Early Cancer Detection

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CEAC: Centre of Excellence for Autoimmunity in Cancer
Within a 30 year period (2000 – 2030), cancer is predicted to double in incidence worldwide, with a concurrent doubling in number of deaths/year.

Most people are diagnosed only when there is a late ‘presentation’ of the cancer; impaired survival, major forms of therapy, major operation, chemotherapy and radiotherapy.

For many types of cancer the outlook has changed little in the last 30 years.
- **Lung cancer** – <10% have surgery in UK and 5%-10% alive at 5 years
- **Pancreatic cancer** – 1% alive at 5 year
Early detection and treatment has been shown to significantly reduce mortality:

**Randomised trials** (Level 1 evidence)

- Breast Cancer - Mammography (50-74yrs)
  - 23% reduction in deaths from breast cancer
  - [NB: only ~1/3rd of BCs occur between 50-74]

- Lung Cancer - CT scans (55-74yrs, >30 yrs)
  - 20% reduction in deaths from lung cancer
  - [NB: Only ~1/3rd LCs occur in NLST trial]

- Colon Cancer - faecal occult blood test + colonoscopy (>50yrs)
  - 16% reduction in deaths from colon cancer
  - [NB: Only ~1/3rd individuals accept colon screening]
AK2

Need to explain NLST

Kennedy Alan, 12/10/2015
Our solution is to provide a blood test that will:

- Improve public acceptability.
- Provide improved sensitivity & specificity compared to other screening methods.
- This will significantly improve clinical outcomes (improved survival rates) and cost-effectiveness.
Hypothesis
The immune system, which protects us from microbes, also mounts a response to very small amounts of aberrant protein overproduced and released by cancer cells within a tumour.

This response includes the generation of **autoantibodies (AAbs)** to these tumour-associated molecules/antigens (TAAs).

Autoantibodies directed against TAAs were shown to be relevant tumour biomarkers and can be detected up to 5 years before the tumour is overt clinically.
1- Lung Cancer.

2- Colorectal Carcinoma.

3- Breast Cancer.
Lung Cancer
Prof Robertson and his team in collaboration with oncimmune have already developed a blood test which has moved from the 'bench to the bedside' enabling the early detection of lung cancer. This test is called Early CDT-Lung.

The test is currently in clinical use and has already shown that within high risk populations that cancers can be detected early whilst they are still treatable with the potential for increased patient survival and indeed in some cases cure.
Audit of the autoantibody test, EarlyCDT®-Lung, in 1600 patients: An evaluation of its performance in routine clinical practice

James Jett, Laura Peek, Lynn Fredericks, William Jewell, William Pingleton, John F.R. Robertson

Lung Cancer 2014; 83: 51–55
Early Cancer Detection Test – Lung Cancer Scotland
2- Colorectal Carcinoma
Colorectal cancer (CRC) is the 2nd highest cause of cancer mortality in the Western world.

Key to better survival is early diagnosis (>90% survival if detected early).

Current early diagnostic methods (ie Faecal sampling) have low takeup (57%:Uk, 34% EU). Alternative investigations are invasive (ie sigmoidoscopy, colonoscopy) and have equally poor patient acceptability.
Antigen-based protein microarrays:

- TAAs are arrayed (spotted) as a regular pattern (a microarray) onto an activated surface. A single array can have multiple TAAs, each at separate location.
- A 5x5mm array can accommodate up to 150+ individual features.
- Immobilized TAAs are exposed to a patient serum sample.
- Autoantibodies binding to any of the TAAs can be detected fluorescently and measured.