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Company presentation

Photoimmunotherapy powered by Modulight

Modulight, Inc.

agility – profitability – customer focus – reliability

Modulight, Inc.

- World's only vertically integrated PDT laser manufacturer
- Profitable privately held company with 15 years track record
- Certified ISO13485 QMS
- Co-branded & OEM products currently shipping to all continents
- Currently 6 pharma companies engaged in photoimmunotherapy have committed to use exclusively ML7710 medical laser
- ML7710 is the most versatile PDT system on in the market and supports multiple indications

Agenda

- Modulight introduction
- Photoimmunotherapy in oncology
- Illumination requirements in photoimunotherapy applications
- Medical lasers in photoimmunotherapy
- Summary

Modulight Product Strategy

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Life Science Solutions

Applications:

Oncology, Surgery and Bacteria removal (photo disinfection)

Offer turnkey and laser module solutions to Pharmas, system integrators and R&D.

Industrial Solutions

Applications:

laser range-finding, scanning, sensing, display, security

Offer chip to system OEM solutions to key system integrators in the market.

Custom Laser Solutions

Applications:

Laser solutions from wafer & chip to components and systems

Application tailored laser components and systems for system integrators globally.

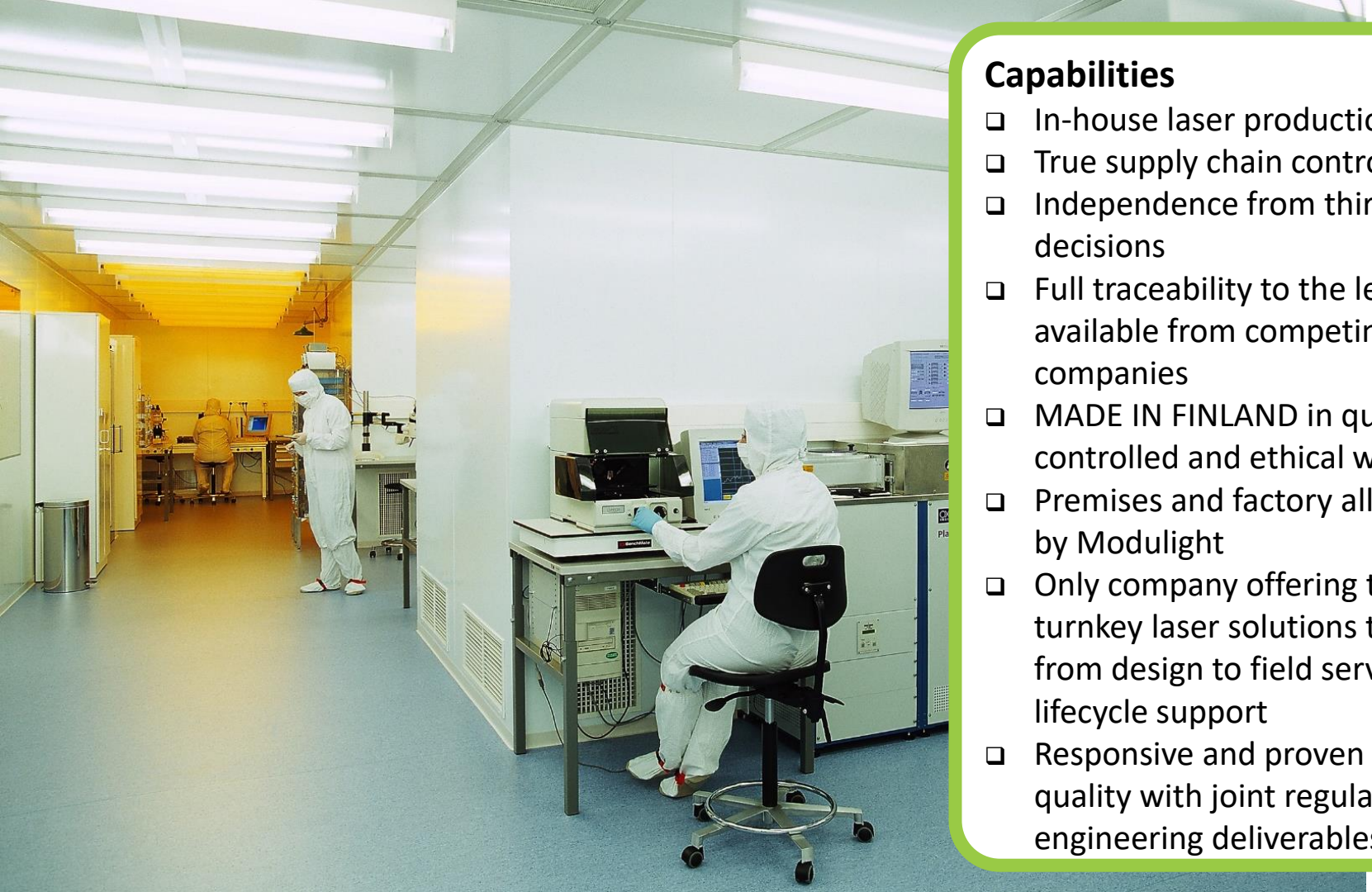
Services

Service categories

Calibration & field service for laser systems

Product design services

Regulatory and compliance management services



Capabilities

- In-house laser production
- True supply chain control
- Independence from third party decisions
- Full traceability to the level not available from competing laser companies
- MADE IN FINLAND in quality controlled and ethical work place
- Premises and factory all owned by Modulight
- Only company offering true turnkey laser solutions to PDT from design to field service and lifecycle support
- Responsive and proven service quality with joint regulatory and engineering deliverables

Photodynamic therapy concept (PDT)

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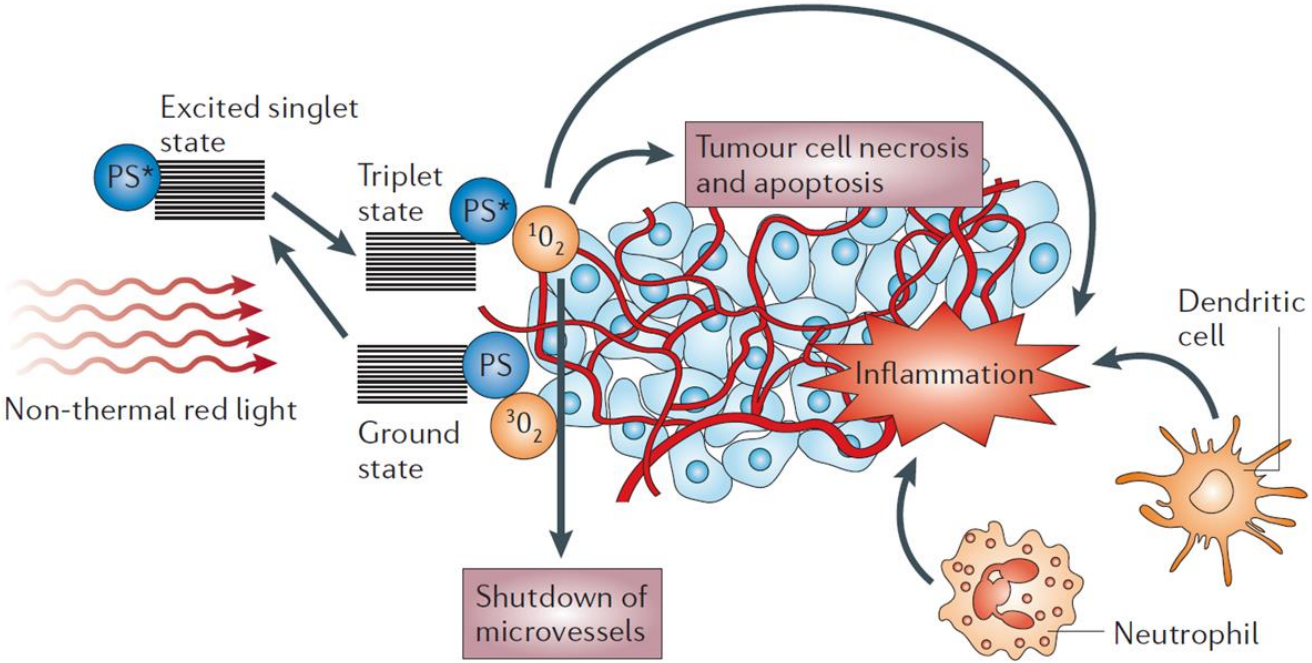

