is dry if someone cleans the IPL or disinfects one part with water.

2.2.7 The system safety equip

The IPL treatment instrument contains some safety devices; all personnel of surgical operation must be familiar with their position and the operation method.

Key switch: The key switch uses to turn on and off the power supply of the IPL. This machine can be opened by the key provided by the KM Company in order to prevent from illegal usage. Please pull out the key after stopping the machine. Please confirm there is no key that the system can't open.

Urgent switch : This red mushroom switch can close the whole machine urgently. While pressing it, in spite of the system is at what kind of condition. The power supply will be immediately cut off. The urgent switch can immediately be loosened by clockwise rotation. Otherwise the equipments will keep on shutting off. Insuring the safety, just press this switch under the emergent

state.

Semiautomatic air switch: The air switch is installed in right lower part of the back plank. When the electro current exceed 20, this switch will cut the power to protect the system. Pushing this switch upwardly can immediately recover the power supply.

Automatic examination of equipments: After switching on, the electro circuit carries on automatically checking. When the equipments circulate, the examination system can keep on monitoring the operation of the system

2.2.8 Safe category of equipments

The electric shock protection: I , Type B;

Corrosion preventing liquid: commonness;

Can't use this machine in the environment that exist the combustibility anaesthetic and the air or carbon monoxides mixture.

Operating mode: Consecution.

Chapter 3 System elucidation

This chapter introduces main parts of the machine: the control system and equipments parameters of the IPL treatment system.

3.1 Parts and control

The IPL treatment system is mainly made up of the following part(according to the picture 3.1):



Control panel

The IPL treatment head

This machine installs the microprocessor inside that can continue to supervise and control the work of the system.

3.1.1 Machine box

Machine box is the heart part of this machine. It includes the following parts:

Power supply module: A power supply of other module at surface of the system to cut off the power supply;

The control module: Control the whole module of system to coordinate the work;

The display controller: Display various information of the equipments, and accept the instruction of users;

High electro voltage power supply: Refresh the capacitance;

Capacitance set: Store the energy that intense pulse light need;

The Simmer power : Simmer the intense light, and make it ready to give or get an electric shock;

Cooling system: Cool the IPL treatment head.



Caution

Only the authorized engineer of the KM company can open the behind plank, and maintain each internal module of this machine. The customer can't tear down this machine by oneself.

3.1.2 Control panel

The customer operate the machine through the control panel, the control panel includes the following parts:

Key switch: Uses to turn on and off the power supply;

Urgent switch: The red mushroom switch, uses to urgently shut off this machine power supply, pressing this switch will shut off the whole power supply of system immediately. It has priority to the system performance compared to the key switch. Follow the arrowhead direction, revolve the urgent switch clockwise and immediately loosen to it, otherwise the machine will keep on shutting off;

The LCD: The customer exchanges with the system through the LCD and the touch key. It is 8.4 inches of LCD that the system appearance, operation interface, hints and instructions.

3.1.3 The IPL treatment head

The IPL treatment head contains electronics equip emitting intense pulse. It drills through a combination of electric cable and system connection; there is a light lead crystal with film plating in the end of treatment head.

Pressing the manual touch key on the IPL treatment head just can shoot the intense pulse light, the intense light is delivered to the treatment district through the 15 × 35 mm filter on the head. It is very important to keep the light lead crystal clean.

Inside the IPL treatment head, there is the thermoelectricity type semi-conductor refrigeration system used to cool off the light lead crystal. Then the temperature of the skin surface can be lowered so as to reduce the patient's unwell.

3.2 System software

The procedure of the IPL mainly has four functions:

Allow the doctor choose the best characteristic parameters for the patients according to the concrete diagnosis.

Control the movement process of the system, in order to prevent unexpected trouble;

Examine the system energy;

Change the IPL filter;

3.3 The environment request

Environment temperature scope: 10°C~30°C;

Relative humidity scope: ≤80%

Atmospheric pressure barometric: 86kpa~106kpa;

The store environment temperature: 0°C~55°C

Power supply: AC220V±22V 50Hz/60Hz±1 Hz;

Chapter 4 Installation and Debugging

The IPL treatment system can be used in the hospital and the beauty salon. Before installation, the preparation is very simple.

The installation contents include:

Dismantle the pack and put the IPL treatment system in the primary location.

Check equipments and parts whether integrity.

Distilled waters need to infuse into the equipments water tank.

Link the power supply.

Test all functions of the IPL.

Install and use

4.1 Equipments detailed list

The following is the detailed list of equipments of this machine:

Host, The IPL treatment head, Protection glasses, Congealed gum, The light lead crystal plastics cover, Manual, Funnel, Pipe, Power cable.

4.2 Installation request

Before tearing down the packing of the IPL treatment system, should check whether the installation is correct.

4.2.1 Space request

This machine should keep off the hot place with a draught, and keep a distance of above 60 cm with other objects.

4.2.2 Electrical request

Before the IPL leaves the factory, it has already marked the local rated voltage according to the customers' request. It corresponds the electricity request as follows:

AC220V \pm 10 %, 20A, 50/60Hz.

The equipments protect a set of line inside of yellow green line which connects the line in the wall and ground through the power supply.

Inputting the electric current can't have to change electric voltage and electric current peak, falling to sink or the wave flowing out suddenly.

So this machine shouldn't uses the power cable and air switches with the lift shaft, air condition system, the high-power motor etc. The KM Company suggests this machine uses lone power cable and air switches.

The main insurance in the machine is the 20 A chopper (air switch). Pushing down it can break the power supply and pushing the air switch again can immediately re- connect the power supply.



Caution

Please confirm the instrument of the rated electric voltage agree with electric voltage (AC220V) that you use.

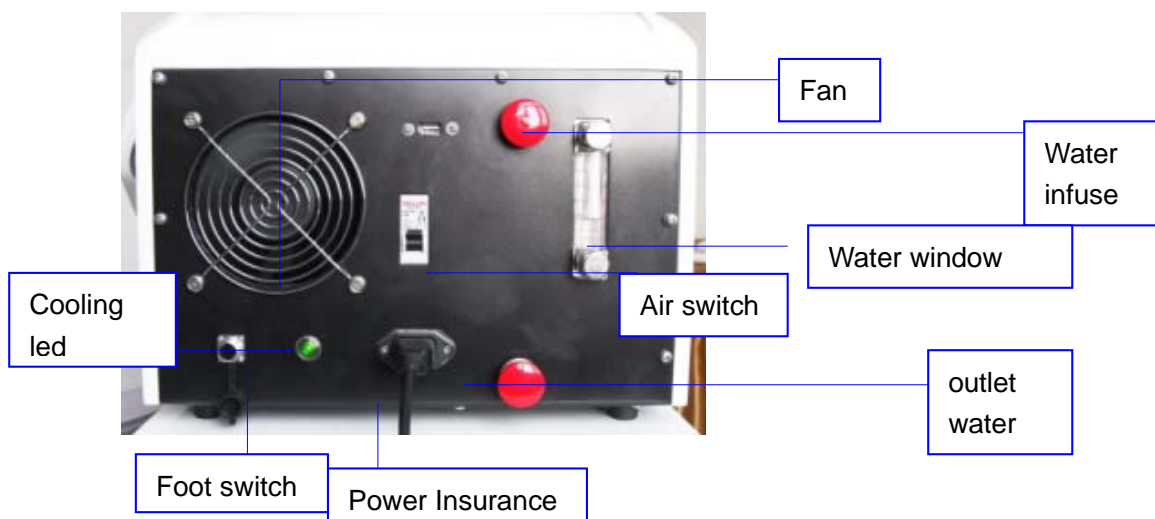
4.2.3 Environment request

Air quality: No causticity particle in the air. Causticity particle (such as acid) can damage the electric wire, the electricity component and optical component surfaces. The dust in the air should be possibly little or it can absorb energy of light and heat up. When the dust grain falls in the surface of the light filter, it may damage the light filter. Metal particle also damages the electricity component.

