IRISIOME

ÆSTHETIC LASER DEVICES

EPIC Online Technology Meeting on Photonics for Dermatology and Aesthetic Applications

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Motivations

Most common lasers

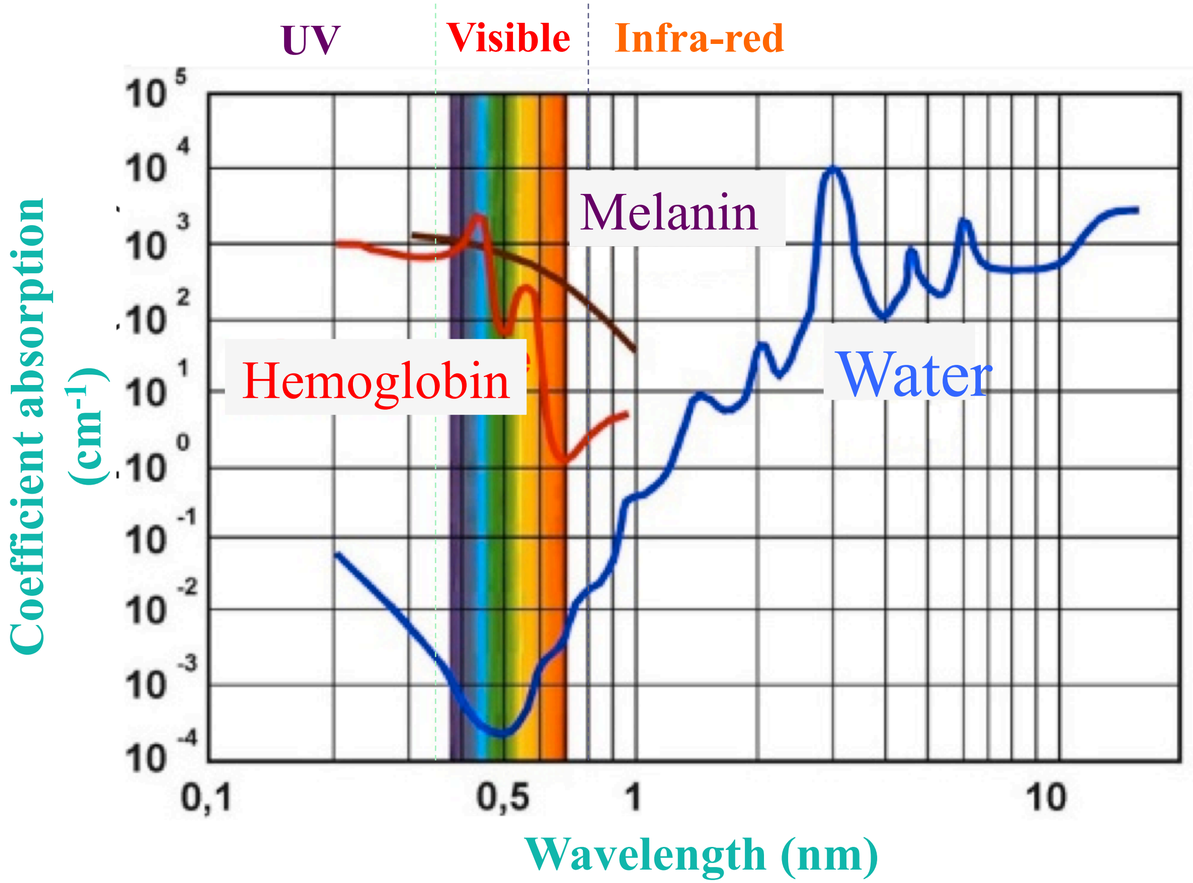
- Pulse durations from sub-ns to several ms
- Repetition rate drives by uses not efficiency
- Wavelength sets by gain medium
- **Performances set by optical architecture**

Major drawbacks: Maintenance, no tunability, **thermal effect (Joule level energy, from ms to ns ou sub-ns)**

- Side effects and down time
- Based on lasers developped in the 80 ‘s
- No major evolution with these technologies