Castano et al, Nature reviews Cancer, 2006

General principle

- Bringing in a light activated drug/molecule in the proximity of tumour cell
- Light activation with the exact wavelength and light dose
- Creation of the reactive singlet oxygen to kill tumour cells
- Cell necrosis and apoptosis

Secondary reaction of PDT in human immunosystem

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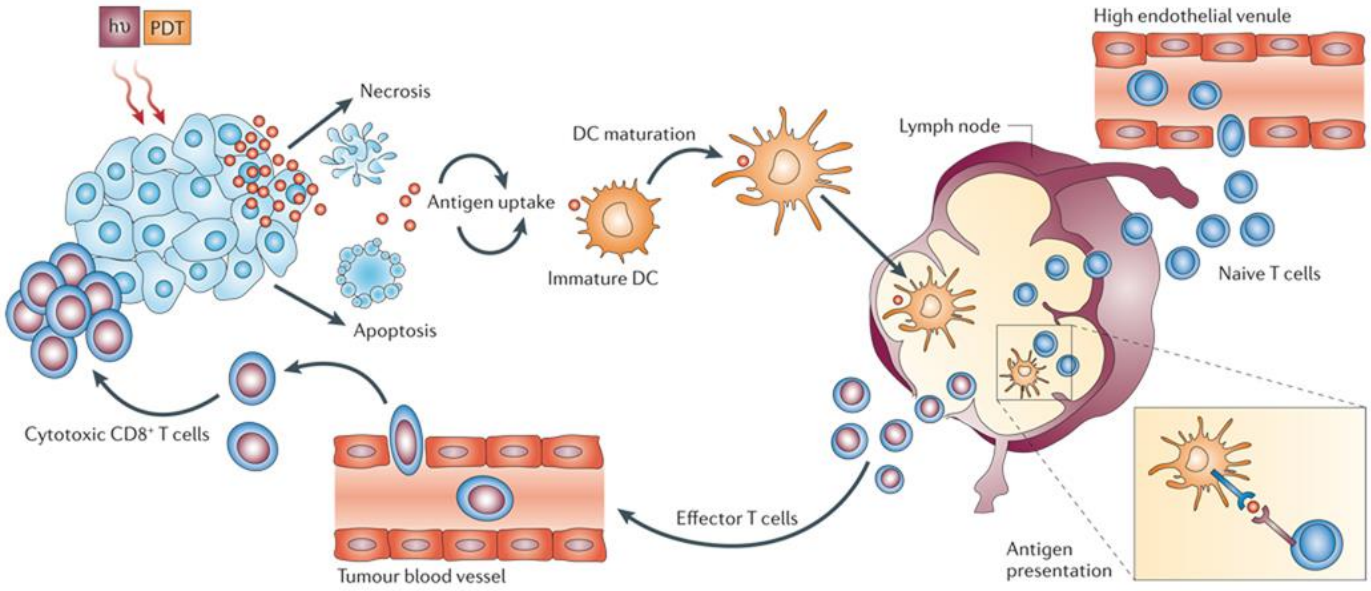

Castano et al, Nature reviews Cancer, 2006

Immunosystem reaction

- PDT induced inflammation induces activation of anti-gen specific T cells in regional lymph nodes
- Activated T lymphocytes become effector T cells and continue tumour killing process

(Photo)immunotherapy in oncology

Photoimmunotherapy

- A new type of **molecular targeted cancer therapy**, which allows the selective destruction of cancer cells
- Combination of targeted antibody and non-targeted photosensitizer
  - ✓ mAb binds **only** to specific proteins on the surface of the tumour cell
  - ✓ Photosensitizer (PS) structured into the drug concenrates at the tumour cell→targeted cell killing
- Types of PS carriers:
  - ✓ Anti-body conjugates
  - ✓ Virus shells
  - ✓ Various other nanoparticles

Cancer immunotherapy

Immunotherapy is treatment that uses certain parts of a person's immune system to fight diseases such as cancer:

1. Stimulating your own immune system to work harder or smarter to attack cancer cells
2. Giving you immune system components, such as man-made immune system proteins

Main types of cancer immunotherapies:

