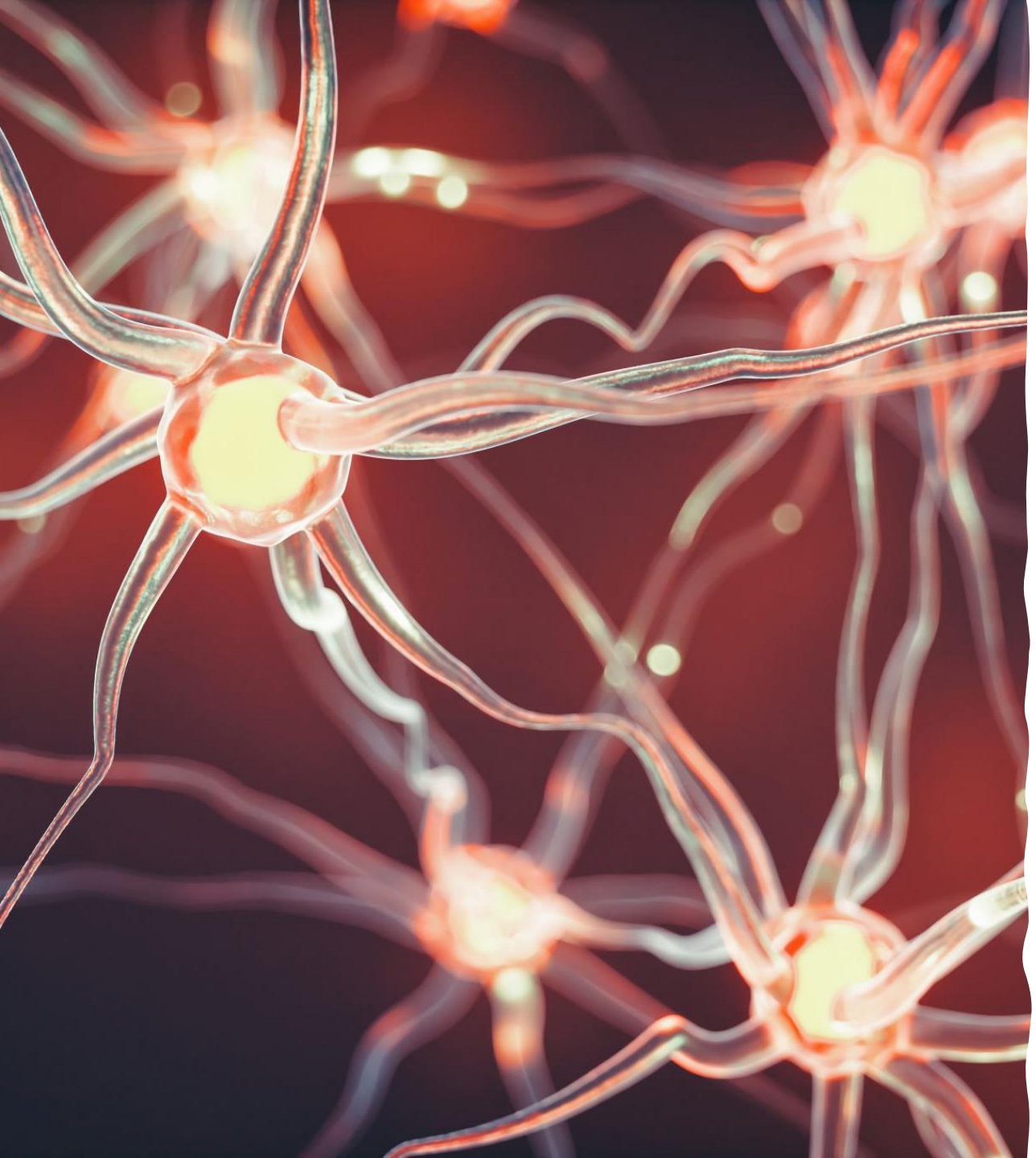


Energy-Based Therapies for Meibomian Gland Dysfunction