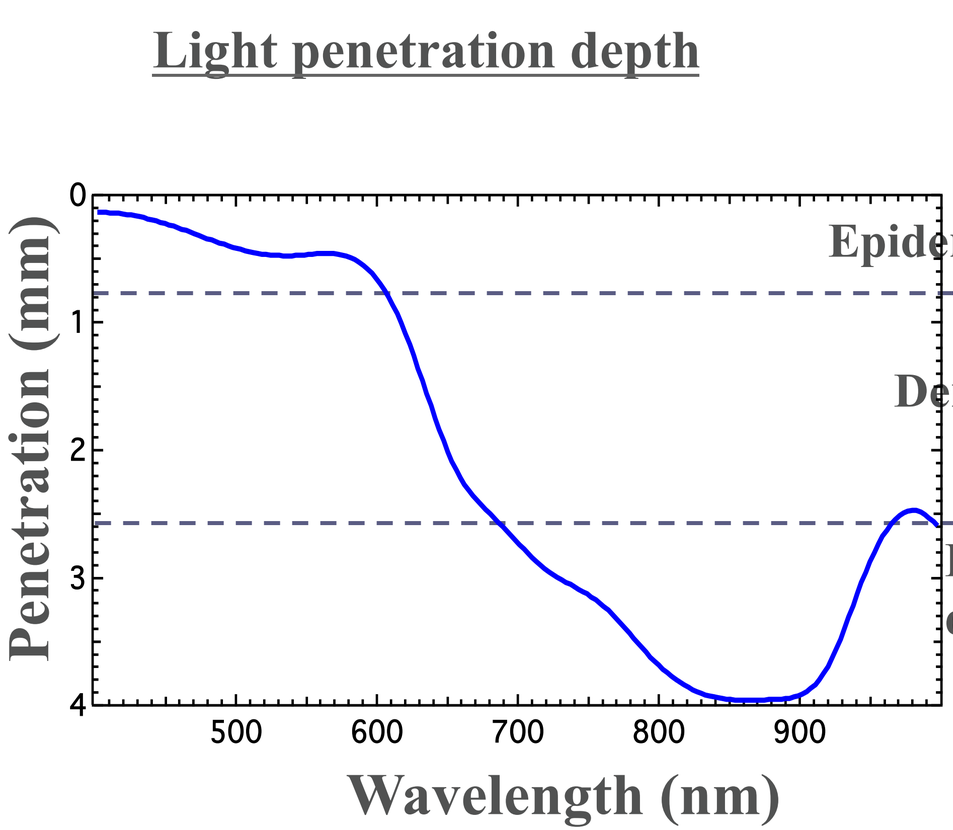
Motivations

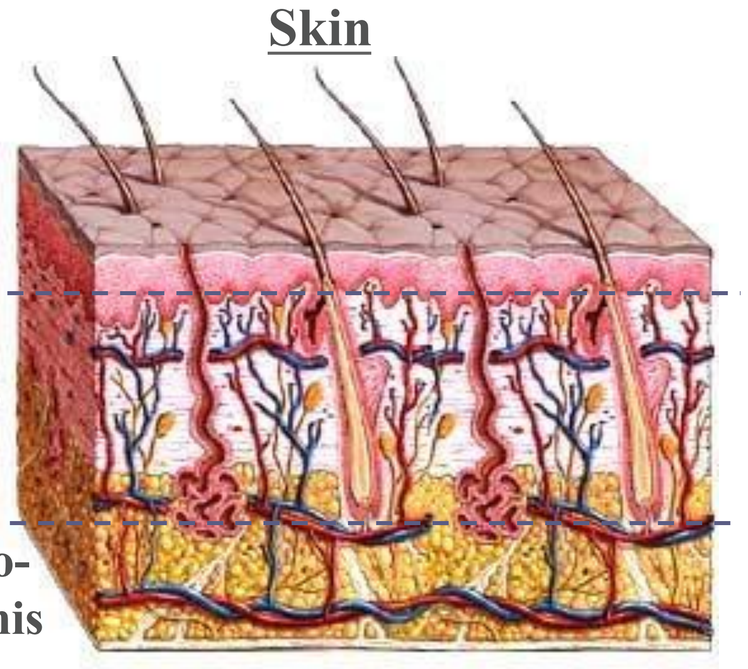
Light is used to act selectively on : **endogenous chromophores**



Motivations

Main chromophore + depth = **wavelength**





- **Several wavelengths are needed to adapt treatments to patients**

Motivations

Main chromophore + depth = **wavelength and pulse duration or frequency**

Chromophore	Diameter	TRT
Tattoo pigments	100 nm	10 ns
Melanosome	100-500 nm	10-250 ns
Vessels	30 – 100 µm	1-10 ms
Follicle	200-300 µm	10 – 100 ms
Leg veins	1 mm	1 s