Temperature: In order to guarantee that the instrument is at the best active statues, the indoor temperature should keep at 20°C ~ 25°C, relative humidity can't be over 80%.The power for this machine to work is about 2 KW; therefore, the treatment room had better install the air condition.

4.3 Installation

- 1) Place: Place instrument steady in 10°C ~ 28°C of indoor temperature, the humidity is not over 80%. Clean operating room and treatment rooms.
- 2) At the bottom of the machine is the Cooling air outlet nozzles, please don't block!
- 3) According to the following figure, pull out the protection plug, pull out two protection plugs



Machine Back

- 4) According to the following figure, install treatment heads



- 5) According to the figure, Infuse into the water: Infuse water: Insert the pipe with funnel into the infusion/water threshold of the cooling system. First Jack up the funnel pipe to the position of the overflow water gap; Increase the distilled water until the distilled water overflow from the overflow water gap; Close infusion water valve; Take away the pipe.



Water window

- 6) Link the power supply: : Connect one end of power cable with the input power source, connect

another end to three line AC outlets

- 7) Switch on: After the above installation completing, insert and revolve the key left, the whole machine switches on electricity right away, at this time water circulation, and the cooling system starts automatically.
- 8) Check: Observe whether instrument is leaking or not. If leaking, close the power supply, and please contact the dealer.
- 9) And water again: The same with the fourth step



Caution

- 1 In order to guarantee the safe operation of the system, please increase the distilled water toward the cooling system in time;
- 2、 While increasing the distilled water for the first time, please carry on according to the above step, then start the system;
- 3、 6 liter distilled water needed to guarantee the cure result
- 4、 Use the distilled water or pure waters only. The water temperature can not be lower than 5 degrees of Celsius;
- 5、 For guaranteeing that water tank circulation safely circulate, open the valve, drain out the 500 ml water, then close the valve.

Replace water

Replace water every 1 months; please carry on according to the following steps strictly.

- 1 Open the out water hole,Let water out.
- 2 According to the figure, infuse water again as the above steps.
- 3 After water replacing, switch on the machine and work.
- 4 Attention: don't screw on the plug of the water outlet during operation.

4.4 Move

In the hospital, clinic or beauty salon, move the IPL treatment system according to the following steps:

First,stop the power!

Put the treatment head on the basket

To ensure the machine smooth

Carried at the bottom of the machine by two people slowly



Caution

If intending to transfer the instrument outside the hospital, please contact the dealer.

Chapter 5 Operation

This chapter describes the operation step of the IPL treatment system.



Warning

*There is high voltage in the IPL, please insure all front-panels have already covered well;
When the IPL starts, please place the treatment head in the support;
All personnel need to wear protection glasses in the treatment room;
Even wearing the protection glasses, do not look straight at the intense light sent out from the treatment head.
The treatment head can't point to any other place besides the target;
Shoot the excessive light energy toward the treatment part may cause skin heat damage.*

5.1 The LCD and function key

This machine controls each related screen through the touch screen according to the figure 5.1 show:



Diagram 5.1 Each screen of relation

“Menu screen” is for choosing the treatment mode;

“Treatment screen” uses to set the pulse treatment parameter, adjusts the energy density, preignition and statistic the treatment head information;

After installing completely, set system to preparative condition, and then start treatment.



“Menu screen” Such as the diagram 5.2 show. The choice Mode : hair removal ; skinrejuvenation;pigmentation therapy;vascular therapy;wrinkle removal;Touch the function key (Such as “hair removal”) then enter into the corresponding treatment screen , such as the diagram 5.3 show.

According to the cure parameter to regulate the T1(The first pulse width), D1(The first pulse delay) with "▲"and" ▼" key.T2 (The secondary pulse width), Press" ready" key to begin the treatment .

5.2 Treatment

1、Insert the power cable of this machine, Insert the key, Switch on. At this time, one voice of the buzzer " Di", after 3 seconds, the LCD starts, At the same time the host power supply starts automatic check, appears the “Menu screen” immediately. Then chose the treatment mode, Then enter “the treatment screen.

Choose the number of pulse at this time Need to enter “Set the pulse treatment parameter”

again to carry on the further setting), Touch **ready** key to enter the work appearance, adjust 、 to prefer appropriate energy density, Each press may change 1 J/cm^2 .

We suggest shooting a test of light spot to evaluate the carrying capacity of reaction while starting treatment using the lower energy density.

2、 After entering the work appearance, the capacitance starts refresh. Press the button on the head at this time, then can carry on to cure, After turning on electricity to complete, the number of counter will add one, the equipments auto starts re-refreshing, repeating the above-mentioned process.

3、 To check whether the light crystal clean or not, whether forming frost or not. If forming frost, please wipe with the clear water clean.

4、 At the treatment area, spreading congealed gum of 2~3ms.The intense pulse light should be conducted into skin through it which spreading only when curing.

5、 Holds the treatment head in the skin surface perpendicularity, press lightly, the treatment head should get in touch with congealed gum well.

6、 Press the button to shoot a intense pulse light, the system will refresh again automatically, need about 2 seconds.

7、 Wipe off the congealed gum, check the cure district, evaluate the sufferer's instant reaction.

8、 Cure next district, allow to have about the overlap of 1mm.

9、 Record the treatment parameter in the sufferer's medical history, Provide reference for next treatment.



Caution

After curing each time, disinfect the filters;

Suggest the patient to return to the hospital after treatment several weeks later in order to confirm whether needing to continue to cure;