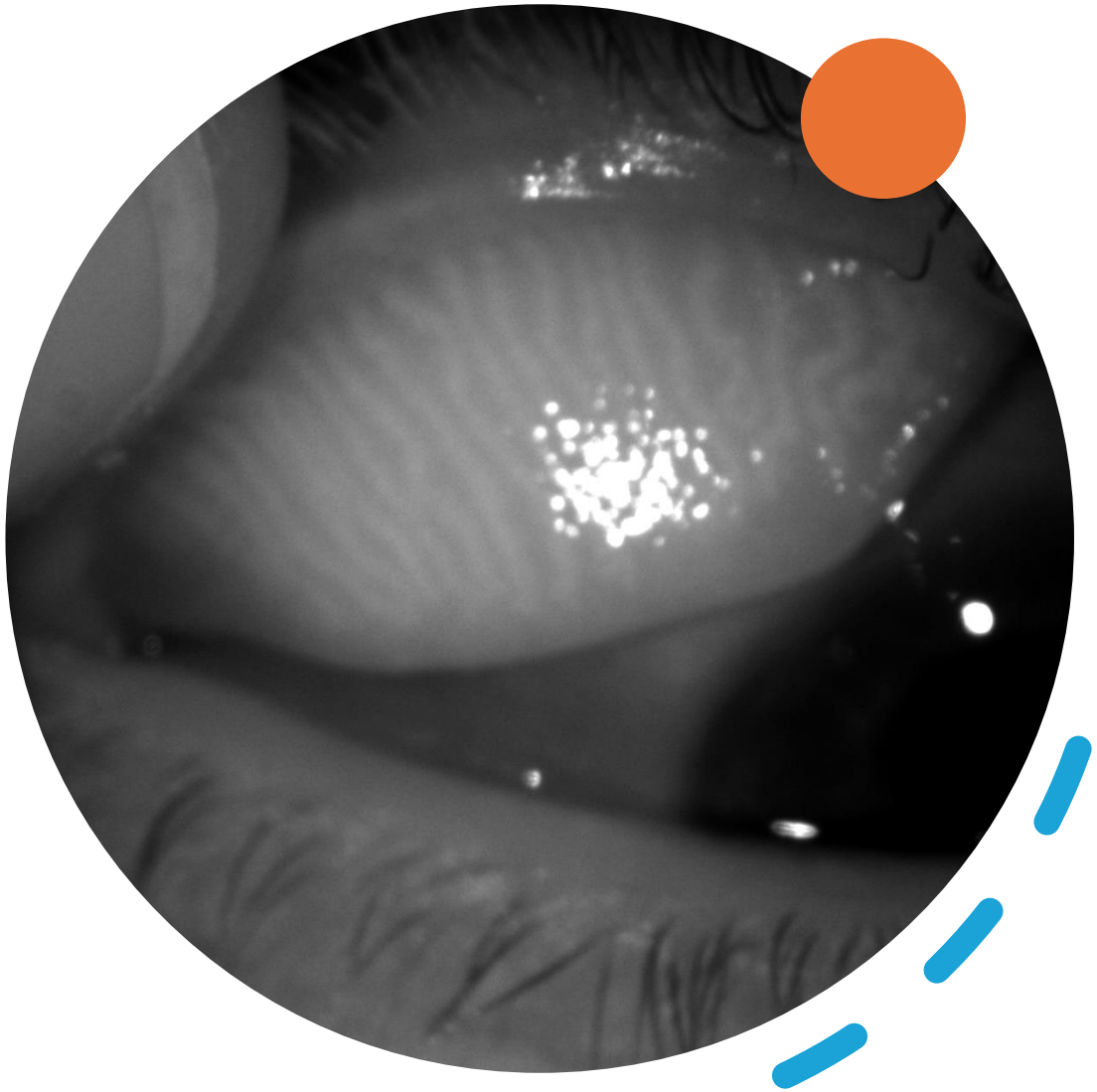
IPL • LLLT (Photobiomodulation) • Radiofrequency

