

3 June 2024, 15:00 - 17:00 CEST

EPIC Online Technology Meeting on  
Photonics for Vision and Eye Research



# Innovations in Light-activated Therapies in Ophthalmology



Speaking today:

**Laura Vesala**

- R&D Engineer •  
at ModuLight

**modulight**

3 Jun 2024

A photograph of a modern, multi-story glass building at night, illuminated from within. The building has a prominent 'modulight' logo on the top edge. The background shows a dark sky and some trees. The building's interior lights are visible through the glass facade.

# Modulight: #KillCancer with science and technology

- We are a biomedical company that designs and manufactures laser devices for the treatment of cancer and eye diseases and for genetics
- Exclusive supplier to 10+ pharmas, other Fortune 500 companies & well-known cancer centers
- We also manufacture products for other high-value applications such as quantum computing
- 20+ years track record of lasers & optics (UV – 2000+ nm) for medical and high value-add applications

## Life sciences

- Oncology •
- Ophthalmology •
- Genetics & diagnostics •

## Other high value-add applications

- Quantum computing •
- Flow cytometry •
- Digital press •

## Services

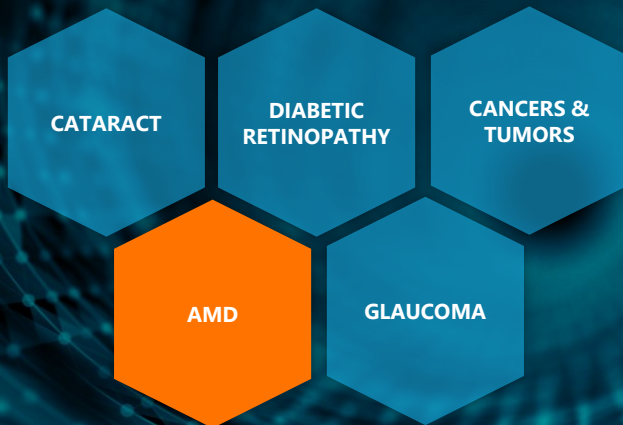
- AI & Cloud for improving treatment efficacy •
- Pay-per-treatment •
- On-site/online training and annual maintenance •
- Lifecycle support with recurring service plans •
- Regulatory design & approvals •
- Regulatory and feature software updates •



# Age-related Macular Degeneration (AMD)

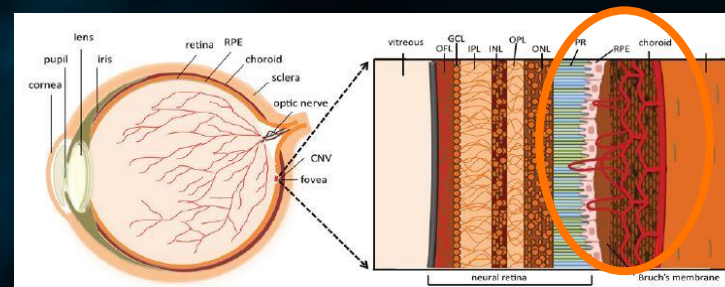
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## CAUSES OF VISION LOSS:



**AMD:** characterized by development of **CNV** and consequent irreversible damage in the macula

- ❑ Dry (atrophic) AMD: most common form which then typically develops into wet AMD
- ❑ Wet (neovascular/exudative) AMD: less common but results in faster vision loss. Is the leading cause of blindness in people over 65.
  - Primary therapy is anti-vascular growth factor (anti-VEGF) injections for wet AMD
  - Photodynamic therapy (PDT) is good treatment option for patients who do not get satisfactory response from anti-VEGF agents (up to 25% of patients)



A diagram consisting of five interconnected hexagons. The top row contains three hexagons: "CATARACT" (teal), "DIABETIC RETINOPATHY" (teal), and "CANCERS & TUMORS" (orange). The bottom row contains two hexagons: "AMD" (teal) and "GLAUCOMA" (teal).

CATARACT

DIABETIC  
RETINOPATHY

CANCERS &  
TUMORS

AMD

GLAUCOMA

## Choroidal hemangiomas

- ❑ Benign tumors composed of blood vessels
- ❑ Treatment options include PDT, photocoagulation, transpupillary thermotherapy, and radiotherapy

## Retinal capillary hemangiomas

- ❑ Benign capillary tumors of the retina
- ❑ Sporadic or related to von Hippel-Lindau (VHL) disease
- ❑ Treatment options include PDT, photocoagulation, cryotherapy, transpupillary thermotherapy, and anti-VEGF