- **Monoclonal antibodies (mAb)**
- **cancer vaccines**

Photoimmunotherapy as combination treatment in oncology

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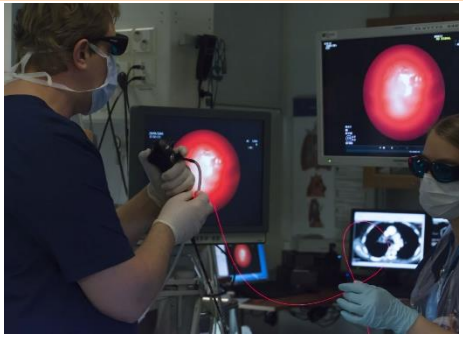
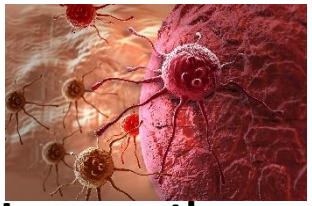


Photoimmunotherapy

- Less invasive targeted treatment of tumours
- Reducing and inhibiting side effects
- Treatment of tumour margins in surgery
- Treatment non-cure indications

+

Chemotherapy



Immunotherapy

Surgery

Examples of Photoimmunotherapy application areas

- Head & neck cancers
- Esophageal cancers
- Bile duct cancer
- Eye melanoma
- Non-small lung cell carcinoma
- Mesothelioma
- Glioblastoma
- Prostate
- Many others…

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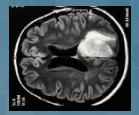
indications & PDT drugs



	approval status	lung	prostate	ENT (ear nose throat)	glioblastoma	dermatology	sinusitis	head & neck	cholangio / bile duct
m	Photofrin (Pinnacle)	Approved in US	●		●					●
	Metvix , Levulan (Galderma)	Approved in US and EU				●	●			
m	PC4 (Fluence)	Clinicals starting					◔			
m	Amphinex (PCI)	Clinicals ongoing	◑		◑		◑		◑	◑
	Methylene blue (Ondine)	Clinicals ongoing						◑		
	Tookad (Steba)	Clinicals ongoing		◑						
	Foscan (Biolitec)	Becoming obsolete?	●		●				●	●
m	PIT (Aspyrian)	Clinicals starting			◔					◔

* Dermatological indications: Psoriasis, CTCL, Eczema, Acne, fungal, skin rejuvenation, hair restoration