TRT : Thermal Relaxation Time

- **Several temporal parameters are needed to adapt treatments to patients**

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Fiber laser technology

- **MOPA system**
- **Reliable (no maintenance)**
- **Compact**

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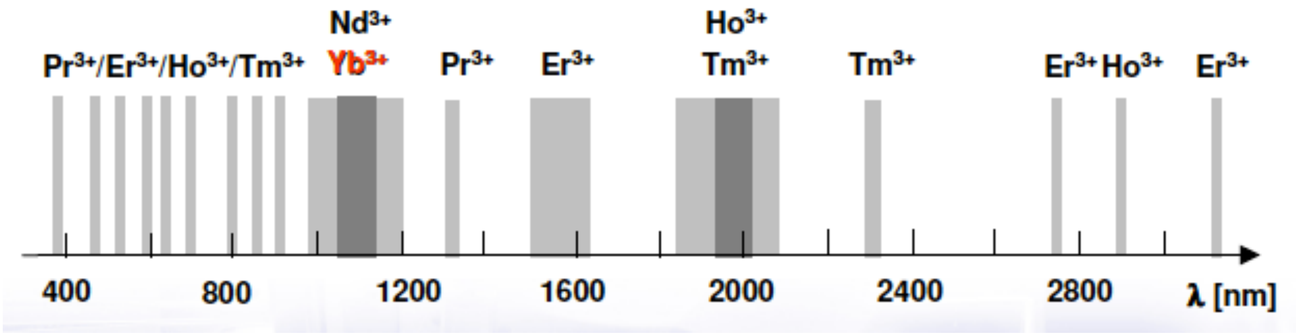
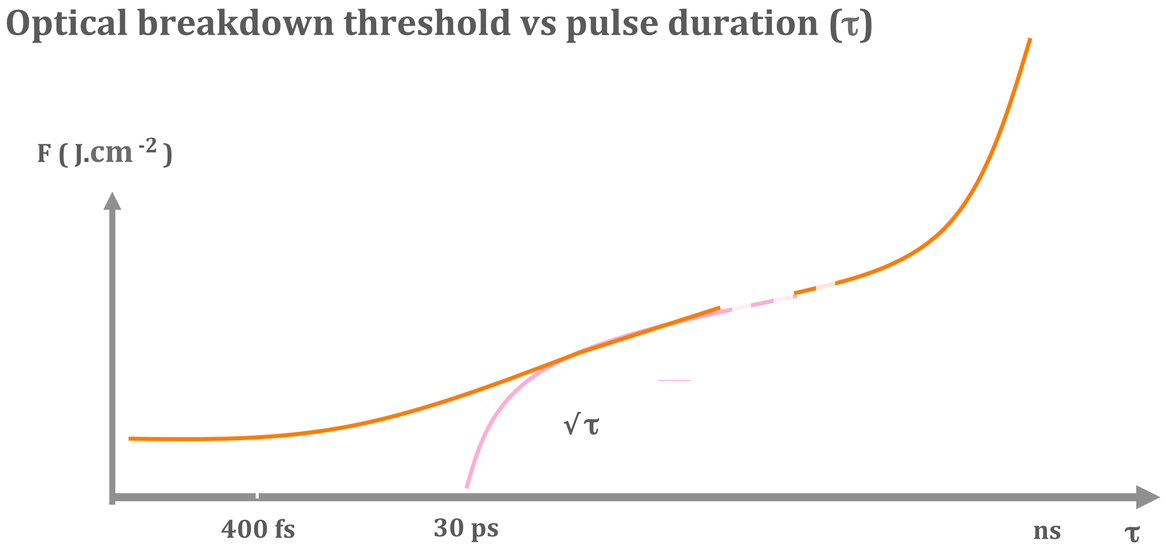
- **Electronic pulse generation**
- **Ultra short pulses (≈ 10 ps)**
- **Scalable to other wavelengths**
- **Adaptable pulse duration and laser repetition rate**



Why picosecond pulses?

New picosecond technology based on cumulative photodisruption



- If the threshold decreases, photoablation efficiency increases

➢ **Very limited energy deposited in the material preventing unnecessary surrounding tissue heating or ablation**

Why picosecond pulses?