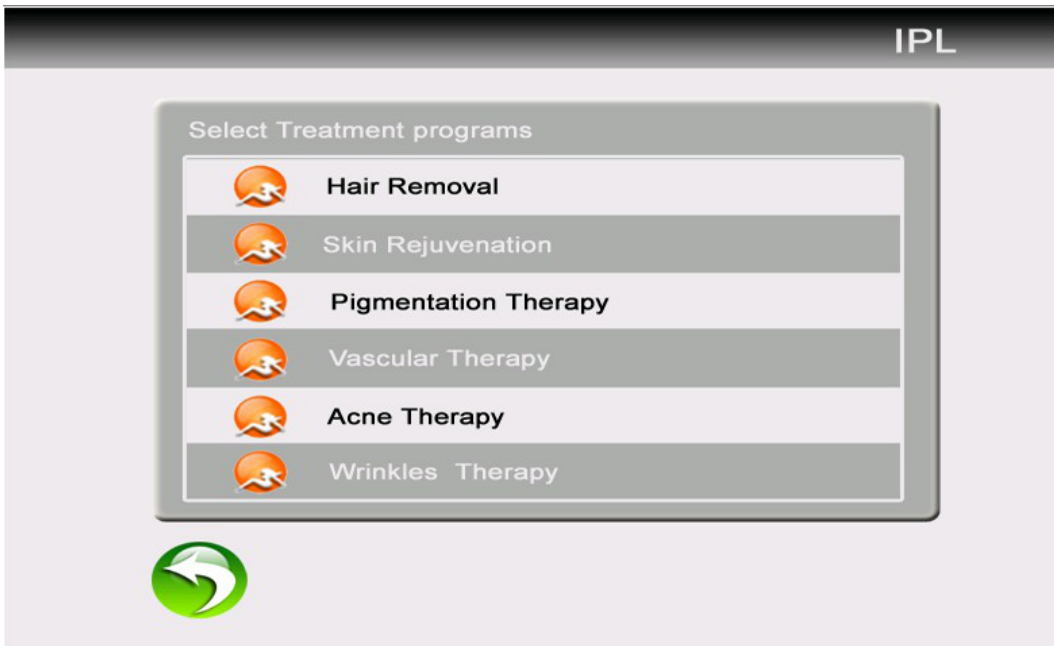
After the treatment, use tissue to sweep the treatment head softly, and disinfect with 75% alcohol tampon.

Touch IPL button ,appear the functions menu of id!



First interface

System Setting

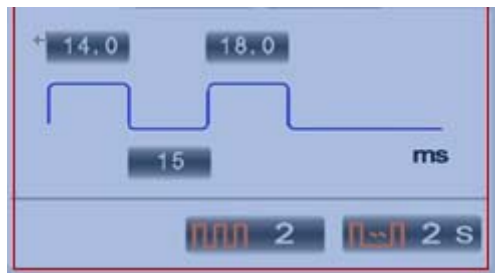


Function menu

The main interface shows 'Hair Removal' mode. It features three treatment records (1, 2, 3) with parameters like 14.0, 18.0, and 15 ms. A central display shows 'IPL 10 J/CM²' with up/down arrows for energy regulation. Below this is a cooling regulation section with a snowflake icon and a progress bar. At the bottom, there are 'Standby' and 'Ready' buttons, a temperature display of 0.00°C, and a 'Return' button.

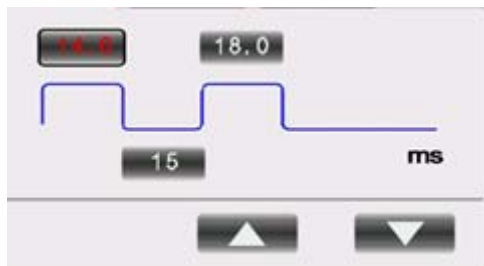
Callouts include:

- Current Treatment Mode (points to 'Hair Removal')
- Treatment Record (points to the record list)
- Total/this times counters (points to the number '2')
- Return (points to the green circular arrow button)
- Stop working (points to the 'Standby' button)
- IPL Regulation of energy (points to the '10 J/CM²' display)
- Regulation of Cooling (points to the snowflake icon)
- Touch the ready button, the lamp will light, then you can touch the foot SW or press the switch of handpieces (points to the 'Ready' button)



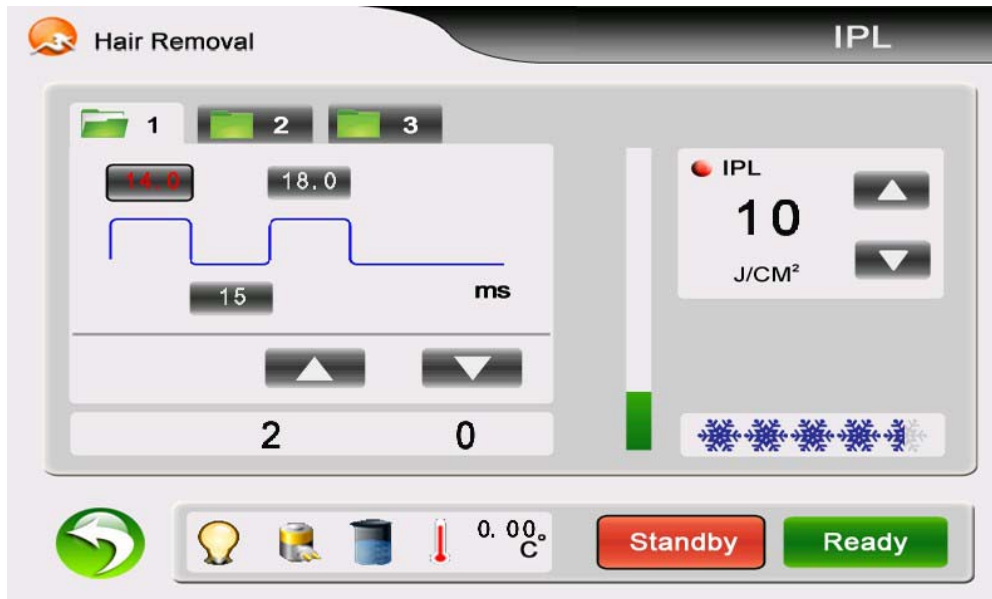
Touch adjust parameter windows

then appear follow windows



Then you can adjust the numbers by up and down button. Finished the adjust, touch the parameter again then you can adjust the other parameters.

Treatment interface



Adjust the parameters windows.



Setting interface


There is eight parameters may be adjust: (According to the figure Diagram 5.7):



: Adjust pulse width ,Adjust range(1-4S), Directly press it can be adjust;



: Adjust pulse counters,Adjust range(1-6), Directly press it can be adjust;

: Adjust RF  work times,Adjust range(50-2500)ms,Directly press it can be adjust,50ms per step, Recommended work Time(300-900)ms;

First pulse width(T1): Adjust first pulse width,Adjust range(1-30)ms,0.1ms per step ;

First pulse Interval(D1) : Adjust first pulse interval ,Adjust range(1-100)ms,1ms per step;

second pulse width(T2): The same With T1;

Second pulse interval(D2): The same With D1;

Repeat pulse width : Adjust the repeat pulse width(After the three pulse),Adjust range(1-5)ms,0.1ms per step