Illuminators in photoimmunotherapy

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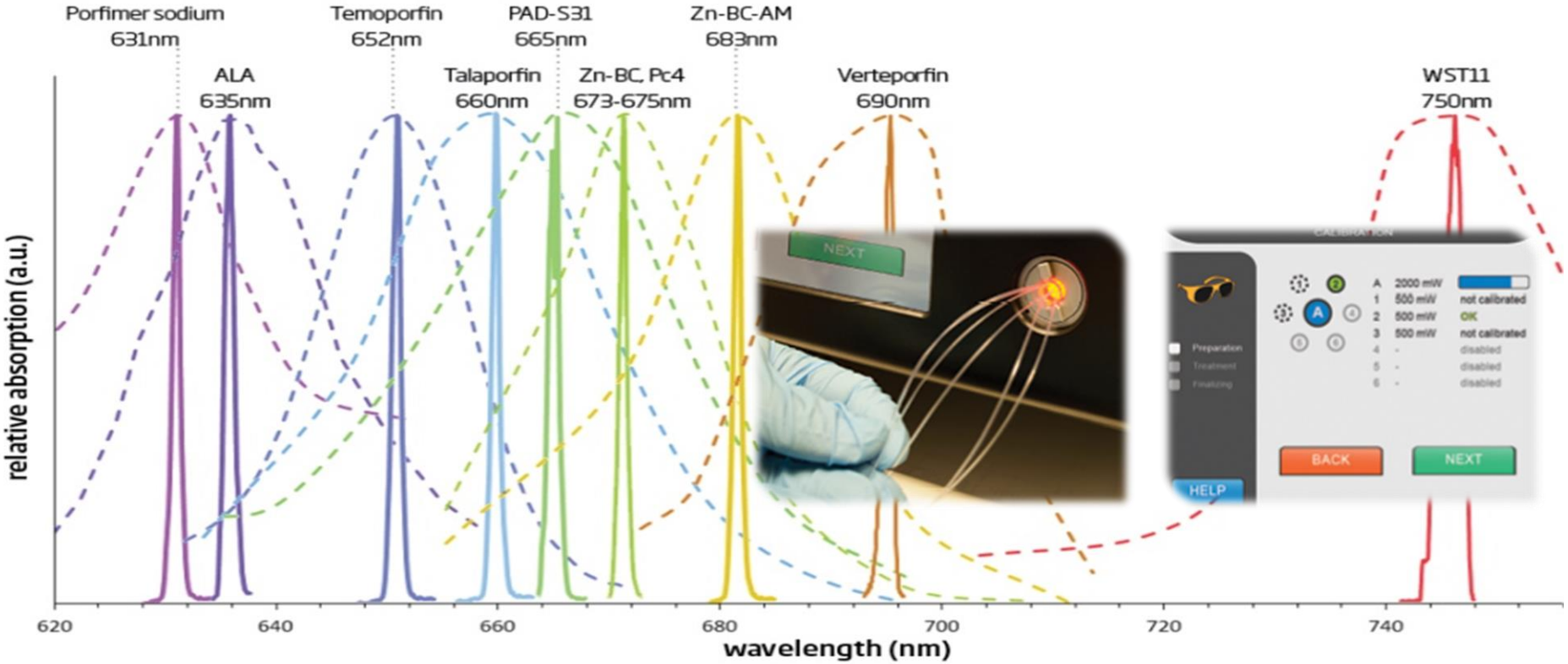
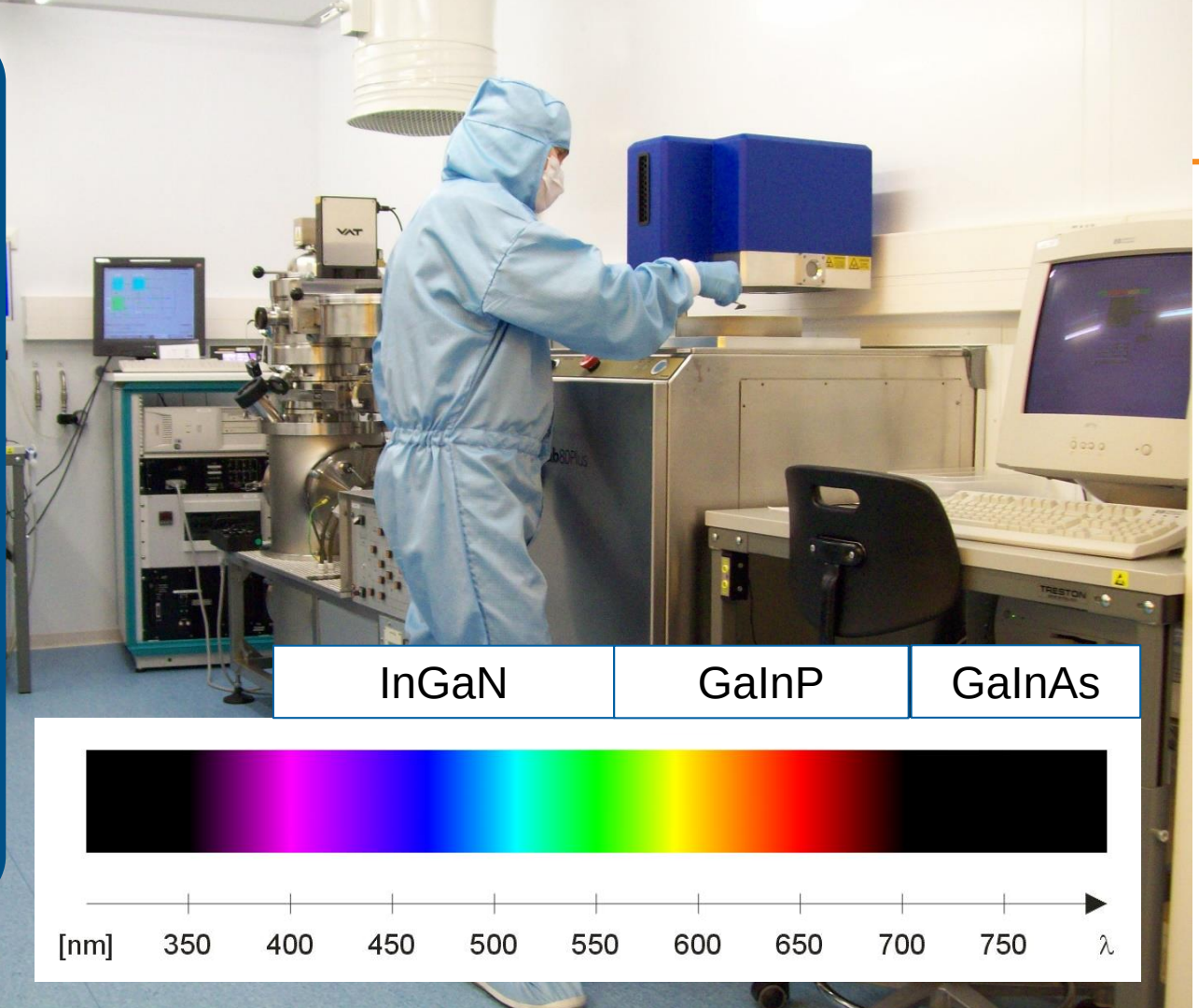


