

Cancer Immunology: opening new doors for cancer treatment



Awen Gallimore, Cardiff University School of Medicine.

Cancer Immunotherapy

New era in the war on cancer:
Revolutionary treatment that will
save thousands hailed as 'biggest
breakthrough since chemotherapy'



Immunotherapy: the big
new hope for cancer
treatment

A historical perspective



William Coley, 1891

– a pioneer in cancer immunity

- observed cases where infection associated with regression.
- injected patients with live bacteria tumour regressed. Moved to dead bacteria to decrease mortality / bacterial toxins



James Ewing

- radiation
- chemotherapy



Helen Coley Nauts, 1953

- created the Cancer Research Institute
- "advocate for a cancer research path that investigates harnessing the body's immune system rather than one that seeks chemicals and radiation to attack the disease."

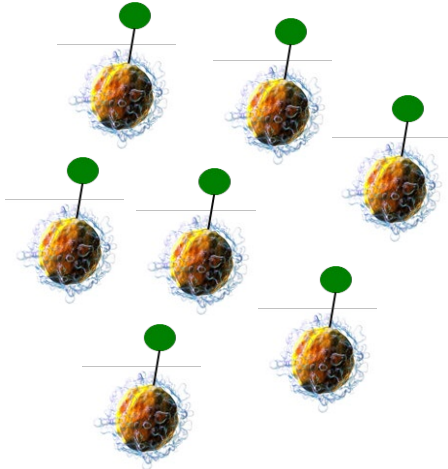
“... the argument went, the immune system plays no role in treating cancer and any scientist who thought otherwise was wasting valuable time and energy.”

Robert Schreiber
1990s

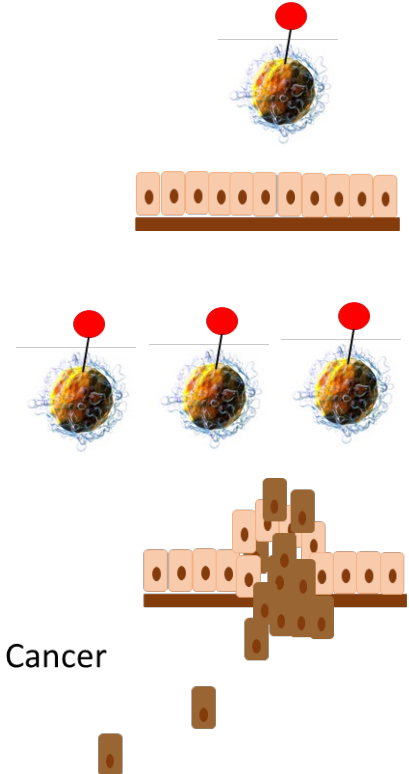
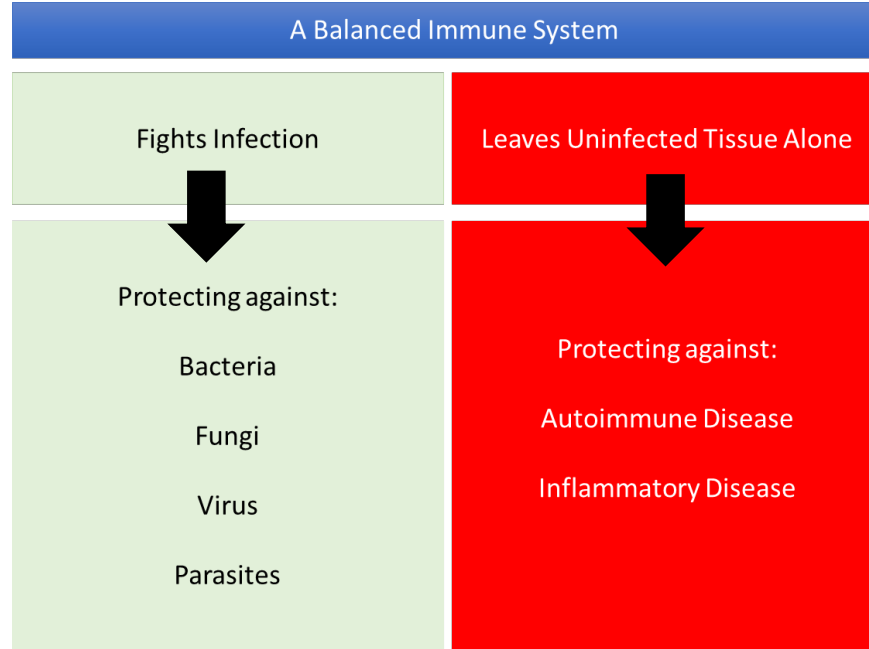
The Immune System Has Evolved to Fight Infection