Diagram 5.3 The treatment screen

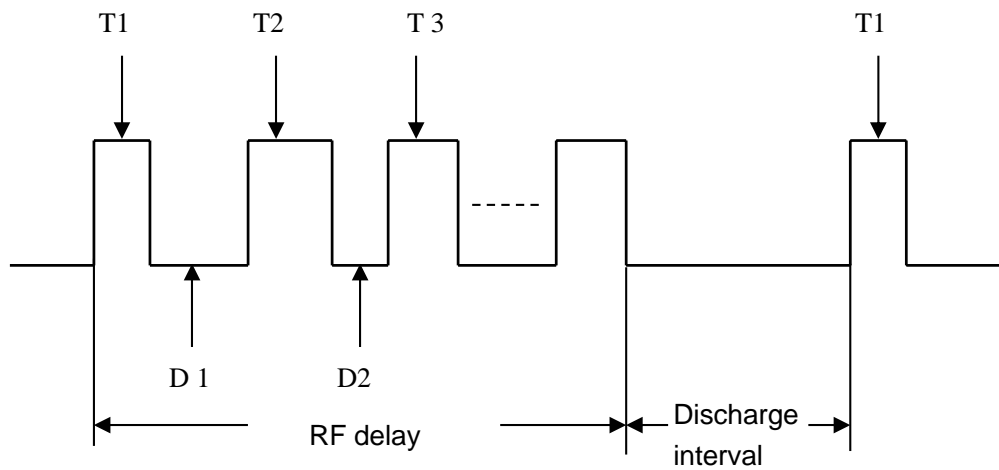
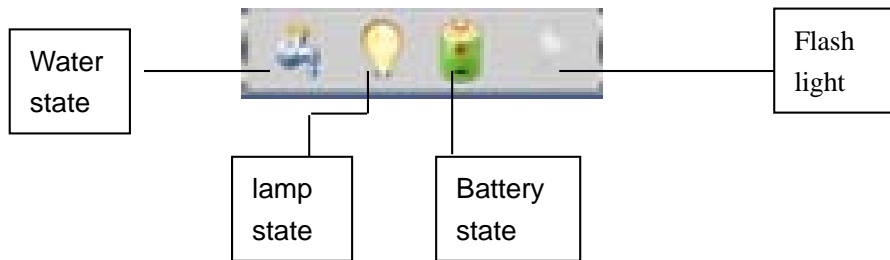


Diagram 5.4 pulse Adjustment

Await orders: After pressing the "ready", the system remains on await orders, the intense light lamp puts out, then it can't shoot the intense pulse light at this time. After pressing the Ready again, The system enters the work appearance, the intense light lamp is bright, then it can shoot the intense pulse light at this time.

Counter: The counter of the treatment screen record the shooting times of that switch on the machine.

After the treatment, please put back head in the fixed, press" BACK" key, let the system return to the " Menu screen". Circumvolving the key switch anti-clockwise closes the machine.



Danger

1、 *While entering the work appearance, the IPL head can't shoot to the person; The IPL head must aim at the treatment part. Then can press to trigger the switch.*

2、 *When needing to break off or stop treatment, must press" Ready" key to return the pause appearance. Avoid the mistake presses to trigger the switch that the IPL head shoots the intense light to injure person's eyes.*

3、 *Have the intense pulse light exportation or not, the IPL head can not aim at operator and other non- sufferer.*

4、 *When the intense pulse light output, the IPL head is absolutely forbidden to aim at weak part such as eye etc. Do not look straight at the intense pulse light output.*

Chapter 6 Maintain and Support

This chapter describes how to use and maintain the IPL treatment system including sweeping the equipments, sweeping lead crystal, changing the IPL head and increasing distilled water etc; also describes some familiar breakdowns and solution also.

The customer can carry out the maintenance through the clear measure listed in this chapter. Maintenance and any other works only can be performed by technical personnel's authorized by dealer.



Warning

Before maintaining this machine, shut down and cut the conjunction of the power supply net. When the instrument switches on, maintaining may cause the body to be injured or damage the equipments system.

The customer should be responsible for the damage caused by the following reasons:

The customer dismantles the outer shell or the accessory of the system without authorization;

The customer sabotage, operate unsuccessfully and maintain to exceed one's authority;

Because of fire, the electric power system breaking down, being stroked by lightning, flood, explodes and other the natural disasters, the customer is responsible.

6.1 Sweep the equipments

Sweep this machine surface once a week with the soft wet tampon. The neutral detergent can be used but should be careful and do not let the liquid infiltrate into the machine.

6.2 Sweep to the light lead crystal

The light lead crystal should keep clean at any time. It should be swept each time after treatment.

When sweeping the light lead crystal, wipe with the wet soft cloth first time, use another piece of soft cloth with absolute alcohol to clean, then dry in the air.

6.3 Replace the IPL treatment head

Each IPL treatment head has service life. Please contact the dealer when replacing a new treatment head at the appointed time.

6.4 Obviate the equipments malfunction

This section enumerates some malfunction phenomenon and solutions.

Malfunction phenomenon	Solutions
Have no display	Check power cable whether the conjunction is good
	Check the urgent switch, press bottom and loosen it clockwise.
	Check the air switch, if it jumps down, push it up. If it jumps down again, please contact the dealer.
While touching the key, the system has no reaction	Please contact the dealer.
The system can't start	Key switch is not revolved to the appropriate position, revolve it clockwise.
System can't initialize	Please contact the dealer.
Malfunction of flash lamp in the IPL treatment head	The flash lamp has reached to its end of life, please change the flash lamp;
	The IPL treatment head is probably damaged, please change the IPL treatment head or contact the dealer.
The IPL treatment head is leaking	The IPL treatment head is probably damaged, please change the IPL treatment head or contact the dealer.
The cooling system temperature is higher	Close the system, lower the temperature, Re- start Contact the dealer.
The power of The IPL treatment head to weaken	The life of the IPL treatment head is not long.

Chapter 7 Accessory

The accessories of this machine include:

- Protection glasses
- Congealed gum
- The plastics cover of the light lead crystal
- Power cable
- Funnel
- Plastics pipe
- User's manual

7.1 Protection glasses

The protection glasses of the IPL can protect the medical personnel and patient's eye.

7.2 The congealed gum

The congealed gum uses to conduct the intense pulse light and cool off the skin, this kind of congealed gum packing is six bottles per box, 250 grams per bottle.

7.3 Order the accessory

This machine has complete set accessory with it when selling including the protection glasses, congealed gum and the cover of light lead crystal. If the customer needs more accessories, please order from dealer.

Chapter 8 Clinical Application

8.1 Training

Doctor, nurse, technician or other professional personnel who accept professional training can operate the IPL treatment system. Strong suggestion: The medical personnel must attend professional training provided by experienced doctor.

8.2 Treatment Range and taboo disease

8.2.1 Target

IPL rejuvenation is lately patulous technical of the intense pulse light which can cure the blood vessel pathological changes (VL) and the pigment pathological changes (PL). This therapeutics provides a kind of beauty principle which can improve the face skin availably, and do not affect patient to work and rest. In addition, this machine also can treat other parts of body, such as the neck, ex- chest and the back of the hand etc.

8.2.2 Treatment Range

1. Smooth small wrinkle, shrink the thick hair-pore, beauty and whiten skin, remove the black rim of eye. (560~1200nm)
2. Treats freckles, chloasma, insolation spot which mostly begin from brown pigment. (560~1200nm)
3. Permanently remove hair, beard, the hair in the arms and legs, the part under the Bikini. (690~1200nm)
4. Treat acne, telangiectasis.(420~1200nm)

8.2.3 Taboo disease



Warning

If discovering the patient has the following characteristics, please stop the treatment.

- 1、 Part or whole body has a fever.
- 2、 The immune system has defect.
- 3、 The scar is left on body.
- 4、 The photoconductive skin and the crowd used the photoconductive medicine (510—1200nm) .
- 5、 Psychologically ill-health and has high expectation.
- 6、 Pregnant woman.
- 7、 the patient who may have the skin cancer.
- 8、 The thrombosis abnormality or the person just take aspirin and the antioxidant.

- 9、 The person may accept sunlight and violently insolation after the IPL treatment in the near future.
- 10、 In the near future(in 3 months), the person uses the hormone cosmetics(such as some “dispelling the spot “product).
- 11、 Epilepsy disease, diabetes, the customer have tendency of bleed.
- 12、 Radiate light upon the customer that the part skin is infected.
- 13、 Brown skin insolated under the sunlight.