The absorption spectra of some common photosensitizers an the laser emission spectra of Modulight ML7710-PDT.

Wavelength engineering at Modulight

- Modulight owns and operates a full optoelectronics fab in Tampere
- Mastering multiple semiconductor material technologies and processes ensures unbeaten wavelength span of 400-2000nm
- Globally unique vertical integration from semiconductor to CE certified medical lasers



ML7710 – Reconfigurable oncology laser platform

- Up to 8 output channels for multiple drugs or light delivery accessories (topical, interstitial)
- Light activated drug therapy, hyperthermal tumour killing, minimally invasive surgery
- Indication and modality tailored user interfaces

All in a single CE marked* medical laser!

ML7710

medical laser system - tool for professionals

* Following clinical applications are covered by the certification:

- Basal cell carcinoma (BCC)
- Non-small cell lung cancer (NSCLC)
- Head and neck cancer (HNSCC)
- High grade dysplasia in Barrett's esophagus (HGDBE)

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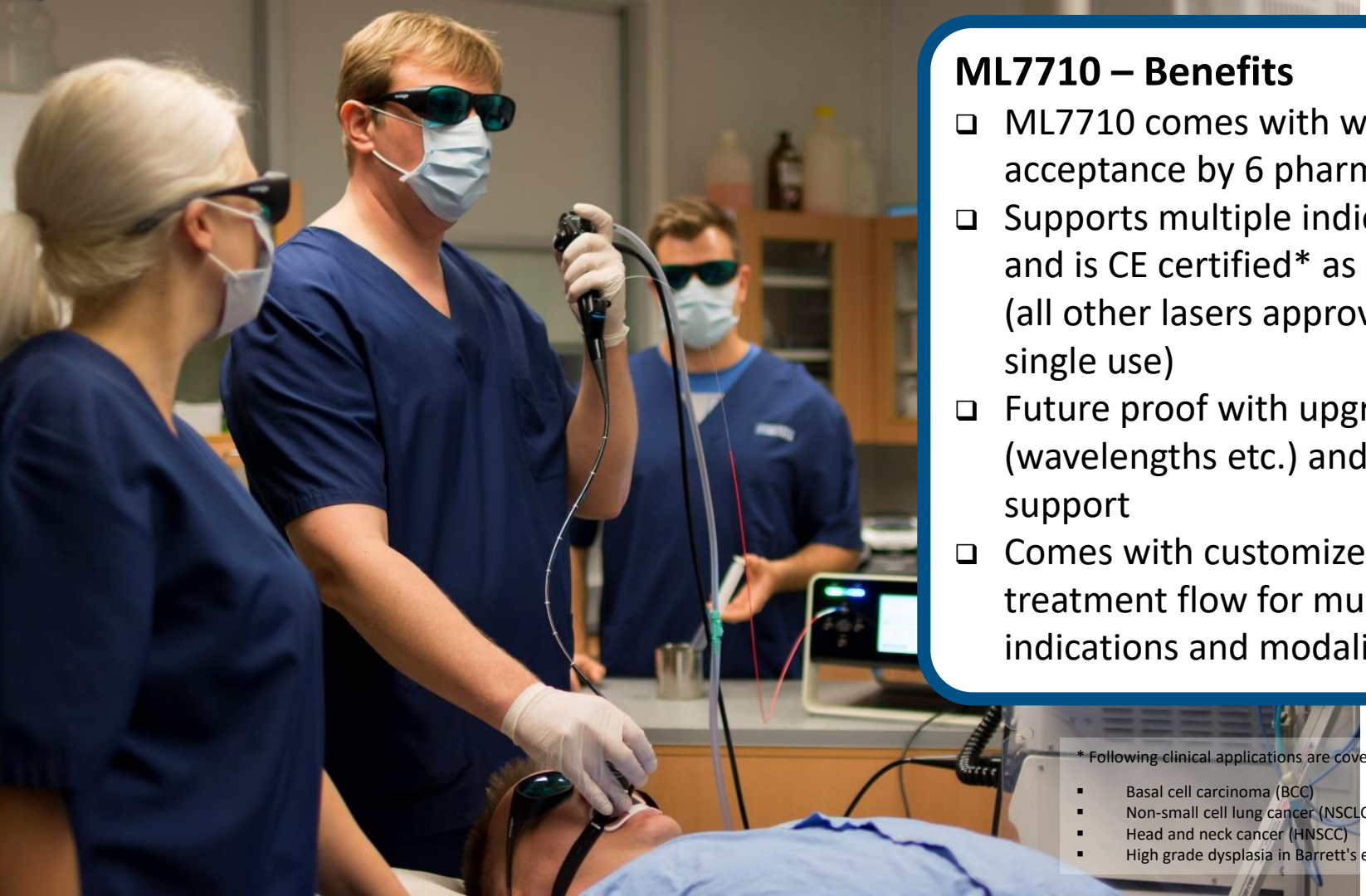
Intertek



