## The Challenge

The most significant negative after-effect on blood vessels treated by percutaneous transluminal angioplasty (PTA) is restenosis (re-narrowing) due to procedure-induced neointimal hyperplasia (NIH), occurring in up to 60% of cases at 12 months. This effect is reduced by use of stents, drug eluting stents, and drug eluting balloons (DEB) but these mitigating steps have limitations - the vessel may not be suitable for stenting and the area may be ineffectively targeted by the drug.

The chemotherapy drug paclitaxel (PTX) is the most commonly used drug to coat DEB and stents, and has recently been shown to have potentially serious local and systemic side effects. There is therefore an urgent need to replace PTX with a DEB that can reduce restenosis / NIH as well as local and systemic side effects associated with PTX DEB.

## The Solution

Our solution is a novel DEB, Lumi-Solve, coated with a less toxic, ultra-violet (UV) light activated drug. The drug will only be released to the target vessel wall at the time of full balloon inflation using a unique UV fibre-optic approach thereby reducing local and systemic side effects from unwanted active drug. The Lumi-Solve drug coating demonstrates effective inhibition of NIH and is less toxic than the current PTX coating.

### Key benefits

- Replacement for Paclitaxel DEB
- Targeted delivery, photo-activated
- Successfully proven in large animal
- Low toxicity

## Development Stage

Proof of Concept complete

## Brief Description & Differentiation

The team have identified a histone deacetylase inhibitor (HDACi) referred to as MCT-3 which has significant *in-vivo* anti-NIH activity and low systemic toxicity. Large animal studies show MCT-3 results to be potentially superior to PTX with inhibition of molecular markers of cellular proliferation and inflammation also demonstrated.

A photo-activated conjugate of MCT-3 (activated by UV light) and a balloon delivery system incorporating Swiss optical fibre technology have been developed. The MCT-3 conjugate is applied to the balloon surface using an ultra-sonic coating technique.

The photo-angioplasty “Lumi-Solve” device allows for targeted delivery and activation of MCT-3 facilitating safer drug delivery to the blood vessel wall and reduced local and systemic side effects (Figures 1-3).

## Research Team

Led by A/Prof Anthony Dear (Eastern Clinical Research Unit).

## Intellectual Property

PCT application filed (2020).

## Key Publications and Resources

5. [https://twitter.com/9NewsMelb/status/1217351155619115008](https://twitter.com/9NewsMelb/status/1217351155619115008)

---

**Fig 1.** Activated UV light source connected to a fibre-optic system in a Lumi-Solve device.

**Fig 2.** Enlarged image of Lumi-Solve balloon surface illuminated by UV light from a Swiss fibre-optic source.

**Fig 3.** Scheme of Lumi-Solve device activation within a narrowed blood vessel.