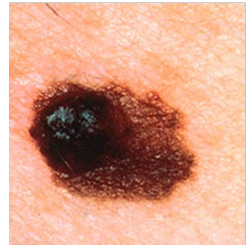
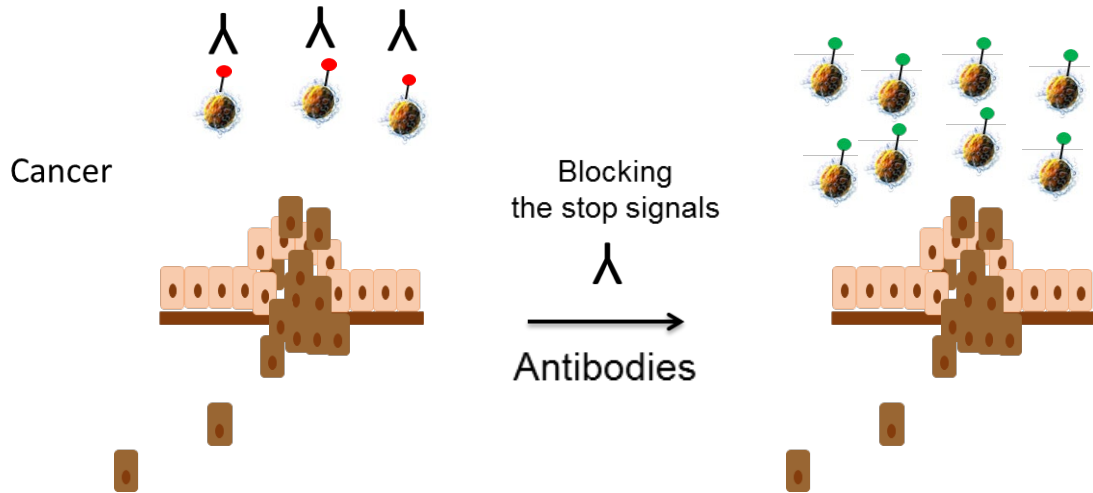
CD28



CTLA4, PD1



Exploiting immune checkpoints for immunotherapy

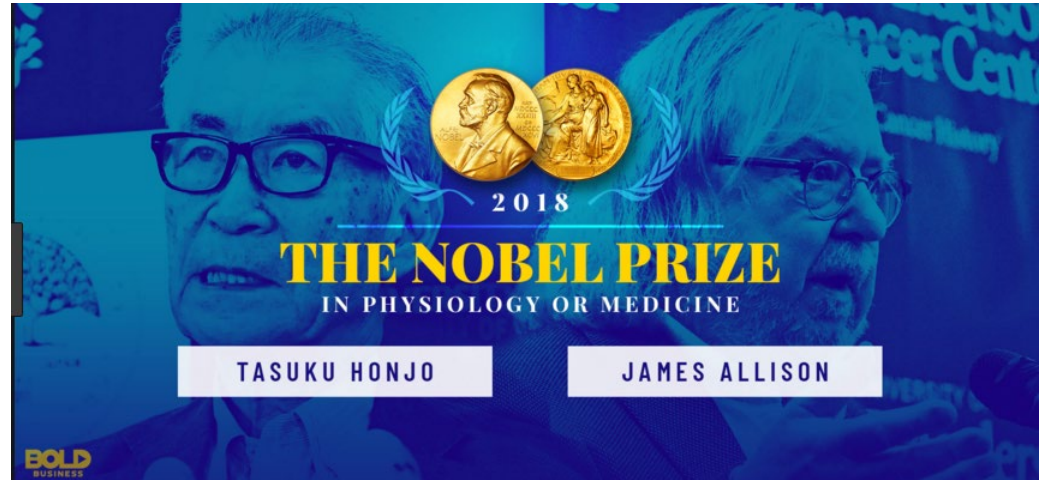


- enabling activation of lymphocytes and cure of previously incurable cancers

- ipilimumab
- nivolumab
- pembrolizumab

- Metastatic melanoma
- Renal cancer
- Non small cell lung cancer
- Urothelial cancer

Breakthrough of the Year, 2013 ; Nobel Prize for Medicine, 2018



“I was really just trying to understand the immune system”

Jim Allison

There is still a long way to go...