8.3 Patient's sieving

Before treatment, Inquiring the patient is important for improving skin effectively.

The IPL rejuvenation only make an easy to wrinkle and can not replace the surgical operation which curer complex condition. IPL rejuvenation can make face neat, take the spot and the sunlight burns and age pigment.

The IPL rejuvenation attracts the patient of the quick rhythm life style, because it does not need the patient to spend a great deal of time to recover in the whole treatment process. That therapeutics does not request the patient to cease work and rest, patient can return to work or live after cure right away. We suggest not treat those who have too high expectation.

8.4 The treatment must know



Warning

Before carrying out the treatment, please reading this segment in detail.

- 1、 Before the treatment, doctor should make comprehensive inspection on the patient. According to the patient's special details, carry on a test light spot in the region which needs to treat first(specially deep skin patient);
- 2、 Pregnant woman, epileptic, slight lazarus, the sun-scald whose capillary vessel burst after chemotherapy, must carry on the operation treatment according to the doctor's suggestion;
- 3、 After cleaning hair of epidermis in the treatment district shaves hair clean, use the neuter liquid to clean the skin surface, but not any cosmetics;
- 4、 Wipe great quantities of used congealed gum in the treatment area (the better congealed gum is used, the result is better);
- 5、 While cure, the IPL head must aim at the treatment area skin, the slight contact skin surface, must keep the light lead crystal clean;
- 6、 The treatment area skin surface sometimes will appear to flush slightly. It is the normal phenomenon and will disappear automatically in a few hours after cure;
- 7、 Record the enactment of the treatment parameters for next time;
- 8、 20 minutes after the treatment, clean the congealed gum. Spreading some aloe can dispel

some unwell symptoms of patient. In 24 hours, do not use any cosmetics. Avoid the irradiation of the sun light and the mightily sport in a month, regulate the food, the spread the sun block when going out;

9、The IPL rejuvenation need 3~6 times generally, interval time is 21 days for each; The IPL hair removal need cure 1~3 times generally, 21 ~60 days for each time.

10、After curing three times usually, the treatment result can be obvious generally.

8.5 Preoperative preparation

8.5.1 Inquiry work

When patient's first visit a doctor, the doctor in charge should:

1、Exclude the patient whose skin is black brown because of basking in the sunlight or artificial lights in recent 3~4 weeks

2、Exclude the patient who may bask to be black brown in the sunlight or artificial lights in future 3~4 weeks.

3、Inquiry patient Of disease history in detail, including what kind of treatment he accepted, judge he or she fit to accept the IPL treatment or not.

4、Make it clear why the patient accept the treatment and what he or she expect.

5、Discuss the plan of IPL skin softer treatment with the patient.

8.5.2 Explanation work

First visit to a doctor, the doctor in charge (or other qualified medical personnel) should tell the patient the following circumstance:

- The body may be unwell or ached when curing;
- After the treatment, may be temporarily swollen, inflamed or dropsy;
- To attain the ideal effect usually needs 3~5 times treatment. The whole period is decided according to the concretely curative effect and the patient's actual expectation value;
- Temporarily slight risk of the side effects may exist , such as pigmentation excessiveness and the skin veins change etc

8.5.3 Protect the eye

While using the IPL, all personnel (include the patient and all medical personnel) must wear the protection glasses to protect eyes. Patient also may cover up the eye with the gauze. Certainly, best protection measure is to let patient shut up eyes.

8.5.4 Anesthesia

During the IPL rejuvenation , using the pulse light with the low energy density do not need anesthesia. But a lot of patients use the local anesthesia to avoid any unwell feeling in cure process. Generally use 4% lidocaine facial cream as the local anesthesia but not use the anaesthesia of EMLA (Eutectic mixture of local anesthetics) which causes the vice- reaction of the blood vessel constringency and will lower the treatment result. Generally after using anaesthetic one hour, carry on the treatment, but wipe off all anaesthetic before treatment.

8.5.5 Take a picture

Take a picture for the patient before and after operation (left, right and front side), because many patients can't objectively evaluate the treatment headway, these photographs can be the powerful proof.

Taking pictures should be under the same environment as similar speed, guide number and focus in order to objectively contrast photographs in different time.

8.6 Vice- reaction

The whole IPL skin softer process needs 3~5 times, the interval time for each time is three weeks. The treatment can improve skin gradually. We can guarantee that the patient does not need to cease work and rest at the same time. The vice- reaction temporarily risk may exist, vice-reaction performances are follows:

8.6.1 Ache

When the pulse light is sent out, some patients may feel unwell in different degree. Some patients say that it likes the pinprick; some say that it likes to be flipped by the rubber. The feeling of cauterization may keep at most one hour. The adult and bigger child can suffer this kind of unwell feeling and some patients request the local anesthesia.

8.6.2 Break the natural veins of skin

Possible scab or water pimple maybe left but disappear in 5~15 days.

8.6.3 Pigmentation change

In the treatment area possibly has the pigmentation change, most appear pigmentation or shortage (appear on the fuscous skin or when the treatment area suffers the sunlight irradiation). To some patients, the inattention protecting from light after operation may cause the pigmentation exceed, this kind of change usually will restore to original in 3~6 months, but the pigmentation change is very few.

After several days in treatment of IPL for tender skin, the freckle and birthmarks will appear the circumstances that color deepen generally, but will disappear basically in the short date.

8.6.4 Scar formation

This treatment seldom produce scar, in very few cases, the big area increases the scar formation or the abnormality of scar proliferation organization. For reducing the risk of forming scar after operation, please follow the postoperative nursing elucidation.

8.6.5 Swollen and inflamed excessiveness

After operation, the nose or the skin of the cheeks easily temporarily red and swollen, usually decrease within 3~7 days.

8.6.6 Skin flimsiness

The treatment area or the nearby skin may become weak, please do not cover at this time, do not rub the treatment area in order to prevent the skin avulsion.

8.6.7 Bluish swelling on skin

Treatment area may appear blue or purple tumefaction on skin, it may keep 5~15 days, the bluish may change into red ferruginous, will fade away in 1~3 months.

8.7 Treatment parameter

8.7.1 Brief introduction

The IPL treatment system is according to the photon beautiful skin principle. A lot of doctors and experts different from selectivity of parameter settings that uses in the IPL according to the skin type, main disease condition of the surgical operation process and patient skin.

The parameter of the IPL treatment system is constituted by the IPL parameter (the pulse type) and the intense light energy (the energy density).

8.7.2 The meaning of the parameter

- Wavelength——Provide the target organization to absorb the light energy optionally
- The number of the pulse——The pulse energy of the each intense pulse light can be divided into two, three or five small continuous pulse. This kind of special system can guarantee the target organization fully absorb pulse energy; at the same time, protect the epidermis to spread heat. Multi pulse benefit the deep department in the target organization to keep on heating, avoid harming the non- target organization;
 - Pulse width——Shines to the target organization and heats up theuration, the interval between pulse width and the space of each pulse (pulse space) takes millisecond as unit, each pulse width can establish independently. When use three pulses, two pulses space adopt the same setting.
 - Pulse space——When many pulses are applied for spreading the heat, more shorter the pulse space is, more quickly the skin heats.
 - Energy density——Total energy shines upon the organization area in unit. The energy density is a unit that measures the total energy shined upon the skin in unit (J/cm^2). The operator sets energy density every time. The energy density is composed by the energy (take J as the unit) sent out by choosey pulses and delivered area (take m^2 as the unit). The intense light pulse of the EROSE instrument enters the patient's skin through through light lead crystal and congealed gum. Because the light spot area of the IPL instrument is very big($8mm \times 40mm$), The light disperses very small, the light penetrates deeply. The energy density is nearly the same in the different depth under the skin (This differentiation is very big with small light spot of the laser). The bigger the energy density is, the temperature of target hair, the surrounding organization and the epidermises is higher.