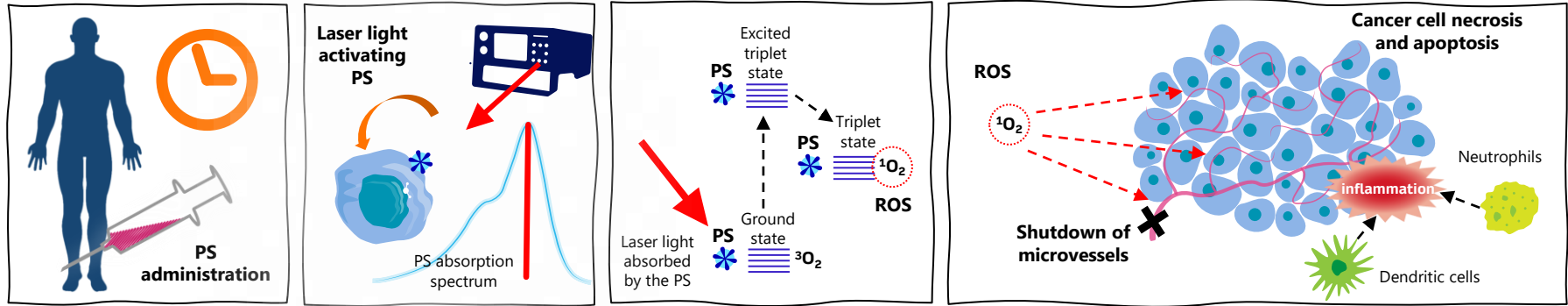
## Choroidal metastases

- ❑ Metastases originate from primary cancers elsewhere in the body (most commonly lung and breast)
- ❑ Treatment options include PDT, external and proton beam therapy, and plaque therapy

## Choroidal/uveal melanomas

- ❑ Most common primary intraocular cancer in adults
- ❑ Treatment options include radiotherapy, enucleation for larger uveal melanomas and currently, PDT has been seen as an attractive option

## Principle & procedure



→ Leads to tumor cell necrosis, provoking an antitumor immune response

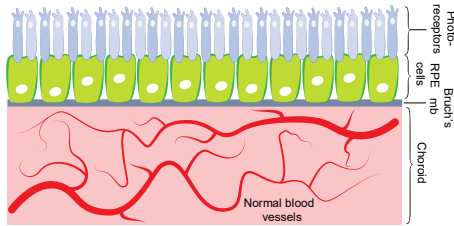
## Key benefits

- ❑ Highly selective antitumor therapy
- ❑ Protects healthy tissue from side effects
- ❑ Can be used as a complementary therapy and standard care
- ❑ Light activation of a drug further adds precise spatiotemporal control of therapeutic effects
- ❑ Can be combined with different antibodies (photoimmunotherapy) available to target & treat a wide variety of cancers
- ❑ Has potential to remove residual microscopic cancer cells after surgery
- ❑ Potential to provoke systemic and lasting antitumor immunity
- ❑ Enables simultaneous imaging by utilizing inherent fluorescence properties of the drug like fluorescence guided surgery (FGS) for GBM

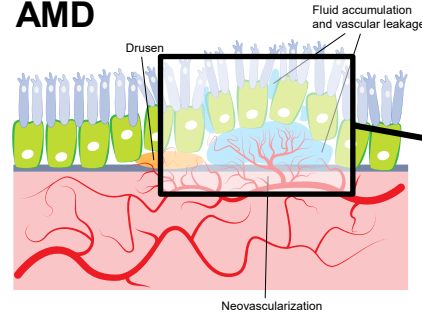
## PDT treatment effect

Reproduced after **Experimental Models in Neovascular Age Related Macular Degeneration**, Olivia Rastoin, Gilles Pagès, and Maeva Dufies, *Int. J. Mol. Sci.* 2020, 21(13), 4627, <https://doi.org/10.3390/ijms21134627>