ML7710 – Benefits

- ML7710 comes with wide acceptance by 6 pharma’s
- Supports multiple indications and is CE certified* as platform (all other lasers approved for single use)
- Future proof with upgrades (wavelengths etc.) and service support
- Comes with customized treatment flow for multiple indications and modalities

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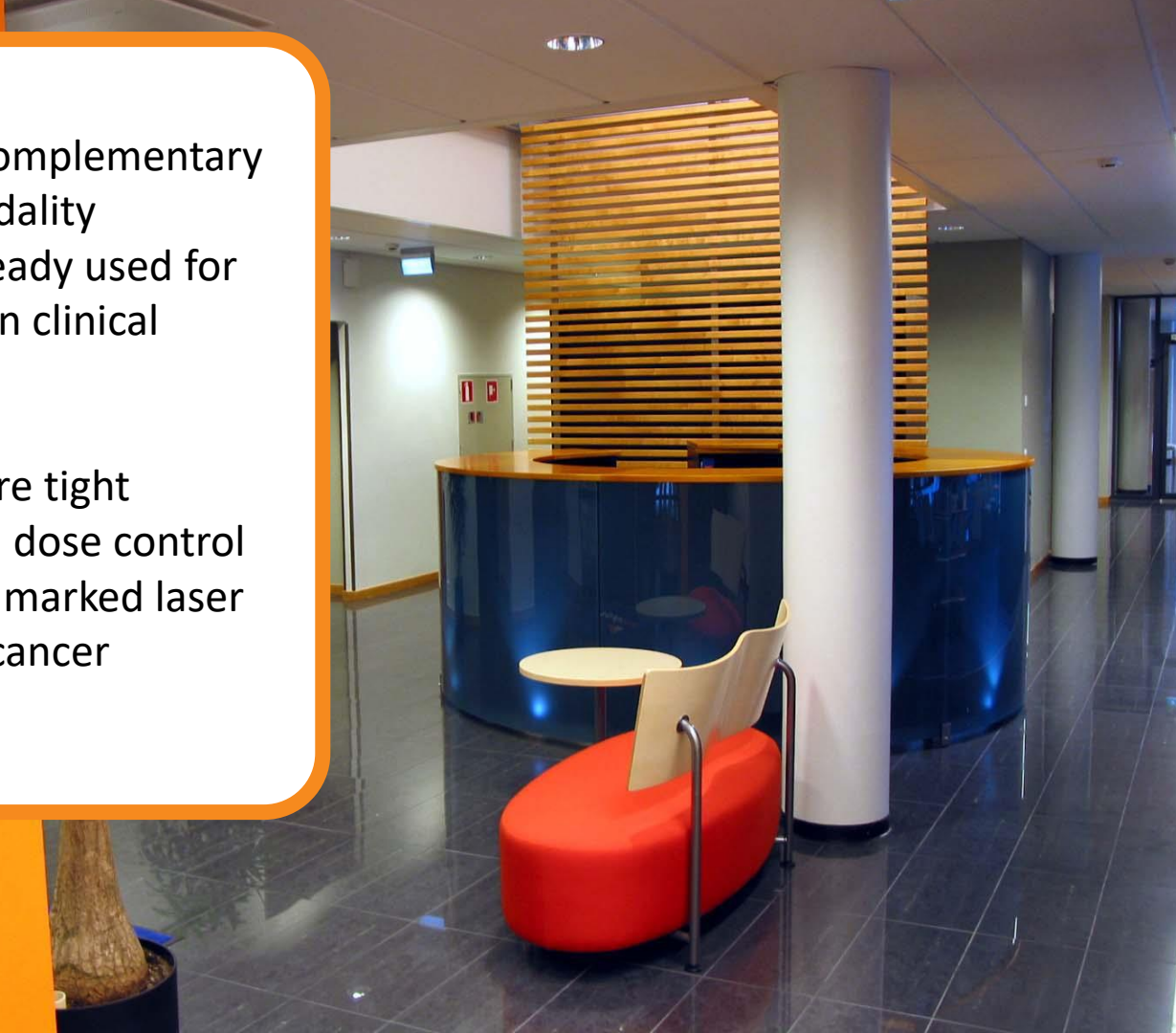
Summary