Congealed gum and cooling IPL head can lower the initial temperature of epidermis in order to guarantee that the highest temperature attains the target organization. Comparative lower energy density is an important part of tender skin technique of IPL, also is guarantee of not ceasing work and rest after operation.

It is keen for setting energy density and successfully choosing procedure to observe the reflection of skin In the treatment.

The energy should be increased carefully after observing the reaction of epidermis.

8.7.3 The parameter constitution principle

- The skin is black or the freckle is deep——Should set the low energy density, long pulse intermission;
- The skin is white or the freckle is light——Can set the high energy density, short pulse intermission;
- The roughness of skin veins is heavy——Can set the high energy density, long pulse intermission;
- The blood vessel is thick—— can set the high energy density, long pulse intermission;
- The blood vessel is thin——can set the low energy density, the short pulse intermission.

Cooling time is decided by the size of object. The smaller object is, the shorter the cooling time is; the bigger object is, the longer the cooling time is.

The IPL treatment system is designed according to the selective absorbent principle of light because the cooling time that thicker blood vessel need is longer, thinner epidermis need is shorter. Therefore, it is useful to utilize character of dispersing heat through dividing the energy when curing.

The pulse space between two pulses must be long enough so that the epidermis have enough time to deliver the energy to the congealed gum and the cooling treatment head, but this pulse space should be shorter than the cooling time of color regiment so that target organize can be heated by each pulse gradually. To most patients, choosing short pulse space is appropriate. The deep color skin absorbs more light energy, the temperature is higher, a should choose the longer pulse space.

8.7.4 Congealed gum

Many customers like to spread congealed gum between the skin surface and the light lead crystal for reducing the un-well feeling.

Though the IPL treatment system can reduce the need for congealed gum because of unwell feeling, congealed gum is useful in curing skill. For example, Used for outline of face, transformation will change slightly when position of treatment head changes.

The congealed gum can be laid on bottom of face or the light lead crystal for 2~3mm. Make the light lead crystal suspend on the surface of congealed gum, which can protect skin well. If the gum is free zed on lead the light crystal, turn off refrigeration function (under" choice mode") to soften the congealed gum.

8.8 The IPL tender skin treatment step

- Let the patient sit in cure chair wearing the protection glasses, remind that the patient do not open the eye in the surgical operation process. The operator selects the best position between the face of patient and the touch screen.
- The treatment usually starts from inconspicuous part of the face, such as the forepart of ear. Spreading congealed gum for the 2~3mm on curing part will help cool off the skin and promote penetrative rate of pulse. When the light pulse shoot at congealed glue, each part which accept the light pulse treatment should spread the new congealed gum.
- Place the treatment head perpendicularly on congealed glue of 2~3mm thick, make the light

lead crystal to get in touch with congealed gum, not skin.

- Press to move the trigger switch, shoot the light pulse.

(The choice of parameter is very important for clinic training. The short pulse mainly used for the undertone skin or the red face. The long pulse width and long pulse intermission mainly used for the deeper skin type and patient whose pigment pathological changes or sunlight burn. We suggest the doctor carefully choose the parameters. If meeting difficult case, consult clinical expert.

- In cure process, when the patient need additional treatment for further consultation with a doctor, increase the energy density properly for better effect. Before starting cure, still need to shoot the test light spot for observation.

- After treatment, do not need any after treatment nursing. The patient can dive into the work or life right away. Anti-sunburn process is needed for treatment area. The appropriate skin nursing can enhance the intense pulse light to smooth the related color regiment, shrink the pore size, and reduce the pigment sink and light aging.

- After treatment, the color of pigmentation and brown spot will deepen, but will disappear in several days.

8.9 After operation nursing

8.9.1 Summarize

The blain and the ulcer on skin after treatment can be cured by the antibiotic ointment or the burn ointment. The low-density ointment can reduce tumidness. If the blain is scabby, keep it wet with the Vaseline etc.

8.9.2 sunlight insolation

One month after operation, patient should protect treatment area from being shined with some medical. The sunlight may improve the rebirth rate of the melanin, thus cause excessiveness of the pigmentation..

8.9.3 Face-painting

Most doctors allow the patient to use the cosmetic immediately after operation. But they request patient to inform them once detecting the area of treatment appears wound or scab and stop Face-painting.

The risk of the low energy IPL light tender skin surgery is very low, the patient can work or live right away.

8.9.4 Continue to treat

The following is the suggestion as reference for doctors that the relevant patient continues to cure.

Patient should return to the hospital for further consultation 3 weeks after a period of treatment(4~6times), and may as well keep the long-term treatment, because some case need one year for recovering.

8.9.5 Vice- reaction

If discovering any vice-reaction in cure process, stop curing until the vice- reaction of

treatment part disappeared, and then checks the reason.

- Immediately clear the Congealed gum, clean irradiation area with rinsing.
- Refrigerate the irradiation area with ice bag for at least 15 minutes until the hot sensation disappears.
- The typical phenomenon may appear:
 - Slightly flaming feeling may go on half an hour or so;
 - Flush slightly,4~12 hours, generally can fade away in a day;
 - Freckle may deepen slightly, generally shed in the week gradually;
 - The freckle may become deep after irradiation for a short time, but will become light gradually;
 - For the irradiation to chloasma, do not appear too obvious instant reaction of skin in order to prevent the vice-reaction of the pigmentation.
- Avoid using hot water, use the cold water to clean the skin mildly. Cosmetics for keeping wet also can be used.
- Purpuric skin , blain, dropsy
 - Can use the ointment ease the reaction, use the BFGF to promote skin to restore in later period. (Be dealt with as light degree injury)
- Pigmentation
 - When appearing in the person with black skin or who suffer insolation, use the BFGF or the liquid of the vitamin C or beautiful and white nursing to reduce it.
 - The decrease or lost of pigment
 - May have something to do with the high energy irradiation, can recover generally by oneself;
 - The guest who adopt the IPL rejuvenation is not allowed to use the stimulating cosmetics or hormone in order to avoid producing the pigmentation.

8.9.6 End the treatment

When to end the treatment is decided by the doctor. Generally when the red spot on the surface of skin, the extension of capillary vessel and pigmentation obviously decrease; When the texture, roseate degree of skin, the sunlight burn and light aging improve obviously, end the treatment.

.8.9.7 After operation skin nursing

Morning

- Use the mildly neutral detergent and cold boiled water to clean the skin
- Spread the vitamin C compositive cream.
- Spread the suntan cream

Night

- Clean the skin
- Spread cream keeping wet.

