Medical Technologies

Bridging the Technology Innovation Gap

Dr Ceri Williams
Director of Medical Technologies Innovation and Knowledge Centre
What is the Medical Technologies IKC?

A unique centre that operates across the medical technologies spectrum from implantable devices to regenerative therapies... ...with a clear focus on outcomes that help the body repair and restore function.

• All activities centre on research translation and commercialisation of new medical and regenerative technologies, products and services

• In core areas of Musculoskeletal and Cardiovascular

• The centre aims to improve the quality of life of the population who expect 50activeyearsafter50 ®

• Established around 50 academic staff, 200 researchers

• Involving 10 Departments around a central hub that is Europe’s largest integrated multi-disciplinary medical engineering centre.
“50 active years after 50®” – Customer & Market needs

- Ageing population with increased life expectancy
- Greater expectation for improved quality of life and higher levels of activity.

- Changing demographics with increasing chronic disease are stretching health services to the limit

- **Government increasingly focussed on driving down healthcare costs**

- Driving the IKC translation of innovation related to...
  - Implants with improved longevity
  - Earlier diagnosis and personalisation of therapies
  - Earlier, less invasive therapies that facilitate future interventions
    - such as tissue preservation, MIS, etc
  - Regenerative therapies
    - which replace or restore diseased and damaged tissue.

However must be cost effective
Our Technology Priorities

Our focus is on our unique capabilities and knowledge in:

**Medical Devices**
- for Longer lasting joint replacements for the hip, knee and spine

**Enabling Technologies**
- Experimental and computational pre-clinical simulation to predict long term clinical outcomes

**Advanced imaging**
- to allow early diagnosis and targeted treatment

**Novel biosensors**
- to diagnose disease and monitor patients’ responses to treatment

**Regenerative biological scaffolds**
- to replace damaged joint and heart tissue

**Autologous stem cells**
- for musculoskeletal and cardiovascular
Closing the translation gap

IKC focuses upon early validation of technical concept and commercial feasibility to **reduce late failure and accelerate innovation**

**IKC Medical Technologies**

- **Proof of concept**
- **Collaborative development**

**Technology Readiness Levels**

1. Needs identification & knowledge creation
2. Solution development
3. Validating concept
4. Investment validation
5. Clearance & trials
6. Launch & evaluation
7. Post-launch development
8. Needs identification & knowledge creation
9. Solution development
10. Validating concept

From bench to bedside and back again
Distinctive Approach to Translating Research

We support innovation to reach TRL 5 enable real commercial investment

bridging the innovation valley of death'

£m/TRL/Year

Technology Readiness Level (TRL)

Medical Technologies
IKC

Industry and TSB

Commercial investment

HEI/RCUK Research WELMEC
IKC Delivering Investment Growth through Bridging the Gap

Successfully delivering research translation leading to real commercial investment

Additional translation support from NHS & NIHR BRU

£15M

IKC

£50M

£70M

Research base

Plus

Private sector investment for growth

Technology Readiness Level (TRL)
Investment in Collaborating Companies to develop our Knowledge and Technology beyond TRL 5

- £m/TRL/Year
- Technology Readiness Level (TRL)

Others:
- DePuy
- Sim Sol
- Invibio
- LTHT
- NBTS

IKC

Medical Technologies

UNIVERSITY OF LEEDS
Our Approach

- Identifying opportunities across the research platform for exploitation and develop routes for translation
- Connecting companies to our knowledge and capability.
- Identifying clinical needs and commercial opportunities to develop solutions (Proof of Concept projects) to de-risk technology to help it progress to commercial investment.
- Validating concepts in partnership with companies (Co-Development projects).
- Undertaking preclinical testing and simulation to use short term methods to predict long term outcomes.
- Funding for legal, IP and professional fees to proactively support projects.
- Designing robust, effective clinical trials.
- Evaluating the health economics of a new product or service.
- Robust project management.

... and reducing late failure
Differentiation from other Commercialisation Organisations

• Committed to bridging the translation gap by enhancing technology and investment readiness at TRL 3&4, to enable and support commercial investment and successful development at TRL 5 and beyond

• Committed to reducing the risk for commercial progression of our technologies

• Unique model with sector specific skills to support research integration innovation and research translation

• An approach that creates co-ownership of research and innovation which Integrates academia, industry and health service including NIHR

• IKC has led strategic change across the University with new approach to delivering research-led innovation translation and impact

• The University has endorsed and adopted Medical Technologies sector-led approach across University.