New picosecond technology based on cumulative photodisruption

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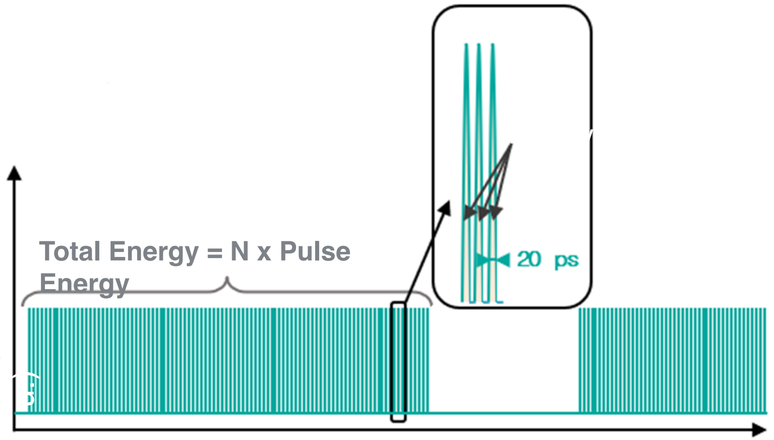
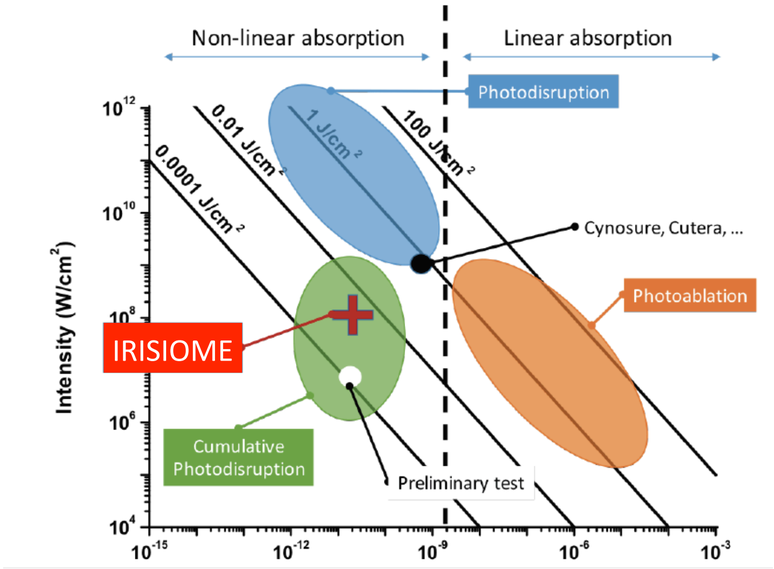




Some numbers:

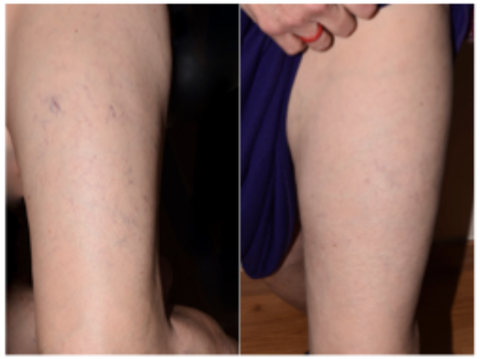
→ Main repetition frequency: few MHz to GHz
→ Burst frequency :1-6 Hz
→ Average power: up to 30 W (IR) 10 W (GR)
→ Spot size: 2 mm
→ Available fluencies: from 1 to 100 J/cm²

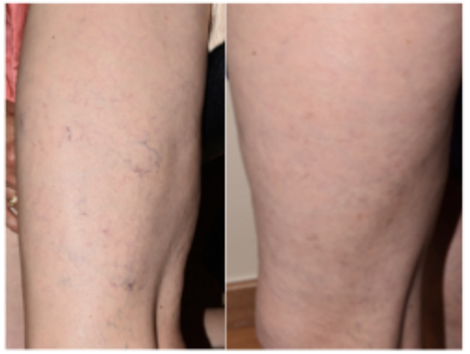
- Interaction with each pulse induces structural changes in the material leading to absorption enhancement
- After a given number of pulses (material and sub threshold intensity dependant) photo-disruption finally occurs

Clinical results

Pigmentary lesions (tattoo removal, lentigines):

Vascular lesions :





Perspectives

Non invasive treatments
No side effects/ no down time

Development of new tools for :

- Imagery (targeting only the lesion)
- Fluorescence (evolution during the treatment)
- Spectroscopy (choice of the correct wavelength)

The Graal : **Parameter adaptation during treatments**

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The end. Thanks for watching!