9.10 The advantages of the IPL treatment

1. Have no harm

2. The painful feeling is not obvious
3. Fast, valid, usage simple
4. The treatment needs no down time.

Chapter 9 Parameters selection

1. Freckle treatment

1.1 Treatment principle

Selective light pyrogenation, namely 560nm-1200nm wide light spectrums is first absorbed by pigment granule and regiment of the organization when penetrate skin, translate into heat energy from light energy. The pigment granule is broken down, partially shells, partially is licked up by cell and transferred outside the body. The skin appears red slightly and freckle's color deepens, but it can be washed and the around normal skin is uninfluenced. The freckles will reduce or the color lighter in a week. The patients accept easily.

1.2 Treatment head

560nm-1200nm rejuvenation treatment head

1.3 The regulation of clinical parameter

1.3.1 The depth of the skin color

The skin is blacker, the pulse intermission is longer; the skin is whiter, the pulse intermission is shorter, the energy is bigger.

1.3.2 Rough degree of the skin veins

The skin vein is rougher, the pulse width is longer; the skin vein is slighter, the pulse width is shorter.

1.3.3 The color of freckles

The freckle color is deeper and the energy is smaller.

1.3.4 The skin sensitive degree

The skin is more sensitive; the energy density is more lower.

1.4 Parameters selection

1.4.1 Two pulses (MODE1)

T1=4~8ms D1=10~20ms T2=6~10ms

1.4.2 Three pulses (MODE2)

T1=3~7ms D1=15~25ms T2=5~9ms

1.4.3 Five pulses (MODE3)

T1=2~6ms D1=15~30ms T2=4~8ms

1.4.4 the energy density is regulated according to 1.5. Choose the pulse mode according to the expression of the patient. After adjusting the parameters, choose a test light spot and raise the energy from low energy (10J) gradually.

1.5 Treatment evaluation

When treating, take the followings as reference: the freckle color become dark, the around normal skin appears slight erythematic, the patient feels slight painful. Otherwise, blain may come into being easily.

If the skin appears serious erythematic, the tumefaction, blain and pigmentation may come into being next day. Therefore, the skin can not accept repeat irradiation if it appears serious erythematic after first irradiation.

For the patient with dark skin or comparatively dense freckles, should reduce the energy density by 2-3J/cm².

Cheekbones skin easily appears pigmentation, should reduce energy density by 1-2J/cm². Don't repeat irradiation.

1.6 Vice reaction

The small blister appeared after the treatment will heal up in 3-5 days automatically.

The pigment will slack up in 1-2 months.

If appear pigmentation, can apply the Retina-A for treatment, 3-6 months fade away.

2 Treatment for telangiectasis disease

2.1 Treatment principle

There are two kinds of telangiectasis disease: the primary stage and continues stage. The clinical telangiectasis of face most appears in the plateau, cold region; the patients who use the unsuitable cosmetics to cause skin repeating hypersusceptibility and who use the long-term hormone.

The face telangiectasis is also called "red blood thread", assumes images as striation, arborization, spider, star, spot, pimple. The diameter mostly is smaller than 0.5mm; The local skin on face of few patients blushes, the blood thread is not obvious, they are usually sensitive to cold, hot and sunlight and often feel flaming, that will influence the beauty. According to the principle that red albumen is sensitive to 521-585nm light and the selective pyrogenation of light, that is the red albumen absorb the light energy of specific wavelength, heats the blood, then heat energy conducts to capillary wall and cause the capillary endothelial cell swollen, the vasospasm contraction, the organization oxygen deficit. As telangiectasis or blowzy disease, the diameter of blood vessel is 0.3-0.7cm in dermis. The specific wavelength of light of professional treatment head penetrate can reach this level to treat the disease effectively. Selectively break vasodilator but not hurt the normal skin. The thinner capillary prefers small pulse width, then heats the hemoglobin quickly, and activates the capillary wall directly. The thicker capillary bled quickly, use the bigger pulse width, heat the hemoglobin and conduct to capillary wall. Cause capillary obstruction and reach the purpose of the treatment.

2.2 Available handle pieces

560nm-1200nm or spare selection 420nm-1200nm (Rejuvenation treatment head)

2.3 Clinical accordance

2.3.1 The depth of the skin color

The skin is darker, pulse intermission is longer, the energy is smaller; the skin is whiter, pulse

intermission is shorter, the energy is bigger.

2.3.2 Thick and thin blood vessel

Blood vessel is thinner, pulse width is shorter, the energy is bigger; Blood vessel is thicker, pulse width is longer, the energy is suitable.

2.3.3 Skin sensitive degree

The skin is more sensitive; the energy density is slighter.

2.4 Parameters selection

2.4.1 2 pulse (MODE1)

T1=4~8ms D1=12~20ms T2=6~10ms

2.4.2 3 pulse (MODE2)

T1=3~7ms D1=15~25ms T2=5~9ms

2.4.3 5 pulse (MODE3)

T1=2~6ms D1=18~30ms T2=4~8ms

2.4.4 The energy density is adjusted according to 2.5. According to the condition of the patient's face, select pulse MODE and adjust pulse parameters, then select a test spot, increase the power energy from 20J gradually.

2.5 Treatment evaluation

Observe instantaneous change of the blood vessel after absorbing energy carefully. This is important to judge whether repeat treatment is needed. Generally 3 kinds of reaction will appear: ① blood vessel instantaneously closes and vanishes; ② blood vessel become thin; ③ the blood inside of blood vessel coagulates to amaranth.

When doing further consultation with a doctor three weeks after surgery, the first condition is a better effect. But any of the 3 kinds of reactions is effective. Do not importune the best effect, otherwise dropsy, blain, purpuric skin even scar will come into being.

2.6 Treatment periods

Usually 21 days, the younger, the period may suitably reduce; the bigger, the period may suitably lengthen.

2.7 Attention

Before treatment, should study out Rx according to the condition of skin and blood vessel. Make certain the right energy, appropriate pulse width, enough pulse intermission, match them properly. For darker skin, use small energy with long pulse intermission. If the energy is too big, inflammation, water blister and pigmentation will appear. If the energy is too small, the target of closing blood vessel and freezing can not be reached.

Usually choose big energy in treatment, after 1-3 times' treatment, may basically finish. Do not repeat irradiation from low energy to the high for many times.

After surgery, should avoid inducement and pay attention to protection to keep effect.

With the Increase of treatment times, increase energy by 2-4J/cm² properly.

If the skin appears serious erythematic, inflammation after the first treatment, do not repeat irradiation to pile up energy in local.

For the patient with black skin or serious telangiectasis, the energy density should reduce 2-3J/cm² during the treatment.

The skin of cheekbones easily appears pigmentation. Reduce energy density 1-2J/cm² during treatment, and do not repeat irradiation as far as possible.

If the IPL rejuvenation treatment is not very effective to the serious patient, combine with the laser for better treatment.

2.8 Vice reaction

The erythema formed after treatment on the normal skin will fade away within 1-2 hours. But the erythema around the extended capillary will fade away after 4 hours.

The water blister will cure naturally within 3-5 days.

The pigment will slack up in 1-2 months.

If pigmentation appears, use the Retina-A for treatment, 3-6 months fade away.

The partial ache, the red erythema are the most common kickback, usually recover within many hours after cure. The local scar or water blister forms almost because the local energy is too high or light spot repeat superposition.