- Photoimmunotherapy is a complementary targeted cancer therapy modality
- Photoimmunotherapy is already used for multiple cancer indications in clinical studies
- Illumination sources for photoimmunotherapy require tight wavelength engineering and dose control
- Modulight ML7710 CE*/ETL marked laser platform supports multiple cancer indications



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Thank you!

Contact:

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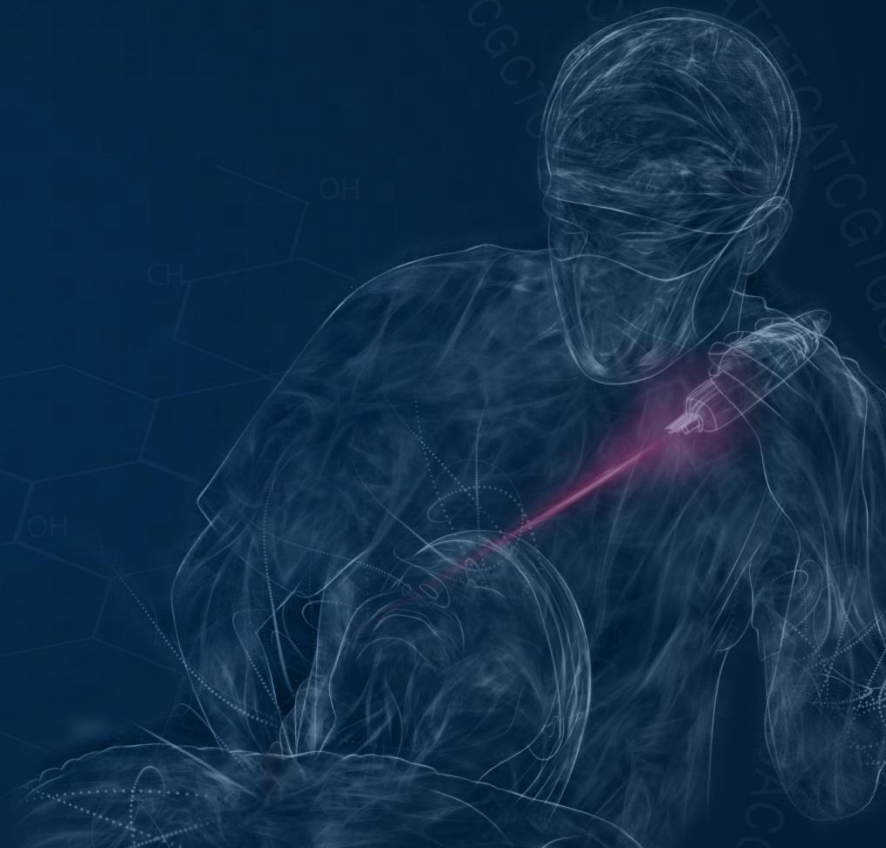
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