Current limitations:

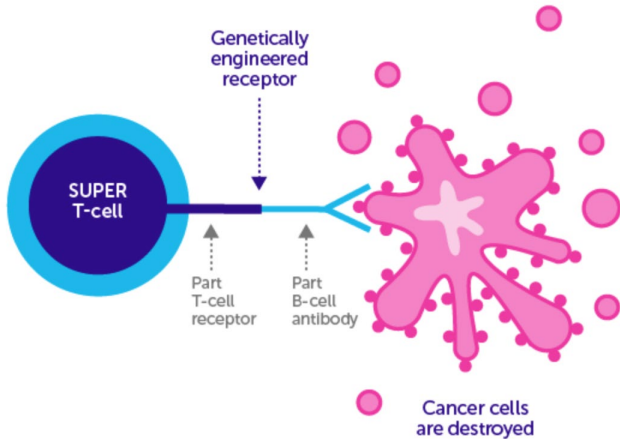
- Successful in *only a minority* of patients
- Successful *only in certain cancers*
- Toxicity (*autoimmunity*)

But the opportunities and scope for improvement are enormous...

Priority research themes for Wales:

- Precision and mechanistic oncology
- **Immuno-oncology**
- Radiotherapy
- Cancer clinical trials
- Supportive and palliative oncology
- Population health-based cancer prevention, early diagnosis, primary care and health service research

CAR T Cells: Chimaeric Antigen Receptors

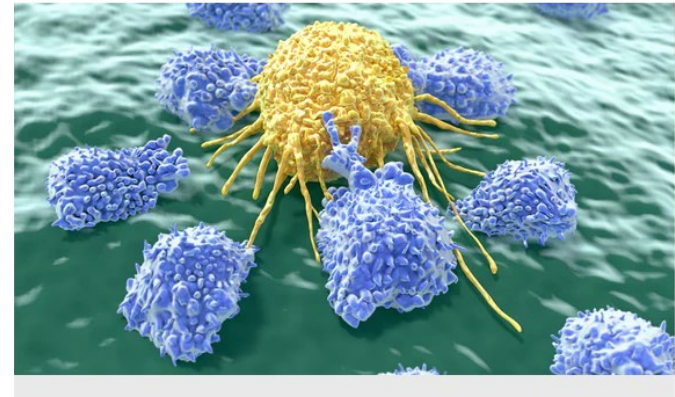


Dr June: "The first CAR trial was actually in HIV patients, not cancer. A lot of people don't know that... The trials were stopped in 1997 when protease inhibitors for HIV came out."

Adoptive T Cell Therapies

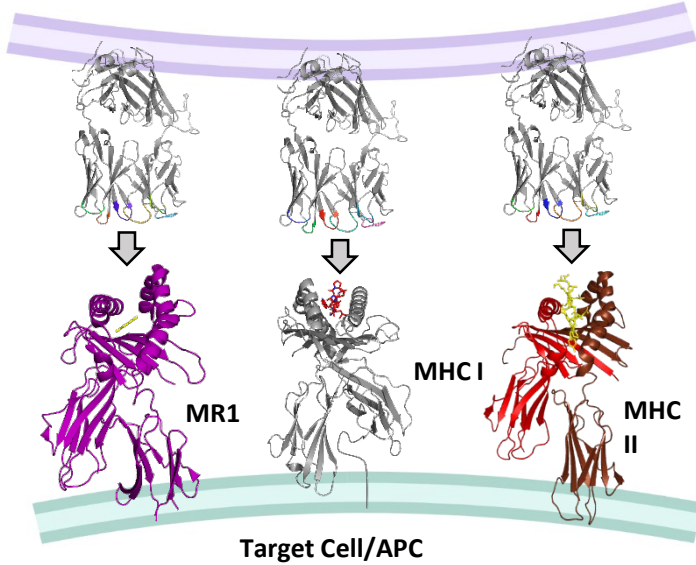
Improved method of engineering T-cells to attack cancer

17 November 2017



Researchers at Cardiff University have found a way to boost the cancer-destroying ability of the immune system's T-cells, offering new hope in the fight against a wide range of cancers.

