**Battling The Big C: Revolutionising Cancer Therapy Using Targeted Nanomedicines**

**Kyle K. Greenland**, Damien A. Leach, James W. Hindley, Anabel Varela-Carver, Oscar Ces, Charlotte L. Bevan

---

### Our Current Understanding

**What is Cancer?**

- Abnormal Cell
- Uncontrolled cell growth
- Solid mass of cancer cells

In the UK, **1 in 2 people** will develop some form of cancer during their lifetime.

**The Challenges with the Current Approach**

1. **Getting Medicines Into Tumours**
   - Tumours surround themselves in a dense network of collagen and hyaluronic acid that blocks medicines entering.
   - Blood vessels in tumours are highly abnormal and disorganised = limited medicines reaching cancer cells.

2. **Side Effects of Cancer Medicines Damaging Healthy Cells**
   - Chemotherapy is similar to using a hammer; effective but blunt and non-specific.

**Losartan: Old Dog, New Tricks**

- Losartan is an approved medication for the treatment of high blood pressure. However, it was discovered that cancer patients taking losartan show better survival outcomes. **Is this just a coincidence?**

- **Concomitant Death of Patient Survival Data**
  - Chemotherapy + Losartan
  - Chemotherapy Only

- **Our Hypothesis:** Losartan locates the dense collagen network surrounding tumours, allowing better drug entry.

- **Dense collagen with limited cancer death**
  - Losartan
  - Loose Collagen with significant cancer death

### Our Approach: Engineering Liposomal Nanomedicines

**What are Nanoparticles?**

- Nanoparticles are extremely tiny, typically ranging from 1,000 nanometers in size. To put this in perspective, this is 70,000 times smaller than a strand of hair.

**What are Liposomal Nanoparticles?**

- These are nanoscale particles composed of lipids (fat). These liposomes are designed to encapsulate and deliver various substances, such as medicines.

**How can we use them in cancer treatment?**

- Nanoparticles can be engineered to only release medication at the cancer site. This limits the damage done to other healthy tissues, and therefore reduces side effects. Their small size also allows them to get deep inside tumours.

**Will my body not just destroy them?**

- As lipid nanoparticles are derived from fat molecules, this does not trigger the immune system.

### Our Findings

1. **Losartan Reduces Collagen in Prostate Cancer**

   - **No Treatment**
   - **Losartan**

2. **Losartan Reduces Abnormal Blood Vessels**

   - **No Treatment**
   - **Losartan**

3. **Nanomedicines are Highly Effective at Killing Prostate Cancer Cells**

   - **Chemotherapy Only**
   - **Chemotherapy in Nanoparticles**

   **91%**

   **45%**

### What Does this Mean for Patients?

- **Losartan unlocks solid tumours and gives cancer medication better access = increasing cancer cell elimination**

- **Nanomedicines precisely target cancer cells = less harmful side effects**

---

**References:**