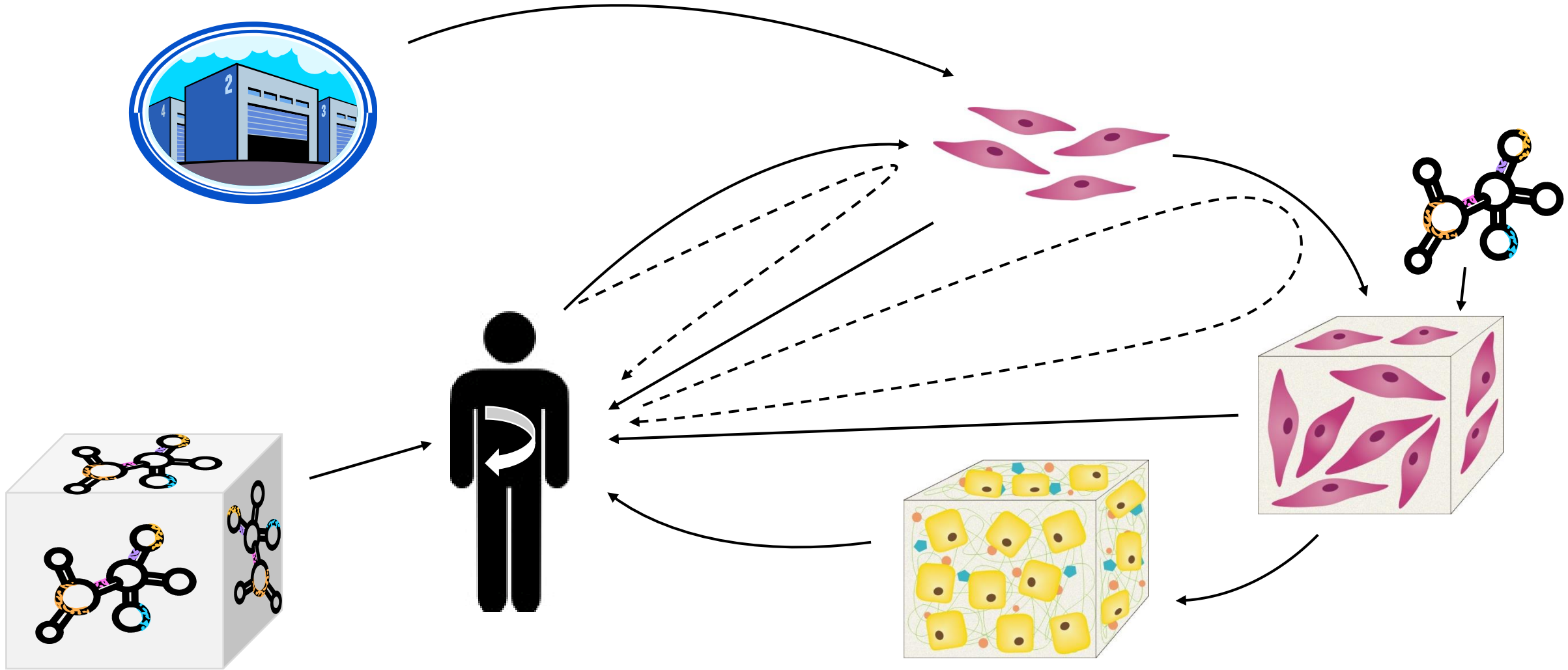


Tissue Engineering and Regenerative Medicine

Kenny Dalgarno & Che Connon



Tissue Engineering and Regenerative Medicine: National and international landscape

- Advanced therapy medicinal products (ATMPs). UK recognised leader in discovery and development.
- Global cell and gene therapy market approx £9 to £14 billion per year by 2025. UK's market size is estimated at 4% (£0.4 to £0.6 billion)
- In a research sense there is a recognised international society (TERMIS)
- Very interdisciplinary field: research council funding co-ordinated to some degree through the UK Regenerative Medicine Platform (UKRMP)
 - Newcastle represented through Jim Shaw
- Cell and Gene Therapy Catapult established as Innovation Centre of Excellence

Tissue Engineering and Regenerative Medicine: Current strengths, Newcastle groups

- Cell-based therapy and Tissue Engineering @NCL is well established
 - Arthritis Research UK Tissue Engineering Centre; CELLEUROPE
- Clinical. GvHD (Dickinson); pancreatic islet (J Shaw); corneal stem cell (Figueiredo), iPSC derived retina (Steel), tolerised dendritic cells for RA (Isaacs), mitochondrial disease embryo nuclear transplantation (Turnbull).....
- Basic. Stem cell biology (Lako), Smart biomaterials (Lakey, Ferreira-Duarte, Gentile), tissue templating (Connon), scaffolds and cell printing (Dalgarno, Benning).....
- Delivery of cells/cell survival
 - Storage/transport (tissue/organ storage; shipping of cellular products at hypothermic temperatures) Positioning of cells/Targeted delivery to site of repair
 - Enhanced organ transplant outcomes
- Scalable production of cell/tissues/microtissues/growth factors
 - Bioprocessing of tissue constructs
 - Scaled production of IPS (upscaling)
 - 3D culture

Tissue Engineering and Regenerative Medicine: Future Research Opportunities

- Still a growing field, drive now towards applications for specific conditions
- UK Regenerative Medicine Platform (UKRMP) review of challenge ideas. Call for challenge ideas Oct 2016. Call for new Hub March 2017. Ideas submitted from Newcastle:
 - Delivery – from storage and transport to administration and release of therapeutic cells (Connon)
 - Platform for Organ Replacement Therapy (Shaw)
- Delivery of cells/cell survival
- Microtissues rather than single cell therapy
- Microtissues for screening and theranostics (e.g. Alcyomics)