

# Beyond DNA: Finding hidden cures



## The need

Despite major developments in medical research over the last 50 years scientists are still searching for cures to some of the most intractable diseases. Cancer kills 150,000 people every year in the UK while dementia affects 700,000 people and this is expected to rise to over 1m by 2025. Treating Alzheimer's and dementias costs the UK £17bn a year.

Since the human genome was sequenced scientists have learned that DNA itself cannot tell us exactly what causes these diseases. But a new field of research – called epigenetics – shows that external factors that control the genome could also be affecting the way our genes behave and could be contributing to disease.

Scientists say that if they can create cells that can regenerate themselves, they could be used to target disease as well as provide new drug therapies.

British scientists have found new ways of monitoring how processes within cells affect our genes which could unlock the enigma of what causes diseases and provide the answers for curing them.

## The results

Identifying the factors which cause cells to change and how to make them regenerate into different ones has enormous potential for treating diseases, including Alzheimer's, Parkinson's, type 1 diabetes, multiple sclerosis and even cancer.

In very simple terms the process of cell regeneration involves stripping back a single cell to its foundations and manipulating it to make new cells – a process known as 'epigenetic imprint erasure'. At the moment however the process is inefficient and no-one really knows how it works. But with such potential for improving lives, scientists all over the world are now searching for ways to make regenerative cells - and UK experts are among those leading the way.

The UK consortium, led by CellCentric, included world epigenetic experts Prof

Azim Surani of the Gurdon Institute at University of Cambridge, Prof Wolf Reik of the Babraham Institute, Cambridge and Prof Keith Campbell of the University of Nottingham. Together, over three years, and with £1.15m worth of funding from the Technology Strategy Board as part of a £2.3m collaboration, they have now achieved a significant breakthrough.

The team has been able to develop a series of 'roadmaps' that can measure the ability of proteins and small molecules to make cells regenerate themselves, and for the first time these 'screens' will give pharmaceutical companies the opportunity to apply the knowledge outside of the laboratory.

The results have already seen further interest from a major global pharmaceutical company.

## What is epigenetics?

DNA alone cannot tell us what causes disease. According to scientists there are other significant factors which control the genome and if these go 'awry', they could be contributing to disease. This is the field of epigenetics. It concerns the molecules that sit on top of DNA and its associated proteins which guide the cell on which genes to use.

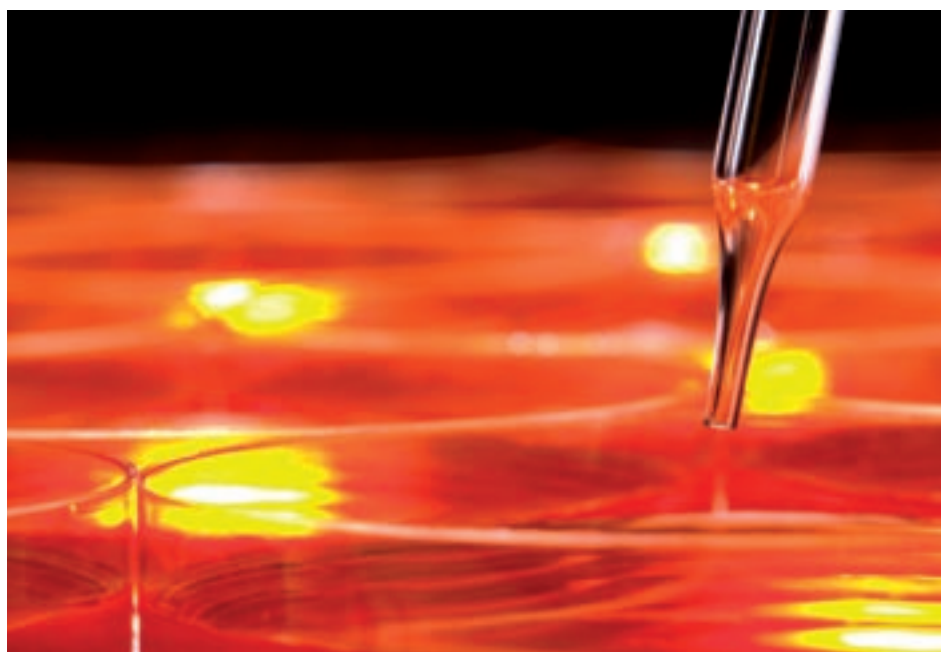
CellCentric is a leading player in this complex field of research. It has built a unique hub and spoke network of leading academics and is uniquely placed to assimilate new epigenetic information and to prioritize it and translate it into new product opportunities.



### HOW TECHNOLOGY STRATEGY BOARD MADE A DIFFERENCE:

'This funding has enabled us to invest in UK-based expertise and achieve a revolutionary breakthrough in what has become a highly competitive field.'

Will West, CEO of CellCentric



## A revolution in healthcare

Healthcare is on the cusp of a major breakthrough that could transform the way we deal with illness and improve millions of lives. In 20 years' time or even sooner it might be possible to design and create cells that are patient-specific and able to target a disease for which current therapy is invasive, and cure a distant hope.

Ultimately, regenerative cells could be tailored to treat specific illnesses in specific patients. For example, the right kind of cells could be used to replace the neurons in the brain of someone suffering from Parkinson's disease. In type 1 diabetes, specifically designed cells could mean a patient no longer having to take insulin for the rest of their lives.

### Technology Strategy Board

Driving Innovation

Collaborative research and development projects are one of the tools that the Technology Strategy Board uses to drive innovation in the UK. The Technology Strategy Board is a business-led executive non-departmental public

body, established by the Government. Its role is to promote and support research into, and development and exploitation of, technology and innovation for the benefit of UK business, in order to increase economic growth and improve the quality of life. It is sponsored by the Department for Business, Innovation and Skills (BIS).

Tel: 01793 442700 [www.innovateuk.org](http://www.innovateuk.org)

### Project 22020

#### Project partners

CellCentric Ltd.  
University of Cambridge (Prof Azim Surani)  
The Babraham Institute (Prof Wolf Reik)  
University of Nottingham (Prof Keith Campbell)

#### Technology Strategy Board investment

£1.15m

Total project investment £2.31m

#### Project contact details

Dr Nessa Carey, Director of Exploratory Research, CellCentric Ltd.

E [nessa.carey@cellcentric.com](mailto:nessa.carey@cellcentric.com)  
[www.cellcentric.com](http://www.cellcentric.com)