The Impact of Translational Research

Chris Watkins and Ian Viney
Medical Research Council

October 2016 Open Council
Translation Across the MRC Portfolio
MRC support for translational medicine

In 2015/16 31% of active MRC research had a focus on translation

Source – MRC 2015/16 Annual report and accounts

Between 2004/05 and 2014 MRC expenditure on work with a translational focus increased from £50M pa to £140M pa

Source – UK Health Research Analysis
Translation Across the MRC Portfolio
Structural biology – membrane proteins

- Proteins that span the cell membrane = huge potential as drug targets
- But difficult to study these at the atomic level until recently
- MRC’s research institutes tackle difficult, long-term and high risk challenges
- Structural biology research at MRC LMB and NIMR helped develop membrane protein crystallisation techniques
- Led to spin out company Heptares Therapeutics
- Use this platform for rational drug design
Heptares Therapeutics - Impact

• Formed in 2007, now employs 80 staff and is growing rapidly
• Pharma companies recognized potential for GPCR research – Heptares signed drug discovery deals with AstraZeneca, MedImmune, Shire, Takeda and others
• Now generated more than $210M investment, with potential to generate $6.75 billion in milestone and royalty payments
• Focus on broad range of diseases such as Alzheimer’s disease, cancer, neurological and psychiatric conditions
• Heptares sold in 2015 - deal worth more than $400M – but still based in Cambridge
Oxford Nanopore Technologies

- Chemical biology highlighted as a promising field of interdisciplinary research by MRC/EPSRC prior to 2000
- £1M MRC programme grant to Professor Hagan Bayley at Oxford - use of nanoreactors for studying chemistry at the single molecule level
- One application was a new method of DNA sequencing using nanopore-forming proteins
- In 2005 the University of Oxford formed spin out Oxford Nanopore Technology and by 2010 the company was funding positions in Professor Bayley’s laboratory
- By 2016 the company has raised more than £100M investment and employs 280 staff

A strand of DNA is passed through a nanopore. The current is changed as the bases G, A, T and C pass through the pore in different combinations.
Real-time genetic analysis of the Zika virus

- Oxford Nanopore has launched a DNA sequencer the size of a USB stick
- Many potential applications in environmental monitoring, rapid field diagnosis and personalised medicine
- Technology was used in the Ebola epidemic and has been tested in the International Space Station
- In 2015 the MRC funded a project to collect Zika virus samples and genotype them in Brazil - the project’s chosen technology was the Oxford Nanopore sequencer

Using the Oxford Nanopore MinION device in front of the minibus lab in Joao Pessoa, Brazil (photo by Ricardo Funari)
Translation across the MRC Portfolio

DISCOVERY

Basic medical research

Prototype discovery and design

Pre-clinical development

Early clinical trials

Late clinical trials

Products

Knowledge

Policy and Practice
STRatified medicine to OPTimise the treatment of Patients with hepatitis C virus (HCV) infection

£5.12m/5 years – 21 partners
Impacts of STOP-HCV

• Developed innovative approaches to determining the diversity of Hepatitis C Virus genomes in patients.
• Trialled Direct Acting Antivirals in the UK, providing hundreds of patients with early access to drugs and saving the NHS c. £12m as Gilead Sciences provided drugs at no cost.
  – The trials demonstrated that these drugs are ineffective in 10-20% of patients.
• STOP-HCV studying samples from the trials to predict non-response, to understand the underlying mechanisms for non-response, and hence open up new therapeutic strategies.
• Existence of the consortium has attracted Pharma to invest in clinical trials in the UK.
  – the consortium’s BOSON study was the largest UK Phase 3 clinical trial for Hepatitis C.
  – 10 UK sites chosen for Gilead’s Phase 3 ‘Astral-1’ trial
  – Merck UK Gt3 trial
MRC Stratified Medicine and Molecular Pathology Investments

- 12 internationally competitive stratified medicine discovery engines
  - Total c. £57m
  - 3 charity co-funders (CRUK, ARUK, BHF)
  - 34 academic and 80 commercial partners

- 6 centres of innovative molecular diagnostic test development
  - Total c. £16m
  - 8 academic and 25 commercial partners
Translation across the MRC Portfolio
Therapeutic Development – Gene Therapy

Professor Robin Ali (UCL)

- Gene therapy for inherited blindness:
- Leber’s congenital amaurosis, in which children are born with no night vision and gradually lose central vision
- MRC supported the basic science
- Then preclinical and clinical development of therapy to through to clinical trial
- Results showed that gene therapy improved night vision but didn’t affect central vision.
- MRC is now funding Robin and his team to improve their viral vector in the hope of being able to sustain central vision too.
- >$30M of investment in Athena Vision
First Human Study of Autologous Macrophage Therapy for Liver Cirrhosis

Professor Stuart Forbes, MRC Centre for Regenerative Medicine at the University of Edinburgh

- Deaths from cirrhosis have doubled in the last ten years in UK, with chronic liver disease causing 1 in 50 of all Scottish deaths
- Clinical trial using bone marrow derived macrophages to promote liver regeneration and reduce, helping the liver repair itself
- Based on MRC-funded discovery science
- £3m grant to conduct the first human study of autologous Macrophage Therapy as a potential treatment for Liver Cirrhosis.

As of February 2016, 197 projects have been supported, ranging from pre-clinical studies to early phase trials, with a total commitment of more than £185m including:

- 144 therapeutics
  - 42 small molecule
  - 42 biologics
  - 21 gene therapy /antisense
  - 9 cell therapies
- 20 vaccines
- 37 diagnostics
- 11 medical devices
- 3 psychological/ behavioural
DPFS Portfolio
Outputs & Impacts of CiC/DPFS

Since 2008 DPFS projects have

- Raised > £100m of financing via spin outs
- Enabled ~60 first-in-human studies

Since 2013 the Confidence in Concept scheme has

- Supported 566 projects (189 with industry partners)
- Built 398 new relationships with industry
- >£109M of follow on funding secured
- 27 patents awarded
- At least 16 spin-out companies created

MRC | Medical Research Council
Translation across the MRC Portfolio
Researchers report progress with, and outcomes/impacts from their MRC-funded research via Researchfish®. Since 2006:

- 60,000 publications, with a FWCI of 2.7 times world average, 60% of these papers are openly accessible in Europe PubMed Central
- 500 patents, approximately 30% of which have been licensed
- 100 spin outs, creating an estimated 1,500 new jobs
- >1100 reported products, interventions and clinical trials in development
  ~150 have reached the market
- >7000 reports of policy influence, 50% of which have impact wider than the UK

Data has been collected from 6,800 MRC awards, with a total value of £3.7billion. These award have led to >£4.5billion of non-MRC follow on funding (almost 30% from outside the UK)
Thank you

www.mrc.ac.uk
Visit our blog: www.insight.mrc.ac.uk
Follow us on Twitter:
   http://twitter.com/the_MRC
MRC Impact: http://twitter.com/MRCEvAl