WAVE Conference

Mark Lucey

Learning Objectives

Explain	Explain mechanisms of IPL, LLLT, and RF in MGD
Compare	Compare evidence for efficacy and safety
Identify	Identify appropriate patient selection
Integrate	Integrate therapies into staged dry eye care

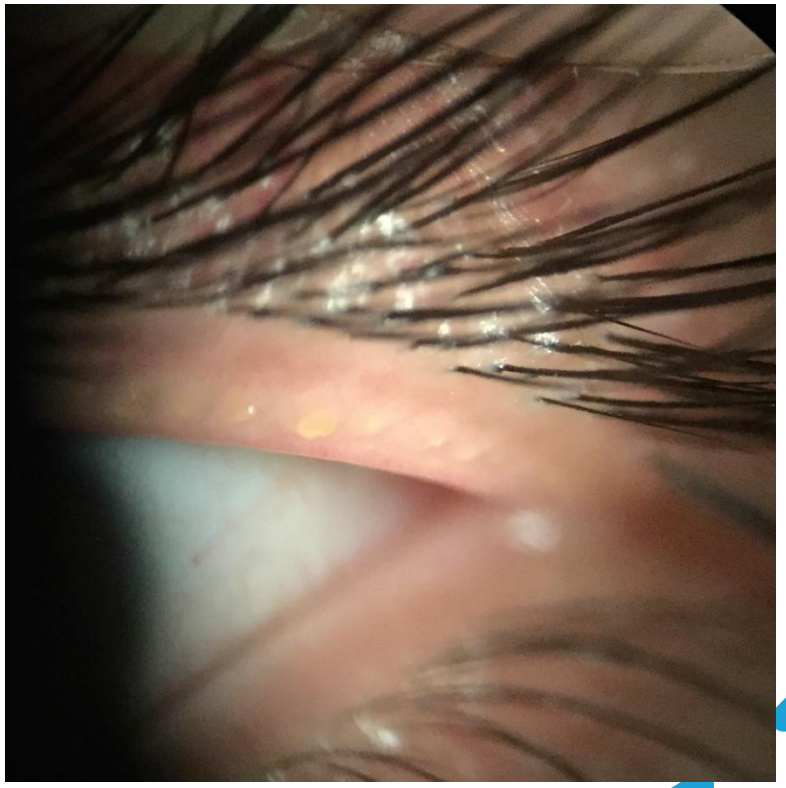


Where These Fit in Dry Eye Care

Adjuncts for moderate–severe or refractory MGD

Not replacements for lid hygiene or ocular surface optimisation

Frequently combined with meibomian gland expression (MGX)