• The Medical Technologies hub will integrate with the other 13 hubs to share and embed innovation practice and culture
Working with a Broad Industry Base

- Currently 38 industrial partners located in UK and rest of the world.
Smart Fixation Devices for Soft Tissue Repair

• Project funded by IKC in the University of Bradford

• **Objective** – to develop degradable shape memory polymer (SMP) materials for use in orthopaedic soft tissue fixation and then develop and test prototypes.

• IKC project completed with following outputs:
  – New IP developed and patent applications filed.
  – Novel polymer formulations generated which have improved biomechanical and biological properties.
  – Business case compiled to form spin-out company which was approved by the University of Bradford.
  – A number of VC’s approached with aim of securing a TSB SMART award once company is formed – VCs undertaking due diligence.
Acellular Biological Scaffolds for Tissue Replacement in the Knee

• To develop an acellular bone scaffold platform that will feed into and accelerate development of decellularised bone-soft tissue xeno-grafts – including:
  – Bone-meniscus-bone meniscus replacement.
  – Osteochondral plug cartilage repair.
  – Bone-patella tendon-bone ACL replacement.
• Determination of the biological and biomechanical compatibility
• De-Risk pre-clinical studies of innovative hard/ soft tissue composite porcine acellular scaffolds
  – Culminating in in vivo biocompatibility and biomechanical compatibility study.
• Accelerate clinical translation of hard/soft tissue composite acellular scaffolds.
• Commercial partners: Tissue Regenix Plc; NHS BT TS
Electronic Biomarker Detection

• A novel biomarker detection technology has been developed by Prof Giles Davies and Prof Christoph Walti in Electrical Engineering
  – Delivers a multiplexed method for simultaneous protein biomarker detection down to sub femto molar concentrations
  – Uses an array of electrodes rather than conventional glass slides to detect a host of biomarkers simultaneously
  – Methodology is label free reducing time, costs and reagents compared to other tests
• Feasibility studies have been completed in conjunction with in-vitro diagnostics companies
• Final validation work is underway in parallel to progressing activities towards licensing of the technology or a spin-out, autumn 2012
Magnetic Medical Imaging

- A Cardiac Magnetometer has been developed by Prof Ben Varcoe in
  to detect the small magnetic fields of the heart that can be used for
  the detection of cardiac dysfunction
  - Passive and non-contact diagnostic tool
  - Rapidly deployable
  - Improves accuracy of patient diagnosis
  - Reduces clinical time and costs
  - Affordable

- Current commercial magnetometer devices are prohibitively expensive, non-portable and require a specialist facility

- A 12 month BHRC funded preliminary clinical study is due to start autumn 2012

- Future applications of the technology include management of chronic cardiac conditions; foetal cardiography; premature labour; bladder conditions
Simulation of Patient Variation for Spinal Device Evaluation

• Proof of Concept project led by Prof Ruth Wilcox in partnership with Simpleware

• Aim to develop a new software product sold through Simpleware’s existing Scan IP+FE platform that can ultimately provide a stratified approach to preclinical simulation in the product design process

• Increasing evidence, especially for spinal treatments, that variance between patients is a major cause of implant failure, addressed by:
  – Replicating range of environments for device in clinical use
  – Simulation of variability in patient groups rather than a ‘standard’

• Improved pre-clinical evaluation result in benefit for patients and healthcare providers in developing more effective interventions
### Successful Track Record of

- Integrated multidisciplinary research base, 50 academics, 200 doctoral researchers
- Portfolio of 128 funded collaborative projects with 38 companies
- 12 POC projects and 6 Co-Development projects underway, 40 planned by 2015
- Access to a wider network of 150 potential collaborating companies
- Contributed to 36 products that have reached the market
- Levered £85m income into University for over 150 research and innovation projects
- IP portfolio of 24 patents in 17 patent families
- Strategic partnerships are in place with 19 global universities to help companies access IP and know-how beyond Leeds
- Embedding our approach to innovation across the University to establish sector-led methodologies and direct the use of HEIF and other innovation investments
Sharing Good Practice with others

• Committed to supporting 13 other innovation sector hubs in University
• Committed to deliver five additional Proof of Concept projects with partners in the N8 that will lead to successful commercial development to TRL 5
• Committed to expanding geographical reach and delivering on national and international scale
• Committed to supporting the Technology Strategy Board, Research Councils and other funders including the Wellcome Trust to drive effective research translation by bridging the valley of death
• Websites: www.medical-technologies.co.uk
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