The individuation of parameters setting as well as the correct operation may avoid its occurrence effectively.

3. Treatment of hair removal

3.1 Treatment principle

Hair is mainly composed by hair stem of the surface of body and the hair follicles in deep epidermis. Supply the nourishment that the hair growth need through the hair follicles. The conventional methods of hair removal are shaving hair, tweezering hair, depilation by chemistry medicament, and depilation by wax, mechanical method, electrolysis and thermal decomposition and so on. Among them, most only remove hair stem for purpose. They are hard to destroy the deep hair follicle and cannot attain the purpose of the real depilation. Although the few may the effectively destroy hair-follicle, but the precision of operation is high and fussy. The treatment of intervention has big hidden trouble of forming the scar.

IPL hair removal has the advantages of not harming epidermis and forever effect which satisfy many people. Melanin cell in hair follicle absorb specific wave band and heat the hair follicle, then selectively destroy hair follicle, thus achieve the effect of removing hair without hurting the surrounding organization.

3.2 Available handle

640nm-1200nm hair removal treatment head.

3.3 Clinical accordance

3.3.1 Hair removal principle

Use the shorter wavelength to treat the tint hair, tint skin and hair on surface. Use the longer wavelength to treat fuscous hair, fuscous skin. Don't recommend to cure the hair with lighter color than skin.

3.3.2 Hair color

The hair is blacker, pulse width is narrower; the color is shallower, pulse width is wider, and

energy density is suitable.

3.3.3 Hair depth

Hair follicle is deeper, pulse width is wider; hair follicle is shallower, pulse width is narrower, and energy density is suitable.

3.3.4 Thick and thin hair

The hair is thicker, the intermission is longer, energy is smaller; the hair is thinner, the intermission is shorter, the energy is bigger.

3.3.5 Hair consistency

Hair denser, the energy is smaller; hair thinner, the energy is bigger.

3.3.6 Skin color

The skin is darker, intermission is longer, energy is smaller; the skin is whiter, intermission is shorter, energy is bigger.

3.3.7 Skin sensitive degree

The skin is more sensitive, the energy density is smaller.

3.3.8 Thermo Relaxation Time

Thermo Relaxation Time names thermal diffusion time. The ideal IPL pulse width is less than 1/2 TRT of hair follicle. And pulse intermission is more than TRT of epidermis. That can destroy the hair follicle but not hurting the epidermis. The TRT of epidermis is 9-10ms, the TRT of hair follicle is 30-100ms. Therefore, the pulse width should be 12-40ms and divided into many times to output. The intermission is at least 10ms.

3.4 Parameters selection and adjusting

Pulse width: Pulse width is longer, the heat distributed in monolayer skin is less, the heat permeate more deep. Adjusting principle: the skin is thicker, pathological changes distribute more deep, adjust pulse width long; selecting 3 pulse, the last pulse width is longest; extending pulse width, may increase energy suitably. Pulse intermission: pulse intermission is longer, the skin cool off more thoroughly. But the temperature of the pathological changes part also will low. Adjusting principle: the skin is darker, adjust pulse intermission long; selecting 3 pulse, the second pulse intermission is slightly longer than the first. Energy density: treatment generally starts from the low energy. Adjusting principle: the skin is darker, more sensitive, start the energy density start low; the skin respond more serious, adjust the energy density low; when changing 3 pulse to 2 pulse, should reduce the energy 20%.

3.4.1 2 pulse (MODE1)

T1=6~8ms D1=12~20ms T2=8~10ms

3.4.2 3 pulse (MODE2)

T1=5~8ms D1=15~25ms T2=7~10ms

3.4.3 5 pulse (MODE3)

T1=4~8ms D1=18~30ms T2=6~10ms

3.4.4 Regulate the energy density according to the 3.5 treatment evaluation. According to the condition of patient's face, select pulse mode and adjust pulse, then select a test light spot and increase the energy from low energy (20J) gradually..

3.5 Treatment evaluation

The patients will feel unwell in different degree; some patients feel acmethesia, the other patients feels being shot by the elastic objects. Cauterant feeling will keep on at most an hour.

Most of adults and older children may endure this kind of illness. The hair can be removed and patients have no feeling, the effect is best; but the hair of some patients can't be removed at once, after a few days hair shed off naturally.

3.6 Treatment periods

The interval general for each treatment is 21 days–1.5 months.

3.7 Attention

If the skin occurs serious erythematic, and occurs inflamed, water blister and pigmentation and so on next day, do not repeat irradiation after first irradiation.

3.8 Vice reaction

Acne: The patient will feel unwell in different degree, some patients feel acmesthesia, the other patients feels being shot by the elastic objects. Cauterant feeling will keep on at most an hour. Most of adults and older children may endure this kind of illness. Some asked for anaesthesia.

The skin vein change: possibly form the scab or the water blister, need 5-10 days to disappear.

Pigmentation: treatment part may form pigmentation change. Most of pigmentation overabundance or insufficiency will occur on the deep color skin or the treatment region that suffer radiation. To some patients, the inattention of avoiding light after surgery may cause the pigmentation excessive. This change will recover within 3-12 months generally.

Scar: This treatment generally will not produce scar (For example the big area hyperplastic scar or abnormal scar hyperplastic organization in few case). In order to reduce the risk of scar formation, please follow the nursing explanation after-surgery.

Excessive inflammation: If excessive inflammation appears, it will disappear within 3-7 days.

Blue turgescence: treatment region may appear blue or purple turgescence, and it will keep 5-15 days. When blue turgescence fades away, the skin may become rust red and will fade away within 1-3 months.

3.9 Nurses after-surgery

After surgery, actualize cold compress in the treatment area (not using ice), cools the treatment area, reduce patient's swollen feeling. If the temperature of chemical cold compress block is lower than 40°C, please do not use. Use refrigerated gauze of 4*4 cm² which is soaked and put into plastic bag. The blain and canker after operation can be treated by antibiotic ointment and cauterant ointment (for example: Silverol or Biafine and so on). You also can use the lower density steroid ointment to reduce ache. A month after the surgery, patients may use the high factor shade and avoid the sunlight irradiation. The sunlight insolation may increase the rate of melanin regeneration, thus cause excessive pigmentation.

After the surgery, prevent trauma in a week. Do not take a shower with hot water; forbid the deep massage and acute exercises. Reduce the formation of convalescent organization dropsy. Use Vaseline etc to cure blain and scar.

3.10 End treatment

When to finish the treatment is decided by doctor. Usually when 80% of hair is removed or patients satisfy the effect, then finish the treatment.

Addenda A: Fitzpatrick Taxonomy

Skin to sunlight exposition response Fitzpatrick classification:

SKIN TYPE	COLOR	CHARACTERISTIC	TO THE REACTION THAT THE FIRST TIME SUMMER EXPOSE
I	White skin	Have light damage No brown spot	Always burn and never tan
II	White skin	Often have the light damage Sometimes have the brown spot	Usually burn and hardly tan
III	White skin	Sometimes have light damage Have the brown spot.	Sometimes medium burn Suntan general level
IV	Moderate brown skin	Seldom light damage Have the brown spot	Few burn Tan easily
V	Nigger-brown skin	Abnormal light damage Often have brown spot	Seldom burn Tan very easily
VI	Dark skin	No light damage Have brown spot	Tan very easily