Intense Pulsed Light (IPL): Mechanism

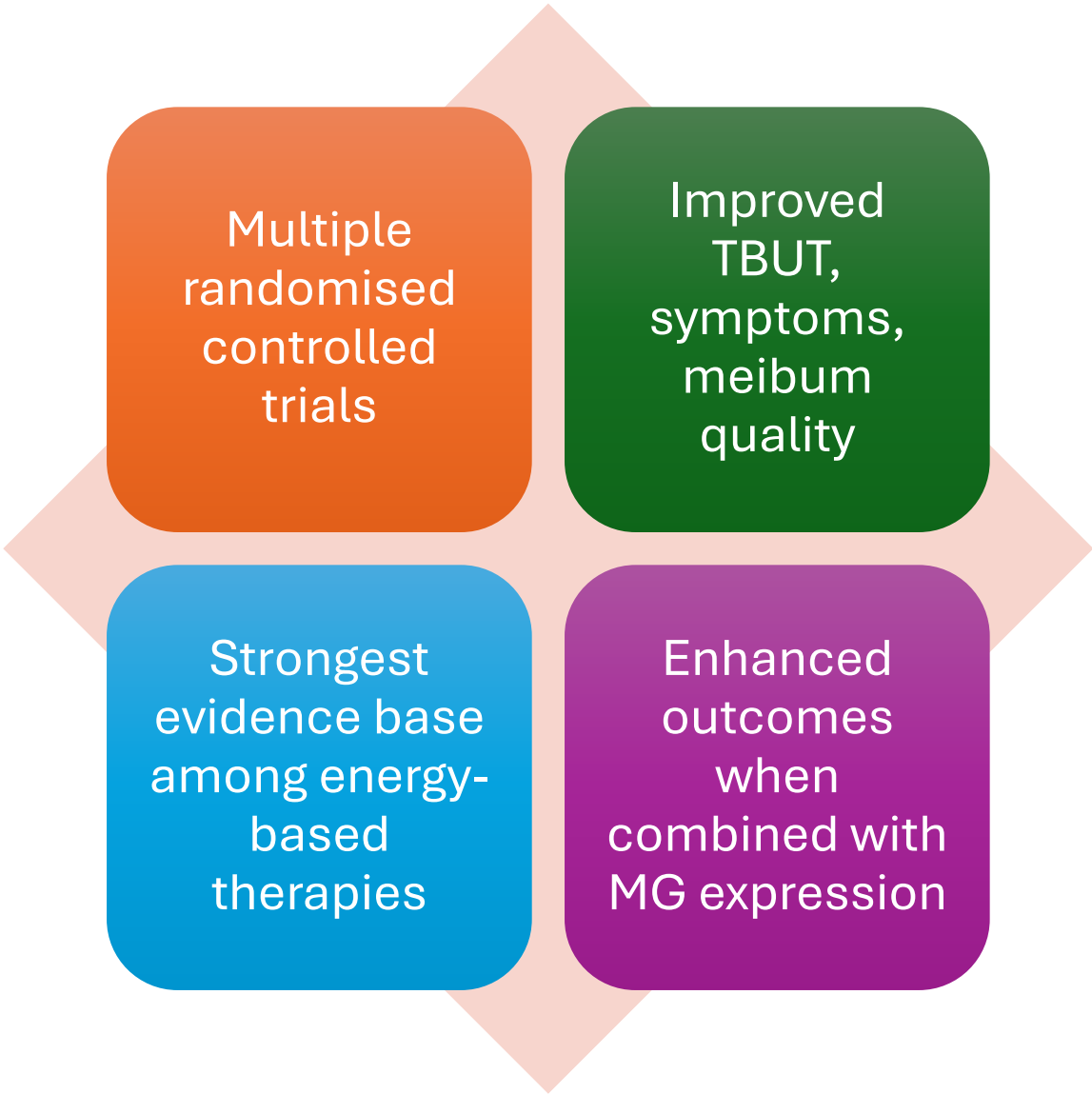
Coagulation of peri-lid telangiectasia

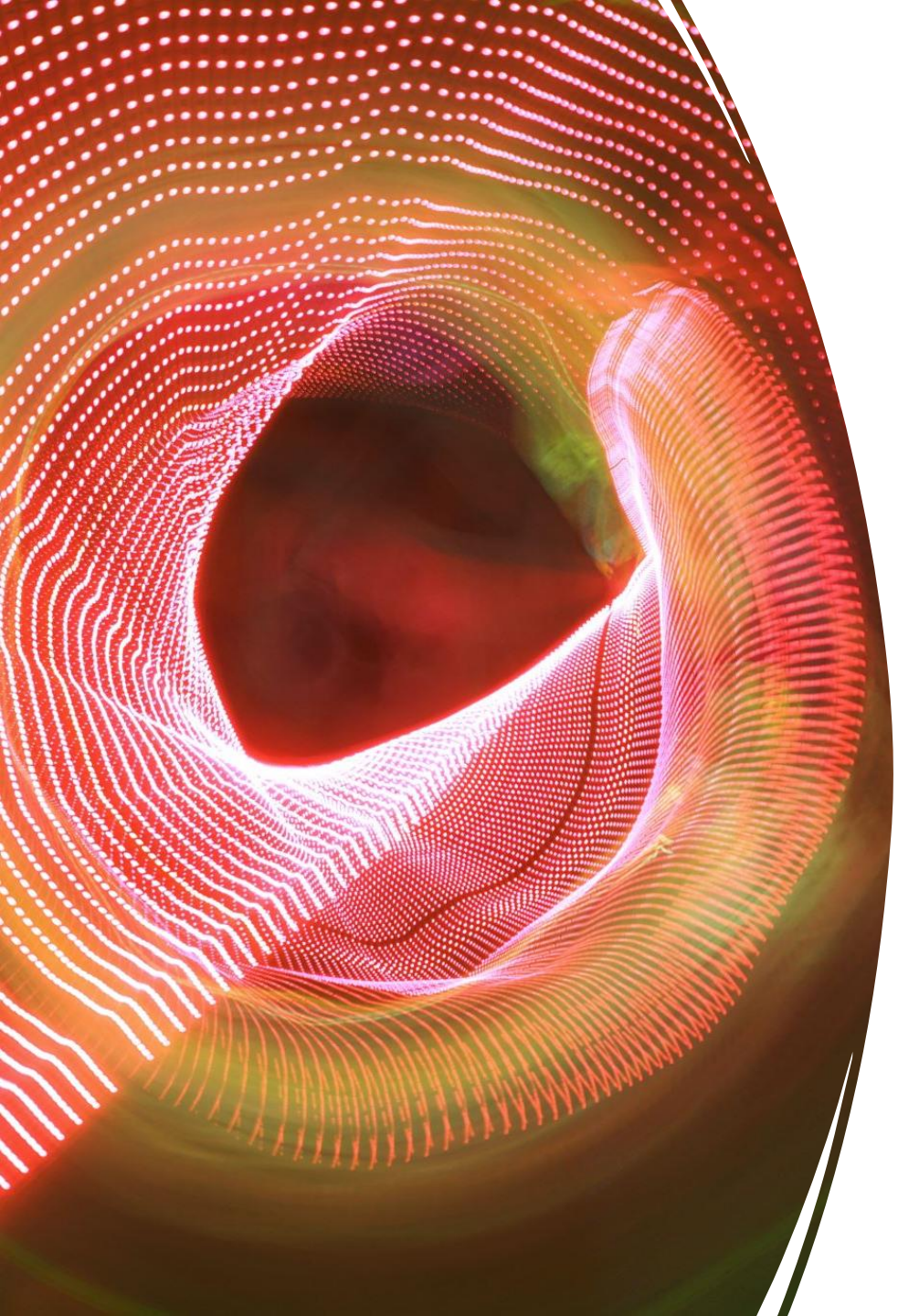
Reduction of inflammatory mediators

Secondary warming of meibum

Possible Demodex load reduction

IPL: Evidence Snapshot





Low-Level Light Therapy (LLLT): Mechanism

- Red / near-infrared LED light
- Photobiomodulation via mitochondrial pathways
- Reduced oxidative stress and inflammation

LLLT: Evidence Snapshot

Growing but smaller evidence base than IPL

Systematic reviews show benefit in refractory MGD

Combination LLLT + IPL superior to LLLT alone

Radiofrequency (RF): Mechanism

Electrical energy converted to controlled heat

Liquefies inspissated meibum

Improves gland expressibility

RF: Evidence Snapshot

- Prospective and emerging sham-controlled trials
- Improved symptoms and gland function
- Most effective when followed by MG expression

Key Take-Home Messages

- Energy-based therapies are adjunctive, not standalone
- IPL currently has the strongest evidence base
- Correct patient selection is critical
- Combination therapy often yields best outcomes