First in Human Study Using the ‘GLOW’ Near Infrared Camera System in Breast Cancer

**Introduction:**

The clinical challenge: 1 in 4 women undergoing breast conserving surgery will have positive tumour margins on resection, thus necessitating further surgery.

Our solution: Fluorescence from molecules in the tumour can guide tumour resection in real time. This is known as Fluorescence Guided Surgery (FGS).

Our objectives are to develop the imaging system and test its performance in clinical trials. Our research question is: Can the system accurately detect the cancer and reliably guide surgeons?

Impact of this work: Preventing positive margins and thus subsequent operations will benefit the patient (cancer treatment & cosmesis), and could save the health service millions of pounds annually.

**Methodology:**

- single centre prospective clinical study
- UK Research Ethics Committee Approval (18/LO/2018)
- 10 patients due to undergo BCS recruited
- Injected 12.5mg ICG intraoperatively
- Colour & NIRF images taken of:
  - tumour in situ
  - tumour ex vivo
  - cavity shaves - lymph nodes
- Fourier transform and image primitive analysis applied in post-processing

**Patient Demographics:**

- Mean Age 56 (45-70)
- BMI 24.2 (19.2-30.2)
- No adverse events recorded
- TBR 1, but 2 cases of aberrant vasculature noted

**Tumour Characteristics:**

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**Results:**

- Images taken of tumour specimen using colour camera, near infrared camera (NIRF), and display of overlay of both images.

**Conclusions:**

- First in woman study using the GLOW camera for fluorescence-guided BCS
- Fourier transform and image primitive analysis of the GLOW images are worth investigating to reveal differences between tumour and normal tissue
- Future studies will focus on further image analysis with ICG and the use of targeting fluorophores such as ALA (REC 19/LO/0927) to further analyse the potential of fluorescence guided breast cancer surgery

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