Successful Anti-Tumour T Cells



Repurposing “old” drugs to boost cancer immunity

Assessing the effect of low-dose cyclophosphamide in patients with inoperable metastatic colorectal cancer

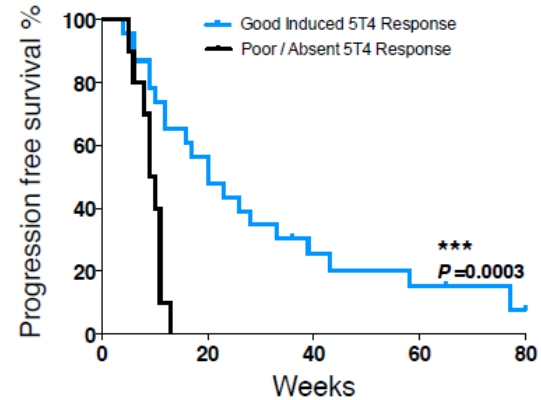
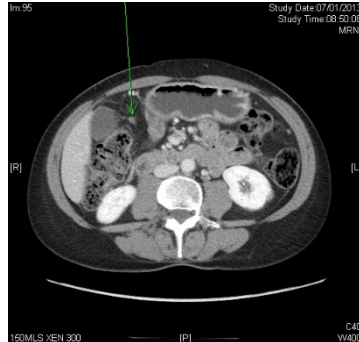
Pre-trial

Large primary tumour.
Several growths in the liver and peritoneum.



Post-trial

Primary tumour reduced in size.
No liver or peritoneal growths.

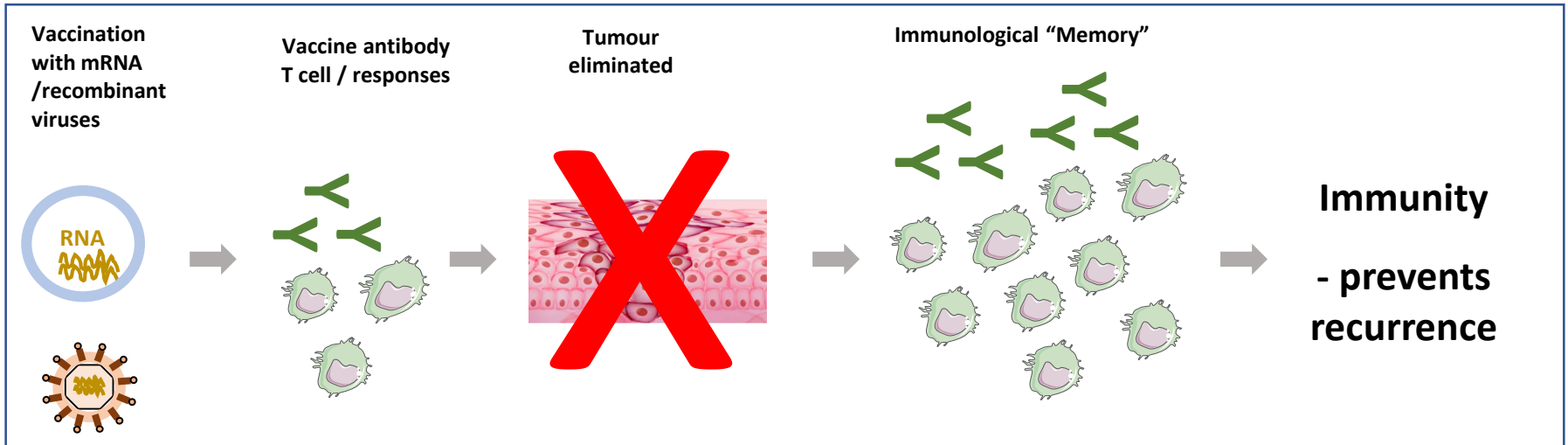


New approaches to development of cancer vaccines



- performed Europe's first trial of a vaccine for human papillomavirus to treat cervical cancer (Cardiff University, 1996)

Professor Sir Leszek Borysiewicz



Cancer immunology: fantastic strides forward but so much more to do

- Share methods and ideas across multiple fields
- Integrate insights and approaches (scientists, clinicians and patients)
- Tailor treatments for individual patients
- Off-the shelf cancer vaccines?

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