### Healthy

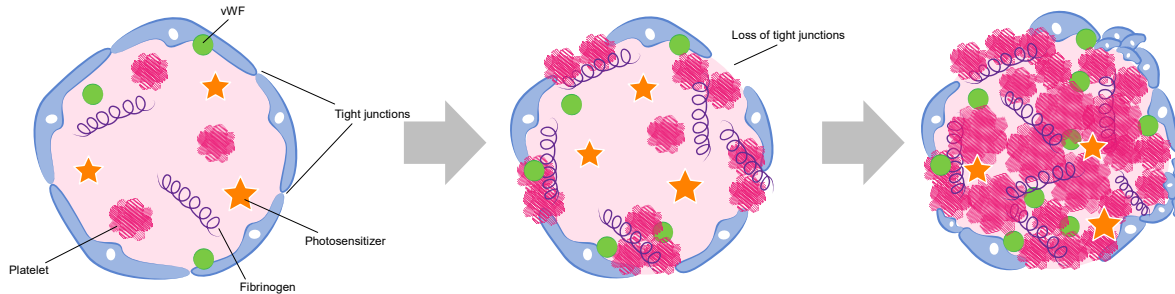


### AMD



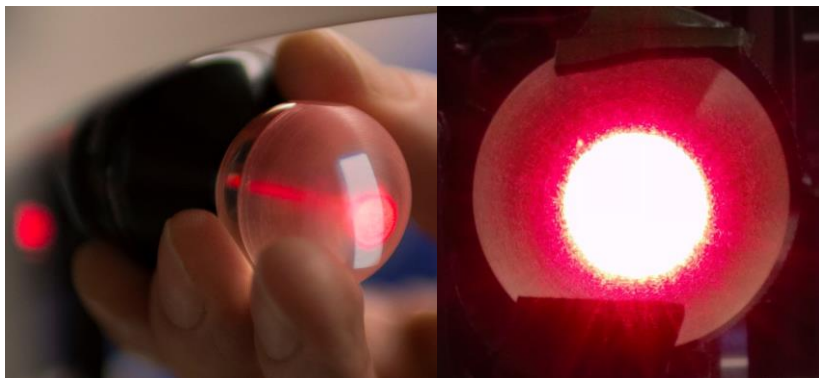
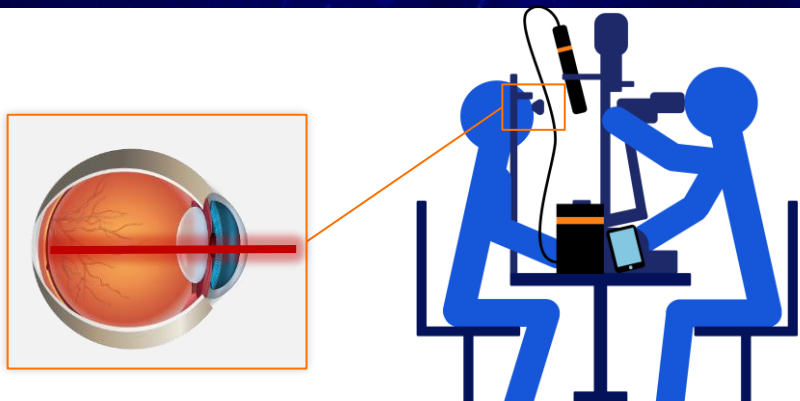
★ = Photosensitizers

## Vascular effects



Reproduced after **The Role of Photodynamic Therapy in Non-malignant and Malignant Eye Disorders**, Patrycja Nowak-Sliwinska, Andrea Weiss, Michel Sickenberg, Arjan W. Griffioen, and Hubert van den Bergh, *J. Anal. Bioanal. Tech.*, 2013, S1, <http://dx.doi.org/10.4172/2155-9872.S1-007>

- ❑ Drug remains inactive in the vessels until illuminated
- ❑ Light exposure in the choroidal neovessels locally activates the drug (verteporfin)
- ❑ Vasoconstriction, blood flow stasis, thrombus formation lead to vessel occlusion
- ❑ Also novel drugs being developed for ocular oncology with direct tumor targeting mechanism (bel-sar)



## Most Common Indications

- ✓ **CNV due to Neovascular Age-related Macular Degeneration**
  - ❑ Patients for whom anti-VEGF therapy cannot be performed such as hypersensitivity/reaction to anti-VEGF agents, acute inflamed or infected eye or increased ocular pressure [1-2]
  - ❑ Patients with subfoveal refractory AMD (poor or no response to anti-VEGF monotherapy (up to 25% of patients) [3-8]
  - ❑ Subfoveal CNV patients who cannot extend, refuse ocular injections or wish to reduce injection burden [9-19]
  - ❑ Patients who have had a stroke in the last 90 days [20]
  
- ✓ **Ocular Oncology\*\***
  - ❑ Choroidal hemangioma patients who require treatment, PDT is gold standard [23,26]
  - ❑ Retinal capillary hemangioma or retinal vasoproliferative tumors with macular location [30]
  - ❑ Small non-pigmented choroidal melanomas or palliative treatment of choroidal metastases [30-31]
  
- ✓ **Polypoidal Choroidal Vasculopathy\*\***
  - ❑ All PCV patients should ideally be treated with PDT + anti-VEGF combination therapy (both increased efficacy and decreased injection burden), as shown in EVEREST studies [21-22]
  
- ✓ **Central Serous Retinopathy\*\***
  - ❑ PDT is gold standard for chronic or persistent CSR [23-25]
  - ❑ Specific acute cases [27-29]

\*\* Non-FDA approved

List of References:



SCAN ME



# ML6710i Ophthalmic Laser

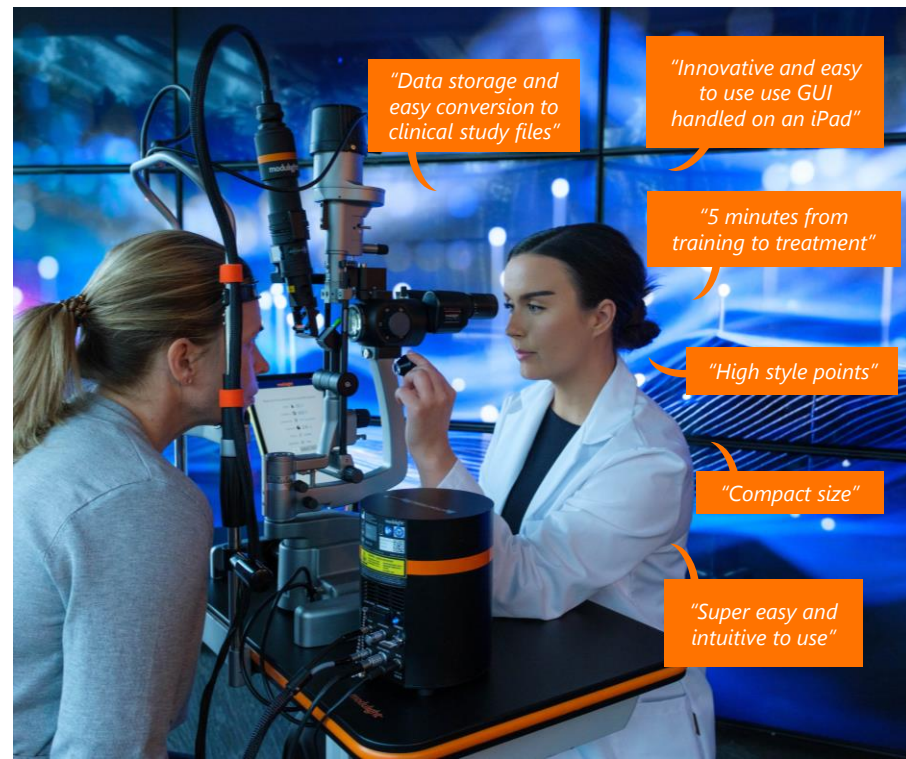
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1. Laser main unit
2. iPad with ML6710i App, wirelessly connected to the ML6710i laser and Modulight Cloud
3. Foot switch for enabling laser emission
4. Beam shaping unit
5. Slit lamp
6. Instrument table with height adjustment



## Welcoming Feedback from ML6710i Users!

We appreciate all feedback and take them into account in our strives for continuous improving of the device. Below some quotes we have received from US ophthalmologists.



# Advantages of ML6710i



- ❑ Cloud connected Graphical User Interface on iPad
  - ❖ Tailor your user account to your own needs
  - ❖ View treatment history
  - ❖ Online tutorials
  - ❖ Software updates
  - ❖ Pay-per-treatment (PPT)
- ❑ Supported ophthalmic PDT laser system

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# Modulight Cloud & Services

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## Pay-Per-Treatment

You pay only for the treatments performed.  
Treatment Charge **includes ongoing support and services.**

## Onsite installation by Modulight staff

Effortless and efficient for you

## User training

The laser is intuitive to use but we are also happy to show it

## Support chat & online tutorials

Helpful how-to-guides and support chat included in iPad app

## Fleet management

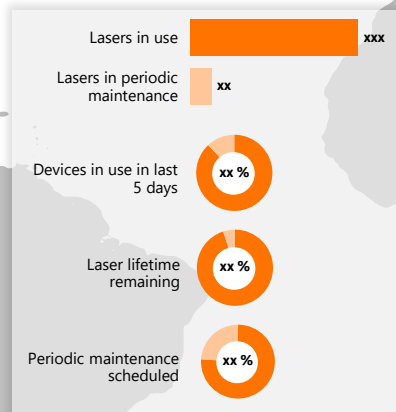
- ❑ All devices connected to Modulight Cloud
- ❑ Overall device view
- ❑ Maintenance planning
- ❑ Device calibration
- ❑ Over-the-air updates



Annual calibration due date approaching



I am not well, please replace me



## What we can do for you:

- Deliver complete, tailored treatment solutions for e.g. ophthalmology
- Ensure long-term supply of critical laser & optics products and parts from our own factory
- Services – installation, training & BIOLAB

## What you can do for us:

- Partner with us to deliver precision parts for medical devices
- Integrate your biomedical expertise into our products (imaging, sensors, theranostics, etc.)

## Summary

- ❑ There are several diseases that affect the posterior portion of the eye where PDT is an attractive treatment option
- ❑ Modulight's modern **cloud-connected** ophthalmic PDT laser brings these PDT therapies to this decade
- ❑ The **platform design** enables utilization of same HW for multiple indications, widening the install-base



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Thank you!

Please follow us in Social Media



Read more:



**Application Note:**

Vision-sparing targeted  
phototherapy for uveal melanoma